East Kent has been a gateway for new people, cultures, ideas and trade for thousands of years. The Isle of Thanet, now joined to the mainland following the silting and reclamation of the former Wantsum Channel, was at the forefront of these movements.

A Kent County Council programme to build a new road link, the East Kent Access, in the south-east part of Thanet resulted in the largest archaeological project carried out in Britain in 2010. An Oxford Wessex Archaeology joint venture undertook the excavation of 48 hectares along the 6.5 kilometre route, revealing a wealth of archaeological evidence spanning the Palaeolithic to the Second World War.

Volume 2 presents the analysis of the finds, environmental remains and the extensive radiocarbon dating programme, and includes the largest published assemblage of unburnt and cremated human bone from Thanet. Amongst the finds the worked flint, the Iron Age coins and the later prehistoric, Roman and Anglo-Saxon metalwork are of particular interest, and there are important assemblages of prehistoric, Roman and Anglo-Saxon pottery, worked stone and fired clay. Highlights from the environmental remains include the large assemblages of animal bone and charred plant remains and the unique evidence for Anglo-Saxon shellfish processing.

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Digging at the Gateway – The Archaeology of the East Kent Access (Phase II) Volume 2

Digging at the Gateway

Archaeological landscapes of south Thanet

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Volume 2: The Finds, Environmental and Dating Reports

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Featuring reports by Alistair J Barclay, Nicholas Cooke, John Cotter, J Crowther, Kirsten Egging Dinwiddy, Denise Druce, A P Fitzpatrick, Phil Harding, David Holman, Michael J Hughes, Kath Hunter, Matt Leivers, Jacqueline I McKinley, Richard I Macphail, Andrew Millard, J M Mills, Sue Nelson, Rebecca Nicholson, Geoff Nowell, Cynthia Poole, Samantha Rubinson, Ian Scott, Rachael Seager Smith, Ruth Shaffrey, Elizabeth Stafford, Chris J Stevens, Lena Strid and Sarah F Wyles

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Front cover: Late Bronze Age penannular gold bracelets;
one cleaned, the other as found (Zone 4, ONs 880 and 881)

Back cover: Anglo-Saxon sceat (ON 2017), from grave 136111
Anglo-Saxon object with cruciform head (ON 2068), from grave 153075
Early Bronze Age triple Food Vessel, from grave 246134

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Foreword

In 2009 prospective road builders gathered at County Hall in Maidstone to be introduced to the East Kent Access Phase 2 Road. I think they were surprised to hear the words of John Farmer, Kent County Council's Major Projects Manager, *'Do not think of this as building a road, think of it as two rail crossings and an archaeological excavation.'* In building a relatively modest but very important stretch of new dual carriageway these were the main challenges to be faced.

It is not unusual for substantial archaeological investigation to accompany the construction of a new road but this was different. Rather than a strung out series of archaeological hot-spots the entire route of the East Kent Access Phase 2 road was known to lie on areas of complex and important, sometimes nationally important, archaeology. Coupled with a timetable constrained by the programme for railway closure to enable one of the largest pre-constructed boxes ever to be built to be thrust beneath to create a tunnel, the challenge to excavate ahead of the road builders was immense and required new approaches and technologies to achieve it.

The scale of the archaeological challenges associated with building this road was recognised at least as far back as my first involvement in 1998. Thanet is well known for possessing beneath its extensive arable lands one of the richest buried archaeological landscapes in the country. The former island's location at the north-eastern tip of Kent made it a gateway for new peoples, ideas, trade and invasion from ancient times. The peoples who once inhabited the area would have borne witness to some of the earliest and most significant events in early British history. The Romans, first through Caesar and then during the Claudian invasion landed on this coastline, and field armies departed in the late Roman period; nearby Richborough was one of the last areas of Roman administration before the abandonment of the province. The Anglo-Saxon people's arrival is celebrated through the tradition of the landing of Hengist and Horsa in AD 449, and later the arrival in AD 597 of Pope Gregory's Mission led by the Benedictine Monk Augustine to convert the Anglo-Saxons to Christianity is considered to have taken place here, close to the route of the new road.

Early desk-based studies undertaken as proposals for the road scheme developed identified a wealth of archaeological remains, some of very high significance, lying throughout the various route corridors being considered. Given the density of archaeology known to occur in the landscape, slight modification of routes to avoid archaeology was difficult, particularly as the location of rail crossings and connections with the road network at Minster, Sandwich and Lord of the Manor were fixed. Furthermore given the shallow depth at which archaeology was expected to lie, options for burying the archaeology beneath the road were also very limited. Given the unavoidable impact on buried archaeology, the decision was therefore taken that large-scale archaeological excavation would take place before the road was constructed. With the certainty of the approach and an understanding that archaeological impact would occur regardless, it was decided that what would have been an expensive programme of trial trenching was unnecessary. The approach of arranging for strip, map and sample excavations and avoiding trial trenching has been a long standing approach in Kent that was used as far back as the 1990s on the development of the nearby Thanet Way road between Monkton and Minster. Save one area where the road rises to cross the railway at Cottington, the entire footprint of the East Kent Access Phase 2 road, more than 40 hectares, was stripped of its ploughsoil and subsoil to reveal the buried archaeological landscape.

To enable the risk of archaeological discoveries to be properly assessed and the excavation programme designed and resourced, a unique archaeological model was put together using available archaeological, documentary and geographical information. The model predicted in detail what archaeology could be anticipated and its quantities. This provided a useful baseline for programming and resourcing the project and management of the contract, and in broad terms proved to be relatively close to the eventual findings.

To meet the enormous challenge of keeping the archaeology programme ahead of the ambitious construction programme required very close working between archaeologists, the road builders and their contractors, the client, Kent County Council, and the project engineers and managers. Recognising the scale of the works the principal contractor VolkerFitzpatrick Hochtief JV appointed Oxford Wessex Archaeology (OWA), a joint venture of two of the largest archaeological units in the country, to carry out the archaeological programme, and at times up to 150 archaeologists were deployed on to the site. Atkins were appointed as archaeological consultants to co-ordinate the complex programme. For their part, Kent County Council recognised the need for full-time monitoring and guidance of the archaeological works and made provision for my own secondment to the on-site team. I was helped throughout by the Council's project managers Jacobs. The success of the project was in no small part due to the cooperation and positive attitude and assistance of all those involved and, although challenging, was an enjoyable and satisfying experience and I feel privileged to have been part of that team.

The approach on site demanded innovative thinking, processes and technologies. Most important of all was that decisions on how to apply the excavation and sampling strategies had to be made very quickly, based on understanding exactly what had been found. Oxford Wessex Archaeology used their experience gained on major sites such as Terminal 5 Heathrow to good effect. As sites were stripped of topsoil they were mapped and plans produced for review by myself and the archaeologists normally within 24 hours. Excavation records, finds and environmental samples were rapidly processed at the site compound and information fed in to a Geographic Information System. Up to date information was then passed back to the site and management teams so that informed decisions could be undertaken as quickly as possible and any delay avoided. Without such a system in place I am convinced that it would have been virtually impossible to excavate so rapidly, understand exactly what we had found and adjust our strategies in the time available. It also allowed us to look not only at sites in detail but how they all linked together and into the landscape.

As you will read in these volumes, the archaeology discovered on the road scheme lived up to our greatest expectations. Spread across the south Thanet coastal landscape we found remains of many periods much of which is of regional and national significance, in some cases unique and others that are characteristically distinct in Thanet. Together the discoveries have provided an enormous contribution to our understanding of the important archaeological landscapes of Thanet and made major contributions to research agendas at regional and national levels.

A major aspect of the project was the extensive Community Archaeology programme that was carried out by OWA. Too often in recent years major archaeological discoveries have been made with little opportunity for local communities to see them or be involved. From the outset the County Council were determined to ensure that the Thanet communities had the opportunity to engage with the exciting discoveries that we expected to make. As a result an exciting and wide-ranging programme of exhibitions, roadshows, school visits, talks and open days, as well as a dedicated area set aside for volunteer excavation and finds processing, was devised by the OWA Community Archaeologist and achieved great successes. The figures are impressive, more than 100 volunteers helped on the project, 3500 pupils in 21 schools received visits by the Community Archaeologist, 1500 attended the open days and many thousands saw the exhibitions and roadshows. I hope that what we achieved goes a long way to demonstrate that the challenge of integrating Community Archaeology into even the most complex of construction projects is surmountable and encourages others to follow our example in future.

I feel privileged to have been part of the team that carried out the largest excavation in Britain in 2010. It was truly a team effort by everyone involved – the client, road builders and engineers, archaeologists and the volunteers. To successfully excavate such a wealth of archaeology within the ambitious timescales needed and despite at times atrocious weather conditions was a truly remarkable achievement which we can all feel rightly proud of. Congratulations to everyone involved.

Simon Mason
Principal Archaeological Officer
Kent County Council

Summary

Oxford Wessex Archaeology (OWA) Joint Venture undertook archaeological investigations in advance of construction of the East Kent Access Road (Phase II) (hereafter EKA2), largely between November 2009 and September 2010. The initial two-month period was mostly taken up with preliminary surveys comprising fieldwalking, test pitting and metal detecting, and limited evaluation trenching. Several small-scale excavations were carried out following the main phase of investigations, and all fieldwork was completed by the end of May 2011.

The new road, approximately 6.5km in length, has been built on the southern slopes of Thanet, extending northwards from the Ebbsfleet peninsula at the mouth of the former Wantsum Channel in the south ('Landscape 3'), then eastwards across the Cliffs End spur ('Landscape 2'), and finally up the scarp slope to the Chalk ridge occupied by Manston Airport to the north ('Landscape 1'). A rich archaeological landscape extends across this variable topography, and at the planning stage it was recognised that the road could not be constructed without affecting known or predicted important archaeological remains, and that these were likely to occur over much of the route. Therefore, the decision was taken to excavate almost the entirety of the footprint for the new road, an area of approximately 48 hectares, thereby providing a substantial and unique transect across this part of Thanet –effectively an island from perhaps the Early Bronze Age to the 15th century AD, with inundation of the Wantsum Channel well advanced by the Late Mesolithic.

This approach has allowed a far better understanding of the sequence and nature of settlement to be gained than would have been possible through a series of individual, smaller excavations. As part of this approach it was decided that extensive evaluation would not be cost-effective, as it would only confirm what was already known about the archaeology and the construction impact. Instead, and using the large amount of information available from previous investigations in the vicinity, an innovative approach was adopted that involved the creation of an 'Archaeological Model' that predicted the archaeological remains which were likely to be encountered along the route. For convenience, the route was divided into 29 archaeological 'zones' reflecting changes in topography, differences in archaeological potential and elements of the road construction scheme.

The scale of the project was enormous, particularly given the nine-month 'window' for virtually all of the excavations to be undertaken, beginning in exceptionally poor winter conditions. A team size often in excess of 100 made discoveries which covered virtually every period between the Palaeolithic and World War II, generating almost 30,000 context records, a vast quantity of finds and large numbers of soil samples. For most of the nine months, excavation proceeded immediately in advance of, and sometimes alongside, construction works. To achieve this required an exceptional level of planning, integration and understanding between all parties involved to ensure there were no delays to the project. Innovative approaches to fieldwork were employed involving initial strip, map and sample of zones followed by appropriate detailed excavation, informed by a bespoke on-site GIS linked to data generated from the finds and environmental processing which continued in tandem with the excavation. It can be noted here that the archaeological fieldwork and construction programme were completed on schedule, confirming the success of the approach adopted.

With the exception of a single flint flake of probable Palaeolithic date and one further Late Upper Palaeolithic/Early Mesolithic piece, the earliest discoveries were a Mesolithic tranchet axe (and a flake from a second example) and a small number of microliths and other diagnostic pieces of similar date, all occurring residually in later features.

Two small groups of pits with associated assemblages of pottery and worked flint dated from the Early Neolithic, representing rare occurrences and forming part of the landscape that included the Chalk Hill causewayed enclosure investigated earlier. The only Middle Neolithic features were a burial and a single pit. Late Neolithic material was also generally sparse, though a possible Late Neolithic hengiform monument has been identified, remodelled in the Early Bronze Age to create an unusually large ring-ditch.

Over the entire route, 11 ring-ditches were certainly identified, along with another possible example. Thanet is rich in ring-ditches and it is unsurprising that up to 12 of these were found on the scheme. However, they provided an opportunity to look at examples spread across the landscape, examine their construction sequences and investigate associated burials. Most of the ring-ditches are of Early Bronze Age date and were generally located on high ground overlooking the Wantsum Channel or Pegwell Bay. They varied greatly in diameter from the smallest, a Middle Bronze Age example at around 7m in diameter, to the largest at approximately 45m across, this

perhaps with a Late Neolithic origin. Burials were found associated with a number of these monuments and one in particular contained a rich assemblage which included a unique triple Food Vessel and an amber 'button'. The chronology of the burials of all periods has been clarified through a comprehensive programme of radiocarbon dating.

No Early Bronze Age settlement or agricultural features were identified and there was only limited evidence for Middle Bronze Age field systems. Later Bronze Age activity was mainly focused on the Ebbsfleet peninsula and on the adjacent slopes of Cottington Hill, with a further focus close to Cliffs End. The remains of at least three settlements including post-built structures, enclosures and trackways were identified, along with a number of burials. Two gold bracelets and a group of bronze ingot and other fragments are very likely to relate to several Late Bronze Age metalwork hoards that have been found previously at the neck of the Ebbsfleet peninsula.

The Iron Age was the most extensively represented period on the scheme, and the vestiges of settlement, enclosures, field systems and trackways were widespread throughout the landscape. The most significant site, principally of Early–Middle Iron Age date, lay on a promontory overlooking Pegwell Bay at Cliffs End, where a large trapezoidal enclosure with broad, deep ditches overlay an earlier ring-ditch. Within the enclosure was a sunken-featured building (a type of prehistoric structure that appears unique to Thanet) and other features, whilst in the immediately surrounding area were post-built structures, probable grain storage pits, complexes of quarries and numerous other pits, several containing burials (including that of a horse) and all used ultimately for the disposal of large quantities of domestic rubbish.

Several Roman trackways were recorded, some originating in the Iron Age, and these have provided an opportunity to map the ancient routeways of this part of Thanet. Adjacent to the trackways were enclosures of various forms, field systems, cemeteries and several areas of settlement, most of which had their roots in the Iron Age.

The largest and longest-lived of these settlements lay at the neck of the Ebbsfleet peninsula, within sight of Richborough, and had a remarkable sequence that spanned the Late Bronze Age to the late Roman period. This area was at the forefront of the major historical events of invasion and the settlement, besides trackways, enclosures, numerous pits, wells and burials, also included a relatively large number of roundhouses rarely found in Thanet and, later, several sunken-featured buildings. At some time probably around the middle of the 1st century BC a substantial ditch had been dug to enclose this strategically important area, and there is a possibility that this work may have been associated with Caesar's expeditions, with a later phase of ditch conceivably associated with the Claudian invasion a century later.

Another focus of Roman settlement, with a concentration of evidence in the middle Roman period, was located on the Chalk ridge and was distinguished by consisting almost entirely of sunken-featured structures. Several small Roman cemeteries were also located in this area, with another example further south, some including both cremation and inhumation burials.

Two areas of early–mid-Saxon settlement were identified, with a possible chronological overlap perhaps providing rare evidence for settlement shift at the end of the 7th century, enhanced by the presence of probably contemporary cemeteries. A dispersed group of sunken-featured buildings of probable 7th-century date lay on the lower slopes of Cottington Hill, with parts of one or more cemeteries close to a complex of trackways higher up along the Chalk ridge. A range of grave goods indicates that the use of these cemeteries probably spanned the mid-6th to the early 8th century. A concentration of pits on the high ground to the north of Cliffs End is broadly of 8th-century date, the remains of buildings, perhaps of posthole or beamslot construction, not surviving. However, there was important evidence for large-scale shellfish processing, possibly with a link to the religious foundation at Minster, and associated with the settlement was a small cemetery. Similar processing remains had previously been found nearby at Cliffs End Farm, providing further confirmation of the scale of this activity.

An apparently isolated group of pits has been assigned a late Saxon date, and medieval settlement appears to have been confined to the Ebbsfleet peninsula. Here, two or possibly three farmsteads were established, their main phase of development spanning the 11th to 14th centuries, broadly contemporary with land reclamation within the rapidly silting Wantsum Channel, which by the end of this period is likely to have largely comprised salt marsh. Reclamation was undertaken by the monks of St Augustine's Abbey, Canterbury, who built the nearby earthen banks which survive as the Monks Wall, Abbotts Wall and the Boarded Groin, but medieval settlements in Thanet were generally small and dispersed.

Post-medieval and modern remains were very sparse; the former represented by a few field boundaries, whilst the latter mainly comprised a network of World War II trenches around the southern perimeter of Manston airfield, an important front-line fighter base in World War II.

A large number and wide range of artefacts were recovered from the excavations and include several groups of importance as well as individually significant finds. Worked flint was ubiquitous, but there were notable Early Neolithic and Early Bronze Age concentrations indicative of *in situ* knapping, utilising different sources of raw material. The Iron Age potins have added considerably to previous coin finds from the area, whilst Iron Age and Roman metalwork assemblages provide large groups from these periods. Of some importance is the additional Late Bronze Age hoard material from the Ebbsfleet peninsula, including a rare pair of gold bracelets. The Anglo-Saxon grave goods, largely metalwork, also contribute further to the nationally important cemetery groups from East Kent. The prehistoric pottery assemblages include a unique Early Bronze Age triple Food Vessel and valuable groups of

Early–Middle Iron Age ceramics. The Roman pottery is notable for the individual grave groups and also the use of birch bark tar for repair, a practice recorded elsewhere in Kent. The Anglo-Saxon grave groups include further examples of Merovingian bottles whilst the domestic assemblage is marked out by the presence of Ipswich ware, the largest assemblage from any site in Kent. The medieval pottery, in contrast, is relatively modest in terms of interest. Triangular fired clay 'bricks', other kiln furniture and briquetage provide detailed information on small-scale salt production, particularly in the Iron Age, whilst the worked stone includes querns of various periods, with evidence for prehistoric exploitation of the Folkestone Beds.

The value of the environmental assemblages lies mainly in them being amongst the first large groups, of various periods, to be studied from Thanet. Of note amongst the animal bone is the presence of fowl in Middle Iron Age contexts, donkey which is likely to be of pre-Roman date and fallow deer which is certainly Roman and not later. Changing proportions of cattle and sheep/goat in the Roman period are likely to reflect changing urban and military needs. Charred plant remains are largely as anticipated, but radiocarbon dating confirmed flax in the Early Neolithic and the continued presence of naked barley up to the Late Bronze Age. The Anglo-Saxon shellfish assemblage is particularly large, includes a range of species, and is interpreted as evidence for processing on a significant scale for subsequent trade. It shows the exploitation of local sources, though there is no evidence for the cultivation of oysters at this time.

Finally, the human bone from the prehistoric, Roman and Anglo-Saxon periods represents the largest group of skeletal material to be studied and published from Thanet and will provide a valuable source for future research. The extensive radiocarbon dating programme, largely targeted on the human bone, and isotope analysis of a group of Middle Iron Age burials (indicating a surprising degree of mobility), contribute further to the value of this assemblage.

An important and particularly successful part of the archaeological programme was community involvement, which was fully integrated within the project. An extensive outreach programme was put in place to enable the local community along the route to actively engage in and feel part of the ongoing archaeological investigations. A community excavation on one of the Bronze Age ring-ditches offered practical experience and there were volunteering opportunities in finds and environmental processing. Road shows, numerous school and other visits, talks and open days took activities and news of the latest discoveries to a wider audience on Thanet and beyond, and a dedicated web site was set up. Overall, several thousand people came into direct contact with the project in various ways, and many thousands more followed its progress and discoveries.

Acknowledgements

It is important to emphasise at the beginning that the successful conclusion to the major programme of fieldwork, undertaken over a remarkably short period of time, was only achieved through continuous co-operation between the principal parties involved: Oxford Wessex Archaeology, Volkerfitzpatrick Hochtief, Kent County Council, Atkins and Jacobs. All members of the construction and archaeological teams were fully aware of each other's needs, recognised the importance of the archaeology and worked hard to ensure the archaeological works were fully accommodated. Without such teamwork the archaeological investigations and road construction works could not have advanced alongside each other as they did, often with only hours or a few metres between them, at multiple locations along the route.

Oxford Wessex Archaeology (OWA) Joint Venture was appointed as archaeological contractor to the East Kent Access (Phase II) scheme (EKA2) by Volkerfitzpatrick Hochtief (VFH), and OWA would like to express their gratitude to VFH for their assistance and support throughout the project set-up phase and the subsequent programme of fieldwork, and also for providing site, finds and environmental processing and office facilities. Although it is not possible to name everyone here, OWA would like to highlight in particular Mick O'Hare, Matt Childs, Nick Horner, Fred Wratten, Alex Vaughan, Neil Scarboro, Helena Dee, Alex Wenn, Danielle Ehren, Sally Fallows, 'Nibs' and last but not least, Graham Timms, who worked closely with us during the latter, crucial stages of the fieldwork. The soil stripping was undertaken by D & M Plant, and we are grateful to John Clarke for co-ordinating what at times proved a complex programme, and the many machine drivers who undertook this work to a high standard. Archaeological recording necessitated by service re-routing within Manston Airport was carried out by OWA on behalf of W E Mannin Ltd, and Malcolm Jordan and Kevin Evendon are thanked for their role in this element of the scheme. An associated excavation, carried out in 2008 (by Wessex Archaeology) at Weatherlees Waste Water Treatment Works in advance of the pond relocation works, was undertaken on behalf of Kent County Council (KCC) and we would like to thank Southern Water for their co-operation.

OWA would also like to record their appreciation to Atkins who were responsible for delivery of the Archaeological Works Package for the scheme. Atkins' role was to manage the archaeological project on behalf of VFH, provide full time advice and direction during the fieldwork, and assist in the communication between the on-site parties. In particular we would like to thank Andrew Holmes, Archaeological Works Manager, who was on site constantly during the main phase of fieldwork, and Janet Miller, Atkins Project Director, who was involved at the beginning. Jacobs acted as project managers to ensure delivery of the scheme on behalf of KCC (Kent Highways), the clients for the EKA2, and their staff provided a considerable amount of positive support to the archaeologists, helping to ensure that the works were smoothly integrated within the construction programme. In particular, Chris Hatcher was extremely helpful and a strong advocate of the archaeological work. Others involved in the team included Guy Perera, John Hilson, Gary Woods and Annie Northcote.

The clients, KCC, gave immense support to the archaeological work, recognising at an early stage how significant an aspect of the road development programme this was. In particular, strong support was provided by the Major Projects team led by John Farmer (Major Capital Project Manager) and especially the project manager Geoff Cripps (Major Projects Manager), both of whom championed the archaeology throughout. A particularly large debt is owed to Simon Mason, Principal Archaeological Officer for KCC Heritage Conservation team, who produced the draft project design, prepared the 'archaeological model' which provided details of the archaeological background and potential for the scheme, and monitored the excavation and subsequent post-excavation work. Based on site throughout virtually all of the fieldwork, his long-term involvement with the project, local knowledge, and rapid feedback and advice at all stages has been instrumental in ensuring that the aims of the on-site archaeology programme were successfully achieved. Adam Single, Archaeological Officer, played a significant role in monitoring the work, and Lis Dyson, Head of Heritage Conservation, provided further support and information. OWA is grateful to all of these representatives of KCC Heritage Conservation team for their collaborative role. John Williams, former County Archaeologist, was instrumental in the development stage of the project. Police surveillance was set up by Chief Inspector Mark Harrison, as part of the Kent heritage protection programme to prevent, in particular, illicit metal detecting on archaeological sites.

Regular checks were carried out by PC Darren Reed (Rural Liaison Officer) and thanks largely to his efforts virtually no illegal detecting took place.

Other statutory and non-statutory consultees provided an invaluable source of advice and information during fieldwork and OWA would like to thank, in particular, Peter Kendall (English Heritage, Inspector of Ancient Monuments) and Dominique de Moulins (English Heritage, South East Regional Science Advisor).

During the course of fieldwork, various other organisations and individuals provided beneficial advice and support to OWA, including Ges Moody and Emma Boast (Trust for Thanet Archaeology) and Nigel Macpherson-Grant. On-site sampling and advice for OSL dating, on behalf of OWA, was undertaken by Jean-Luc Schwenninger and David Peat. The forbearance of the various landowners along the route should also be acknowledged here, and we would like to thank them for their interest and the helpful information that some provided.

The OWA joint venture was overseen by the chief executives of Oxford and Wessex Archaeology, David Jennings (Gill Hey from 2013) and Sue Davies (Chris Brayne from 2013), along with Simon Palmer and Clive Burrows (Peter Dean from 2012).

The members of the fieldwork team – totalling in excess of 200 and too numerous to mention by name – are all thanked for the tremendous contribution they made to the project, many over much or all of the 11-month on-site programme, and sometimes in extremely inclement conditions, most notably during prolonged rain in late 2009 and the periods of heavy snow in early 2010. However, mention should be made of Paul Clark, Pat Moan and Ralph Brown who spent many long days monitoring machine stripping and through their vigilance ensured that the correct levels were reached and archaeological features identified. Besides these, the supervisory team must be singled out for individual acknowledgement, given the very tough challenges they were set to achieve the deadlines for various parts of the scheme: Vix Hughes (who also ran the Community Excavation), Al Zochowski (who led the 'burial team'), Rebecca Peacock, Jeremy Mordue, Sian Reynolds, Laura Piper, Neville Redvers-Higgins, Gerry Thacker, Jacek Gruszczynski, Olly Good, Neil Parker, Piotr Orczewski, Mike Donnelly, Mark Gibson, Rowan McAlley, Mike Green, Roberta Marziani, Chris Pickard, Rob De'Athe, and Dave Reay (Weatherlees Pond). Without their leadership and dedication the archaeological project could not have been completed to schedule. The local volunteers who undertook the metal detecting also deserve mention here, with George Rollison a regular presence in all conditions.

The survey teams were a vital component of the project, ably led by Matt Kendall and Emily Plunkett assisted by Gemma Stewart and Harriet Bloore in the field, whilst Tori Wilkinson, assisted by Dan Jackson, in the office was indispensable. Together they ensured the rapid production of site plans and report figures, essential for the smooth progress of the fieldwork. The GIS system used to such great effect was devised and maintained by Niall Donald, and the pivotal role of on-site data management was undertaken by John Powell who, in addition, contributed much to the daily running of the fieldwork; both worked well beyond the call of duty. Further survey and IT support were provided by Ruth Panes, Paul Middleton-Jones and Chris Brayne. Autumn Robson and Bron Chapman were largely responsible for context data entry, amounting to more than 28,000 individual records.

Paul Murray maintained a photographic diary of the project, and a variety of finds was photographed on site, many by Mariusz Wisniewski. The monthly fly-overs of the scheme commissioned by VFH provided a valuable and informative aerial record of the archaeological landscapes, as well the progress of the construction works.

Finds processing and recording was co-ordinated by Elina Brooke, assisted by Janice McLeish, both of whom rose to the considerable challenge and kept the lights in the finds office burning during many late nights to ensure that they were not overwhelmed by the volume of material. They were helped by Hannah Speiler and several volunteers of whom the late Gina Llewellyn-Jones and Margaret Symonds provided regular support. Further advice and finds identifications were provided by Lorraine Mepham, Phil Harding, Andrew Fitzpatrick, Paul Booth, Jörn Schuster and Jacqueline I McKinley. Lynn Wootten undertook the cleaning, consolidation and conservation of selected artefacts, and the metalwork assemblage has been X-rayed at the Wiltshire Council conservation laboratory at the History Centre, Chippenham.

Environmental processing was supervised by Laura Strafford, assisted by Julia Meen, who, with Christof Heistermann, undertook specialist on-site sampling. The environmental team, like the finds team, worked unceasingly, prioritising, processing and assessing the many hundreds of samples that were taken during the project. Further advice was provided by Rebecca Nicholson, with additional information from Elizabeth Stafford and Carl Champness, particularly concerning the geological, colluvial and other sedimentary sequences. Much of the processing of the bulk, artefact, marine shell and mollusc samples was carried out by Hayley McParland, Susan Rawlings, Ashley Strutt and Sophie Nias-Cooper.

The wide-ranging and very successful outreach programme was largely devised, organised and undertaken by David Crawford White, helped by various site staff during open days and other events, and supported by Hannah Kennedy (graphics) and Tom Goskar (website). The collaborative role of the Trust for Thanet Archaeology is also acknowledged in this respect, and the considerable support and facilities made available courtesy of the Holiday Inn, Minster were very much appreciated, particularly during the Community Excavation. Further support was provided by the Powell Cotton Museum at Quex Park, The Isle of Thanet Archaeological Society, and Thanet Community Transport in providing buses for the open days. Media work was undertaken in partnership by Tessa Hallett and Phil Scrivenor of KCC and Andrew Fitzpatrick and Tom Goskar of OWA.

The overall fieldwork programme has been managed by Ken Welsh, a role which involved far more than a single sentence can convey, underpinned by the OWA Management Team of John Dillon and Bob Williams, with support at various times from Richard Greatorex, Roland Smith, Andrew Fitzpatrick and Dan Poore, who also oversaw the OWA Health and Safety plan. Phil Andrews directed the fieldwork, with considerable assistance from Paul Murray who undertook the day-to-day organisation of the stripping and excavation of the various zones, as well as attending to Health and Safety and numerous other fieldwork issues; their roles in the project cannot be overstated. Invaluable support also came from Rob De'Athe who took over the task of preparing the Characterisation Reports and Further Archaeological Works Designs, with finds and environmental summaries provided by Elina Brooke and Laura Strafford respectively. Natalie Anderson, Harriet Bloore, Sarah McGoldrick and Angela Batt dealt efficiently with a variety of staff and accommodation matters arising from building and maintaining a large fieldwork team.

Preliminary stratigraphic reporting was undertaken by the supervisors of the individual excavation zones, with the reports in the assessment compiled by John Powell (Zones 1–5 and Weatherlees Pond), Jacek Gruszczynski (Zone 6), Gerry Thacker (Zones 7–11), Olly Good (Zone 12), Matt Leivers (Zones 13–15 and 26) and Vix Hughes (Zones 17–24 and 29).

During excavation and post-excavation, the following specialists (in no particular order) are thanked for their contributions to the fieldwork and the assessment report: Phil Harding (worked flint), Matt Leivers (earlier prehistoric pottery), Rachael Seager Smith and Elina Brook (later prehistoric pottery and Roman pottery), John Cotter (post-Roman pottery), Nigel Macpherson-Grant and Paul Hart (spot-dating of pottery from Zone 6), Nicholas Cooke (Roman and later coins), David Holman (Iron Age coins), Grace Jones (metalwork), Ruth Shaffrey (stone), Cynthia Poole (structural fired clay, fired clay objects and ceramic building material), Sue Nelson with Lorraine Mepham (beads, glass, worked bone, jet, shale, pipeclay figurines and clay pipe), Alistair Barclay (amber and scientific dating), Sam Rubinson (slag), Jacqueline I McKinley and Kirsten Egging Dinwiddy (human bone), Lena Strid (animal bone), Rebecca Nicholson (fishbone and coprolites), Greg Campbell (marine shell), Kath Hunter (charred plant remains and charcoal), Elizabeth Huckerby (pollen), Elizabeth Stafford (snails), Carl Champness (soils and sediments) and Hugh Beamish (World War II defences).

Subsequent analysis and publication has been undertaken by many of the same specialists who were involved in the assessment phase, with the addition of Gerry Thacker (Zone 6), Kate Brady (Zones 17–24 and 29), Jo Mills (samian), Rebecca Nicholson (marine shell), Ian Scott (Roman, Anglo-Saxon and later metalwork), Andrew Fitzpatrick (Bronze Age metalwork), Kayt Marter (Roman grave pottery) and Chris Stevens and Michael Grant (radiocarbon submissions). Paul Craddock (British Museum) kindly analysed and commented on the crucible from Zone 13 and Sarah Wyles provided comparanda for the pierced oyster shells. The isotopic investigation of the Iron Age burials from Zone 12 was conducted by Andrew Millard and Geoff Nowell at Durham University.

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Kevin Reeves (University College London) who kindly facilitated the EDS studies.

The post-excavation programme has been managed by Ken Welsh, and overseen by Phil Andrews, Alex Smith, Anne Dodd and Paul Booth, with additional support from Andrew Fitzpatrick. The site publication illustrations have been prepared by Markus Dylewski and Hannah Kennedy, with advice and assistance from Magdalena Wachnik and Karen Nichols, and the finds drawings are by Elisabeth James, Kitty Brandon and Sophie Lamb. Finds photographs are by Karen Nichols and Magdalena Wachnik. The task of copy-editing has been undertaken by Philippa Bradley (Volume 1) and Lisa Brown (Volume 2), and the challenge of typesetting ably dealt with by Charlie Webster of Production Line, Oxford.

The draft texts were read by Tim Champion (prehistoric), Tony Wilmott (Roman) and David Hinton (Anglo-Saxon and medieval), and we are very grateful for their comments and advice on various aspects of the structural, finds, environmental and discussion sections. Simon Mason has reviewed the entire report, in particular volume one, and his intimate knowledge of the scheme and surrounding archaeology has resulted in a considerable number of corrections and improvements to the texts and figures.

Introduction

This publication presents the results of the analysis of the archaeological discoveries ranging in date from the Palaeolithic to World War II made along the entire 6.5km route of the East Kent Access (Phase II), hereafter EKA2, road scheme (Fig 0.1). The publication has been prepared by the Oxford Wessex Archaeology Joint Venture (hereafter OWA), appointed in October 2009 by Volkerfitzpatrick Hochtief Joint Venture (VFH) to undertake archaeological works in advance of construction of the EKA2, a Kent County Council (KCC) highways project.

Project background

Although at around 6.5km the EKA2 is not a large road by any means, it provides an important and vital link in the major road network to the south of the Isle of Thanet connecting the dual carriageways of the A253 Thanet Way to the west of Manston Airport, the A256 Sandwich Bypass to the south and the major road junction known as the Lord of the Manor to the east of Manston Airport. The road is regarded as a key component in the regeneration of the area and East Kent in general. The EKA

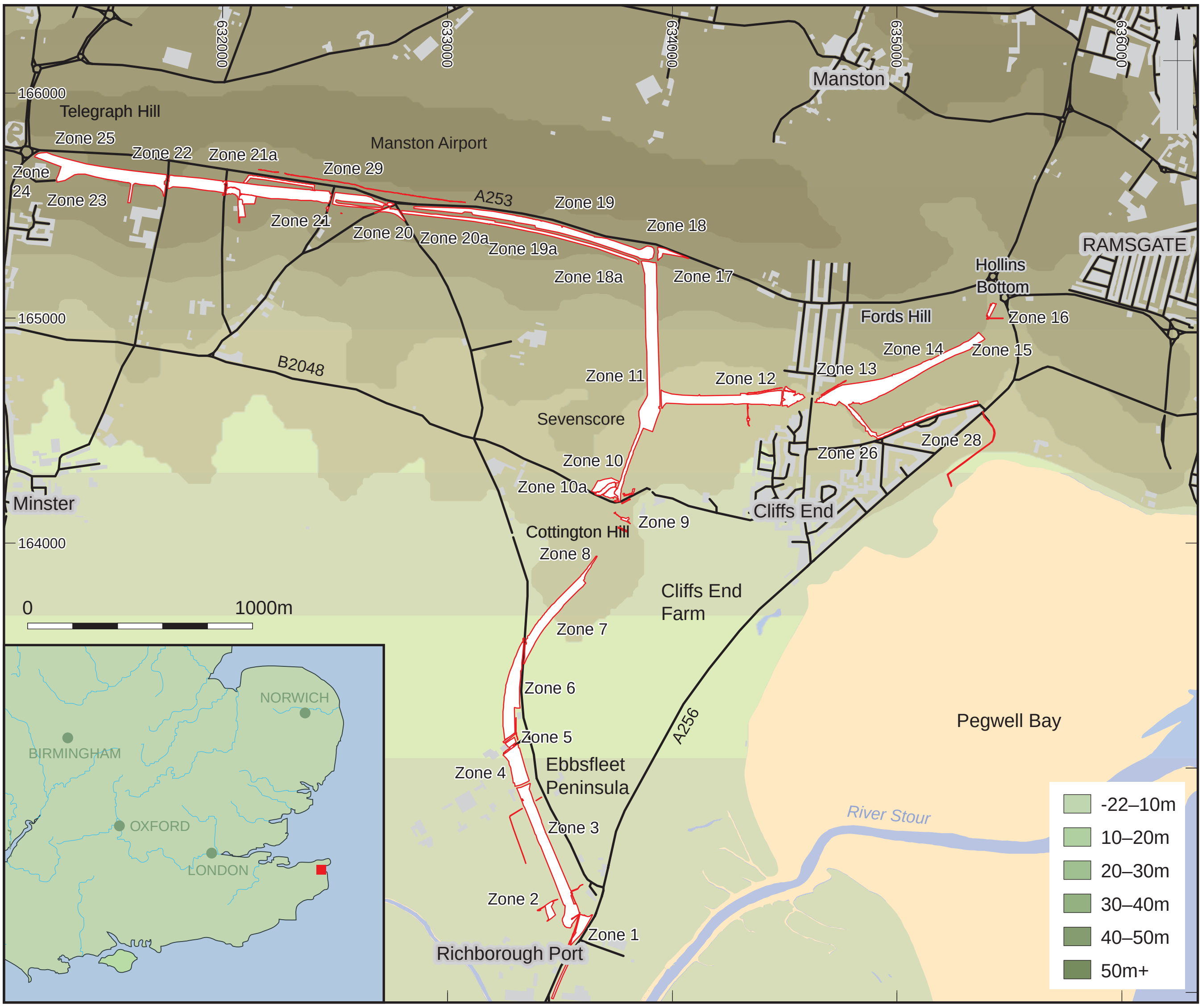


Fig 0.1 Site location plan (contains Ordnance Survey data © Crown copyright and database right 2014)

(Phase I) was an earlier road scheme to the south, which links with EKA2, and was designed to improve traffic movement to the north of Sandwich (see Fig 0.1). The latter scheme was constructed entirely on land reclaimed since the earlier medieval period and had only minimal archaeological impact. To the west, and also linking with the EKA2, the A253 Thanet Way improvements between Minster and Monkton, undertaken in 1994–5, saw the excavation of a rich archaeological landscape which was continued on the EKA2 (Bennett *et al* 2008).

Starting from a new roundabout close to the former (now demolished) Richborough Power Station in the south, the EKA2 runs northwards, rising gently from the Ebbsfleet Peninsula towards Cottington Hill, then crossing the railway on a new bridge and falling again before climbing the moderate slope of Sevenscore (Fig 0.1). On reaching the summit of the east-west ridge on which Manston Airport is sited, the road turns west and runs parallel to the runway and the A253, ending at the existing Mount Pleasant roundabout near Minster and Telegraph Hill. The new road has been linked to Ramsgate to the east by a spur road that runs east from a point approximately half way up the slope of Sevenscore. This spur road passes between Cliffs End and Foads Hill, through a tunnel beneath the railway, before joining the Lord of the Manor roundabout west of Ramsgate.

Over the 6.5km route of the EKA2 the ground rises from 1.5m aOD at the southern end of the Ebbsfleet peninsula, where it lies on Thanet Sands, to 52m aOD at the western end on the Upper Chalk ridge near Telegraph Hill, with the Cliffs End spur at between 20m and 30m aOD. Further details of the topography and geology are included below with the descriptions of the 29 individual zones (or groups of zones) defined along the route. A notable feature of Thanet is the absence of rivers, although there are several small streams, and springs occur in several places around the east, south and west of the island. Ponds were also common and provided a further source of water.

At an early stage in the planning of the road development it was recognised by Kent County Council that archaeology was one of the major considerations in delivery of a successful project. Regardless of the specific route of the scheme, any new road in what was known to be particularly rich and important archaeological landscape would almost certainly entail disturbance of significant archaeological remains. Given the importance of the new road connection and the constraints of the existing network, the airport, Cliffs End and the international importance of Pegwell Bay there was no viable alternative to the scheme and the need for a programme of archaeological investigation was quickly established. The ensuing archaeological investigation became one of the largest ever carried out on the Isle of Thanet.

The understanding of the significance of the archaeological landscape and the potential impact of the scheme was first set out in a desk based study undertaken by Oxford Archaeology in 2003 (Oxford Archaeology 2003). This highlighted the range and density of archaeological deposits in this part of Thanet which are extensive, multi-period and, in places, complex. Following completion of the Oxford Archaeology study in November 2003, further important archaeological investigations, associated with other development proposals, were undertaken in the vicinity of the proposed road, and these added significantly to the background information and understanding of the scheme. The largest and most relevant investigations were undertaken in 2004–5 in connection with the construction of the Weatherlees–Margate–Broadstairs Wastewater Pipeline (Egging Dinwiddy and Schuster 2009), which south of Manston Airport runs in close proximity to part of the EKA2. Indeed, at the Weatherlees treatment works at the southern end the two construction areas overlapped.

The results of these further investigations, in addition to the information included in the 2003 study, were incorporated in the second part of the *East Kent Access Phase II, Volume 2f (Archaeology)* document, issued in 2008 by the KCC Heritage Conservation team. It had already been decided to not undertake an extensive and costly programme of evaluation as this would only confirm the anticipated significant archaeological impact, and that instead the focus was on a programme of excavation that covered virtually the entire scheme. In lieu of the evaluation, and given the extensive knowledge gained from previous investigation in the landscape, an innovative approach was adopted that involved the construction of an 'Archaeological Model' that predicted the archaeological characteristics and assemblages that would be encountered in a series of zones. The 'Archaeological Model', divided the route into 28 separate 'zones' (Zones 1–28; Zone 29 was added subsequently, in 2010) (Fig 0.1) and for each of these provided details of the archaeological background and potential, and followed this with a 'Zone Archaeological Model' which outlined the types of archaeological features and deposits which were foreseeable within a particular zone. A summary of the archaeological background is included with the descriptions of the individual zones (or groups of zones) below.

In accordance with the conditions placed on the planning permission (TH/05/0964) for the EKA2, the KCC Heritage Conservation team requested that a staged archaeological programme should be undertaken in advance of construction of the scheme, the detail for which was set out in the first part of the *East Kent Access Phase II, Volume 2f (Archaeology)* document. In response to this document, OWA produced three high-level documents for the scheme, comprising a Project Design, which set out the methods by which the archaeological works would be undertaken, a Research Design and the Community Archaeology, Outreach and Publicity Strategy.

Topographical and geological background

by Elizabeth Stafford

The Isle of Thanet is located at the most easterly point of Kent, beyond where the Thames estuary opens to the North Sea. The topography of Thanet comprises a plateau lying above *c* 40m OD, with a chalk ridge rising

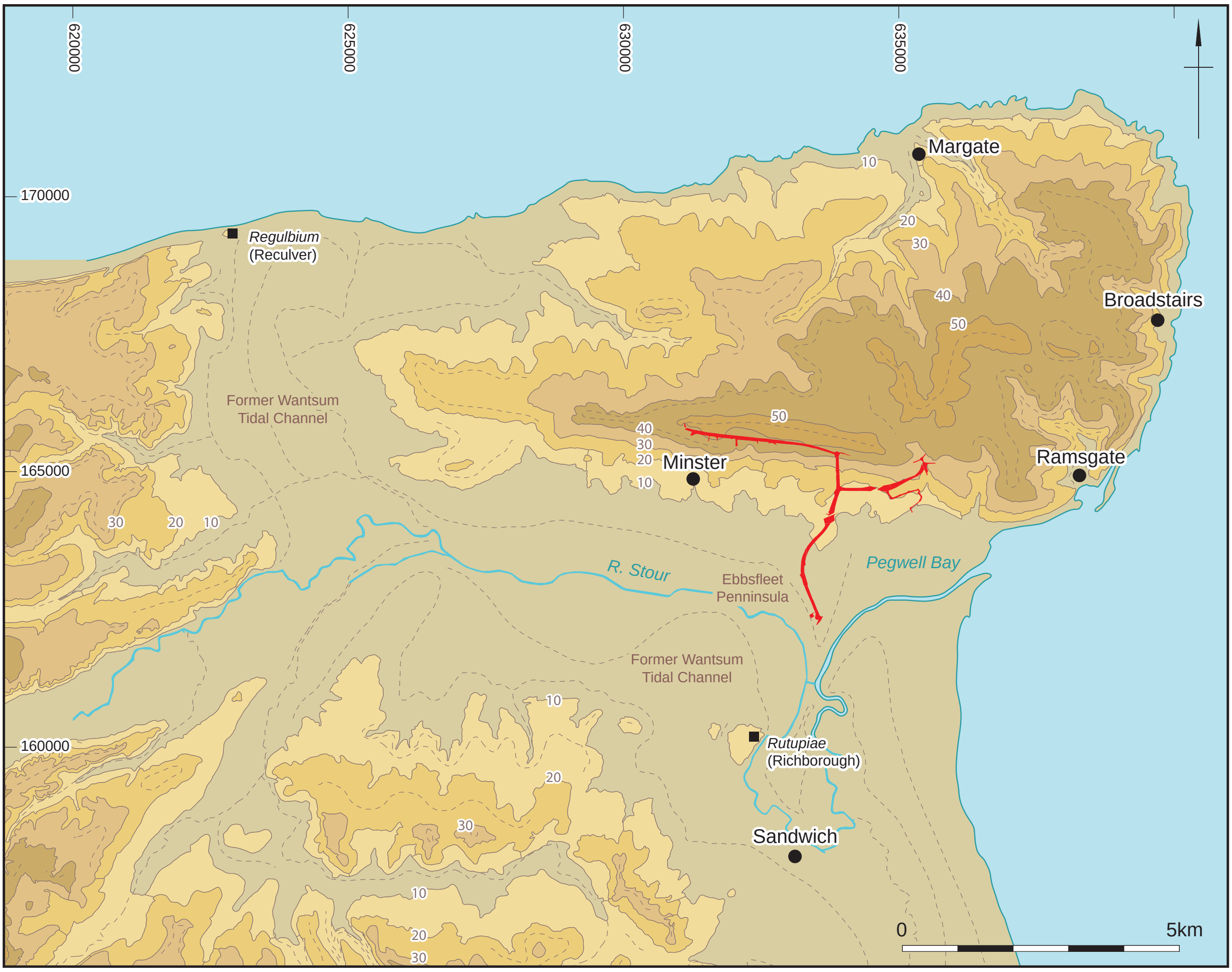


Fig 0.2 The Isle of Thanet, topographical background (contains Ordnance Survey data © Crown copyright and database right 2014)

to more than 50m OD dominating its southern side (Fig 0.2). The plateau slopes are incised by numerous dry valleys or coombes. On the seaward side the coast is characterised by steep cliffs and sandy bays. To the south and west Thanet is separated from the rest of Kent by a low-lying area, formerly occupied by the Wantsum tidal channel. The Ebbsfleet peninsula forms a low linear promontory of Thanet Sand extending into the Wantsum. Further details of the topography are provided in the Introduction to the Zones below.

Over the last 12,000 years changes in sea-level have profoundly affected the topography and landscape of the area. Towards the end of the last glacial period sea-level was considerably lower than at present (eg, Yokoyama *et al* 2000; Clark *et al* 2009), Britain was still connected to the Continent, the Thames was a tributary of the River Rhine, and vast areas now occupied by the North Sea were dry ground (ie, Doggerland, Coles 1998; Gaffney *et al* 2007; 2009). During the Mesolithic period, as the climate warmed and sea-levels began to rise due to melting of the northern glaciers, this area began to be inundated until the land bridge linking the Kentish Weald to the Boulonnais in northern France was finally breached *c* 6000 BC forming the Dover Straits. The history of the Wantsum channel, separating Thanet from the rest of Kent is the subject of considerable debate, although it is possible that a tidal channel was in existence at least from the Early Bronze Age (Coles 1998; Moody 2008, fig 17). Certainly the majority of Thanet was separated from the mainland including the part of the island which the EKA2 lies upon. The Wantsum was utilised as a major sea channel during the last 3000 years and at the beginning of the Roman period was probably at its maximum extent. Based on the distribution of tidal deposits the mouths were 3–4km across, narrowing to 1.8km between Wall End and Sarre and 1.5km between Sarre and the Stourmouth island; boreholes indicate a depth of at least 12m (Perkins 2007). However, the build-up of the 'Stonar Bank' (shingle) at its eastern end and deposition of sediment from the River Stour caused a process of gradual silting and, from the medieval period, managed reclamation of what was probably salt marsh at that time (Cloet and Robinson 1956; Moody 2008; Perkins 2007).

The solid geology of this part of north-east Kent is dominated by Cretaceous Chalk (135–64 ma years) which forms the underlying rock throughout the Isle of Thanet (Fig 0.3). The chalk is capped in places by

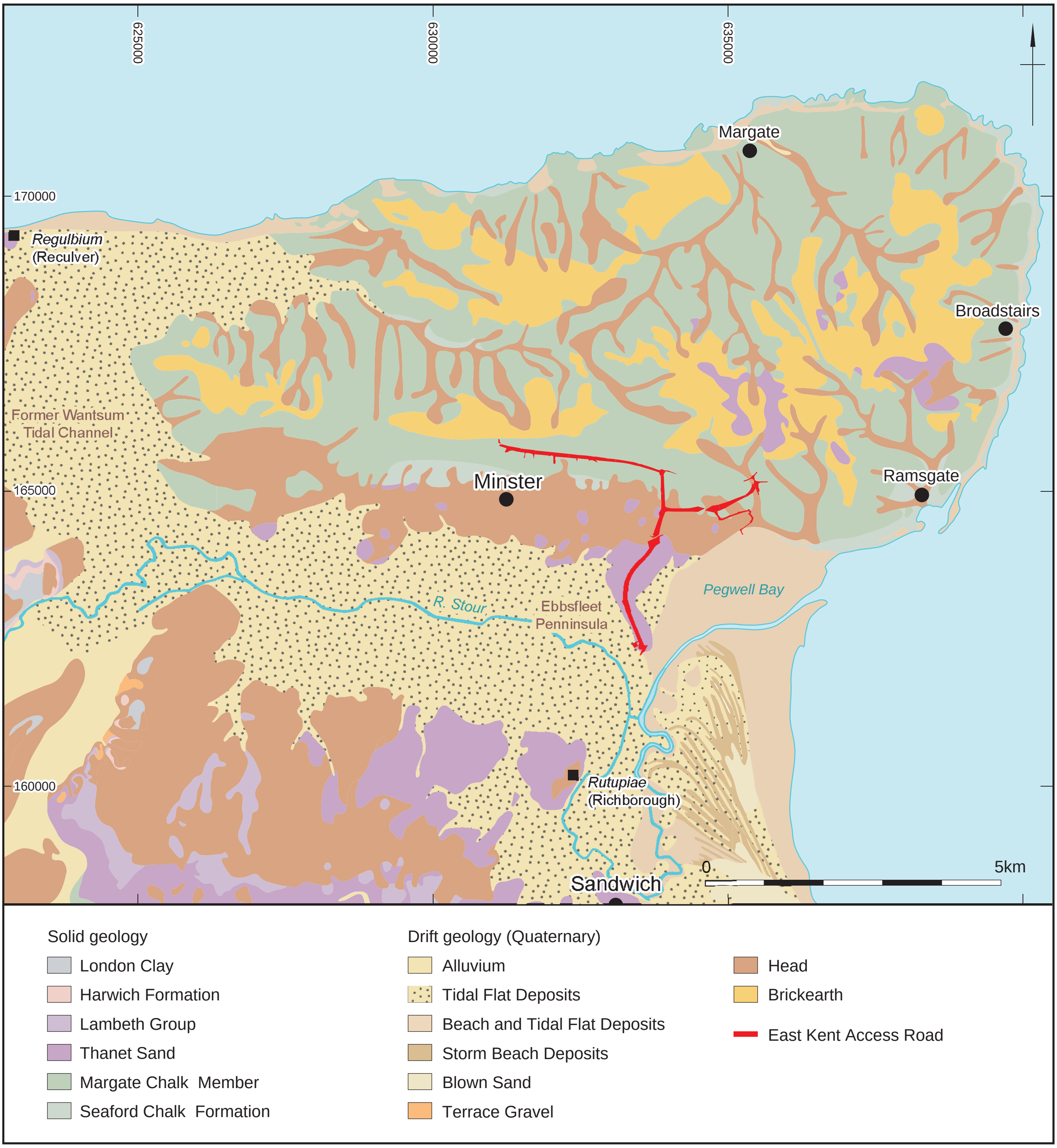


Fig 0.3 The Isle of Thanet, geological background (© British Geological Survey and Ordnance Survey)

Tertiary deposits (64–38 ma years), predominantly sands, silts and marls of the Thanet Beds. Superficial drift deposits of Quaternary Age overlie the solid geology. Pleistocene fine-grained loessic deposits (Brickearth), formed under cold periglacial conditions, cap the higher ground, and chalky rubble and slope deposits (Head) infill dry valleys. In places these deposits have been reworked by more recent colluvial processes. The loess sequences exposed in the cliffs have been the subject of considerable study (eg, Kerney 1965; Murton *et al* 1998; Wintle and Catt 1985; Weir *et al* 1971). Intercalated Late Glacial soil horizons have been identified at North Cliff, Broadstairs (Kerney 1965), and at Pegwell Bay an argillic brown earth overlying loess was sealed by colluvium containing Neolithic artefacts (Weir *et al* 1971).

In lower lying areas sequences comprise Holocene alluvium, tidal flats and beach deposits (Fig 0.3), although little archaeological work has been carried out to date on the Wantsum alluvial plain (Perkins 2007).

The soils along the route varied, usually reflecting the topography and the underlying geology. On the chalk ridge, near Manston, topsoil was generally very thin, having been substantially reduced by ploughing and erosion, and this was also the case on parts of the Cliffs End spur. On the scarp slopes below the depths of topsoil (and subsoil) increased, and below this were extensive and in places significant depths of colluvium. This overlay Brickearth and sealed Saxon features, and appears to have accumulated as a result of ploughing in the medieval period. Colluvial deposits were also present on the flanks of Cottington Hill and extended down to the neck of the Ebbsfleet peninsula. Ploughing had denuded the topsoil on the Thanet Sands forming the central ridge of the peninsula, but depths increased towards the edges, and alluvial deposits were encountered along the margin of the Wantsum Channel to the west.

Archaeological and historical background

The Isle of Thanet

The Isle of Thanet is distinctive, arguably unique, both in its physical setting – from perhaps the Early Bronze Age to medieval periods it was an island (approximately 85km^2), separated from the mainland by the Wantsum Channel (see above) – and in the range and density of its archaeological remains. The area flanking the northern side of the mouth of the Wantsum, through which the EKA2 passes, also has strong associations with history and myth, from the landing of the Roman army of Claudius at nearby Richborough, to the arrival of the invading Saxons or Jutes epitomised by Hengist and Horsa, the coming of the Christian missionaries led by St Augustine and later Danish raids. Today, these events and stories provide powerful connections with the island's past, which is often seen as having provided a gateway to new peoples, cultures and ideas through trade and invasion.

Landscapes

The archaeological landscapes of Thanet are recognised as being distinctive because of the ways past communities have used the different landscapes of the island, and the sheer density of remains from the Neolithic onwards. This is especially true for the Neolithic–Bronze Age and the Saxon periods.

Some of the key characteristics of the landscape that make Thanet distinctive can be identified as:

- The soils of the Isle are widely regarded as having been very fertile and attractive to farming although, as elsewhere in southern England, the extensive and intensive farming of the landscapes only started towards the Middle Bronze Age;
- An increasingly intensive shaping of the landscape from the Neolithic onwards. This is reflected in the many multi-period archaeological sites;
- The development and change in ritual and funerary monuments, particularly of prehistoric date.

Peoples

Environmental changes, such as the rise in sea level, towards the end of the Mesolithic, gradually resulted in the creation of the Isle of Thanet and this will have helped to shape its distinctiveness. The gradual widening of the Wantsum Channel would have set it apart from the mainland physically. Thus it was at the same time an extremity of Britain and the closest point to continental Europe. Some of the key issues relevant here are:

- As an island, whose size, shape and coastline all changed through time, Thanet could have served as a gateway for people and ideas moving between mainland Britain and continental Europe along the principal routes of communication;
- The relatively narrow straits of the Wantsum Channel could, together with the topographical units of the Ebbsfleet Peninsula and Weatherlees Island and the development of Stonar spit, have provided a sheltered passage and a safe harbourage for vessels travelling between continental Europe and Britain;
- Alongside the movement of people and ideas would have been the exchange of goods. It is possible, for example, that settlements at the neck of the Ebbsfleet Peninsula were engaged in trade and exchange perhaps from the beginning of the Early Bronze Age;
- In the Roman period the military base and port at Richborough with its associated civilian settlement (*vicus*) was one of the major gateways to Britain. More locally, its imposing structures would have dominated the entrance to the Wantsum Channel, controlling the movement of troops, travellers and traders, and exerted a major influence on Thanet;
- In historic times Thanet and the region around it have been in the forefront of invasion and defence, from the invasions of Julius Caesar and Claudius to the late Roman creation of the defences of the Saxon Shore, to, in recent times, the Battle of Britain.

Background to the EKA2

The Isle of Thanet has a long and distinguished history of archaeological research by individuals, notably Dave Perkins, and organisations such as the Trust for Thanet Archaeology and the Canterbury Archaeological Trust. The earlier, large-scale work undertaken along the A253 Thanet Way road improvements between the Minster and the Mount Pleasant roundabouts, immediately to the west of the EKA2 scheme, is particularly relevant here, revealing features including a complex of Early Bronze Age funerary monuments, an unusual Roman rural settlement comprising sunken-featured buildings, an Anglo-Saxon cemetery and a medieval farmstead (Bennett *et al* 2008). A review of the Isle of Thanet up to the high medieval period has recently been published by Moody (2008) and the Isle has also been considered in the context of a county-wide survey (Williams 2007).

More specifically, the Oxford Archaeology study (2003) had set out in detail the high archaeological potential for the EKA2 route, and the results were subsequently incorporated in the KCC *East Kent Access Phase II, Volume 2f (Archaeology)* document of 2008. The latter included information from relevant excavations undertaken during the intervening five years, including a new service station at the Mount Pleasant (Minster) roundabout (Canterbury Archaeological Trust 2004; Gollop and Mason 2006), the Weatherlees to Margate Waste Water Pipeline (Andrews *et al* 2009), housing development at Cliffs End Farm (McKinley *et al* forthcoming) and, more recently, the Thanet Earth project (Canterbury Archaeological Trust 2010). In addition to these investigations were works connected to the development of the EKA2 scheme, comprising monitoring of geotechnical test pits (Trust for Thanet Archaeology 2006; 2008a) and the excavation of a new pond at Weatherlees Waste Water Treatment Works (Wessex Archaeology 2008). Further information is provided in the introduction to the zones below.

In order to facilitate the practical implementation of the KCC *East Kent Access Phase II, Volume 2f (Archaeology)* 'Zone Archaeological Model' in the field and during analysis, the 29 landscape-specific Archaeological Zones were grouped in the OWA Research Design (see below) into three broad physical Landscape Zones. These are summarised here, while general characteristics of each individual site zone are outlined further below.

Landscape 1: Chalk Ridge

This is formed by a chalk escarpment that runs east to west and represents the most northerly part of the route of the new road, running east to west between the Lord of the Manor and Mount Pleasant roundabouts (Pl 0.1). The escarpment carries the main modern route, the A253 road which might, on parts of its current route, have prehistoric origins. Some of the key topographical sub-divisions of Landscape 1 and the known archaeological sites are:

- Telegraph Hill: Zones 23 and 24 (Late Neolithic–Bronze Age funerary and monumental sites);
- Laundry Hill: Zones 21 and 22 (Neolithic 'focus'/ Bronze Age enclosure);
- Thorne Hill: Zones 19 and 20 (Late Iron Age and Roman settlement and burials/Saxon burials).

Landscape 2: Pegwell Bay/Cliffs End Spur

Landscape 2 is formed of a spur (and associated scarp slope) of land behind Pegwell Bay which starts at Chalk Hill and slopes in a south-westerly direction through Cliffs End and on towards the base of Sevenscore, where Zones 11 and 12 were located (Pl 0.1). Some of the key

Pl 0.1 Aerial photograph showing Cliffs End Spur in foreground (Zones 13-15) and Chalk ridge in background (Zones 17-20), with Manston airport in upper right hand corner (view from east). Photo: Volkerfitzpatrick Hochtief

topographical sub-divisions of Landscape 2 and the known archaeological sites are:

- Foads Hill, Zones 13 and 14: (Bronze Age burials and prehistoric funerary and monumental sites);
- Hollins Bottom, Zones 15 and 16: (Neolithic/Bronze Age funerary and monumental sites/Saxon cemeteries).

Landscape 3: Ebbsfleet Peninsula

The southern slope has three transverse spurs, composed of Thanet Beds (sands), extending southwards as the Ebbsfleet Peninsula into the ancient Wantsum Channel (Pl 2). Some of the key topographical sub-divisions of Landscape 3 and the known archaeological sites are:

- Base of Sevenscore/Cottington Hill, Zones 8, 9 and 10: (Neolithic, Bronze Age, Iron Age Roman and Saxon activity);
- Cottington Hill – Ebbsfleet Peninsula Saddle, Zones 6 and 7: (Bronze Age–Iron Age occupation and ritual activity, Roman settlement and occupation);
- Ebbsfleet Peninsula, Zones 1, 2, 3, 4 and 5: (Neolithic, Bronze Age–Iron Age occupation and ritual activity, Roman settlement and occupation, medieval farming).

Research designs

The OWA *Research Design* was intended to provide a strategic framework which would provide an informed context for asking questions and making decisions about interpretation at the start of, during and after the archaeological fieldwork. This was developed within the draft regional research framework which was being compiled for south-east England, as well as period-specific national research frameworks. The Research Design set out to:

- Briefly characterise the archaeological significance of the Isle of Thanet;
- Identify the opportunities that the scheme presents;
- Identify research questions and assess the data sets that may be available to answer those questions;
- Outline the landscape approach that was to be used throughout the project and to identify three key Landscapes Zones;
- Promote a self-critical and reflexive approach to the archaeological works

Two overarching themes – *People* and *Place* – are identified in this *Research Design*. In combination, these themes help to define what is distinctive about the

Pl 0.2 Aerial photograph showing the Ebbsfleet Peninsula in foreground (Zones 1-8), with Chalk ridge upper left and Cliffs End Spur and Pegwell Bay upper right (view from south). Photo: Volkerfitzpatrick Hochtief

archaeology of Thanet within the context of current frameworks of archaeological understanding at a local, regional and national level. It was recognised that the categories of people and place are not exclusive, and that there has been continuing interplay between the physical characteristics of the landscape and how they have been changed by people. In addressing this interplay, a landscape-based approach was adopted, facilitated by the use of a scheme-wide GIS landscape model during the archaeological fieldwork and analysis.

On the basis of a review of recent and current work and an accompanying consultation, a series of research questions that are either specific to Thanet or its contribution to the wider setting were identified, which were refined and made more specific in the Updated Project Design issued as part of the Post-Excavation Assessment (OWA 2011):

Place

- How and why was Thanet distinctive from other areas?
- How has the sea influenced different forms of contact with continental Europe and the rest of Britain?
- How did the dynamic and changing coastline influence the past communities of Thanet?
- How did environmental change, both natural and caused by man, on land and at the coast influence the past communities of Thanet?
- What effects did the changing character of the Wantsum Channel have on Thanet?
- How were particular localities such as the Ebbsfleet Peninsula affected by the changing character of the Wantsum Channel?
- How, and why, did people use different parts of their landscapes?
- Have man-made changes caused earlier landscapes to be hidden or even partially or wholly destroyed?
- Were monumental landscapes for ceremony and burial deliberately created from the later prehistoric period onwards?
- Where were settlements sited, and why?
- How did economic and social factors influence the development of the landscape development as seen in land divisions, field boundaries and tracks etc. in the late prehistoric and historic periods?
- How did networks of settlement and communication influence the development of the prehistoric and historic landscapes?
- How were defensive landscapes created in the historic periods?
- How did the ownership of land influence the development of the landscape in the prehistoric and historic periods, for example through the first field systems or ecclesiastical, manorial and tied estates?
- Can the past landscapes identified in the archaeological works be understood in the context of the present landscape and its component units?
- Have wider cultural influences, for example aesthetics and recreation, influenced the development of the historic landscape?

People: movement of people, goods and ideas

- What evidence is there for assimilation and change through migration, invasion, exchange or the adoption of new cultural norms?
- Facing the ocean: did the people of Thanet view themselves and/or the Isle as being in some way different from the mainlands?
- How did religious beliefs, mortuary rituals and funerary monuments change through time?
- Are any of the mortuary rituals seen in Thanet distinctive in Britain?
- To what extent can grave-goods be used as indicators of ethnicity and social persona?
- Why were so many hoards of Bronze Age metalwork deposited on Thanet and in what contexts?
- Can existing later prehistoric chronological and typological sequences for Thanet be refined more closely? And if so are they applicable more widely?
- When, and if, did Thanet emerge as a key location in networks of trade and exchange?
- What were the roles of early coinages in Thanet?
- Can the settlement evidence from the neck of the Ebbsfleet Peninsula be interpreted as indicating a Late Iron Age/Early Roman settlement engaged in trade and exchange?
- What effects did the Roman military base and port at Richborough have on the contemporary settlement pattern and communications on Thanet?
- When did the Saxon settlement of Thanet take place and how does the resulting settlement pattern compare to the wider Saxon settlement pattern of East Kent?
- What was the nature of medieval settlement and farming in the area and how was this affected by the reclamation of the marshes around the Wantsum Channel?
- What changes did the defence of Britain in the two World Wars cause in this area, and in particular those relating to Manston airfield?

Fieldwork

Because of the exceptionally high density of archaeological features anticipated along virtually the entire route, as well as their vulnerability, the decision was made (*East Kent Access Phase II, Volume 2f (Archaeology)*) that all areas where road construction was likely to impact on buried archaeological remains would be stripped and subject to archaeological investigation, largely obviating the need for evaluation trenching in advance of area excavation. This approach, developed largely in Kent, reflects the experience gained on major developments elsewhere in the county, for example on High Speed 1 and, most relevantly, on the A253 Thanet Way improvements between Minster and Monkton undertaken in 1994–5. A particular benefit of this approach is that not only are individual sites investigated, but also the spaces between them, allowing the place of sites in the landscape to be better understood. It also allowed otherwise isolated but significant features, including several burials, which might have been missed by evaluation trenching and more targeted excavation, to be identified and excavated.

Within the areas stripped, largely in arable farmland, much of the archaeological resource was known to lie shallowly buried and, therefore, any modifications to avoid particular sites or monuments would almost certainly lead to an impact on other known, as well as unknown, buried remains. Furthermore, preservation *in situ* of any archaeological remains was only likely to be possible in exceptional circumstances. However, deeply stratified sequences were not anticipated, with the possible exception of Zone 6, and it was considered unlikely that any significant waterlogged deposits would be encountered.

The likelihood of any significant modern disturbance was considered to be generally low, and this proved to be the case when the route was stripped. The principal disturbances comprised an area of service trenches at the north end of Zone 3 and a former pond and adjacent area at the south end of Zone 4, all of which had been subject to some previous investigation (Wessex Archaeology 1992; Hearne *et al* 1995; Andrews *et al* 2009), an area levelled for barn construction in Zone 5, and the trenches for twin gas pipes that ran through Zones 18–20 and which had also been the subject of earlier recording (Perkins 1985). Ploughing had led to some truncation of archaeological deposits on the higher parts of the route, particularly where natural chalk lay directly beneath a thin cover of topsoil in some areas of Zones 13 and 19–24. However, nowhere was this considered a major factor limiting their survival and burials, for example, had largely escaped undamaged. In many zones elsewhere, varying depths of colluvium had served to protect archaeological deposits from any significant damage through post-medieval and modern ploughing.

There were some changes to the footprint of the scheme following the commencement of archaeological fieldwork. In particular, Zone 10 was extended to include an adjacent area (Zone 10a) designated for a balancing pond (to replace one proposed for Zone 9), an additional area was investigated in Zone 21 to incorporate the revised location of another balancing pond, and a further area (Zone 29, within Manston Airport) was

Pl 0.3 Excavations in progress in Zone 13, immediately ahead of tunnel approach works (view from west)

added to the programme during the course of the scheme. Zone 25, within the south-west corner of Manston Airport, was excluded from the scheme in May 2011. An area adjacent to Zone 4, referred to here as 'Weatherlees Pond', was excavated in 2008 in advance of the scheme, as part of ecological mitigation works.

Three principal stages of fieldwork were undertaken, comprising a series of *Preliminary Surveys*, followed by *Strip, Map and Characterisation* and then, where required, *Further Archaeological Works*, the latter normally comprising detailed excavation. In addition to these elements, evaluation trenching was undertaken in Zone 2 and Zone 26 and various watching briefs and targeted watching briefs (the latter allowing detailed excavation where necessary) were carried out, including monitoring of the removal of possible unexploded ordnance.

The main phase of excavation, as well as the preliminary surveys, took place over a relatively short period between November 2009 and October 2010, dictated by the EKA2 construction programme which, as an unavoidable necessity, overlapped from spring 2010 with the archaeological programme (Pl 0.3). Additional small pieces of work were carried out subsequently between then and May 2011 when archaeological fieldwork was completed. During this 18 month period approximately 40 hectares were subject to excavation involving up to 140 site staff at any one time, working concurrently on as many as 12 zones.

Preliminary surveys

The *Preliminary Surveys* comprised surface collection survey, metal detector survey and topsoil/subsoil test pitting, undertaken in November–December 2009. These surveys, designed principally to assess the presence, density and distribution of artefacts in the ploughsoil, covered almost the entire route, but excluded areas where they were not required (eg, where the ground level was to be raised or the topsoil undisturbed) or where ground conditions did not permit (eg, covered with tarmac or concrete). The intention was to try to capture information about the use of the landscape that may survive in the ploughsoil rather than relying solely on what survives in the cut features, particularly relevant for earlier prehistoric activities. All the material collected is tabulated in Table 1, and significant finds (eg, coins and worked flint) have been incorporated in this publication report.

In addition, a topographic survey was undertaken on the known (from aerial photographs) sites of two of the

Table 0.1 Totals of finds recovered from different types of pre-excavation survey

Material	*Fieldwalking*		*Test-Pits*		*Metal Detecting*	
	No.	*Wt. (g)*	*No.*	*Wt. (g)*	*No.*	*Wt. (g)*
Animal Bone	19	147	19	110	-	-
Burnt Flint	854	15,852	170	3993	-	-
CBM	5045	68,781	561	8503	-	-
Clay Pipe	23	43	12	26	-	-
Fired Clay	7	190	2	37	-	-
Worked Flint	304	-	179	-	-	-
Glass	48	339	40	226	-	-
Human Bone	1	17	8	4	-	-
Metalwork	12	-	21	-	1039	-
Gold	-	-	-	-	*2*	-
Silver	-	-	-	-	*2*	-
Copper alloy	-	-	*1*	-	*479*	-
Lead	-	-	*2*	-	*334*	-
Iron	*12*	-	*18*	-	*180*	-
Other metal	-	-	-	-	*31*	-
Pottery	1226	7435	289	1592	-	-
Prehistoric	*65*	*644*	*61*	*274*	-	-
Roman	*303*	*1856*	*104*	*743*	-	-
Medieval	*366*	*1581*	*40*	*122*	-	-
Post-Medieval	*436*	*3013*	*70*	*399*	-	-
Undated	*56*	*341*	*14*	*54*	-	-
Shell	42	210	81	514	-	-
Slag	6	178	3	40	3	97
Stone	4	22	2	11	-	-

ring-ditches in Zone 23 to establish whether any upstanding mound survived in either example. Full details of the methodologies for the preliminary surveys are set out in the Project Design but summaries are presented below.

Geophysical survey was not undertaken as it was considered that the geologies in some areas would be unresponsive, particularly where colluvium was present, and the presence of services in some areas (Zones 19 and 20) would preclude generation of any useful results.

Surface collection survey
Collection of material was carried out on a 20m grid aligned parallel to the line of the proposed road scheme. In order to maximise the recovery of surface artefacts, two transects, set 10m apart, were walked within each collection unit. Collections within each unit comprised all material visible in a zone 1m to either side of the centre line of the two transects comprising that unit.

Metal detector survey
Survey transects were spaced 10m apart with individual finds bagged in individually numbered bags and recorded. Metal detectors were set to recover ferrous as well as non-ferrous metals and all materials were retained and individually bagged. Locations of finds were recorded using a differential GPS.

Topsoil/subsoil test pitting
Test pits were excavated in areas designated in the KCC Draft Project Design. They were excavated on a grid spaced at 50m intervals. The numbers of test pits and locations took into account the final land-take and adopted a 'best fit' within the shape of the scheme. Test pits were 1m x 1m in plan and were excavated by hand in 0.1m spits to the surface of the 'natural' or to the surface of preserved archaeological deposits, whichever was encountered first. A 30-litre soil sample was recovered from each spit and sieved through a 10mm mesh and all spoil scanned with a metal detector. Archaeological features were not excavated.

Discussion of results
Overall, the Preliminary Surveys provided relatively little information to supplement that obtained from the subsequent stages of fieldwork, and did not require any changes to the methodologies adopted for that work. Virtually all of the metal detector finds were of modern date, a few were post-medieval and just a handful Roman. The paucity of pre-modern material can in part be attributed to past metal detecting of the topsoil, as well as the deposits of subsoil and colluvium that masked earlier remains, particularly of Roman date, in some areas. The latter is also likely to explain the low levels of worked flint and pottery recovered from fieldwalking. Only the test pits produced a little more, in some cases, but there was insufficient worked flint to make any confident predictions about earlier prehistoric activity and the location of this within the landscape. The results were presented in a series of *Preliminary Survey Reports* and were also incorporated into the GIS landscape model.

Strip, map and sample

The overall process was designed to uncover and begin to understand the 'big picture' by widespread stripping and then focusing attention on the detailed excavation of those parts of the landscape and features that were most significant to more fully understanding the archaeological sequence, a strategy informed by a process of sample excavation and characterisation.

Excavation
The topsoil, subsoil and, where present, colluvium along the route was stripped under archaeological supervision, commencing in December 2009, except where it was agreed that, due to the limited impact of the scheme in specific areas, archaeological deposits could be preserved *in situ*. The aim of this stage was to characterise, within each zone or defined area, the archaeology present, and this would then enable a robust programme of *Further Archaeological Works* to be designed, approved, programmed and implemented.

Machine stripping was undertaken mainly by 360° tracked excavators, provided by Volkerfitzpatrick Hochtief Joint Venture, working under constant archaeological supervision. Successive spits of not more than 100mm were removed, to the top of archaeological levels or the top of undisturbed natural, whichever was the higher. Metal-detecting was undertaken throughout stripping and subsequent hand-excavation. All spoil was stored within the footprint of the new road, requiring that some zones where the land-take was relatively narrow (eg, Zones 11 and 12) be stripped and excavated as a series of separate areas in order to accommodate temporary bunds of topsoil, subsoil and, in some cases, colluvium.

As machine stripping progressed archaeological features were mapped by either GPS or TST (Total Station), using a control framework of survey points related to the Ordnance Survey grid, and a digital base plan generated. The digital base plan was then used to devise an appropriate sampling strategy, which was submitted to the Principal Archaeological Officer for approval. This sampling strategy plan formed the basis of the characterisation investigation, which aimed to establish and assess the character, complexity, preservation, extent, depth, date etc of the archaeological remains present through an appropriate number of interventions, supported by information provided through a rapid on-site assessment of the associated finds and environmental assemblages.

Throughout the archaeological works a GIS was used to map landscape and archaeological data (including ongoing finds and environmental assessments) and this information was fed back to the fieldwork team in an iterative process to assist in making informed decisions in relation to the *Research Design*.

The iterative process involved the constant attendance of the KCC Principal Archaeological Officer who worked closely with the excavation team to agree strategies on a day-to-day basis. The GIS based system allowed feedback in many cases within a 24 hour period that enabled informed decisions to be made quickly and allowed the complex excavation and construction programme to remain on schedule and respond to changes in priorities.

Recording

The recording system used on the EKA2 has been developed over 15 years of OWA and Framework joint ventures. The system is specifically designed to be reflexive and iterative, with the GIS Landscape model updated on a daily basis. At all stages of work, plans were digitised and context information entered into the scheme database which was used to support the GIS Landscape model. Harris matrices were compiled where necessary and context grouping was carried out in parallel with fieldwork.

Full details of the recording system, as well as of excavation procedures, finds and environmental procedures and the approaches to the excavation of human burials adopted are provided in the *Project Design*, and were implemented in both the *Strip, Map and Characterisation* and *Further Archaeological Works* stages of works.

Characterisation Report

Following completion of characterisation within each zone or specified area a report, the *Characterisation Report*, was prepared, except for a relatively small number of the zones where it was agreed (with KCC) that this was not required. This was most often because of the compressed timescale for completion of the archaeological works programme, partly resulting from delays caused by inclement weather conditions during the early stages of fieldwork which resulted, in some zones, in the archaeological investigations taking place immediately in advance of construction works. In these cases, and where *Further Archaeological Works* were deemed necessary, a back-to-back approach was adopted, with *Strip, Map and Characterisation* being followed immediately by *Further Archaeological Works*, with no break for reporting (for example in Zone 4). Here, the iterative dissemination of information between the excavation teams, finds and environmental teams and those monitoring the excavations allowed decisions to be reached with as much information as was needed to move forward. In a few zones, where there were relatively few archaeological features and the sequence was not very complex (eg, Zone 17), all excavation was completed as part of the *Strip, Map and Characterisation* phase.

The *Characterisation Report* included, as a minimum, a site location plan, a plan showing interventions and provisional feature phasing, a summary of the archaeological sequences by period and phase, quantification tables of stratigraphic, finds and environmental data together with an explanation of how this compared with the original archaeological model for the zone, and a summary of the significance of the features and deposits revealed, related to previous understanding and evidence contained within the Landscape and Archaeological Model and to the Research Aims set out in the project's *Research Design*.

Further archaeological works

The *Strip, Map and Characterisation* stage allowed a revised set of Research Aims to be formulated and these were set out in a *Further Archaeological Works Design* document. The revised set of Research Aims were generally informed by the approach and framework set out in the *Research Design*, but also included further questions that had not been set out in the *Research Design* and were only formulated at the *Strip, Map and Characterisation* stage. The *Further Archaeological Works Design* also included a statement of the strategy proposed for addressing the Research Aims, a methodology for the *Further Archaeological Works* and a plan showing the location and extent of the proposed works.

During *Further Archaeological Works* sites were excavated and recorded in accordance with the agreed excavation and sampling strategy set out in the *Further Archaeological Works Design* (FAWD)and developed through the focus provided by the relevant (ie, to each zone) research priorities as set in the *Research Design*. Finds and environmental information was entered into the scheme database as processing and cataloguing proceeded, with as much of this as possible undertaken in parallel with the fieldwork, in dedicated facilities established within the main site compound.

The approach was iterative with the sampling strategy being continuously developed and adapted throughout the course of the individual excavations in consultation with the Principal Archaeological Officer for KCC and VFH's archaeological consultant (Atkins), various OWA period, finds and environmental specialists, and English Heritage (EH) representatives. This allowed research priorities to be updated and modified as the project developed.

Community archaeology and outreach

Community archaeology and outreach formed a significant and integrated element of the EKA2 archaeological project, and its implementation followed the requirements set out in the project design produced in 2008 by the KCC Heritage Conservation team (Part 1 of *East Kent Access Phase II, Volume 2f (Archaeology)*). Kent County Council has recognised the importance of local communities learning about, and wherever possible, seeing the archaeological work that is taking place on sites within the county. This has far too often not been achieved on many sites for a variety of reasons. The EKA2 archaeological programme was seen as a huge opportunity to demonstrate that even on the most complex of developments, local communities can engage with the archaeological works and provide access to their heritage, as well as leaving a legacy of an increased appreciation and understanding of their heritage.

In order to accommodate community archaeological works within the scheme an area of the route was designated as a community excavation site. The most appropriate area for such a site, given the requirements of the earthworks programme, was within Zones 22–23 which was not required for release to the main contractor until June 2010. By designating a single site for community excavation, this allowed the health and safety aspects of volunteers working within a development site to be more closely managed.

The community excavation focused on one of the ring-ditches in Zone 23 (Pl 0.4) and an adjacent late prehistoric field and enclosure system in Zone 22. Virtually all of the excavation and recording of these features was undertaken by volunteers, with supervision and training provided with OWA staff. Approximately 90 people took part on the four-week long excavation, with an average of 14 per day, which ran over weekends and some evenings as well. Of these people, 91% came from Thanet, with most of the others from East Kent, and they gave an overwhelmingly positive response to the experience.

The community excavation featured in one of two open weekends that were held in May and June 2010, each of which attracted almost 1000 visitors (Pl 0.5). There were also several group visits to the community excavation and Cliffs End residents were given the opportunity to have guided tours of the excavations going on in their area.

In addition to the fieldwork, volunteers participated in finds and environmental work throughout most of the duration of the project, working alongside the OWA specialists based in the main site compound.

The outreach programme was a creative and innovative piece of work which promoted good local relations and went beyond the confines of the excavation. The main phase of this programme took place over four months between March and June 2010, and was co-ordinated and largely run by David Crawford-White, a community archaeologist with a wealth of experience. At the beginning all schools, libraries and a range of other institutions and meeting places in Thanet were circulated with information about the EKA2 archaeological project. Then, two stand-alone exhibitions were prepared which were displayed at 12 venues around Thanet for up to four weeks at each place. Eight road shows were undertaken involving staff from OWA and various other organisations (including the Trust for Thanet Archaeology, Portable Antiquities Scheme, the Isle of Thanet Archaeological Society and the Powell Cotton Museum) which went to libraries, the Powell Cotton Museum, the Holiday Inn, and the main shopping complex at Westwood Cross on two occasions, to explain the archaeology of the EKA2 and talk about the latest discoveries. Similar displays were also done for the Kent County Show at Detling and the Archaeology Day at the Powell Cotton Museum in Quex Park.

Twenty-one schools were visited, mainly primary and junior, but some older groups and special needs, where between six and 600 each day were given presentations and engaged in activity workshops. A further 400 people from 18 organisations were also given presentations or came to the site, including the local Young Archaeologists Club, Rotary Clubs, residents associations, Mencap, Women's Institutes and a group from Pfeizer's, who also took part in the community excavation.

Throughout the fieldwork publicity was generated through the media and a dedicated website, reaching many more than the several thousand who had come into contact with the archaeological project directly

Pl 0.4 Beginning of Community Excavation in Zone 23, following cleaning of Early Bronze Age ring-ditch 193123 (view from north)

Pl 0.5 Open Day in Zone 13 – Early-Middle Iron Age sunken-featured building 174060 in foreground (view from east)

through the various outreach activities and open days.

Following the completion of fieldwork, there have been further exhibitions, presentations to a variety of groups in Thanet, lectures at national conferences or meetings, and a major article in *Current Archaeology*.

Post-excavation and publication

Post-excavation work fell into several phases and, like the fieldwork, was subject to very tight deadlines for a project of this scale. However, it should be re-iterated here how much of the data entry, including that from the finds and environmental processing, took place on site in order to inform the *Preliminary Survey Reports*, *Characterisation Reports* and *Further Archaeological Works Designs* produced during the course of the fieldwork.

Immediately following the completion of fieldwork in autumn 2010 an interim report was prepared. This included summaries of each of the excavated zones, and was issued in early 2011. The next stage was a post-excavation assessment of the archaeological sequences within each zone, largely undertaken by the project officers responsible for the excavations in the field. Specialists undertook assessments of the various components of the finds and environmental assemblages, and recommendations for further analysis were prepared, with the over-arching assessment report, including an updated project design, issued in the summer of 2011 (OWA 2011).

Following approval of the assessment report, post-excavation analysis began in autumn 2011 and was completed by the end of 2012. Throughout both this and the assessment phase, results from the various studies were fed back into the scheme GIS Landscape model in order to inform the ongoing analyses. The resulting publication, in two volumes, reflects the scale and importance of the EKA2 project, under-pinned by the scheme-wide GIS Landscape model.

Volume 1 presents an introduction to the project, a general account of the archaeological features by chronological period (and within that by zone or groups of zones, reflecting different Landscape Zones), and period-specific discussions of the character, environment, economy and chronology of the sites in relation to local and regional landscapes and settlement patterns. These reflect the archaeological remains of the earlier prehistoric, later prehistoric, Roman, and Saxon and later periods. The description in the period-based chapters is of a fairly condensed nature and is site-specific. It is followed first by wider ranging discussion sections and then by short summaries of all the relevant classes of artefactual and environmental evidence prepared by the relevant specialist contributors.

Volume 2 presents detailed specialist reports on all finds, human bones, and faunal, marine, plant and other environmental remains. In addition to these printed volumes, additional data are available in the project archive.

Introduction to the Zones

Ebbsfleet Peninsula (Landscape 3)

Zones 1–3

Zone 1 lay at the southern end of the Ebbsfleet peninsula, in a relatively low-lying location at the junction of the former Wantsum Channel and Pegwell Bay. Until the medieval period the Ebbsfleet peninsula was surrounded by water on all but the northern side, though by this time there is likely to have been extensive marsh land bordering its edges. As the Wantsum Channel silted up further land reclamation took place through monastic inning of the area and associated drainage, probably converting salt marsh to grazing marsh. No previous archaeological investigations had taken place within or close to Zone 1, the closest being approximately 100m to the north (see Zones 3 and 4).

A narrow triangular area was left un-investigated towards the southern end of the zone due to the presence of services, though a watching brief was maintained on a new service trench which crossed this area. A watching brief was also maintained on a service trench which extended to the east of the zone, towards Ebbsfleet Lane, but no features were identified within the narrow confines of the trench.

The excavations in Zone 1 exposed a small part of the south-west edge of the Ebbsfleet peninsula and adjacent alluvial deposits, though no significant waterlogged remains were encountered within the latter or in any of the archaeological features. The Thanet Beds forming the peninsula sloped down from 4m aOD at the north end of the zone to 1.5m aOD in the south. Deeper excavations to the west for the installation of storm-water tanks (Zone 1a) revealed almost exclusively made ground and no deposits of palaeo-environmental interest.

Zone 2 lay to the west of Zone 1, towards the southern end and on the west side of the Ebbsfleet peninsula. No previous archaeological investigations had taken place in the immediate vicinity, but an evaluation was undertaken prior to excavation to determine the depth at which any significant archaeological deposits occurred. This was because the zone extended across the edge of the Wantsum Channel, where it was proposed to build a barn, the construction of which was likely to have only a minor or no impact on deeply buried archaeological deposits in this area. The evaluation demonstrated that channel fills were present in the western half of the zone, though no deposits of palaeo-environmental interest were identified, and subsequent excavation was, therefore, largely confined to the higher ground in the eastern half of the zone.

The excavations in Zone 1 had revealed a small part of the south-west edge of the Ebbsfleet peninsula and adjacent alluvial deposits, and in Zone 2 the uppermost, slightly peaty deposits along the gently sloping western edge of the peninsula were exposed. However, as in Zone 1, no significant waterlogged remains were encountered. Further excavation was undertaken within Zone 2 in the summer of 2012, in advance of the construction of a digester unit. This revealed a continuation of the medieval ditches recorded in Zones 1 and 2 and a small number of discrete features, all of probable 13th–15th century date.

The Oxford Archaeology Desk Based Assessment (Oxford Archaeology 2003) identified a large, ovate cropmark interpreted as an enclosure of possible Bronze Age date, falling partly within Zone 2 (and also in Zone 1). However, excavation revealed no trace of such a feature, which must now be interpreted as a reflection of some variation in the topsoil or the crop itself.

Zone 3 occupied a large strip along the central 'spine' of the Ebbsfleet peninsula. The Thanet Beds forming the peninsula sloped down very gently from 4m aOD at the south end of the zone to 3.5m aOD in the north, and then rose again into Zone 4. A slight knoll in the central part of Zone 3 was at 6.9m aOD.

Earlier excavations in the vicinity had demonstrated that the Ebbsfleet peninsula has been an attractive location for activities dating back at least to the Early Bronze Age (Perkins 1992a; Wessex Archaeology 1992; Hearne *et al* 1995; Wessex Archaeology 2004; Wessex Archaeology 2008; Moody 2008; Andrews *et al* 2009). In particular, previous, limited archaeological work within or close to Zone 3 provided evidence for medieval farming activity, though it was suggested that any remains would be heavily truncated (Perkins 1992a). However, the EKA2 excavations showed this not to be the case.

In addition to excavation within the zone, a watching brief was maintained on a service trench which ran parallel to the west of and crossed the zone, but this was almost entirely devoid of archaeological features.

Zones 4–5

Zones 4 and 5 occupied the central 'spine' at the neck of the Ebbsfleet peninsula where it is joined to the Isle of Thanet. The Thanet Beds forming the peninsula here rose steadily from a low point between Zones 3 and 4 at 3.5m aOD to 6m aOD in the north.

Several earlier investigations both within and to the east and west of Zone 4 have revealed a substantial quantity of complex archaeological features and deposits, providing further evidence that the Ebbsfleet peninsula – and this part in particular – has been an attractive location for activities dating back at least to the Early Bronze Age (Perkins 1992a; Wessex Archaeology 1992; Hearne *et al* 1995; Wessex Archaeology 2004; Wessex Archaeology 2008; Moody 2008; Andrews *et al* 2009). Archaeological remains appeared to be denser on the eastern side of the peninsula, facing Pegwell Bay, and included a small ring-ditch of probable Late Neolithic or Bronze Age date, three Late Bronze Age metalwork hoards as well as a possible midden deposit and a complex of broadly contemporary ditches and pits, and Iron Age, Roman and medieval enclosures and field systems. Also identified was a sequence of substantial Late Iron Age–early Roman ditches extending east-west across the peninsula, at least two burials inserted into the top of the ditches, and the flint cobble footings of a rectangular British building.

A large area in the central western part of Zone 4 had been impacted during construction of the Weatherlees Waste Water Treatment Works (WWTW) in the early 1990s, particularly by the digging of a large pond, several pits and the installation of services. This area was subject to archaeological investigation at the time, as was the footprint of the road to the south which provided access to the Weatherlees WWTW (Wessex Archaeology 1992; Hearne *et al* 1995). The part of the access road that crossed Zone 4 had been built over and underlying deposits not disturbed by construction of the EKA2. The southern part of Zone 4, to the south of the access road, was not fully stripped due to the presence of services, but previous work (Wessex Archaeology 1992; Hearne *et al* 1995) showed that this lay in a slightly lower lying 'saddle' that was probably prone to periodic flooding.

The road between Zones 4 and 5, which provided access to Ebbsfleet Farm (which probably has medieval origins) remained in use throughout 2010 and was removed in May 2011, allowing excavation to be completed in this area. Any pre-modern features in the western half of Zone 5 had been completely truncated by earlier ground reduction for the construction of a barn associated with Ebbsfleet Farm to the west.

Weatherlees Pond

In the summer of 2008 an archaeological excavation was undertaken in conjunction with construction work at the Weatherlees Waste Water Treatment Works (WWTW). The construction work comprised significant earthmoving and the excavation of a new pond that formed part of the advance ecological mitigation works for the development of the EKA2 and, therefore, the results from the 2008 excavation have been incorporated within this publication report.

The Weatherlees Pond site was located 30m to the west of Zone 4, and an area of *c* 0.1 hectares was stripped to archaeological levels. Considerable landscaping had been undertaken during the construction of the Weatherlees WWTW in the 1990s, including the excavation of a large pond (see Zone 4), with the material from this used to build a substantial bund immediately to the north-west. This material was present across the majority of the area and was up to 3.5m deep on the western side of the site. The surface of the underlying Thanet Beds sloped upwards from the south-west, from 2.1m aOD to 3.25m aOD.

Zone 6

Zone 6 lay on Thanet Sands, immediately to the north of the Ebbsfleet peninsula and to the south-west of Cottington Hill. The ground sloped gently down from Zone 7 in the north, at 7m aOD, to a shallow depression in the southern half of Zone 6, the lowest point of this being at 4.3m aOD. To the south of the depression the ground rose quite sharply to the south-west to 6.2m aOD, with a summit in the wooded area of Ebbsfleet Hill immediately to the north of Ebbsfleet Farm.

Previous investigations to the west of the zone in 1990 (Perkins 1999), and to the east in 1990 and 2005 (Perkins 1999; Andrews *et al* 2009), demonstrated the uniquely rich potential of Zone 6. This included an apparently stratified sequence of settlement-related deposits which spanned the Early–Middle Iron Age to the mid–late Roman periods. The stone footings of two Roman buildings were recorded, on either side of Zone 6, and a sequence of substantial ditches of Late Iron Age–early Roman date were probably associated with those recorded to the south in areas adjacent to Zone 4 (see above).

In addition to the main excavation area, a pipe trench along the eastern edge of the southern part of Zone 6 and the northern part of Zone 5 was subject to a targeted watching brief. A narrow strip along the verge bordering Ebbsfleet Lane at the north end of Zone 6 was excavated after the completion of archaeological work within the remainder of the zone, but the section of Ebbsfleet Lane which separates Zones 6 and 7 has been retained and has been buried *in situ* as part of the EKA2 construction works, with no disturbance to the underlying archaeological deposits.

Excavation was undertaken in two stages owing to the presence of what initially was believed to be a midden, covering an area in the central southern part of the zone. However, the hand excavation of a series of test pits through this deposit showed it to be a layer of 'dark earth' (170028), and subsequent analysis indicated that the deposit comprised a mixture of colluvium, organic and other remains which had accumulated in what was the lowest part of the site and been reworked through ploughing in the post-Roman period (Macphail and Crowther, Chap 20, Volume 2). Following the test-pit investigation, and the closure of a public footpath crossing this area, the 'dark earth', along with a layer of colluvium (170010) which partly overlay it on the southern slope of Ebbsfleet Hill, were removed by machine in carefully controlled spits, with metalwork and other significant finds (spanning the Late Bronze Age to medieval periods) being 3D-recorded. Below the 'dark earth' were features of Early Neolithic–late Roman date.

During the latter stages of excavation carefully controlled machining of some deposits and larger features (eg, wells and the ditches at the northern end of the site) was undertaken following the completion of hand excavation. This then allowed further and more extensive excavation and recording of these and other features which had previously been obscured by spreads of later material and colluvial deposits.

The feature density recorded over much of Zone 6 decreased markedly at the extreme north end of the zone and also in the southern part of the zone. The dramatic and sharply-defined fall-off of Iron Age and Roman features in the south coincides with a field boundary indicated on the 1st edition Ordnance Survey map of the area; this field boundary is probably a fossilised medieval (and potentially earlier) land division.

Zones 7–8

Zone 7 lay to the north-east of Zone 6 and occupied a gentle to moderate slope on the south-west side of

Cottington Hill. The Thanet Beds here slope upwards from 7m aOD at the south end adjacent to Ebbsfleet Lane to 12m in the north on Cottington Hill.

The feature density recorded over much of Zone 6 decreased dramatically at the extreme north end of that zone and this is reflected in the generally lower density of features recorded in Zone 7, which continued into Zone 8 approaching the top of Cottington Hill. However, the density was substantially greater than found during earlier pipeline works less than 100m to the east (Andrews *et al* 2009), perhaps reflecting the slightly lower position of the latter and its proximity to what would have been marsh bordering Pegwell Bay until drained for agricultural use.

Zone 8 occupied an area close to the low summit of Cottington Hill, on the brow of the hill and extending down the gentle south-west-facing slope, from 15.25m to 12m aOD. Most of the summit and the north-east-facing slope was not excavated, as this part of the zone was designated for filling for construction of the Cottington Lane overbridge. The features in Zone 8 represent a clear continuation of the pattern seen in Zone 7, with some evidence for the influence of topography. Previous work had identified 'the greatest concentration of surface finds in Thanet' (Perkins 1992a), with much of this being of Early Iron Age date, but also including some Saxon and medieval material, along with post-medieval building remains.

Zones 9–10a

Zone 9 lay on the gentle north-east-facing slope of Cottington Hill, extending on to the lower ground at the base of this slope adjacent to the railway. None of this zone was designated for open area excavation as it was to be filled for construction of the Cottington Lane overbridge. However, earlier geotechnical pits had been monitored (Trust for Thanet Archaeology 2006) and limited trenching was undertaken in advance of the installation of services and other works associated with bridge construction. One area was excavated in the north of the zone, and two smaller linear trenches were opened to the south. The Thanet Beds at the south end lay at 10.3m aOD, the lowest area in this part of the route, and all of the trenches remained constantly flooded (and therefore required pumping), although no waterlogged archaeological deposits were encountered, probably due a fluctuating water-table.

Zones 10 and 10a (considered together as Zone 10 below) were located at the base and on the lower part of the Sevenscore scarp slope on land which rises gently to the north of the railway and Cottington Road, from 11m aOD in the south to 14.4m aOD in the north. Only a relatively narrow strip (up to 20m wide) of Zone 10 was excavated (for a farmer's access track) with the remainder being designated for preservation *in situ*, where the ground level was to be raised as part of the Cottington Road railway overbridge works. Two trenches were, however, excavated at the southern end of the zone in the footprint of the bridge bund and bridge piling works, the latter revealing nothing but disturbed or made ground.

Zone 10a to the west of the southern end of Zone 10 was excavated between late August and early October 2010, at the end of the main programme of EKA2 archaeological works. Zone 10a covered the footprint of a lagoon which has replaced that originally intended for the western part of Zone 9. The route of a temporary road diversion which bisected Zone 10a, and crossed the southern end of Zone 10, was investigated in late April 2011 following the removal of the road.

Archaeological features were cut into Thanet Sands and towards the southern end of the Zone 10 were sealed by a layer of colluvium up to 0.3m thick.

Zones 11–12

Zone 11 lay on the Sevenscore scarp slope which rises at a moderate angle to the north towards the ridge of higher ground occupied by Manston Airport. The zone was sub-divided into Zone 11 (north) and Zone 11 (east), reflecting the northern and eastern arms respectively of this T-shaped area. The land within this area rises from 14.5m aOD in the south to 28m aOD in the north of Zone 11 (north), but within Zone 11 (east) it remains fairly level at 15m aOD.

Colluvial soil covered virtually the entire area to a depth of up to 0.3m, and because of the need to strip and store this material within the zone, a somewhat piecemeal approach to the excavation was adopted. Furthermore, due to several natural, albeit localised, undulations in the underlying Thanet Sands geology, additional machining was required in the central part of Zone 11 (north) to provide a coherent plan of the archaeological features. A buried electricity cable ran down the eastern edge of Zone 11 (north) and constrained excavation in this area.

Overall, little background information was available from the very limited archaeological work previously undertaken in the immediate vicinity of Zones 9, 10 and, particularly, Zone 11.

Zone 12 continued eastwards from Zone 11 (east) across the scarp slope of Sevenscore which rises gently to the north towards the ridge of higher ground occupied by Manston Airport. The ground also rises from 15.5m at the west end of the zone to 18.8m at the east end close to the railway line and Cliffs End, and beyond this to the promontory in the eastern half of Zone 13 (which lies at 25.9m aOD). There was also a change in geology, from Thanet Sands to Chalk, which was exposed on the higher ground at the east end of the zone. Construction of a tunnel beneath the railway involved the excavation of a substantial cutting in Zone 12 to the west and in Zones 13 and 14 to the east.

As with Zone 11, it was necessary to approach the investigation of Zone 12 in a somewhat piecemeal fashion. This was largely because of the presence of substantial deposits of colluvium (up to 0.35m thick) which covered the Thanet Sands across most of the zone, and which had to be stored within the zone. The situation was further exacerbated by the initial retention of underground and overhead services at the east end of the zone and a public footpath at the west end. In addition to the main area of excavation, work was undertaken in advance of pipe-laying immediately beyond the northern edge of the zone and also extending to the south.

There was little background information from the very limited archaeological work previously undertaken within or in the vicinity of the zone (Trust for Thanet Archaeology 2003; Trust for Thanet Archaeology 2008a; Andrews *et al* 2009), but excavation revealed an unexpectedly dense and coherent pattern of features spanning the Bronze Age to Roman periods. Features were concentrated in the western half of the area, particularly within a slight dip which extended into Zone 11 (east). The eastern part of the site contained relatively few features.

Cliffs End Spur (Landscape 2)

Zones 13–16

Zone 13 was separated from Zone 12 by a railway line and lay to the east of Foads Lane on a south-west-facing slope rising moderately steeply from 19m aOD in the south-west to 25m aOD in the north-east. The eastern half of the zone was located on more gently sloping ground which forms a slight, south-facing spur or promontory with a maximum height of 25.9m aOD, though the ground then continues to rise gently to the north-west beyond the limits of the zone. Chalk was exposed in the western part of the zone and on the promontory, with Brickearth covering this to the east. From the promontory there are extensive views to the south-east across the Channel to the Continent.

Monitoring of geotechnical pits in the western part of the zone was undertaken in 2008 (Trust for Thanet Archaeology 2008a), and earlier archaeological investigations overlapping with the western end of Zone 13 were carried out during the installation of a gas pipe, revealing a grave, a ditch and three pits, all of probable Iron Age date (Willson 1984). In addition to Iron Age material, Neolithic flints and a Mesolithic 'Thames Pick' have been recovered during fieldwalking in this area (Thanet SMR 171).

Of particular significance are the discoveries made during excavations in 2004–5 at Cliffs End Farm, approximately 250m to the south of Zone 13 (McKinley *et al* forthcoming). These revealed six ring-ditches, three enclosures, and a unique mortuary feature, together spanning the Early Bronze Age to Early Iron Age, as well as a Saxon cemetery and a large number of pits, some rich in marine shell, spanning the 6th–8th centuries AD. The high archaeological potential of Zone 13 was further confirmed by crop and soil marks visible on aerial photographs, indicating a large ring-ditch apparently overlain by a substantial trapezoidal enclosure, features subsequently investigated during the EKA2 excavation.

Zone 14 lay to the east of Zone 13, its western end at 25.5m aOD sited on the same promontory upon which the cropmarks of the trapezoidal enclosure and the large ring-ditch had been recorded. To the east the land falls away gently (where Brickearth overlies the Chalk) and then rises eastwards up a south-west-facing slope of another promontory which forms the western side of the Hollins Bottom dry valley. Here, at the north-east end of the zone, Chalk was exposed and the land surface lay at 30.6m aOD.

Subsoil covered the Brickearth over much of the slightly lower lying central part of the zone to a depth of up to 0.3m and, because of the need to strip and store this material within the zone, a somewhat piecemeal approach to the excavation was adopted in this part of the site. Furthermore, it was apparent that some evidence of largely disturbed (by ploughing) feature fills survived within the lower part of the subsoil, particularly where these contained large quantities of oyster shell or where stone hearths were present, and this necessitated a staged approach to the stripping and excavation where such features occurred.

Earlier investigations comprised the monitoring of six geotechnical test pits in 2008 which recorded several archaeological features cutting into Upper Chalk or Brickearth deposits and a scatter of finds of various periods (Trust for Thanet Archaeology 2008a).

Zone 15 was located on the south and south-east-facing slopes of the west side of a dry valley known as Hollins Bottom. The land generally falls from 31m aOD in the west to 25m aOD in the east. The western part of Zone 15 lies on Upper Chalk while the eastern half, in Hollins Bottom, lies on Brickearth.

No archaeological investigation had taken place in the area of Zone 15. However, previous work in the vicinity had indicated that the area east of Hollins Bottom is particularly rich in archaeological remains. A Neolithic causewayed enclosure occupied Chalk Hill and a possible cursus monument extended south from this towards the Lord of the Manor road junction (Clark *et al.* in prep). Numerous cropmarks indicate the presence of further probable Neolithic monuments and Bronze Age barrows in this area, several of which have been excavated at the Lord of the Manor junction (Macpherson Grant 1977; Perkins 1980a–b; Moody 2008).

At least two extensive inhumation cemeteries of Saxon date have been identified from aerial photographs, and numerous Saxon graves excavated on the east side of Hollins Bottom, most notably at the site known as Ozengell (a Scheduled Ancient Monument 468962), which lies beneath and extends to the north of the Lord of the Manor junction at the eastern end of Zone 15 (Macpherson Grant 1977; Perkins 1980a–b; Moody 2008).

Zone 16 was the designation assigned to the existing Lord of the Manor roundabout at the east end of Zone 16. This double-roundabout had been constructed in the 1970s, involving a substantial raising of the ground level, thereby preserving *in situ* any further Saxon burials relating to the Ozengell cemetery which lay approximately 100m to the north-east. The EKA2 modifications to the roundabout were of a relatively superficial nature and involved no impact on the Scheduled Monument.

Zones 26–28

Zone 26 consisted of a narrow strip (up to 20m wide) along the proposed route of a sewer outfall. This route extended south-eastwards from the west end of Zone 13 (at 21.5m aOD) to Cliffsend Road just east of Cliffs End Cottages, where the route turned north-east along the north side of the road as far as the junction with Sandwich Road and the northern end of Zone 28 (at 19m aOD).

Cropmark evidence for a large Bronze Age ring-ditch and Iron Age enclosure in Zone 13 to the north and the Bronze Age ring-ditches, enclosures and mortuary feature and Saxon cemetery and pits at Cliffs End Farm a short distance to the south (McKinley *et al* forthcoming) indicated a high potential for the occurrence of significant archaeological features in the zone. Furthermore, the Brickearth which covered this area is known to have potential to contain important Pleistocene deposits, particularly in the vicinity of Pegwell Bay.

An evaluation was undertaken along the length of Zone 26 prior to excavation. This demonstrated that the eastern half of the zone was devoid of archaeological features, though two possible palaeochannels were identified. On the basis of this, colluvium/subsoil was not stripped from the eastern half of the route. However, a watching brief was maintained during excavation of the pipe trench in this area, although this identified no deposits of palaeo-environmental interest.

Zone 27 comprised an easement associated with Zone 28, and was not subject to any construction-related impacts.

Zone 28 was the final section of the relatively narrow route of a sewer outfall pipe which originated in Zone 13, passed through Zone 26, crossed the Sandwich road and then continued downwards along the line of the access road to the former Hoverport site on the coast at Pegwell Bay. The archaeological potential of Zone 28 was generally limited, and this potential was further reduced because the pipe trench was a maximum of 2m wide and the upper part lay within varying depths of road formation and made-ground deposits. Nevertheless, the brickearth at the cliff edge was highlighted as this has the potential to contain important Pleistocene deposits, and such deposits have been recorded in a cliff face exposure a short distance around the coast to the north-east. However, no Pleistocene deposits were identified in a watching brief on this section.

Chalk Ridge (Landscape 1)

Zones 17–25 and 29

Zones 17–25, along with Zone 29 (a new service trench), made up the western part of the EKA2. Commencing at the eastern end, Zone 17 extended up the Sevenscore scarp slope, northwards from Zone 11, as far as the A253, and from here Zones 18 to 24 ran consecutively westwards, parallel and just south of the chalk ridge occupied by Manston Airport, as far as the services at the Minster roundabout where the A253 and B2048 meet. Zone 25, a relatively small area immediately north-east of this roundabout (and within the south-west corner of Manston Airport), was removed from the EKA2 scheme in May 2011. Zone 29 comprised a new service trench approximately 900m long which lay just within the southern boundary of Manston Airport and ran parallel to and approximately 50m north of Zone 20 and the east end of Zone 21.

The highest part of Thanet is the promontory at Telegraph Hill, to the north-west of Zone 24, which lies at approximately 55m aOD. The chalk ridge in Zones 22–24 at the west end of the scheme is at a maximum elevation of 51.7m aOD, and the ground falls gently from here to 44.6m aOD in Zone 18, and then more steeply to the southern end of Zone 17 where it is at 28m aOD. Zones 17–24 all faced south, with extensive views over the former Wantsum Channel.

Chalk is the predominant geological deposit throughout Zones 17–24, generally directly underlying ploughed topsoil or, in some places, subsoil. In Zone 29 the ground surface comprised grass, with some areas of hard-standing. As seen elsewhere in this part of Thanet, the chalk exposed along the ridge of higher ground was cut by a series of parallel, north-south ‘stripes’ of periglacial origin. In some areas, just below the brow of the chalk ridge, discontinuous areas of Brickearth overlay the Chalk. This was seen particularly along the southern extremities of the Zones 19–21, and in the central part of Zone 21 the Brickearth sloped into a shallow dry valley which was infilled with colluvial deposits.

The archaeological works along the Chalk Ridge were carried out in accordance with the agreed methodology, but in several instances there were constraints which had minor impacts upon the programme and extent of stripping. These constraints included the initial presence of gas and electricity services and associated exclusion zones up to 8m wide running through parts of Zones 18–20, a temporary site compound (at the east end of Zone 18), existing roads (in Zones 20–22), a badger sett (in Zone 21), potentially contaminated deposits in World War II trenches (Zones 18–20 and a change in the proposed location of a new balancing pond (Zone 21).

An additional excavation area, 1.8km long and generally between 12 and 20m wide, was stripped parallel to and approximately 10–15m south of Zones 18, 19, and 20 to accommodate diverted gas services. This area was sub-divided and the individual parts were designated Zones 18a, 19a, and 20a respectively. At the western end of Zone 20 the gas main diversion crossed the zone and the 12m-wide easement was stripped parallel to and 15m north of the zone. This area was also designated Zone 20a, and continued into Zone 21a to the west, where it linked to the existing gas main.

Zone 17 continued northwards from Zone 11, from 28.5m aOD up the gentle to moderate south-facing slope of Sevenscore to the chalk ridge above at 44.6m aOD. Background information highlighted the presence of several infilled chalk quarries and associated features within and either side of Zone 17 (Oxford Archaeology 2003).

Zone 18 lay at 90° to the northern end of Zone 17, and extended to the west along the chalk ridge and south of the A253, at an average height of 45m aOD. Background information highlighted no significant potential for Zone 18, but noted a focus of Iron Age and Romano-British features to the west in Zone 19 (see below).

Zone 19 extended between Zones 18 and 20, at heights of between 46.5m and 48.5m aOD, with Zone 19a lying south of the main excavation area. Earlier excavations during the installation of the twin gas pipes along the middle of this zone revealed a significant concentration of Iron Age and Roman features, as well as cemeteries of Roman and Saxon date, all in the central part of the zone (Perkins 1985).

Zone 20 lay between Zones 19 and 21, at a height of 48m aOD (slightly lower than Zone 19) Earlier excavations during the installation of twin gas pipes along the middle and northern part of Zone 20 revealed a significant concentration of Roman features (Perkins 1985). These indicated a settlement towards the western end of the zone, probably focused on the postulated junction of a trackway extending to the south-east towards Cottington (and the Roman settlement in Zones 10/10a) and the presumed course of *Dunstrete*, a medieval route with probable Roman or earlier origins which ran east-west along the ridge to the north.

Zone 21 extended either side of Wayborough Hill, at a height of 50m aOD. The background information indicated a moderate level of archaeological potential, largely based on cropmark evidence, which suggested the presence of an extensive prehistoric landscape (Oxford Archaeology 2003; Moody 2008; Perkins 2010). This included ring-ditches within the zone as well as a substantial sub-rectangular enclosure (Scheduled Ancient Monument (Kent 262)) of likely Bronze Age or Iron Age date immediately to the south of the zone.

A substantial, shallow dry valley ran north-south across the central area of the east half of Zone 21, becoming wider and deeper to the south but not extending as far north as Zone 21a. This and a large shallow, hollow to the west were sampled for environmental data, though no buried soils were evident within either and the dry valley appeared to be filled entirely with colluvial deposits.

Zone 22 lay between Zones 21 and 23, at a height of 51.7m aOD. Features in the western half of the zone were wholly or partly investigated as part of the EKA2 Community Excavation undertaken in May and June 2010.

Background information again indicated a moderate level of archaeological potential largely based on cropmark evidence, which suggested the presence of an extensive prehistoric landscape (Oxford Archaeology 2003; Moody 2008; Perkins 2010). Features within this landscape included ring-ditches as well as an oval enclosure of possible Beaker date a short distance to the south, the latter the subject of earlier evaluation (Boast and Gibson 2000). Two small pits found close to the southern edge of the zone during this earlier evaluation were assigned a Neolithic date, though the work in 2010 identified no Neolithic features in this area.

Zone 23 extended between Zones 22 and 24, at a maximum height of 50.5m aOD, with some Brickearth overlying the chalk in the south-west corner of the zone. Background information based on cropmark and excavated evidence suggested that there was high potential for the occurrence of significant archaeological features in this zone, with the presence of an extensive prehistoric landscape including several ring-ditches (Oxford Archaeology 2003; Bennett *et al* 2008; Moody 2008; Perkins 2010). One of these ring-ditches, within Zone 23, had been the subject of limited earlier excavation undertaken in advance of the construction of the Minster Services immediately to the south-west (Canterbury Archaeological Trust 2004; Gollop and Mason 2006). These investigations also revealed an important Middle and Late Iron Age site as well as a group of Roman burials in the area now occupied by the new services. In addition, documentary evidence pointed to the likely presence of remains related to the Thanet Union Workhouse, shown on the 1st edition OS maps.

Zone 24 lay at the western end of the EKA2 route, with the ground surface here at 47m aOD. Background information indicated a similarly high potential to that in Zone 23 (see above). However, the EKA2 excavations indicated that the late prehistoric and Romano-British focus of activity only extended a short distance north into Zone 24, though more recent excavation (undertaken by Museum of London Archaeology) to the south of the Minster Services excavations have confirmed a continuation of the Iron Age and Roman activity there.

Zone 29 was an addition to the original programme of archaeological investigations and lay entirely within the southern boundary of Manston Airport, north of the A253 and parallel to Zone 20 and the eastern end of Zone 21. The work comprised a targeted watching brief on an approximately 900m long, 1m-wide trench dug for an electricity diversion related to the EKA construction works.

Radiocarbon dating

by Alistair J Barclay and Chris J Stevens

Introduction

Fifty-six samples were submitted to the Scottish Universities Environmental Research Centre (SUERC) from selected prehistoric, Romano and Saxon features to try and address a number of research aims regarding the site. Seven dates are on samples of animal bone, mainly articulated, and 42 are on samples of human bone mostly from inhumation and cremation burials, five are on charred plant remains and two are on charred food residue on pottery.

Project aims

The radiocarbon dating strategy had two main aims:

- To confirm the date of otherwise unphased deposits (eg, human and animal bone), to confirm the date of material thought to be contemporaneous with the associated feature (eg, not intrusive or redeposited) and to provide direct dates for pottery by targeting charred food residues;
- To provide more precise dates (ie, within a century) for selected features including a Neolithic pit (191086) with an associated pottery group and a complex of intercutting ditched boundaries (1384 and 3131) of Late Iron Age date. To compare these age estimates with other sites of relevant interest.

Methods, pretreatment, measurement and calibration

The radiocarbon date for each selected sample is quoted in the tables (see Vol 1, Chaps 2–5) in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986). They are conventional radiocarbon ages (Stuiver and Polach 1977). All have been calculated using the calibration curve of Reimer *et al* (2004) and the computer program OxCal (v4.1) (Bronk Ramsey 1995; 1998; 2001; 2009). The calibrated date ranges cited in the text are those for 95% confidence. They are quoted in the form recommended by Mook (1986), with the end points rounded outwards to 10 years for errors >25 years. The ranges in plain type in the radiocarbon tables have been calculated according to the maximum intercept method (Stuiver and Reimer 1986). All other ranges are derived from the probability method (Stuiver and Reimer 1993).

To achieve more precise dates the methods adopted follow the standard Bayesian approach to chronological modelling as outlined by Bayliss and Ramsey (2004), a heuristic procedure that starts by defining a problem and involves the building of simulation models to inform sample selection. Sample results will determine whether the initial model fits expectation, or needs modification or further results.

In two cases (pit 191086 and ditches 1384 and 3131) a Bayesian approach has been adopted for the interpretation of the chronology (Buck *et al* 1996; Bayliss *et al* 2007). Although the simple calibrated dates are accurate estimates of the dates of the samples, it is the dates of the archaeological events, which are represented by those samples, which are of interest, as is the chronology of the selected features and their associated activity. The dates of this activity can be estimated not only using the absolute dating information from the radiocarbon measurements, but also by using the stratigraphic relationships between samples. The OxCal program provides the methodology to combine these different types of information explicitly, to produce realistic estimates of the dates. However, the *posterior density estimates* produced by this modelling are not absolute. They are interpretative *estimates*, which can and will change as further data become available and as other researchers choose to model the existing data from different perspectives. They are quoted in *italics*.

The technique used is a form of Markov Chain Monte Carlo sampling, and has been applied using the program OxCal v4.1 (http://c14.arch.ox.ac.uk/). Details of the algorithms employed by this program are available from the on-line manual or in Bronk Ramsey (1995; 1998; 2001; 2009). The algorithms used in the models described below can be derived from the structures shown in the figures in Vol 1, Chaps 2–5 and Chap 21.

The samples were pretreated as described by Stenhouse and Baxter (1983), graphitised using methods described by Vandeputte *et al* (1996), and dated by AMS as described by Xu *et al* (2004) and Freeman *et al* (2007).

Chapter 1

Coins and Tokens

by Nicholas Cooke and David Holman

Introduction

Some 247 coins and tokens were recovered, both during excavation and as part of a preliminary controlled metal detecting exercise. For the purpose of this report, the coins from some zones have been grouped to allow consideration of assemblages from archaeological sites which extend across several of the designated zones:

Zones 1–3
Zones 4–8
Zones 9–12
Zones 13–14
Zones 17–19
Zones 20–23

The bulk of the assemblage from the EKA2 are struck in copper alloy (183 coins and tokens), with smaller numbers of potin (44 coins), silver (18 coins) and gold (2 coins). One of the copper alloy coins, ON 2171, an antoninianus of Postumus, appears to have been silvered, whilst a second (ON 4398), a Gallo-Belgic stater, appears to have been plated in gold.

In general, the assemblage is in reasonable condition, with the majority of coins and tokens identifiable to period. Some post-depositional corrosion is evident on a few coins, notably the potin coins, but in general, the assemblage shows little sign of serious corrosion. Many of the coins also show signs of pre-depositional wear. The coins recovered range in date from the Late Iron Age through to the 20th century, and the majority are likely to represent accidental losses, although a small hoard of Roman coins was identified in Zone 7.

The assemblage is not equally distributed along the route. By far the largest group of coins comes from Zones 4-8, and from Zone 6 in particular, whilst some zones contained no coins at all. Many zones, however, contain assemblages dominated by post-medieval and modern coinage, much of it found through the systematic use of metal detectors.

Zones 1-3

The coin assemblage from these areas is small (11 coins, Table 1.1.) and largely comprises an unstratified group of post-medieval and modern coins. A mid-4th century minim, a coin of the House of Valentinian (ON 988013) and a silver farthing of Edward I (ON 998012), minted 1280–1, point to some earlier activity. The latter, from Zone 1, may relate to the medieval farmstead excavated on the site.

Zones 4-8

The bulk of the coins recovered from the site came from Zones 4-8 (see Table 1.2).

Table 1.1 Coins from Zones 1–3

Object	*Context*	*Zone*	*Type*	*Issuer/type*	*Issue date*	*Reference*
110	201004	Zone 1	AE 4	House of Constantine – fallen horseman type	AD 350–360	Copy as LRBC II, 25
998012		Zone 1	AR Farthing	Edward I – Long cross with 3 pellets in each quadrant. CIVI TAS LON DON	AD 1280–1281	North 1975, 1053/1
998013		Zone 1	AE coin	Illegible. V corroded coin, prob C18 or C19 in date	Post-medieval	-
991011		Zone 1	AE Half Penny	Victoria – Half penny	AD 1900	Seaby 1989, 3962
992046		Zone 1	AE Penny	George V – Penny	AD 1930	Seaby, 1989, 4055
998009		Zone 1	AE Florin	Elizabeth II – Florin	AD 1957	Seaby 1989 4146
992053		Zone 1	AE Penny	Elizabeth II – New penny	AD 1971	Seaby, 1989, 4240
988013		Zone 2	AE 3	House of Valentinian – Gloria Romanorum type	AD 364–378	As LRBC II,78
993012		Zone 2	AE Half Penny	George III – Reverse illegible	AD 1770–75	
998015		Zone 2	AE Penny	George V – Penny	AD 1915	Seaby 1989, 4051
4652	172056	Zone 3	AE Penny	George VI – Penny	AD 1940	

Zones 4 and 5

Only six coins were recovered from Zone 4, with none from Zone 5. The Zone 4 coins are an Iron Age Kentish Primary potin coin, two Roman coins (a poorly dated as/dupondius and a coin of Valens, minted between AD 364 and 378), and three post-medieval and modern issues. So small an assemblage can tell us little, but the Iron Age and Roman coins may represent activity peripheral to the settlement in Zone 6.

Zone 6

In contrast, some 139 coins were recovered from Zone 6. These range in date from the Iron Age to the modern period, with the majority Late Iron Age or Roman in date.

Late Iron Age coins from Zone 6

Forty-four of the coins from Zone 6 are of Iron Age date. This represents 83% of the total number of Iron Age coins from the entire excavations, clearly showing a dense concentration on an already known and productive site (Holman 2005).

The coins from Zone 6, within the principal Iron Age settlement area, consist mainly of potin coins (34) dating from between the mid-2nd and mid-1st centuries BC. The earliest are those of the prolific Kentish Primary Series, common finds in East Kent and which were already well represented at Ebbsfleet from earlier metal-detector finds (Holman 2005). There are 12 of these from the present excavations, although the generally heavily corroded condition of these coins means that a Gaulish origin is not impossible in one or two cases, but in view of the surprisingly low number of Gaulish imports recorded from Thanet this is considered unlikely. The presence of Kentish Primary Series potin coins in some quantity suggests some activity here in the mid-late 2nd century BC.

The emphasis towards an early date for the bulk of the Iron Age coinage from Zone 6 is maintained by the presence of 22 examples of the subsequent Flat Linear I coins, the earliest of which dates from the late 2nd century BC. A reassessment of Flat Linear potin typology and classification is currently in progress (Holman forthcoming a), but for the purposes of this report the current classification system most often used (Allen 1971) is adopted, with modifications where considered necessary. Coins from both early (Allen A-D) and late (Allen L) in the series are well represented, attesting to continued activity in the first half of the 1st century BC. These types fall within those groups which are by some way the most commonly found among recorded metal detector finds from the East Kent area. Coins from the middle part of the series are virtually absent, which is a common feature of the distribution of Flat Linear I potins in East Kent. Conversely, both of the Flat Linear I hoards found on Thanet (Holman forthcoming b) contain a large proportion of precisely those middle phase coins which are generally absent from the site finds, perhaps suggesting specific episodes of hoarding.

The latest Flat Linear potins present are four examples of Allen L7 and one of Allen M2a, the latter variety having recently been discerned by the writer (DJH) through a study of the Takeley hoard as having certain Class II features while retaining a broad, Class I flan. None of the smaller Flat Linear II potins are present but this is not unexpected, only one coin of this type having been recorded from Thanet. Flat Linear II potins are generally scarce across East Kent with the exception of the major sites at Canterbury and Folkestone and, to a rather lesser extent, Goodnestone (Holman 2005).

The remaining ten Iron Age coins from Zone 6 unexpectedly include three of gold, although one of these is a plated core. A gold quarter stater of Gallo-Belgic BA2 type is early, probably contemporary with the Kentish Primary and the earliest Flat Linear potins. The plated core is Gallo-Belgic Ca1, again contemporary with the mid to late part of the Flat Linear I sequence. The remaining gold coin, a stater of Cunobelin, is perhaps the latest Iron Age coin from the site, dating from *c* AD 20-30, and is a rare find in East Kent although one has also been recorded nearby from St Nicholas-at-Wade. The single silver coin is an issue of Cunobelin which was fairly certainly struck at a mint somewhere in the East Kent area. The six bronzes are all of types which are typically found in the surrounding area and date from the later 1st century BC-early 1st century AD.

It has been noted previously (Holman 2005) that the Iron Age coin distribution at Ebbsfleet does not include the latest issues, for example those of Amminus and the late issues of Cunobelin, and these are again absent, although they are almost invariably much scarcer than earlier Cunobelin types as site finds in East Kent. Nonetheless, the low number of later Iron Age coins may again infer a reduction in site activity shortly before the Claudian invasion.

Roman coins from Zone 6

Eighty–nine of the coins from the zone date to the Roman period. These are largely small denomination copper alloy issues ranging in date from the 1st century AD through to the late 4th century AD, although three silver denarii (ON 321 of Vespasian, ON 3237 of Trajan and ON 4651 of Elagabalus) were also recovered. All but eight of the Roman coins from Zone 6 could be identified to period (after Reece 1991, see Fig 1.1).

The earliest coins are two of Claudius, struck between AD 41 and 54. Combined with a single coin of Nero (period 3) and three Flavian coins (period 4), these suggest activity and coin use in Zone 6 in the post-conquest period. In particular, the presence of a denarius of Vespasian hints at coin use in the late 1st century AD. Denarii were regularly withdrawn from circulation as part of devaluations of the coinage, and although the denarius of Vespasian post-dates the major devaluation during the reign of Nero, it is unlikely to have remained in circulation much beyond the subsequent devaluation under Trajan in AD 107. Small numbers of coins of the 2nd century AD (periods 5 to 10) point to continued coin use on the site at this time. Indeed, it is likely that low level coin use continued throughout the 3rd century AD – periods 11 and 12 saw only low levels of coins supplied to Britain, and these are rare as site finds.

The coinage system established by Augustus, with the gold aureus, silver denarius and small copper alloy denominations (the sestertius, dupondius, as, semis and quadrans – the last two very rare in Britain) lasted with relatively little change until the early-mid 3rd century AD, when the first major change saw the eventual replacement of the denarius with the antoninianus. During this time, little effort seems to have been made to withdraw bronze coinage from circulation and re-issue new coinage, although the semis and quadrans seems to have been used little, perhaps having become too devalued through inflation. As a result of this bronze coins remained in circulation for considerable periods of time after they were struck, making them relatively poor dating tools. Much more effort was made to maintain Imperial control over bullion coinage, however, and denarii are likely to have spent less time in circulation. The ratio at which silver coinage circulated comparative to bronze is far from clear – this is likely to have varied over time, and coin loss may not necessarily accurately reflect coin use on a site. However, three denarii were recovered amongst the 16 coins struck before AD 238, a ratio of 1 silver coin to every 4.33 bronze coins, a ratio which compares favourably to that at sites such as the High Speed 1 excavations at Springhead (1 to 5.63 coins – see Holman and Cooke 2011) and Richborough (1 to 5.77 coins – see Walker 1988, 284). Whilst this proportion is no doubt influenced by the small size of the early assemblage from Zone 6, it seems reasonable to suggest that coins were used on Zone 6 at this time, and circulated in proportions similar to those on other sites in Kent.

The dearth of coins in periods 13 and 14 is, however, surprising at first sight. Many British sites have significant peaks of coin loss in these periods, in which the omnipresent antoninianus and its numerous 'barbarous' copies seem to have circulated and been lost in great numbers. It is somewhat of a surprise then, to note that only six antoniniani were recovered from Zone 6 and that only one is likely to be a copy. At the nearby fort at Richborough, some 8,858 coins of periods 13 and 14 were recovered, part of an overall assemblage of 50,767 coins (some 174 coins per thousand, compared to 75 per thousand from the Zone 6 assemblage). Indeed, the average period 13 and 14 assemblage from 140 sites published by Reece (1991) was some 280 coins per thousand. This strongly suggests that there was a marked drop in coin use on Zone 6 in this period, perhaps representing a hiatus of activity. However, a similar decline and likely near-abandonment has already been noted for the nearby Minster Roman villa site, where the equivalent figure is 81 per thousand (Holman and Parfitt 2005), and the possibility that this may be a more widespread phenomenon in the immediate vicinity should be considered, although the data are yet to be collated.

Following this, however, there is solid evidence for coin use and loss in Zone 6 from the early 4th century AD onwards. The presence of period 15 and 16 coins, generally less common as site finds than coins of the later 4th century, clearly indicates coin use in the first two decades of the 4th century AD. The peaks of coin loss in periods 17 (AD 330–348) and 19 (AD 364–378) are much as expected. The quantity of period 18 coins (the bulk of which comprise copies of 'Fallen Horseman' *Fel Temp Reparatio* issues) is at first sight higher than might be expected for a typical British site, but is not exceptional for East Kent; Minster Roman Villa has a rather higher rate of loss and there are hints that a workshop producing significant quantities of

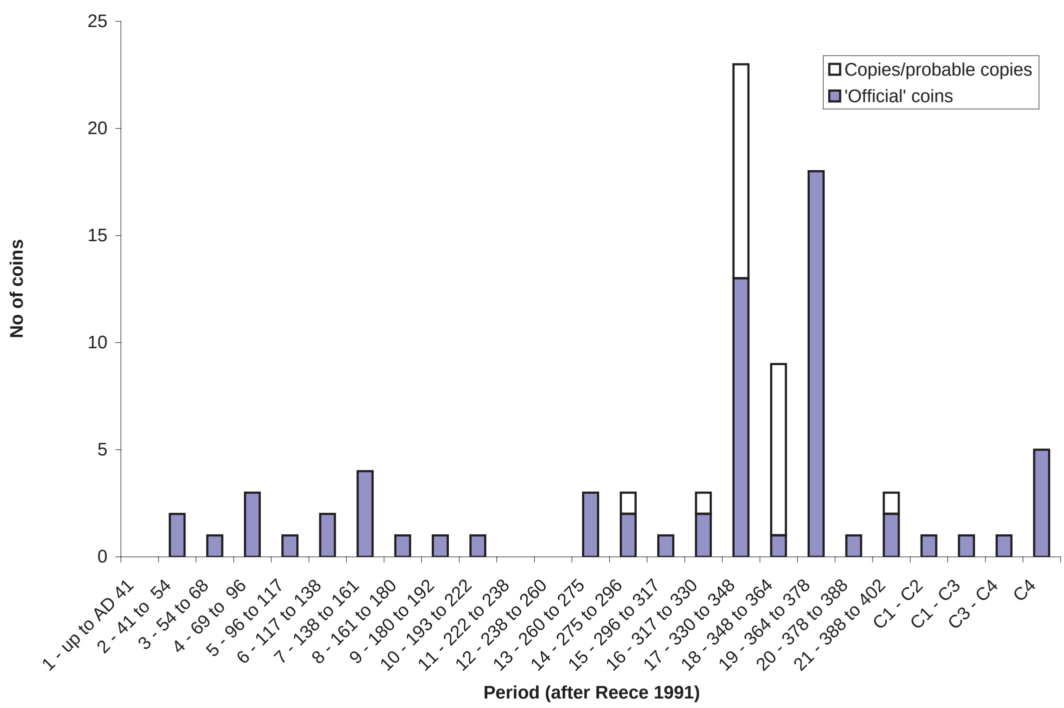


Fig 1.1 Roman coins from Zone 6

'Fallen Horseman' copies was operating in the area (Anderson 1998). The coins of periods 20 and 21 confirm that coins were in use on Zone 6 well into the late 4th century AD and in all probability into the 5th.

Although the assemblage of Roman coins from Zone 6 is not a particularly large one, it can perhaps tell us something about the use of Roman coinage on the site. The coins of the 1st to 3rd centuries suggest that coins were in use on the site from the Flavian period onwards, and, apart from a period in the late 3rd century AD when coin use declined or stopped altogether, continued until the early 5th century AD.

Post-Roman coins from Zone 6

The remaining six coins from the zone form an undistinguished group, comprising a silver Short Cross penny of Henry II (minted 1180–9), modern coins of Edward VII and George V and three illegible coins, all too badly damaged, worn or corroded to be identified closely.

Zone 7

Thirteen coins were recovered from Zone 7: one an Iron Age coin, seven Roman coins and a group of five post-medieval and modern coins. The earliest is a Flat Linear potin coin of the late 2nd-early 1st century BC.

The small assemblage of Roman coins from the zone is dominated by a small hoard of silver denarii. This comprised five coins, ranging in date from a very worn issue of Vespasian (ON 2730, AD 69–79) through to one of Antoninus Pius (ON 2723, minted AD 155–156). Two of these coins, ONs 2722 and 2739, a denarius of Marcus Aurelius as Caesar minted in AD 146-147 and a denarius of Nerva minted in AD 97, were corroded together. The fifth coin (ON 2724) was minted by the emperor Trajan, in AD 101-2. There can be little doubt that these form a small hoard, collected and deposited in the second half of the 2nd century AD, probably shortly after the latest coin was minted in AD 155–156. Although the degree of wear on a coin is not an infallible indication of the time it spent in circulation, the heavy wear recorded on the issue of Vespasian is consistent with the suggested deposition date. With the exception of this coin, the coins showed relatively little evidence of wear. The remaining Roman coins from the zone comprise a sestertius of Hadrian and a damaged 4th century nummus.

The small group of post-medieval and modern coins recovered includes a copper farthing of Charles I (1625–49) and coins of Edward VII and Queen Victoria.

Zone 8

The three coins recovered from this zone comprise two of Queen Victoria and a halfpenny of Elizabeth II.

Zones 9-12

No coins were recovered from Zone 9, although some 23 coins were recovered from Zones 10, 11 and 12 (see Table 1.3).

Zone 10

Twelve of these coins were recovered from Zone 10. Three of these are Roman coins, although only one, an as of Titus (ON 4213) could be identified to period. The two post-medieval coins include a Rose/Orb jeton from Nuremburg, struck by Hans Krauwinckel II. Nuremberg took over from Tournai as the main European centre for jeton manufacture in the 16th century. Prior to this, designs on jetons usually reflected those on contemporary coins, and jetons were often minted under government authority. The only controls on the minting at Nuremburg were those imposed by the Guild organisation, and new designs flourished. Hans Krauwinckel II was Guild Master in Nuremburg between AD 1586 and 1635. The remaining coins are all modern losses, and include a 5 centimes piece of Napoleon III (ON 986044) as well as several British coins of the late 19th and early 20th centuries.

Zone 11

A small mixed group of coins was recovered from Zone 11. Two of these are Late Iron Age potins, one Kentish Primary and one Flat Linear I, presumably relating to some form of limited Iron Age activity on the site. The single quartered silver penny of Aethelred II may have been struck in Rochester, where the names of several moneyers contain the letters EA- recorded on the reverse, although there are also candidates at several other mints. The fourth coin from the zone is a modern penny of George V.

Zone 12

The coins from Zone 12 comprise two Roman coins – a sestertius of Marcus Aurelius (ON 1) and a nummus of the House of Constantine (ON 993051), a Nuremburg jeton, two post-medieval coins or tokens and a modern penny of Edward VII.

Zones 13-16

Only a small number of coins were recovered from the excavations on Zones 13–14, and none from Zones 15 or 16 (see Table 1.4). Few Iron Age or Roman coins were found – perhaps surprising given the presence of Roman settlement remains in this area.

Zone 13

Two coins came from this zone – an Iron Age Kentish Primary potin (ON 538) and a halfpenny of George III.

Zone 14

The four coins from this zone comprise an illegible Roman coin, probably struck in the 4th century AD, a quartered Short Cross penny of King John (ON 985001; minted 1209–17) and two modern coins, one of which is illegible (Table 1.4).

Zones 17-19

No coins were recovered from Zone 17. Elements of the small assemblage from Zones 18 and 19 relate to the Iron Age, Roman and Saxon activity in this area (Table 1.5).

Table 1.2 Coins from Zones 4–8

Object	*Context*	*Zone*	*Type*	*Issuer/type*	*Issue date*	*Reference*
3529	280140	Zone 4	Potin coin	Kentish Primary Series	Mid C2 BC	As Van Arsdell 1402
3503	172144	Zone 4	AE As/Dupondius	Unknown as/dupondius	C1–C3	
3509	190213	Zone 4	AE 3	Valens – Securitas Reipublicae type	AD 364–378	As LRBC II, 82
990016		Zone 4	AE Jeton/Token	Badly corroded jeton or token	Med/Post-med	
989044		Zone 4	AE Half Penny	William III – Half penny	AD 1695–1698	Seaby 1989, 3554
4008	172144	Zone 4	AE Half Penny	Edward VII – Half penny	AD 1910	Seaby 1989, 3991
697	130012	Zone 6	AV quarter stater	Gallo Belgic BA 2, Class 1	*c* 125–100 BC	Van Arsdell 35
4398	170010	Zone 6	AV/AE stater (pl.)	Gallo-Belgic Ca1	*c* 80–60 BC	Van Arsdell 42-3
2943	130012	Zone 6	AV stater	Cunobelin (Corn ear/ Horse right)	*c* AD 20–30	Van Arsdell 1931
4321	130012	Zone 6	AR unit	Cunobelin (CVN in tablet/ Figure walking right)	*c* AD 15–30	Van Arsdell 2067
309	130010	Zone 6	Potin coin	Kentish Primary Series	Mid C2 BC	As Van Arsdell 1402
313	130010	Zone 6	Potin coin	Kentish Primary Series	Mid C2 BC	As Van Arsdell 1402
603	130010	Zone 6	Potin coin	Kentish Primary Series	Mid C2 BC	As Van Arsdell 1402
3235	170002	Zone 6	Potin coin	Kentish Primary Series?	Mid C2 BC	As Van Arsdell 1402
3238	310006	Zone 6	Potin coin	Kentish Primary Series	Mid C2 BC	As Van Arsdell 1402
3250	310010	Zone 6	Potin coin	Kentish Primary Series	Mid C2 BC	Van Arsdell 1410
3305	130012	Zone 6	Potin coin	Kentish Primary Series	Mid C2 BC	Van Arsdell 1428-3
3318	130012	Zone 6	Potin coin	Kentish Primary Series	Mid C2 BC	As Van Arsdell 1402
3348	130012	Zone 6	Potin coin	Kentish Primary Series	Mid C2 BC	As Van Arsdell 1402
3351	130012	Zone 6	Potin coin	Kentish Primary Series?	Mid C2 BC	As Van Arsdell 1402
4649	264243	Zone 6	Potin coin	Kentish Primary Series	Mid C2 BC	As Van Arsdell 1406
4765	130012	Zone 6	Potin coin	Kentish Primary Series	Mid C2 BC	Van Arsdell 1402
3972	153131	Zone 6	Potin coin	Flat Linear I	*c* 130/125–120/115 BC	Allen A var. (VA 104)
686	130012	Zone 6	Potin coin	Flat Linear I	*c* 120/115–105/100 BC	Allen D2
2134	130012	Zone 6	Potin coin	Flat Linear I	*c* 120/115–105/100 BC	Allen D2
3303	130012	Zone 6	Potin coin	Flat Linear I	*c* 120/115–105/100 BC	Allen D2
3304	130012	Zone 6	Potin coin	Flat Linear I	*c* 120/115–105/100 BC	Allen D2?
3358	130012	Zone 6	Potin coin	Flat Linear I	*c* 120/115–105/100 BC	Allen D2?
4639	172303	Zone 6	Potin coin	Flat Linear I	*c* 120/115–105/100 BC	Allen D2
3977	239227	Zone 6	Potin coin	Flat Linear I *c* 40% survives of a badly corroded potin	*c* 120/115 –105/100 BC	Allen C var.
2929	156220	Zone 6	Potin coin	Flat Linear I	*c* 105/100–95/90 BC	Allen F/GB?
2113	130012	Zone 6	Potin coin	Flat Linear I	*c* 120/115 –105/100 BC	Allen D2?
354	133023	Zone 6	Potin coin	Flat Linear I	*c* 95/90–80/75 BC	Allen J4 var.
3349	130012	Zone 6	Potin coin	Flat Linear I	*c* 95/90–80/75 BC	Allen J3 or J4 var.
3875	130012	Zone 6	Potin coin	Flat Linear I	*c* 80/75–65/60 BC	Allen H2/3 var.
2990	170010	Zone 6	Potin coin	Flat Linear I	*c* 80/75–65/60 BC	Allen L3/4 var.
626	130012	Zone 6	Potin coin	Flat Linear I	*c* 80/75–65/60 BC	Allen L3/4 var.
3961	190254	Zone 6	Potin coin	Flat Linear I	*c* 80/75–65/60 BC	Allen L3/4 var.
8409	289045	Zone 6	Potin coin	Flat Linear I Incomplete – only *c* 35% survives	*c* 80/75–65/60 BC	Allen L3/4?
2177	130012	Zone 6	Potin coin	Flat Linear I Incomplete flan – only *c* 60% present	*c* 80/75–65/60 BC	Allen L7
3928	298153	Zone 6	Potin coin	Flat Linear I Damaged flan – *c* 65% survives	*c* 80/75–65/60 BC	Allen L7
3964	144158	Zone 6	Potin coin	Flat Linear I Broken – in 2 pieces, *c* 70% survives	*c* 80/75–65/60 BC	Allen L7
4770	182305	Zone 6	Potin coin	Flat Linear I	*c* 80/75–65/60 BC	Allen L7
3352	130012	Zone 6	Potin coin	Flat Linear I Only half survives	*c* 70/65–65/60 BC	Allen M2a
308	130010	Zone 6	AE unit	Dubnovellaunos (Horse right/ Lion left)	*c* 25–5 BC	Van Arsdell 166
3902	130244	Zone 6	AE unit	Dubnovellaunos (Boar right/ Eagle right)	*c* 25–5 BC	Van Arsdell 180

Table 1.2 (continued)

Object	*Context*	*Zone*	*Type*	*Issuer/type*	*Issue date*	*Reference*
337	130009	Zone 6	AE unit	Eppillus (Geometric pattern/ Eagle left)	*c* AD 1–15	Van Arsdell 450
338	130009	Zone 6	AE unit	Eppillus (Head left/ Charioteer right	c AD 1–15	Van Arsdell 453
3369	130012	Zone 6	AE unit	Cunobelin (Pegasus left/ Victory left)	*c* AD 15–30	Van Arsdell 1973–1
990143	194163	Zone 6	AE unit	Ambiani (Combined animals/ Horse left) (Continental import)	*c* 50–30 BC	Scheers 125
2114	130012	Zone 6	AE As	Claudius – Minerva r with shield	AD 41–54	RIC I, 100
3316	130012	Zone 6	AE As	Claudius – reverse illegible	AD 41–54	
912	182031	Zone 6	AE As/Dupondius	Nero – uncertain reverse	AD 64–68	
321	130010	Zone 6	AR denarius	Vespasian – PON MAX (TRP) COS VI Pax reverse	AD 75	RIC II, Vespasian, 90
346	130012	Zone 6	AE As	Domitian - Spes advancing l holding flower.	AD 77–78	RIC II, Vespasian, 791a
990111	185148	Zone 6	AE As	Vespasian – Eagle on globe	AD 72	RIC II, Vespasian, 1202
3237	130012	Zone 6	AR denarius	Trajan – Trajan's column. COS VI PP SPQR	AD 114–117	RIC II, Trajan, 307
3324	130012	Zone 6	AE sestertius	Hadrian – uncertain reverse	AD 117–138	
3248	310002	Zone 6	AE sestertius	Hadrian – uncertain reverse	AD 117–138	
629	130012	Zone 6	AE dupondius	Antoninus Pius – TR POT COS II.	AD139	RIC III Antoninus Pius, 552a
2160	269063	Zone 6	AE dupondius	Antoninus Pius – LIBERTAS COS IIII	AD 154–155	RIC III, Antoninus Pius, 933
2965	305020	Zone 6	AE sestertius	Faustina II – uncertain reverse	AD 145–161	
3909	130012	Zone 6	AE sestertius	Faustina I – Aeternitas reverse	AD 141–145 ish	RIC III, Marcus Aurelius, 103B
328	130009	Zone 6	AE sestertius	Marcus Aurelius – uncertain reverse	AD 161–180	
3321	130012	Zone 6	AE sestertius	Commodus – Minerva reverse	AD 189	RIC III, Commodus, 1599
4651	130012	Zone 6	AR denarius	Elagabalus - PM TR P IIII COS III P P	AD 221	RIC IV, Elagabalus, 43
622	130012	Zone 6	AE Antoninianus	Claudius II Gothicus – Divo Claudio	AD 270–273	RIC V, Part a, Claudius II, 265
2171	170002	Zone 6	AE Antoninianus	Postumus – Galley (Laetitia Aug)	AD 259–268	RIC V, Part II, Postumus 73
2172	170002	Zone 6	AE Antoninianus	Postumus –uncertain reverse	AD 259–268	
2146	130012	Zone 6	AE Antoninianus	Radiate antoninianus. Possibly Carausius/Allectus	AD 270–296	
3302	130012	Zone 6	AE Antoninianus	Radiate copy – from Pax?	AD 270–296	
3370	130012	Zone 6	AE Antoninianus	Allectus – uncertain reverse	AD 293–296	
998020		Zone 6	AE 3	Constantine I – Soli Invicto Comiti	AD 307–317	Variant on RIC VI, London 113
3322	130012	Zone 6	AE 3	Constantine I – Beata Tranquillitas	AD 321	RIC VII, Trier, 303
3325	130012	Zone 6	AE 3	Constantine I – VICTORIAELAETAEPRINCP type	AD 318–321	
990148	130012	Zone 6	AE 3	Crispus – Iovi Conservatori type	AD 321–324	RIC VII, Cyzicus, 17
3307	130012	Zone 6	AE 3	House of Constantine – Urbs Roma	AD 330	LRBC I, 51
3320	130012	Zone 6	AE 3	House of Constantine – Urbs Roma	AD 334	LRBC I, 205
683	130012	Zone 6	AE 3	House of Constantine – Urbs Roma	AD 330–335	As LRBC I, 51
3330	130012	Zone 6	AE 3	House of Constantine – Urbs Roma	AD 330–335	LRBC I, 195
2151	130012	Zone 6	AE 3	House of Constantine – Constantinopolis	AD 330–335	As LRBC I, 52
3328	130012	Zone 6	AE 3	House of Constantine – Constantinopolis	AD 330–335	As LRBC I, 52
3876	130012	Zone 6	AE 3	House of Constantine – Constantinopolis	AD 330–335	As LRBC II, 52

Table 1.2 (continued)

Object	Context	Zone	Type	Issuer/type	Issue date	Reference
345	130012	Zone 6	AE 3	Constantine II – Gloria Exercitus 2 standards	AD 331	LRBC I, 187
3877	130012	Zone 6	AE 3	Constantine II – Gloria Exercitus 2 standards	AD 333	LRBC II, 198
4640	130012	Zone 6	AE 3	House of Constantine – Gloria Exercitus 2 standards	AD 330–335	As LRBC I, 72
687	130012	Zone 6	AE 3	House of Constantine – Gloria Exercitus 2 standards	AD 330–345	? Copy as LRBC I, 48
3323	130012	Zone 6	AE 4	Constantine II – Gloria Exercitus 2 standards	AD 330–345	? Copy as LRBC I, 49
990140	278162	Zone 6	AE 3	Constantine I – Gloria Exercitus 2 standards	AD 330–345	Copy as LRBC I, 60
4312	130012	Zone 6	AE 4	Constans – Gloria Exercitus 2 standards	AD 333–335	As LRBC I, 75
352	130012	Zone 6	AE 3	Constans – Gloria Exercitus 1 standard	AD 339	LRBC I, 133
4683	170002	Zone 6	AE 3	Constantine II – Gloria Exercitus 1 standard	AD 335–341	As LRBC I, 88
302	130010	Zone 6	AE 4	House of Constantine – Gloria Exercitus 1 standard	AD 335–345	? Copy as LRBC I, 87
2896	130010	Zone 6	AE 3	House of Constantine – Gloria Exercitus 1 standard	AD 335–345	? Copy as LRBC I, 87
682	130012	Zone 6	AE 3	House of Constantine – Gloria Exercitus 1 standard	AD 335–345	Copy as LRBC I, 87
2176	130010	Zone 6	AE 4	House of Constantine – Gloria Exercitus 1 standard	AD 330–335	Copy as LRBC I, 87
348	130010	Zone 6	AE 4	Constantine II – Gloria Exercitus 1 standard	AD 335–345	? Copy as LRBC I, 88
4759	310016	Zone 6	AE 3	Constans – Victoriaeddaugqnn type	AD 342	LRBC I, 137
3306	130012	Zone 6	AE 3	Constans – Victoriaeddaugqnn type	AD 341–348	LRBC I, 158
3252	310017	Zone 6	AE 3	Constans – Phoenix on pyre	AD 348–350	As LRBC II, 33
347	130008	Zone 6	AE 4	House of Magnentius – Victoriaeddnnaugetcae type	AD 350–360	?Copy as LRBC II, 25
2175	130010	Zone 6	AE 3	House of Constantine – fallen horseman type	AD 350–360	? Copy as LRBC II, 25
618	130012	Zone 6	AE 3	Constantius II - fallen horseman type	AD 350–360	? Copy as LRBC II, 201
344	130012	Zone 6	AE 4	House of Constantine – fallen horseman type	AD 350–360	Copy as LRBC II, 25
684	130012	Zone 6	AE 4	House of Constantine – fallen horseman type	AD 350–360	Copy as LRBC II, 25
2179	130012	Zone 6	AE 4	House of Constantine – fallen horseman type	AD 350–360	Copy as LRBC II, 25
3874	130012	Zone 6	AE 4	House of Constantine– fallen horseman type	AD 350–360	Copy as LRBC II, 25
998045		Zone 6	AE 3	House of Constantine – fallen horseman type	AD 350–360	Copy as LRBC II, 25
343	130010	Zone 6	AE 3	House of Valentinian – Gloria Romanorum type	AD 364–378	As LRBC II, 78
3298	130012	Zone 6	AE 3	Valentinian I – Gloria Romanorum type	AD 364–375	As LRBC II, 279
990110	247237	Zone 6	AE 3	Valens – Gloria Romanorum type	AD 367–375	LRBC II, 348
331	130010	Zone 6	AE 3	Valentinian I – Gloria Romanorum type	AD 364–375	LRBC II, 350
336	130009	Zone 6	AE 3	House of Valentinian – Securitas Reipublicae type	AD 364–378	As LRBC II, 82
990139	170056	Zone 6	AE 3	House of Valentinian – Securitas Reipublicae type	AD 364–378	As LRBC II, 82
992008		Zone 6	AE 3	House of Valentinian – Securitas Reipublicae type	AD 364–378	As LRBC II, 82
645	130012	Zone 6	AE 3	Valens – Securitas Reipublicae type	AD 364–378	As LRBC II, 86
676	130010	Zone 6	AE 3	Valens – Securitas Reipublicae type	AD 364–378	As LRBC II, 86

Table 1.2 (continued)

Object	*Context*	*Zone*	*Type*	*Issuer/type*	*Issue date*	*Reference*
339	130009	Zone 6	AE 3	Valens – Securitas Reipublicae type	AD 367–375	LRBC II. 306
677	130010	Zone 6	AE 3	Valens – Securitas Reipublicae type	AD 364–378	LRBC II, 513
3300	130012	Zone 6	AE 3	Valens – Securitas Reipublicae type	AD 364–378	As LRBC II, 502
3246	310012	Zone 6	AE 3	Valens – Securitas Reipublicae type	AD 364–378	LRBC II, 528
2109	130012	Zone 6	AE 3	Valentinian I – Securitas Reipublicae type	AD 367–378	LRBC II, 1430
994002		Zone 6	AE 3	Valens – Securitas Reipublicae type	AD 375	LRBC II, 528
332	130010	Zone 6	AE 3	Gratian – Gloria Novi Saeculi type	AD 367–375	As LRBC II, 499
2137	130010	Zone 6	AE 3	Gratian – Gloria Novi Saeculi type	AD 367–375	As LRBC II, 517
324	130010	Zone 6	AE4	Gratian – Wreath containing VOT/XV/MVLT/XX	AD 378–383	LRBC II, 377
999001		Zone 6	AE 4	Gratian – Wreath containing VOT/XV/MVLT/XX	AD 378–383	LRBC II, 377
2150	130012	Zone 6	AE 4	Arcadius – Victoria Auggg type	AD 388–402	As LRBC II, 566
3295	130012	Zone 6	AE 4	House of Theodosius – Victoria Auggg type	AD 388–402	As LRBC II, 162
991002		Zone 6	AE 4	House of Theodosius – Virtus Exerciti type	AD 393–402	Copy as LRBC II, 1992
997007		Zone 6	AE sestertius	Illegible	C1–C2	
678	130012	Zone 6	AE sestertius	Illegible	C1–C3	
2895	130010	Zone 6	AE 3	Illegible	C3–C4	
3362	130012	Zone 6	AE 4	Illegible	C4	
2173	130010	Zone 6	AE 4	Illegible	C4	
3256	310008	Zone 6	AE 4	Illegible	C4	
681	130012	Zone 6	AE 4	Illegible	C4	
3301	130012	Zone 6	AE 4	Illegible	C4	
3202	305032	Zone 6	AR Penny	Henry II – short cross penny	AD 1180–1189	North, 1994, 962
992007		Zone 6	AR Sixpence	Edward VII Six pence	AD 1902	Seaby 1989, 3983
992001		Zone 6	AE Penny	George V – one penny	AD 1917	Seaby 1989, 4051
990142	145309	Zone 6	AE 4	Blank – possibly a coin blank or small weight		
4769	297114	Zone 6	? coin	Illegible. Small fragment of copper, may be a frag. of coin		
990133	185148	Zone 6	coin	Illegible		
2721	201078	Zone 7	Potin coin	Flat Linear I	*c* 120/115–105/100 BC	Allen D2
2730	201078	Zone 7	AR denarius	Vespasian - uncertain	AD 69–79	-
2739	201078	Zone 7	AR denarius	Nerva - FORTVNA AVGVST type	AD 97	RIC II, Nerva, 16
2724	201078	Zone 7	AR denarius	Trajan – Hercules PM TRP COS IIII PP type	AD 101–102	RIC II, Trajan, 49
2725	201078	Zone 7	AE sestertius	Hadrian – Uncertain reverse	AD 117–138	-
2722	201078	Zone 7	AR denarius	Marcus Aurelius – Spes TR POT COS II type	AD 146–147	RIC III, Antoninus Pius, 437
2723	201078	Zone 7	AR denarius	Antoninus Pius – Salus TR POT XIX COS IIIII type	AD 155–156	RIC III, Antoninus Pius, 254
992030		Zone 7	AE 4	? fallen horseman copy – fragment only	C4	
991013		Zone 7	AE Farthing	Charles I – crown/rose	AD 1625–1649	As Seaby 1989, 3201
988004		Zone 7	AE Penny	Victoria – Penny	AD 1865	Seaby 1989, 3954
992029		Zone 7	AE Half Penny	George VI – Half Penny	AD 1945	Seaby 1989, 4115
992037		Zone 7	AE Half Penny	George VI – Half Penny	AD 1943	Seaby 1989, 4115
998019		Zone 7	AE coin	Illegible	-	-
995015		Zone 8	AE Half Penny	Victoria – Half Penny	AD 1861	Seaby 1989, 8956
995013		Zone 8	AE Half Penny	Victoria – Half Penny	AD 1899	Seaby 1989, 3962
995014		Zone 8	AE Half Penny	Elizabeth II – Half Penny	AD 1973	Seaby, 1989, 4250

Table 1.3 Coins from Zones 9–12

Object	*Context*	*Zone*	*Type*	*Issuer/type*	*Issue date*	*Reference*
4213	239280	Zone 10	AE As	Titus – reverse uncertain	AD 79–81	-
986137	249175	Zone 10	As/Dupondius	Unknown. Worn smooth. Only half present	C1–C3	-
986145	249175	Zone 10	AE 4	Unknown. Probably a C4 copy	C4	-
986126	249175	Zone 10	Jeton	Hans Krauwinckel II – Rose/Orb jeton	AD 1586–1635	-
986119	249175	Zone 10	AE coin	Illegible. Heavily corroded post-medieval coin	Post-medieval	-
986044		Zone 10	AE 5 centimes	Napoleon III. 5 centimes	AD 1854	-
988028		Zone 10	AE Half groat	Victoria. Half groat	AD 1896	Seaby 1989, 3962
990085		Zone 10	AE Half Penny	Edward VII Half penny	AD 1901–1910	Seaby, 1989, 3991
986122	249175	Zone 10	AE Penny	George V – Penny	AD 1936	-
986125	249175	Zone 10	AE Half Penny	George VI – Half penny	AD 1948	-
990048		Zone 10	AE Florin	Elizabeth II florin	AD 1962	Seaby 1989, 4146
990089		Zone 10	AE Penny	Elizabeth II Penny	AD 1967	Seaby 1989, 4157
421	165004	Zone 11	Potin coin	Flat Linear I	*c* 120/115–105/100 BC	Allen D2
993043		Zone 11	Potin coin	Kentish Primary Series	Mid C2 BC	As Van Arsdell 1406
989043		Zone 11	AR Penny	Aethelred II Penny. Moneyer begins with EA-. Quartered	*c* AD997–1003	As North, 1994, 770
992061		Zone 11	AE Penny	George V – Penny	AD 1930	Seaby 1989, 4055
1	126015	Zone 12	AE sestertius	Marcus Aurelius – Salus 1 SALVTI AVG COSIII	AD 168–169	RIC III, Marcus Aurelius, 964
993051		Zone 12	AE 4	House of Constantine – Gloria Exercitus 2 standards	AD 335–345	Copy as LRBC I, 87
992083		Zone 12	AE Jeton	Nuremburg jeton	C16–C17	-
989011		Zone 12	AE Token	Uncertain design. Very worn	C17–C18	-
989013		Zone 12	AE coin	Illegible	Post-medieval	-
998101	998101	Zone 12	AE penny	Edward VII – penny	AD 1905	Seaby 1989, 3990

Table 1.4 Coins: Zones 13–14

Object	*Context*	*Zone*	*Type*	*Issuer/type*	*Issue date*	*Reference*
538	243014	Zone 13	Potin coin	Kentish Primary Series	Mid C2 BC	As Van Arsdell 1406
983014		Zone 13	AE Half Penny	George III – Half Penny	AD 1806–7	Seaby 1989, 3781
1570	184002	Zone 14	AE 3	Illegible	C4	
985001		Zone 14	AR Penny	John – short cross penny, quartered	AD 1209–1217	North, 1994, 974/1
983009		Zone 14	AE Half Penny	Illegible	C18–C19	
985045		Zone 14	AE Penny	Victoria – Penny	AD 1861	Seaby 1989, 3954

Zone 18

A single Flat Linear I potin was recovered (ON 991040). Another Iron Age coin, a struck bronze unit of Dubnovellaunos, dating from the late 1st century BC (ON 1206), came from Zone 18/19

Zone 19

One Kentish Primary potin was recovered from Zone 19 (ON 990069), as well as a late 4th century BC bronze coin from Carthaginian Sicily (ON 998120). Although this latter coin would initially appear to be an extraordinary find, coins of this type are in fact not uncommon in East Kent and one has previously been recorded from the area covered by Zone 6 in this report. The appearance of such early coins remains a mystery in the continued absence of stratified specimens and the subject has most recently been discussed by Holman (Holman 2005). The small group of pre-Roman coins from Zones 18/19 must relate to Late Iron Age activity in the area in the late 2nd and 1st centuries BC. The presence of three illegible early Roman coins from Zone 19 suggests that there may be continuity into the early Roman period, although none is well dated. A single late Roman coin, a nummus of the late 340s AD, was also recovered from the site (ON 990082).

The only Saxon sceat from the entire scheme was recovered from a Saxon grave in Zone 19, and was clearly deposited as a grave good (ON 2017) along with several other items in a triple inhumation burial (grave 136111). The coin lay in the waist area between two of the burials.

Series BIb silver sceatta (BMC 27b)

Obv. Blundered legend. Diademed bust right within serpent circle

Table 1.5 Coins from Zones 17–19

Object	*Context*	*Zone*	*Type*	*Issuer/type*	*Issue date*	*Reference*
991040		Zone 18	Potin coin	Flat Linear I	*c* 120/115–105/100 BC	Allen D2 var.
1206	153105	Z 18/19	AE unit	Dubnovellaunos (Boar right/ stylised eagle right)	*c* 25–5 BC	Van Arsdell 180
990069		Zone 19	Potin coin	Kentish Primary Series	Mid C2 BC	As Van Arsdell 1406
998120		Zone 19	AE unit	Siculo-Punic (Bust left/ Horse right)	Late C4 BC	CNS, Kartago 20
990052		Zone 19	AE as/dupondius	Uncertain	C1–C2	-
1218	126095	Zone 19	AE as/dupondius	Illegible	C1–C3	-
4750	153032	Zone 19	-	Saxon grave		
	153034		AE As	Uncertain		
990082		Zone 19	AE 3	House of Constantine – Phoenix on globe. Fel Temp Reparatio type	AD 348–350	As LRBC II, 42
2017	136113	Zone 19	AR sceatta	Bust r./ Bird atop a cross Primary series – Series B	AD 680–710	North, 1994, 126
988019		Zone 19	AE coin	Illegible	Post-medieval	-
990068		Zone 19	AE coin	Illegible	Post-medieval	-
990081		Zone 19	AE Half Penny	Illegible	Post-medieval	-
990061		Zone 19	AE Farthing	Victoria – farthing	AD 1860–1895	Seaby 1989, 3958
990055		Zone 19	AR Shilling	George V – Shilling	AD 1922	Seaby 1989. 4023
990070		Zone 19	AE Farthing	George V – Farthing	AD 1925	Seaby, 1989, 4060

Rev. Blundered legend. Bird on a cross with annulet at the end of each arm.
0.88g Slightly worn. Die Axis 180°. ON 2017, context 136113

Although wear on coins is not a reliably accurate indicator of circulation, it seems likely that this coin was not in circulation long before its deposition. Sceattas of this type are generally dated to *c* AD 685–95, suggesting a date for the burial late in the 7th century AD or early in the 8th (Grierson and Blackburn 2007, 165-7). Although coins are not very common as grave goods, Series B sceattas have been recovered from Saxon graves elsewhere in Kent, including from recent excavations at Springhead (Holman and Cooke 2011) and Bridge (Wilkinson 2008), as well as outside the county. The remaining six coins from the zone are either illegible post-medieval or modern issues.

Zones 20-24
Coins came from all five of these zones, with the majority from Zones 20 and 21 (see Table 1.6)

Zone 20
Eleven coins were recovered. The earliest of these was a Flat Linear I potin (Object 3908) dated to *c* 90-60 BC. There were also four late Roman coins, ranging in date from *c* AD 270 through to *c* AD 345. These are likely to be associated with activity related to the Roman sunken-featured-buildings in this area. These form a fairly closely dated group, suggesting that the activity on the site was fairly short lived. Five coins and a token dated to the post-medieval and modern periods were also recovered.

Zone 21
Four late Roman coins came from Zone 21. These are likely to be part of the same assemblage as those recovered from Zone 20, although three were too corroded to be identified to period. The fourth is possibly a copy of a nummus of the House of Magnentius struck between AD 350 and 353.

The remaining nine coins from the site comprise a single Nuremburg jeton (ON 995073), struck by Guild master Hans Krauwinckel II (master AD 1586–1635), seven post-medieval and modern coins (including a 1937 American one cent piece – ON 988189) and one illegible coin.

Zone 22
A single illegible post-medieval coin was recovered from Zone 22.

Zone 23
The four coins recovered from Zone 23 were a coin of Constantine I struck in AD 323–4 (ON 992184), a Short Cross silver penny of Henry III struck by the Canterbury moneyer, Hiun in 1216–7 (ON 990150), a halfpenny of George III and an extremely worn silver flan of uncertain date.

Zone 24
An illegible coin from Zone 24 is thought likely to be post-medieval in date (Table 1.6).

Discussion

The assemblages recovered from the excavations provide us with important evidence for coin use on Thanet, especially in the Late Iron Age and Roman periods. In particular the coins from Zones 6 and 7 provide a chronological framework for activity in this area, and also

Table 1.6 Coins from Zones 20–24

Object	*Context*	*Zone*	*Type*	*Issuer/type*	*Issue date*	*Reference*
3908	126254	Zone 20	Potin coin	Flat Linear I. Damaged flan – probably *c* 80% present	*c* 95/90–65/60 BC	Allen J or L?
1900	251015	Zone 20	AE antoninianus	Postumus – uncertain reverse	AD 259–268	-
3794	249020	Zone 20	AE antoninianus	Radiate copy. Small irregular flan	AD 270–296	-
3787	249020	Zone 20	AE 3	Uncertain – Virtus Exercit type	AD 318–324	-
991060		Zone 20	AE 3	House of Constantine – Gloria Exercitus 2 standards	AD 330–345	? Copy as LRBC II, 48
991070		Zone 20	AE Token	Corroded C17 token	C17	-
991051		Zone 20	AE coin	Illegible	Post-medieval	-
998163		Zone 20	AE Token	Bust l, VICTORIA REGINA – TO HANOVER. 1837 below	AD 1837	
3793	249020	Zone 20	AE Half Penny	Victoria – Half Penny	AD 1887	Seaby 1989, 3956
991069		Zone 20	AE coin	Illegible	Unknown	-
7759	171221	Zone 20	AE coin	Illegible	Unknown	-
998193		Zone 21	AE 3	House of Magnentius – Victoriaddnnauggetcae type	AD 350–353	As LRBC II, 5
992144		Zone 21	AE 3	Illegible	C3–C4	-
988046		Zone 21	AE 4	Illegible	C4	-
992197		Zone 21	AE 4	Illegible	C4	-
995073		Zone 21	AE Jeton	Hans Krauwinckel II – Imperial orb GOTES SEGEN MACHT REICH	AD 1586–1635	Cf. Mitchiner. 1571–1573
983025		Zone 21	AE Half Penny	Extremely worn C18 half penny	C18	
995058		Zone 21	AE Farthing	Victoria – Farthing	AD 1838–1860	Seaby 1989, 3950
998190		Zone 21	AE Half Penny	Victoria – Half Penny	AD 1837–1901	-
995055		Zone 21	AR Six Pence	George V – Six Pence	AD 1928	Seaby 1989, 4040
995060		Zone 21	AE Penny	George V – Penny	AD 1935	Seaby 1989, 4055
988189		Zone 21	AE one cent	United States of America – 1937 One cent	AD 1937	-
990107		Zone 21	AE Half Penny	George VI – Half Penny	AD 1943	Seaby 1989, 4115
991066		Zone 21	AE coin	Illegible	Unknown	-
992157		Zone 22	AE coin	Illegible	Post-medieval	-
992184		Zone 23	AE 3	Constantine I – Sarmatia Devicta type	AD 323–324	RIC VII, Trier, 435
990150		Zone 23	AR Penny	Henry III – Short Cross penny	AD 1216–7	North, 1994, 976/1
998249		Zone 23	AE Half Penny	George II – Half Penny	AD 1729–1739	Seaby 1989, 3720
998248		Zone 23	AR coin	Illegible – worn smooth	Unknown	-
992174		Zone 24	AE coin	Illegible	Post-medieval	-

highlight changes in coin use and loss over time which may reflect periods of activity or even abandonment.

Iron Age coins

A total of 53 Iron Age coins dating from between the mid 2nd century BC and the early 1st century AD, and one earlier Siculo-Punic bronze coin, were recovered during the course of the excavations, the majority (46) from Zones 4-7 within and in the immediate vicinity of a previously known site at Ebbsfleet which had already produced a significant number of Iron Age coins from metal-detecting activity over a number of years in the 1990s (Holman 2005). The excavation of a portion of this site, and the coin assemblage from it provide important evidence for coin use and loss on a Late Iron Age domestic settlement in East Kent. Analysis of the range of Iron Age coins from this site has the potential to shed light on the date range of the settlement, changes in coin use and also trade links and exchange networks – or lack of – with the continent. It also provides an opportunity for a re-assessment of the previously published group of coins from the site.

Potin coins are very much in the majority, much more so than has previously been noted at Ebbsfleet; indeed, the 23 Flat Linear I potins alone represent 50% of the Iron Age coins recovered from Zones 4-7. This has given rise to some significant changes in the analysis of the site finds since this was last discussed (Holman 2005). The possibility that coins previously found by local metal detectorists and recorded by the writer contain an element of bias away from the potins must be considered, many of the potins recorded from here being in very poor condition as a result of soil conditions and agricultural activity. Although only supposition, perhaps the most likely reason for the considerable disparity in the distributions between past metal detector activity and the recent excavations is that some

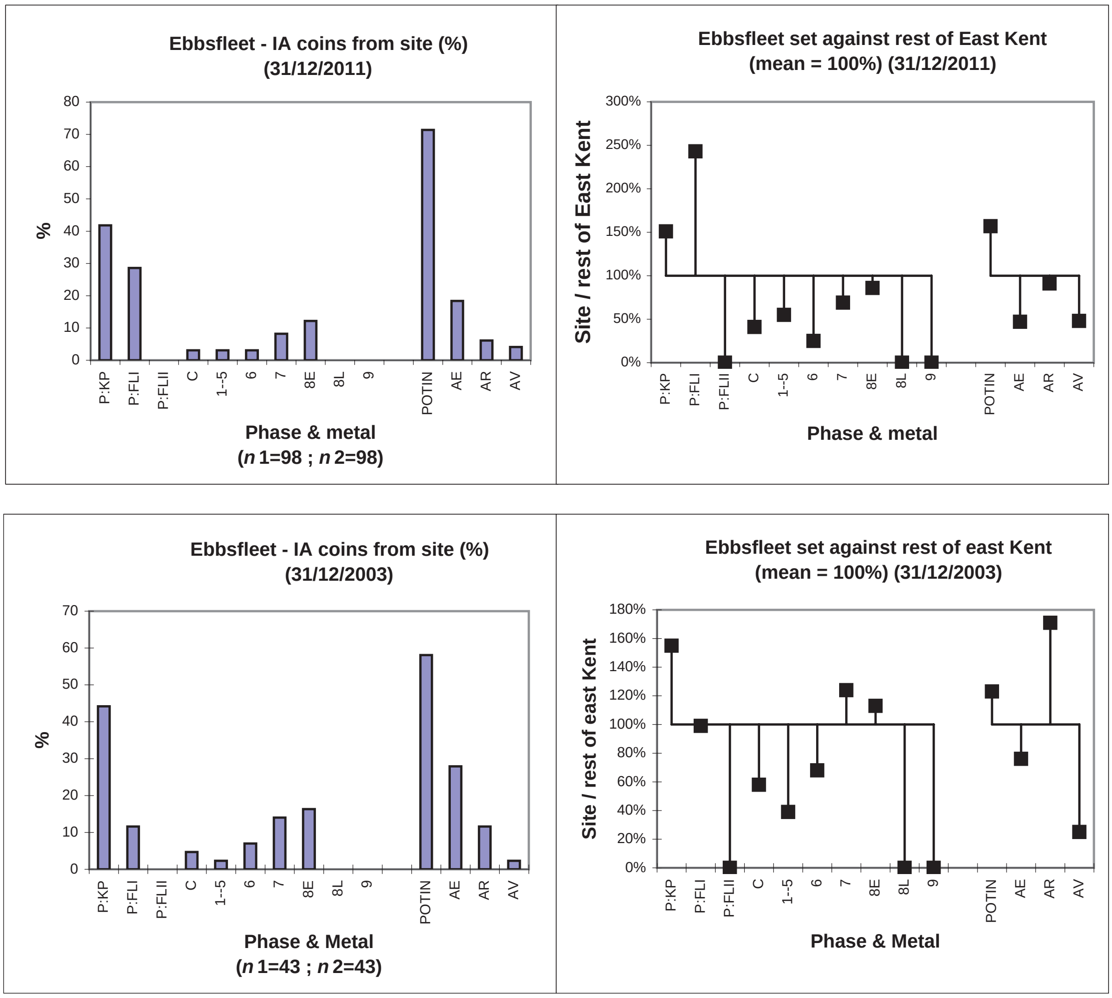


Fig 1.2 Iron Age coins from the Ebbsfleet peninsula and the rest of East Kent

of the worst coins were not thought worthy of recording by their finders, something which has also been noted for poor quality late Roman coins.

What can be seen is that the proportion of Flat Linear I potins is rather greater than previously noted and the ratio of potin to other metals, bronze and silver in particular, has consequently increased (Fig 1.2). Furthermore, whereas Kentish Primary potins previously displayed the most significant rise above the general East Kent background, these have now been superseded by Flat Linear I potins, which has also forced all later coins to be under-represented in area terms. In terms of metals, silver was originally over-represented but has now returned to a level more in line with what might be expected while potin, as expected, leads the way. These changes may also be seen as providing a reminder of the pitfalls of relying on relatively small samples for coin analysis from any particular site, the greater number now available probably giving a truer reflection of what was being used and lost/deposited, for whatever reasons(s), on the Ebbsfleet site.

Comparing the coins from the Ebbsfleet settlement against all other Iron Age coins recorded from Thanet also suitably illustrates the early nature of the coinage from this site, with potin clearly dominant, in contrast to the background pattern showing a more even loss pattern and an overall later distribution while maintaining potin in the foremost position (Fig 1.3). The 'other' coins include four hoards, including two Flat Linear potin hoards – one of moderate size, the other the largest currently known – all of which have been counted as a single find to avoid falsely skewing the figures.

Although only smaller numbers of Iron Age coins were recovered from the other zones along the route,

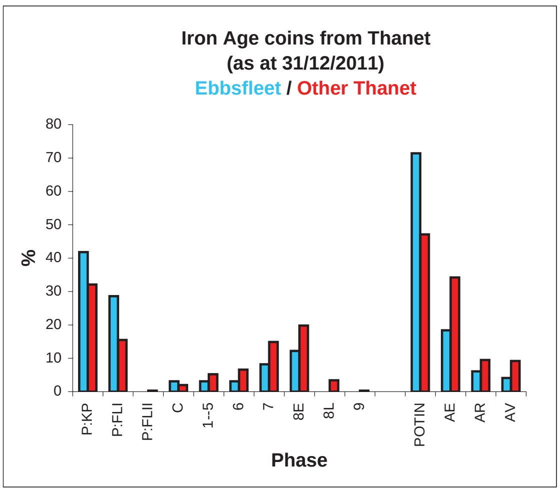


Fig 1.3 Iron Age coins from Thanet

these can provide some information on coin use in the wider landscape, and in some cases may be linked to more dispersed settlements or associated activity. Their distribution is broadly similar to that already discerned from earlier finds from Thanet and across East Kent generally and forms part of a consistent background pattern of coin loss away from clearly defined sites in the conventional sense. There seems to be little difference in the spatial distribution of Iron Age and Roman coins and common factors pertaining to the dispersal of coins from settlements may be evident for much of this period.

Roman coins

With the exception of the small hoard of silver denarii buried on Zone 7 in the second half of the 2nd century AD, the Roman coins recovered from the excavations largely comprise small denomination coinage, probably lost in everyday use on the sites. None of the assemblages apart from that from Zone 6 is sufficiently large to allow inter-site comparisons to be drawn. Despite this, the smaller assemblages recovered from some sites provide useful dating evidence for both features and phases of activity. In particular, the coins from Zones 20 and 21 suggest that the activity in the area dates to the late 3rd and first half of the 4th centuries AD.

The largest assemblage, however, was recovered from Zone 6. The 1st century coins from this zone suggest that there was coin use on the site in the second half of the 1st century AD. Although the copper alloy coins of this period could well have remained in circulation into the 2nd or even 3rd centuries AD, the presence of a denarius of Vespasian probably indicates that coins were used in this area by the end of the 1st century AD. From this period onwards, it appears that coins were used regularly, if in small quantities, until the mid 3rd century AD. Whilst the dearth of coins of the first half of the 3rd century AD is not unexpected, the low numbers of antoniniani from the second half of the 3rd century certainly is, although this is paralleled by a very similar decline at the nearby Minster Roman Villa site. The small numbers of coins from this period strongly suggest that the site saw minimal activity at this time. This apparent hiatus of activity only lasted until the early 4th century AD, when there appears to have been a resurgence of coin use, with coin loss continuing throughout the 4th century and in all probability into the early 5th century AD. The latest coins from this area are those of the House of Theodosius (*c* 388-402), which seem to have comprised the last official shipments of coins to the province prior to its abandonment by the Roman state in *c* AD 410, and which were found in large quantities at the nearby fort at Richborough (Reece 1981). Roman coins post-dating AD 402 are extremely rare as British site finds, and it is almost certain that coinage ceased to be used in Britain as part of a monetised economy in the first third of the 5th century AD.

Saxon, medieval and later coinage

Only a few Saxon and medieval coins were recovered from the site. Whilst these can provide broad dates for features and deposits, and allow some comparison with other sites in the area, the small size of the assemblage means that the potential for further analysis is limited. The Saxon sceat and hammered silver medieval coins are all typical Kentish finds. The only other medieval numismata of note are the jetons recovered from Zones 10, 12 and 21, all of which were common Nuremburg types.

A moderately large assemblage of post-medieval and modern coins was recovered from the excavations. Most of these were found unstratified, their number undoubtedly swelled by the systematic use of metal detectors. They can tell us little about the archaeology of the area, although there are one or two interesting coins – notably the 1937 American one cent piece and the 5 centimes piece of Napoleon III.

Chapter 2

Bronze Age Metalwork

by A P Fitzpatrick

This chapter provides the catalogue of the metalwork; their wider setting is discussed in Volume 1, Chap 3.

Early Bronze Age

Gold sheet

Zone 13, burial 230116, grave 230115. Two tiny fragments of gold sheet, apparently folded over, were recovered from the sample taken from the very poorly preserved burial of a two-three year old child (Pl 2.1). Part of a faience bead (ON 1541) was also found in the grave (see Chap 7). These fragments, and the faience bead, may have been part of a small composite necklace. Some amber beads were covered with gold sheet but, as these fragments appear to have been folded, they may have belonged to some other object decorated with gold sheet.

The best known of these composite objects are the gold cones and button covers (Taylor 1980, 45-7, pl. 24; 26, d-g) but gold was also used to decorate other objects, for example the shale studs inset into the macehead from Clandon, Dorset (Needham and Woodward 2008, 23-7, fig 10-11). The use of embossed gold dates mostly to the 20th–18th centuries BC (Needham's Period 3: 1950/1900–1750/1700 BC).

Pl 2.1 Gold sheet fragments

Copper alloy pin

Zone 21, ring-ditch 216090, grave 246134, ctx 246135. ON 2262 (see Volume 1, Chap 2)

D: 2mm, L (as surviving): max 51mm, 5 fragments weighing 2g, one of which is the tip. It is possible that the pin was slightly curved rather than straight. The pin was associated with a miniature triple Food Vessel and an amber button.

Early Bronze Age pins of bronze or bone are not common finds in Britain (Gerloff 1975, 110-12, app. 3, 249-50). Even within this relatively small group a range of different types of head is known – ring-headed, multiple ring-headed, bulb headed and crutch headed, the latter being the most common. Several pins were associated with Snowshill-Camerton type daggers, which dates them to the 16th century BC, during Wessex 2 (Needham 2000, 178-9). The pins presumably indicate the adoption of a new style of costume by a minority, perhaps elite, group and the presence of an amber button in grave 246134 would be consistent with this.

Copper alloy awl

Zone 20, ctx 282007, ON 2307. A square-sectioned awl. L: 55mm, W: 4mm

Although this example was found in a Roman context, it may be compared with Bronze Age examples. Awls were made throughout the Bronze Age and are found in burials, settlements and hoards. As there is little evidence for Bronze Age settlement on the chalk ridge but ample evidence for barrows it is possible that the awl was originally placed in a grave associated with the barrow cemetery that was disturbed in antiquity. Awls occur quite frequently in Early Bronze Age graves (eg, Annable and Simpson 1964, nos 415-31).

Late Bronze Age

Objects of gold (Fig 2.1)

Hoard VIII

Bracelets

Two complete penannular gold bracelets (Pl 2.2) were found unstratified in Zone 4. It was possible to determine that the soil the bracelets came from was restricted to a relatively small area, some 10m by 5m. This area had been heavily disturbed in modern times but no feature that might have contained the bracelets was found and no other objects were recovered in a careful search of all the topsoil from the area. It seems likely that the bracelets were either placed on the ground or buried together as a small hoard (Hoard VIII) in a shallow scoop that did not penetrate the subsoil. They were not associated with bronze Hoard VII.

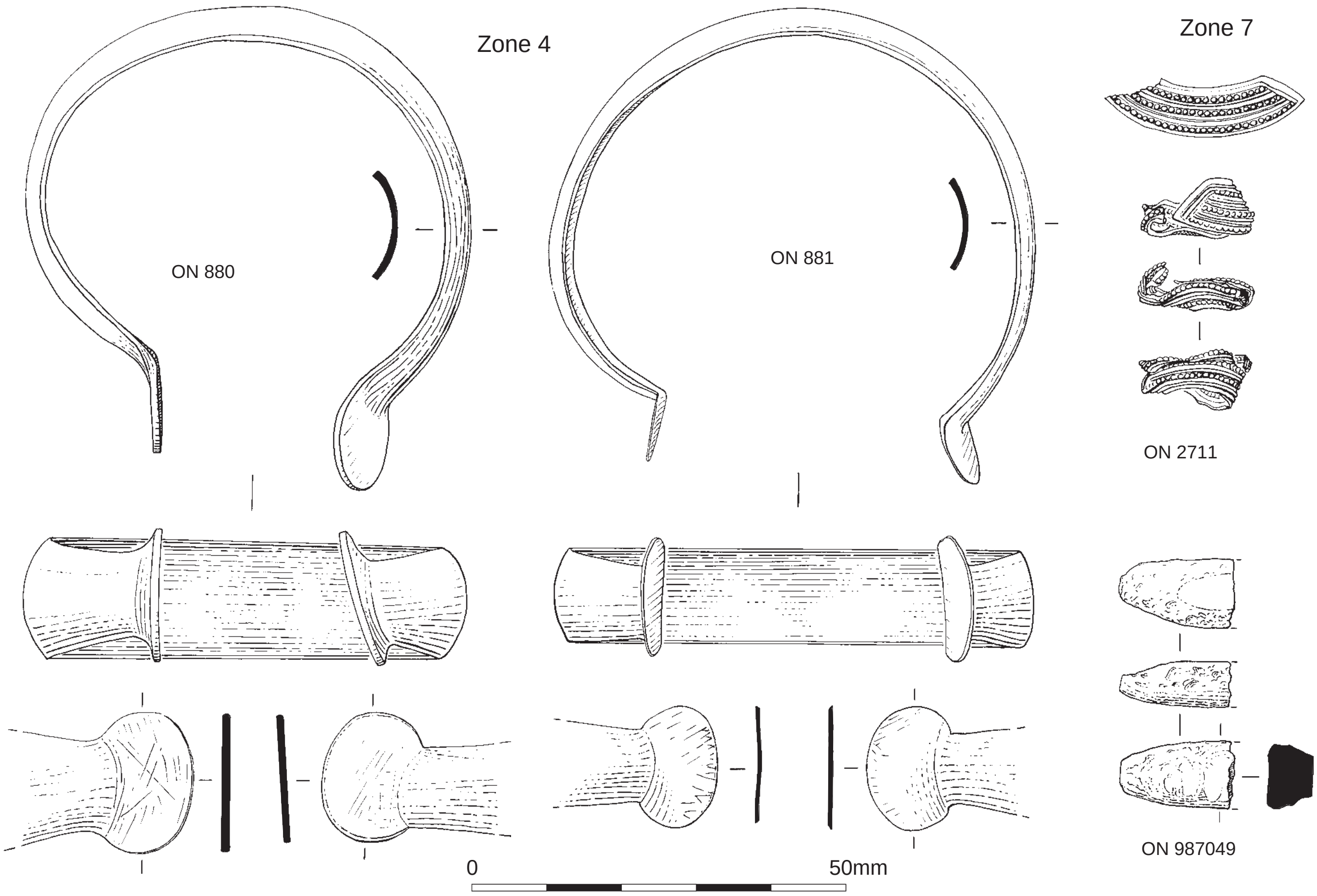


Fig 2.1 Gold objects

Pl 2.2 Pennanular gold bracelets; one cleaned (ON 880), the other as found (ON 881)

Ctx 172144, ON 880. A complete penannular gold bracelet. It has a deeply hollowed, C-shaped cross-section, and flat, outwardly-projecting oval terminals. D: 58mm, T: 15mm, Wt: 26g

Ctx 172144, ON 881. A complete penannular gold bracelet. It also has a deeply hollowed, C-shaped cross-section, and flat, outwardly-projecting oval terminals. The body of this bracelet is not quite as deep as ON 880 but its diameter is slightly greater, which presumably accounts in part for its greater weight. The terminals are slightly more open than on ON 880. D: 62mm, T: 12mm, Wt: 33.9g

Late Bronze Age penannular gold bracelets are well known in Britain and Ireland and Eogan distinguished 12 varieties (1994, 84-5, 154-8, fig 38). He described these varieties 'only as an aid to description' as hoards of bracelets often contain several different varieties. The Ebbsfleet Peninsula bracelets belong to his Variety 3, which may correspond to Needham's Class C* (Hook and Needham 1990, 21). Variety 4 is similar but the body is not as deeply hollowed and the terminals are solid.

Bracelets of Variety 3 are one of the less common varieties but are known from hoards at Bawdeswell, Norfolk (Varndell 2008a) and Tisbury, Wiltshire (Hawkes and Clarke 1963, 231-5, pl. xi, 1-2; Taylor 1980, 66-8; Eogan 1994, pl. 11). A single find is known from the sea at West Wight, and it is notable that another gold bracelet, of Eogan Variety 1, was found 2km away a few years earlier (Basford and Roberts 2009). A fragment of a terminal is also known from East Wight (Basford 2007).

The Bawdeswell hoard was found by a metal detector user and comprises seven gold bracelets, five of which are of Variety 3 with one each of Varieties 1 and 4. Four of the seven were in close proximity, as if clumped together, and the other three were found within 0.45m and at the same depth. The Tisbury hoard contained two Variety 3 bracelets, one of Variety 1, three of Variety 2 and one of Variety 9.

As a group, Late Bronze Age gold bracelets have been dated primarily by their occasional inclusion in hoards dominated by well-dated bronze objects, but they do not seem to have been incorporated in large 'founders' hoards of bronze. Gold hoards often contain only bracelets and the typical size of the hoards known to Eogan when he was writing in the early 1990s was three objects. The Ebbsfleet find fits this pattern well. In Kent, the Little Chart hoard contained three bracelets, however, some larger hoards of bracelets are known and, as well as the Bawdeswell find, these include the two hoards from Bexley Heath, Kent. Hoard 1 contained eight bracelets: two of Variety 1, two of Variety 2, three of Variety 4, and one of Variety 5. Hoard 2 contained nine bracelets: five of Variety 4, and four of Variety 5 (Eogan 1994, pl. 8-9).

'Lock-ring'

Zone 7, ctx 201089, ON 2711 (Pl 2.3). A crumpled probable Late Bronze Age 'lock-ring' was found in Zone 7, within layer 201087, the surface of Late Iron Age ditch 193099. The 'lock-ring' is made from gold sheet. The longest visible edge is curved and there is a diagonal terminal. The exterior and interior faces of the object are decorated with what appear to be three parallel rows of small raised dots, each *c* 1mm in diameter. Between the rows of dots are two raised plain horizontal bands. These rows of decoration are bordered by two similar raised bands. Estimated D: *c* 35mm, L: 14mm, W: 8mm, Wt: 1g

Lock-rings are rare in southern England. These rings are penannular in shape and hollow. They have two face plates and usually a separate sheet of gold closed the interior of the ring, though this sheet is usually absent from examples found in southern England (Eogan 1969, 103, fig 4; 1994, 83-4, 89). Some lock-rings have cores of wax or wood which supported the delicate gold sheet (Needham *et al* 2007; La Niece and Cartwright 2009). In Ireland the face plates are made of individual gold wires fixed together either by solder or resin but in Britain the plates are more often of sheet gold decorated with incised concentric grooves.

The alternating plain and decorated zones of the Ebbsfleet example are unusually elaborate. Simple repoussé decoration is rare but the two rings from Harting Beacon, Sussex, both have two rows of widely spaced embossed dots and the Highdown Hill finds, also from Sussex, have, in addition, raised lines (Eogan 1969, 124-5, fig 4, 41-3; Taylor 1980, 68-9, pl. 48, g). Widely spaced dots and ridges are found on one of the examples from the Vénat, Charent hoard and other examples from that hoard, and also that from Saint-Martin-sur-le-Pré, Marne, are decorated with either ridges or dots, but not both (Eogan 1969, 104, 127, 140-3, 14, nos. 49-58, fig 5, pl. ix, 59). These cross-Channel connections are to be expected, not least because the Vénat lock-rings come from a large Carp's Tongue hoard. This association suggest that the Ebbsfleet lock-ring is contemporary with the gold bracelets and the bronze hoards from Zone 4.

The closely spaced dots on the Ebbsfleet lock-ring echo the appearance of the twisted wire used on the Irish examples. A similar combination of dots and grooves is seen on the unusually small lock-ring from the River Dodder at Rathfarnham, Co. Dublin. This small object is distinct from other Irish lock-rings in that it is made from wire fixed to a frame of sheet gold that was decorated with grooves (Eogan 1969, 104, pl. v, 3;

Pl 2.3 Gold 'lock ring'

x). In discussing this object Cahill noted its similarities with Iberian *arracada* earrings of Middle Iron Age date (2009, 104, pl. 10), though the Ebbsfleet Peninsula ring appears to be residual in a Late Iron Age context.

Ingot

Zone 6, ctx 7, ON 987049 (Pl 2.4). Part of a bar or rod (finger) ingot with a roughly square section. Part of one surface has been hammered flat and the object has been cut, perhaps with a chisel. L: 15mm, T: 5mm, Wt: 7.1g

In the absence of analyses, the object may be compared with finger ingots of Late Bronze Age date. Gold ingots have been found occasionally in Late Bronze Age hoards, for example at Askeaton, Co. Limerick, Mooghaun, Co. Clare, and Llanarmon-yn-Iâl, Denbighshire (Clwyd) (Eogan 1994, 83, fig 36, 4, pl. xv), and the gold content revealed by the surface analysis of some recent single finds from England, including one from Brabourne, Kent, is consistent with a Late Bronze Age date (Varndell 2008b; 2008c). However, such a simple form is also known from later contexts and in view of the extensive Iron Age occupation in Zone 6 the presence of a similar ingot in the Late Iron Age hoards at Snettisham, Norfolk should be noted. A single finger ingot was found there amongst the many other types of ingot. Although it was originally thought to be of tin, recent work has shown that the ingot is an alloy of gold and silver (Clarke 1954, 58, no. 6, pl xiii, 6; J. Joy pers. comm.).

Pl 2.4 Gold ingot fragment

Objects of bronze

Hoard VII

Sword

Zone 4, ctx 172144, ON 3511.1 (Fig.2.2). Hilt fragment of a Ewart Park sword, broken at what would have been the second rivet down from the top, and at the base across the two rivet holes for the handle. L: 34mm, W: 23mm, T: 5mm, Wt: 30g

Socketed Axes

Zone 4, ctx 172144, ON 3505 (Fig 2.2). Mouth fragment from a South-eastern type socketed axe with a double mouth-moulding and angular corners (Butler 1963, 84; Needham 1986, 41; 1990, 28-31, fig 2-3, Class A1). L: 38mm, W: 23mm, Wt: 36g

Zone 4, ctx 172144, ON 3510 (Fig 2.2). Mouth fragment from a socketed axe, probably also of South-eastern type. The axe is deformed, possibly through miscasting or by hammering when breaking it up. L: 38mm, W: 28mm, Wt: 20g

Zone 4, ctx 172144, ON 3511.2. Small mouth fragment from a socketed axe, probably also of South-eastern type. L: 21mm, W: 12mm, T: 2mm, Wt: 4g

End-winged axe

Zone 4, ctx 172144, ON 3511.3 (Fig 2.2). Fragment of an end winged axe, broken at the beginning of the septum, and possibly, the loop. L: 38mm, W: 16mm, T: 23mm, Wt: 102g

Ring

Zone 4, ctx 172144, ON 3511.4. Part of a ring, possibly a bracelet. L: 52mm, T: 8mm, D: *c* 8mm, Wt: 15g

Unidentified

Zone 4, ctx 172144, ON 892 (Fig 2.2). Blade fragment from near the hilt or handle. Triangular in section, flat on one side. The edges taper slightly. This blade fragment is very thick and apparently flat at one end. It is not from a Carp's Tongue or Ewart Park sword. Although attributed to Hoard VII it is not certain that this object is Late Bronze Age in date and the object number is not in the same sequence as the other finds from the hoard. L: 40mm, W: 31mm, T: 7mm, Wt: 59g

Zone 4, ctx 172144, ON 3511.5. Irregularly shaped cast fragment of relatively thin metal. Possibly from a socketed sickle or a small tool. L: 23mm, W: 18 mm, T: 1mm, Wt: 6g

Ingot Fragments

Zone 4, ctx 172144, ON 4007. Part of a plano-convex ingot which has the impression of the tip of a weapon, either a sword or spear, on the upper side. L: 31mm, W: 56mm, T: 19mm, Wt: 106 g

Zone 4, ctx 172144, ON 3511.6. Large fragment of a plano-convex ingot. L: 76mm, W: 47mm, T: 34mm, Wt: 481g

Zone 4, ctx 172144, ON 3511.7. Large fragment of a plano-convex ingot. L: 37mm, W: 37mm, T: 18mm, Wt: 115g

Zone 4, ctx 172144, ON 3511.8. Large fragment of an ingot. L: 33mm, W: 31mm, T: 15mm, Wt: 126g

Zone 4, ctx 172144, ON 3511.9. Fragment of a plano-convex ingot. L: 29mm, W: 26mm, T: 21mm, Wt: 53g

Zone 4, ctx 172144, ON 3511.10. Fragment of a plano-convex ingot. L: 38mm, W: 20mm, T: 14mm, Wt: 49g

Zone 4, ctx 172144, ON 3511.11. Fragment of a plano-

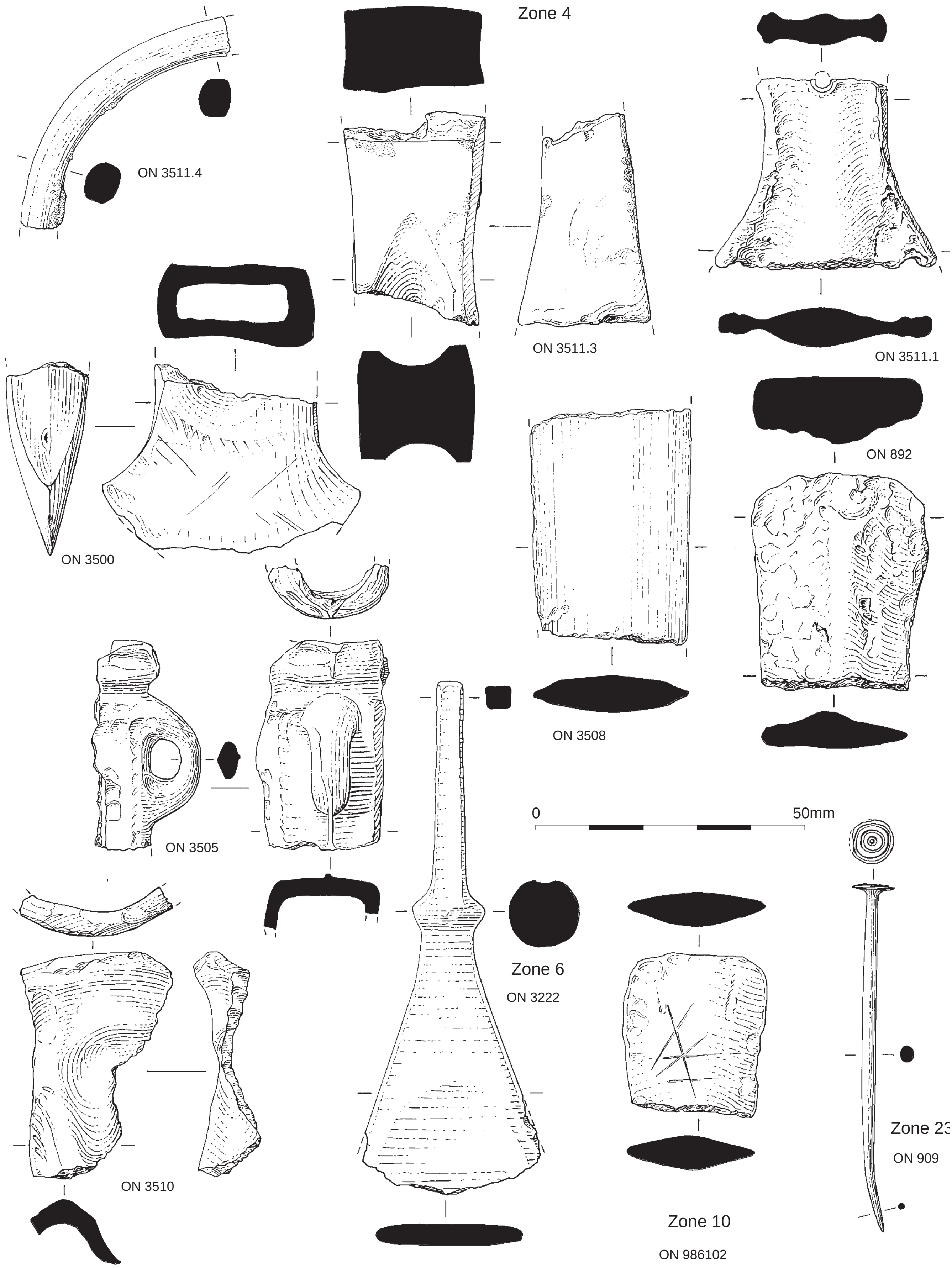


Fig 2.2 Copper alloy objects, including Zone 4 hoard

convex ingot. L: 30mm, W: 17mm, T: 7mm, Wt: 14g

Waste metal
Zone 4, ctx 172144, ON 3511.12. Irregular fragment of cast metal. L: 40mm, W: 38mm, T: 6mm, Wt: 35g

Zone 4, ctx 172144, ON 3511.13. Irregular fragment of cast metal. L: 33mm, W: 29mm, T: 3mm, Wt: 21g

Late Bronze Age metal objects from settlement contexts

Zone 3
Ctx 133010, ON 103. Small, unidentifiable, rectangular fragment of bronze. L: 10mm, W: 7mm, T: 1mm, Wt: 0.25g

Zone 4
Objects ON 3500 and 3508 appear to be single finds and not part of Hoard VII, although they were found not far from Hoards IV-VI.

Sword
Ctx 172144, ON 3508 (Fig 2.2). Blade fragment of a Ewart Park sword, which lacks the grooves that define the central rib on Carp's Tongue swords. L: 40mm, W: 29mm, T: 7mm max., Wt: 43g

Socketed Axe
Ctx 172144, ON 3500 (Fig 2.2). Part of the tip of a socketed axe. The tip is damaged. L: 33mm, W: 4mm, T: 13mm, Wt: 63g

Ingot
Ctx 254125 (pit 254124), ON 4701. Small fragment from a plano-convex ingot. One side may have been cut. L: 17mm, W: 25mm, T: 13mm, Wt: 23g

Zone 6

Tanged Chisel
Ctx 305067, ON 3222 (Fig 2.2). An almost complete tanged chisel, but the tip of the blade is missing. There is a bulbous moulding below the square-sectioned handle. This is a typical Late Bronze Age type which is thought to be a leather working tool and is widely distributed (Burgess *et al* 1972, 217-18, type 2; Roth 1974, type 1, 38, Taf. 4, 1-4; Coombs and Bradshaw 1979, 183, no. 3, fig 10.1, 3; O'Connor 1980, 175). L: 94mm, W: 31mm, T: 4mm, Wt: 31g

Zone 10

Blade fragment
Ctx 249175, ON 986102 (Fig 2.2). Heavily worn but apparently slightly tapering fragment of a blade with a lenticular section, from the subsoil. The absence of edge grooves suggest that the fragment is not from a rapier, and though it could be from an early Middle Bronze Age Group II dirk, these are rare from south of the Thames (Burgess and Girloff 1981, 19-46, pl. 119), and it seems more likely to be from a Late Bronze Age tanged or socketed knife. L: 29mm, W: 26mm, T: 7mm, Wt: 22g

Ingot Fragment
Ctx 249175, ON 986134. Lump, possibly from a plano-convex ingot. L: 25mm, W: 19mm, T: 15mm, Wt: 32g

Zone 23

Pin
Ctx 198099, ON 909 (Fig 2.2). Late Bronze Age pin. The shaft is 2mm in diameter, tapering to 1mm at the tip, which is slightly bent. The flat head is decorated with three concentric raised circles and a central dot. A wide range of Late Bronze Age nail, disc and wart headed pins are known (O'Connor 2010, 203-5; Coombes 2001, 274, 290, fig 10.9, 175-6, 178-9). D: of head 7mm, L: 64mm, Wt: 2g

Chapter 3

Iron Age, Roman and Post-Roman Metalwork

by Ian Scott

Introduction

The metalwork of periods post-dating the Bronze Age was considered together. All the material was examined and the full catalogues are in the project archive. A selection of the more important pieces is included here and key items are illustrated. The material is presented in sequence of zones or groups of zones where appropriate, with overall quantities of material by zone summarised in Table 3.1. Within each zone objects are presented in broad chronological groups and discussed in terms of functional categories. The data are such that inevitably quantification of material by phase will include pieces which may be intrusive or residual. These are identified in the text where possible.

The assemblage by Zone

Zone 1

There are just 13 metal finds (29 fragments) from Zone 1, eight objects (23 fragments) from medieval contexts, two objects (3 fragments) from post-medieval contexts and one from topsoil. In addition there is a nail shank fragment from Roman ditch 172210 and an undiagnostic fragment from unphased pit 194117.

The objects from medieval contexts include a buckle plate (ON 116) from ditch 172116, a length of copper alloy strip (ON 4352) (5 fragments) from pit 175120, and a fragment of copper alloy sheet with possible incised decoration (ON 4693), also from pit 175120. The decorative strip is incised with a stylised bird and was presum-

Table 3.1 Summary of numbers of metal objects by zone and period of deposit

	Zone																					
Phase	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*9*	*10*	*11*	*12*	*13*	*14*	*17*	*19*	*20*	*21*	*22*	*23*	*26*	*29*	*Totals*
Late Prehistoric 1			0																			0
Bronze Age												1							1			2
Late Bronze Age																			0			0
Late BA or Early IA							1		1													2
Iron Age				1		5									0					1		7
Early Iron Age							2					2										4
Early or Middle IA						1						6										7
Middle Iron Age				0	1	1						1										3
Middle or Late IA				1		1	0															2
Late Iron Age						1					2	1										4
Late IA or early Ro			0			14	1		2		4	2				0						23
Roman				11		6	1			16	6		17		56	70	3		0			186
Early Roman						105	3		6	3		8			59						1	185
Early or middle Ro						8			482						2	47	2				1	542
Middle Roman						50	135			22					75	109	6					397
Middle or late Ro						2			5							28						35
Late Roman						82			11		3				4	165						265
Saxon												1	49		287							337
Early or middle Saxon									8				2		114							124
Middle Saxon									2													2
Late Saxon														1								1
Saxo-Norman															17							17
Medieval	7	4	8			0									2							21
Early Medieval			1											2				1				4
Post-medieval	2			2															3			7
Modern																4			2			6
colluvium			1			286			1	1	2	27	1									319
natural									2													2
subsoil				6			15		49													70
topsoil	1		1	0		2		0					2		10	4					19	39
unphased			3			112			4	3	9	4	33		96	6		4			2	276
Total	10	4	14	21	1	676	158	0	573	45	26	53	104	3	722	433	11	5	6	1	23	2889

0 indicates the presence of fragments such as nail stems not counted as objects

ably intended as a binding but its precise use is uncertain. Other medieval finds include the point of a knife blade (ON 4612, pit 175161), two miscellaneous objects – an iron ring (4 fragments) (ON 114) and an L-shaped object (2 fragments) (ON 131) – and 9 nail fragments.

The post-medieval objects came from a single pit (175145) and comprise a small strip of iron, a nail and a large drawn wire pin with crimped wire wound head (ON 115).

Catalogue

ON 116. **Buckle plate, hinged**, lacks buckle frame and tongue. Slightly tapered rectangular with 5 rivets. One end is folded to form a hinge. The back of the plate does not extend far beyond the first pair of rivets. Part of the leather belt is preserved. There are extant traces of gilding on the plate, which is otherwise plain except for simple moulded step defining the hinge. Cu alloy and leather. L: 42mm; W: 16mm. Ctx 230113, ditch 172116, intervention 230110. Medieval

ON 4352. **Decorated strip** (5 fragments), with a possible lip or fold at one end. The strip is quite thin with lightly incised incised lines forming curvilinear patterns with some small hatched zones. The pattern appears to show a bird facing to the left with its neck stretched out. The bird's head and eye are quite clear, as are its tail and tail feathers to the right. No nail or pin holes. Function uncertain. Cu alloy. L: 73mm; W: 11.5mm. Ctx 175127, pit 175120, intervention 175120. Medieval.

Zone 2

Just four nails and three nail shank fragments were recovered from Zone 2, all from medieval contexts.

Zone 3

Zone 3 produced 17 objects and 25 fragments, excluding *c* 115 iron fragments, mainly of nails, from medieval context 149012 (ditch 149010). Most of the metal finds were came from medieval ditch contexts. A small group of four objects (5 fragments) were not dated stratigraphically. Two fragments of copper alloy of uncertain function were found in to the Late Iron Age or early Roman gully 172034. A late Saxon pit (143037) produced two fragments of a small iron object of uncertain function (ON 111). Early medieval ditch 172178 produced a single nail shank fragment, and ditch 172179 a fragment of iron strip and a nail shank fragment.

Medieval ditches

Ditch 132011 produced a poorly preserved nail and a nail shank fragment; ditch 149010 produced 115 iron fragments, mostly incomplete nails. Ditch 172031 produced one nail, four miscellaneous fragments, two unidentified fragments and a prick spur (ON 102) of 11th-century date. Ditch 172032 produced a single nail shank fragment and ditch 172166 a single nail. Ditch 172173 produced a nail shank fragment and a whittle tang knife (ON 101).

Catalogue

ON 102. **Prick spur**. Arms of D-section, straight in the horizontal and tapering from the prick to the front. One arm ends in a flat terminal probably pierced by two rivets securing the straps of the spur with the help of a small plate or washer. The prick is missing but the neck is long with moulding part way along. The riveted attachment indicates an 11th-century date. Fe. L overall: 180mm; L of neck: *c* 50mm; W: 85mm. Ctx 141020, ditch 172031, intervention 131018. Inv No 3001. Medieval

The straight sides and prick indicate that this is an early spur, dating to the 11th or early 12th century. The sides of the earliest medieval spurs terminated in rectangular loops through which the spur straps could pass, or like this example, had plates to which the straps were riveted (see Jope 1956, fig 13, nos 1-7). The form of the extant plate matches Ward Perkins's form Aii (Ward Perkins 1940, 94, fig 28). The long neck, which would originally have ended with a small goad, indicates that this spur dates to the earlier 11th century rather than later, when large lozenge-shaped goads were fashionable (Ellis 1995, 127; compare spurs from Queen Street, Oxford, Bruern, Oxfordshire and York (Jope 1956, fig 13, nos 1-3) with spurs from St Aldate's, Oxford and London (*ibid*, fig 13, nos 6-7)).

ON101. **Whittle tang knife**. Triangular section blade with slightly curved back and curved cutting edge. Incomplete tang. Fe. L overall: 119mm; L of blade: *c* 90mm; W: 23mm. Ctx 141011, ditch 172032, intervention 141010. Inv No 3002. Medieval.

Zone 4

There are just 21 metal finds (34 fragments) from Zone 4, including six nails (11 fragments), probably coffin nails, from Roman grave 177322. Only small numbers of finds were recovered from Iron Age and from Roman contexts other than the grave. These include a large latchlifter (ON 3530, 347mm long) from Iron Age ditch 190272 and a plain iron ring (ON 3534) in two fragments from Middle or Late Iron Age ditch 190288. Middle Iron Age gully 127133 produced a single, small, undiagnostic iron fragment. Roman ditch 190289 produced a fragment of copper alloy wire and a shapeless lump of copper alloy. Ditch 190290 produced two knives, one of which (ON 532) was fragmentary and the other (ON 3533) an incomplete knife with a whittle tang. Neither could be identified to form. Two nails and two nail shank fragments came from post-medieval trackway 141207 and three finds, including a heavy copper alloy harness buckle (ON 3506) and a small pellet bell (ON 3502), were found in the subsoil.

Catalogue

1. ON 3530. Latchlifter, large. Fe. L: 347mm. Ctx 312043, ditch 190272, intervention 172268. Inv No 4021. Iron Age
2. ON 3533. **Whittle tang knife**, with tang continuing line of the back of the blade. The blade has a straight back but is angled down towards the point. The edge is eroded but was probably slightly curved. Fe. L extant: 71mm. Ctx 177357, ditch 190290, intervention 177352. Inv No 4024. Roman

Zone 5

The only find from Zone 5 is a small penannular brooch (ON 887) from a Middle Iron Age pit.

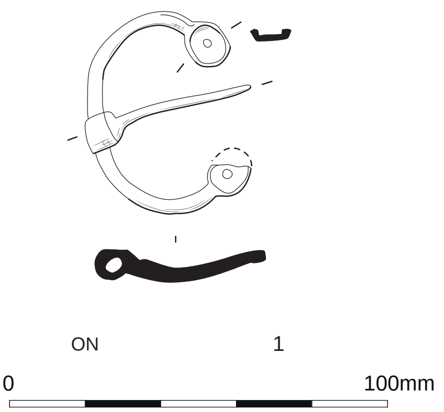


Fig 3.1 Metalwork from Zone 5

Catalogue (Fig 3.1)

1. ON 887. Penannular brooch (3 fragments) with a hoop of circular section. It has large circular terminals recessed for inlay, now lost. The pin is slightly bent. Cu alloy. D: 24mm x 26mm. Ctx 123190, pit 254114, intervention 254114. Middle Iron Age (Fig 3.1).

   A similar but larger and better preserved penannular brooch (ON 1204) was found in an early Roman ditch in Zone 19. The form does not fit readily into Fowler's original scheme (Fowler 1960), but it is probably Fowler's original H2 with flattened disc terminals with enamel inlay (*ibid*, 153), subsequently redefined as Form H3 (Fowler (1963, 111). As defined by Fowler this is post-Roman in date. However, the present brooch and the brooch from Zone 19 do not conform precisely to Fowler's types and the suspicion is that they are an Iron Age form. The present example came from the fill of a pit assigned a Middle Iron Age date, and the example from Zone 19 was found in an early Roman context. This would seem to preclude a late date and lend support to an early date. However, the Zone 5 brooch is from the uppermost of four fills in pit 254114, and the brooch from Zone 19 is from the single fill of ditch or gully 126160, so both objects could be later in date than the features.

Zone 6

This metalwork assemblage comprises 676 objects (819 fragments). Over 42% of the assemblage by object count is from colluvial deposits, and 17% is unphased or otherwise undated. The stratified material is almost exclusively from Iron Age and more particularly Roman contexts, but is limited in quantity. Although the finds from colluvial deposits are not securely dated stratigraphically it is clear that the metal objects were largely of Late Iron Age or Roman date. There are only a few modern items.

Table 3.2 Zone 6 – Summary quantification of metal finds by phase and function (object and fragment counts)

Phase		*Arms*	*Tools/ Crafts*	*Transport*	*Measure*	*Personal*	*Hobnails*	*Household*	*Door*	*Security*	*Structural*	*Bindings*	*Nails*	*Misc*	*Query*	*Unknown*	*Waste*	*Total*
Iron Age	Count		1										1		3			5
	Fragt		3										1		3			7
Early or	Count							1										1
Middle IA	Fragt							1										1
Middle	Count						1											1
Iron Age	Fragt						1											1
Middle	Count														1			1
or Late IA	Fragt														1			1
Late IA	Count														1			1
	Fragt														1			1
Late IA	Count	2				2		4					2	3	1	0		14
or early Ro	Fragt	5				2		6					3	5	1	2		24
Ro	Count										1		4		1	0		6
	Fragt										1		6		1	2		10
Early Ro	Count		7	1		6		2			5	1	39	25	12	0	7	105
	Fragt		7	1		6		2			5	1	65	26	14	13	9	149
Early or	Count		1			2							3	1	1			8
middle Ro	Fragt		1			2							5	1	1			10
Middle Ro	Count		6			8	1	1			1		16	13	3		1	50
	Fragt		6			9	1	1			1		18	13	3		1	53
Middle	Count												1	1				2
or late Ro	Fragt												2	1				3
Late Ro	Count	1		7		3	9		1	1	1	1	37	17	4			82
	Fragt	1		7		3	9		1	1	2	1	47	18	4			94
Medieval	Count												0					0
	Fragt												1					1
Colluvium	Count	13	15	1	6	49	4	10		1	7	7	35	86	37	0	11	286
	Fragt	14	17	1	6	50	5	10		1	7	7	44	88	42	14	12	322
Unphased	Count		5			3	1	1		1	4	1	27	61	10	0		114
	Fragt		5			3	1	1		1	4	1	33	78	10	6		143
Total	Count	16	35	10	6	73	19	19	1	3	19	10	165	207	74	0	19	676
	Fragt	20	39	10	6	75	20	21	1	3	20	10	225	230	81	37	22	820

Stratified metal objects

Iron Age occupation

There are six iron objects and one copper alloy object from Iron Age contexts, and another 11 from contexts assigned a Late Iron Age or early Roman date. The latter are two copper alloy objects, seven iron objects, and two nails (3 fragments).

Five finds are from contexts assigned a generic Iron Age date. These include four objects found on cobbled surfaces, including a possible copper alloy arched pin shaft (**Cat. No. 60**, ON 3880) and fragments of a scythe blade (**Cat. No. 27**, ON 3890) from context 298137, feature 291102, a tanged fragment possibly from a sword blade (**Cat. No. 10**, 3911) and a link or brace made from an iron loop twisted to form the shank with loops at each end (**Cat. No. 127**, ON 3910) (both cobbled surface 126275). The pin shaft (**Cat. No. 60**, ON 3880) may be from an early form of ring-headed pin, and the link (**Cat. No. 127**; ON 3910) could be a component of a cauldron chain. An incomplete nail from stakehole 169003 (context 254043) is likely to be intrusive from Roman levels.

The only find from an Early to Middle Iron Age context is a blade from a pair of shears from ditch 170101 (**Cat. No. 39**, ON 3941). A single hobnail, probably intrusive, came from Middle Iron Age pit 170196. A small iron penannular ring or loop of uncertain function which appears to have a notched or cable patterned outer edge (**Cat. No. 128**, ON 3225) recovered from ditch 170143 is the only find from a Late Iron Age context.

A small number of metal finds from Late Iron Age or early Roman contexts include two small nails (context 243108, ditch 190517; context 223106, ditch 190465) and a nail shank fragment (context 262113, ditch 170082). Miscellaneous metalwork includes a rod (ON 3342, context 239167, ditch 1904), bar fragment (ON 4464, context 330009, ditch 190436), and three broad strip fragments (ON 4096, context 232113, pit 232111).

More interesting are a spearhead (**Cat. No. 6**, ON 3292), a dagger fragment (**Cat. No. 9**, ON 3871), a copper alloy one-piece sprung brooch (**Cat. No. 65**, ON 2181), a cast copper alloy tankard handle (**Cat. No. 109**, ON 180) and three knives (**Cat. Nos 110–112**, ON 2117, ON 2165, ON 3341). The spearhead (**Cat. No. 6**; ON3292) is poorly preserved, heavily encrusted and in four pieces. It has a leaf-shaped blade which appears from the breaks to have had a diamond, or lozenge, cross section. The socket is partly missing. The surviving part of the dagger blade (**Cat. No. 9**; ON 3871) shows that the blade is double edged, quite narrow and originally was tapered. The one-piece sprung brooch (**Cat. No. 65**; ON 2181) with flat triangular bow and four-coil spring is a pre-Conquest type generally dated to the first half of the 1st century AD, but with some examples from 1st century BC contexts (Mackreth 2011, 14-20; see also Butcher 2001, 41). The cast copper alloy handle, probably from a tankard (**Cat. No. 109**, ON 2180), is simply decorated in an openwork curvilinear scheme.

Two of the three knives (**Cat. Nos 110–111**; ON 2117, ON 2165) are Iron Age forms with strongly curved blades which continued in use up to the end of the 1st century AD at least. These correspond to Manning's (1985, 118, fig 29) Type 23. The third knife (**Cat. No. 112**, ON 3341) is probably of Manning Type 18, a common form widely used during the Roman period.

The small numbers of finds from Iron Age contexts precludes detailed consideration of the contexts in which they were found. Most (n = 8) came from ditch fills, and include a shears blade (**Cat. No. 39**; ON 3941), a penannular ring **(Cat. No. 128**, ON 3225) a cast copper alloy handle (**Cat. No. 109;** ON 2180) and whittle tanged knife (**Cat. No. 112**; ON 3341). Other finds (n = 4) are from pits, and include a tanged dagger fragment (**Cat. No. 9**; ON 3871), a simple sprung brooch with flat section bow (**Cat. No. 65**; ON 2181) and a whittle tanged knife (**Cat. No. 111**, ON 2165).

Four finds from cobbled surfaces have been noted above. One knife (**Cat. No. 110**; ON 2117) was recovered from a ring gully, and a single nail fragment from stakehole 169003 was probably intrusive.

Roman occupation (Table 3.3)

Some 251 metal finds (317 fragments) from Zone 6 come from Roman contexts. Six finds (10 fragments) are from contexts assigned a broad Roman date, and 104 metal finds (148 fragments) are from early Roman contexts. A small number of finds (n = 8; 10 fragments) are from early to mid-Roman contexts, some 49 metal finds (52 fragments) from mid-Roman contexts and just two finds (3 fragments) from middle to late Roman contexts. There are 82 objects (94 fragments) from late Roman contexts.

Roman

The six objects from contexts assigned a broad Roman date are an L-shaped iron fragment, possibly a structural

Table 3.3 Zone 6 – Summary of stratified metal finds from Roman contexts by feature type (object count)

Period	*Ditch/ gully*	*Pit*	*Grave*	*SFB*	*Layer*	*Well*	*Water-hole*	*Hollow way*	*Working hollow*	*Posthole*	*Quarry pit*	*Cobbled surface*	*Total*
Roman		2			4								6
Early Roman	36	24	23	1	11	1		5		3			104
Early or middle Ro		7				1							8
Middle Roman	17	17		5		5			4	1	1	*	50
Middle or late Ro	1	1											2
Late Roman	9	7	20	25	6	4	11						82
Totals	63	58	43	31	21	11	11	5	4	4	1	0	252

fitting, from pit 170192, a nail from pit 240163, and three nails (4 fragments) and at least two fragments of folded copper alloy strip, perhaps from a bracelet, with one strip wrapped around the other at a right angle (**Cat. No. 83**, ON 3377), from layer 258058. The bracelet is incomplete, and possibly deliberately cut and folded, suggesting that it was not new when deposited. Another cut and rolled fragment of broad armlet (**Cat. No. 82**; ON 3308) was recovered from colluvial deposits.

Early Roman (Table 3.4)

The 105 metal objects (149 fragments) from early Roman contexts include a number of metal objects (n = 23; 46 fragments), mostly nails, from two early Roman graves. These have been separately listed (see Table 3.7 below). Grave 126238 contained eight nails (11 fragments) including four complete examples, but no other metal finds. Grave 260017 yielded 16 metal objects (35 fragments) including 10 nails (27 fragments), an L-shaped staple, a possible holdfast and three fragments of iron strip or sheet. Five nails were complete and could be measured. The nails from graves 126238 and 260017 may be coffin nails. The nails from grave 126238 are a good length for coffin nails, whereas the nails from 260017 are shorter. Other early graves had no metal finds.

Most of the finds are from ditches (n = 36 objects; 43 fragments) and in particular from ditch 170041 (n = 15; 16 fragments), from graves (n = 23; 46 fragments) and from pits (n = 23 objects; 27 fragments). Few individual features produced more than a small number of objects. Most of the metal finds from ditches are structural items, nails, miscellaneous metal fragments and objects of uncertain identification. Ditch 190441 produced a piece of square bar which is probably part of small mortice chisel (**Cat. No. 37**, ON 3885), and ditch 170116 produced a whittle tang knife with distinctive curved blade (**Cat. No. 113**, ON 3907). Ditches 170115 and 249117 produced the only personal items: a Colchester brooch (**Cat. No. 71**, ON 3966) from ditch 170115 and a coiled spring and pin fragment (**Cat. No. 63**, ON 3234), probably from a simple bow brooch, from ditch 249117. Only ditch 170041 produced more than small number of finds. These comprise 15 objects including five nails, two structural items, a piece of a binding, three pieces of miscellaneous bar, strip or block and two items of uncertain identification. The remaining finds from ditch 170041 are a small socketed reaping hook (**Cat. No. 31**, ON 669), and a probable small worn ploughshare (**Cat. No. 22**, ON 4088).

Pits individually also produced limited numbers of finds, and perhaps surprisingly the range of finds from pits was even more restricted than the range of finds from ditches. Most pits produced nails, miscellaneous fragments of strip, bar, sheet etc, unidentified pieces and waste fragments. Pit 319034 produced an object which may well be an incomplete S-curve key, rather than a latch lifter (**Cat. No. 124**, ON 3960). If the identity is correct this is an unusual find, comparable to keys from Stradonice (Czech Republic). The only other object was a tapering copper alloy pin, with a plain head (**Cat. No. 98**, ON 2986), from pit 245133. One other identifiable object from an early Roman context was a snaffle bit link (**Cat. No. 53**, ON 3267) from deposit 301095.

Other contexts produced small numbers of finds. Hollow-way 143316 produced two possible tool fragments: a tapered punch or spike (**Cat. No. 50**; ON

Table 3.4 Zone 6 – Summary quantification of metal finds from early Roman contexts by context type and object function (object & fragment counts)

Feature type	*Feature no.*		*Tools/ crafts*	*Transport*	*Personal*	*Household*	*Structural*	*Bindings*	*Nails*	*Misc*	*Query*	*Undiagnostic*	*Waste*	*Total*
Ditches	170041	Count	1			1	2	1	5	3	2			15
		Fragt	1			1	2	1	6	3	2			16
	170114	Count									1			1
		Fragt									1			1
	170115	Count			1									1
		Fragt			1									1
	170116	Count				1			1					2
		Fragt				1			1					2
	170147	Count							1	1				2
		Fragt							1	1				2
	170178	Count							0	2	1	0		3
		Fragt							2	2	2	2		8
	190441	Count	1											1
		Fragt	1											1
	190447	Count								1				1
		Fragt								1				1
	190466	Count							1					1
		Fragt							1					1
	190468	Count									1			1
		Fragt									1			1
	190492	Count											5	5
		Fragt											5	5
	190510	Count								1				1
		Fragt								2				2
	249100	Count								1				1
		Fragt								1				1

Table 3.4 (continued)

Feature type	*Feature no.*		*Tools/ crafts*	*Transport*	*Personal*	*Household*	*Structural*	*Bindings*	*Nails*	*Misc*	*Query*	*Undiagnostic*	*Waste*	*Total*
	249117	Count			1									1
		Fragt			1									1
	Total	Count	2		2	2	2	1	7	9	5	0	5	36
	Total	Fragt	2		2	2	2	1	10	10	6	2	5	43
Pits	170158	Count								1	1			2
		Fragt								1	1			2
	178214	Count								1				1
		Fragt								1				1
	185180	Count								1				1
		Fragt								1				1
	245133	Count			1				2	1				4
		Fragt			1				2	1				4
	245137	Count							1				1	2
		Fragt							1				3	4
	247120	Count							2					2
		Fragt							2					2
	255053	Count								1		0		1
		Fragt								1		2		3
	262094	Count									1		1	2
		Fragt									1		1	2
	269061	Count										0		0
		Fragt										5		5
	277054	Count							0					0
		Fragt							1					1
	301089	Count								3	3			6
		Fragt								3	3			6
	301097	Count							2			0		2
		Fragt							2			1		3
	319034	Count									1			1
		Fragt									1			1
	Total	Count			1				7	8	6	0	2	24
	Total	Fragt			1				8	8	6	8	4	35
Graves	126238	Count							8					8
		Fragt							11					11
	260017	Count					2		10	3		0		15
		Fragt					2		27	3		3		35
	Total	Count					2		18	3		0		23
	Total	Fragt					2		38	3		3		47
Layers/ deposits	301095	Count	1	1	1				3	2	2			10
		Fragt	1	1	1				4	2	3			12
	301098	Count							1					1
		Fragt							1					1
	Total	Count		1	1				4	2	2			11
	Total	Fragt		1	1				5	2	3			13
Hollow way	143316	Count	2						0	3				5
		Fragt	2						1	3				6
Posthole	247088	Count	1		1		1							3
		Fragt	1		1		1							3
SFB	130227	Count							1					1
		Fragt							1					1
Well	132144	Count							1					1
		Fragt							1					1
	Total	Count	6	1	5	2	5	1	38	25	13	0	7	104
	Total	Fragt	6	1	5	2	5	1	64	26	15	13	9	148

Table 3.5 Zone 6 – Summary quantification of metal finds from middle Roman contexts by context type and object function (object & fragment counts)

Feature type	*Feature no.*		*Tools/ crafts*	*Personal*	*Household*	*Structural*	*Nails*	*Misc*	*Query*	*Waste*	*Total*
Cobbled surface	170152	Count					0				0
		Fragt					1				1
	137270	Count	1				1	1			3
		Fragt	1				1	1			3
	170049	Count						1			1
		Fragt						1			1
	170050	Count						1			1
		Fragt						1			1
	170083	Count					1	1			2
		Fragt					1	1			2
Ditches	170099	Count	1	1			1				3
		Fragt	1	1			1				3
	170109	Count		1							1
		Fragt		1							1
	170150	Count		1			1				2
		Fragt		1			1				2
	190454	Count					2				2
		Fragt					2				2
	190484	Count						2			2
		Fragt						2			2
	Total	Count	2	3			6	6			17
	Total	Fragt	2	3			6	6			17
	123305	Count					1				1
		Fragt					1				1
	130237	Count					1				1
		Fragt					1				1
	132098	Count							1	1	2
		Fragt							1	1	2
	170021	Count		2			2				4
		Fragt		2			2				4
Pits	255053	Count					1				1
		Fragt					2				2
	263091	Count	1					2	1		4
		Fragt	1					2	1		4
	263094	Count						1			1
		Fragt						1			1
	264201	Count						1			1
		Fragt						1			1
	327030	Count		2							2
		Fragt		2							2
	Total	Count	1	4			5	4	2	1	17
	Total	Fragt	1	4			6	4	2	1	18
Posthole	262157	Count	1								1
		Fragt	1								1
Quarry pit	216097	Count		1							1
		Fragt		1							1
	170136	Count		1				2	1		4
Sunken feature		Fragt		2				2	1		5
buildings	170168	Count						1			1
		Fragt						1			1
Well	153123	Count	1				4				5
		Fragt	1				4				5
Working hollow	247146	Count	1		1	1	1				4
		Fragt	1		1	1	1				4
	Total	Count	6	8	1	1	16	13	3	1	50
	Total	Fragt	6	9	1	1	18	13	3	1	53

4018), and a socket (**Cat. No 48**, ON 3338) probably from a tool such as a reaping hook. The finds from posthole 247088 include an incomplete reaping hook (**Cat. No.32**, ON 2183) and a well-preserved nail cleaner (**Cat. No. 101**; ON 2182). The nail cleaner is a 1st-century type with shouldered blade and moulded neck (Eckardt and Crummy 2008, 121, fig 59). A copper alloy hairpin with decorated head (**Cat. No. 97**; ON 3231) came from layer 124163.

Layer or deposit 301095 produced a pair of iron dividers (**Cat. No. 44,** ON 3276), a mouth bar from a jointed bridle (ON 3267) and a fragment of a cable pattern bracelet formed from wires twisted together (**Cat. No. 85,** ON 3265).

Early or mid-Roman

There are just nine finds (11 fragments) from early or mid-Roman contexts. They include a fragment of saw blade (**Cat. No. 35**, ON 2995), the shaft of a probable hairpin (**Cat. No. 99**, ON 2961), an iron finger ring with large oval bezel (**Cat. No. 95**, ON 2969), and three nails (4 fragments) from pit 245134. There is also an object of uncertain identification (ON 2996) from the same feature. Other finds comprise a strip of iron (ON 4048) and a nail shank fragment (ON 4473) from well 170167, and a nail from ditch 190466.

Mid-Roman (Table 3.5)

Finds from contexts of mid-Roman date number only 50 (53 fragments). They include six tools, including one hooked iron billet, nine personal items, including a single hobnail, one household item and one structural object. Otherwise the metal finds comprise 16 nails (18 fragments), 13 miscellaneous pieces of rod, strip, bar, plate, etc, three items of uncertain identification and one piece of melted copper alloy.

The finds come from ditches (n = 17), pits (n = 17), a well (n = 5), a quarry pit (n = 1), a 'working hollow' (n = 4) and sunken-featured buildings (SFBs) (n = 5). Only SFB 170136, pits 170021 and 263091, 'working hollow' 247146 and well 153123 produced more than three metal finds. The only find from a posthole was part of a hooked iron billet (**Cat. No. 51**), from posthole 262157.

Most of the finds from ditches are nails (n = 6) and miscellaneous pieces (n = 6), but tools and personal items were also found. Most ditches produced one or two finds, and two (137270 and 170099) produced three finds. Those from ditch 137270 are a tanner's draw knife (**Cat. No. 40**, ON 4062), a nail and a length of bar (both ON 4061), and from ditch 170099 a possible file (**Cat. No. 49**, ON 4578), a late Roman copper alloy buckle (**Cat. No. 17**; ON 990145) and a nail. Ditch 170109 produced brooch pin fragment and a coil spring (**Cat. No. 76**, ON 3374) and 170150 produced a Colchester brooch (**Cat. No. 73**; ON 3976) and a nail.

Finds from pits include nails (n = 5) and miscellaneous pieces (n = 4) but also four personal items, including a single hobnail from pit 170021, and a tool. Four pits produced single nails only, one pit produced a single nail and nail fragment, and two pits produced two finds each. The latter included a nail cleaner and ear scoop (**Cat. No. 100**, ON 3967) found together in pit 327030, a possible lock hasp (**Cat. No. 125**, ON 3294) and a lump of melted copper alloy waste (ON 3980) from pit 132098. Two pits produced four finds each. Those from pit 170021 comprise a hairpin (**Cat. No. 96**, ON 614), a hobnail and two nails, and from pit 263091 a rake tine (ON 3334), two miscellaneous fragments and a piece of shaped iron bar, possibly part of a harness link or junction (ON 3331).

A brooch pin and spring fragment (ON 3289) was found in quarry pit 216097 and a fragment of iron bar or strip (ON 4479) in SFB 170168. A second SFB (170136) produced two fragments of a narrow plain bracelet (**Cat. No. 88**, ON 3983), two fragments of copper alloy sheet (ON 3981) and a triangular fragment of iron (ON 3929). Five finds recovered from well 153123 are a copper alloy needle (**Cat. No. 43**, ON 3886) and four nails. Four finds from 'working hollow' 247146 are a small reaping hook (**Cat. No. 30**, ON 897), a (probably) modern plate hinge (ON 899), a split spike loop (ON 4000) and a nail.

The finds assemblage from mid-Roman contexts is dominated by nails and miscellaneous pieces of metal, but there are a number of tools and personal items. One item of note is a 4th-century Roman copper alloy buckle (**Cat. No. 17**; ON 990145) from an upper fill in ditch 170099, a type with military associations. Another buckle of similar date but different form (**Cat. No. 18**; ON 335) was recovered from colluvial deposits (see below).

The tools include a small reaping hook (**Cat. No. 30**; ON 897) from 'working hollow' 247146 and a tanner's draw knife (**Cat. No. 40**; ON 4062) from ditch 13270. Other tools are a possible file (**Cat. No. 49**; ON 4578) from ditch 170099, a rake tine (ON 3334) from pit 263091, and a complete copper alloy needle (**Cat. No. 43**; ON 3886) from well 153123.

Personal items are more numerous and include a Colchester brooch (**Cat. No. 73**; ON 3976) from ditch 170150, a hairpin (**Cat. No. 96**; ON 614) from pit 170021, and a nail cleaner and ear scoop set (**Cat. No 100**; ON 3967) from pit 327030. The latter were found together and probably belonged to a toilet set.

Middle or late Roman

Three metal finds from contexts of middle or late Roman date are a small Type 1 nail and a nail shank fragment from ditch 190449, and a fragment of iron plate or strip from pit 247137.

Late Roman

There were few late Roman contexts and these yielded few finds (Table 3.6).

The metal finds (n = 20; 29 fragments) from three late Roman graves (136191, 246148 and 254020) have been separately listed (Table 3.7). Grave 136191 produced three incomplete nails, which alone cannot demonstrate the presence of a coffin although they, while perhaps a little short, would be suitable as coffin

Table 3.6 Zone 6 – Summary quantification of metal finds from late Roman contexts by context type and object function (object & fragment counts)

Feature type	*Feature no.*		*Arms*	*Transport*	*Personal*	*Hobnails*	*Security*	*Structural*	*Binding*	*Nails*	*Misc*	*Query*	*Total*
Ditches	170029	Count								2			2
and		Fragt								2			2
gullies	170048	Count			1								1
		Fragt			1								1
	170107	Count				6							6
		Fragt				6							6
	Total	Count			1	6				2			9
	Total	Fragt			1	6				2			9
Graves	136191	Count								3			3
		Fragt								3			3
	246148	Count		1									1
		Fragt		1									1
	254020	Count								14	2		16
		Fragt								19	3		22
	Total	Count		1						17	2		20
	Total	Fragt		1						22	3		26
Pit	254104	Count		6						1			7
		Fragt		6						1			7
	170132	Count	1		2		1	1	1	4	4	1	15
SFBs		Fragt	1		2		1	2	1	4	4	1	16
	170135	Count								1	2	1	4
		Fragt								1	2	1	4
	289042	Count				3				1	2		6
		Fragt				3				3	2		8
	Total	Count	1		2	3	1	1	1	6	8	2	22
	Total	Fragt	1		2	3	1	2	1	8	8	2	23
Oven	289056	Count								0			0
		Fragt								2			2
Waterhole	247100	Count								6	3	2	11
		Fragt								7	3	2	12
Well	176147	Count								2	2		4
		Fragt								2	2		4
Layer	128041	Count								4	2		6
		Fragt								4	2		6
	Total	Count	1	7	9	9	1	1	1	37	17	4	82
	Total	Fragt	1	7	9	9	1	2	1	47	18	4	94

nails. The single metal find from grave 246148 is a large, plain, iron D-shaped buckle (**Cat. No. 52**; ON 3309), possibly from a harness. The finds from grave 254020 include 13 nails, three fused fragments of bar and a nail or stud with a large conical head (L extant: 73mm). Eight of the nails are complete or near complete, and 47mm-95mm long. The average length is 66.5mm, the median value 67.5mm.

Only a small number of features produced finds other than nails or miscellaneous fragments. From gully 170107 came six corroded and encrusted hobnails (ON 4060), and pit 254104 produced fragments of iron barrel hoops (**Cat. No. 121**; ON 3213). SFB 170132 produced 14 metal finds, including a probable socketed weapon point, possibly incomplete (**Cat. No. 1**; ON 4094), a cable pattern bracelet (**Cat. No. 84**; ON 3218), a brooch pin (ON 885), a latchlifter (**Cat. No. 122**; ON 3986) and a poorly preserved fragment of rod or bar with looped terminal (ON 4574). Other SFBs produced only small numbers of nails or miscellaneous metalwork.

The unphased finds include agricultural tools, including a scythe blade (**Cat. No. 26**; ON 3940) from context 252254, a spud (**Cat. No. 23**; ON 668) from context 207048, and a rake prong or tine (**Cat. No. 33**; ON 2166) from context 258045. The complete scythe blade (**Cat. No. 26**; ON 3940) is a short blade of a type found, for example, at La Tène itself (Vouga 1923, pl xiv, no. 5; pl xxv, no 2). The form of the blade suggests that it is an Iron Age scythe that predates the Claudian invasion. Other unphased finds include a 'traveller' or tyre runner (**Cat. No. 38**; ON 2960) from unphased layer 305072, used by wheelwrights to measure the circumference of the felloe (rim or segment of rim) when making a one piece tyre for a wheel. Another example of a tyre runner was recovered from grave 126204 in the eastern Roman cemetery in Zone 19. A

Table 3.7 Zone 6 – Catalogue of metal finds from Roman graves

Grave	*Phase*	*Description*	*No.*	*Fragt*	*Dimensions*	*ON*	*Context*
126238	ERo	Type 1 nail complete. Fe	1	1	L: 32mm	4314	126239
		Type 1 nail complete. Fe	1	1	L: 45mm	4315	126239
		Type 1 nail, almost complete, bent or clenched tip. Fe	1	1	L: 65mm	4316	126239
		Type 1 nail, complete. Fe	1	1	L: 55mm	4317	126239
		Type 1, incomplete, encrusted. Fe	1	1		4318	126239
		Type 1 head fragment; stem fragment. Possibly join. Fe	1	2		4319	126239
		2 x Type 1 head Fragments; 2 x stem fragments, one bent into a U-shape. Fe	2	4		4320	126239
		Totals	8	11			
260017	ERo	L-shaped nail, complete. Fe	1	1	L: 50mm	3920	260027
		Type 1 nail, complete. Fe	1	1	L: 50mm	3923	260027
		Type 1 nail complete. Fe	1	1	L: 48mm	3933	260027
		L-shape nail or staple. Fe	1	1	L: 31mm	3934	260027
		Type 1 nail, complete. Fe	1	1	L: 48mm	3943	260027
		Type 1 nail head fragment. Fe	1	1		3932	260027
		Nail stem fragment. Fe	0	1		3921	260027
		Nail stem fragment. Fe	0	1		3924	260027
		3 x nail stem Fragments, 2 fused together. Fe	0	3		3925	260027
		Nail stem fragment. Fe	0	1		3931	260027
		Nail stem fragment. Fe	0	1		4476	260018
		Nail stem fragment. Fe	0	1		3934	260027
		Nail stem fragment. Fe	0	1		3935	260027
		Type 1 head, slightly domed. Fe	1	1		3936	260027
		Small Type 1 head fragment. Fe	1	1		3942	260027
		Type 1 head fragment. Fe	1	1		3948	260027
		Type 1 head fragment. Fe	1	1		3949	260027
		Type 1 head fragment, encrusted. Fe	1	1		3954	260027
		Nail stem fragment. Fe	0	1		3939	260027
		2 x nail stem Fragments	0	2		3944	260027
		Nail stem fragment. Fe	0	1		3946	260027
		2 x nail stem Fragments. Fe	0	2		3947	260027
		Nail stem fragment. Fe	0	1		3953	260027
		L-shaped staple?. Fe	1	1	L: 37mm	3930	260027
		Holdfast or nail bent into a hook shape. Fe	1	1	L: 30mm	3937	260027
		2 x sheet Fragments, one a possible strip. Fe	2	2		3926	260027
		Small strip fragment. Fe	1	1		3931	260027
		Undiagnostic. Fe	0	1		3927	260027
		Undiagnostic lump, possibly slag. Fe	0	1		3938	260027
		Undiagnostic lump. Fe	0	1		3945	260027
		Totals	16	35			
136191	LRo	2 x Type 1 nail heads. Fe	2	2		3287	136192
		Type 1 nail head. Fe	1	1		3288	136192
		Total	3	3			
246148	LRo	D-shaped buckle. Large plain harness buckle. Fe	1	1	L: 30mm; W: 65mm	3309	246150
254020	LRo	Nail with large domed or low conical head, incomplete stem. Fe	1	1	L extant: 73mm	633	254021
		Type 1 complete, encrusted. Fe	1	1	L: 70mm	634	254021
		Type 1 almost complete, encrusted. Traces of wood? Fe	1	1	L: 65mm	635	254021
		Type 1 complete, encrusted. Fe	1	1	L: 95mm	636	254021
		Type 1 complete, heavily encrusted. Mineral preservd wood. Fe	1	1	L: 70mm	660	254021
		Type 1 almost complete, encrusted. Fe	1	1	L: 70mm	661	254021
		Type 1 incomplete, clenched. Fe	1	1	L extant: 47mm	632	254021
		Type 1 nail, incomplete, encrusted. Fe	1	1	L extant: 55mm	637	254021
		Possible Type 1 nail, incomplete. Mineral preserved wood on stem.	1	1	L extant: 60mm	644	254021
		Type 1 nail, incomplete and heavily encrusted. Fe	1	1		639	254021

Table 3.7 (continued)

Grave	*Phase*	*Description*	*No.*	*Fragt*	*Dimensions*	*ON*	*Context*
		1 x Type 1 head fragment; 2 x small stem Fragments. Fe	1	3		640	254021
		Type 1 head fragment. Fe	1	1		641	254021
		Nail with large flat circular head, heavily encrusted. Fe	1	1		642	254021
		Large nail with large domed head, incomplete;	2		643	254021	
		Fragment of nail stem, clenched tip, Fe	1				
		Nail stem fragment or short spike. Fe	0	1		Sample 5347	254022
		Nail stem fragment. Fe	0	1		638	254021
		Nail stem fragment, Fe	0	1		661	254021
		3 x bar Fragments fused together. Fe	2	3		631	254021
		Undiagnostic flat fragment. Fe	0	1		Sample 5344	254022
		Undiagnostic fragment. Fe	0	1		Sample 5349	254022
		Totals	16	25			

(Early Roman graves 176106, 297092 and 297120 and late Roman grave 207049 contained no metal finds.)

cold chisel or mason's chisel (**Cat. No. 42**; ON 2944) from layer 305071 cannot be closely dated. A fragment of a plain penannular copper alloy bracelet (**Cat. No. 88**; ON 4773) was recovered from topsoil (170002). A bucket or vessel handle mount (**Cat. No. 118;** ON 375) came from layer 133044, and a length of chain (**Cat. No. 125**; ON 4064) from context 178187 (pit 178185). These items cannot be closely dated.

The finds from the colluvial deposits number 286 (322 fragments) and include a number of post-medieval and modern finds. They also include nails (n = 35), miscellaneous finds (n = 86) and objects of uncertain identification (n = 37) which are not closely datable. The main classes of find are personal items (n = 49), tools and craft items (n = 15), military equipment (n = 13) and household items (n = 10). Although these finds include material of modern date, it is apparent that the remaining objects are all or almost all of Late Iron Age or Roman date. Consequently, if the modern material is excluded the finds can be treated as single unstratified assemblage.

Militaria

Militaria include a modern 0.22 in cartridge case (ON 314) and two lead shot for pistol or musket (ON 2888 and ON 3245). Other more relevant weapons are a socketed missile head with long lozenge section point (**Cat. No. 2**; ON 698), three spearheads (**Cat. Nos 3–5**; ON 2957, ON 3200, ON 2982), a possible tanged arrowhead (**Cat. No. 7**; ON 699), a dagger blade (**Cat. No. 8**; ON 2988), and three fragments of scabbard binding, including two copper alloy terminal knobs with fragments of side channel from Roman sword scabbards (**Cat. Nos 11–13**; ON 692; ON 2120, ON 3223).

Other military equipment comprises a 1st-century cast buckle plate (**Cat. No. 14**; ON 4311), a hinged component for a buckle or strap end (**Cat. No. 15**; ON 674), a mid 2nd-century or later belt fitting (**Cat. No. 16**; ON 3262) and a 4th-century buckle (**Cat. No. 18**; ON 335). There is also a pendant fitting (**Cat. No. 19**; ON 3297) and a fragment of a mount (**Cat. No. 20**; ON 327) which may be military fittings but cannot be certainly identified or dated.

A few weapons hint at a date prior to the Claudian invasion of the mid 1st century AD. The long lozenge section point (**Cat. No. 2**; ON 698) may be a weapon of late Republican or early Imperial date and the possible tanged arrowhead (**Cat. No. 7**; ON 699) is comparable to similar objects found at Numantia (Spain) and at Alesia (Côte d'Or), amongst other sites (Deyber 2008). However, the identification of this particular form of object as an arrowhead is not certain and similar objects have been identified as tools. Two of the three spearheads from the colluvium have blades with a distinctive wavy outline (**Cat. Nos 3–4**; ON 2957, ON 3200). Their asymmetrical outline resembles the wavy or cut spearheads found in Europe, which are an Iron Age type and probably pre-dating the Claudian invasion.

The tanged dagger blade (**Cat. No 8**, ON 2988) is undatable and not readily identifiable as either an Iron Age or a Roman form, but there are spearheads with a similar blade which suggest a 1st-century date. The scabbard bindings (**Cat. Nos 11–13**; ON 692, 2120, 3223) are probably mid 1st-or 2nd-century or later, as they are distinctly different from earlier Roman scabbard bindings.

A decorated cast belt plate (**Cat. No 14**; ON 4311) is probably also mid 1st century, of a type possibly produced in Britain (Grew and Griffiths 1991, 55). Another 1st-century belt fitting is a hinged buckle or strap end component (**Cat. No. 15**; ON 674). Of two other belt fittings recovered one is for a baldric (**Cat. No. 16**; ON 3262) and dates to the mid 2nd century or later. It reflects the change over from the military waist belt to the baldric for carrying the sword. Another piece of belt fitting is a 4th-century buckle (**Cat. No. 18**; ON 335). Belt fittings of similar date have been found at Richborough. Another buckle (**Cat. No. 17**; ON 990145) of the same date but different form was found in ditch 170099.

Tools

These include a number of agricultural tools along with woodworking and other craft tools. Notable agricultural tools include a complete ploughshare (**Cat. No. 21**; ON 305) comparable to examples from Bigbury (Kent) and Danebury (Hants), and probably of late Iron Age or early Roman date. Two spuds (**Cat. Nos 24–25**; ON 307, ON 4027), a scythe blade fragment (**Cat. No. 28**; ON 306) and a socketed reaping hook (**Cat. No. 29**; ON 351) were also recovered.

Other tools include the blade of an axe of Roman type (**Cat. No. 34**; ON 672), a probable mortice chisel (**Cat. No. 36**; ON 2100) for woodwork, a leather-worker's awl (**Cat. No. 41**; ON 2963), a fragment of a stylus (**Cat. No. 45**; ON 829), and two fire tools (**Cat. Nos 46–47**; ON 3209; ON 2977). The handle of one of these, which is probably an Iron Age poker (**Cat. No 46**; ON 3209), has alternating plain and twisted sections.

A possible steelyard, now bent double (**Cat. No. 54**; ON 2972) and two lead pendant weights, probably with loops of iron (**Cat. Nos 55–56**; ON 694, ON329), and possibly steelyard weights, were identified. There is also a lead net weight or spindle whorl (**Cat. No. 57**; ON 3357) and a conical lead weight (**Cat. No. 58**; ON 4086).

Personalia

Amongst this group is an Iron Age copper alloy ring-headed swan's neck pin (**Cat. No. 59**; ON 3347), but most of the personal adornment objects are brooches, all 1st-century forms. Two poorly preserved simple sprung brooches of possible early 1st century AD date may have had external chords (**Cat. Nos 61–62**; ON 2122, ON 3251). There is a simple bow brooch with a slight knob near the top of the bow (**Cat. No. 64**; ON 2148) and four simple sprung brooches with flat section bows, the so-called Nauheim derivatives, (**Cat Nos 66–69**; ON 3285, ON 2887, ON 2900, ON 3253). Also identified were a spring and pin fragment (**Cat. No. 70**; ON 3254), a single Colchester brooch (**Cat. No. 72**; ON 3878), two two-piece Colchester brooches (**Cat. Nos 75–76**; ON 2967,ON 3374), and hinge and pin from a possible Aucissa brooch (**Cat. No. 77**; ON 3361). There are two complete Hod Hill brooches and part of a third brooch of this type (**Cat. Nos. 78–80**; ON 3353, ON 3913, ON 2892) and part of a possible rear hook brooch (**Cat. No. 81**; ON 630).

Other items of personal adornment include a cut and rolled fragment of a 1st-century broad armlet (**Cat. No. 82**; ON 3308), a cable pattern bracelet (**Cat. No. 84**; ON 3218), a plain bracelet with a narrow band with terminals decorated with transverse mouldings, a fragment of plain narrow bracelet band (**Cat. No. 87**; ON 3904), and a plain band of circular section with hooked catch (**Cat. No. 90**; ON 4325). A fragment of a narrow bracelet with a terminal decorated with transverse lines was rolled into a crude ring. There is also an incomplete crenellated bracelet.

All but the broad armlet **(Cat. No. 82**, ON 3308) are forms that occur most often in late Roman contexts. The cut and rolled fragments (**Cat. Nos 82, 91**; ON 3308, ON 3883) hint at the reuse or reworking of material. The broad armlet (**Cat. No. 82**) may have been made into a small finger ring but more likely into a loop to be worn as an amulet. The other rolled bracelet fragment (**Cat. No. 91**), though rather crudely executed, could have been worn as a finger ring. Swift (2012) has recently discussed the phenomenon of the recycling bracelet fragments as finger rings and similar objects.

Three finger rings were recovered from the colluvium. One is a complete ring with a bezel decorated with a pattern of dots, a form found largely in East Anglia, Essex and Hertfordshire, although Cool (1983, 38-9, map 6.1) recorded an example from Silchester. The type dates to the second half of the 1st century. A second finger ring is a coiled or spiral ring, a form that cannot be closely dated.

Other items of personal equipment are four pairs of tweezers (**Cat. Nos 102–105**; ON 615, ON 334, ON 3259, ON 2124) – all plain forms – from the colluvial deposits, and a possible cosmetic pestle (**Cat. No. 106**; ON 609). Heavily encrusted with corrosion products, this was identified from the x-ray. There is also a post-medieval silver finger ring (ON 325).

Household objects

A number of knives or fragments of knife blades (**Cat. Nos 114–117**; ON 326; ON 2974; ON 2985; ON 2106) were recovered from the colluvium, along with a complete bucket hoop or binding (**Cat. No. 120**; ON 2955) and a latchlifter (**Cat. No. 123**; ON 2119) and a few unidentified objects (**Cat. Nos 129–132**; ON 625, ON 2143, ON 2952, ON 3371).

Catalogue (Figs 3.2-3.4)

Militaria: missile points, spearheads and arrowheads

1. ON 4094. Missile point, socketed with tapering circular section point. The socket is open and the tapering point may be incomplete. Fe. L: 110mm; socket D: 18mm x 19 mm. Possibly a complete missile point, but more probably the socket and part of the tang of a socketed pilum or similar weapon (cf Poux 2008b, 332-35, fig 22; see also Desbat and Maza 2008, 249-50, fig 7, no 61). Ctx 289044, SFB 170132. Inv No 868. Late Roman (Fig 3.2).
2. ON 698. Missile point with long square or lozenge section point. Most of the presumed socket is missing. Fe. L: 175mm. Examples of weapon heads with square or lozenge sections points come from various sites of late Republican or early Imperial date, but are usually shorter heads than this example (eg, hoard from Grad near Šmihel (Slovenia): Horvat 2002, pl 13, nos 3-14; see also Poux 2008b, 358-59, fig 41), but longer weapons usually identified as pila are known (eg, Grad near Šmihel: Horvat 2002, pls 8-12 (Poux 2008b, 332-35, fig 22; see also Sievers 2001, 180, fig 13). Ctx 130012, feature 170028, colluvium. Inv No 671 (Fig 3.2).
3. ON 2957. Spearhead with mid rib and asymmetric wavy outline. Closed socket with single nail. Fe. L: 210mm; L of blade: 143mm; W: 38mm. Ctx 170010, feature 170010, colluvium. Inv No 717 (Fig 3.2).
4. ON 3200. Spearhead with midrib and wavy outline. Closed socket with single nail. Fe. L: 191mm; L of

blade: *c* 130mm; socket D: 19mm x 17mm. Ctx 305028, feature 170010, colluvium. Inv No 918

5. ON 2982. Spearhead blade (not illustrated) with pronounced midrib and eroded edges (2 fragments). The socket is lost and the blade bent. The blade could have been leaf-shaped or wavy in outline. Fe. L of blade: *c* 280mm; W: *c* 62mm. Ctx 305026, feature 170010, colluvium. Inv No 900

6. ON 3292. Spearhead (not illustrated), with long leaf-shaped blade, of lozenge cross section (4 fragments). The closed socket is incomplete. Poorly preserved, mineralised and encrusted. Fe. Overall L extant: 31 5mm; L of blade: 258mm; W of blade: *c* 50mm. Ctx 262113, ditch 170082. Inv No 1201. Late Iron Age or early Roman

   Spearheads from Iron Age sites in Britain often have midribs (eg, Hunsbury (Northants): Dryden 1885, 60, pl. vi; Fell 1936, 66, pl. va; Danebury (Hants): Sellwood 1984, 361, fig 7.19, nos 2.100-2.101; Cunliffe and Poole 1991, 352, fig 7.18, nos 2.284), but spearheads with markedly asymmetrical wavy or cut outlines are not found. These examples seem to relate to the tradition of wavy or cut spearheads found in Continental Europe (eg, Brunaux and Rapin 1988, 122, fig 60; Déchelette 1914, 1144-1146, fig 479). Examples are known from Gournay sur Aronde (Oise) (Brunaux and Rapin 1988, 122, pl. xliii, no. 1130, pl. lii, no 4579), Ribemont sur Ancre (Somme) (Brunaux and Rapin 1988, fig 60), Nimes (Gard) (Déchelette 1914, fig 479) and from La Tène (Switzerland) (Vouga 1923, pl xi, nos 1-3, 5-6). Spearheads with cut asymmetrical blades (fers de lances échancrés: eg, La Tène, Nimes and Gournay) appear to be more common than those with wavy outlines. The asymmetrical spearheads are of Iron Age type and probably pre-date the Claudian invasion.

7. ON 699. Possible tanged arrowhead with lozenge section blade. Comparable to points from Numantia (Spain), and Alesia (Côte d'Or) and Montmartin (Oise) (Deyber 2008, figs 1-2), identified by Deyber (2008, passim) as arrowheads, although other identifications as tools, probably awls or burins, have been suggested. Renoux (2000, 91-114) does not include this form in his typology of arrowheads and, although similar points found at Vindonissa (Switzerland) have been identified weapon heads (Unz and Deschler-Erb 1997, 23 and Taf. 20: 381-82), an alternative identification as tools could be suggested. Fe. L: 76mm. Ctx 130012, feature 170028, colluvium. Inv No 668 (Fig 3.2).

Militaria: daggers and swords

8. ON 2988. Dagger blade, diamond cross section, tang with a spacer or washer. Fe. The form of the blade is broadly comparable to the blade of a spearhead from a 1st-century inhumation burial at Camelon, Stirlingshire (Scott 1976, 84-5, fig 3, no 3), although the latter has midrib. However, the tang and especially of the presence of a spacer or washer on the tang strongly suggest this object is a dagger and not a spearhead. The precise form is not closely paralleled. L: 315mm; L of blade: *c* 190mm; W: 44mm. Ctx 305050, feature 170010, colluvium. Inv No 724 (Fig 3.2).

9. ON 3871. Dagger fragment (not illustrated), with whittle tang. The blade is narrow and double-edged with a diamond cross section, and probably tapered to the tip. Narrow blade, not a Roman military dagger or pugio. Too little of the blade survives to be certain of form, but it probably had a straight tapering blade. There is a larger broader dagger with straight tapered blade from Kingsholm (Manning 1985, 158, pl 75, V19), and similar daggers of 1st-century date from Camulodunum (Hawkes and Hull 1947, 340, pl civ, nos 2 and 7). An example from Verulamium was found with late 3rd-century coins (Wheeler and Wheeler, 1936, 219, pl lxivb, no. 8). A dagger from Wroxeter (Bushe-Fox 1914, 18, fig 9) has a blade with edges curving uniformly to the tip. It was described as having a handle 'probably fitted with rings or bone or wood, as is shown by the transverse ribs'. Fe. L: 110mm; Tang L: *c* 70mm; blade W: 27mm. Ctx 320006; pit 320005. Inv No 590. Late Iron Age or early Roman

10. ON 3911. Tanged blade fragment. The extant width of the blade suggests it could be a sword, but too little of the blade survives for certainty. Fe. The width of the blade is suggestive of a Roman gladius rather than a longer narrower Iron Age sword (see Manning 1985, 150; Scott 1976, 83, table 1; Ulbert 1969). L: 106mm; W: 56mm. Ctx 317040, cobbled surface 126275. Inv No 600. Iron Age

11. ON 692. Sword scabbard binding comprising terminal knob with part of one side channel. Cu alloy. Fragment of a binding with terminal knob from the bottom of a scabbard (cf examples from Vindonissa (Switzerland): Unz and Deschler-Erb 1991, Taf. 9: 172-73). The form suggests 1st century AD date. H: 60mm. Ctx 130012, feature 170028, colluvium. Inv No 1044

12. ON 2120. Sword scabbard binding (not illustrated), small fragment comprising terminal knob with parts of side channels from a scabbard. Cu alloy. Similar to Cat. No. 11. H extant: 18mm. Ctx 130012, feature 170028, colluvium. Inv No 1052

13. ON 3223. U-section scabbard binding (not illustrated) for sword sheath or, less likely, for a shield. Cu alloy. L: 34mm; W: 5.5mm. Ctx 305054, feature 170010, colluvium. Inv No 1103

Militaria: belt fittings

14. ON 4311. Cast buckle plate with pattern of fine punched dots and hinged buckle frame (missing). Similar military belt buckle plate from London (Grew and Griffiths, 1991, 63 and fig 9, no. 49). Form is defined by Grew and Griffiths as Type A, examples of which are decorated with punched decoration or niello inlay (*ibid*, 49). They suggest (*ibid*, 55) that narrow plates with punched decoration such as the examples from London and Silchester (*ibid*, fig 9, nos 48-50) were locally produced. The London examples are unused. The archaeological evidence suggests that Type A fittings first appear in the principate of Augustus, they are found in Tiberian forts, but are most common in forts founded under Caligula or Claudius. The British evidence suggests that this type of fitting went out of use by the 60s AD. Cu alloy. L extant: 67.5mm; W: 22mm. Ctx 130012, feature 170028, colluvium. Inv No 1139 (Fig 3.2).

15. ON 674. Hinged buckle or strap end component, comprising narrow cast rectangular plate decorated with grooves and with two of three hinge loops. Probably dates to the early to mid 1st century AD. There are two small nails or rivet holes, one at each of the outer corners. Cast. Resembles belt fittings from

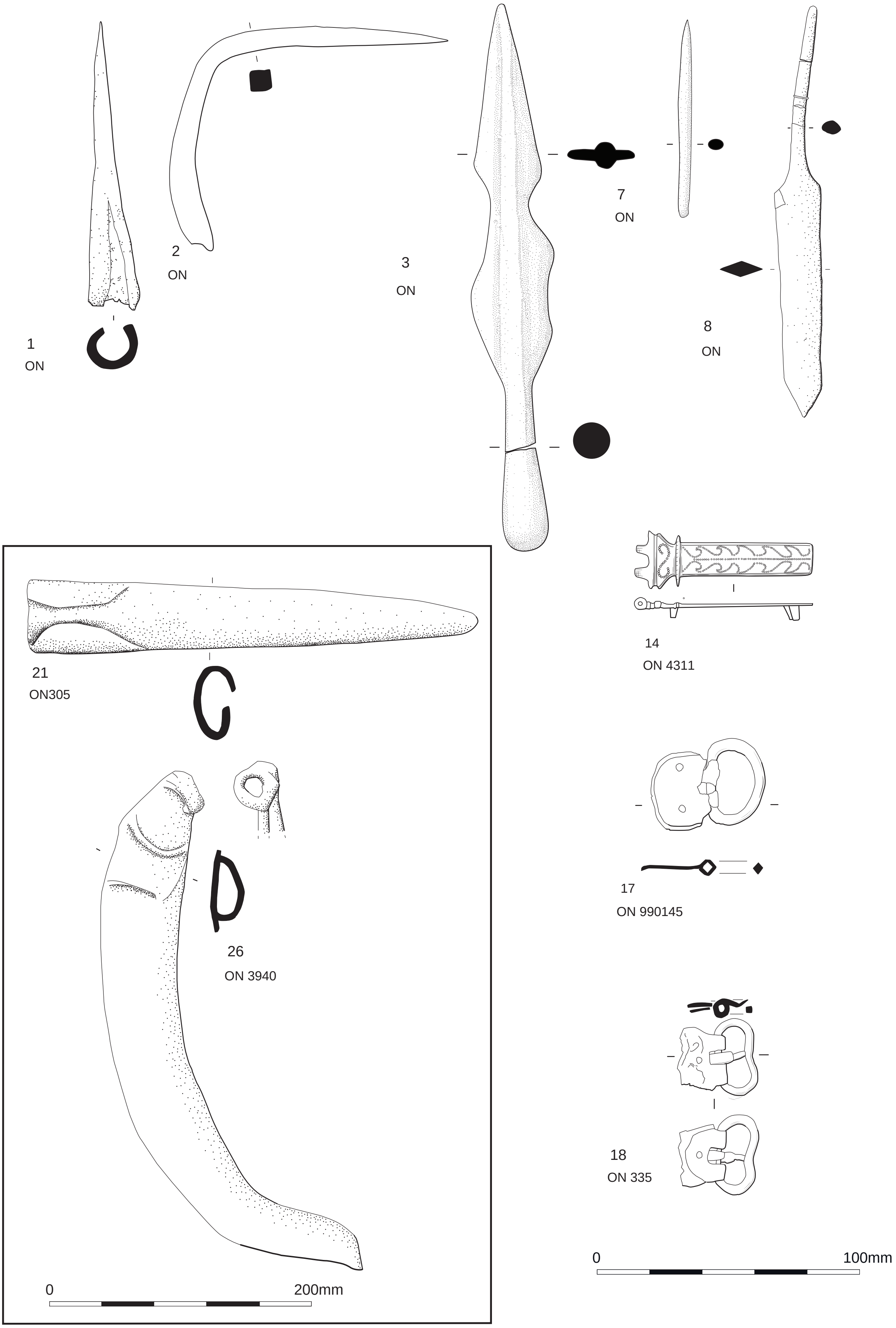


Fig 3.2 Metalwork from Zone 6

Vindonissa, Switzerland (Unz and Deschler-Erb 1997, 34, 36, Taf 14, nos 1059-1063), Aislingen (Ulbert 1959, 93, Taf 17, nos 30-31) and Kastell Oberstimm near the Danube (Böhme 1978, 171, Taf 21, B136), a fort first established under Claudius. British examples come from Richborough (Bushe-Fox, 1932, pl xii, fig 1, 32), Fishbourne (Cunliffe 1971, 110, fig 43, no. 76; see also Grew and Griffiths 1991, 78, fig 16, no. 179) and Hod Hill (Brailsford 1962, fig 4, A78, A 96; see also Grew and Griffith 1991, 76, fig 15, no 154, 78, fig 16, no 176-177, 180). Examples from Richborough and Hod Hill are attached to buckles. The distribution of this type of fitting is interesting since it concentrates on southern Germany and the Danube (Böhme 1978, 218, Abb. 74). Cu alloy. L extant: 13mm; W: 28mm. Ctx 130012, feature 170028, colluvium. Inv No 1042

16. ON 3262. Belt fitting, comprising triangular openwork casting, with one side more substantial and pierced axially. Cu alloy. Broadly similar fittings have been found at the fort of Alteburg-Heftrich, a numerus fort first occupied in the mid 2nd century, and at the Saalburg, both on the Taunus frontier in Upper Germany. Oldenstein (1976, 211 and Taf. 73, 965-970) identifies these objects as fittings for shoulder belts, and dates them to period after the mid 2nd century AD. L: 24mm; W: 34mm. Ctx 130012, colluvium 170028. Inv No 942

17. ON 990145. Buckle with oval frame attached to oval plate formed from sheet and secured by 2 rivets. Late Roman form current in the 4th century (Swift 2000, 190), type defined by Sommer (1984,18-19, Taf. 1: 1) as Sorte 1 Form A Typ a, and by Simpson (1976, 195-96, fig 2) as part of his Group 2. Compare examples from Winchester (Booth *et al* 2010, 218-19 and fig 3.248; Clarke 1979, 270-72 and fig 34 and generally Cool 2010, 285-90), Silchester (Boon 1959, 80 and pl. iii: A8), Canterbury (Ager, in Garrard 1995, 1028, fig 437, no. 414; see also Ager 1987, 27, fig 1, e) and Intercisa (Hungary) (Alföldi 1957, 460-63 and Abb. 104). Fragments of similar (incomplete) buckles have been found at Richborough (Lyne 1999, 105-06, figs 7-17, 34 and 37). See also Cat. No 18 below. Cu alloy. L: 45mm, W: 33mm. Ctx 279144, ditch 170099. Inv No 1149 (Fig 3.2).

18. ON 335. Buckle, with concave, or saddle-shaped, loop and a buckle plate formed from sheet Cu alloy. The plate has a pattern of lightly engraved lines and small punched dots on its face. Late Roman form, specifically 4th century (Swift 2000, 190). Plate is incomplete but may have been kidney-shaped. Buckle is Sommer's Sorte 1 Form A Typ b (Sommer 1984, 18-9, Taf 1:2; see also Swift 2000, 190-92, figs 231-32) and Simpson's Group 1 (Simpson 1976, 193-95, fig 1). For examples from Intercisa, Hungary see Alföldi (1957, 460 and Abb.101, 6). Similar (incomplete) buckles have been found at Richborough (Lyne 1999, figs 1-6 and 34). Compare with Cat. No. 17 above. Cu alloy. L: 31mm; W: 30mm. Ctx 130009, feature 170010, colluvium. Inv No 1024 (Fig 3.2).

Militaria: possible military fittings

19. ON 3297. Small pendant fitting comprising band of triangular section formed into an oval with pierced flange terminals. Cu alloy. A complete example of a similar fitting attached to a suspension loop was found with other military objects in 18th-century excavations in the oppidum of Le Chatêlet at Gourzon, Haute-Marne, France (Dechezleprêtre 2008, fig 4). The object is not dated, and Le Chatelet has produced material ranging in date from the Iron Age to the late Roman period and beyond. L: 40mm; W: 35mm. Ctx 130012, feature 170028, colluvium. Inv No 1099

20. ON 327. Decorative mount or terminal from a mount, incomplete, with single fixing stem. Cu alloy. L: 28mm; W: 18mm. Ctx 130009, feature 170010, colluvium. Inv No 1021

Tools and crafts: ploughshares

One complete ploughshare (Cat. No. 21) came from colluvial deposits and a smaller worn example (Cat. No. 22) from the fill of an early Roman ditch. The complete example is almost certainly an Iron Age rather than Roman type (Manning 1985, 43-4; Rees 1979, 59). Rees has argued that the longer examples, such as those from Bigbury, Kent, are of later date. The example from Zone 6 is of similar size and could be Late Iron Age. The three published socketed plough shares from Danebury, Hants. were all recovered from Iron Age contexts (Sellwood 1984, 354-57, fig 7.14, nos 2.69-2.71), but the longest share, an exceptional 690mm long, was from the earliest dated context. For more on ploughing see Payne (1947) and Manning (1964).

21. ON 305. Ploughshare, complete. Fe. See examples from Bigbury (Thompson 1983, 265, fig 13, nos 1-3, fig 19, nos 49-50 and pl. xxxii, a) and Danebury (Sellwood 1984, 354-57, fig 7.14, 2.69). L: 346mm; W: 56mm. Ctx 130010, feature 170028, colluvium. Inv No 1194

22. ON 4088. Probable ploughshare, worn fragment. Fe. See the examples of shorter ploughshares from Hunsbury, Northants (Dryden 1885, 60, pl vii, no.5) and Danebury (Sellwood 1984, fig.7.14, 2.70-2.71). L: 76mm. Ctx 255039, ditch 170041. Inv No 829. Early Roman (Fig 3.2).

Tools and crafts: spuds

Functional and poorly dated socketed tool used to clean mud from ploughs and other digging tools.

23. ON 668. Spud with split socket. No visible nail or nail hole. Fe. L: 134mm; W: 56mm. Ctx 207048, fill, Unphased. Inv No 662

24. ON 307. Spud with closed socket and wide blade. Fe. L: 136mm; W: 56mm. Ctx 130010, feature 170028, colluvium. Inv No 725

25. ON 4027. Possible spud or digging stick with flat narrow blade with round end and open socket with nail hole. Fe. L: 80mm; W: 30mm. Ctx 130010, feature 170028, colluvium. Inv No 653

Tools and crafts: Scythes, sickles and reaping hooks

A number of sickles and scythes and blade fragments were recovered. These range from a complete scythe blade of Iron Age form (**Cat. No. 26**) through to small socketed reaping hooks (**Cat. Nos 29–30**) to a small pruning hook (**Cat. No. 31**). In general for reaping hooks and pruning hooks see Rees (1979, 450-67, figs 158-78). For scythes see Rees (1979, 473-80, figs 236-43).

26. ON 3940. Scythe blade, complete. The broad curved blade terminates at the handle end in a fixed ring, through which the wooden handle would have passed. The handle was secured by a strip from the back of

blade folded over the handle and riveted. Iron Age type. Fe. L: 400mm. Ctx 252254. Unphased. Inv. No. 1199 (Fig. 3.2).

This scythe falls into Pietsch's early Type 1 'Kurzstielsense' with blades under 500mm long (1983, 68, Abb 22), which he states were widely found across the 'keltisch-germanischen Kulturkries'. Longer scythes with an acute or right angle handle he argues are typical of the Roman military. The blade of the Zone 6 scythe is similar to but not precisely the same as scythes from La Tène (Switzerland), which were recovered with their handles attached (Vouga 1923, pl. xxiv, no 5, pl xxv, no. 2). Incomplete examples of blades have been found at Dünsberg (Jacobi 1977, Taf 19, no 2) and Manching (Jacobi 1974, Taf 27, nos 479-480). Complete blades have been found at Stradonice (Czech Republic) (Pi 1906, pl xxxvii, nos 3 and 6). The Zone 6 scythe differs from all these blades in having an integral ring at the handle end of the blade. The scythe blade fragment from the Eton Rowing Lake excavations at Dorney, Berks (Lambrick with Robinson 2009, fig 7.2, a, fig 8.3) has part of the handle surviving and shows clearly one of the common methods of attachment for earlier scythes. The end of the blade was formed into a rod tang which was bent up at a right angle. This pierced the handle and was secured by a rove. The end of the handle was further secured by a rivet through the blade and handle and also secured with a rove. The Eton scythe blade in form fits Pietsch's Type 2a, and is from a Late Iron Age or early Roman context. Since the site generally produced very little evidence of Roman material it is reasonable to see the Eton scythe together with the present blade as evidence for the use of scythes in Britain, at least in the south-east, prior to the Claudian Invasion.

27. ON 3890. Scythe or sickle blade, incomplete, three fragments. Fe. Not enough survives of the blade to be certain of its form. It could be part of a scythe blade or a hooked blade or sickle similar to the larger examples from Bigbury, Kent (Thompson 1983, 265, fig 14, no. 14; fig 15, nos 19-21; pl. xxxiii, a). The Bigbury examples probably date to the very end of the Iron Age. L: 275mm; W: 55mm. Ctx 298137, cobbled surface 291102. Inv No 599. Iron Age
28. ON 306. Scythe blade fragment. Fe. L: 179mm; W: 60mm. Ctx 130010, colluvium 170028. Inv No 726
29. ON 351. Reaping hook with open socket (3 fragments). Fe. Compare the reaping hooks found at Danebury (Sellwood 1984, 346-49, figs 7.8-7.9; Cunliffe and Poole 1991, 333-41, figs 7.9-7.10). L: 145mm; W: 95mm. Ctx 128017, feature 170010, colluvium. Inv No 730
30. ON 897. Reaping hook with tapered open socket. Fe. L: 140mm, W: 80mm. Ctx 247182, 'working hollow' 247146. Inv No 672. Mid-Roman
31. ON 669. Small reaping or pruning hook, socketed. Fe. L: 125mm. Ctx 255039, ditch 170041. Inv No 663. Early Roman
32. ON 2183. Socketed tool, incomplete, possibly reaping hook (not illustrated). Open socket with single nail. Fe. L: 106mm. Ctx 247091, posthole 247088. Inv No 710. Early Roman

Tools and crafts: Rakes

33. ON 2166. Rake tine (not illustrated). Fe. L: 110mm. Ctx 258048, layer. Inv No 708. Unphased

Tools and crafts: Woodworking tools

34. ON 672. Axe head, fragment. Axe with backward curving blade. Fe. Although incomplete, this axe is clearly the form with backward curving blade defined by Manning as his Type 4 (Manning 1985, 15-6, Fig.3), current from the 1st to the 4th century and also found at La Tène (Vouga 1923, pls xlii, nos 10-11, xliii, nos 6-7). Extant L of head: 94mm; W of edge: 68mm. Ctx 130010, colluvium 170028. Inv No 664
35. ON 2995. Saw blade fragment with rectangular plate tang with 2 rivet holes. Blade fragment with large teeth. Fe. Fragment of a saw blade with single handle, similar to those found at Glastonbury Lake village, which include an example complete with its wooden handle (Bulleid and Gray 1917, 370-71, 385, pl. lx, i53; see also pl lxi, i52). There are examples from Iron Age contexts at Danebury (Sellwood 1984, 351, fig 7.11, no 2.42; Cunliffe and Poole 1991, 342, fig 7.12, no 2.239) and from Hunsbury (Dryden 1885, 60, pl. vi, 16-17). One of the Hunsbury examples has part of a bone handle attached. L: 85mm; W: 28mm. Ctx 245125, probable pit 245134. Inv No 910. Early or mid-Roman
36. ON 2100. Chisel, with stout rectangular section handle, bevelled cutting edge and battered head. Fe. The bevelled edge suggests that this is a mortice chisel for woodworking rather than a cold chisel for cutting metal. L: 126mm. Ctx 130012, colluvium 170028. Inv No 686. Possibly Roman
37. ON 3885. Chisel (not illustrated). Bar of square section with chisel end, possibly a small mortice chisel. Fe. L: 76mm; W: 9mm. Ctx 282080, ditch 190441. Inv No 593. Early Roman
38. ON 2960. Traveller or tyre runner, comprising iron disc with central hole (D: 8mm), and single shallow notch. Fe. These were used by wheelwrights to measure the circumference of the felloe (rim or segment of rim) prior to tyring a wheel as described by Sturt (1923, 122; see also Jenkins 1966, 109-10, fig 25, photograph 97). They are found in Late Iron Age cremation burials and on settlement sites and hillforts (Scott 2012, 152-56; see also Luke 2008, 222-23). Some have been identified as circular knives (eg, Luke 2008, 222) D: 76mm x 72mm. Ctx 305072, layer. Inv No 723. Unphased

Tools and crafts: Other tools

39. ON 3941. Shears blade. Shears were used for a wide variety tasks and are common (Manning 1985, 34-5). For Continental Iron Age examples see La Tène (Switzerland) (Vouga 1923, 70, pl xii) and Stradonice (Pi 1906, pl. 34, no. 15). See also Déchelette 1914, 1280-84, figs 554-555. There are single pairs of shears in what are thought to be the graves of craftsmen, eg, in the grave of a tanner or saddler in the cemetery of Ménil-Annelles (Ardennes) (Stead *et al*, 2006, 223, and fig 79; see also Guillaumet, 1996, 73) and in a grave of a metalworker or smith from St Georgen am Steinfeld, Lower Austria (Taus 1963; see also Guillaumet, 1996 18). Shears are found in Roman contexts, but finds from Iron Age contexts in Britain are uncommon. Fe. Extant L: 124mm; W: 36mm. Ctx 216136, ditch 170101. Inv No 618. Early or Middle Iron Age
40. ON 4062. Tanner's two-handed draw knife with curved blade of triangular section, with a square tang at each

end for handles. Almost certainly used for leather-working rather than for woodwork. Probably a dehairing knife rather than a scudding knife or fleshing knife. In medieval tanneries curved two-handed knives were used to scrape and clean the hides. The dehairing knife had a curved blunt blade. The fleshing knife, which was used to deflesh treated hides, had a curved two-edge blade with sharp edges. After further treatment a curved scudding knife was used for the final scraping of the hide to remove hair roots and the like. The scudding knife was another blunt knife, sometimes with a stone blade (Thomson 1981, 163-65 and fig 3; Jenkins 1965, 192, fig 44, photograph 164). A blade similar in form found at the Magdalensberg has been identified as a Haareisen, or hair knife (Dolenz 1998, 212-13, Taf 76, no W322). Gaitzsch (1980, Taf. 25, nos 128, 130, 133) cites examples from Pompeii. He suggests that draw knives fell into three groups defined by their lengths (*ibid*, 68-9, Abb 8). This example is shorter than those adduced by Gaitzsch. Fe. L: 194mm. Ctx 137271, ditch 137270. Inv. No. 815. Mid-Roman

41. ON 2963. Awl with tapering circular section blade and tang, with step down and a small non-ferrous washer at junction. Fe. A leatherworker's awl, this fits with Manning's Type 1 (Manning 1985, 39-40, fig 9), with a long tapering blade and marked shoulders, but the tang is longer than the examples catalogued by Manning. L: 112mm; L of blade: 77mm. Ctx 305004, feature 170010, colluvium. Inv No 718
42. ON 2944. Cold chisel or mason's chisel (not illustrated), almost square section shaft slightly widened at head and at edge. Bevelled edge. Fe. A similar though shorter chisel comes from Hod Hill (Manning 1985, 9, pl. 5, A22). L: 292mm. Ctx 305071, layer. Inv No 1195. Unphased
43. ON 3886. Needle with elongated eye (not illustrated). Cu alloy. Probably a leatherworker's needle. L: 73mm. Ctx 153124, well 153123. Inv No 1126. Mid-Roman
44. ON3276. Dividers (not illustrated). Fe. L: 193mm, W: 52mm. Ctx 301095, layer 301095. Inv No 901. Early Roman
45. ON 829. Stylus fragment (not illustrated). Eraser missing. Fe. Comparable to examples from London (Wheeler 1930, pl xxiv, no 3). For typology of Roman styli see Manning 1985, 85-6. In the absence of the eraser it is not possible to assign this example to a type. Roman form. L: 83mm. Ctx 128009, feature 170028, colluvium. Inv No 675
46. ON 3209. Fire tool or Poker formed from iron bar with small rolled-over loop terminal. The shaft is for the most part of square section with two short sections of twisted shaft. The end is of rectangular section. This could be the handle of a fire shovel or a poker. Possibly the handle of an Iron Age poker such as those from Camulodunum (Essex) (Hawkes and Hull 1948, 343, pl. 104, no 8), Manching (Bavaria) (Jacobi 1974, Taf. 30, no, 533) and Stradonice, Czech Republic (Pi 1906, pl 36, 10-14, 16-17) (see also Rodwell 1977, fig 3, nos 2, 4-6), but with a loop terminal similar to an example from Southcote, Berks (*ibid*, fig 3, no. 10). Generally for Iron Age pokers see Fell 1990 (86-92, fig 3.1, and 314-22, figs A1-A3, nos 1-30). Fe. L: 432mm. Ctx 305041, feature 170010, colluvium. Inv No 198
47. ON 2977. Possible poker formed from iron rod with large neat rolled over loop terminal. Not closely datable. Fe. L: 397mm. Ctx 305016, feature 170010, colluvium. Inv No 1197

Tools and crafts: Possible tools

48. ON 3338. Open socket (not illustrated) incomplete and bent. Fe. L extant: 58mm; W: 43mm. Context 143317, hollow-way 143316. Inv No 904. Early Roman
49. ON 4578. Possible file (not illustrated), comprising tapering bar of rectangular section with tang at wider end. No surviving evidence for teeth. Fe. L: 140mm; W: 12mm. Ctx 288142, ditch 170099. Inv No 888. Mid-Roman
50. ON 4018. Punch or tapering square section spike (not illustrated). Fe. L: 74mm. Ctx 143319, hollow-way 143316. Inv No 644. Early Roman

Tools and crafts: Billet

51. ON-. Hooked billet. Top of a hooked billet. Fe. Trade iron of late Iron Age or Roman date. Small numbers of hooked billets are known (Crew 1995, 'Meare type') and most examples are from Iron Age sites (Salter 1997, 96), but a 2.9kg example was recovered from a 2nd- to early 3rd-century context at Asthall (Oxon) (Salter 1997, 95-6, and pl. 4.1; also Mould 1997, 83, 85, and fig.4.4, no. 1). A similar weight was found at Wookey Hole, Somerset (Balch 1914, pl. XVII, no. 11 and 11a, 87). Examples known to Crew (1995) range from 1200-1640g, substantially less than those from Asthall and Wookey Hole. The EKA2 example weighs much less than 1200-1640g but is incomplete. H: 110mm. Wt: 638g. Ctx 262158, posthole 262157. Inv No 1250. Mid-Roman

Transport

52. ON 3309. Large D-shaped harness buckle (not illustrated). Fe. L: 30mm; W: 65mm. Ctx 246150, grave 246148. Inv No 950. Late Roman
53. ON 3267. Snaffle bit (not illustrated), fragment comprising link probably from the jointed mouth bar of a snaffle bit. Encrusted with corrosion at one end. Fe. L: 90mm. Ctx 301095, layer/backfill. Inv No 935. Early Roman

Weights and weighing

54. ON 2972. Possible steelyard, bent double. There is a terminal knob at the end of the shorter arm, and a series of notches to allow adjustment of the position of the scale pan or hook, to allow different ranges of weights to be measured. The counterbalance weight was moved back and forward on the longer arm until the balance was level and the weight then read from the position of the counterbalance. Suspension loops are missing. Steelyards in both copper alloy and iron are known, and can vary considerably in size. Two from Dorn Farm, Moreton in the Marsh, Glos are large, with bars over 1m long (Manning 1985, 106, pl. 52, p40-p41). For steelyards marked with numbers see examples from Richborough (Henderson 1949, 131, pl xxxviii, no. 133), Westhawk Farm, Ashford (Cool 2008, 167-8, no. 80), Kastell Aislingen, Germany (Ulbert 1959, 77, 96, Taf 29, no 1), and from Vodice, Slovenia (Pflaum 2007, 299-300, pl. 1). For the use of the steelyard see Crummy 1983, 99-100, and more generally see Manning (1985, 106-07, pl 52) Fe. L: 235mm; L extended: c 540mm. Ctx 305006, colluvium 170010. Inv No 898

55. ON 694. Weight, circular, with a domed top with remains of iron attachment, tapered sides and flat base. Possibly a lead steelyard weight, though generally these appear to be biconical (eg, from the Walbrook: British Museum, P&EE 1935 10-28 1); the copper alloy steelyard from Vodice has an almost spherical lead weight (Pflaum 2007, 299-300, fig.11, pl.1) and others have weights often in the form of a bust (eg, Wheeler 1930). Pb. D: 22mm x 23.5mm; H: 27mm. Ctx 130012, colluvium 170028. Inv No 1170
56. ON 329. Weight (not illustrated), cotton reel shaped with remnants of iron attachment at the top. Narrow at the waist and slightly bevelled at the upper edge. Possibly a steelyard weight, See Cat. No. 55. Pb and Fe. H: 50mm; H of body: 41mm; D: 38 x 40mm. Ctx 130009, feature 170010, colluvium. Inv No 1158
57. ON 3357. Small spindle whorl, or net weight (not illustrated), circular with plano-convex section and central perforation. Pb. D: 22mm x 23.5mm; H: 10mm. Ctx 130012, feature 170028, colluvium. Inv No 1188
58. ON 4086. Possible conical weight (not illustrated). Pb. D: 22mm x 23 mm; H: 16mm. Ctx 130012, feature 170028, colluvium. Inv No 1190

Personalia

59. ON 3347. Ring-headed swan's neck pin. Cu alloy. Comparable to examples from Hunsbury, Northants (Fell 1936, 60, fig 3, no. 1; Dunning 1934, fig 3, no. 2), Woodeaton, Oxon (*ibid*, fig 3, no. 1; see also Harding 1972, 90-1, 170, pl 73, g-l, m) and Chinnor, Oxon (*ibid*, pl 73, e-f). L: 75mm; D of head: 22mm. Ctx 130012, feature 170028, colluvium. Inv No 1109
60. ON 3880. Possible ring-headed pin shaft (not illustrated). Only the arched shaft is extant. Cu alloy. Similar to examples from Cold Kitchen Hill, Wilts and Woodeaton, Oxon (Dunning 1934, fig 4, nos 11, 13; see also Harding 1972, 170, pl 73, m). L: 30mm. Ctx 298137, cobbled surface 291102. Inv No 1120. Iron Age

Personalia: Sprung bow brooches

61. ON 2122. One-piece brooch with sprung pin, heavily encrusted with corrosion products. With external chord and possibly with just two coils, but the exact form unclear. Fe. L: 73mm. Ctx 130012, feature 170028, colluvium. Inv No 691
62. ON 3251. One-piece bow brooch with sprung pin. Incomplete, flattened, catchplate missing. The spring has four coils and an external chord. Fe. L: 44mm; W: 17mm. Ctx 310004, feature 170028, colluvium. Inv No 929

These incomplete brooches (**Cat. Nos 61–62**) made from wire probably with external chord are variants of the simple sprung brooches. They may date a little earlier than the mid 1st-century AD dating of the simple sprung brooches. Since both are poorly preserved and encrusted with corrosion products they cannot be precisely identified to form and the absence of catchplates further restricts dating.

63. ON 3234. Fragment of Simple brooch with sprung pin (not illustrated). Form uncertain. Heavily encrusted with corrosion products. Fe. L: 58mm; W: 15mm. Ctx 306039, ditch 249117. Inv No 941. Early Roman
64. ON 2148. Simple one-piece bow brooch, with circular section bow with knob towards head. Four coil spring with internal chord, and plain catchplate. Cu alloy. Simple one-piece bow brooches are a mid 1st-century AD form occurring in both pre- and post-Conquest contexts including Flavian contexts (Bayley and Butcher 2004, 146-7). The plain knob on the bow perhaps similar to examples from Richborough with mouldings on the bow (eg, Bayley and Butcher 2004, 56, and fig 38: 28). L: 47mm; W: 11mm. Ctx 130012, feature 170028, colluvium. Inv No 1049

Personalia: Nauheim derivative brooches

The Nauheim Derivative is a pre-Conquest type, generally dated to the first half of the 1st century AD but with some examples from 1st century BC contexts (Mackreth 2011, 14-20; see also Butcher 2001, 41). Olivier (1996, 237) and Butcher and Bayley (2004, 147) prefer to date them a little later, to the middle years of the 1st century AD.

65. ON 2181. One-piece bow brooch with flat section triangular bow and plain catchplate. It has a four-coil spring and internal chord. Nauheim Derivative. Cu alloy. L: 45mm; W: 10mm. Ctx 256047; pit 256060. Inv No 1050. Late Iron Age or early Roman
66. ON 3285. Simple one-piece brooch (not illustrated) with flat section triangular bow (2 fragments), with four-coil spring and internal chord. Bow with a reverse curve, plain catchplate. Nauheim Derivative. Cu alloy. L: 66mm; W: 12mm. Ctx 310011, feature 170028, colluvium. Inv No 1093
67. ON 2887. Simple one-piece brooch (not illustrated), with flat section triangular bow. Nauheim Derivative. Pin and most of spring missing. Plain catchplate. Cu alloy. L: 42mm; W: 8mm. Ctx 130010, feature 170028, colluvium. Inv No 1067
68. ON 2900. Simple one-piece brooch, Nauheim Derivative (not illustrated). Fragment of upper portion of bow, with little of spring, and no pin or catchplate. Cu alloy. L extant: 20mm; W: 12mm. Ctx 130010, feature 170028, colluvium. Inv No 1078
69. ON 3253. Simple one-piece brooch, Nauheim Derivative (not illustrated). Bent and twisted fragment lacking catchplate. Cu alloy. Extant L: 33mm; W: 11mm. Ctx 310003, feature 170028, colluvium. Inv No 1086
70. ON 3254. Brooch pin and spring fragment (not illustrated). Cu alloy. L: 32mm; W: 20mm. Ctx 310006, feature 170028, colluvium. Inv No 1090

Personalia: Colchester brooches

Colchester brooches date to the early to mid 1st-century AD, and are a pre-Conquest type which continued in use in the middle years of the century (Bayley and Butcher 2004, 148-50; see also Mackreth 2011, 37-8). **Cat. No. 72**, which has a catchplate pierced by circular holes and has fluted wings, is a slightly later form that probably dates to the Claudio-Neronian period (Mackreth 2011, 37, 41).

71. ON 3966. Colchester brooch. One-piece brooch with external chord of spring secured by a hook. Spring protected by small plain wings and catchplate decorated with fretted rectilinear cut outs. Cu alloy. L: 62mm, W: 19mm. Ctx 126265, ditch 170115. Inv No 1129. Early Roman
72. ON 3878. Small Colchester brooch, three rectangular perforations in the catchplate and plain wings over the spring. Plain bow with flattened outer face. Cu alloy. L:

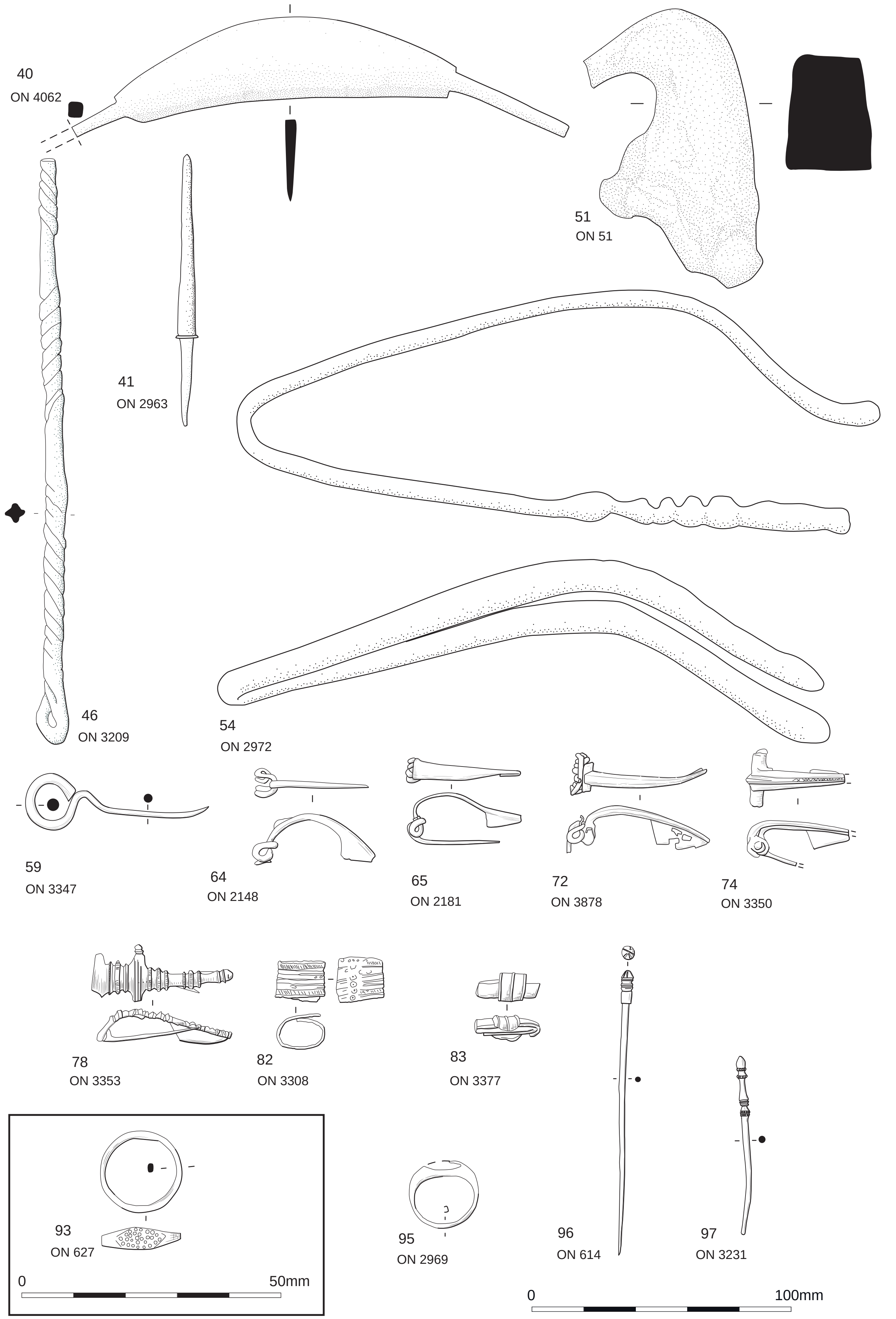


Fig 3.3 Metalwork from Zone 6 (cont)

53mm; W: 18mm. Ctx 130012, feature 170028, colluvium. Inv No 1122

73. ON 3976. Colchester brooch. Small one-piece brooch with external chord of spring secured by a hook, spring protected by fluted wings and catchplate decorated with circular holes. Cu alloy. L: 52mm, W: 30mm. Ctx 248193, ditch 170150. Inv No 1133. Mid-Roman

Personalia: Colchester derivative brooches

74. ON 3350. Small two-piece Colchester brooch with and unpierced catchplate. Spring intact and protected by plain wings. Cu alloy. Separate spring and pin are attached to a lug at the head of the brooch. Mackreth terms this form the Harlow brooch (Mackreth 2011, 50). It is a small example of the type with no foot knob (Bayley and Butcher 2004, 83, nos 167-80), dated to the mid 1st century AD (*ibid*, 157). L: 40mm; W: 24mm. Ctx 130012, feature 170028, colluvium. Inv No 1110
75. ON 2967. Two-piece Colchester brooch. Incomplete pierced catchplate and fragments of spring but no pin. Plain side wings. Cu alloy. L: 64mm; W: 28mm. Ctx 305030, feature 170010, colluvium. Inv No 1071
76. ON 3374. Brooch pin and spring fragment (not illustrated). Four extant coils of a spring originally of at least eight coils. Cu alloy. L: 34mm. Ctx 244199, ditch 170109. Inv No 1117. Mid-Roman

Personalia: Hinged brooch

77. ON 3361. Brooch pin and hinge fragment (not illustrated). Probably from an Aucissa brooch. Cu alloy. L: 41mm. Ctx 130012, feature 170028, colluvium. Inv No 1113

Personalia: Hod Hill brooches

78. ON 3353. Hod Hill brooch. Cu alloy. Lateral knobs comparable with an example from Stonea, Cambs (Mackreth 2011, pl. 95, no. 9074). Mackreth (*ibid*, 140) suggests that this group of Hod Hill brooches dates from the Conquest period and did not continue in use after *c* AD 60. L: 54mm; W: 23mm. Ctx 130012, feature 170028, colluvium. Inv No 1111
79. ON 3913. Hod Hill brooch, tinned. Hod Hill brooch with lateral knobs; this is very like an example from Dragonby (Olivier 1996, 249 and fig 11.7: 78; cf Mackreth 2011, 138, pl 93, no. 14075). Date from the Conquest to after AD 60 as with the above. Cu alloy. L: 43mm; W: 27mm. Ctx 130012, feature 170028, colluvium. Inv No 1128
80. ON 2892. Hod Hill brooch fragment, hinged pin (not illustrated). Cu alloy. Incomplete, with ribs (cf Mackreth 2011, pl 93, no. 9274; pl 94, nos 9307 and 9346). Conquest to AD 60 and after. L: 30mm; W: 19mm. Ctx 130010, feature 170028, colluvium. Inv No 1072
81. ON 630. Possible rear hook brooch. Fragment comprising pierced catchplate and foot knob from a bow brooch. The bow is decorated with incised lines, and the bottom of the catchplate is marked with incised transverse lines and a cross. Cu alloy. L extant: 42mm. Ctx 130012, feature 170028, colluvium. Inv No 1040

Personalia: Bracelets and armlets

82. ON 3308. Broad armlet decorated with parallel moulded ridges including cable pattern borders. Slightly broadened but undecorated terminal. Rolled fragment. Cu alloy. L extant: 19mm; W: 16.5mm. Ctx 130012, feature 170028, colluvium. Inv No 1101
83. ON 3377. Possible bracelet fragments, comprising two strips folded together. The outer strip is a fragment of broad bracelet band wrapped around a folded fragment of narrow strip. The outer band has plain raised borders and a central rib and is probably a fragment of an early Roman broad armlet. Cu alloy. L: 26mm. Ctx 126236, layer 258058. Inv No 1119. Roman

Nina Crummy (2005b) in recent discussion of broad armlets has drawn attention to the fact that they have a limited distribution (*ibid*, fig 2) and are associated with early Roman levels. She suggests that they may have been military decorations (armillae) but, although their early dating and limited distribution undoubted, her arguments are not totally convincing. One problem is the apparent lack of Continental parallels for the early broad bracelet form (*ibid*, 98). Continental parallels might be expected if they were indeed military decorations. That said, the sculptural and literary evidence suggests that armillae could vary in form (Maxfield 1981, 89-91) and this makes it difficult to distinguish armillae from other bracelets. However, military armillae appear to have been made of gold or silver and not of copper alloy, which would help with identification, but is a significant argument against the identification of the early broad copper alloy bracelets as armillae. The fact that both fragments of this armlet are incomplete, and that it was probably deliberately cut and folded or rolled, suggests that it need not have been new when deposited. Swift (2012) has recently drawn attention to the reuse of bracelets and in particular to their reworking as finger rings. It is conceivable that Cat. No. 82 is a poor attempt to make a ring from part of an early bracelet. But even if the idea that it was made into a ring is dismissed it is clear that the bracelet had been cut and part retained for use. Cat. No 83 is a little more difficult to interpret since the fragments have been tightly rolled.

84. ON 3218. Cable pattern bracelet formed from twisted wires, probably with hooked ends. Cu alloy. 94mm x 60mm. Ctx 289046, SFB 170132. Inv No 1150. Late Roman
85. ON 3265. Bracelet fragment comprising twisted wires forming cable pattern (not illustrated). Cu alloy. L extant: 48mm. Ctx 301095, layer/backfill 301095. Inv No 1096. Early Roman
86. ON 613. Bracelet comprising thin band of oval section, widening towards each terminal and decorated with transverse mouldings. Cu alloy. 76mm x 44mm. Ctx 130012, feature 170028, colluvium. Inv No 1030
87. ON 3904. Bracelet fragment (not illustrated), comprising plain narrow band of oval section. Cu alloy. L: 62mm. Ctx 130012, colluvium 170028. Inv No 1127
88. ON 3983. Bracelet (not illustrated), two fitting fragments of a plain narrow band of oval section. Cu alloy. L: 42mm; W of band: 2-2.5mm. Ctx 315005, SFB 170136. Inv No 1136. Mid-Roman
89. ON 4773. Bracelet fragment with thickened plain terminal of sub-rectangular or oval section. Cu alloy. L extant: 36mm; W: 40mm. Ctx 170002, topsoil. Unphased. Inv No 1200
90. ON 4323. Bracelet (not illustrated) with plain band of circular section (not illustrated), slightly thickened at the centre, with hooked catch. Cu alloy. 80mm x

59mm. Ctx 130012, feature 170028, colluvium. Inv No 1141

91. ON 3883. Bracelet with narrow strip band. Fragment rolled into tight curl. Terminal with cut 'X' and a panel of transverse lines. Cu alloy. L: 16mm; W: 5mm. Ctx 130012, feature 170028, colluvium. Inv No 1121

92. ON 4310. Crenellated bracelet, incomplete and bent, with hooked catch. Cu alloy. L: 52mm. Ctx 130012, feature 170028, colluvium. Inv No 1138

Apart from Cat. Nos 81–82 all the bracelets are types that most commonly occur in late Roman contexts and in particular in graves. (For discussions of bracelets see particularly Swift 2000, chapter 4, Crummy 1983, 37-45, and Cool 1983, chap 5).

Personalia: Finger rings

93. ON 627. Small finger ring with expanded bezel decorated with a diamond-shaped panel of raised dots. Cu alloy. Cool (1983 vol. 1, no. 9, 238-39, fig 6.1 and map 6.1; vol 4, 1024-25, and fig 108, no 2) classes rings such as this as her Sub-group Va, with a suggested dates of the 'middle part of the second half of the 1st century AD'. She lists only eight examples, their distribution limited to a zone running from Caister-on-Sea Yarmouth (Norfolk) to Silchester, Hants. Other examples came from Caistor by Norwich (Norfolk), Colchester and Chelmsford (Essex), and Braughing and Verulamium (Herts). D: 20mm. Ctx 130012, feature 170028, colluvium. Inv No 1038

94. ON 3372. Coiled or spiral finger ring with cable pattern on outside edge of the coils. Cu alloy. Cool (1983 vol .1, 224-4, fig 6.1, no. 4; vol 4, 997-999) classifies plain spiral rings as Group II. The spiral ring is a long-lived form, with examples dating from Bronze Age and Saxon contexts. The form is not common in Roman Britain but is found throughout the Roman period. D: 28mm x 22mm. Ctx 130012, feature 170028, colluvium. Inv No 1116

95. ON 2969. Finger ring with large oval bezel. Fe. This ring falls in Cool's Group IV, rings with expanded bezels set with a stone or glass intaglio, and forms part of Sub-group A (Cool 1983, vol 1, 227-237, fig 6.1, no. 6). The form developed during the early 1st century AD, and examples are found in 1st and 2nd century AD contexts in Britain. D: 28mm x 24mm. Ctx 245123, probable pit 245134. Inv No 713. Early or mid-Roman

Personalia: Hair pins

96. ON 614. Hairpin with tapering shaft and decorated head. Cu alloy. It has affinities with Cool's Group 11 pins decorated with multiple angular blocks (Cool 1990, 160, 164 and fig 7: 4, 5, 9, 10), and Group 12 pins with cross-incised knobs (*ibid*, 164 and fig 8: 3-5). Pins of sub-group 11A and of Group 12 are both found in Kent (*ibid*, 164) and Group 11 and Group 12 pins seem to have been in use by the early 2nd century, but the available dating evidence is limited. L: 110mm; L of head: 15mm. Ctx 170024, pit 170021. Inv No 1031. Mid-Roman

97. ON 3231. Hairpin fragment comprising decorated head and upper shaft. Cu alloy, best assigned to Cool's Group 2 hairpins with 'knob on cordon' heads (1990, 154 and fig 2: 4 and 6), a type used throughout the Roman period. L extant: 69mm; L of head: 23mm. Ctx 124163, layer. Inv. No. 1085. Early Roman

98. ON 2986. Pin, possible hairpin, with plain head formed by thickening of shaft. Cu alloy. L: 127 mm. Ctx 245124, pit 245133. Inv No 1084. Early Roman

99. ON 2961. Pin (not illustrated), Possible hairpin, with plain head formed by thickening of shaft. Cu alloy. L: 128mm. Ctx 245122, probable pit 245134. Inv No 1070. Early or mid-Roman

Personalia: Toilet items

100. ON 3967. Nail cleaner and ear scoop (found together). A toilet set comprising a plain ear scoop and a nail cleaner with leaf-shape blade and moulded neck. The nail cleaner has a moulded handle with loop at the top and rocker decoration down the centre of the blade. Cu alloy. The nail cleaner resembles an example from Canterbury (Garrard 1995, 1013, fig 426, no 298), one of Eckardt and Crummy's Group of cast nail cleaners with moulded necks and shouldered blades (Eckardt and Crummy 2008, 121, fig 59). These are a 1st century AD type, and examples have been recovered from pre-Flavian contexts, although others have been found in much later contexts. Nail cleaner: L: 52mm, W: 14mm; Ear scoop: L: 58mm. Ctx 327031, pit 327030. Inv No 1130-1131. Mid-Roman (Fig 3.4).

101. ON 2182. Nail cleaner, well-preserved with broad blade and moulded handle with loop at the top. Cu alloy. Like Cat. No, 100, it belongs to the group with shouldered blades and moulded necks (loc cit). L: 44mm, W: 6mm. Ctx 247091, posthole 247088. Inv No 1063. Early Roman

102. ON 615. Tweezers, narrow blades with plain border. Cu alloy. L: 59mm; W: 4mm. Ctx 130012, feature 170028, colluvium. Inv No 1032

103. ON 334. Tweezers, small plain blades widening to the tip, formed from single strip of cu alloy. L: 55mm; W: 6mm. Ctx 130010, feature 170028, colluvium. Inv No 1023

104. ON 3259. Tweezers, plain slightly widening to the grip or tip. Cu alloy. L: 50mm; W: 6mm. Ctx 310009, feature 170028, colluvium. Inv No 1094

105. ON 2124. Tweezers, plain formed from strip of cu alloy. L: 54mm; W: 4mm. Ctx 130012, feature 170028, colluvium. Inv No 105

106. ON 609. Possible cosmetic pestle. Curved object with looped end, heavily encrusted, identified from x-ray. Fe. Banana shape and looped end suggest it could be a pestle from a cosmetic set (see Jackson 2010). L: 85mm. Ctx 130010, colluvium 170028. Inv No 778

Belt fittings

107. ON 695. Stud or belt mount with low domed centre and single shank. Cu alloy. D: 16.5mm; H: 7mm. Ctx 130012, colluvium 170028. Inv No 1045

108. ON 2891. Small oval or D-shaped buckle. Cu alloy. L: 14.5mm; W: 18mm. Ctx 170010, colluvium. Inv No 1068

Household

109. ON 2180. Tankard handle, cast. Possibly a Late Iron Age tankard handle. Expanded terminals each pierced with two small pin or rivet holes. Cu alloy. This object was originally curved and has been straightened, allowing the slightly curved expanded terminals at each end to fit to the curvature of the tankard body. Closely resembles a cast curved handle from Porth Dafarch (Anglesey) (Corcoran Class IV: 1952, 99, no. 9, pl xi,

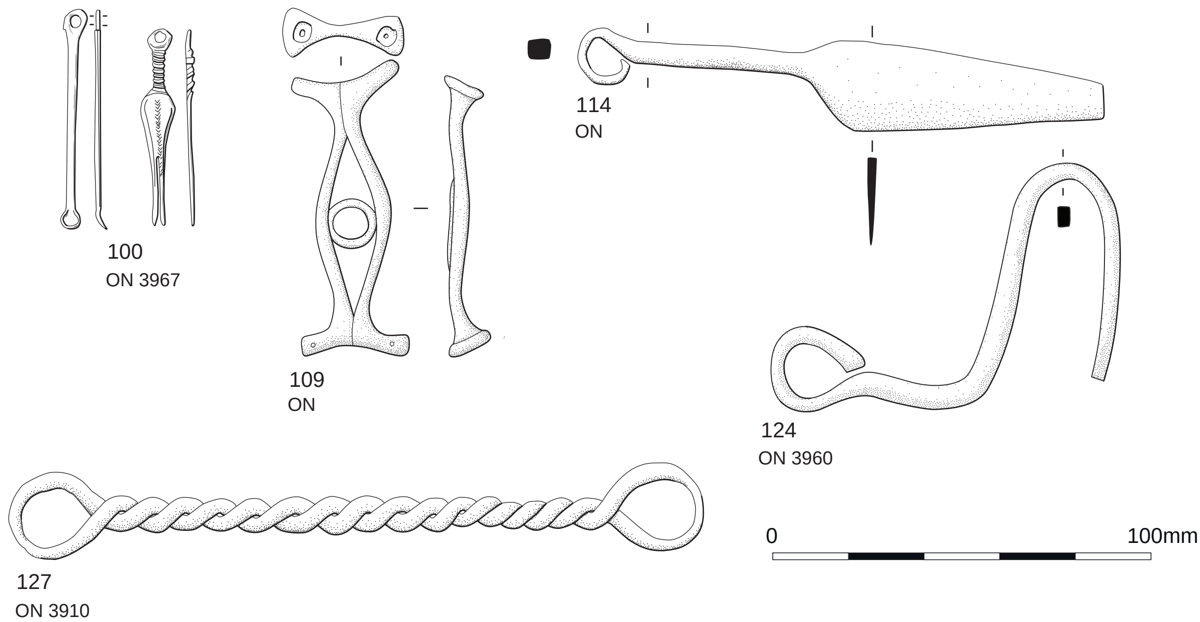


Fig 3.4 Metalwork from Zone 6 (cont)

2), an openwork casting made up of three conjoined rings with an extended foot at the top and bottom. L: 78mm; W: 32mm. Ctx 263019; ditch 170088. Inv No 1069. Late Iron Age or early Roman (Fig 3.4).

110. ON 2117. Knife with curved and tapering blade of triangular section. No extant tang, but single Cu alloy rivet or pin at point where tang was attached. Fe. Manning Type 23. An Iron Age form which continued in use up to the end of the 1st century AD (Manning 1985, 118, fig 29). L: 127mm; W: 38mm. Ctx 258028; ring gully 170086. Inv No 689. Late Iron Age or early Roman

111. ON 2165. Knife with whittle tang (not illustrated). Strongly curved blade of triangular section (2 fragments). Manning Type 23, as Cat. No. 110. Fe. L: 154mm; W: 30mm. Ctx 258049; pit 256060. Inv No 707. Late Iron Age or early Roman.

112. ON 3341. Knife with whittle tang (not illustrated). The blade is broken but largely present (2 fragments). Fe. Manning Type 18. A very common form widely used throughout the Roman period (Manning 1985, 117, fig 29). Overall L: *c* 145mm. Ctx 239167; ditch 190455. Inv No 946. Late Iron Age or early Roman

113. ON 3907. Knife with whittle tang and curved blade. Fe. Manning Type 24 (Manning 1985, 118 and fig 29: 24). L: 99mm, W: 31mm. Ctx182299, ditch 170116. Inv No 595. Early Roman

114. ON 326. Knife with solid handle with looped terminal. Fe. L: 144mm; L of blade: 84mm; W: 25mm. Ctx 130010, feature 170028, colluvium. Inv No 727

115. ON 2974. Whittle tang knife (not illustrated). Has a strongly curved blade, tip missing. Fe. L: 203mm; extant L of blade: 149mm; W: 32mm. Ctx 305005, feature 170010, colluvium. Inv No 908 (Fig 3.4).

116. ON 2985. Whittle tang knife (not illustrated). Has a deep strongly curved blade. Fe. L: 130mm; L of blade: *c* 95mm; W: 40mm. Ctx 305027, feature 170010, colluvium. Inv No 909

117. ON 2106. Whittle tang knife fragment, little of blade survives. Fe. L extant: 83mm; W: 17mm. Ctx 130012, colluvium 170028. Inv No 683

118. ON 3882. Bucket handle mount, with welded rolled over loop and single nail hole. Fe. H: 78mm,W: 29mm. Ctx 130012, colluvium 170028. Inv No 592

119. ON 375. Handle mount from bucket or other metal vessel. Slightly cranked stem with hole for handle, and two pierced lobes for nails or rivets. Fe. W: 57mm, H: 93 mm. Ctx 133044, layer. Unphased. Inv No 755

120. ON 2955. Hoop or binding (2 fragments), D-shaped section with flat face inside of hoop. Fe. Probably a bucket hoop. Similar in size to one from Hod Hill, which Manning (1985, 103, pl. 48, no P23) identifies as a possible Iron Age bucket hoop, but also suggests could have served a reinforcement for the rim of a sheet copper alloy vessel. Smaller hoops of similar cross section from Danebury (Hants) (Cunliffe and Poole 1991, 352, fig 7.20, nos 2.295-2.298), Hunsbury (Fell 1936, 67, pl iv b, no. 5) and from Hod Hill (Manning 1985, 71-2, pl. 30, H31-H32) are identified as nave hoops. These generally these have a diameter of no more than 150mm (Fox 1946, 76-7; Manning 1985, 71, Cunliffe and Poole 1991, 352). D: 195mm x 205mm, max W of hoop: 10mm. Ctx 170010, feature 170010, colluvium. Inv No 1193

121. ON 3213. Barrel hoop fragments. (6 fragents). Fe. (1) L: 152mm; W: 40mm; (2) L: 148mm; W: 40mm; (3) L: 127mm; W: 38mm; (4) L: 85mm; W: 36mm; (5) L: 72mm; W: 42mm; (6) L: 71 mm; W: 40mm. Ctx 245105, pit 245104.. Inv. No. 896. Late Roman

Security

122. ON 3986. Latch lifter. Fe. L: 263mm. Ctx 289045, SFB 170132. Inv No 660. Late Roman

123. ON 2119. Latch lifter with large rolled over loop terminal. Fe. L: 280mm. Ctx 130012, colluvium 170028. Inv No 897

124. ON 3960. Key fragment, comprising S-curved bar with rolled over loop at one end. Fe. Unusual key with a strongly curved stem, resembles examples from the oppidum of Stradonice, Czech Republic (Pi 1906, pl xxxii, nos 6-10; see also Déchelette 1914, fig 619). L: 104mm, W: 64mm. Ctx 319041, pit 319034. Inv No 601. Early Roman (Fig 3.4).

125. ON 3294. Possible hasp. Tapering plate slightly curved in cross section, U-staple towards narrow end. Two nail

holes at corners of the wider end and centre of the narrow end. Fe. L: 165mm; W: 56mm. Ctx 132100, pit 132098. Inv No 905. Mid-Roman

126. ON 4064. Chain comprising nine links: seven pinched figure-of-eight links and two oval. Fe. L of links: 45-50mm. Ctx 178187, pit 178185. Inv No 816. Unphased

Objects of uncertain function

127. ON 3910. Link or brace formed from a loop of thick wire, twisted to form the stem with loops at each end. Fe. Possibly a component of a cauldron chain (see Manning 1983; also Fenwick 1981, 41-44, and fig 6). L: 185mm; W: 24mm. Ctx 317028, cobbled surface 126275. Inv No 659. Iron Age (Fig 3.4).
128. ON 3225. Small penannular ring or fitting. Cable pattern or transverse notching on outer edge. Fe. D: 38mm x 40mm. Ctx 168254, ditch 170143. Inv No 926. Late Iron Age
129. ON 625. Roundel or mount, truncated cone shaped with flange, border of repoussé dots. Hole at apex. Cu alloy. D: 42mm; H: 14mm. Ctx 130012, colluvium 170028. Inv No 1037
130. ON 2143. Cast circular fragment, decorated with two concentric grooves, possibly a fragment of a bell. Cu alloy. D: 25mm. Ctx 130012, colluvium 170028. Inv No 1056
131. ON 2952. Cast decorative edge binding? Cu alloy. L: 19mm; W: 13mm. Ctx 130012, colluvium 170028. Inv No 1082
132. ON 3371. Openwork casting fragment with slight evidence of tinning. Cu alloy. L extant: 45mm; W extant: 20mm. Ctx 130012, colluvium 170028. Inv No 1115

Zone 7

Metal finds from Zone 7 were confined largely to objects associated with graves. These are tabulated below (Table 3.8)

Zone 7 metal finds number 167 objects (236 fragments), of which 137 objects (184 fragments) come from graves. The finds include 104 hobnails (124 fragments) from graves, and 40 nails (67 fragments), 26 (44 fragments) of these from graves. There are also 11 miscellaneous pieces (16 fragments) and seven objects of uncertain identification (14 fragments). There is a single household object, a small whittle tang knife (ON 1561) from ditch 159241, and three items of personalia: a post-medieval shanked button (ON 2712) from an unphased context, a small circular plate brooch (ON 986086) from subsoil, and a penannular bracelet (ON 2451) from grave 267091. (See Zone 7 grave catalogue).

Catalogue

1. ON 561. Whittle tang knife. The blade has a straight back, with almost parallel sides. The back curves down to the point. Fe. The blade form a Roman or Saxon date. L: 120mm; W: 12mm. Ctx 1360997, ditch 159241, intervention 136096. Inv No 7010

2. ON 986086. Plain circular plate brooch with hinge pin and with attached plain, domed stud in centre. Very light. Cu alloy. D: 24mm. Ctx 193139, subsoil. Inv No 1148. Probably post-medieval

Zones 9–11

Finds from Zone 9 comprise just two nail shank fragments from topsoil. There are some 573 metal finds (557 fragments) excluding coins from Zone 10. Many of the finds (n = 47; 59 fragments) were recovered from subsoil (Table 3.9). However, most finds (n = 373; 418 fragments) are from Roman inhumation and cremation graves and comprise mainly nails and hobnails (Table 3.11). Finds from other phases and features are limited, but include a pair of smith's tongs (**Cat. No. 1**) of early to mid-Saxon date from the upper fill of a ditch (178358). Metal finds from Zone 11 number 45 (65 fragments), and include 21 nails (40 fragments) and three brooches and a bracelet fragment. The finds from both Zone 10 and Zone 11 are predominantly from Roman contexts (Table 3.10).

Zone 10

Late Bronze Age or Early Iron Age

A single iron nail, almost certainly Roman and therefore intrusive, was recovered from well 157006, context 157009.

Late Iron Age or Early Roman

Just two metal finds were recovered from this phase, both from ditch fills. Ditch 42020 (context 42031) produced a possible iron blade fragment of unidentified form (ON 4776). Ditch 194104 (context 124049) produced three fragments of a Colchester brooch (ON 211; **Cat. No. 2**) of mid 1st-century date.

Early Roman

Five metal objects were found in contexts of this phase, and comprise two hobnails (ditch 249250), a fragment of iron rod (ditch 194093), and two small unidentified iron fragments (ditch 42056). A pair of copper alloy tweezers (ON 200, **Cat. No. 5**) was found in ditch 194090 (context 194037). These are plain but would fit happily in an early Roman context.

Early to mid-Roman

The largest phase assemblage was recovered from early to mid-Roman contexts and came exclusively from burials. Urned cremation burial 176311 included some 50 hobnail fragments, the number suggesting these were the remains of a pair of nailed shoes or boots in the burial. The only other metal finds were two nails and three nail shank fragments.

Inhumation graves (Tables 3.11 and 3.12)

Metal finds were recovered from seven inhumation burials of this phase. Five, perhaps six, graves (42008, 176554, 182340, 239266, 248221 and perhaps 247315) produced sufficient hobnails to suggest the presence of nailed footwear, and one grave (182340) produced parts of the preserved nailing patterns of two nailed shoe soles. Grave 258338 produced a single hobnail, which could very easily be a stray or intrusive find.

The shoe sole remains from grave 182340 comprise three fragments of the right shoe (ON 4224; *c* 78

Table 3.8 Zone 7 – Catalogue of metal finds from graves

Description	*No.*	*Fragt*	*Dimen-sions*	*ON sample*	*Context*
Unphased cremation					
Burial 179132 Urned cremation burial					
Nail stem fragment. Fe	0	1		7368	179132
Early Iron Age					
Grave 136139 Inhumation burial					
1 ON 2754. Plain ring. Cu alloy. D: 27m x 28mm. Context 136140. Inv No 7007					
Type 1 head fragment; 3 x small nail stem fragments. Fe	1	4		2753	136140
Middle Roman					
Grave 267091 Inhumation					
1 ON 2451. Penannular ring or bracelet, of flat oval section, with tapered pointed terminals. Cu alloy. D: 34mm x 28mm. Context 267090. Inv No 560					
2 ON 2451. Plain ring, oval section, with 2 opposed areas of wear. Cu alloy. D: 31mm x 32mm. Context 267090. Inv No 59					
Type 1 nail, complete. Fe	1	1	L: 75mm	2748	267090
Type 1 nail, complete, encrusted. Fe	1	2	L: 95mm	2749	267090
Type 1 head fragment, encrusted. 1 x stem fragment. May refit. Fe	1	2	L: 90mm	2755	267090
Type 1 nail, 2 fragments. possible mineralised wood. Fe	1	2	L: 77mm	2756	267090
1 x nail of uncertain type (2 fragts), complete 1 X Type 1 head fragment. Fe	2	3	L: 95mm	2778	267090
Type 1 nail head fragment. Fe	1	1		2727	267090
Type 1 nail head fragment. Rectangular even lozenge shaped head. Encrusted. Fe	1	1		2728	267090
Type 1 nail head fragment; nail stem fragment. No refit. Fe	1	2		2745	267090
Type 1 nail head fragment; 1 nail stem fragment	1	2		2762	267090
Type 1 nail incomplete and heavily encrusted. Fe	1	1		2763	267090
Type 1 nail head fragment; 1 x stem fragment, Possibly from same nail. Fe	1	2		2765	267090
Nail stem fragment, some mineralised wood. Fe	0	1		2768	267090
Type 1 nail, incomplete, heavily encrusted. Fe	1	1		2772	267090
Type 1 nail, incomplete, heavily encrusted. Fe	1	1		2773	267090
Type 1 nail incomplete, heavily encrusted. Fe	1	1		2774	267090
Type 1 nail head fragment, encrusted in corrosion product. Fe	1	1		2775	267090
Type 1 nail incomplete. Fe	1	1		2776	267090
Type 1 nail incomplete. Fe	1	1		2777	267090
Type 1 nail head fragment - heavily encrusted. Fe	1	1		2759	267090
Type 1 nail head fragment encrusted with corrosion product. Fe	1	1		2779	267090
Nail head. Fe	1	1		2758	267090
3 nail stem fragments. Fe	1	3		2744	267090
Nail stem or bar fragment, encrusted. Fe	1	1		2746	267090
Nail stem fragment, possible mineral preserved wood	0	1		2750	267090
Nail stem fragment (2 x refitting fragts),possible mineral preserved wood. Fe	0	2		2751	267090
Nail stem fragment, heavily encrusted	0	1		2761	267090
Bar fragment. Fe	1	1		2760	267090
Bar fragment, heavily encrusted. Fe	0	1		2766	267090
Nail or rivet fragment heavily encrusted. Fe	1	1		2743	267090
Undiagnostic fragment. Fe	0	1		2747	267090
Undiagnostic amorphous lump. Fe	0	1		2757	267090
Undiagnostic lump. Fe	0	1		2764	267090
Undiagnostic amorphous lump. Fe	0	1		2767	267090
Total	25	44			
Grave 271009 cremation burial					
Hobnails. Fe	4	4		4593	271010
Hobnails Fe	60	60		sample 7300	271010
Hobnails. Fe	40	60		sample 7301	271010
4 x Type 1 nails, various sizes, incomplete; 3 x nail stem fragments	4	7		4593	271010
2 x undiagnostic fragments	0	2		4593	271010
Total	108	133			

Table 3.9 Zones 9–11 – Quantification of metal objects by zone, feature and object function (object & fragment counts)

Zone	*Feature type*	*Feature*		*Arms*	*Tools*	*Personal*	*Hobnails*	*Leisure*	*Household*	*Structural*	*Nails*	*Misc*	*Query*	*Undiag*	*Waste*	*Total*
	Topsoil	197064	Count								0					0
9			Fragt								2					2
		Total	Count								0					0
		Total	Fragt								2					2
	Cremation	176311	Count				50				2					52
	burial urned		Fragt				50				5					55
	graves	42008	Count				25									25
			Fragt				25									25
		176334	Count				36				10			0		46
			Fragt				24				24			7		55
		179267	Count				1				3	1				5
			Fragt				1				12	4				17
		182340	Count				153				7			0		160
			Fragt				42				18			2		62
		239266	Count				49				10		1	0		60
			Fragt				42				19		1	4		66
		239278	Count								8	3				11
			Fragt								16	3				19
		247315	Count				13				14					27
			Fragt				13				26					39
		248221	Count				105									105
10			Fragt				96									96
		258338	Count				1				8			0		9
			Fragt				1				11			2		14
	Colluvium	159001	Count			1										1
			Fragt			1										1
	Ditches	42020	Count										1			1
			Fragt										1			1
		42024	Count								0					0
			Fragt								1					1
		42056	Count										2	0		2
			Fragt										2	5		7
		178358	Count		1					1	0	3	0	0		5
			Fragt		1					1	1	3	1	6		13
		194090	Count			1								0		1
			Fragt			1								1		2
		194093	Count									1				1
			Fragt									1				1
		194104	Count			1										1
			Fragt			3										3
		249239	Count											0		0
			Fragt											2		2
		249250	Count				2									2
			Fragt				2									2
	Gully terminus	248228	Count										1			1
			Fragt										2			2
	Enclosure	249232	Count											0		0
	ditch		Fragt											1		1
	Pits	197117	Count								2					2
			Fragt								2					2
	Finds retrieval	123025	Count	1								1	1			3
			Fragt	1								1	1			3
	Subsoil	249175	Count	4	1	11		1		1	2	15	8	0	4	47
10			Fragt	4	1	15		1		1	4	15	8	2	8	59
	Natural	42007	Count										1			1
			Fragt										1			1
		249176	Count	1												1
			Fragt	1												1
	Sunken	194086	Count				1		2		0					3
	featured		Fragt				1		2		1					4
	buildings	249199	Count								0					0
			Fragt								3					3
	Well	157006	Count								1					1
			Fragt								1					1
		Total	Count	6	2	14	436	1	2	2	67	24	15	0	4	573
		Total	Fragt	6	2	20	297	1	2	2	144	27	17	32	8	558

Table 3.9 (continued)

Zone	*Feature type*	*Feature*		*Arms*	*Tools*	*Personal*	*Hobnails*	*Leisure*	*Household*	*Structural*	*Nails*	*Misc*	*Query*	*Undiag*	*Waste*	*Total*
	Grave	147141	Count			2										2
			Fragt			2										2
	Ditches	159314	Count			1										1
			Fragt			1										1
		159332	Count			2					1		1			4
			Fragt			2					2		1			5
		171060	Count								2					2
			Fragt								2					2
		190417	Count										1			1
			Fragt										1			1
11		190422	Count									3	3			6
			Fragt									3	3			6
		190423	Count								0					0
			Fragt								2					1
		215037	Count								0					0
			Fragt								1					1
	Pits	129018	Count			1										1
			Fragt			1										1
		134043	Count								1			0		1
			Fragt								2			1		3
		137136	Count								1					1
			Fragt								1					1
		143105	Count								2	1				3
			Fragt								3	1				4
		158007	Count									1				1
			Fragt									1				1
		189077	Count		1											1
			Fragt		1											1
		189089	Count								2					2
			Fragt								2					2
		189090	Count								2					1
			Fragt								2					1
11	Quarry pit	262015	Count		1						8	2	2			13
			Fragt		1						17	2	2			22
	Structure	190431	Count								0					0
			Fragt								3					3
	Floor	143026	Count								1					1
			Fragt								2					2
	Hearth	143098	Count							1						1
			Fragt							1						1
	Layer/ placed deposit	143023	Count								2					2
			Fragt								3					3
	Colluvium	165013	Count			1										1
			Fragt			1										1
			Count		2	7				1	21	7	7	0		45
			Fragt		2	7				1	40	7	7	1		65
		Total	Count	6	4	21	436	1	2	3	88	31	22	0	4	618
		Total	Fragt	6	4	27	297	1	2	3	186	34	24	33	8	625

hobnails) and two fragments of the left shoe (ON 4274; *c* 51 hobnails). The three fragments of the right shoe comprise most of the tread, waist and heel of the shoe, and the two fragments of the left shoe comprise the heel together with the waist and rear portion of the tread. The right shoe may have been on its side since it was clearly slightly squashed while in the grave. This makes identifying the nailing pattern of the right shoe difficult. However, sufficient of the nailing pattern of the left shoe survives to indicate that it was nailed with a single line of hobnails around the edge, and that the waist was not nailed. Both heel and tread were nailed with lines of hobnails within the border. The right shoe could very well conform to this pattern. The nailing pattern does not exactly match Rhodes's Type C pattern of heavily nailed shoe, which he defined as having a border of at least two lines of hobnails, with further lines of nails filling the space within the border (Rhodes 1980, 107, fig 59, no. 591; see also Padley 1991). The single row of hobnails forming the outer border, and the absence of nails on the waist matches Carol van Driel-Murray's Form 1b nailing pattern (van Driel-Murray and Gechter 1984, 21-23, fig 3). Heavily nailed shoes can be identified as working footwear.

Graves 42008 and 248221 produced no nails, which suggests that these graves lacked nailed wooden coffins. The other six graves contained sufficient nails and nail fragments to suggest that they had held nailed coffins.

Table 3.10 Zones 9–11 – Quantification of metal objects by zone, phase and object function (object & fragment counts)

Zone	*Phase*	*Data*	*Arms*	*Tools*	*Personal*	*Hobnails*	*Leisure*	*Household*	*Structural*	*Nail*	*Misc*	*Query*	*Waste*	*Undiagnostic*	*Total*
	Topsoil	Count								0					0
9		Fragt								2					2
	Total	Count								0					0
	Total	Fragt								2					2
	Late BA	Count								1					1
	or Early IA	Fragt								1					1
	Late IA	Count			1							1			2
	or Early Ro	Fragt			3							1			4
	Early Ro	Count			1	2				0	1	2		0	6
		Fragt			1	2				4	1	2		9	19
	Early or	Count				432				51		1		0	484
	middle Ro	Fragt				293				103		1		15	412
	Middle	Count				1				3	1				5
	or late Ro	Fragt				1				12	4				17
	Late Ro	Count								8	3				11
10		Fragt								16	3				19
	Early or	Count		1		1		2	1	0	3	0		0	8
	middle AS	Fragt		1		1		2	1	2	3	1		6	17
	Middle AS	Count								2					2
		Fragt								2					2
	Colluvium	Count			1										1
		Fragt			1										1
	Natural	Count	1									1			2
		Fragt	1									1			2
	Subsoil	Count	4	1	11		1		1	2	15	8	4	0	47
		Fragt	4	1	15		1		1	4	15	8	8	2	59
	Unknown	Count	1								1	2			4
		Fragt	1								1	3			5
	Total	Count	6	2	14	436	1	2	2	67	24	15	4	0	573
	Total	Fragt	6	2	20	297	1	2	2	144	27	17	8	32	558
	Ro	Count		1	2					5	4	4			16
		Fragt		1	2					5	4	4			16
	Early Ro	Count			2					1					3
		Fragt			2					2		1			4
	Middle Ro	Count		1	2				1	13	2	3		0	22
11		Fragt		1	2				1	29	2	3		1	39
	Unphased	Count								2	1				3
		Fragt								4	1				5
	Colluvium	Count			1										1
		Fragt			1										1
	Total	Count		2	7				1	21	7	7		0	45
	Total	Fragt		2	7				1	40	7	8		1	65
	Total	Count	6	4	21	436	1	2	3	88	31	22	4	0	618
	Total	Fragt	6	4	27	297	1	2	3	186	34	24	8	33	625

Most of the nails were incomplete and only a few length measurements were possible. The nails vary in length from 20mm (grave 258338) and 40mm (grave 247315) to 97mm (grave 239278) (Table 3.12).

Middle or Late Roman

The only metal finds of this phase were three nails (12 fragments) (context 179269) and a single hobnail (context 179268) from grave 179267. Of the three nails two were complete and measured 39mm and 40mm.

Late Roman

The only metal finds are eight nails (16 fragments) from grave 239278, which also produced a coin. There are five complete nails ranging in length from 40mm to 97mm (Table 3.12).

Early to Mid-Saxon

Metal finds were recovered from three features – ditch 178358, SFB 194086 and pit 197117 – and number 13 (18 fragments). The finds from the ditch comprise three nails, a washer, two fragments of sheet and a pair of smith's tongs (ON 4217, **Cat. No. 1**). The finds from SFB 194086 consist of fragments of two knives (ON 213-ON 214, **Cat. Nos 7–8**), a single hobnail and a nail. From pit 197117 came two nails. It is uncertain how many of the finds from these three features are Roman and, therefore, residual in these contexts.

Table 3.11 Zones 9–11 – Metal finds from graves by grave and object type (object & fragment counts)

Zone	*Phase*	*Grave*		*Brooches*	*Hobnails*	*Nails*	*Bar fragts*	*Plate fragts*	*Undiag.*	*Total*
11	Roman	147141	Count	2						2
			Fragt	2						2
	early or	176311	Count		50	2				52
	mid Ro	(crem)	Fragt		50	5				55
	early or	42008	Count		25					25
	mid Ro		Fragt		25					25
	early or	176334	Count		36	10			0	46
	mid Ro		Fragt		24	24			7	55
	early or	179267	Count		1	3		1		5
	mid Ro		Fragt		1	12		4		17
	early or	182340	Count		153	7			0	160
10	mid Ro		Fragt		42	18			2	62
	early or	239266	Count		49	10			1	60
	mid Ro		Fragt		42	19			5	66
	early or	247315	Count		13	14				27
	mid Ro		Fragt		13	26				39
	early or	248221	Count		105					105
	mid Ro		Fragt		96					96
	early or	258338	Count		1	8			0	9
	mid Ro		Fragt		1	11			2	14
	late Ro	239278	Count			8	3			11
			Fragt			16	3			19
		Total	Count	2	383	60	3	1	1	450
		Total	Fragt	2	244	126	3	4	16	395

Table 3.12 Zones 9–11 – Graves: nail counts including measured nails

Phase	*Grave*	*Measured nails*	*Total nails*	*Total nail fragts*
Early or middle Roman	176334	55mm x 2	10	24
Early or middle Roman	182340	70mm x 1	7	18
Early or middle Roman	239266	75mm x 1		
		78mm x 1		
		82mm x 1	10	19
Early or middle Roman	247315	40mm x 1		
		47mm x 1	14	26
Early or middle Roman	258338	20mm x 1		
		38mm x 1		
		50mm x 1	8	11
Middle or late Roman	179267	39mm x 1		
		40mm x 1	3	12
Late Roman	239278	40mm x 1		
		65mm x 1		
		78mm x 1		
		90mm x 1		
		97mm x 1	8	16

Unstratified

The unstratified finds include material from subsoil, and moat are post-medieval objects including lead pistol or musket shot and buttons, but also two Roman brooches (ON 4215 and ON 986133; **Cat. Nos 3–4**). Finds from colluvial deposits include a copper alloy stud (**Cat. No. 6**), which is not sufficiently distinctive to be closely datable, but may be Roman.

Zone 11 (Tables 3.9 and 3.10).

Roman

There are 16 metal finds from Roman contexts, including five nails, four miscellaneous fragments and four items of uncertain identification. The remaining objects are an open socket with two nail holes (ON 4551; **Cat. No. 16**), possibly part of a tool, a two-piece Colchester brooch (ON 435; **Cat. No. 12**) and a poorly preserved mineralised brooch spring fragment (ON 441) from another brooch both from grave 147141. The grave also produced 10 nails (24 fragments), including two complete nails measuring 55mm long (Table 3.12).

Early Roman

Three objects (4 fragments) from early Roman contexts are a Nauheim derivative brooch (ON 414; **Cat. No 11**) from pit 129018, a nail from pit 137136, and small fragment of copper alloy (ON 422: **Cat. No. 15**) from ditch 159314, probably part of a Roman bracelet. A nail shank fragment came from ditch 215037.

Mid-Roman

There are 22 objects (39 fragments) from mid-Roman contexts. They include the blade of a pair of shears (ON 433; **Cat. No. 10**) from quarry pit 262015 and a much eroded Rosette brooch (ON 429; **Cat. No. 13**) from ditch 159332. There is also an eroded brooch spring fragment (ON 430) from ditch 15933. Other finds include 19 nails, mainly found in ditches and pits and in particular in quarry pit 262015 (Table 3.9), and a split spike loop (ON 4562) found in a hearth (143098).

Unphased

A small number of objects recovered from unphased features and colluvium include a nail from ditch 190423 and two nails and fragment strip iron from pit 143105. Colluvial deposit 165013 produced a possible 1st-century AD broad armlet fragment (ON 420; **Cat. No. 14**).

Conclusions

There is no evidence for metalwork of Iron Age date. Most of the metalwork comes from Roman contexts, and mainly from the graves in the small cemetery in Zone 10. These inhumation burials produced hobnails, nails, and a few fragments of miscellaneous metalwork. An unurned cremation burial (176311) produced 50 hobnails, two nails and three nail shank fragments. The only grave to contain possible grave goods was cremation 147141 in Zone 11, which produced a mid 1st-century two-piece Colchester brooch (**Cat. No. 12**) and a poorly preserved spring fragment (ON 441) from a second brooch. There are only two possible tools and no household items from Roman contexts. A fragment of probable shears blade (**Cat. No. 10**) and a socket possibly from a tool (**Cat. No. 16**) come from Roman contexts in Zone 11. The only well-preserved tool is a pair of smith's tongs (**Cat. No. 1**) from ditch 178358 of early to mid-Saxon date. The only household items were a knife blade (**Cat. No. 7**) and a knife blade tip (**Cat. No. 8**) from Saxon SFB 194086. A late medieval or early post-medieval book clasp (**Cat. No. 9**) appears to be a stray find.

Catalogue

Zone 10

1. ON 4217. Pair of smith's tongs, also called 'locking tongs', complete and quite small. One arm ends in a rolled over loop with attached bar to hold jaws closed, effectively acting as pliers. Both handles are shaped and thickened towards the jaws. As functional items tongs are not readily dated on typological grounds. This pair is from a Saxon context and could be of Saxon origin. Possibly used for non-ferrous metalworking. Fe. L: 235mm. Ctx 279254, Inv No 10073. Early to mid-Saxon. Fig 3.5, no.1 (Fig 3.5).
2. ON 211. Colchester brooch, incomplete. (3 fragments) (1) Oval sectioned bow fragment, tapering towards foot (missing); (2) part of spring and pin; and (3) upper bow and part of spring, vestigial small wings and probable rearward facing hook to hold external chord. Cu alloy. Small wings over the spring and narrow bow. The plain bow of thin section suggests this is an early brooch, possibly of continental origin. The absence of the catchplate makes dating difficult. Early to mid 1st century AD. L extant: 31mm; W: 18mm. Ctx 124049, ditch 194104. Inv No 10033. Late Iron Age-Early Roman
3. ON 4215. Rear hook brooch (5 fragments), two-piece brooch with rear hook. Spring with eight coils. Catch plate with 4 small circular piercings and chased rocker pattern. The brooch had no foot knob. Cu alloy. Lacks wings, but the head of the bow is incomplete. May be a two-piece Colchester brooch dating to the mid 1st century AD. L: 52mm. Ctx 249175. feature 249175. Subsoil. Inv No 10010. Unphased
4. ON 986133. Two-piece bow brooch, poorly preserved, only bow survives, with slight trace of wings and possible hook to hold chord. No extant spring, pin or catchplate. Possibly a much eroded two-piece Colchester brooch of mid 1st-century AD date. Cu alloy. L: 37mm. Ctx 249175, feature 249175. Subsoil. Inv No 10025. Unphased
5. ON 200. Tweezers, almost complete. Undecorated, straight sided with ends slightly turned in. Wire suspension loop attached at top, corroded. Cu alloy. L: 60mm; W: 6mm. Ctx 194037, ditch 194090. Inv No 10008. Early Roman
6. ON 210. Stud, with domed head and square section shaft. Cu alloy. D: 13.5mm; H: 12mm. Ctx 159001, feature 159001, colluvium. Inv No 10032
7. ON 214. Whittle tang knife, with blade of triangular cross section, with curved back and curved blade. Heavily encrusted with corrosion product. Fe. Ottaway back form D (Ottaway 1992, 572). The form of the blade confirms that this is a Saxon knife. Most Saxon knives are whittle tanged and quite short, most being less than 160mm, and the majority under 120mm long (Ottaway 1992, fig 236; see also Härke 1989). L: 107mm; W: 18mm. Ctx 197085, SFB 194086. Inv No 10007. Early or mid-Saxon
8. ON 213. Knife blade fragment, tip only, The blade had a slightly curved back and a more strongly curved edge, and a triangular cross section. Fe. L extant: 75mm; W: 25mm. Ctx 197085, SFB 194086. Inv No 10006. Early or mid-Saxon
9. ON 986148. Small book clasp fragment, folded and decorated at the wider end. The narrower end is a hook. Cu alloy. Probably 15th- or 16th-century (see for example Ottaway and Rogers 2002, 2936-39, fig 1503, no. 15234). L: 32mm; W: 11.5mm. Ctx 249175, feature 249175. Subsoil. Inv No 10009

Zone 11

10. ON 433. Shears blade, with part of spring, blade tip missing. The blade has a slightly concave edge. From a large pair of shears, originally perhaps at least 240-250mm long. Shears were used for a number of tasks and by various craftsmen. Correspond to Manning's group of medium sized shears, measuring more than 150mm long (Manning 1985, 34). Fe. L: 175mm; W: 31mm. Ctx 143150, quarry pit 262015. Inv No 11012. Mid-Roman
11. ON 414. One-piece bow brooch, with tapering flat section bow. Nauheim derivative. Bow slightly bent towards the foot and has an incised border. Unperforated almost triangular catchplate. Spring of three coils; pin missing. Cu alloy. L: 51mm; W: 10mm. Ctx 129019, pit 129018. Inv No 11001. Early Roman

12. ON 435. Two-piece Colchester brooch (Colchester derivative), poorly preserved. Foot and catchplate are missing. Spring of six coils secured by rear hook. L: 50mm; W: 20mm. Cu alloy. Ctx 209121, grave 147141. Inv No 11013. Roman (mid 1st century AD) (Fig 3.5).
13. ON 429. Rosette brooch, incomplete and eroded. Cylindrical spring cover, small, strongly curved bow. Eroded and missing some elements, so unclear whether it had a circular or lozenge shaped plate and whether the spring cover was open at the back or originally fully enclosed the spring. It was probably open, and this is likely to be an early form securely dated before the Claudian conquest (Mackreth 2011, 28-9, pl. 16, nos 5819, 5822). Cu alloy. L extant: 39mm; W: 23mm. Ctx 171125, ditch 159332. Inv No 11009. Mid-Roman
14. ON 420. Armlet fragment, broad curved strip decorated with a central band, possibly with a herring-bone motif, edges appear to be defined by two grooved lines. Probably part of a 1st-century broad armlet (see Crummy 1983, 1586; 2005b). Cu alloy. L extant: 27mm; W: 15mm. Ctx 165013, feature 165013, colluvium. Inv No 11003
15. ON 422. Possible bracelet terminal, decorated strip fragment, curved and slightly tapering, with plain raised edging, apparently decorated in the centre. Cu alloy. L: 1m; W: 3.3mm. Ctx 249007, ditch 159314. Inv No 11004. Early Roman.
16. ON 4551. Possible tool fragment, open socket, with two nail holes to secure a possible handle. Fe. L: 66mm; W: 24mm. Ctx 189082, pit 189077. Inv No 11029. Roman

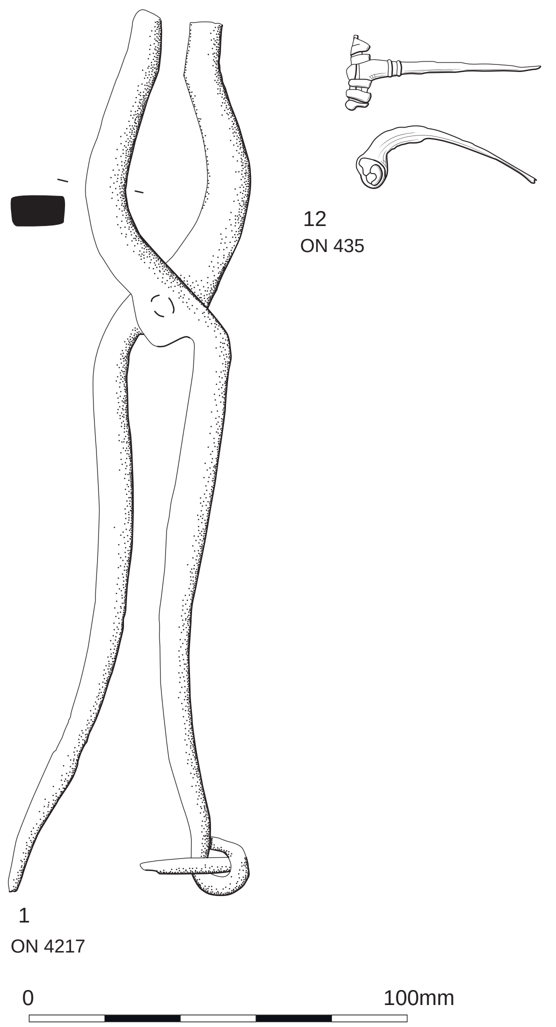


Fig 3.5 Metalwork from Zones 10 and 11

Zone 12

There are 24 metal objects (42 fragments) from Zone 12, including four objects (16 fragments) from grave 166005. The finds include 14 nails (24 fragments), only two (7 fragments) from grave 166005, and five miscellaneous items (10 fragments) including a ring (6 fragments) (ON 2) from grave 166005.

The most interesting item is a complete iron tyre (ON 1400) from a hollow-way (268010). This was found associated with a small quantity of Roman pottery. The tyre is complete and measured 950mm x 920mm in diameter; that is it is just less than 1m in diameter. The tyre has a plano-convex cross-section with the convex face on the outside and measures *c* 40mm wide. Unusually the tyre is made in two pieces with two lap joints on opposite sides of the tyre. The tyre is about 45mm wide at the joints. The cross section of the tyre suggests that it may have been well-worn before it was discarded or lost. Although not made from a single length of iron, the tyre would still have constituted a one-piece hoop tyre which would have required heating to fit to the wheel. This gives us confirmation of the date of the tyre, which could only be Late Iron Age or Roman in date or 18th-century or later in date, since the art of making and fitting single hoop tyres was lost during the medieval and early post medieval periods. It is unlikely that the wheel is of 18th- or 19th-century date, and its context supports a Late Iron Age or Roman date.

Catalogue

1. ON 1400. Iron tyre. The tyre has a plano-convex cross section. Fe. D: 950mm x 920mm; W of tyre: *c* 40m, W of tyre at joints: *c* 45mm. Ctx 238014, feature 268010, intervention 238012. Inv No 12005. Roman (Fig 3.6).

2. ON 4405. Ox-goad, comprising spiral ring with spike. Fe. D: 22mm; L: 27mm. Ctx 126015, colluvium. Inv No 870

3. ON 4091. Decorated fragment, looks like one end of a Roman spatula probe, in which case it is more likely to be copper alloy than iron. An olive-shaped element defined by a double moulding below which is a slightly swollen section that ends in a second double moulding. Just below this the object is broken. It is completely encrusted and identification has been made from the x-ray. Possibly Fe. L extant: 46mm. Ctx 250049, ditch 190149, intervention 250048. Inv No 832. Late Iron Age

Zones 13, 14, 15 and 26

Introduction

There are 157 metal finds (200 fragments) compromising 102 objects (134 fragments) from Zone 14, 52 objects (57 fragments) from Zone 13, two objects from Zone 26 and a single metal find from Zone 15 (Table 3.13). The finds from Zone 13 include small numbers of objects from Iron Age and Roman contexts, but the largest number of objects (n = 27) are from colluvial

Fig 3.6 Iron tyre from Zone 12

deposits or subsoil. By contrast half of the finds from Zone 14 are from Saxon contexts, with other material from Roman contexts. However, a good proportion of the material is not securely dated stratigraphically. There is a single object, a fragment of a pair of shears (**Cat. No. 5**), from a Saxon context in Zone 15. The metal finds from Zone 26 comprise an iron collar and tang and a nail shank, both from an Iron Age context (context 226002).

Zone 13

Bronze Age
A medieval buckle (**Cat. No. 17**) came from context 200072, an upper fill in early Bronze Age ring-ditch 134096, and is certainly intrusive.

Early Iron Age
There are two metal finds from this phase, both from ditch 134099, and they comprise a length of iron wire (ON 4565, context 245106) and a large nail with hollow domed head (L: 150mm) (ON 825, context 174002).

Early or Middle Iron Age
The metal finds from this phase comprise six objects (10 fragments). They include a ring-headed pin with short arched shaft (**Cat. No. 14**) from pit 248027 and a padlock bolt (**Cat. No. 45**) from pit 126141. Pit 126141 also contained a small oval iron disc of unknown function (**Cat. No. 48**), a plain copper alloy ring (ON 1532) of oval section with wear on opposite sides, suggesting it was used as link or junction, and seven fragments of lead or lead alloy waste (ON 4577). Other finds are three nail shank fragments, two from quarry pit 202160 (ON 4567)

Table 3.13 Zones 13, 14 and 26 – Summary quantification of metal finds by zone and phase and functional type (object and fragment counts)

Zone	*Phase*		*Tools*	*Transport*	*Personal*	*Household*	*Security*	*Structural*	*Binding*	*Nails*	*Misc*	*Query*	*Waste*	*Undiagnostic*	*Total*
	Bronze Age	Count			1										1
		Fragt			1										1
	Early IA	Count								1	1				2
		Fragt								1	1				2
	Early or Middle IA	Count			1		1			0	2	1	1		6
		Fragt			1		1			3	3	1	7		16
	Middle IA	Count										1			1
		Fragt										1			1
	Late IA	Count											1		1
		Fragt											1		1
13	Late IA or early Ro	Count									2				2
		Fragt									2				2
	Early Ro	Count	2	1	1	1			1	1	1				8
		Fragt	2	1	1	1			1	1	1				8
	Saxon	Count	1												1
		Fragt	1												1
	Unphased	Count			1				1	1		1			4
		Fragt			1				1	2		1			5
	Colluvium	Count	1		3	4		1	1	5	8	2	2		27
		Fragt	1		3	4		1	1	5	8	2	2		27
	Total	*Count*	*4*	*1*	*7*	*5*	*1*	*1*	*3*	*8*	*14*	*5*	*4*		*53*
	Total	*Fragt*	*4*	*1*	*7*	*5*	*1*	*1*	*3*	*12*	*15*	*5*	*10*		*64*
	Roman	Count	1	2		2		1	2	0	6	3			17
		Fragt	1	2		2		1	2	2	6	3			19
	Saxon	Count	3		2	13			2	7	14	8		0	49
		Fragt	3		2	16			2	12	17	8		7	67
14	Early or middle Saxon	Count	1								1				2
		Fragt	1								1				2
	Unphased	Count	2		3	5		2		2	17	2			33
		Fragt	2		3	5		2		6	25	2			45
	Colluvium	Count								1					1
		Fragt								1					1
	Total	*Count*	*7*	*2*	*5*	*20*		*3*	*4*	*10*	*38*	*13*		*0*	*102*
	Total	*Fragt*	*7*	*2*	*5*	*23*		*3*	*4*	*21*	*49*	*13*		*7*	*134*
	Iron Age	Count								0		1			1
26		Fragt								1		1			2
	Total	*Count*								*0*		*1*			*1*
	Total	*Fragt*								*1*		*1*			*2*
	Total	Count	11	3	12	25	1	4	7	18	52	19	4	0	156
	Total	Fragt	11	3	12	28	1	4	7	34	64	19	10	7	200

and one from SFB 174060, and two small fragments of iron wire (ON 1503) from pit 200062.

Middle Iron Age
The only metal find was a fragment of iron plate or sheet rolled at one edge (ON 1546) from pit 156166. It was probably part of the socket for a tool of indeterminate type. There was no evidence for a nail hole.

Late Iron Age
The only find was a flat fragment of lead or lead alloy waste (ON 537) from quarry pit 292001.

Late Iron Age or early Roman
There are just two metal finds, a plain iron ring (ON 1507) (D: 42mm) from pit 154081, and a length of iron rod (ON 535) from gully 134101.

Early Roman
There are eight metal finds from this phase, six of which were found in SFB 193140. The finds from this SFB include a knife of Roman form with angled back (**Cat. No. 24**), a small Colchester brooch of mid 1st-century date (**Cat. No. 16**), a socketed reaping hook that would fit in an Iron Age or Roman context (**Cat. No. 2**), the heel of a hipposandal (**Cat. No. 13**) and a nail (ON 4566). The only metal find from SFB 191125 is a distinctive socketed mortice chisel (**Cat. No. 1**) of late Iron Age or early Roman form. The only other find of this phase is an iron collar (D: 40mm) from pit 191136.

Colluvium/subsoil
A substantial proportion of the finds from Zone 13 are from colluvial or subsoil deposits (n = 27). These include five nails, eight miscellaneous pieces of metalwork and two pieces of lead waste or offcuts. Two items of uncertain identification are a fragment of iron plate pointed at one end (ON 1580) and a copper alloy fitting which may be much more recent in date (ON 546). The remainder include a spade shoe (**Cat. No. 8**) which could be Roman or medieval. Personal items comprise two post-medieval buttons (ON 542, ON 1584) and a post-medieval heel iron (ON 543). Household items are a possible fire steel (**Cat. No. 43**), two knives (**Cat. Nos 28 and 40**) and a possible rushlight holder (**Cat. No. 44**). The possible fire steel and the rushlight holder are both tentatively identified and cannot therefore be dated closely. The two knives (**Cat. Nos 28 and 40**) are Saxon types and are the only objects that can be confidently dated. There is a complete rivet or clench nail with diamond-shaped rove (ON 540) and a curved fragment of iron strip with two nails, probably a binding.

Zone 14

Roman (Table 3.14)
There are 17 metal finds (19 fragments) from Roman contexts. These include eight miscellaneous pieces, and just two nail shank fragments. The finds are from enclosure ditches, other ditches and pits.

The number and range of finds is limited and it is notable that there are almost no nails, which is unusual if there was a habitation site close by. The finds include two items relating to transport, a snaffle bit link (**Cat. No. 12**) from enclosure ditch 159224 and a spur (**Cat. No. 11**) from enclosure ditch 159219. The form of the latter is not precisely paralleled. It could be a piece of late Roman cavalry equipment, but the date is uncertain. There is a spur of late Roman type from Richborough (Bushe-Fox 1932, 79, pl x, no. 10) but it differs significantly from this example (see below **Cat. No. 11**). The only possible tool is a bar slightly tapered at each end (ON 502). There are no personal items, and the only household items are two knives (**Cat. Nos 23 and 25**), one of which (**Cat. No. 25**) is Saxon. Enclosure ditch 159224 produced a joiner's dog or staple (ON 4080), a rectangular collar or link (ON 1566), a fragment of iron strip (ON 500), a nail shank fragment (sample 6923) and two small fragments of iron sheet or plate. Enclosure ditch 159219, in addition to the spur (**Cat. No 11**), produced a knife (**Cat. No.23**) and a nail shank fragment. A knife (**Cat. No. 25**) also came from pit 279009.

Table 3.14 Zone 14 – Summary of finds from Roman features by functional class (object & fragment counts)

Feature type	*Feature*	*Context*		*Tools*	*Transport*	*Household*	*Structural*	*Bindings*	*Nails*	*Misc*	*Query*	*Total*
	159224	185003	Count							1		1
			Fragt							1		1
Ditches	159241	136097	Count								1	1
			Fragt								1	1
	159244	259027	Count								1	1
			Fragt								1	1
	159219	133075	Count			1						1
			Fragt			1						1
		182119	Count						0			0
			Fragt						1			1
		193138	Count		1							1
Enclosure			Fragt		1							1
ditches	159224	133084	Count				1					1
			Fragt				1					1
		178073	Count					1				1
			Fragt					1				1
		182117	Count							1		1
			Fragt							2		2
		219069	Count		1				0			1
			Fragt		1				1			2
	145166	145162	Count							2	1	3
			Fragt							1	1	2
	185006	185005	Count	1								1
			Fragt	1								1
Pits	230088	230089	Count					1		1		2
			Fragt					1		1		2
	264026	264065	Count							1		1
			Fragt							1		1
	279009	279013	Count			1						1
			Fragt			1						1
		Total	Count	1	2	2	1	2	0	6	3	17
		Total	Fragt	1	2	2	1	2	2	6	3	19

Table 3.15 Zone 14 – Summary of knives by phase and feature type

Phase	*Feature type*	*Feature no.*	*Context*	*Total*
Roman	Ditch	159219	133075	1
	Pit	279009	279013	1
	Total			2
Early Roman	SFB	193140	200092	1
	Total			*1*
Saxon	Grave	136059	136061	1
	Pit	133048	133049	1
			133051	1
		139054	139053	1
		139090	139089	1
		166068	166071	1
		173094	173107	1
		203020	203021	1
		240037	240038	1
		264021	264041	1
	Pit Total			10
	Total			11
Unphased	Ditch	212079	212078	1
	Pit	173079	173081	1
	Quarry pit	159336	203015	1
			203017	1
	?	?	127033	1
	Total			5
Colluvium	Colluvium	184002	184002	2
	Total			2
	Total			21

Saxon

Almost half of the finds from Zone 14 were found in contexts of Saxon date. These amount to 51 objects (65 fragments). They include a draw knife (**Cat. No. 3**), a tanged awl (**Cat. No. 6**) and a bell clapper (**Cat. No. 9**). There is second bell clapper (**Cat. No. 10**) from an unphased quarry pit (context 159336). The bell clappers are probably from cattle or sheep bells. The draw knife is a Saxon form with handles attached by nails or rivets.

The only personal items are a copper alloy hooked tag (**Cat. No. 19**) and an iron girdle hanger (**Cat. No. 22**). The most common single type of find are knives, with 11 being recovered from Saxon features, all but one from pits (Table 3.15). The single exception is the knife (**Cat. No. 35**) found in two pieces in grave 136059. The latter and the knives from pits (**Cat. Nos 26, 29–34, 36, 37** and ON 534) are Saxon types. The uncatalogued knife (ON 534) is fragmentary and its form is uncertain. There is also a knife tang (ON 532) from another Saxon pit (context 202051). There are at least five further knives, probably Saxon, from contexts of uncertain date (see below) in Zone 14: **Cat. No. 27**, from an undated deposit, and **Cat. Nos 38–40** from colluvium or unphased features. **Cat. No. 41** is long narrow knife of uncertain type, but possibly Saxon, again from an unphased feature.

The only other household items are a bucket handle (**Cat. No. 42**), complete but broken into three pieces, from pit 279003, and a fragment of a probable shears blade (**Cat. No. 4**).

Apart from the knives and other objects noted above, the metal finds from Saxon features are comparatively limited in number and range: two bindings, a small number of nails and nail fragments, miscellaneous bits of bar, rod, strip and plate, and some pieces of uncertain identity including a possible fragment of iron vessel rim (**Cat. No. 50**) and a length of bar hooked at one end and looped at the other (**Cat. No. 51**).

Unphased

A substantial proportion of the metal finds from Zone 14 are from unphased contexts (n = 33; 46 fragments). The unphased finds include an awl (**Cat. No. 7**), a bell clapper (**Cat. No. 10**), a 1st-century Aucissa brooch (**Cat. No. 15**), five knives (see above; **Cat. Nos 38–39, 41**, ON 551 and ON 578), a late Saxon strap end (**Cat. No. 18**) and a Saxon pin (**Cat. No. 20**). The knives comprise at least two Saxon examples (**Cat. Nos 38–39**) and a long, thin knife (**Cat. No. 41**) is possibly also Saxon. The Aucissa brooch (**Cat. No. 15**), late Saxon strap end (**Cat. No. 18**) and Saxon hair or cloak pin (**Cat. No. 20**) were recovered from context 133109, which indicates that this layer is mixed and contained residual finds.

Zone 15

Saxon

The only metal find from a context of Saxon date in Zone 15 is part of a pair of shears (**Cat. No. 5**) from pit 174117.

Conclusions

The evidence from the metalwork for Iron Age occupation is very slight and comes from Zone 13. Stratified metal finds are limited in number as might be expected. The ring-headed pin (**Cat. No. 14**) is an Iron Age piece from a stratified context. The distinctive mortice chisel (**Cat. No. 1**) from an early Roman feature on Zone 13 is a form which has parallels from late La Tène oppida or early Imperial (Augustan) sites on the Continent (Mölders 2010, 164, 176) and may well date before the Claudian invasion.

Roman metalwork from Zones 13 and Zone 14 indicates a presence during the Roman period, but insufficient material present to demonstrate occupation or habitation in Zone 14, though this is attested in Zone 13. The Saxon material is similarly limited but is remarkable for the number of knives, most of them from pits (see Table 3.15). Zone 14 has produced evidence for the processing of shellfish and the large number of knives may have been connected with this activity.

Catalogue

Tools

1. ON 4568. Mortice chisel, socketed, with closed socket. Fe. Parallels for this distinctive chisel form have been

found at Bibracte (Mölders 2010, 51, 111, fig 50, no. 68), Stradonice (Pi 1906, Taf 38, no. 22), Sanzeno (Trentino, Italy) (Nothdurfter 1979, 29, 119, Taf. 8, nos 144-45) and in the Roman metal finds from Augsburg-Oberhausen (Hübener 1973, Taf. 19, no 29). Mölders (*ibid*, 176) cites further examples and dates this form to the late La Tène (La Tène D) or Augustan periods (*ibid*, 164). There are examples of this form of chisel from Manching (Bavaria) but these have solid handles rather than sockets for wooden handles (Jacobi 1974, 23-4, Taf. 6, nos 75-6). The presence of a socketed or solid handle, together with the strong but narrow blade and cutting edge, confirm that these are mortice chisels. L: 121mm; W: 14mm. Ctx 191127, SFB 191125. Inv No 14039. Early Roman (Fig 3.7).

2. ON 1513. Reaping hook, with open socket and single nail hole. Fe. L: 170mm; W: 105mm. Ctx 200092, SFB 193140. Inv No 14135. Early Roman
3. ON 1704. Draw knife blade. Distinctive Saxon type with triangular section blade with angled back and rounded ends. Approx 14mm wide at the ends which each have a perforation for attachment of the handles. Most surviving examples have curved backs, but the method of attaching the handle using rivets is distinctive. Examples from Flixborough (Lincs) (Ottaway 2009a, 255, fig.7.1, no 2449) and Burrow Hill (Suffolk) (Fenwick 1983, 40, fig 4, a-e) were found with rivets still in place. Other examples have been found at Sutton Courtenay (Oxon) (Leeds 1923; Fenwick 1983, fig 4, f), Riby Cross Roads (Lincs) (Ottaway 1994, 251-2, 257, illus. 14, no. 22) and at Thwing, East Yorks (Ottaway 2009b, fig 3, f). The latter example is most comparable to the present blade in that it has an arched back. Fe. L: 144mm; W: 28mm. Ctx 157070, pit 157069. Inv No 14054. Saxon (Fig 3.7).
4. ON 574. Shears blade of triangular section with straight cutting edge and very slightly curved back. The blade is incomplete and little of the arm survives. Heavily encrusted with corrosion product. Fe. L: 102mm; W: 20mm. Ctx 173113, pit 173112. Early or middle. Inv No 14110. Saxon
5. ON 580. Shears fragment comprising part of on blade, one arm and part off the spring. That this is a shears blade is confirmed by the position where the broken arm meets the blade, which is wrong for a knife. Fe. L: 113mm. Ctx 174118, pit 174117. Inv No 14114. Saxon
6. ON 4607. Tanged awl, with traces of mineral-preserved wood from handle. Fe. L: 95mm. Ctx 148065, pit 148067. Inv No 14048. Saxon

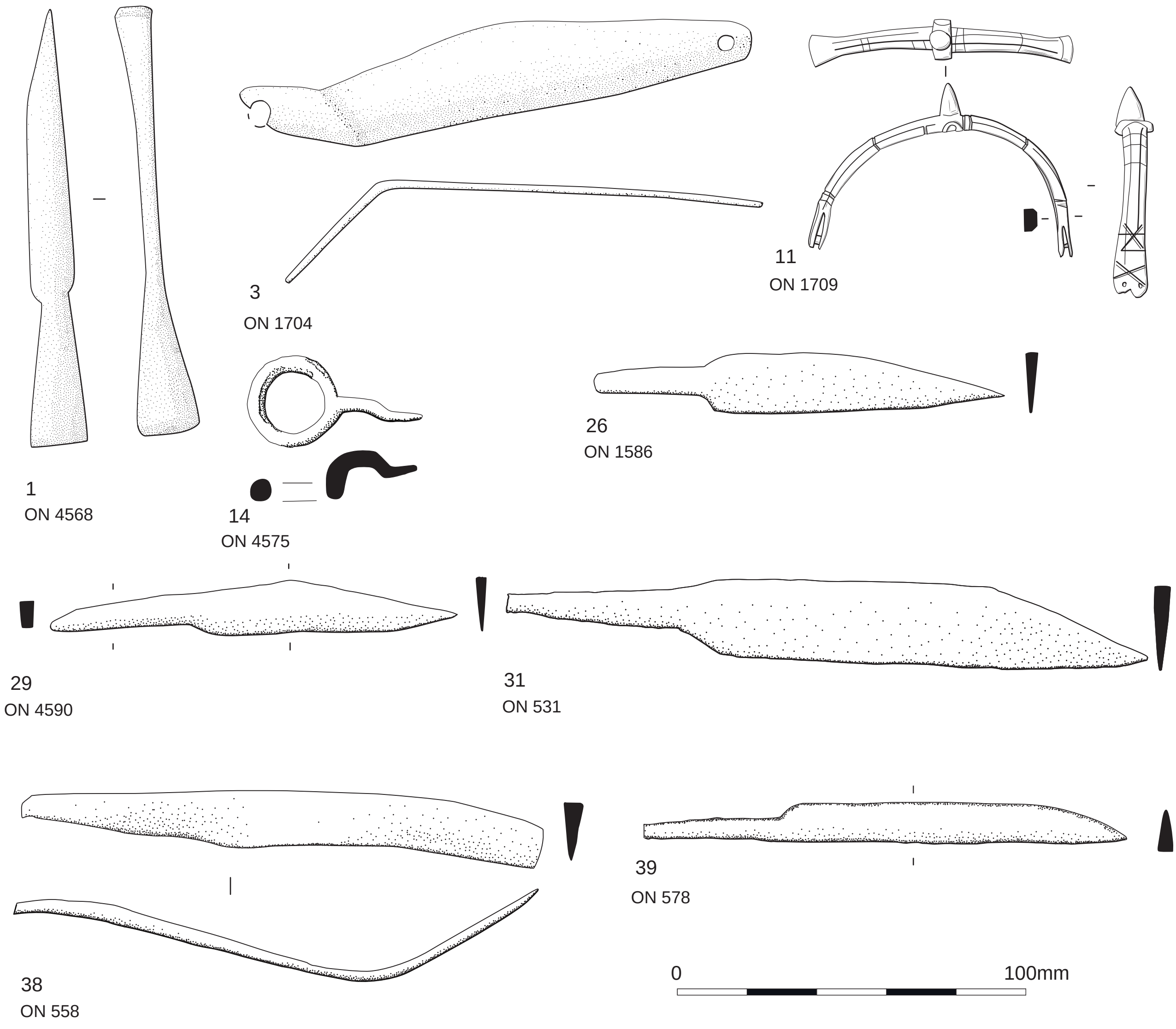


Fig 3.7 Metalwork from Zones 13 and 14

7. ON 548. Possible awl, comprising bar tapering to each end; one tapered point has a square section the other is circular in section. Fe. L: 81mm. Ctx 203015, quarry pit 159336. Inv No 14088. Unphased
8. ON 1568. Spade shoe, with straight mouth. The mouth and arms are grooved to hold the wooden blade. The spade shoe could be Roman, since it falls broadly within Manning's type 2 (1985, 44-7, fig 11), but it also could be medieval and fall into Goodall's type 3 (2011, 77-9, 88, fig 7.4, F13-F14) Fe. L: 145mm; W: 125mm. Ctx 184002, colluvium 184002. Inv No 14032
9. ON 573. Bell clapper. See an example from Riby Cross Roads (Ottaway 1994, 258, illus. 14, no 23) and more generally Goodall 2011, 102-103, fig 711, F139-F145). The bells were probably cattle or sheep bells. Fe. L: 64mm. Ctx 139072, pit 139075. Inv No 14109. Saxon
10. ON 549. Bell clapper. Fe. L: 61mm. Ctx 203015, quarry pit 159336. Inv No 14089. Unphased

Transport

11. ON 1709. Prick spur, with plain conical prick. The arms are bevelled on the outer edges and end in split terminals. The terminals are decorated with incised diagonal crosses and each has two pin or rivet holes. Cu alloy. L: 51mm; W: 79mm. Ctx 193138, enclosure ditch 159219. Inv No 14065. Roman (Fig 3.7).

    Although very broadly similar to spurs found in Britain (Shortt 1959; Leahy 1996; Worrell 2004) this example differs significantly from them in its method of attachment. Two main forms of spurs were identified by Shortt (1959, 61-2); those fastened by rivets and those with rectangular or circular loop terminals. Most spurs from Roman Britain are rivet spurs and have arms terminating in discs with a single large rivet (eg, Chedworth, Glos, Woodeaton and Corbridge, Northumb: Shortt 1959, fig 2, nos 2-4, 28; fig 3, nos 7-10; see also Giesler 1978, Abb. 1, a-c). The pricks are often larger and more elaborate than the present example and usually have a hook above the prick. This is a Roman 'provincial' spur type (Jahn 1921, Abb. 82-83). Another form has a third disc and rivet replacing the hook above the prick (Giesler 1978, Abb. 1, D-F; Jahn 1921, Abb. 84). This form is not common in Britain but a pair were found in the cemetery at Lankhills, Winchester (Cool 2010, 218-20, 290-91. fig 3.248, nos 4-5).

    There are two copper alloy spurs with split terminals from Britain, an example from Pakenham, Suffolk (Shortt 1959, fig 2, no.19, pl. xv, no.19) and a similar spur from Icklingham, Suffolk (Shortt 1964). Although the two spurs are not identical, in both cases the terminals are split and take the form of animal heads. The prick on the Pakenham spur also takes a zoomorphic form with inlaid glass eyes. Neither of these Suffolk spurs has a hook. The dating of these two spurs has been debated and is still unclear. Shortt (1959, 62, 71; 1964; 1966) argued that they were 1st-century and Roman, with Celtic antecedents, whereas Wilson (1965) was quite certain that they were Saxon, a view repeated by Williams (2002, 116-17). Hinton (1978, 56; 2005, 183-5) sat firmly on the fence in his discussion of the Pakenham piece, but did question whether it was in fact a spur at all.

    The Pakenham and Icklingham spurs are only relevant to the dating of the present spur because of their split terminals. Stylistically they are quite different. The problem is that there appears to be no other spur with this form of terminal. Neither Jahn (1921) nor Giesler (1978) make reference to a spur attachment of this type. The ditch from which the spur was recovered is assigned a Roman date, but some of the small quantity of pottery from the upper ditch fills is Saxon. The spur does not appear to be a Roman form, but neither can Saxon parallels be adduced. Later Saxon spurs of the 10th or 11th centuries are prick spurs but quite different in size and form (see Ellis 1984, figs 140-41; Ellis 1995, 130, fig 90, no 316; see also Scott 2013, 184, 186-87 fig 3.12, no 1) and therefore throw no light on the matter.
12. ON 1567. Snaffle bit link from the jointed mouth bar. Rolled over loop at one end and part of another loop at the other end. Fe. L: 74mm; W: 2mm. Ctx 219069, feature 159224. Inv No 14146. Roman
13. ON 1516. Hipposandal heel fragment. Plate fragment with concave curve and a rolled over loop at one end. Part of either a Type 1 or Type 2 hipposandal (Manning 1985, 6-5, fig 16). Fe. L: 81mm; W: 69mm. Ctx 200092, SFB 193140. Inv No 14133. Early Roman

Personal

14. ON 4575. Ring headed pin, with arched shaft that is short in proportion to ring. The plain of ring is at right angles to the plain of the arch. Paralleled in general form by ring headed pins from Park Brow, Sussex and from Cold Kitchen Hill, Somerset (Dunning 1934, 278-79, fig 5, nos 1-2; see also Becker 2008, fig 1, no. 2). Fe. L: 50mm; W: 28mm. Ctx 248029, pit 248027. Inv No 14040. Early or Middle Iron Age (Fig 3.7).
15. ON 1588. Aucissa brooch with hinged pin. This variant with a narrow oval section or D-section bow dates to the mid 1st century AD. Mackreth does not think that they occur before the Conquest (Mackreth 2011, 131, pl. 89, nos 8522, 8525, 8527). Cu alloy. L: 49mm; W: 10.5mm. Ctx 133109. Inv No 14059. Unphased
16. ON 1509. Small Colchester two-piece bow brooch. Cu alloy. L: 35mm; W: 19.5mm. Ctx 200092, SFB 193140. Inv No 14055. Early Roman, mid 1st century AD
17. ON 1508. D-shaped buckle frame, with offset bar. Cast. Tongue missing. Buckle of medieval form, probably mid 13th to the end of the 15th century. Cu alloy. L: 20mm; W: 32.5mm. Ctx 200072, ring-ditch 134096. Inv No 1406
18. ON 1589. Decorated strap end, with split top, two pin holes. 9th or 10th century. Comparable to a number of strap ends from Winchester (Hants) dated by Hinton (1990, 500-502, fig.126, esp. no. 1071) to the 10th century, perhaps into the early 11th century. Cu alloy. L: 44mm; W: 9.5mm. Ctx 133109. Inv No 14060. Unphased
19. ON 510. Hooked tag with ring and dot decoration. Used from the 7th to 11th centuries, ring and dot ornamentation is quite common. Compare the hooked tag from Hamwic (Southampton, Hants) (Hinton 1996, 10, fig 4 no. 169/488). Cu alloy. L: 21mm; W: 18mm. Ctx 202023, pit 202021. Inv No 14066. Saxon
20. ON 1590. Hair or cloak pin with slightly faceted globular head decorated with ring and dot motifs. The shaft has a slight thickening at or just below its mid point. Similar to a number of mid-Saxon pins from Hamwic (Hants) (Hinton and Parsons 1996, 19, fig 8, nos 31/672 and 32/420) and from Flixborough (Lincs)

(Rogers 2009, fig 1.23, nos 295, 300). At Flixborough globular headed pins, including examples with decorated heads, occurred in 7th- to mid 9th-century contexts, but were more common in late 9th- to 11th-century contexts (Rogers 2009, 42). A similar date range was observed at Cottam, East Yorks (Haldenby and Richards 2009). Cu alloy. L: 60mm. Ctx 133109. Inv No 14061. Unphased

21. ON 564. Pair of tweezers with a moulded and lipped spring, and moulded castings including transverse moulded ridges below the spring. One arm missing. The surviving arm is plain and straight-sided. It curves in at the end. Comparable to a small group of tweezers with moulded and lipped springs identified by Eckardt and Crummy (2008, 154-55, fig 96). The closest parallel for the moulding is on an example from a Claudio-Neronian context at Sheepen, Colchester, Essex (*ibid*, fig 96, no. 314; see also Niblett 1985, fig 61, no 10). Tweezers of this group are found in Late Iron Age or early Roman contexts. Cu alloy. L: 51mm; W: 6mm. Ctx 168091, pit 168090. Inv No 14063. Unphased
22. ON 567. T-shaped girdle hanger with a square sectioned shaft which widens and flattens slightly towards top end. Incomplete – one 'arm' is missing. Fe. L: 238mm; W: 60mm. Ctx 176066, pit 176064. Inv No 14108. Saxon

Household

Knives

Three knife blades (**Cat. Nos 23–25**) were recovered from Roman contexts. **Cat. No. 24** is good Roman type, **Cat. No. 23** could be a Roman knife but part of the blade is missing and it is more likely to be Saxon on the basis of its form. **Cat. No. 25** is a definite Saxon form, and is very similar in form to **Cat. Nos 26–28**. These knives have backs that slope up from the handle and are sharply angled down to the tip (Ottaway back form A2). **Cat. No. 26** is from a Saxon pit and is the only one of the three from a Saxon context. **Cat. Nos 29–30** are also of back form A2, and both are from Saxon pits. **Cat. No. 31** is a larger knife with Type A2 back, again from a Saxon pit. **Cat. Nos 32–37** are all from Saxon contexts and are good Saxon forms. **Cat. Nos 38–40** are not securely dated stratigraphically but they are undoubtedly of Saxon form. **Cat. No 41** is long and thin, and its date is uncertain on both typological and stratigraphic grounds.

23. ON 541. Knife blade, narrow incomplete. No extant tang. The blade of triangular section has a straight edge and back. Towards the tip the back angles down. This could be a Roman type. Manning (1985, 108-111, fig 28) has identified a number of narrow bladed forms, although this blade is poorly preserved, making precise identification difficult. It is perhaps more likely to be a Saxon knife with a Type C1 back (Ottaway 1992, 568), and came from the upper fill of the ditch that contained Saxon material. Fe. L: 87mm; W: 13mm. Ctx 133075, ditch 159219. Inv No 14085
24. ON 1515. Knife with sharply angled back, curved edge and broad tang or handle, Manning Roman Type 8 (1985, 113, fig 28). Fe. L: 123mm. Ctx 200092, SFB 193140. Inv No 14132. Early Roman
25. ON 1710. Whittle tang knife. Blade with piled back, and steeply angle tip. Most of the blade and part of the tang survive. Ottaway back form A2 (Ottaway 1992, 561-65, fig 229). Fe. L: 76mm; W: 16mm. Ctx 279013, pit 279009. Inv No 14025. Roman, but upper fill contained probable Saxon material
26. ON 1586. Whittle tang knife, with a groove parallel to the back and steeply angled at the point. Deep blade of triangular section with curved cutting edge. Ottaway back form A2 (*ibid*). Fe. L: 107mm; W: 17mm. Ctx 240038, pit 240037. Inv No 14011. Saxon (Fig 3.7).
27. ON 501. Whittle tang knife. Angled back and deep blade, edge slightly curved. Ottaway back form A2 (*ibid*). Fe. L: 108mm; W: 19mm. Ctx 127033. Inv No 14134. Unphased
28. ON 1583. Whittle tang knife, blade complete, tang missing. The deep blade has a straight back, steeply angled tip and curved edge, which has been forged separately and welded to the back. Ottaway back form A2 (*ibid*). Fe. L: 83mm; W: 22mm. Ctx 184002, colluvium. Inv No 14009
29. ON 4590. Whittle tang knife, with angled back and curved edge. Ottaway back form A2 (*ibid*). Fe. L: 119mm; W: 17mm. Ctx 264041, pit 264021. Inv No 14045. Saxon (Fig 3.7).
30. ON 588. Tanged knife, fragment. Most of the triangular section blade with angled back is extant. Little of the rectangular section tang survives. Ottaway back form A2 (*ibid*) Fe. L: 93mm; W: 16mm. Context 166071, pit 166068. Inv No 14116. Saxon
31. ON 531. Whittle tang knife, large. Straight back, angled point. Triangular section blade. Ottaway back form A2 (*ibid*). Fe. L: 185mm; W: 26mm. Ctx 133051, pit 133048. Inv No 14077. Saxon (Fig 3.7).
32. ON 1717. Knife blade fragment, with slightly curved edge, and gently curved back. Probably a Type D back with gently curved back through the length of the blade (Ottaway 1992, 572, fig 232).Fe. L: 96mm; W: 18mm. Ctx 202155, pit 202151. Inv No 14030. Saxon
33. ON 506. Knife blade fragment, more or less triangular point; triangular section. Too little of the blade survives for certain identification, but possibly a Type D back (*ibid*). Fe. L: 53mm; W: 20mm. Ctx 139053, pit 139054. Inv No 14072. Saxon
34. ON 530. Whittle tang knife, with curved back almost complete, tip broken. Edge is slightly concave. Rectangular section tang, triangular section blade. Fe. L: 119mm; W: 17mm. Ctx 133049, pit 133048. Inv No 14076. Saxon
35. ON 557. Whittle tang knife, incomplete. (2 fragments – tang and most of blade). Blade has a straight back and groove at near the back. Possibly a Type C1 back (Ottaway 1992, 568-70). Similar form to Cat. No. 38. Fe. L at least: 130mm. W: 15mm. Ctx 136061, grave 136059. Inv No 14096. Saxon
36. ON 565. Knife blade, narrow, straight edge and straight back with curved tip. Type C3 back (Ottaway 1992, 570). Fe. L extant: 97mm; W: 11mm. Ctx 173107, pit 173094. Inv No 14103. Saxon
37. ON 572. Whittle tang knife, blade has triangular section and is bent. It has a slight curved back and curved edge. The blade is probably a Type D back (Ottaway 1992, 572, fig 232). Fe. L extant: 118mm; L extended: *c* 135mm; W: 15mm. Ctx 139089, pit 139090. Inv No 14107. Saxon
38. ON 558. Whittle tang knife. Most of tang and of blade survive. The blade is bent but has a straight horizontal back angled down at the point, a straight edge and triangular section. Type C1 back (Ottaway 1992, 568-70) similar form to Cat. No. 35. Fe. L: 151mm; W:

20mm. Ctx 173081, pit 173079. Inv No 14097. Unphased (Fig 3.7).

39. ON 578. Whittle tang knife with straight back curving down to the tip, and a straight edge welded to knife. Triangular section blade. Possibly back Type C2 (Ottaway 1992, 570). Fe. L: 139mm; W: 15mm. Ctx 203017, quarry pit 159336. Inv No 14112. Unphased (Fig 3.7).
40. ON 1585. Whittle tang knife. Triangular section blade back curves down to the tip and the edge is almost straight or very slightly curved. Type C3 back (Ottaway 1992, 570). Fe. L: 114mm; W: 18mm. Ctx 184002, colluvium. Inv No 14010
41. ON 1715. Whittle tang knife with long narrow blade. The back of the blade curves down slightly and is angled down near the point, which is missing. The edge has a concave curve. The form of this blade suggests that it could be Saxon, but it is rather long for a Saxon knife. Fe. L: 274mm; W: 19mm. Ctx 212078, ditch 212079. Inv No 14154. Unphased
42. ON 1599. Bucket handle (3 fragments), rectangular cross section with rolled over hooks are each end. Fe. L: 240mm. Ctx 279008, pit 279003. Inv No 14019. Saxon
43. ON 1596. Possible fire steel, formed from folded and rolled bar or thick strip iron. Fe. L: 60mm; W: 12mm; H: 37mm. Ctx 184002, colluvium. Inv No 14015
44. ON 503. Possible rushlight holder or pricket candlestick. The twisted stem suggests either a fire tool or an object associated with lighting. One end of the stem appears to taper to a blunt point. At the other end there were probably originally three branches, two now cut short. The surviving branch is bent at a right angle to the stem and forms a V-shape with rolled-over tips, possibly to hold a rushlight. The V-shaped arm also suggests a support for a rushlight; the lack of a spike between the arms of the V suggest that it is not a pricket candlestick. Fe. L: 145mm; H: 80mm. Ctx 184002, colluvium. Inv No 14073. Undated

Security

45. ON 1523. Padlock bolt, strip bent into a U-shape and pinched into a kink halfway down one side: the end is bent back on itself to form a barb spring which was inserted into the body of the lock. The other end is formed into circular section rod and this would have engaged with a loop or eye on the lock. Two plain rings are threaded onto the bolt. Fe. L: 140mm; W: 66mm. Ctx 126145, pit 126141. Inv No 14136. Early or Middle Iron Age (Fig 3.8).

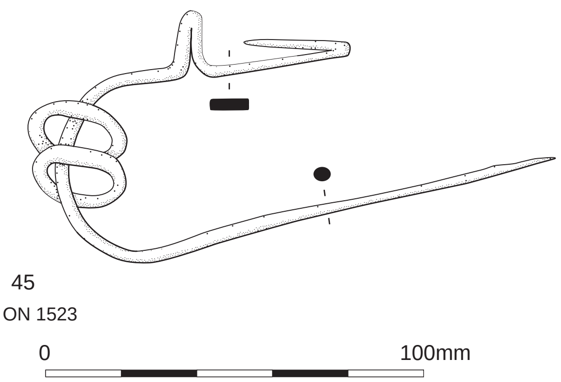


Fig 3.8 Metalwork from Zone 15

Bindings

46. ON 1560. Narrow decorated binding fragment with rivet at each end, with transverse lines. Fe. L: 51mm; W: 9mm. Ctx 203006, pit 203004. Inv No 14141. Saxon
47. ON 1562. Possible binding fragment with curvilinear outline. Fragment is wide at one end, narrows down before widening again at the other end. The wider end is curled, perhaps caused when it was broken. The narrower end has a single nail hole. Fe. L: 60mm; W: 35mm. Ctx 175089, pit 175086. Inv No 14142. Saxon

Objects of uncertain identification

48. ON 524. Small oval disc, slightly dished, apparent double perforation towards one end. Fe. D: 31mm x 36 mm. Ctx 126145, pit 126141. Inv No 14137. Early or Middle Iron Age
49. ON 1718. Strip, bent and twisted, formed into a hook at one end, other end folded back on itself. Fe. L: 183mm; W: 12mm. Ctx 259027, ditch 159244. Inv No 14031. Roman
50. ON 1708. Possible vessel rim fragment. May be part of a vessel rim or part of the flange of a shield boss but too fragmentary for certain identification. Fe. L: 75mm. Ctx 251042, pit 251040. Inv No 14023. Saxon
51. ON 1714. Object formed from bar with a hook at one end and a loop at the other end, which is bent at a right angle. Fe. L: 97mm. Ctx 212075, pit 212074. Inv No 14027. Saxon

Zone 17

There just two metal finds from Zone 17: a nail from a late Saxon pit (143037), and a knife (ON 410) from a late Saxon or early medieval pit (147029).

Catalogue

ON 410. Whittle tang knife, with deep blade of triangular section, with a very slightly curved back and convex curved cutting edge. Probably incomplete, tip of the blade missing. Poorly preserved. The deep blade form with convex curved cutting edge is consistent with a medieval form. Fe. L: 180mm, W: 30mm. Ctx 147031, quarry pit 147029, intervention 147029. Inv No 17002. Late Saxon/early medieval

Zone 19

Introduction

The metal finds from Zone 19 number some 722 objects (1238 fragments), the majority recovered from graves. There are finds from three Roman cemeteries and from three Saxon cemeteries. The finds from the Roman inhumation and cremation burials number 185 objects (384 fragments) and those from Saxon burials number 401 (631 fragments). Finds from non-grave contexts number 134 objects (223 fragments). These include 95 objects – nails and hobnails – from a single unphased (but probably Roman) pit (239107) which did, however, contain a very small quantity of cremated human bone, and 10 objects from topsoil. A further 44 nail or hobnail fragments are not included in the overall non-grave total, but are shown in Tables 3.16 and 3.17.

Finds from contexts other than graves

The range of finds is quite limited and no contexts, with

Table 3.16 Zone 19 – Non-grave metalwork by phase and broad context type

Phase		*Pit*	*Ditch*	*Trackway*	*Natural feature*	*Topsoil*	*Total*
Iron Age	Count	0					0
	Fragt	1					1
Roman	Count			1			1
	Fragt			1			1
Early Ro	Count	0	9	1			10
	Fragt	1	10	1			12
Middle Ro	Count	44					44
	Fragt	56					56
Saxo-Norman	Count			17			17
	Fragt			20			20
Medieval	Count		2				2
	Fragt		2				2
Natural	Count				1		1
	Fragt				1		1
Topsoil	Count					10	10
	Fragt					10	10
Unphased	Count	95					95
	Fragt	176					176
Total	Count	139	11	19	1	10	180
Total	Fragt	234	12	22	1	10	279

the exception of unphased (but probably Roman) pit 239107 and the trackway 126227 of Saxo-Norman date, produced more than one or two metal finds (Table 3.18).

Iron Age

Pit 205106, which contained an Iron Age burial, produced a single, probably intrusive, nail.

Roman occupation

Outside from the Roman burials, the evidence for Roman metal finds is very limited. The only find from a 'general' Roman context is a medieval 'fiddle key' horseshoe nail (ON1958) from trackway 126277, context 211129. The metal objects from early Roman contexts number just 10 (12 fragments). They include an ox-goad (ON 4709) from context 126193, ditch 126191, a penannular brooch (**Cat. No. 2**; ON 1204) from context 126162, ditch 126170, and a plate brooch with dished cone (**Cat. No.3**; ON 1212) from context 220128, ditch 126170.

Catalogue

1. ON 1204. Penannular brooch with oval section hoop decorated with transverse mouldings on outer face. Large circular terminals recessed for inlay now lost. The pin is bent and has a decorated attachment loop. A similar but smaller penannular brooch (ON 887) was found in Zone 5 in Middle Iron Age pit 254114. Cu alloy. D of brooch 33mm x 32mm. L of pin: 45mm. Ctx 126162, ditch 126170. Inv No 473. Early Roman (Fig 3.9).
   ON 4709. Ox-goad with spiral socket. Fe. L: 44mm.Ctx 126193, ditch 126191. Inv No 1207. Early Roman
   ON 1212. Plate brooch with dished cone. Hinged pin. This form of brooch seems to be in used by *c* AD 70, but perhaps mainly dates to the 2nd and early 3rd century (Mackreth 2011, 163-64, pl 108, no. 11119) Cu alloy. D: 38mm x 40mm; H: 20mm. Ctx 220128, ditch 126170. Inv No 563. Early Roman

Saxo-Norman

The 17 finds (20 fragments) of this phase derive from trackway 126227. They include a spearhead (**Cat. No. 4**; ON 1966), a decorative copper alloy binding (**Cat. No. 5**; ON 1963), a knife blade and knife blade fragment (ON 3412 and ON 1960), a horseshoe (ON 1959) and two horseshoe nails (ON 1961 and ON 1964), along with four nails (7 fragments), a washer and three objects of uncertain identification.

Table 3.17 Zone 19 – Non-grave metalwork by phase and type

Phase		*Arms*	*Tools*	*Transport*	*Personal*	*Hobnails*	*Household*	*Structural*	*Binding*	*Nails*	*Query*	*Waste*	*Undiag.*	*Total*
Iron Age	Count									0				0
	Fragt									1				1
Roman	Count			1										1
	Fragt			1									1	
Early Ro	Count		1		2	5				2				10
	Fragt		1		2	6				3				12
Middle Ro	Count					23				21			0	44
	Fragt					23				25			8	56
Saxo-	Count	1		3			2	1	1	4	3	2		17
Norman	Fragt	1		3			2	1	1	7	3	2		20
Medieval	Count				2									2
	Fragt				2								2	
Natural	Count							1						1
	Fragt						1						1	
Topsoil	Count				1			1		2	3	3		10
	Fragt				1		1		2	3	3		10	
Unphased	Count					9				86				95
	Fragt					12			164				176	
Total	Count	1	1	4	5	37	2	3	1	115	6	5	0	180
Total	Fragt	1	1	4	5	41	2	3	1	202	6	5	8	279

Table 3.18 Zone 19 – Non-grave metalwork by phase, feature type and object type

Phase	*Type*	*Feature*		*Arms*	*Tool*	*Transport*	*Personal*	*Hobnails*	*Household*	*Structural*	*Binding*	*Nails*	*Query*	*Undiag.*	*Waste*	*Total*
Iron Age	pit	205106	Count									0				0
			Fragt									1				1
Roman	trackway	126277	Count			1										1
			Fragt			1										1
Early Ro	ditches	126170	Count				2									2
			Fragt				2									2
		126172	Count									1				1
			Fragt									1				1
		126191	Count		1											1
			Fragt		1											1
		151055	Count					5								5
			Fragt					6								6
	pit	248271	Count									0				0
			Fragt									1				1
	trackway	126226	Count									1				1
			Fragt									1				1
Saxo-Norman	trackway	126227	Count	1		3			2	1	1	4	3		2	17
			Fragt	1		3			2	1	1	7	3		2	20
Medieval	ditch	297041	Count				2									2
			Fragt				2									2
Unphased	pit	239107	Count					9				86				95
			Fragt					12				164				176
Natural	natural feature	166119	Count							1						1
			Fragt							1						1
Topsoil	topsoil	126095	Count				1			1		2	3		3	10
			Fragt				1			1		2	3		3	10
		Total	Count	1	1	4	5	14	2	3	1	94	6	0	5	136
		Total	Fragt	1	1	4	5	18	2	3	1	177	6	8	5	223

Catalogue

ON 1966. Spearhead with a long straight-sided blade and short incomplete socket. The size and form suggest a Saxon date, perhaps redeposited from a disturbed grave. It conforms to Swanton's Group G1 or G2, depending on whether it was originally less than or more than 300mm long. Swanton (1973, 99, fig 35) dates the shorter Group G1 to the 6th century and indicted that the larger spearheads of Group G2 had early 7th-century associations (*ibid*, 101). Fe. L: 260mm; L of blade: 225mm; W of blade: 31mm. Ctx 124110, trackway 126227. Inv No 241. Saxo-Norman

ON 1963. Decorative binding or terminal cut from sheet. There are two round nail holes and a third small square hole and stamped ring motifs on face. Cu alloy. L: 46mm; W: 22mm. Ctx 124110, trackway 126227. Inv No 511. Saxo-Norman

Unphased

Ten objects were recovered from deposit/layer 126095, which is not securely phased. They include a number of fragments of copper alloy, an iron fragment and 2 nails. Most are undiagnostic, but amongst them is a late 7th-century Saxon buckle.

Catalogue

2. ON 1208. Buckle with fixed plate. The frame is an elongated oval. The plate which not complete is decorated with a T-shaped cut out and a number of punched ring and dot motifs. There is small rectangular slot for the tongue which is missing. On the back are two raised lugs which would have helped secure the buckle to the belt. There would have been a copper alloy strip to back the belt to which the lugs would have been secured. Cu alloy. L: 30mm; W: 40mm. Ctx 126095, topsoil deposit. Inv. No. 492 (Fig 3.9)

This distinctive buckle belongs with a group of buckles (Type II.26: Marzinzik 2003, 53, pl 150) concentrated in Kent, which have the loop and plate cast as one. The plates are often perforated with cutout patterns (Evison 1955, 33) but the buckles are quite variable in form (Evison 1956, 92). Evison (1955, pl ix, b) illustrates an example from Breach Downs (Kent), which is a little different from this example. Leeds (1936, 102-03, fig 21) illustrated examples from Kent, including one similar to this buckle. There are also examples from Holborough (Kent) (Evison 1956, 92-94, 121-22, fig 18, no. 1 & pl. ii, a) and Half Mile Ride, Margate (Kent) (Perkins 1987, 226-8, fi. 3, no 1) and a more recently published example from grave 13 in the Mount Pleasant cemetery (Bennett *et al* 2008, 292,

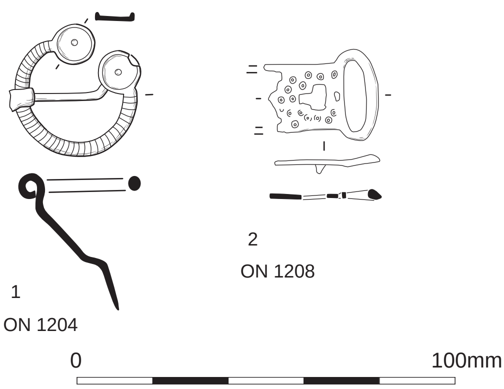


Fig 3.9 Metalwork from Zone 19

Table 3.19 Zone 19 – Roman graves: metal finds (object count)

	Burial type	Feature no.	Personal	Hobnails	* Nails	Security	Structural	Binding	Misc	Query	Total
Eastern cemetery (126189)	Cremation	126106	1						4		5
	Cremation	126110			1 (8)						1
	Cremation	150100	1		1 (2)						2
	Cremation	153060			2 (11)						2
	Cremation	153068			10 (21)	1		1		2	14
	Cremation	166077		7	12 (31)						19
	Cremation	177480		23	21 (22)						44
	Cremation	220057	1								1
	Cremation	220064	1								1
	Cremation	220129			1 (2)						1
	Inhumation	126100			10 (17)						10
	Inhumation	150097			14 (51)		3	1	12	3	33
	Inhumation	176345			0 (4)						0
	Inhumation	176342	3						1		4
	Inhumation	220054			8 (30)						8
	Inhumation	220112			12 (35)		1		4	1	18
	Inhumation	248104			6 (18)						6
	Inhumation	248266			2 (3)						2
	Empty grave	126329			8 (16)						8
	Grave ?	176348			0 (4)						0
	Grave ?	248258			1 (1)						1
Western cemetery (126189)	Inhumation	216013							1	1	2
	Inhumation	257016	1								1
	Inhumation	278060	1								1
	Inhumation	262044	1								1
	Totals		10	30	109	1	4	2	22	7	185

* Nails –figures in parentheses are the numbers of nail fragments

296-96, fig 3/9, no. 1). The buckle type is not exclusive to Kent and there are examples from Butler's Field, Lechlade (Glos) (Boyle *et al*, 1998, 119-20, fig 5.92, grave 155 no. 11; Boyle *et al* , 2011, 57-8), from Castledykes South (N Lincs) (Drinkall and Foreman, 1998, 65, 272, fig 85, grave 108, no. 2), which is somewhat similar to the Breach Downs buckle, and from grave 31 at Uncleby (Yorks) (Leeds 1936, 102, pl. xxvii, no. 31). These can be dated to the late 7th century and 8th century (Marzinzik 2003, 53).

Roman inhumation and cremation burials

These are summarised in Table 3.19.

A catalogue of the metal finds is presented here. Details of nails and undiagnostic iron objects are tabulated below; objects from inhumation burials are in Table 3.20 and those from cremation burials in Table 3.21.

Eastern cemetery: inhumation burials

Grave 126204 (inhumation burial 126205)

1. ON 3633. Disc, thinning to outer edge; central hole (D: *c* 13mm) with non-ferrous collar or lining. Incomplete circumference, no clear notches. Encrusted. Possibly a 'traveller' or tyre runner, similar to that from Zone 6 (Cat. No. 38 above) used by a wheelwright or tyring smith to measure the circumference of a wheel. Fe. D: 78mm. Ctx 126205. Inv No 130

Inhumation graves 126223 and 220136 contained no metal finds. None of the cremation burials (126223 (within inhumation grave), 220117 and 220119) contained metal finds.

Central cemetery 126189: inhumation burials

Grave 126100 (inhumation burial 126101)

The only finds from this grave are 10 nails or nail heads and 17 nail fragments, all likely to be coffin nails. Three of the nails could be measured: one is 75mm long, one at least 75mm long and one is 95mm long.

Grave 150097 (Inhumation burial 150099)

This grave contained numerous metal finds, all likely to be coffin fittings. There are 15 nails or nail heads, including three complete nails (L: 90mm; 80mm; 60mm) and three substantially complete nails (L: 90+mm; 70+mm; 47+mm), and 36 fragments of nail shank. The grave also contained a short bolt and rove (ON 3418). Other finds, all iron, comprise a ferrule or socket (L: 52mm; D: 15mm) (ON 3417), a fragment of possible joiner's dog (ON 3401), straps for a loop hinge (3 fragments) with at least four nails or nail holes (ON 3400), four lengths of strip or fragments of bindings, two pieces with possible nail holes (ONs 3409-3410, 3416, 3418), three pieces of bar (ONs 3419, 3445-3446) and six fragments of plate or strip (ON3401, 3410).

Grave 176345 (inhumation burial 176346)

The only metal finds were four nail shank fragments.

Grave 176342 (inhumation burial 176343)

The burial contained three bracelets or anklets, and an iron disc. The small bracelet was penannular.

1. ON 3636. Wire bracelet with sliding catch. Bracelets with sliding or expanding catches are widely distrib-

uted in northern Gaul, and along the Rhine and Danube frontiers in the 4th century (see Swift 2000, 127, fig 158). Cool (2010, 297, following Cool 1983, chap 5) classifies wire bracelets with expanding catches as Group 3. Although most examples are of 4th-century date, there are a few from earlier contexts (Cool 1983, 132 and table 5.2). For 4th-century examples see the bracelets from Colchester (Crummy 1983, 37-8, fig 41: 1590 and 1601) and Lankhills (Clarke 1979, graves 10, 182, 256, 323, 327 and 336; and Booth *et al* 2010, graves 495, 920 and 985). The size of this bracelet suggests that it might have been an anklet. Cu alloy. D: 84mm x 90mm. Inv No 486

2. ON 3637. Wire bracelet formed from 2 intertwined lengths of wire. Has a rattle formed from wire and a hooked catch. Apparently a composite brooch made from two lengths of wire roughly twisted together, with a hooked catch. One of the wires has a rattle formed from a length of coiled wire. Possibly created from the remains of broken or damaged wire bracelets. Cu alloy. D: 73mm x 75mm. Inv No 487
3. ON 3638. Plain penannular bracelet of half round section. Cool's Group 5 (Cool 1983, 139-40, fig 5.2: 4). These bracelets appear to have been in use from at least the mid 1st century to the 4th century. Cu alloy. D: 60mm x 62mm. Inv No 488

   ON 4637. Disc. Fe. D: 17mm; T: 5mm. Inv No 26

Grave 220054 (inhumation burial 220056)
This grave contained a minimum of eight nails, all probably from a coffin.

Grave 220112 (inhumation burial 220113)
This grave produced a large assemblage of mostly fragmentary iron objects, virtually all of them nails likely to derive from a coffin.

Grave 248104 (inhumation burial 248106)
This grave contained a minimum of six probable coffin nails.

Grave 248266 (inhumation 248268)
This grave contained at least two nails and one nail fragment.

Central cemetery 126189: cremation burials

Grave 126106 (cremation burials 126107 and 126108)
Grave 126106 contained a bow brooch (ON 1290) and four small fragments of iron wire fused together (see Table 3.21).

4. ON 1290. Bow brooch with flat slightly ridged bow and spring with external chord secured by rear facing hook. Catch plate largely missing, pin broken. Some features of an early Colchester brooch: an external chord secured by a hook and the profile of the bow is straight with a sharp angle at the head (eg, Mackreth 2011, 36-7, pl 21.13142, and 29, and pl 22, 9), but the spring has only 5-6 coils and the brooch lacks the wings characteristic of the Colchester type. Affinities with Feugère's Type 9b, which also has a flat bow with straight profile, external chord and retaining hook, dated to the period *c* 10 BC to AD 50/60 (Feugère 1985, 238-243, dating 241). Cu alloy. L: 39mm; W: 10.5mm. Ctx 126107. Inv No 509

Grave 126110 (cremation burials 126111 and 126112)
This grave contained one complete nail shank (L: 75mm) and seven nail shank fragments.

Grave 150100 (cremation burial 150103)
This grave contained a large Rosette brooch, an incomplete Type 1 nail (Manning 1985, 134-37) and a clenched nail shank fragment (contexts 150103, 150101).

5. ON 3606. Large Rosette brooch, rosette-shaped flat plate to which a repoussé sheet was originally attached by a rivet. Tail lightly fluted and catchplate pierced. Pin and spring are separate and were secured by the cylindrical spring case. A complete example with its decorated plate from Colchester (Crummy 1983, 8 and fig 3). Mackreth dates this form to *c* AD 30-65 (Mackreth 2011, 31), and Olivier suggests a date either side of the Claudian conquest (Olivier 1996, 247). Bayley and Butcher (2004, 150) argue that this and other types with cylindrical spring cases were pre-conquest types widely distributed in Gaul which were going out of fashion in the reign of Claudius. Their distribution appears to favour the south and east, with examples from East Anglia and from Kent and Sussex (Mackreth 2011, 31). Cu alloy. L: 95.5mm; W: 43.5mm; L of pin: 83.5mm; W of spring: 25mm. Ctx 150101. Inv No 478

Grave 153060 (cremation burial 153064)
This grave contained two Manning Type 1 nail heads and seven shank fragments (contexts 153061, 153064).

Grave 153068 (cremation burial 153070)
This grave produced a number of nails including nine small nails or tacks 20mm-33mm long. The longer nail (L: 50mm) might be a coffin nail, but the small nails or tacks probably came from a box or casket. The ring with attached junction plates (ON 2032), the ring with grooved outer edge (associated with ON 1225) and the fragment of binding (ON 2024) suggest that this was a casket burial.

6. ON 1225. Slide bolt from a lock. Cast cu alloy. Incomplete. Compare more complete examples from Colchester (Crummy 1983, 124 and fig 136) and Vindolanda (Birley 1997, 22 and fig 9, nos 46-47). The working of the slide lock was described by John Ward in 1911 (232-36 and fig 66, N-P and fig 67, A-B), illustrated in the London Museum Roman catalogue (Wheeler 1930, fig 16). L: 55mm; T: 10mm. Ctx 153069. Inv No 504
7. ON 2032. Strap junction comprising ring with two opposed junction plates. At least one of the junction plates has two rivets. Fe. L: 54mm. Ctx 153070. Inv No 426
8. ON 1225. Ring. Grooved outer edge. Cast cu alloy. D: 26mm. Ctx 153069. Inv No 503
9. ON 2024. Binding. V-shaped flat fragment. No extant nail or pin holes. Decorative rather than functional? Cu alloy. L: 27mm. Ctx 153070. Inv No 534

Grave 166077 (cremation burial 166078)
Twelve heads from Manning Type 1 nails (Manning 1985, 134-37) and 19 nail shank fragments were recovered from this grave, along with seven hobnails – one single and two fused clumps, suggesting there was nailed footwear with the body.

Table 3.20 Catalogue of nails and undiagnostic iron objects from Roman inhumation graves in Zone 19

Grave	*ON*	*Identification*	*Metal*	*Count (fragts)*	*Dimensions*	*INV*
126100	1271	Nail Type 1 complete	Fe	1 (1)	L: 95mm	272
	1280	Nail Type 1 head, bent and incomplete	Fe	1 (1)	L. extant: 75mm	280
	1275	Nail Type 1 complete	Fe	1 (2)	L: 75mm	275
	1272	Nail Type 1 head fragment. Not measured	Fe	1 (1)	-	271
	1273	Nail stem fragment	Fe	0 (1)	-	273
	1274	Nail Type 1 nail, incomplete	Fe	1 (2)	-	274
	1276	Nail stem fragment	Fe	0 (1)	-	276
	1277	Small Type 1 nail fused to nail stem, both with mineral preserved wood. Plus another small stem fragment	Fe	1 (3)	-	277
	1278	Nail Type 1 with small head, incomplete and bent	Fe	1 (1)	-	278
	1279	Nail Type 1 head fragment	Fe	1 (1)	-	279
	1281	Nail Type 1 head fragment	Fe	1 (1)	-	281
	1283	Nail Type 1 head fragment	Fe	1 (1)	-	282
	1284	Nail stem fragment	Fe	0 (1)	-	283
	1284	Undiagnostic fragment	Fe	0 (1)	-	284
150097	3404	Nail, possibly T-head, but eroded. Incomplete and bent	Fe	0 (1)	L extant : 90mm	123
	3415	Nail Type 1(2 refitting fragts.	Fe	1(2)	L: 90mm	135
	3406	Nail stem, or tapering spike, complete	Fe	1 (1)	L: 80mm	125
	3407	Nail Type 1 incomplete; 5 x stem fragments	Fe	1 (6)	L extant: *c* 70mm	126
	3414	Nail Type 1 complete; Type 1 head only (not measured)	Fe	2 (2)	L: 60mm	134
	2099	Nail Type 1 incomplete	Fe	1 (1)	L: extant 47mm	175
	4638	Nail Type 1 incomplete	Fe	1 (1)	L extant: 46mm	27
	3401	Nail stem fragment	Fe	0 (1)	-	115
	3402	7 x small nail stem fragments	Fe	0 (7)	-	120
	3403	Nail stem fragment	Fe	0 (1)	-	122
	3405	Nail stem fragment	Fe	0 (1)	-	124
	3408	Nail stem fragment	Fe	0 (1)	-	127
	3413	Nail stem fragment	Fe	0 (1)	-	133
	3420	4 x nail stem fragments	Fe	0 (4)	-	88
	3421	Nail Type 1 head; 1 x stem fragment	Fe	1 (2)	-	89
	3422	v Type 1, incomplete; 2 x stem fragments	Fe	1 (3)	-	90
	3426	2 x small nail stem fragments	Fe	0 (2)	-	92
	3427	1 x nail Type 1 bent and incomplete; 2 x stem fragments	Fe	1 (3)	-	93
	3428	Nail Type 1 with mineralised wood	Fe	1 (1)	-	94
	3447	2 x nail head fragments; 2 x stem fragments	Fe	2 (4)	-	105
	3455	Nail stem fragment	Fe	0 (1)	-	64
	3481	Nail stem fragment	Fe	0 (1)	-	315
	3482	2 x nail stem fragments fused together	Fe	0 (2)	-	314
	3483	Nail Type 1 head fragment. Not measured	Fe	1 (1)	-	316
	4685	Nail Type 1, incomplete	Fe	1 (1)	-	58
	3400	Straps for loop hinge, with at least 4 nails/nail holes. 3 x fragments	Fe	1 (3)	L: 210mm; W: 34mm	113
	3401	Possible fragment of dog or clamp. Could be fragment of large rectilinear buckle	Fe	1 (1)	L: 63mm	114
	3418	Short nail and rove with mineralised wood	Fe	1 (1)	L: 35mm; W: 35mm	85
	3416	Binding or strip with 1 possible nail	Fe	1 (1)	L: 61mm; W: 25mm	136
	3401	Strip or plate fragment. Not measured	Fe	1 (1)	-	116
	3409	Strip or binding, with 1 possible nail hole	Fe	1 (1)	L: 58mm; W: 24mm	128
	3410	5 x strip or plate fragments, no joins. One fragment twisted. Not measured	Fe	5 (5)	-	129
	3410	Strip or binding, no obvious nails or nail holes	Fe	1 (1)	L: 45mm; W: 27mm	131
	3418	Strip fragment, heavily encrusted. W: 25mm - 27mm	Fe	1 (1)	L: 51mm; W: 27mm	84
	3419	Bar fragment, encrusted. Not measured	Fe	1 (1)	-	87
	3445	Bar, or nail stem, fragment. Encrusted, Not measured	Fe	1 (1)	-	103
	3446	Bar or nail stem fragments. Encrusted. Not measured	Fe	1 (2)	-	104
	3401	Plate fragment with 2 nails and a cut slot.	Fe	1 (1)	L: 66mm; W: 64mm	118
	3401	Plate fragment with nail or small loop attached	Fe	1 (1)	L: 52mm; W: 42mm	119
	3417	Socket or Ferrule. Open socket, no visible nail	Fe	1 (1)	L: 52mm	86
	3401	Undiagnostic fragment	Fe	0 (1)	-	117
	3402	3 x undiagnostic fragments	Fe	(3)	-	121
	3425	4 x undiagnostic fragments (include possible nail stem fragments)	Fe	0 (4)	-	91

Table 3.20 (continued)

Grave	*ON*	*Identification*	*Metal*	*Count (fragts)*	*Dimensions*	*INV*
176345	3644	Nail stem fragment	Fe	0 (1)	-	9
	3645	2 nail stem fragments	Fe	0 (2)	-	10
	3646	Nail stem fragment, clenched	Fe	0 (1)	-	11
220054	1237	1 Type 1 nail incomplete (2 fragts). Extant L: 94mm); 2 x small stem fragments	Fe	1 (4)	L extant: 94mm	256
	1239	1 Type 1 nail (2 fragts); 1 x nail stem fragment	Fe	1 (3)	L: 84mm	258
	1240	1 Type 1 nail, incomplete (2 fragts). Extant L: 78mm Mineral preserved wood on stem	Fe	1 (2)	L extant: 78mm	259
	1238	1 Type 1 nail (2 fragts)	Fe	1 (2)	L: 75mm	257
	1236	1 nail stem (L extant 54mm); 2 x small stem fragments	Fe	1 (3)	L extant: 54mm	255
	1253	Type 1 nail, incomplete (2 x fragts)	Fe	1 (2)	L extant: 45mm;	265
	1254	Type 1 nail, incomplete. L extant: 37mm	Fe	1 (1)	L extant: 37mm	266
	1235	4 small nail stem fragments	Fe	0 (4)		254
	1248	1 Type head fragment; 1 x stem fragment. Not measured	Fe	1 (2)		260
	1249	Nail stem fragment	Fe	0 (1)		261
	1250	2 stem fragments	Fe	0 (2)		263
	1255	Nail stem fragment	Fe	0 (1)		267
	1256	Nail stem fragment. Mineral preserved wood (mpw)	Fe	0 (1)		268
	1257	Nail stem (2 fragts). Mpw	Fe	0 (2)		269
	1249	Amorphous undiagnostic lump. Possibly slag	Fe	0 (1)		262
220112	3628	Joiner's dog, complete, with clenched points	Fe	1 (1)	L: 72mm	7
	3615	Pointed spike with thickening towards the point	Fe	1 (1)	L: 109mm	342
	3619	Type 1 nail, almost complete	Fe	1 (1)	L: 85mm	345
	3624	4 fragts. (1)Type 1 bent to an L-shape. Complete L: 80mm; (2) complete nail stem. L: 70mm. (3) & (4) nail stem fragments	Fe	2 (4)	L: 80mm	2
	3626	Type 1 (2 fragts), almost complete	Fe	1 (2)	L: 80mm	4
	3623	Type 1 large sub square head. Complete	Fe	1 (1)	L: 75mm	1
	3622	1 Type 1 nail, incomplete; 1 x small stem fragments	Fe	1 (2)	L extant: 65mm	348
	3627	Type 1 incomplete	Fe	1 (1)	L extant: 58mm	5
	3629	Type 1, incomplete head and bent into an L-shape. Mineral preserved wood on stem	Fe	1 (1)	L: 120mm	6
	3625	Nail stem fragments	Fe	0 (2)		3
	3628	Nail stem fragment	Fe	0 (1)		8
	3610	1 nail head fragment; 1 stem fragment. Not measured	Fe	1 (2)		338
	3613	1 oval nail head,; 1 stem fragment. Not measured	Fe	1 (2)		341
	3616	Nail stem fragment. Not measured	Fe	0 (1)		343
	3620	1 Type 1 nail incomplete; 3 stem fragments (in 2 fused lumps)	Fe	1 (4)		346
	3621	1 nail head fragt; 6 stem fragments (in 4 fused lumps)	Fe	1 (7)		347
	3611	2 nail stem fragments	Fe	0 (2)		539
	3612	Nail stem fragment	Fe	0 (1)		540
	-	Nail stem fragment	Fe	0 (1)		576
	3614	2 irregular plate fragments. Not measured	Fe	2 (2)		339
	3614	2 fragments of strip, one very small. Not measured	Fe	2 (2)		340
	-	Undiagnostic fragment	Fe	0 (1)		575
	-	Undiagnostic fragments	Fe	0 (2)		577
248104	2082	Type nail, incomplete (2 fragts)	Fe	1 (2)	L extant: 60mm	166
	2083	Type 1 complete, bent and encrusted	Fe	1 (1)	L: 43mm	167
	2080	1 x Type 1 nail (2 x fragts) almost complete; 1 x Type 1 head fragment; 1 x stem fragment	Fe	2 (4)	L: 40mm	164
	2081	2 x stem fragments	Fe	0 (2)		165
	2084	2 x nail stem fragments	Fe	0 (2)		168
	2085	Type 1 head fragment. Not measured	Fe	1 (1)		169
	2086	3 x nail stem fragments	Fe	0 (3)		170
	2087	Nail stem, or bar, fragment	Fe	0 (1)		171
	2088	1 x Type 1 nail, incomplete (not measured); 1 x nail stem fragment	Fe	1 (2)		172
248266	3647	1 Type 1 complete; 1 Type incomplete; 1 stem fragment	Fe	2 (3)	L: 42mm	12

Grave 177480 (cremation burial 177482)
This burial contained at least 21 nails, most incomplete. The complete nails included a number of smaller nails (L: 33mm to 40mm), which may have been used in making a small box or casket. Other finds are individual and strips of hobnails, suggesting nailed footwear.

Grave 220057 (cremation burial 220059)
10. ON 1266. Colchester brooch. Most of the pierced catchplate is missing. The spring (6 coils) is secured by a rear facing hook. Facetted bow. The brooch and pin appear to have been deliberately bent. Resembles examples from Dragonby, which are defined as simple Gaulish brooches (Olivier 1996, 240, fig 11.4, nos 38-39, 41, 43), but more correctly identified as an early Colchester brooch. Cu alloy. L: 95mm; W: 25mm. Ctx 220059. Inv No 510

Grave 220064 (cremation burial 220063)
11. ON 1286/990130. Plate brooch in the form of nailed shoe sole. Enamelled in light brown or sand with 'hobnails' in very dark brown or black enamel. Hinged pin. Mackreth (2011, 179-80) dates shoe sole brooches decorated simply with enamel from the late 1st to mid 2nd century or later, but there are examples from later contexts. A 3rd century date would be reasonable. Cu alloy. L: 36mm W: 7mm. Ctx -, Inv No 1202

Grave 220129 (cremation burial 220130)
This cremation contained a single incomplete twisted nail of Manning Type 1 (Manning 1985, 134-37).

Cremation graves 126103, 126195, 126223, 126334, 166082, 193051, 220060, 220072, 220099, 220115, 220117, 248260 and 279096 contained no metal finds

Grave-like features
Feature 126329 contained three complete Manning Type 1 nails (4 fragments) (L: 70mm; *c* 65mm; *c* 50mm); two incomplete Type 1 nails (4 fragments); three Type 1 heads; and five shank fragments. There are no other metal finds. These are tabulated below (Table 3.22). Feature 176348 produced four nail shank fragments and feature 248258 a single nail fragment (ON 4699).

Western cemetery 195118: inhumation burials

Grave 216013=216010 (inhumation burial 216011)
12. ON 2428. Hollow ring made of two parts held together

Table 3.21 Catalogue of nails and undiagnostic iron objects from Roman cremation graves in Zone 19

Grave	*ON*	*Identification*	*Metal*	*Count (fragts)*	*Dimensions*	*INV*
126106	-	Wire fragments fused together	Fe	4 (4)	-	566
126110	2011	1 nail stem/headless nail; 1 stem fragment	Fe	1 (2)	L: 75mm	412
	-	6 stem fragments	Fe	0 (6)	-	578
150100	3618	Nail stem fragment, clenched.	Fe	0 (1)	-	344
	-	Type 1 nail, incomplete	Fe	1 (1)	-	579
153060	-	1 x type 1 head fragment; 4 x stem fragments	Fe	1 (7)	-	571
	-	1 x Type 1 head; 3 small stem fragments	Fe	1 (4)	-	572
153068	2012	Small nail or tack	Fe	1 (1)	L: 27mm	413
	2013	Small nail or tack	Fe	1 (1)	L: 27mm	414
	2014	Small nail or tack	Fe	1 (1)	L: 21mm	415
	2015	Small nail or tack	Fe	1 (1)	L: 20mm	416
	2023	Small Type 1 nail, complete	Fe	1 (1)	L: 33mm	419
	4448	1 x Type 1 nail, complete; 4 x small nails, complete; 3 x stem fragments	Fe	5 (8)	L: 50mm; L: 30mm (x2) L: 27mm; L: 21mm	19
	-	8 x stem fragments	Fe	0 (8)	-	580
	2015	Undiagnostic fragment	Fe	0 (1)	-	417
166077	4447	Hobnails. 2 x clumps of hobnails (of 3 x hobnails and 2 x hobnails) and 1 loose hobnail	Fe	6 (3)	-	17
	4580	Possible hobnail with mineral preserved leather	Fe	1 (1)	-	21
	-	12 x Type 1 heads; 19 x stem fragments	Fe	12 (31)	-	573
177480	4669	Nail Type 1, complete but bent	Fe	1 (1)	L: 80mm	47
	4669	Nail Type 1, complete but bent	Fe	1 (1)	L: 40mm	50
	4669	Nail Type 1, complete but bent	Fe	1 (1)	L: 38mm	49
	4669	Nail Type 1, complete but bent	Fe	1 (1)	L: 37mm	52
	4669	Nail Type 1, small, complete	Fe	1 (1)	L: 34mm	48
	4669	Nail Type 1, small, clenched tip	Fe	1 (1)	L: 33mm	51
	4669	15 Type 1 nail heads only; 1 stem fragment	Fe	15 (16)	-	53
	4669	2 strips of hobnails (of 5 x hobnails and 9 x hobnails) and 9 x loose hobnails	Fe	23 (23)	-	54
	4669	Amorphous / undiagnostic fragments	Fe	0 (8)	-	55
220129	4698	Type 1 nail, twisted, incomplete.	Fe	1 (2)	L extant: *c* 50mm	60

Table 3.22 Catalogue of nails and undiagnostic iron objects from Roman grave-like Features in Zone 19

Feature	ON	Identification	Metal	Count (Fragts)	Dimensions	INV
126329	4677	3 x Type 1 nails complete (2 x fragts); 2 x Type nails, incomplete (4 x fragts); 3 x Type 1 heads; 5 x stem fragments	Fe	8 (16)	L: 70mm; 65mm & 50mm	57
176348	4663	4 x stem fragments	Fe	0 (4)	0	28
248258	4699	Type 1 nail, incomplete	Fe	1 (1)		61

by three rivets. The join line runs around the circumference. Type 1 ring with three rivets (O'Connor and Foster 2000, 194). Comparable hollow rings found at South Cadbury, Somerset (*ibid*, 194, fig 99 no 11) and Yarnton, Oxon (Henig 2011, 425, no. 19, fig 15.2, B). The South Cadbury ring has a core of black organic material. On the Continent hollow rings appear early in La Tène A in Switzerland, Germany and Austria and spread out during the later La Tène (Raftery 1988, 4-9). The British examples appear to be Continental imports. Cu alloy. D: 20mm; T: 5mm. Ctx 216011. Inv No 553

13. ON 2428. Small collar (3 fragments). Band or collar, perhaps used as a binding on a wooden rod. Cu alloy. D: 9mm; W: 4mm. Ctx 216011. Inv No 552

Grave 257016 (inhumation burial 257018)

14. ON 2423. Hair pin with barrel-shaped knob over baluster moulding. A further moulding on shaft, and possible traces of gilding. Moulding topped and tailed by cordons below the head. Probably of Cool's broadly defined Group 3 of hairpins and within sub-group 3b (Cool 1990, 154, fig 1:7-9; fig 3:1-5, 7 and 9), which have been found in mid 1st century to the 4th century contexts (*ibid*). Cu alloy. L extant: 69mm. Ctx 257015. Inv No 550

Grave 262044 (inhumation burial 262043)

15. ON 1810. Spiral finger ring. Coiled cu alloy wire with slightly flattened terminals. Coiled finger rings of Roman date are known but this burial, which is crouched, may be prehistoric; a Saxon date is unlikely. D: 19.5mm x 19mm. Ctx 262043. Inv No 512

Grave 278060 (inhumation burial 278058)

16. ON 4633. Penannular brooch, small, with 'cotton reel' terminals. Cu alloy. D: 12.5mm x 12mm; L of pin: 16mm. Ctx 278058. Inv No 482

Finds from Saxon inhumation burials

Northern cemetery 126228

Grave 126091

1. Small domed object, solid, circular in section with small perforation through centre. Cu alloy. D: 12.5mm; H: 9mm. Ctx 126092, ON 1224. Inv No 502

Other finds:
Three nail shank fragments. Fe. Ctx 126093, Sample 5618.Inv No 565

Grave 126183

1. ON 4631. Wire with corroded lump at one end. Fe. L: 84mm; D: 2mm. Ctx 126184. Inv No 23

Grave 136111

1. ON 2029. Socketed point (3 fragments). Tapering point of rectangular cross section with long split socket. Blade has no sharp edges and the tip is battered. Unfinished? Fe. L overall: 124mm; L of point: *c* 55mm; W of point: 11mm; D of socket: 12mm. Ctx 136112. Inv No 236
2. ON 2028. Whittle tang knife blade, curved back, almost straight edge. Ottaway back type C1 (1992, 568). Fe. L: 115 mm; L of blade: 78mm; W: 13mm. Ctx 136113. Inv No 424
3. ON 2027. Fire steel or strike-a-light, formed from thin plate, with curled terminals. Firesteels or strike-a-lights may also have been mounted on purses as Brown (1977) demonstrated for Continental examples of 5th- and 6th-century date. The British examples differ in form and only a few have buckles (Geake 1997, 79-80 & fig 4,27; for an elongated example with a buckle see grave 86, Mill Hill, Deal: Parfitt and Brugmann 1997, 76, fig 44, k). Long slim firesteels seem to date to the 6th century, and humped or triangular steels are found with 7th-century associations. A 7th- or 8th-century fire steel from the cemetery at Polhill, near Sevenoaks, Kent (Geake 1997, 80, fig 4.27) is more like the current example, being comparatively short, markedly arched or triangular in shape with a straight back and long curled arms. Fe. L: 72mm; W: 28mm. Ctx 136113. Inv No 421
4. ON 2056. Cylindrical container or 'workbox'. Four large fragments from cylindrical body of container decorated with parallel raised lines of punched dots. The container was lipped at one end. Two further joining fragments from a riveted seam, and one small fragment with a pin or rivet hole. Also 32 small curved sheet fragments (total fragments = 39). Work boxes or reliquaries are quite widely found in Saxon cemeteries, but do not appear as grave goods before the middle of the 7th century (Evison 1987, 107), and possibly not before the final quarter of the 7th century (Geake 1997, 35). Surviving examples vary in size and detail of form, but are formed of sheet copper alloy, often decorated with lines and patterns of punched dots. The use of these boxes is debated, but Hills (2011 passim) has recently argued that they might be reliquaries rather than 'work boxes'. Her argument is that the boxes may have contained secondary relics, either objects that had been in contact with the body of a saint, or soil or stones from holy places. Scraps of textiles found in some boxes may have been just such relics. A complete example of similar size to this box found from North Leigh, Oxfordshire (Leeds 1940, 21-2, pl vi, C-D; MacGregor and Bolick 1993, 232, No. 43.1) had a cross inscribed on the lid. Two boxes found in grave 306 the cemetery at Cuxton, Kent are both decorated with unequivocal Christian iconography (Blackmore et al 2006, 17-18, figs 24-25; Blackmore 2006, 35-41; see also Reynolds 2011, 373-75, fig 6.29), and are clearly reliquaries. The larger box is an import and possibly Byzantine. The implication of the dating

and the iconography is that these objects served as reliquaries and were an indication of Christianity. Cu alloy. Container D: *c* 45mm; L extant : *c* 40mm. Ctx 136112. Inv No 48

5. ON 2018. Small-long brooch, with trapezoid head decorated with quincunx of ring-and-dot motifs. The bottom end of the brooch terminates in a fan-shape and is decorated with further ring-and-dot. The pin was hinged but is lost. Broadly matches a group of small-long brooches with rectangular or trapezoid heads and fan-shaped or triangular feet, with heads and feet decorated with ring-and-dot or annulets (MacGregor and Bolick 1993, 128-29, nos 5.12-15.14, 15.17-15.18). One of the earliest examples of a small-long brooch comes from Shakenoak, Oxon (Vierck 2005, 210-14, fig iii. 32; MacGregor and Bolick 1993, 147, no. 15.83) in 5th century context, but small-long brooches continued in used into the 6th century. Cu alloy. L: 54mm; W: 16mm. Ctx 136114. Inv No 536
6. ON 2020. Cast rectangular plate with interlaced ribbon decoration. Plain stepped edge and is slightly curved through its length. Possibly a belt plate but no visible means of attachment, in contrast to a belt plate with interlaced decoration from the cemetery at Alfriston Sussex (Griffiths and Salzman 1914, 34, pl ix, fig 2; Welch 1983, 353, fig 7b), found with a buckle and with three rivets at each end. Cu alloy. L: 34mm; W: 14mm; T: 2mm. Ctx 136113. Inv No 537
7. ON 2055. Plain buckle with oval buckle frame and small plain rectangular plate. The plate was secured to the belt by 3 rivets. Marzinzik's Type II.24a, buckles, either iron or copper alloy, with oval loops or frames and square or rectangular plates often with three rivets (2003, 51, pls 130-37). These are found in late 6th- to early 8th-century contexts. At Buckland, Dover there are up to 11 examples (graves 18, 33, 36, 39, 61, 71, 113, 137, 144-146: Evison 1987, 89-90, 214-253 passim; Marzinzik 2003, 218-19). Particularly good examples came from grave 33 (Evison 1987, 226, fig 20, 33/5) and grave 71 (*ibid*, 235, fig 38, 71/6). Fe. L: 30mm; W: 25mm. Ctx 136112. Inv No 238
8. ON 2019. Buckle or hinge plate, tongue-shaped with bevelled edges and three dome-headed rivets. The outer rivet had a shank 9mm long, the inner pair of rivets has shanks *c* 7mm long. The length of the shanks of the rivets suggest that the hinge was attached to a board between 7mm and 9mm thick, rather than to a belt. Cast Cu alloy. L: 30mm; W: 18mm. Ctx 136113. Inv No 561
10. ON 2057. Possible girdle or belt formed from wire links with rolled over looped ends. Fe.: four wire fragments: (1) tapered fragment (L: 49mm); (2) fragment of wire with rolled over loop at one end (L: 39mm); (3) fragment of wire with broken loop at one end (L: 25mm); (4) curved fragment of wire (L: 21 mm). ON 2027: three small fragments formed from wire of square section, two with twisted wire at one end. L: 20mm; 18mm; 17mm. ON 2028: five pieces of wire of square section fused in lump. L: 56mm. Ctx 136112, ON 2057; Ctx 136113, ON 2028 and 2027. Inv Nos 233–234, 420, 425
   Compare grave 171168 below
11. ON 2021. Two small tacks with clenched chisel tips and small heads. Cu alloy. L: 18mm and 19mm. Ctx 136113. Inv No 533
12. ON 2058. Object of uncertain function comprising wide tube formed from rolled sheet, with small tapering tube attached to one side. Cu alloy. Larger tube: L: 25mm; D: 15mm; smaller tapering tube: L: 23mm. Overall length including corrosion: 41mm. Ctx 136112. Inv No 474
13. ONs 2045-2050. Five complete bolts with domed circular heads and lozenge-shaped roves, and incomplete bolts. Fe. L: 75mm, 78mm (x 2); 80mm; 72mm; incomplete bolt: 29mm. Ctx 136112. Inv Nos 430-435
14. ON 1233. Large bolt with domed head and circular section shank. Fe. L: 103mm. Ctx 136112. Inv No 252
15. ON 2057. Lozenge-shaped rove fused with nail shanks or bar fragments. Fe. Ctx 136112. Inv No 232

Other finds:

ON 2057. Length of tapered bar or rod. Fe. L: 49mm. Ctx 136112.. Inv No 233

ON 2019. Poorly preserved fragment of Fe strip (W: 20mm), with cu alloy split pin, and fe link or ring fragment. Fe and Cu alloy. Ctx 136112. Inv No 652

ON 1232. Large hobnail head. Fe. D: 16mm. Ctx 136112. Inv No 251

ONs 2022 and 4670. Four nail shank fragments. Fe. Ctx 136112. Inv No 418, 29

ON 2029. Strip with possible tang and fused fragment attached to tang. Fe. L: 49mm; W: 14mm. Ctx 136112. Inv No 237

This grave also contained a Series B sceat (ON 2017), probably minted *c* AD 685–95 (see Cooke and Holman, Chapter 1).

Grave 153034

1. ON 1202. Bracelet with plain band of half round section. Cu alloy. D: 67mm x 71.5mm. Ctx 153032. Inv No 494

Other finds included ON 4579, a nail shank fragment. Fe. Ctx 153032. Inv No 20

Grave 153058

1. ON 1252. Whittle tang knife, with blade of triangular section and curved back and curved edge. Ottaway back type D (1992, 572). Fe. L: 195mm; L of blade: 120mm; W: 25mm. Ctx 153057. Inv No 26

Other finds included ON 4016, a trapezoid plate with a possible nail hole. Fe. L: 31mm. Ctx 153057. Inv No 16 and two hobnails; two nail shank fragments, four undiagnostic fragments. Fe. Ctx 153057, Sample No 5630. Inv Nos 568 570, 567 and 569

Grave 153075

1. ON 2068. Possible thread picker with cruciform head. Long tapering point, flat undecorated rectangular body and cruciform head. Found near the waist and its association with a pair of shears (ON 2067), in a female grave, suggesting textile-making function (David Hinton pers. comm.). Its use as a pin or stylus, for example, can probably be ruled out. Cu alloy. L: 105.5mm, W: 18mm. Ctx 153077. Inv No 475
   These objects are clearly neither styli nor pins and the suggested identification as thread pickers seems likely. A similar example with a flat but decorated body and tapered point found at Finglesham, Kent in grave 180 was identified as a possible thread picker (Geake 1997, 60, fig 4.18). The cruciform head of the present example

can be compared the head of a surviving pin of a linked pair from Flixborough North Lincolnshire, which has a disc head decorated with a similar cruciform motif (Rogers 2009, 36-7, 65, fig 1.27, no. 559). Two other pins with large disc heads had cross motifs (*ibid*, fig 1.27, nos 560-61). In function these pins, which were probably to secure clothing, obviously differ from the present example, but the comparison of the decoration is relevant. Rogers has dated these linked dress pins to the 8th century but cruciform motifs were quite widely used. There is, for example, the small-long brooch from a 5th-century context at Shakenoak already noted above (grave 136111, no 5). This has a disc head formed into a cruciform by cutouts (MacGregor and Bolick 1993, 147, no. 15.83). The cruciform motif may be an overt Christian sign in some contexts but there is no necessity to view all such instances as Christian iconography.

2. ON 2070. Necklace rings, formed from thin wire with twisted wire junction. One compete ring made up of four fragments, with three fragments forming part of a second ring. Cu alloy. D: *c* 25mm. Ctx 153077. Inv No 535
3. ON 2064. Whittle tang knife, incomplete blade of triangular section. Fe. L extant: 71mm. Ctx 153077, Inv No 160
4. ON 2067. Small pair of shears. Fe. L: 150mm; L of blades c 70mm. Ctx 153077. Inv No 564
5. ON 2066. Rivet and rove. Fe. L: 50mm. Ctx 153077. Inv No 162
6. ON 2069. Rivet or nail, incomplete. Sub-square head and shank of circular section. Fe. L: 40mm. Ctx 153077. Inv No 163

Grave 153084

1. ON 2092. Small pair of shears (2 fragments). Fe. L: 170mm, L of blades: *c* 85mm. Ctx 153086. Inv No 174
2. ON 4694. Whittle tang knife fragment. Knife with dropped edge and angled choil. Triangular-section blade. Traces of possible bolster. Fe. L extant: 29mm; W: 15mm. Ctx 153085. Inv No 59
3. ON 2092. Possible knife blade fragment. Possible triangular section blade. Fe. L extant: 65mm. Ctx 153086. Inv No 173

Other finds are ON 3439. Small fragment of wire. Cu alloy. L: 9mm. Ctx 153086. Inv No 479

Grave 166102

1. ON 1291. Seax. Long triangular section blade, not piled. Tang has traces of preserved organic handle. Relatively narrow blade, back has a marked curve near the point. Geake (1997, 72) following Härke (1989a, table 1) suggests that the division between seaxes and larger knives was marked by a blade length of 180mm. Seaxes vary greatly in blade lengths and widths. This blade is towards the shorter end of the range, and is quite narrow (Geake 1997, table 4.14). Evison (1987, 31) argued that seaxes from Britain date after the middle of the 7th century, but Geake (1997, 74) has suggested that narrow seaxes were used throughout the 7th century, with broader and longer ones appearing later. Härke, in his study of early weapons burials (1989b), has suggested that seaxes first appear in graves in very small numbers well before the mid 7th century, but are more common later. Fe. Overall L: 385mm; Blade L: 270mm; Blade W: 27mm. Ctx 166103. Inv No 1218
2. ON 1296. Oval or D-shaped buckle frame attached to slightly tapered plate. The plate has decoration inlaid with wire adjacent to the buckle frame. Marzinzik (2003, 44-5, pls 92-93) has identified a small group of buckles with tapered plates in iron (Type II. 18a), found in both male and female graves and dating from the 5th to the 7th century. None of the examples illustrated by Marzinzik has inlaid decoration. The distribution of Type II.18a buckles suggests that few of this type have been found in Kent (*ibid*, map 23). Fe. L overall: 65mm; W: 32mm. Ctx 166103. Inv No 294
3. ON 2001. Tiny oval buckle frame attached to a fragment of plate formed from strip. Possibly a small Type II.24a buckle, but not enough of the plate survives for certain identification Cu alloy. L: 9mm; W: 12mm. Ctx 166103. Inv No 531
4. ON 2006. Small strap end with split top with one rivet or pin. Small waisted strap end of late 6th- to 7th-century date. Similar to nos 1 and 2 from Grave 166141. Cu alloy. L: 28 mm; W: 6 mm. Ctx 166103. Inv No 532
5. ON 1295. Whittle tang knife with incomplete blade with slightly curved back. Fe. L extant: 124mm; Blade L extant: c 80mm; W: 25mm. Ctx 166103. Inv No 287
6. ON 2010. Whittle tang blade, encrusted. Mineral-preserved organics (2 fragments). Straight parallel-sided blade with square end with rounded corners. Fe. L: 133mm; L of blade: 93mm; W: 23mm. Ctx 166103. Inv No 411
7. ON 2008. Lock or bolt plate, incomplete. Two nail/rivet holes. More complete example from Grave 171168 No. 11. Fe. L: 53mm; W: 27mm. Ctx 166103. Inv No 409
8. ON 1296. Fragment of parallel-sided strip with rounded end, and single nail or rivet hole. Fe. L: 69mm; W: 24mm. Ctx 166103. Inv No 290
9. ON 1296. Fragment of possible parallel-sided strip with rounded end, and single nail or rivet hole. Fe. L: 59mm; W: 21mm. Ctx 166103. Inv No 291
10. ON 2005. Bar of square section with flattened splayed end. W of splayed end: 24mm. Fe. L: L: 170mm; W: 10mm x 10mm. Ctx 166103. Inv No 401
11. ON 2004. Two Fe bars crossed and fused together with a possible organic layer. Two small Cu alloy fragments, possibly pins, also present. L of bars: 59mm and 43mm. Ctx 166103. Inv No 400
12 ON 2005. Junction plate or link with 2 rivets, poorly preserved, in four fused fragments. Traces of mineral-preserved organics. Fe. L; 44mm. Ctx 166103. Inv No 406
13. ON 1297. Sheet fragment tapered with cutout and two pin holes. Function unclear. Cu alloy. L: 17mm; W: 14mm; T: 1mm. Ctx 166103. Inv No 508

Other finds:

ON 2008. Strip or plate fragment, two parallel strips welded together. Fe. L: 33mm; W: 18mm. Ctx 166103. Inv No 408

ON 1296. Two thin plate or sheet fragments, undiagnostic. Fe. Not measured. Ctx 166103. Inv No 293

ONs 1289, 1296, 1298–1299, 2000, 2002–8 and 4445. One complete nail with flat head; 12 nail shank fragments. Fe. Nail L: 50mm. Ctx 166103. Inv Nos 285, 292, 288-289, 403-404 and 18

Grave 166105

1. ON 2035. Whittle tang knife, blade with straight back. Little of blade survives. Mineral-preserved organics on

the tang. Fe. L extant: 96mm.Ctx 166106. Inv No 423

2. ON 2034, but could possibly be part of ON 2035. Possible blade fragment. Fe. L: 80mm; W: 13mm. Ctx 166106. Inv No 422
3. ON 2037. Length of rod, slightly tapered and widening at one end. Fe. L: 97mm. Ctx 166106. Inv No 428
4. ON 2038. Length of bar bent to form a right angle. Fe. L: 37mm; W: 25mm. Ctx 166106. Inv No 429
5. ON 2036. Length of rod, encrusted. Fe. L: 108mm. Ctx 166106. Inv No 427
6. ON 4446. Wire, thin curved fragment, possibly from necklace ring. Cu alloy. L: 7mm. Ctx 166017. Inv No 481

Grave 166116

1. ON 2060. Small nail or rivet, with circular flat topped head, incomplete. Fe. L: 30mm. Ctx 166117. Inv No 159

Grave 166141

1. ON 3423. Small strap end with split top and possibly with two rivets or pins. Cu alloy. L: 31mm; W: 9mm. Ctx 166142. Inv No 496. Cf ON 3429, Inv No 444
2. ON 3429. Small strap end with split top and two rivets or pins. Cu alloy. L: 31mm; W: 9mm. Ctx 166143. Inv No 444
   Two strap ends similar to a small strap end (no. 4) from Grave 166102. Date to the late 6th or 7th century.
3. ON 3424.Small object made from thin sheet or plate. Fragment of circular plate with two parallel lugs extending from one edge. Cu alloy. L extant: 12mm. Ctx 166142. Inv No 443

Grave 209243

1. ON 3609. Whittle tang knife with straight back and parallel edge, broken at tip. Triangular section blade. Ottaway back type A1 (1992, 562-63). Fe. L: 237mm; W: 27mm. Ctx 209244. Inv No 217
2. ONs 3497-3498. Oval buckle frame with plain buckle plate secured by three pins or rivets. Type II.24a (Marzinzik 2003, 51, pls 130-37) (See Grave 136111, no. 7 above). Cu alloy. L: 63m; W: 57mm. Ctx 209244. Inv No 328-329
3. ONs 3485-3495, 3600, 3602-3605; 3601, 3607. Sixteen rivets or clench bolts formed from bolts with lozenge-shaped roves; three fragments of rivets. Fe. Complete rivets: L: 80mm (x 2); 78mm (x 2); 77mm (x 1); 75mm (x 2); 72mm (x 2); 70mm (x 4); 66mm (x 1); 6 5mm (x 1); 55mm (x 1). Ctx 209244. Inv Nos 317-327, 331, 333-336; 332, 337

Other finds:

ON 4632. Short thin strip. Fe. L: 18mm; W: 5mm; T: 1mm. Ctx 209244. Inv No 24

ON 3499. Fragments of iron and Cu alloy plates riveted together. Fe and cu alloy. L: 23mm; W: 17mm. Ctx 209244. Inv No 330

ON 3609. Eighteen small to medium plate fragments, some appear to be laminations. Fe. Not measured. Ctx 209244. Inv No 218

Grave 220011

1. ON 1200. Eleven fragments of wire, some curved fragments. Fe. Ctx 220012. Inv No 242
2. ON -.Three small fragments of wire. Fe. Ctx 220013. Sample 5601. Inv No 574

Grave 220095

1. ON 1234. Whittle tang knife. The blade has slightly sinuous back and down curved tip. Ottaway back type C2 (1992, 570). Fe. L overall: 137mm; L of blade 95mm; W: 23mm. Ctx 220096. Inv No 253
2. ON 4672. Whittle tang, or possibly plate tang, knife, (5 fragments). Straight or slightly curved back, dropped edge with gently curved choil. Fe. Lt: *c* 90mm. Ctx 220097. Inv No 31
3. ON 2065. Rivet, or bolt and rove, Bolt with slightly domed head and circular section shank. Diamond shaped rove. Fe. L: 60mm. Ctx 220096. Inv No 161
   Other finds are ON 1207, a large Type 1 nail, head fragment. Fe. Ctx 220097. Inv No 243, and three nail shank fragments. Fe. Not measured. Ctx 220097. Sample 7271. Inv No 581.

Grave 220109

1. ON 3450. Whittle tang knife with curved back and triangular section. Slight concave curve to edge. X-ray shows possible trace of bolster or hilt. Ottaway back type D (*ibid*, 572). Fe. L: 140mm. Ctx 220110. Inv No 83
2. ONs 3430-3436, 3448-3449.Probable girdle or belt with links of lenticular or flattened oval cross section with Cu alloy terminal loops, eg, ONs 3430, 3435, 3448 and 3449. Some examples have attached Cu alloy figure-of-eight loops, eg, ONs 3431, 3432, 3435 and especially 3448 and 3449. ON 4691 is a Cu alloy figure-of-eight loop which may have been part of the girdle. At least 24 fragments survive.The most complete link is represented by ON 3448 which has a link which is 77mm long but lacks its terminal loops. The complete link and loops must have been at least 85mm long. Fe and Cu alloy. ON 3432: L extant: 62mm and 50mm; ON 3435: L extant: 45mm; ON 3448: L extant: 77mm; ON 3449: L extant: 61mm. Ctx 220110. Inv Nos 95-101, 106-107, 484

Grave 251044

1. ON 1292. Nail with slightly domed circular head and tapering shank, complete, passed through a fragment of strip or binding. Fe. L: 87mm. Ctx 251046. Inv No 286
2. ON 2009. Nail with small square head and square washer. Mineral-preserved wood on lower part of nail shank. Fe. L: 94mm. Ctx 251046. Inv No 410

Grave 251061

1. ON 2059. Whittle tang knife with straight back and down curved tip, and straight edge (2 fragments). Ottaway back type C1 (*ibid*, 568). Fe. L: 136mm; L of blade: 110mm; W: 18mm. Ctx 251062. Inv No 436

Grave 266018

1. ON 1263. Whittle tang knife with strongly angled back and cutting edge with convex curve. Ottaway back type D (*ibid*, 572). Fe. L: 129mm; W: 20mm. Ctx 266019. Inv No 270
2. ON 1223. Cast fragment. Identification uncertain. Cu alloy. L: 30mm; W: 13mm. Ctx 266020. Inv No 501

Southern cemetery 195119

Grave 171168

1. ONs 1866, 4705 and 4706. Bag group, includes bundle of keys, strips and rods (No. 2 below). Ctx 171170. Inv Nos 445-451

a) ON 1866. Bag ring. Iron ring with leaf-shaped fragments fused to opposite sides. Fe. D: 73mm x 70mm. Inv No 445
b) ON 4706. Linked rings or loops of iron wire. Fe. Larger ring: L: 25mm; W: 19mm; the smaller ring: L: 21mm; W: 17.5mm. Inv No 446
c) ON 4706. Ring or loop (7 small fragments). Fe. Inv Nos 447-450
d) ON 4705. Rod of circular or oval section. One end resting on ring (a) and the other under the ring. It lay on the textile surface (No. 8, i below). Possible girdle link. Fe. L: 50mm. Inv No 451

This bag group includes a large iron bag ring (a) together with a number of small linked rings (b & c). Associated with the bag ring, and probably contained within the bag, was a possible bundle of keys (2 below) as well as the small rings and other fragments. It is possible also that the probable chatelaine (3 below) was in the bag but it perhaps more likely that this was buried as a separate item. For a discussion of bags and bag collections see Geake 1997, 80-81, fig 4.28, and Clark in Boyle *et al* 2011, 73-4).

2. ON 4707. Bundle of possible keys, strips and rods. Part of Bag group (No. 1). Overall L: 100mm. Ctx 171170. Inv Nos 452-459
a) Plain ring of oval section. Cu alloy. D: 37mm. Inv No 452
b) Possible key. Strip with possible looped terminal at one end, broken at the other end. (2 fragments). Fe. Inv No 453
c) Small ring fragment. Fe. Inv No 454
d) Small ring. Fe. Inv No 455
e) Strip. Fe. Inv No 456
f) Broad strip with terminal loop. Possible key. Fe. Inv No 457
g) Rod with barley sugar twist and terminal loop. Fe. Inv No 458
h) Strip, slightly tapered, with incomplete looped terminal at wider end, Fe. Inv No 459
i) Textile, mineralised. Patches of coarse textile in strips were identified overlaying a finer mineralised textile. Inv No 460

These fragments include what could be three possible keys and a fragment of mineralised textile which may well be the remains of the bag. Compare for example the bunches of keys or latchlifters from Buckland, Dover grave 245 (Parfitt and Anderson 2012, 397, fig 10.11, 245/k), grave 250 (*ibid*, 399-400, fig 10.14, 250/o1-o2) and grave 376 (*ibid*, 432, fig 10.48, 376/c-g). From their position overlapping the bag ring (1 above) it is very probable that the keys were in the bag or laid on it. An alternative is that the keys belong with the chatelaine (3 below).

3. ON 4708. Y-shaped fragment of object comprising incomplete ring with rod attached. Fe. L: 42mm; W: 37mm. Inv No 461

4. ON 1867. Chatelaine group. Ctx 117170. Inv Nos 468-472

Table 3.23 Miscellaneous metal objects from Zone 19 Anglo-Saxon grave 171171

Identification	*Comments*	*Metal*	*Length*	*Context*	*ON*	*Count*	*Fragt count*	*INV*
Strip	Tapered thin strip, partly rolled at the narrower end	Ca	L: 30mm; W: 8mm	171170	1869	1	1	521
Ring and junction	Fragt of plain ring and attached junction plate. L of junction plate: 25mm	Fe	L: 35mm	171170	1874	1	1	358
Ring and junction	Plain ring (6 fragts) with 2 small strips of cu ally forming a small junction plate. See sketches	Fe Ca		171170	1879	1	8	360
Catch	Very small link or catch formed from rectangular section bar with flatted and pierced circular terminals, one terminal broken, the other is complete and has stub of pin or nail *in situ* Cf Inv Nos 0524-0525	Ca	L: 17mm	171170	1876	1	1	523
Catch	Very small link or catch with tapered bar of rectangular section with flattened circular terminal at one end and hook at the other end. Nails or pins in situ at each end. Cf Inv Nos 0523 & 0525	Ca	L: 17mm	171170	1877	1	1	524
Catch	Very small link or catch, formed from small strip pierced at one and with small hook at the other end. Pins or nails in situ at each end. Cf Inv Nos 0523-0524	Ca	L: 12mm	171170	1878	1	1	525
Clip or staple	Possible clip or staple, encrusted	Fe	L: 28mm; W: 23mm	171170	1881	1	1	362
Ring	2 x curved fragments from a simple ring. Of uncertain thin cross section (either square or circular)	Fe		171170	1882	1	2	363
Looped link	Link formed from thin wire, with fragment of ring at one end. Link L: 78mm	Fe	L: 87mm	171170	1883	1	1	364
Nail	Type 1 nail head with mineral preserved wood. Circular slightly domed head	Fe		171170	1872	1	1	357
Nail	Small nail head, with mineral preserved wood. Not measured	Fe	0	171170	1875	1	1	359
Wire	Wire fragment, possibly from chin link	Ca	L: 10mm	171170	1884	1	1	526
Lead? object	Teardrop shaped object, possibly lead See sketch and x-ray	Fe	L: 40mm; W: 24mm	171170	1880	1	1	361

a) Lift key with rolled over loop with attached fragment of small ring. Fe. L: 124mm. Inv No 468
b) Key fragment and 3 girdle links forming part of chatelaine. Fe. L: 77mm. Inv No 470
c) Three girdle links. Fe. Inv No 471
d) Length of rod, possibly part of girdle. Fe. L: 47mm. Inv No 472
e) Length of rod. Fe. L: 95mm. Inv No 469

The presence of a number of chain or girdle links (c and b) together with keys (a and b) suggest these fragments may be part of a chatelaine. The keys (2 above) could have been distinct from the chatelaine or may have been part of the chatelaine set. Compare the 'complex of keys' or chatelaine from Buckland, Dover, grave 134 (Evison 1987, 245, text fig 48; see also Geake 1997, 57-8, figs 4.16-4.18).

5. ONs 1868, 4702-4704. Shears group. Ctx 117170. Inv Nos 462-467
a) ON 1868. Pair of shears. Fe. Overall L: 165mm; L of blades: 73mm and 75mm. Inv No 462
b) ON 4703. Whittle tang knife with angled back. Mineral-preserved organics on tang. Fe. Overall L: 128mm; L of blade: *c* 95mm; W of blade: 18mm. Inv No 464
c) ON 4704. Fragment of bone comb and case with Cu alloy fittings, including slide with attached chain (see No. 5 d below). Cu alloy and bone. Comb and case: L extant: 62mm; W: 55mm. Inv No 467
d) ON 4705. Length of cu alloy chain comprising six S-shaped links. One large link (L: 17mm) and 5 smaller links (L: 12-14mm). Originally attached to comb case (No 5 c above). Cu alloy. L: 69mm. Inv No 465
e) ON 4702. Probable girdle link of oval section and narrowing to each end. Fe. L: 71mm. Inv No 466
f) ON 1868. Girdle link. Fused to shears. Fe. L: 56mm. Inv No 463

The presence of shears (a) suggests a late 7th- or even early 8th-century date. The knife (b) is a good Saxon form a conforms to Ottaway back type A2 (Ottaway, 561-64). The incomplete bone comb and case (c) together with the now detached chain (d) is comparable to a fragmentary example from the Buckland cemetery Grave 110/8 (Evison 1987, 119-20, text fig 24, fig 49, 110/8). The Buckland example is dated to the end of the 7th century.

6. ON 1835. Scutiform pendant, with central boss and probably four smaller bosses, very fine punched holes around the very edge of the pendant. Just over half survives. Ag. D: 29mm. Ctx 171170. Inv No 513

Part of a silver scutiform pendant. Compare the complete scutiform pendants from Cemetery II, Chamberlains Barn sandpit, Bedfordshire grave 39 (Hyslop 1963, 181, fig 13, b) and grave 57 (*ibid*, 185, fig 17, h) and from Buckland cemetery, Dover grave 35 (Evison 1987, 226, fig 21, 35/3), and grave 67, (*ibid*, 234-35, fig 37, 67/3a, 3b and 4). In the 1994 excavations at Buckland a scutiform pendant with detached shield grip was found in grave 245 (Parfitt and Anderson 2012, 82, 396, fig 10.11, 245/d), a pair of pendants in grave 250 (*ibid*, 82, 399, fig 10.13, 250/c2) and another example in grave 339 (*ibid*, 82, 420, fig 10.37, 339/d). Fragments of further scutiform pendants were recovered Buckland from graves 32 and 38 (Evison 1987, 55, figs 19, 4p and 22, 3). All the graves at Buckland contained female burials. Hyslop (1963, 199-200) dates the use of scutiform pendants to the 7th century and Evison (1987, 55) states that the Dover evidence does not contradict this dating. By contrast MacGregor and Bolick (1993, 161) have suggested that scutiform pendants could date from as early as the 5th century to the 7th century.

7. ON 1838. Finger ring with plain hoop, circular section and flat circular bezel formed from coiled wire and attached by fine coiled wire. Cu alloy. D: 22mm. Ctx 171170. Inv No 515

8. ON 1873. Five complete necklace rings formed from thin wire, with twisted junction, and one ring fragment. Cu alloy. D: 18mm x 19mm; D: 15.5mm x 14mm; D: 19.5mm x 20mm; D: 17.5mm; D: 17mm x 18mm; D: 18.5mm x 19mm. Ctx 171170. ON 1837, ON 1841-1842, ON 1844–1845, ON 4763 and 1873. Inv Nos 514, 517–520, 495 and 522

9. ONs 1853, 1856, 1857, 1859, 1860 and 1885. Probable girdle or belt with links of lenticular or flattened oval cross section, with wire loops at each end. At least 14 fragments survive. The form is best illustrated by ONs 1856 1857 and 1859 and 1885, each of which comprises more than half of a link and the loop junction with the next link. ON1885 is the most complete link. Fe. ON 1856: L extant: 54mm; ON 1857: L extant: 65mm; ON 1859: L extant 68mm. ON 1885: L extant 81mm. Ctx 171170. ON 1853-1865. Inv Nos 303-308, 350-356, 365

10. ON 1840. Small hemispherical domed object with three small holes which presumably served to secure the object, perhaps by stitching rather than by pinning. Cu alloy. D: 8mm. Ctx 171170. Inv No 516

11. ON 1871. Lock or bolt plate. (2 fragments). Fe. L: 118mm. Ctx 171170. Inv No 231

12. ON 1874. Ring and junction. Fragment of plain ring and attached junction plate. Fe. L extant: 35mm; L of junction plate: 25mm. Ctx 171170. Inv No 358

13. ON 1879. Ring and junction. Plain ring (6 fragments) with two narrow strips of copper alloy forming a junction plate. Fe and cu alloy. Ctx 171170. Inv No 360

14. ON 1876. Small link or catch formed from rectangular section bar with flatted and pierced circular terminals, one terminal broken, the other is complete and has stub of pin or nail *in situ*. Cu alloy. L: 17mm. Ctx 171170. Inv. No. 523

15. ON 1877. Small link or catch formed from tapered bar of rectangular section with flatted and pierced circular terminal at one end and hook at the other end. Nails or pins *in situ* at each end. Cu alloy. L: 17mm. Ctx 171170. Inv. No. 524

16. ON 1878. Small link or catch. Strip pierced at one end, hook at the other end. Nails or pins *in situ* at each end. Cu alloy. L: 17mm. Ctx 171170. Inv. No. 525

Other finds:

ON 1881. Clip or staple, encrusted. Fe. L: 28mm; W: 23mm. Ctx 171170. Inv. No. 362

ON 1882. Ring, two curved fragments from a simple ring of uncertain, thin cross section. Fe. Not measured. Ctx 171170. Inv. No. 363

ON 1883. Looped link. Link formed from thin wire, with fragment of ring at one end. Fe. L overall: 87mm; L of link: 78mm. Ctx 171170. Inv. No. 364

ON 1869. Tapered thin strip, partly rolled at the narrower end. Cu alloy. L: 30mm; W: 8mm. Ctx 171170. Inv. No. 521

ON 1884. Wire fragment, possibly from chain link. Cu alloy. L: 10mm. Ctx 171170. Inv. No. 52

ON 1880 Flattened teardrop shaped object, possibly lead. Pb. L: 40mm; W: 24mm. Ctx 171170. Inv. No. 361
ON 1872. Nail, head fragment only. Circular slightly domed head with mineral-preserved wood Fe. Not measured. Ctx 171170. Inv. No. 357
ON 1875. Nail, small nail head, with mineral-preserved wood. Fe. Not measured. Ctx 171170. Inv. No. 359

Grave 189174

1. ON 2410.Spearhead with incomplete leaf-shape blade, and long split socket. No obvious nail/nail hole. Probably Swanton Group D1 or D2 (Swanton 1973, 64-71, figs 18 & 20) of slim leaf-shaped blades with sockets longer than their blades (*ibid*, 64). Examples known from graves ranging from the 5th-7th century (*ibid*, 64, 67). Fe. L extant: 202mm. Ctx 189176. Inv No 182
2. ON 2424-2525. Whittle tang knife with tapered blade. Ottaway back type D (Ottaway, 572). Fe. Overall: 190mm. Ctx 189176. Inv Nos 188–189
3. ON 2426. D-shaped buckle frame and part of thin sheet buckle plate. The buckle plate fragment has two angled corners and three extant rivets. The buckle is of Marzinzik's Type II.24a (2003, 51, pls 130-37) (See Grave 136111, no. 7 above). Cu alloy. Buckle frame: L: 12.5mm; W: 19 mm; buckle plate: L: 11mm; W: 14mm. Ctx 189176. Inv No 551
4. ON 4015. Boot cleat. Fe. Ctx 189176. Inv No 14

Grave 189178

1. ON 3044. Whittle tang knife blade, incomplete. Extant portion has triangular section and parallel edges. Fe. L extant: 58mm; W: 13mm. Ctx 189180. Inv No 112
2. ON 3043. Link formed from wire and looped at each end. Fe. L: 78mm. Ctx 189180. Inv No 111

Other finds are ON 3042, nail shank fragment (Fe), Ctx 189179, Inv No 541 and ON 4681, three tiny strip fragments (Cu alloy), Ctx 189179, Inv No 483.

Grave 205115

1. ON 2420. Whittle tang knife with curved edge, straight back and down-curved tip. Probably Ottaway back type C1 (Ottaway 1992, 568) Fe. L: 142 mm; L of blade: *c* 90mm; W: 19mm. Ctx 205117. Inv No 229
2. ON 2420. Three possible awls. One awl, square section tapering to each end (L: 78 mm). Two square section bars, possibly awls, incomplete. (L: 69mm and 75mm). Fe. Ctx 205117. Inv No 230

Grave 216007

1. ON 2409. Girdle links. At least five links formed from thin wire with looped ends. Possibly a chatelaine. Fe. L: 99mm. Ctx 216005. Inv No 181

Grave 218200

1. ON 1831. Small spearhead, socketed with broad leaf-shaped blade and long split socket. It is rather small and contrasts markedly with the larger long bladed heads often found in burials (eg, see below West cemetery graves 252076 and 282014). However, it is undoubtedly a spearhead rather than an arrowhead because the socket, although quite slim, is too large in diameter for an arrow. A weapon head of this size is most likely to be used on a thrown weapon rather than as stabbing spear. Fe. L: 91mm; Blade W: 24mm; D of socket: 16mm. Ctx 218199. Inv No 1208
2. ON 1834. Buckle plate, fragment of small plain buckle plate formed from folded Cu alloy sheet. No obvious decoration. Precise form unclear. Cu alloy. Extant L: 21mm; Extant W: 13mm. Ctx 218199. Inv No 1211

Other finds are ON 1832–1833, two nail shank fragments (Fe), Ctx 218199, Inv Nos 1208–1209.

Grave 218203

1. ON 2415. Possible knife blade, mineral-preserved wood on faces. Fe. L: 81mm. Ctx 218207. Inv No 185

Grave 228044

1. ON 2405. Small plain tweezers. Cu alloy. L: 27mm; W: 3.5mm. Ctx 228046. Inv No 547
2. ON 2414. Small buckle, oval frame and fixed trilobate plate with narrow extension, attached by lugs with washers rather than pins or rivets. No exact parallel known Cu alloy. L: 27mm; W: 12mm. Ctx 228046. Inv No 548
3. ON 2406. Whittle tang knife blade. Parallel-sided blade with straight back, steeply angled tip and triangular cross section. (2 fragments). Ottaway back type A1 (Ottaway 1992, 561). Fe. L overall: 174mm; L of blade: 136mm; W: 24mm. Ctx 228046. Inv No 179
4. ON 2408. Whittle tang knife blade. Incomplete tapered blade of triangular section. (2 fragments). Possibly of Ottaway back type D. Fe. L overall: 110mm; L of blade extant: c 85mm. Ctx 228046. Inv No 180

Other finds are ON 2407, large nail (Fe), incomplete, flat circular head, and also nail shank fragment (Head D: 28mm x 30mm), Ctx 228046, Inv No 177.

Grave 250050

1. ON 2421. Shield boss with narrow flange, slightly pointed cone and probable rod (bent over) at the apex. The boss is of a low curved cone form (Evison 1963, 40-41, fig 1, d), which is Dickinson Group 6 (Dickinson and Härke 1992, 20), dated by her to the late 6th or 7th century (*ibid*, fig 16). Fe. D: 128mm; H: 80mm. Ctx 250052. Inv No 239
2. ON 2412. Elongated plain pyramidal block or 'cocked hat' pommel (Cu alloy) with fragmentary upper guard or small plate (Cu alloy), both mounted on an iron tang. Possibly a sword pommel. Cu alloy and Fe. L overall: 44mm; H: 21mm; L of block: 31mm; H of block: 10mm Ctx 250052. Inv No 183

There is a detached undecorated sword pommel of similar type to one from Buckland, Dover grave 360 (Parfitt and Anderson 2012, 428, fig 10.43, 360/e). Good examples of simple pommels *in situ* came from graves 20 and 21 at Petersfinger, Wiltshire (Leeds and Short 1953, 14, 16-7, pl 1, 52 & 60; see also Menghin 1983, 195-96, nos 18-19). This pommel is a particular form comprising metal pommel and upper guard plate riveted together and often sandwiching an organic layer (Bone (1989, 64, fig 5.3). Bone (loc cit) dates hilts with metal pommels and upper hilt guards to the late 6th and 7th centuries. One variant of this hilt type is the 'ring sword'. Although this pommel is not from a 'ring sword' the construction of the pommel and upper guard is similar, and a ring sword from grave C3944 at Saltwood Tunnel shows clearly the relationship between the 'cocked hat' pommel and upper guard plate (Riddler *et al*, 2006, 64-5, fig 97; see also Reynolds 2011, 357, fig 6.12); see also details of pommels of 'ring swords' from Bifrons and Sarre, Kent (Åberg 1926, 141-43, figs 272-73).

3. ON 2411. Flat fragment with mineral-preserved wood and one or possibly two small rivets. Possibly from scale tang. Fe. L: 28mm. Ctx 250052. Inv No 184

Other finds are ON 2421, strip with two, possibly three nail holes (Fe. L: 108mm; W: 13mm), Ctx 25052, Inv No 240 and ON 2422, plate or sheet fragments, irregular – one large with one possible nail hole and seven small fragments (Fe. Not measured), Ctx 250052, Inv No 187.

Grave 280022

1. Buckle with oval frame and triangular plate with lines of punched decoration. Mushroom shaped shield. Decorated copper alloy buckle of Type II.23b-ii (Marzinzik 2003, 50, pls 19-130), dating to the late 6th and 7th centuries. There is a similar buckle, but with a back plate from Buckland, Dover Grave 56 (Evison 1987, 232, fig 31, 56/6) and a small copper alloy example with fixed frame from Holborough, Kent grave 7 (Evison, 1956, 120, fig 16, 6). cf Finglesham grave 83.3 and 95.7, 95.8. Cu alloy. L: 47mm; W: 24mm. Ctx 280023. ON 2416. Inv No 549
2. ON 2418. Whittle tang knife (3 fragments), poorly preserved. Straight back with angled tip. Ottaway back type D (Ottaway 1992, 5728). Fe. L: 110mm. Ctx 280023. Inv No 186

Grave 286013

1. ON 1888. Knife blade fragment, curved back. Fe. L: 74mm. Ctx 286015. Inv No 366
2. ON 1889. Girdle link with looped end. Fe. L extant: 81mm. Ctx 286015. Inv No 367

Grave 286016

1. ON 2400. Small leaf-shaped spearhead, with long socket. Eight L-shaped iron corner reinforcements were found at Buckland, Dover in grave 388 (Parfitt and Anderson 2012, 435, fig.10.51, 388/a-h). Fe. L overall: 184mm; L of head: 105mm; W of head: 24.5mm; D of socket: 17mm. Ctx 286011. Inv No 178
2. ON 2403. Small plate fragment. Cu alloy. Ctx 286011. Inv No 546
3. ON 2401-2402Six small irregularly shaped fragments. Cu alloy. Ctx 286011. Inv Nos 544-545

Probable grave 252037

1. ONs 1931, 1933-1935, 1937, 1941, 1944 and 1946. L-shaped corner bindings. Five complete or almost complete examples and two fragments. Eight L-shaped iron corner reinforcements were found at Buckland, Dover in grave 388 (Parfitt and Anderson 2012, 435, fig.10.51, 388/a-h). Ctx 252038. Inv Nos 375, 371-372, 376, 374, 390, 377 and 391

   a) ON 1931. L-shaped corner binding, with two nails with domed circular heads. Mineral-preserved wood on inner surfaces; wood grain aligned transversely. Fe. L of arms: *c* 80mm; *c* 65mm; W: *c* 50mm. Inv No 375

   b) Part of an L-shaped corner binding, with one nail. Mineral-preserved wood on inner face; grain aligned transversely. Fe. L: 64mm, W: 50mm. Inv No 376

   c) ON 1937. Part of L-shaped corner binding, with single nail with flat square head. Mineral-preserved wood on inner surfaces; wood grain aligned transversely. Fe. L: 76mm; W: 39mm. Inv No 374

   d) ON 1944. L-shaped corner binding, with two nails. Nails have short chisel points (L: *c* 50mm and *c* 42mm). Fe. L of arms: *c* 90mm and *c* 88mm; W: 38-40mm. Inv No 377

   e) ON 1941. L-shaped corner binding with two nails. Mineral-preserved wood on inner faces, grain aligned longitudinally. Fe. L of arms: 99mm and 96mm; W: *c* 40mm. Inv No 390

   f) ON 1946. L-shaped corner binding with two nails (2 fragments). Mineral-preserved wood on inner faces, grain aligned longitudinally. Fe. L of arms: 95mm and 82mm; W: 34mm. Inv No 391

   g) ON 1933-1934. L-shaped corner binding, one arm incomplete (2 fragments). Mineral-preserved wood on inner surfaces, grain aligned longitudinally. Fe. L 104mm; W: 32mm. Inv Nos 371-372
2. ON 6832. Small binding strips. one complete strip with two tacks or pins (3 fragments) (L: 18.5mm; W: 7mm), and five fragments, one with two pin holes, two with a single pin hole and one with a pin or tack *in situ*. The three extant tacks measure 9.5-10mm long. Cu alloy. Ctx 252038. Inv No 490
3. ON 1951. Plate or strip binding, possible nail. Some mineral-preserved wood. Fe. L extant: 97mm; W: 52mm. Ctx 252038. Inv No 392
4. ON 1803. Binding. Strip with single, domed nail head. Fe. L: 97mm; W: 37mm. Ctx 252038. Inv No 298
5. ONs 1800-1802. Bolts, three probable clench bolts or rivets. Oval section shanks and slightly domed circular heads. Fe. L: 75mm, 80mm, 82mm. Ctx 252038. Inv Nos 295-297
6. ON 1929. Tack, Cu alloy. L: 11mm. Ctx 252038. Inv No 528
7. Nails. 21 nails (34 fragments) (see Table 3.24), including some with domed heads and circular section shanks, some of which widen towards the tip, others with chisel tips.

Other finds are ON 1805, 16 small fragments of Fe sheet, Ctx 252038, Sample 6832, Inv No 583 and five irregular fragments of Fe plate, no original edges, Ctx 252038. Inv No 301.

Western cemetery 195116

Grave 217135

1. ON 2449. Possible strap end or binding. Single nail hole. Fe. L: 50mm; W: 22mm. Ctx 17136. Inv No 204

Grave 252076 (Table 3.26)

1. ON 2431. Spearhead, with long angular blade, most of socket missing. Swanton's Group H3 of large spearheads with angular blades, which he dates to the 6th century (Swanton 1973, 111-14, fig 41) and are concentrated in cemeteries in Kent (*ibid*, fig 42). Fe. L extant: 363mm; L of blade: 322mm; W of blade: 57mm. Ctx 252075. Inv No Nos 437 and 1246
2. ON 2429. Small oval buckle with tongue, poorly preserved. Fe. L: 32mm; W: 42mm. Ctx 252075. Inv No 190
3. ON 2484. Oval, or D-shaped, buckle with tongue. Fe. L: 26mm; W: 33mm. Ctx 252079. Inv No 208
4. ON 2484. Circular buckle with slight offset for attachment of strap. Fe. D: 30mm. Ctx 252079. Inv No 209
5. ON 2485. D-shaped buckle frame (3 fragments). Cu alloy. L: 22mm; W: 32mm. Ctx 252079. Inv No 480
6. ON 2430. Whittle tang knife, incomplete blade of triangular section. Fe. Overall L: 120mm; W of blade: 28mm. Ctx 252075. Inv No 225
7. ON 2484. Whittle tang knife with straight back and concave, curved edge. Incomplete blade. Fe. L

Table 3.24 Nails from Zone 19 Anglo-Saxon grave 252037, context 252038

Count	*Fragt count*	*Description*			*Context*	*ON*	*Sample*	*INV*
2	8	2 x possible nail head fragments; 6 x stem fragments. Fe	Fe		252038	0	6832	584
0	3	3 x nail stem fragments. MPW	Fe		252038	1803	0	299
0	1	Stem fragment. MPW	Fe		252038	1804	0	300
0	1	Stem fragment	Fe		252038	1806	0	302
1	1	Nail with slightly domed circular head and stem with little or no taper. MPW	Fe	L: 86mm	252038	1930	0	368
1	1	Nail flat circular head and tapered stem of ?circular section	Fe	L: 101mm	252038	1932	0	369
1	1	Nail or rivet with flat small square head attached to strip fragment. The stem appears to widen away from the head	Fe	L: 54mm	252038	1933	0	370
1	1	Nail either with slightly domed head, or with smaller flat square head and a washer. See sketch	Fe	L: 68mm	252038	1936	0	373
1	1	Nail with slightly domed possibly circular nail head, and non-tapering stem. MPW. Possibly nail with small head and washer	Fe	L: 86mm	252038	1938	0	378
1	1	Nail with slightly domed sub-square head. Square section stem? MPW. Incomplete	Fe	L: 67mm	252038	1939	0	379
1	1	Nail with slightly domed sub square head, non-tapering stem, incomplete. MPW	Fe	L: 57mm	252038	1940	0	380
1	1	Nail with slightly domed circular head and slightly tapered stem. MPW	Fe	L: 92mm	252038	1942	0	384
1	2	Nail with chisel point, and possible circular domed head or rove. (2 fragts)	Fe	L: 92mm	252038	1943	0	385
1	1	Nail with lozenge-shaped head or lozenge-shaped rove. Stem ends in possible chisel point. MPW. Incomplete	Fe	L: 74mm	252038	1945	0	381
1	1	Nail with domed lozenge-shaped head, tapering stem. MPW	Fe	L: 70mm	252038	1948	0	382
1	1	Nail with lozenge-shape head or lozenge-shaped rove. Tapered stem with MPW	Fe	L: 88mm	252038	1949	0	383
1	1	Nail with circular dome head, incomplete stem. MPW	Fe	L: 56mm	252038	1950	0	386
1	1	Nail with small circular head attached to strip fragment. Stem with chisel point. MPW	Fe	L: 75mm	252038	1952	0	387
1	1	Nail with small square head and rove rather than head, and chisel point. MPW	Fe	L: 95mm	252038	1953	0	388
1	1	Nail with domed circular head, incomplete. MPW	Fe	L: 75mm	252038	1954	0	389
1	1	Nail with domed circular head and slightly tapered stem with possible chisel point. MPW. Appear to be attached to a fragment of Fe strip	Fe	L: 71mm	252038	1955	0	393
1	1	Nail with circular flat head, an upper stem only. MPW	Fe	L: 36mm	252038	1956	0	394
1	2	Nail incomplete; nail stem fragment. 2 fragments do not join	Fe		252038	1957	0	395

extant: 135mm. Ctx 252079. Inv. No. 213

8. ON 2431. Small clamps or staples (six objects or fragments). (1) – (2) two complete small clamps or staples. (3) – (4) two fragments of small clamps or staples. Fragment (4) is tiny. (5) small clamp or staple. (6) small clamp or staple. Cu alloy. (1) L: 23.5mm; W: 4.5mm; H: 7mm; (2) L: 22.5mm; W: 5mm. (3) L: 19.5mm; W: 3mm; H: 8.5mm; (4) Not measured; (5) L: 15.5mm; W: c 3.5mm; H: 8mm. (6) L: 17mm; W: 2mm; H: 4.5mm. Ctx 252075. Inv. Nos 439–442

9. ON 2431. Small binding comprising two small curved strips joined by three rivets or pins. Wood preserved between the strips. The grain runs across the gap. Cu alloy. L: 22mm; W: 6mm. Ctx 252075. Inv No 438

10. ON 2430. Pin with rolled over loop (3 fragments). Pin shank probably has a circular section. Encrusted. Rolled over loop has a rolled terminal. Fe. L: 100mm. Ctx 252075. Inv No 226

Other finds :

ON 2483. Fragment of wire or pin. Fe. L: 25mm. Ctx 252079. Inv. No. 207

ON 2484. Miscellaneous iron fragments and objects found together. See also circular buckle (No. 4) and whittle tang knife (No. 7) above. Inv Nos 32–39, 210–212, 214–215

a) Cranked bar. Bar of rectangular section, with dog-leg bend (2 fragments). Fe. L: 200mm. Inv No 32

b) Curved object of uncertain function (2 fragments). Fe. L: 60mm. Inv No 33

c) Curved fragment, possibly ring fragment. Fe. L: 41mm. Inv. No. 35

d) Curved strip, rectangular section. Fe. L: 37mm. Inv. No 36

e) Bar of square section with rolled over loop at one end. Possible nail shank fused to bar. (2 fragments). Fe. L: 83mm. Inv. No. 38

f) Ring or washer, possibly of square section. Fe. D: 44mm x 40mm. Inv. No. 211

g) Fragment, undiagnostic. Fe. Not measured. Inv. No. 212

h) Two plain rings. Found with bar (i). D: 28mm x 32mm; 33mm x 35mm. Inv. No. 214

i) Bar fragment. Found with plain rings (h). Fe. L:

Table 3.25 Finds from Zone 19 western Anglo-Saxon cemetery grave 267072

Class	*Object*	*Description*	*Metal*	*Dimensions*	*Context*	*ON*	*Sample*	*Count*	*Fragt count*	*Inv*
Misc	Wire	2 x fragments of wire, one curved	Fe		267070	0	7493	2	2	585
Personal	Pendant	Small circular silver pendant, shield-like. Central boss with border of small raised dots, and four further dots around central boss. Incomplete/D: 15mm	Ag	D: 15mm	267070	0	7497	1	1	48
Binding	Binding	3 x small fragments of silver.(1) U-shaped clip with rivet and fragment of U-shaped channel; (2) & (3) 2 small fragments of silver U-shaped channel. L: 11mm & 12mm. Probably part of ON 2440 (inv No 0538)	Ag	W: 4mm	267071	2312	0	1	3	542
Query	Girdle?	2 x joining fragments of square section wire	Fe	L: 58mm	267071	2313	0	2	2	176
Query	Object	Object formed from folded and rolled . cu alloy strip. L: 14.5mm; W: 5.5mm; Ht: 7mm	Ca	L: 14mm; W: 6mm; Ht: 7mm	267071	2320	0	1	1	543
Household	Knife	Whittle tang knife with parallel sided blade. See sketch (3 fragts)	Fe		267071	2438	0	1	3	191
Household	Knife	Whittle tang knife with curved edge and angled back. Overall L: 200mm; L of blade: 122mm; W of blade: *c* 26mm. (2 fragts)	Fe	L: 200mm; W: 26mm	267071	2439	0	1	2	228
Binding	Binding	Silver U-section binding with a neatly folded corner and 2 x riveted U clips. L: 41mm; Th of binding: *c* 4mm. 3 x lengths of U-binding: L: 27mm; 21mm; 11mm. And 4 small silver fragts. See Inv No 0542 (ON 2312) (8 fragts)	Ag	L: 41mm	267071	2440	0	1	8	538
Security	Lift key?	Possible lift key bit, fused to cu alloy ring (Inv No 0197). Possibly joins with Inv No 198 (ON 2443)	Fe	L: 52mm	267071	2441	0	1	1	196
Misc	Ring	Simple cu alloy ring of circular section, wear on inside at one point on circumference.	Ca	D: 32mm	267071	2442	0	1	1	197
Misc	Ring	Simple cu alloy ring, with possible traces of wear on inner face.	Ca	D: 25mm	267071	2443	0	1	1	199
Personal	Chatelaine	2 iron rod attached to a fragment of iron ring. Possibly remain of a chatelaine. May join to Inv No 196 (ON 2441). Fused to cu alloy ring (Inv No 0199)	Fe	L: 80mm	267071	2443	0	1	1	198
Query	Girdle?	3 fragments of wire: (1) looped fragment with second loop attached (L: 29mm): (2 & 3) 2 Lengths of wire (L: 26mm and 30mm)	Fe	L: 29mm	267071	2444	0	3	3	200
Query	Girdle?	3 fragments of wire: (1) length of wire with looped end attached to a second loop (L: 27mm); (2) straight length of wire (L: 28mm); 2 short lengths of wire crossed and fused together (L: 18mm)	Fe	L: 27mm	267071	2445	0	3	3	192
Query	Girdle?	2 fragments: (1) L: 27mm; (2) with possible loop (L: 24mm)	Fe	L: 27mm	267071	2446	0	2	2	193
Query	Girdle?	3 fragments: (1) wire with loop at one end (L: 37mm) see sketch; (2) short length of wire (L: 16mm); (3) short length of wire with twist attached (L: *c* 20mm)	Fe	L: 37mm	267071	2447	0	3	3	194
			Fe	L: 37mm	267071	2447	0	3	3	194
Personal	Annular brooch	Probable annular brooch of flat oval section. There are 4 internal lugs with small holes (not pierced right through) (D: 37mm x 40mm)	Ca	D: 40mm	267071	2450	0	1	1	558
Personal	Strap end	Small tongue shaped strap end, decorated with 3 ring and dot motifs. See sketch	Ca	L: 32mm; W: 7mm	267071	2452	0	1	1	476

Table 3.25 (continued)

Class	*Object*	*Description*	*Metal*	*Dimensions*	*Context*	*ON*	*Sample*	*Count*	*Fragt count*	*Inv*
Personal	Disc brooch	Cu alloy disc brooch with applied silver rim. See sketch, photos and notes	Ca Ag	D: 34mm	267071	2453	0	1	1	477
Query	Girdle?	Length of wire, slightly curved.	Fe	L: 28mm	267071	2459	0	1	1	195
Query	Girdle?	Length of wire with small wire fragment attached (L: *c* 25mm)	Fe	L: 25mm	267071	2460	0	1	1	201
Query	Girdle?	3 small fragments of wire: (1) short length of wire with loop at one end (L: 25mm): (2 & 3) two small lengths of wire (L: 12mm & 15mm)	Fe	L: 25mm	267071	2461	0	3	3	202
Query	Girdle?	Length of wire with twist of wire at one end	Fe	L: 28mm	267071	2462	0	1	1	203
Query	Girdle?	Short length of wire, encrusted.	Fe	L: 14mm	267071	2463	0	1	1	205
Query	Girdle?	Fragment of wire with twist of wire at one end.	Fe	L: 26mm	267071	2500	0	1	1	219
Query	Girdle?	Fragment of wire with twist of wire at one end.	Fe	L: 17mm	267071	2501	0	1	1	220
Query	Girdle?	Small fragment of wire, heavily encrusted	Fe	L: 15mm	267071	2502	0	1	1	221
Query	Girdle?	2 fragments of wire with looped ends linked together.	Fe	L: 20mm	267071	2503	0	1	1	222
Query	Girdle?	Fragment of wire	Fe	L: 22mm	267071	2504	0	1	1	223
Query	Girdle?	Fragment of wire	Fe	L: 19mm	267071	2505	0	1	1	224
Query	Girdle?	Wire links with loop at one end, linked to a second loop.	Fe	L: 47mm	267071	2506	0	1	1	216
Query	Girdle?	Wire, or thin bar, of square section, curved. 2 x fragts. Similar to Inv Nos 0138-0139	Fe	L: 50mm	267071	2507	0	1	2	137
Query	Girdle?	Wire, or thin bar, of square section. 1 x frat. Similar to Inv Nos 0137 & 0139	Fe	L: 28mm	267071	2508	0	1	1	138
Query	Girdle?	Length of wire looped at on end. Possibly from a girdle? Similar to Inv Nos 0137 and 0138	Fe	L: 53mm	267071	2509	0	1	1	139
Query	Girdle?	Tiny fragment of wire, or bar, similar to Inv Nos 0137-0139. Too small to measure.	Fe	0	267071	2510	0	1	1	140
Query	Girdle?	Wire, or bar, of square section, similar to Inv Nos 0137-0140	Fe	L: 25mm	267071	2511	0	1	1	141
Query	Girdle?	Wire, or bar, of square section, with possible expansion (or corrosion bubble) in centre	Fe	L: 25mm	267071	2512	0	1	1	142
Query	Girdle?	Wire, or bar, of square section, small fragment.	Fe	L: 16mm	267071	2513	0	1	1	143
Query	Girdle?	Small fragment of wire with possible Feature similar to ON 2512 (Inv No 0142). Not measured.	Fe	0	267071	2514	0	1	1	144
Query	Girdle?	Wire, or bar, of square section, 2 x joining fragts.	Fe	L: 32mm	267071	2515	0	1	2	145
Query	Girdle?	Wire, curved fragment.	Fe	L: 35mm	267071	2516	0	1	1	146
Query	Girdle?	Wire, encrusted, possibly formed into a loop at one end. X-ray is not conclusive.	Fe	L: 31mm	267071	2517	0	1	1	147
Query	Girdle?	2 x looped and linked fragments of wire. L: 24mm and 19mm.	Fe	L: 24mm	267071	2518	0	1	1	148
Query	Fragment	Small undiagnostic fragment. See sketches.	Fe		267071	2519	0	1	1	149
Query	Girdle?	Wire, or bar, of square section.	Fe	L: 25mm	267071	2520	0	1	1	150
Query	Girdle?	Wire, or bar, of square section	Fe	L: 23mm	267071	2521	0	1	1	151
Unknown	Fragments	2 x amorphous undiagnostic fragments	Fe		267071	2522	0	0	2	152
Query	Girdle?	Wire, or bar, of square section, 2 x joining fragts.	Fe	L: 53mm	267071	2523	0	1	2	153
Query	Girdle?	Wire, curved square section fragment	Fe	L: 21mm	267071	2524	0	1	1	154
Misc	Wire	V-shaped fragment	Fe	L: 34mm	267071	2525	0	1	1	155
Query	Girdle?	Wire, square section with possible loop at one end, encrusted	Fe	L: 55mm	267071	2526	0	1	1	156
Query	Girdle?	Wire, possibly square section, very heavily encrusted	Fe	L: 36mm	267071	2527	0	1	1	157
Query	Girdle?	Wire, widened at one end, encrusted	Fe	L: 55mm	267071	2528	0	1	1	158

48mm. Inv No 215
j) Nails. Four nail shank fragments and the head of an L-shaped nail. Not measured. Inv. Nos 34, 37, 29, 210

Grave 267072 (Table 3.25)

1. ON-. Keystone disc brooch with applied silver rim. Avent Type 2.4 (Avent 1975, 24-29, figs 4-11), dates from the early to mid 6th century Cu alloy and Ag. D: 34mm. Ctx 267071. Inv No 477
2. ON 2450. Annular brooch, flat oval section. Four internal lugs with small holes. Could date as early as the 5th century or as late as the 7th-century, but form suggests that it should late rather than early in the range. Cu alloy. D: 37mm x 40mm. Ctx 267071. Inv No 558
3. ON -. Small circular scutiform pendant. Central boss with border of small raised dots, and four further dots around central boss. Incomplete. See above, Grave 171168 No. 6. Ag. D: 15mm. Ctx 267070. Sample 7497. Inv No 489
4. ON 2452. Small tongue-shaped strap end, decorated with three ring-and-dot motifs. A form closely associated with Kent and probably early to mid 6th-century date. There are comparable small strap ends from Mill Hill, Deal in grave 25 (Parfitt and Brugmann 1997, 131, fig 30, 25B/c-d), grave 33 (*ibid*, 133, fig 31, 33/f, j), grave 63 (*ibid*, 139, fig.35, 63/f-g) and grave 69 (*ibid*, 143, fig 39, 69/f). A strap end with ring and dot on both faces was found in 1994 in grave 412 at Buckland, Dover (Parfitt and Anderson, 2012, 442, fig.10.58, 412/d). Cu alloy. L: 32mm; W: 7mm. Ctx 267071. Inv No 476

Table 3.26 Miscellaneous finds from Zone 19 western Anglo-Saxon cemetery grave 252076

Class	*Object*	*Description*	*Metal*	*Context*	*ON*	*Count*	*Fragt count*	*Inv*
Household	Knife	Whittle tang knife with straight back, and concave curved edge. Incomplete blade. See sketch	Fe	252079	2484	1	1	213
Structural	Clamp or staple	2 x small clamps or staples. (1) L: 23.5mm; W: 4.5mm; Ht: 7mm; (2) L: 22.5mm; W: 5mm.	Ca	252075	2431	2	2	439
Structural	Clamp or staple	2 x fragments of small clamps or staples, one fragment tiny. Large fragment: L: 19.5mm; W: 3mm; Ht: 8.5mm; Smaller fragment may join with one of the other pieces (Inv Nos 0439-0441) or the larger fragment here. Not measured	Ca	252075	2431	1	2	442
Structural	Clamp or staple	Small clamp or staple. L: 15.5mm; W: *c* 3.5mm; Ht: 8mm.	Ca	252075	2431	1	1	441
Structural	Clamp or staple	Small clamp or staple. L: 17mm; W: 2mm; Ht: 4.5mm. Found with Inv No 0438-0439 and 0441-0442 and possible leather fragments	Ca	252075	2431	1	1	440
Binding	Binding	Small binding comprising 2 small strips joined by 3 rivets or pins. There is MPW preserved between the strips. The grain runs across the gap.	Ca	252075	2431	1	1	438
Query	Pin	Pin with rolled over loop. Pin shank of circular? section. Encrusted. The rolled over loop has a rolled terminal. See sketch. (3 fragts)	Fe	252075	2430	1	3	226
Query	Tube	Tube or socket. Extant length 120mm; D ranges from 18mm to 20mm.	Fe	252075	2431	1	1	437
Query	Cranked bar	Bar of rectangular section, with dog leg bend (2 fragts)	Fe	252079	2484	1	2	32
Query	Fitting	Fragment fitting formed from strip of sub-rectangular section (2 fragts)	Fe	252079	2484	1	2	33
Query	Object	Object or fragment of uncertain ID.	Fe	252079	2484	1	1	212
Nails	Nail	2 x stem fragments	Fe	252079	2484	0	2	37
Nails	Nail	Nail stem, fused to buckle (Inv No 209).	Fe	252079	2484	1	1	210
Nails	Nail	L-shaped nail head. Not measured.	Fe	252079	2484	1	1	39
Nails	Nail	Nail stem fragment, curved	Fe	252079	2484	0	1	34
Miscellaneous	Wire	Fragment of wire or pin	Fe	252079	2483	1	1	207
Miscellaneous	Bar	Bar of square section with rolled over loop at one end. Possible nail stem fused to bar. (2 fragts)	Fe	252079	2484	1	2	38
Miscellaneous	Ring	2 x plain rings: D: 28mm x 32mm and 33mm x 35mm. Found with bar (Inv No 0215)	Fe	252079	2484	2	2	214
Miscellaneous	Washer	Washer or ring, possibly of square section. D: 44m x 40mm.	Fe	252079	2484	1	1	211
Miscellaneous	Bar	Bar fragment, found with plain rings (Inv No 0214)	Fe	252079	2484	1	1	215
Miscellaneous	Ring	Possible fragment from a ring?	Fe	252079	2484	1	1	35
Miscellaneous	Curved strip	Curved strip of rectangular section	Fe	252079	2484	1	1	36

5. ON 2440 and ON 2312. Silver U-section binding with U clips (11 fragments). ON 2440: (1) U-section binding with a neatly folded corner and riveted U clips. L: 41mm; T of binding: *c* 4mm. (2)-(4) Three lengths of U-binding: L: 27mm; 21mm; 11mm. (5)–(8) Four small silver fragments. ON 2312: (9)–(10) Two small fragments of U-shaped channel: L: 11mm and 12mm; (11) U-shaped clip with rivet and fragment of U-shaped channel. Ctx 267071. Inv Nos 538 and 542
6. ON 2438. Whittle tang knife with parallel sided blade (3 fragments). Ottaway back type A1 or C1 (Ottaway 1992, 562-63, 568). Fe. L: 190mm; L of blade: *c* 120mm; W of blade: 21mm. Ctx 267071. Inv No 191
7. ON 2439. Whittle tang knife, curved edge and angled back. Ottaway back type A1 or A2 (Ottaway 1992, 561-63). Fe. Overall L: 200mm; L of blade: 122mm; W of blade: *c* 26mm. Ctx 267071. Inv No 228
8. ON 2441. Possible lift key bit, fused to Cu alloy ring ON 2442. Fe. L: 52mm. Ctx 267071. Inv No 196
9. ON 2442. Ring of circular section, wear on inside at one point on circumference. Cu alloy. D: 32mm. Ctx 267071. Inv No 197
10. ON 2443. Two iron rods, attached to a fragment of iron ring. Possibly remains of a chatelaine. Fused to Cu alloy ring ON 2443 and may join ON 2441. Fe. L: 80mm. Ctx 267071. Inv No 198
11. ON 2443. Ring, possible wear inner face. Cu alloy. D: 25mm. Ctx 267071. Inv. No. 199
12. ON 2313, 2444–2447, 2459–2463, 2500–2518, 2520–2521, 2523–2524, 2526–2528. Probable girdle links formed from square section wire with loops at each end. There are fragments with single end loops, eg, ON 2445, probably ON 2446, ON 2447, ON 2500 and ON 2501. ON 2444, ON 2502, ON 2506 and ON 2518 are examples of fragments with linked end loops. Many of the fragments are small and comprise just pieces of square section wire. ON 2313 is the longest extant link and comprises two joining fragments but no end loops. ON 2509 and ON 2526 are two of the longest fragments and each has a single end loop. ON 2447 and ON 2506 are good examples of end loops. Fe. ON 2313: L: 58mm; ON 447: 37mm; ON 2506: L: 47mm; ON 2509: L: 53mm; ON 2526: L: 55mm. Ctx 267071. Inv Nos 137–148, 150–151, 153–154, 156–158, 176, 192–195, 200–203, 205, 216, 219–224

Other finds

ON 2320. Object formed from folded and rolled strip. Cu alloy. L: 14.5mm; W: 5.5mm; H: 7mm. Ctx 267071. Inv. No. 543

ON 2519. Tiny cast fragment with small flanges. Uncertain function. Cu alloy. Ctx 267071. Inv. No. 149

ON 2525. Wire fragment. Fe. L: 34mm. Ctx 267071. Inv. No. 155

ON -. Two fragments of wire, one curved. Fe. Not measured. Ctx 267070. Sample 7493. Inv. No. 585

ON 2522. Two undiagnostic fragments. Fe. Ctx 267071. Inv. No. 152

Grave 279036

1. ON 2434. Small long brooch, complete. A small-long brooch with a distinct cruciform head, down curved lappets below the bow and a double-lobed foot. No precise parallel found. Cu alloy. L: 73mm; W: 26mm. Ctx 279037. Inv No 556
2. ON 2436. Annular brooch with hoop of plano-convex section with a seating for the pin tip and two plain bosses. The pin is iron and encrusted and probably fixed to a constriction in the hoop. Annular brooches are found in contexts dating from the 5th to 7th centuries (MacGregor and Bolick 1993, 82). Compare plain annular brooches with iron pins from Mill Hill, Deal, grave 73 (Parfitt and Brugmann 1997, 41,145, fig 41, 73/d) and grave 86 (*ibid*, 41, 149, fig 44, 86/a-c) and from Buckland, Dover grave 13 (Evison 1987, 48-9, 219, fig 9, 13//6). Cu alloy and Fe. D: 33mm x 35mm; L of pin: 38mm. Ctx 279037. Inv No 557
3. ON 2432. Decorated annular buckle or brooch, plano-convex section with panels of transverse ribs alternating with slight plain bosses. Slight constriction of frame, perhaps for attachment of pin. Cu alloy. D: 39mm x 40mm. Ctx 297037. Inv No 554
4. ON 2433. Decorated annular buckle or brooch of plano-convex section with panels of transverse ribs alternating with plain sections. Fragment of iron pin survives. Cu alloy. D: 39mm x 41mm. Ctx 297037. Inv No 555

Egan (1991, 64, 248) argued that generally annular brooches should be distinguished from annular buckles by the fact that their pins are either attached through a hole in the frame or anchored by a constriction in the frame. On the other hand, the pins of buckles are generally free to move around the frame, although there might be a constriction or groove for the tip of the pin to rest in. One of the buckles or brooches has a constriction but no pin (**Cat. No. 3; ON 2432**) whereas the other example (**Cat. No.4; ON 2433**) has the remains of an iron pin with a slight groove rather than a constriction opposite the pin attachment, which suggests that it might be a buckle rather than a brooch; if so it is likely that the former is also a buckle and that they make a pair, as is suggested by their positions within the grave. These annular buckles could date to the 7th century. A very similar annular buckle or brooch was found in grave 164 in the Saxon cemetery at Castledyke South, Barton-on-Humber (N Lincs) (Drinkall and Foreman, 1998, fig 106, no. 1). The Castledyke South cemetery dates from the early 6th to the late 7th century.

5. ON 2437. Whittle tang knife with long narrow blade with straight back and triangular section. (2 fragments). Possibly Ottaway back type E (Ottaway 1992, 572). Fe. L: 146mm; W: 13mm. Ctx 279037. Inv No 227

Other finds are ON 7446, three small fragments of Fe wire, Ctx 297038, Inv No 586.

Grave 282014

1. ON 2479. Spearhead, large leaf-shaped blade and long split socket. Swanton's Group C3 of very large spearheads with leaf-shaped blades (Swanton 1973, 55-9, fig 13), dated to the 6th and 7th centuries. There is a distinct cluster of this form of spear in Kent (*ibid*, fig 14). Swanton Fe. L: 377mm; L of blade: 246mm; W of blade: 42mm. Ctx 282016. Inv No 1217
2. ON 2480. Ferrule or socket. Fe. L: 79mm; D: 17mm. Ctx 282016. Inv No 206

Other finds

ON 4673. Nail head, flat circular. Fe. Ctx 282016. Inv No 56

ON 4621. Nail shank fragment. Fe. Ctx 282015. Inv No 22

Zones 20 and 21

Introduction

The metalwork assemblage from Zones 20 and 21 is almost exclusively from Roman contexts and comprises 444 objects and 769 fragments (Table 3.27). The large number of fragments is in part due to the recovery of many small fragments in sieving of soil samples. Most of the finds are stratified and from phased contexts ranging in date from the Late Iron Age to the late Roman period. A small number of finds (four tin cans) were recovered from a World War II feature associated with Manston Airfield. The group includes 120 metal finds (183 fragments) from graves. The remainder came from ditches (n = 39; n fragments = 60), pits (n = 57; n fragments = 80) and SFBs (n = 203; n fragments = 414). The finds from Zone 20/21 reflect the fact that this area was occupied by a Roman settlement.

Roman settlement (Zone 20/21 Table 2 RB)

There are 49 metal objects (59 fragments) from generic Roman contexts. Metal finds came mainly from pits, ditches, and especially graves.

Graves

Burials include both cremations and inhumations. Two cremation burials containined metal finds. Cremation burial 252066 was accompanied by two copper alloy bracelets (ON 4412 and ON 4413) and a finger ring

Table 3.27 Zone 20 metalwork summary by period and type

Phase	Feature type		Tools	Transport	Personal	Hobnails	Household	Security	Structural	Binding	Nails	Misc	Query	Undiag	Waste	Total
Late IA	Ring Ditch	Count												0		0
or early		Fragt												2		2
Roman	Ditches	Count					1			1	1	1				4
		Fragt					1			1	1	1				4
	Graves	Count		1	4	34					13	4	1	0		57
		Fragt		1	4	44					39	4	1	1		94
Roman	Pits	Count	1		1				1		1	1		0		5
		Fragt	2		1				1		3	1		3		11
	Trackway	Count									4	2	1			7
		Fragt									5	2	1			8
	Total	Count	1	1	5	34	1		1	1	19	8	2	0		73
	Total	Fragt	2	1	5	44	1		1	1	48	8	2	4		117
Early or	Ditches	Count									1	1				2
middle		Fragt									3	1				4
Roman	Graves	Count				28					11	1	4			44
		Fragt				27					19	1	4			51
	Topsoil	Count		1												1
		Fragt		1												1
	Trackway	Count			1						2					3
		Fragt			1						3					4
	Total	Count		1	1	28					14	2	4			50
	Total	Fragt		1	1	27					25	2	4			60
Middle	Ditch	Count	1						1		1					3
Roman		Fragt	1						1		1					3
	Enclosure	Count	2				1				3	2		0		8
	Ditch	Fragt	2				1				3	2		16		24
	Graves	Count									18	1				19
		Fragt									37	1				38
	Levelling	Count									2					2
		Fragt									2					2
	Natural feature	Count										1				1
		Fragt										1				1
	Pits	Count	1		3				1		13	7	4	0		29
		Fragt	1		3				1		18	8	5	4		40
	SFBs	Count	6		1		1		2	4	14	19	3	0		50
		Fragt	6		1		1		2	5	25	19	3	15		77
	Surface	Count							2			1				3
		Fragt							2			1				3
	Total	Count	10		4		2		6	4	51	31	7	0		115
	Total	Fragt	10		4		2		6	5	86	32	8	35		188

Table 3.27 (continued)

Phase	*Feature type*		*Tools*	*Transport*	*Personal*	*Hobnails*	*Household*	*Security*	*Structural*	*Binding*	*Nails*	*Misc*	*Query*	*Undiag*	*Waste*	*Total*
Middle	SFBs	Count	1		1		1		1	2	13	8	1	0		28
or late		Fragt	1		1		1		1	2	14	18	1	6		45
Roman	Ditch	Count			1		1	1			5	9	1			18
		Fragt			1		1	1			6	10	1			20
	Pit	Count	1			2				1	12	5	1	0		22
		Fragt	1			2				1	18	5	1	1		29
Late	SFB	Count	1		1	2	3	6	3	2	15	82	11	0	1	127
Roman		Fragt	1		1	2	3	6	3	2	27	100	22	126	1	294
	Trackway	Count												0		0
		Fragt												1		1
	Total	Count	2		2	4	4	7	3	3	32	96	13	0	1	168
	Total	Fragt	2		2	4	4	7	3	3	51	115	24	128	1	345
Modern	World War II	Count					4									4
	Features	Fragt					4									4
Topsoil	Topsoil	Count			1		2									3
		Fragt			1		2									3
	Ditch	Count									2	1	1			4
		Fragt									3	1	1			5
Unphased	Levelling	Count	1								1					2
		Fragt	1								1					2
	Total	Count	1								3	1	1			6
	Total	Fragt	1								4	1	1			7
	Unstrat	Count												0		0
		Fragt												1		1
	Total	Count	15	2	14	66	14	7	11	10	132	146	28	0	1	446
	Total	Fragt	16	2	14	75	14	7	11	11	228	176	40	176	1	771

(ON 4414). Cremation burial 252068 was very close to 252066 and was accompanied by a bracelet (ON 4426), part of the jointed mouth bar of a snaffle bit (ON 4425), some nails and bits of miscellaneous metalwork.

There were three inhumation burials with metal finds, but grave 205135 produced just a small undiagnostic fragment. Graves 126066 and 267003 both contained a number of hobnails, suggesting the possible presence of nailed footwear, but neither grave produced sufficient hobnails for a pair of shoes or boots. Grave 126066 contained 22 hobnails (32 fragments) and grave 267003 contained just 12 hobnails. Both graves also contained nails: grave 126066 produced six nails (7 fragments) and grave 267003 5 nails or nail heads and some 24 pieces of shank giving a total number of 29 fragments.

Pits

Four pits produced metal finds (Zones 20/21 Table 2), but two contained only nails and miscellaneous fragments and a third (271047) contained a large nail or stud with a domed head (ON 4422). Pit 126090 produced an iron tine for a wooden rake (ON 4620) and, from an upper fill, a post-medieval button (ON 1228).

Ditches

Three ditches produced metal finds, but in very limited numbers. Ditch 288074 contained a knife (ON 3801) with a solid handle. Some nails and miscellaneous metalwork were recovered from trackway 280027.

Early or mid-Roman contexts (Zone 20/21 Table 3 Early or mid Roman)

The finds from this phase are few and most came from burials. Inhumation grave 198300 had both nails (n = 5) and hobnails (n = 28), whereas grave 216094 had nails (n = 6) but no hobnails. Neither grave had obvious grave goods, but grave 198300 contained a tiny fragment of copper alloy rod and four curved pieces of iron bar (ON 3763), two of them apparently with hobnails or small nails fused to them. One of the bar fragments appears to have two spikes or hooks at one end, suggesting that it may have been part of a fleshhook.

Mid-Roman contexts (Zone 20/21 Table 4 Mid Roman)

Metal finds from this phase number 115 (188 fragments) and include a number of tools, personal and household items. The finds came mainly from pits and SFBs, with limited finds from ditches.

Burials

There are two inhumation burials, 128084 with 14 nails (33 fragments) but no other metal finds and 182241 with four nails (4 fragments) and a small length of thin iron rod.

Ditches and enclosure ditches

Two ditched produced metal finds. Ditch 205059 contained a small copper alloy bell (ON 860), possibly a harness bell, and a large nail or holdfast with L-shaped head (ON 4142). Enclosure ditch 249051 had eight metal finds (24 fragments), including a small pruning hook (ON 3107) and a possible small chisel or spatula (ON 4151) with a rod tang or handle. There is also part of a bone handle on an iron tang (ON 1902) as well as nails and miscellaneous pieces.

Pits

There are metal finds in small numbers from pits (Zone 20/21 Table 4 mid Roman). Pit 189182 contained a single nail and a possible punch or awl (ON 4427) comprising a tapering spike of circular section. Pit 228055 had a fragment of a decorated copper alloy hair pin (soil sample 7709) and a strip of iron. Pit 250094 produced a knife of distinctive blade form with a rounded tip and a rectangular section handle or tang (ON 3181). Pit 279028 produced a number of finds comprising a split spike (ON 108), nails, miscellaneous pieces and a length of bar with loops formed at each end (ON 4431), but also a bead (ON 3789) formed from a cut and rolled fragment of broad copper alloy armlet, possibly an amulet. Pit 286001 contained fragment of a brooch pin (ON 146) and nails.

Sunken-featured buildings (SFBs)

Three SFBs produced metal finds. SFB 249049 has single binding (2 fragments) (ON 3135) comprising two curved iron strips, one with a nail, possibly from a bucket or other vessel. The finds from SFB 22059 include a probable leatherworking knife with leaf-shaped blade (ON 3111) and a fragment of copper alloy pin shaft (sample 7723). Other finds are nails, miscellaneous metalwork and undiagnostic fragments. SFB 249081 contained the most metal finds, including a smith's hammer (ON 3195) weighing 1.155kg, a tanged paring chisel (ON 3184), an iron tine (ON 3185) from a wooden rake, a small square section punch (ON 4420) and an awl (ON 3704). A fragment of a broad lozenge section blade with an incomplete broad tang (ON 4174) could be from a bladed tool or possibly even from a sword. Other finds include four bindings – two L-shaped bindings (ON 3191, ON 3706), an iron collar (ON 3716) and an iron strip with nails (ON 3704) – and a large heavy bolt with a head in the form of a truncated cone (ON 3199). There are nails, miscellaneous fragments and three objects of uncertain identity. In total there were 43 metal objects (57 fragments) from SFB 249081.

Middle or late Roman contexts (Zone 20/21 Table 5 mid or late Roman)

Finds come from two SFBs, SFB 144128 which produced a single nail, and SFB 249085 which produced 27 metal objects (44 fragments). The latter include a small socketed pruning hook (ON 4026), a small simple copper alloy bracelet (ON 3800) and bucket handle mount (ON 3732). There are also two bindings formed from strip (ON 3728, ON 4188), an iron stud with a large domed circular head (ON 3729) and 12 nails (13 fragments).

Late Roman contexts (Zone 20/21 Table 5)

Late Roman metal finds are quite numerous, but a concentrated in just four features.

Ditch 217122 contained 18 metal finds (20 fragments) including nails and miscellaneous pieces along with a copper alloy finger with glass intaglio (ON 1904), an incomplete small iron ladle or spoon (ON 4155) and a latchlifter (ON 4154). Pit 251005 produced 22 metal objects (29 fragments) including a small socketed reaping hook (ON 856), two hobnails, an iron collar or binding (ON 847) and 12 nails (18 fragments). The largest group came from SFB 249083 (n = 125; n fragments = 292). Many fragments are small undiagnostic pieces from soil samples, but there are numerous miscellaneous pieces. Other finds include a small tanged lunate leatherworking knife (ON 3745), three tanged knives (ON 3152, ON 3158, ON 3748), one (ON 3152) of which is incomplete, another (ON 3158) bent double and the third (ON 3748) has the remains of an antler handle. There are also a barb spring padlock bolt (ON 3117), a slide lock bolt (ON 3150), a possible barb spring padlock key (ON 3188) and possible lock plate (ON 4176). If the latter is a lock plate it resembles lock plates from Saxon contexts (eg, ON 1871 from Grave 171168, **Cat. No. 11**). Structural fittings include a probable swivel (ON 3117), a spilt spike loop (ON 4193) and an iron dog or staple (ON 4161). The swivel was found together with the barb spring padlock bolt (also ON 3117) noted above.
The only other find was an undiagnostic fragment from trackway 126227.

Discussion

Many of the metal finds were recovered from SFBs, but the quantities of finds from the various structures are variable, with some producing almost no metal finds but others containing numerous objects. Although it would be tempting to assume that the finds found in SFB pits related directly to their use and occupation, caution is in order. An SFB is a pit and there is no reason to doubt that an abandoned SBF pit could have been used as a convenient hole into which to dispose of rubbish. That said it is perhaps unlikely that the smith's hammer (ON 3195) found in SFB 249081 was simply thrown away. It is heavy (1.155kg) and apparently perfectly serviceable. It is unlikely that any rubbish will have come far and it is likely to have come from within the settlement. We cannot simply dismiss the possibility that finds found in the pit of an SFB relate to its occupation and use, but we need to be cautious in our assumptions.

The bulk of the metal finds assemblage from Roman settlement in Zones 20 and 21 are structural items, including nails and craft tools, especially for metalworking, leatherworking and carpentry, and agricultural tools, especially reaping hooks. Most of the small number personal ornaments were found in graves.

Catalogue of objects from non-burial contexts

Tools

Metalworking

1. ON 3195. Smith's hammer, with almost circular eye and a small square face and a cross pane face. See examples from Vertault (Côte d'Or) (Tisserand 2010, pl. 1, nos

4-5). Fe. L: 208mm; W across eye: 55mm; T at eye: 28mm. Ctx 271053, SFB 249081. Inv No 20001. Mid-late Roman (Fig 3.10).

2. ON 4420. Punch. Tapered square section tool with small head. Fe. L: 110mm. Ctx 205139, SFB 249081. Inv No 20250. Middle-late Roman
3. ON 4179. Punch or set. Tapered tang flattened towards end to form a cutting edge. Pinched in just below the head. Fe. L: 74mm. Ctx 215228, surface 215228. Inv No 20227. Mid-late Roman
4. ON 3704. Awl. Square section bar tapering to a point at each end. Fe. L: 111mm. Ctx 215185, SFB 249081. Inv No 20113. Mid-late Roman

Woodworking

5. ON 3184. Tanged paring chisel with long slim blade. Compare an example with a maker's stamp from the Walbrook, London (Manning 1985, 21-2, pl 10, no. B25). Fe. L: 230mm. Ctx 271051, SFB 249081. Inv No 20096. Mid-late Roman (Fig 3.10).

Leatherworking

6. ON 3745. Lunate knife with tang of rectangular section. Leatherworking knife. Leatherworking knife. See an example from Pompeii (Gaitzsch 1980, Taf. 37, no. 176; see also *ibid*, 122-25 and Abb.13; see also Tisserand 2010, 254, fig 5 and pl. 2) Fe. :L: 93mm; W of blade: 72mm. Ctx 205166, SFB 249083. Inv No 20123. Late Roman (Fig 3.10).
7. ON 3111. Leatherworking knife with leaf-shaped blade, near complete, handle rectangular section, small rolled-over loop at the end. See an example from Vertault (Côte d'Or) (Tisserand 2010, pl 2, no 26), and another from Vindonissa (Switzerland) with similar leaf-shaped blade but twisted handle (Gansser-Burckhardt 1942, 18-9, Abb. 7, no 23:732). Fe. L: 167mm; W of blade: 29mm. Ctx 228068, SFB 228059. Inv No 20050. Mid-late Roman (Fig 3.10).
8. ON 4196. Double handled draw knife incomplete. One tang extant, the blade is twisted and at the end opposite the extant tang thickens as if for a second tang. The blade is double edged. Poorly preserved and damaged. May have been used for woodwork or leather preparation. Fe. L extant: 114mm. Ctx 215219. Inv No 20246. Unphased

Agricultural tools

9. ON 856. Reaping or pruning hook with split socket. Fe. L: 101mm; W: 45mm. Ctx 251011, pit 251005. Inv No 20122. Late Roman
10. ON 4026. Reaping or pruning hook, with open ring socket and nail hole. Fe. L: 100mm; W: 45mm. Ctx 252096, SFB 249085. Inv No 20186. Mid-late Roman
11. ON 3107. Pruning hook, with open ring socket and possible nail. Fe. L: 89mm; W: 33mm. Ctx 205134, enclosure ditch 249051. Inv No 20049. Mid-Roman
12. ON 3185. Rake tine with tang. Fe. L: 143mm. Ctx 271051, SFB 249081. Inv No 20099. Mid-late Roman
13. ON 4623. Probable rake tine with tang (2 fragments). Fe. L: 105mm. Ctx 171203, pit 126090. Inv No 20281. Roman
14. ON 860. Harness bell. Small bell with rounded dome and lozenge-shaped suspension loop. No clapper extant. Cu alloy. H: 29mm; D: 24mm. Ctx 205056, ditch 205059. Inv No 20287. Mid-Roman

Household

15. ON 4155. Ladle or spoon, fragment, comprising handle with part of small ladle bowl. Fe. L: 91mm. Ctx 249073, ditch 217122. Inv No 20166. Late Roman
16. ON 3801. Knife with solid handle with possible loop terminal. Almost triangular blade, bent at tip. Manning Type 8 knife with back angled down and solid handle (Manning 1985, 113, fig.28, no. 8). Fe. L: 206mm; L of blade: 142mm; W of blade: 42mm. Ctx 288075, ditch 288074. Inv No 20180. Roman
17. ON 3748. Knife, blade tip missing, part of antler handle still in place. Four loose antler fragments. Blade probably closest to Manning Type 15 (Manning 1985, 115-6, fig 28, no. 15), but may be related to the short broad late form Type 21 (*ibid*, fig 29, no 21). Antler and Fe. L: 178mm; W of blade: 25mm. Ctx 171221, SFB 249083. Inv No 20124. Late Roman
18. ON 3158. Whittle tang knife, blade (bent in half) has curved edge and slightly curved back. Originally *c* 160mm in length. Manning Type 15 (Manning 1985, 115-6, fig 28, no. 15). Fe. L extant: 84mm; W: 30mm. Ctx 205163, SFB 249083. Inv No 20066. Late Roman
19. ON 3181. Knife with solid handle rather than tang. Has a blade with rounded point and triangular cross section. Unusual form resembling the pointed end of an Iron Age poker, but the triangular section of the blade indicates that it is a knife of specialised form. Fe. L: 115mm; W of blade 27mm. Ctx 250101, pit 250094. Inv No 20091. Mid-Roman
20. ON 3728. Bucket handle mount. Long mount with an eye for the handle at the top and a nail hole just below. Broken at the bottom and originally longer. Fe. L: 238mm; W: 32mm. Ctx 144120, SFB 249085. Inv No 20142. Mid-late Roman
21. ON 3732. Bucket handle mount. Tapered strip with rolled loop or eye at the top. Square nail hole below the eye, bottom end bent and broken off. Fe. L extant: 83mm; W: 33mm. Ctx 144120, SFB 249085. Inv No 20147. Mid-late Roman
22. ON 1907. Possible bucket handle mount, incomplete. Strip with rolled over eye at one end, broken at the other. No nail holes. L: 91mm; W: 24mm. Ctx 227019, pit 279028. Inv No 20060. Mid-Roman

Personal

23. ON 3789. Possible bead or amulet formed from a cut and rolled fragment of moulded strip. Possibly a fragment of a broad armlet. Evidence for the re-working or re-cycling of artefacts, in particular the reuse of cut down bracelets and armlets. This armlet has been quite carefully rolled to make a neat bead or amulet. Cu alloy. L: 18mm; D: 9.5mm x 9.5mm. Ctx 279031, pit 279028. Inv No 20346. Mid-Roman (Fig 3.10).
24. ON 3800. Probable small plain bracelet, plain oval section band. Cu alloy. 49mm x 40mm; W: 3mm. Ctx 144120, SFB 249085. Inv No 20355. Mid-late Roman
25. ON 1904. Finger ring. Fragment with plain expanded bezel and incomplete band. Bezel set with an oval glass(?) intaglio with bevelled border. The intaglio has a slightly pitted surface but no obvious engraving. Cool's Group IV (1983 226-227) or Guiraud's Type 2c (1981, 22, fig 3; 1989, 181-82, fig 14). Cu alloy and glass. L: 20mm; W: 11mm. Ctx 135041, ditch 217122. Inv No 20348. Late Roman
26. Sample 7709. Hairpin, complete with small decorated head, a flame-shaped knob above a cordon. Possibly

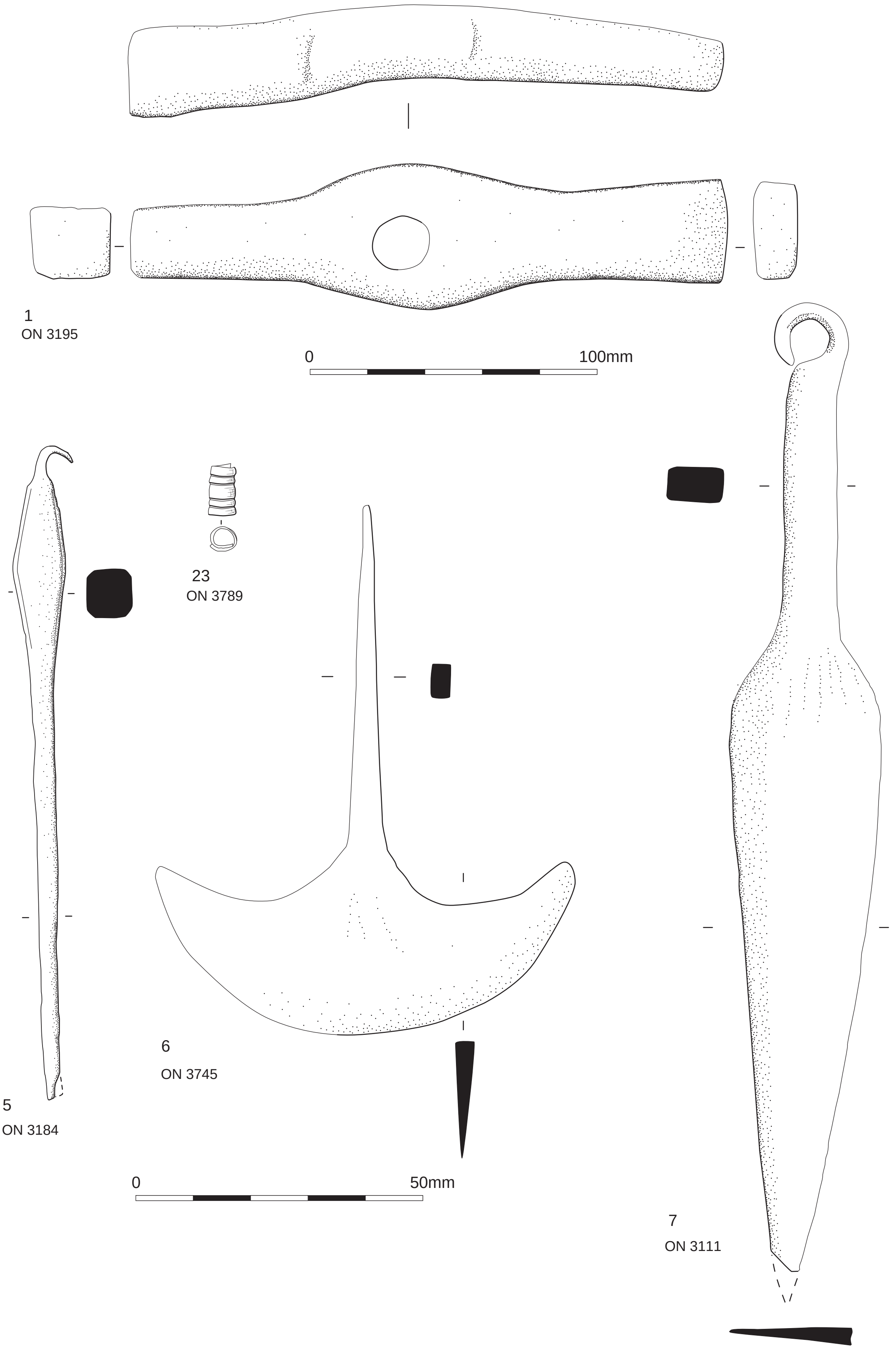


Fig 3.10 Metalwork from Zones 20 and 21

Cool's Group 2 or Group 3 (Cool 1990, 154, fig 2). Cu alloy. L: 121mm. Ctx 228056, pit 228055. Inv No 20351. Mid-Roman

27. ON 3708. Possible probe, stylus or modelling tool formed from wire, tapering to a point at one end and formed into a small flattened small flared terminal at the other end. Bent. Small flared head is rather small and not spoon-like, so the identification is uncertain. Alternative identification as a stylus is unlikely since the shaft is too slim for a comfortable grip and what would be the eraser is rather narrow and small. Most likely a modelling tool. Cu alloy. Original L: *c* 140mm. L extant: 118mm. Ctx 214130, trackway 249061. Inv No 20374. Early or mid-Roman

Locks and keys

28. ON 3188. L-shape slide key, thick rectangular section stem. Bit at a right angle to stem and has no visible cuts or teeth. Lack of teeth suggests it is unfinished, but there is a slide lock bolt from Colchester which has a simple rectangular opening (Crummy 1983, fig 136, no. 4134). The bit engaged with the slide bolt (see ON 3150 below) lifting the tumbler(s) and allowing the bolt to be withdrawn. Compare examples from Colchester, Essex (Crummy 1983, 125-26, fig.140, nos 4150, 4153-4154). Fe. L: 95mm. Ctx 171214, SFB 249083. Inv No 20098. Late Roman
29. ON 3150. Slide lock bolt. Compare bolts from Colchester, Essex (Crummy 1983, 124, fig 4133, 4136). Used with an L-shaped slide key such as Cat.No. 28. Fe. L: 87mm; W: 20mm. Ctx 205163, SFB 249083. Inv No 20059. Late Roman.
30. ON 3117. Barb spring padlock bolt with two bolts, one wide with a single extant spring, the others narrow with two springs, one each side. The bolts spring from a sub-rectangular end plate which may have had a bolt or pierced plate attached close the padlock. Fe. L: 99mm. Ctx 205162, SFB 249083. Inv No 20029. Late Roman.
31. ON 4176. Probable lock bolt. Incomplete broad, round shouldered and tanged plate with a slot down the centre. A bar is fixed across the plate secured by two rivets. Comparable to bolts from Saxon cemetery at Buckland, Dover (Kent) (Evison 1987, 100-101, text fig 17, see also *ibid*, fig 4, grave F, no. 4). Fe. L exant: 73mm; W: 47mm. Ctx 171233, SFB 249083. Inv No 20222. Late Roman
32. ON 4154. Latch lifter, handle incomplete. Fe. L: 173mm. Ctx 249073, ditch 217122. Inv No 20203. Late Roman

Structural

33. ON 3199. Bolt or stud with domed or truncated cone shaped head. Square section shank. Fe. L: 91mm. Ctx 271054, SFB 249081. Inv No 20106. Mid-late Roman
34. ON 4422. Bolt or stud with large domed head and oval section shank. Fe. L: 87mm. Ctx 271050, pit 271047. Inv No 20252. Roman
35. ON 4184. Nail or bolt with large slightly domed head and deliberately split lower shank. Fe. L: 97mm. Ctx 171246, ditch 171245. Inv No 20235. Unphased
36. ON 3117. Swivel? Rod with mushroom shaped head at one end and incomplete hook or loop at other. Fe. L: 85mm. Ctx 205162, SFB 249083. Inv No 20030. Late Roman
37. ON 4193. Split spike loop. Fe. L: 70mm. Ctx 171231, sunken featured building 249083. Inv No 20245. Late Roman
38. ON 1908. Split spike loop. Fe. L: 68mm. Ctx 227014, pit 279028. Inv No 20061. Mid-Roman

Bindings

39. ON 3191. Binding or L-shaped fitting formed from narrow strip. No nail holes. Fe. L of arms: 220mm and 163mm; W: 20mm. Ctx 271051, SFB 249081. Inv No 20002. Mid-late Roman
40. ON 4188. Binding or collar, strip broader in the middle and tapering at each end, one end incomplete. Bent into a half circle with extant end bent at a right angle. Fe. L: 80mm; W: 63mm. Ctx 215239, SFB 249085. Inv No 20241. Mid-late Roman

Objects of uncertain function

41. ON 4174. Tanged blade? Broad incomplete blade of lozenge cross section, with rectangular section tang or handle. Possible tool. Fe. Ctx 205146, SFB 249081. Inv No 20219. Mid-late Roman
42. ON 4183. Looped bar or strip. Tapering bar or strip, incomplete, formed into a rolled over loop at the narrow end. Fe. L extant: 62mm. Ctx 171228, SFB 249083. Inv No 20232. Late Roman
43. ON 3144. Plate with rolled over loop at one corner. No nail holes. Fe. L: 65mm; W: 43mm. Ctx 205163, SFB 249083. Inv No 20048. Late Roman

Finds from burials

Roman inhumation burials

Finds from these inhumation burials in Zone 20 are tabulated in Table 3.38 below.

Roman cremation burials

Grave 252066 burial 252067

Bracelets placed above the cremated bone, no sign of burning on the bracelets or finger ring.

1. ON 4412. Simple penannular bracelet, formed from thick wire, with plain very slightly expanded terminals which end square. The terminals now slightly overlap. Plain penannular bracelets seem to have been used from the mid 1st century to the mid 4th century Cu alloy. Ctx 252067. Inv No 20382
2. ON 4413. Ribbon twist bracelet, formed on a thick iron wire core and spirally wrapped with thin copper alloy strip. Corrosion of the iron has removed much of the wrapping but sufficient remains to show how the bracelet was decorated. (6 fragments). Probably a variant of the ribbon twist bracelet defined by Cool (1983, 129-30). These differ from the more common cable twist in being wound around a core, which is often removed, leaving a void. This bracelet is probably a variant of this type made with an iron core which was left in place. Ribbon twist bracelets seem to be almost exclusively from 4th century AD contexts. Fe and cu alloy. Ctx 252067. Inv No 20383
3. ON 4414. Finger ring with expanded bezel with small glass intaglio and angular hoop. The intaglio is now stained green, probably by copper alloy corrosion, and appears to have an image (undefined) cut into its surface. Cool (1983, 226-227) classifies plain finger rings with expanded bezels as Group IV, rings with a stone or glass intaglio. This example fits into sub-group IVA (*ibid*, fig 6.1, no. 6). Guiraud (1981, 223, fig 3; 1989, 181-85, fig 11) classifies this

Table 3.28 Metal finds from Roman inhumation burials in Zone 20

Grave	*Description*	*Count*	*Fragt.*	*Dimensions*	*ON*	*Context*
126066	Type 1 nail, small	1	1		1300	126067
	Type 1 nail head with stem scar. Possible mineral preserved wood traces	1	1		1301	126067
	Type 1 nail, incomplete.	1	1		1302	126067
	Type 1 nail (2 fragts), encrusted with corrosion product	1	2		1303/ 1304	126067
	Type 1 nail, incomplete.	1	1		1306	126067
	Type 1 nail, incomplete	1	1		1307	126067
	13 x hobnails; 9 x single nails; 2 x clumps of 2 hobnails each	13	11		1305	126067
	9 hobnails	9	21		sample 5903	126068
	Total	28	39			
205135	Undiagnostic fragment. Fe	0	1		sample 7702	205136
267003	Type 1 nail, almost complete. Fe	1	1	L: 74mm	1927	267001
	Nail of uncertain type (only part of head) almost complete. Fe	1	1	L: 83mm	1928	267001
	Type 1 nail (2 fragts), stem bent. Fe	1	2		1923	267001
	Type 1 nail, incomplete. Fe	1	1		1914	267001
	Type 1 head fragment. Fe	1	1		1922	267001
	12 x nail stem fragments. Fe	0	11		1915	267001
	Nail stem fragment. Fe	0	1		1916	267001
	Nail stem fragment. Fe	0	1		1917	267001
	Nail stem fragment. Fe	0	1		1918	267001
	Nail stem fragment. Fe	0	1		1920	267001
	Nail stem fragment. Fe	0	1		1924	267001
	Nail stem fragment. Fe	0	1		1925	267001
	Nail stem fragment. Fe	0	1		1926	267001
	4 x nail stem fragments. Fe	0	4		4596	267001
	Nail stem fragment. Mineral preserved wood. Fe	0	1		4598	267001
	3 x hobnails. Fe	3	3		1913	267001
	3 x hobnails. Fe	3	3		sample 6812	267001
	6 x hobnails. Fe	6	6		4597	267001
	Strip fragment. Fe	1	1		1921	267001
	Total	18	42			
128084	1 x Type 1 nail, complete, bent; 1 x nail stem fragment. Mineral preserved wood. Fe	1	2	L: 47mm	1828	128086
	Type 1 nail, incomplete (2 fragts). Fe	1	2		1811	128086
	Type 1 nail, incomplete. Fe	1	1		1812	128086
	Type 1 nail, incomplete. Fe	1	1		1813	128086
	Type 1 nail, incomplete. Fe	1	1		1822	128086
	Type 1 nail, incomplete. Fe	1	1		1817	128086
	Type 1 nail, incomplete. Fe	1	1		2300	128086
	Type 1 nail, incomplete. Fe	1	1		2301	128086
	Type 1 nail incomplete, head flattened against stem. Fe	1	1		4415	128086
	2 x nail head fragments, 3 x stem fragments. Mineral Preserved wood. Fe	2	5		1821	128086
	Type 1 nail head; 4 x small stem fragments. Fe	1	5		2302	128086
	Nail stem fragment. Fe	1	1		1818	128086
	Nail stem fragment. Fe	0	1		1819	128086
	Nail stem fragment. Fe	0	1		1820	128086
	Nail stem fragment. Fe	0	1		1823	128086
	3 x nail stem fragments. Fe	0	3		1824	128086
	2 x nail stem fragments, refit. Fe	0	2		1827	128086
	Nail stem fragment. Fe	0	1		1829	128086
	Nail stem fragment. Fe	0	1		1830	128086
	Nail stem fragment. Fe	0	0		2304	128086
	Nail stem fragment. Fe	1	1		4416	128086
	Total	14	33			
182241	Type 1 nail, complete	1	1	L: 80mm	3777	182242
	Type 1 nail, incomplete	1	1		3776	182242
	Type 1 nail, incomplete	1	1		3780	182242
	Type 1 nail head only	1	1		3778	182242
	Small length of thin rod	1	1		3779	182242

Table 3.28 (continued)

Grave	Description	Count	Fragt.	Dimensions	ON	Context
	Total	5	5			
198300	Type 1 nail, incomplete and bent. Fe	1	1		3759	198301
	Type 1 nail incomplete. Fe	1	1		3766	198301
	Nail with small head, incomplete. Fe	1	1		3760	198301
	2x nail fragments (may refit). Fe	0	2		3761	198301
	Type 1 nail incomplete. Fe	1	1		3762	198301
	Type 1 nail incomplete + small undiagnostic fragment (not nail). Fe	1	1		3764	198301
	Hobnail. Fe	1	1		3763	198301
	17 x hobnails. Fe	17	17		3774	198301
	8 x loose hobnails; 1 clump of 2 hobnails	10	9		3775	198301
	4 fragments of rectangular sectioned bar, 2 curved at one end, appear to have small nails/tacks or hobnails at the curved end. 2 other bar type fitting fragts, 1 possibly the end of a flesh hook with 2 hooks. Fe	4	4		3763	198301
	Tiny rod fragment. Cu alloy	1	1		sample 7777	198299
	Total	38	39			
216094	4 x Type 1 nails, 1 x complete, 3 x incomplete; 1 x stem fragment. Some with traces of mineralised wood.	4	5	L: 65mm	4571	216095
	Type 1 nail, 2 fragts, incomplete	1	2		3785	216095
	Type 1 nail 3 fragts, incomplete	1	3		3786	216095
	2 x nail stem, mineral preserved wood	0	2		ON 3784	216095
	Total	6	12			

brooch as Type 2f, a ring with simple expanded bezel, but with an angular band or hoop. Cu alloy. 23.5mm x 20mm; W: 8.5mm. Ctx 252067. Inv No 20384

Grave 252068 burial 252069

1. ON 4426. Torc twisted bracelet, incomplete, formed from single twisted strand of flattened rectangular section wire. Similar bracelets recovered from 4th- to early 5th-century grave deposits in the Butt Road cemetery and 3rd- to 4th-century deposits from Inner Relief Road excavations at Colchester (Essex) (Crummy 1983, 37-8, fig 41, nos 1590, 1620). Cool (1983, 136-37, table 5.3) dated this type to the late 3rd or 4th century. Cu alloy. 85mm *c* 70mm. Ctx 252069.
2. ON 4425. Possible snaffle bit link. Bar of sub-square section with loop at one end and stub of possible loop at the other end. Fe. L: 86mm. Ctx 252069.

Additional items from this grave are tabulated below.

Zone 22

The only find was a fragment of iron strip from early medieval ditch 193085.

Zone 23

The 10 objects (27 fragments) from Zone 23 include a fragment of copper alloy sheet, a piece of iron strip and two nails recovered from the upper fill (context 195075) of Bronze Age ring-ditch 195070. With the exception of these, a nail shank fragment from the upper fill of Early Bronze Age ring-ditch 195004, and another from a Roman pit (290305), all the finds are from post-medieval or modern contexts.

Zone 29

The finds from Zone 29 total 23 objects (325 fragments), and 19 objects (19 fragments) including 12 nails are from topsoil. Another nail was found in Roman pit 159041, two more in unphased dump deposit 159061 and a further fragment in Roman cremation burial 159009. Six miscellaneous pieces and an offcut of lead all came from the topsoil.

Table 3.29 Miscellaneous metal obejcts from Zone 20 Roman cremation burial 252068

Description	No.	Fragt.	Dimensions	ON	Context
2 x Type 1 nails, complete; 1 x nail stem fragment. Nail Lengths: 73mm and 66mm. Fe	2	3	L: 73mm L: 66mm	4424	252069
Bar, eroded but tapered at each end. Possibly an eroded tang at one end. Possible tool. Fe	1	1	L: 82mm	4424	252069
Length of rod, one end flattened (rectangular section) Unknown purpose. Fe	1	1	L: 110mm	4425	252069
Short length of thick bar, slightly tapered through its length. Fe	1	1		4425	252069
Strip of plano-convex section, slightly irregular (eroded) edges. No nail holes. Fe	1	1	L: 85mm	4425	252069
Total	6	7			

Summary catalogue of illustrated objects from non-burial contexts (Figs 3.1-3.10)

These objects are listed in sequence of excavated zones. Detailed descriptions are presented in the main text of this report (above). Significant metal objects from graves are illustrated with their respective grave plans in Volume 1.

Zone 5 (Fig 3.1)

1. ON 887. Penannular brooch with large circular terminals recessed for inlay (now lost). Cu alloy. Ctx 123190, pit 254114, intervention 254114. Middle Iron Age

Zone 6 (Fig 3.2)

1. ON 4094. Missile point, socketed with tapering circular section point. Fe. Ctx 289044, SFB 170132. Late Roman. Inv No 868
2. ON 698. Missile point with long square- or lozenge section point. Most of the socket missing. Fe. Ctx 130012, feature 170028, colluvium. Inv No 671
3. ON 2957. Spearhead with mid rib and asymmetric wavy outline. Closed socket with single nail. Fe. Ctx 170010, feature 170010, colluvium. Inv No 717
7. ON 699. Possible tanged arrowhead with lozenge section blade. Fe. Ctx 130012, feature 170028, colluvium. Inv No 668
8. ON 2988. Dagger blade, diamond cross section, tang with a spacer or washer. Fe. Ctx 305050, feature 170010, colluvium. Inv No 724
14. ON 4311. Cast buckle plate with pattern of fine punched dots and hinged buckle frame (missing). Cu alloy. Ctx 130012, feature 170028. colluvium. Inv No 1139
17. ON 990145. Buckle with oval frame attached to oval plate formed from sheet and secured by two rivets. Cu alloy. Ctx 279144, ditch 170099. Mid-Roman. Inv No 1149
18. ON 335. Buckle, with concave, or saddle-shaped, loop and a buckle plate. Pattern of lightly engraved lines and small punched dots on plate face. Cu alloy. Ctx 130009, feature 170010, colluvium. Inv No 1024
21. ON 305. Ploughshare. Fe. Ctx 130010, feature 170028, colluvium. Inv No 1194
26. ON 3940. Scythe blade, complete. Iron Age type. Fe. Ctx 252254. Unphased. Inv No 1199

Zone 6 (cont) (Fig 3.3)

40. ON 4062. Tanner's two-handed draw knife with curved blade. Fe. Ctx 137271, ditch 137270. Mid-Roman. Inv. No.815
41. ON 2963. Awl with tapering circular section blade and tang. Fe. Ctx 305004, feature 170010, colluvium. Inv No 718
46. ON 3209. Fire tool or poker formed from iron bar with small rolled-over loop terminal. Fe. Ctx 305041, feature 170010, colluvium. Inv No 1198
51. ON-. Hooked billet. Top of a hooked billet. Fe. Ctx 262158, posthole 262157. Mid-Roman. Inv No 1250
54. ON 2972. Possible steelyard, bent double. Suspension loops missing. Fe. Ctx 305006, colluvium 170010. Inv No 898
59. ON 3347. Ring-headed swan's neck pin. Cu alloy. Ctx 130012, feature 170028, colluvium. Inv No 1109
64. ON 2148. Simple one-piece bow brooch, with circular section bow with knob towards head. Cu alloy. Ctx 130012, feature 170028, colluvium. Inv No 1049
65. ON 2181. One-piece bow brooch with flat section triangular bow and plain catchplate. Nauheim Derivative. Cu alloy. Ctx 256047; pit 256060. Late Iron Age or early Roman. Inv No 1050
72. ON 3878. Small Colchester brooch, with three rectangular perforations in the catchplate and plain wings over the spring. Plain bow with flattened outer face. Cu alloy. L: 53mm; W: 18mm. Ctx 130012, feature 170028, colluvium. Inv No 1122
74. ON 3350. Two-piece Colchester brooch, no foot knob and unpierced catchplate. Spring intact and protected by plain wings. Cu alloy. Ctx 130012, feature 170028, colluvium. Inv No 1110
78. ON 3353. Hod Hill brooch. Cu alloy. Ctx 130012, feature 170028, colluvium. Inv No 1111
82. ON 3308. Broad armlet decorated with parallel moulded ridges including cable pattern borders. Slightly broadened bur undecorated terminal. Rolled fragment Cu alloy. L of rolled fragment: 19mm; W: 16.5mm. Ctx 130012, feature 170028, colluvium. Inv No 1101
83. ON 3377. Possible bracelet fragments, comprising two strips folded together. The outer band has plain raised borders and a central rib and is probably a fragment of an early Roman broad armlet. Cu alloy. Ctx 126236, layer 258058. Roman. Inv No 1119
93. ON 627. Small finger ring with expanded bezel decorated with a diamond-shaped panel of raised dots. Cu alloy. Ctx 130012, feature 170028, colluvium. Inv No 1038
95. ON 2969. Finger ring with large oval bezel. Fe. Ctx 245123, probable pit 245134. Early or mid-Roman. Inv No 713
96. ON 614. Hairpin with tapering shaft and decorated head. Cu alloy. Ctx 170024, pit 170021. Mid-Roman. Inv No 1031
97. ON 3231. Hairpin fragment comprising decorated head and upper shaft. Cu alloy. Ctx 124163, layer. Early Roman. Inv. No 1085

Zone 6 (cont) (Fig 3.4)

100. ON 3967. Nail cleaner and ear scoop. The nail cleaner has a moulded handle with loop at the top and rocker decoration down the centre of the blade. The scoop is quite plain. Found together. Cu alloy. Nail cleaner. Ctx 327031, pit 327030. Mid-Roman. Inv Nos 1130-1131
109. ON 2180. Tankard handle, cast. Cu alloy. Ctx 263019; ditch 170088. Late Iron Age or early Roman. Inv No 1069
114. ON 326. Knife with solid handle with looped terminal. Fe. Ctx 130010, feature 170028, colluvium. Inv No 727
124. ON 3960. Key fragment – S-curved bar with rolled over loop at one end. Fe. Ctx 319041, pit 319034. Early Roman. Inv No 601
127. ON 3910. Link or brace formed from a loop thick wire, twisted to form the stem with loops at each end. Fe. Ctx 317028, cobbled surface 126275. Iron Age. Inv No 659

Zone 10 (Fig 3.5)

1. ON 4217. Smith's tongs. One arm ends in a rolled over loop with attached bar to hold jaws closed. Fe. Ctx 279254, ditch 178358. Early to mid-Saxon. Inv No 10073

Zone 11 (Fig 3.5)

12. ON 435. Two-piece Colchester brooch (Colchester

derivative), poorly preserved. Foot and catchplate are missing. Cu alloy. Ctx 209121, grave 147141. Roman. Inv No 11013

Zone 12 (Fig 3.6)

1. ON 1400. Iron tyre. The tyre has a plano-convex cross section. Fe. Ctx 238014, feature 268010, intervention 238012. Roman. Inv No 12005

Zones 13/14 (Fig 3.7)

1. ON 4568. Mortice chisel, socketed, with closed socket. Fe. Ctx 191127, SFB 191125. Early Roman. Inv No 14039
3. ON 1704. Draw knife blade. Triangular section blade with angled back and rounded ends. Fe. Ctx 157070, pit 157069. Saxon. Inv No 14054
11. ON 1709. Prick spur, with plain conical prick, terminals decorated with incised diagonal crosses and each has 2 pin or rivet holes. Cu alloy. Ctx 193138, enclosure ditch 159219. Roman. Inv No 14065
14. ON 4575. Ring headed pin, with arched shaft that is short in proportion to ring. Fe. Ctx 248029, pit 248027. Early or Middle Iron Age. Inv No 14040
26. ON 1586. Whittle tang knife, with a groove parallel to the back and steeply angled at the point. Fe. Ctx 240038, pit 240037. Saxon. Inv No 14011
29. ON 4590. Whittle tang knife, with angled back and cured edge. Fe. Ctx 264041, pit 264021. Saxon. Inv No 14045
31. ON 531. Large whittle tang knife. Straight back, angled point. Fe. Ctx 133051, pit 133048. Saxon. Inv No 14077
38. ON 558. Whittle tang knife, blade bent. Fe. Ctx 173081, pit 173079. Unphased. Inv No 14097
39. ON 578. Whittle tang knife with straight back curving down to the tip, and a straight edge. Edge welded to the knife. Fe. Ctx 203017, quarry pit 159336. Unphased. Inv No 14112

Zone 15 (Fig 3.8)

45. ON 1523. Padlock bolt, formed from strip bent into a U-shape and pinched into a kink halfway down one side, end bent back on itself to form a barb spring. Two plain rings threaded onto the bolt. Fe. Ctx 126145, pit 126141. Early or Middle Iron Age. Inv No 14136

Zone 19 (Fig 3.9)

1. ON 1204. Penannular brooch, decorated with transverse mouldings. Large circular terminals recessed for inlay (now lost). Pin is bent and has a decorated attachment loop. Cu alloy. Ctx 126162, ditch 126170. Early Roman. Inv No 473
2. ON 1208. Buckle with fixed plate. Plate decorated with a T-shaped cut out and punched ring and dot motifs. Cu alloy. Ctx 126095, topsoil deposit. Inv. No. 492

Zones 20/21 (Fig 3.10)

1. ON 3195. Smith's hammer, small square face and cross pane face. Fe. Ctx 271053, SFB 249081. Mid-late Roman. Inv No 20001
5. ON 3184. Tanged paring chisel with long slim blade. Fe. Ctx 271051, SFB 249081. Mid-late Roman. Inv No 20096
6. ON 3745. Lunate leatherworking. Fe. Ctx 205166, SFB 249083. Late Roman. Inv No 20123
7. ON 3111. Possible leatherworking knife with leaf-shaped blade, almost complete. Fe. Ctx 228068, SFB 228059. Mid-late Roman. Inv No 20050
23. ON 3789. Possible bead or amulet formed from a cut and rolled fragment of moulded strip, possibly from a broad armlet. Cu alloy. Ctx 279031, pit 279028. Mid-Roman. Inv No 20346

Chapter 4

Metalworking Debris

by Samantha Rubinson

Introduction

Approximately 14.7kg of material identified as iron slag or related industrial debris was submitted for analysis. The condition of the material is moderate, with the majority of the slag fragments slightly abraded around the edges.

All of the material was examined visually or with use of a hand lens to identify type and form. Hammerscale was collected by running a magnet over environmental samples sieved to 4–2mm and 2–0.5mm. This information was then assigned to various production processes and the results recorded. A summary of the details is presented in Table 4.1.

Description

Fragments of only two clay crucibles have been identified, and there are no mould fragments. Early–Middle Iron Age pit 186033 in Zone 13 contained three joining fragments of a small crucible with a pouring lip, though it was not possible from what survived to calculate the dimensions and volume of the crucible. It was clearly small, suggesting that it was for precious metals, but XRF analysis carried out at the British Museum showed no surviving traces. The form of this crucible is very unusual, if not unique, at this date (Paul Craddock pers. comm.). The second crucible fragment is an undiagnostic body sherd, heavily burnt but not vitrified and with no visible trace of metal, recovered from early Roman ditch 170032 in Zone 6.

A total of 12.82kg of slag was probably the product of ironworking activities, specifically iron smithing. The slag is typically amorphous, consisting of a combination of highly vesicular pieces, sometimes with a slightly 'ropey' upper surface, and more dense low porosity pieces. Some of the latter are likely to be fragments of smithing hearth bottoms that no longer retain their original shape.

The assemblage includes five distinct smithing hearth bottoms (SHBs). These are the hemispherical bowl-shaped accumulations of slag which formed at the base of smithing hearths. A detailed list can be found in Table 4.2. Four of these SHBs are relatively dense with a low porosity, while the other, from Zone 6, is smaller and moderately vesicular. The sizes vary from 60 x 60 x 25mm to 130 x 120 x 60mm, and weights from 62g up to 491g.

Small quantities of hammerscale were found in environmental samples from Zones 3, 6, 10, 11, 14, and 20.

The upper part of a hooked billet, a small ingot of raw iron ready for smithing, came from Zone 6. Its surviving length is 110mm and it weighs 634g (see Chapter 3; Zone 6, cat. no. 51). The billet is likely to be Late Iron Age or Roman in date and came from a component posthole (262157) of a four-post structure (262165) which has been assigned a mid-Roman date, though postholes in the same group also produced Iron Age pottery.

Table 4.1 Ironworking debris by zone, type and weight

Zone	*No. pieces*	*Smithing (g)*	*Hearth lining (g)*	*Non-diagnostic (g)*	*Other (g)*	*Total (g)*
1	1			12		12
3	18	106		22		128
6	100	476	107	229	956	1768
10	48	749	102	25		876
10a	58	1986				1986
11	5	290				290
12	29	358		110		468
13	35	220	24	82		326
14	53	5599		41		5640
19	28	383	74	3		460
20	122	2040	10			2050
21	1	427				427
23	27	151		7	38	196
29	10	31	13	30	1	75
Totals	477	12,816	330	561	995	14,702

Other finds that could have been associated with metallurgical activity include one piece of possible iron ore (31g) from Zone 6 and six pieces of coal (38g) from Zone 23. However, there is relatively little other ironworking debris from either of these zones, and no evidence for smelting.

A small quantity of hearth lining (330g) was identified. As hearths can be used for a multitude of activities only the hearth lining found in direct association with iron smithing slag can be attributed to metallurgical activity. Hearth lining with iron slag adhering to it was found in Zones 10, 13, 14, 19, 20, and 29, and one piece (from Zone 14) had the remains of a probable tuyère hole.

Non-diagnostic material (561g), generally in the form of fuel ash slag (FAS), was also recovered. This material can be created by various high temperature processes including, but not exclusive to, metalworking.

Table 4.2 Details of smithing hearth bottoms (SHBs)

Zone	*Context*	*Weight (g)*	*Dimensions (mm)*	*Notes*
6	132079	62	60x60x25	
14	158052	211	95x65x30	
14	158064	491	130x120x60	
14	158064	423	85x70x40	In multiple pieces
21	205121	427	100x75x40	

Discussion

Overall, the quantity of slag is very small given the size of the area investigated and the large number of features excavated, and there were no clear concentrations of metallurgical residues. Of the 13 zones with slag assemblages, the largest quantity of debris (5.6kg) came from Zone 14. This zone produced several relatively large pieces of slag (average weight 560g) and three of the five SHBs. Approximately 2kg of smithing slag came from Zone 10a and a similar quantity from Zone 20, whilst the remaining zones produced an average of 290g of smithing slag, with less than 100g coming from Zones 1 and 29. The general paucity of material is echoed in the similarly small quantities of metallurgical debris recorded on two other large linear projects which crossed parts of the southern half of Thanet, on the Weatherlees to Broadstairs wastewater pipeline (Egging Dinwiddy and Schuster 2009) and the A253 road improvements to the west of the EKA2 (Bennett *et al* 2008).

No debris from iron smelting was recovered from the site and the relatively small quantities of smithing slag provide no clear evidence of ironworking activity within the excavated areas. The presence, however, of a combination of smithing slag, hearth lining, tiny quantities of hammerscale and the hooked billet from Zone 6 indicates smithing activity in the vicinity during the Iron Age or Roman period, with similar evidence of Roman or later date from Zone 10. A pair of smith's tongs, of probable early or mid-Saxon date were found in Zone 10 (see Chapter 3; Zone 10, cat. no. 1). A slightly larger quantity of smithing slag from Zone 20 can be fairly confidently assigned a late Roman date, and also from this area came several metalworking tools, including a smith's hammer, two punches and an awl (see Chap 3; Zone 20, cat. nos 1–4). The largest quantity of ironworking debris, from Zone 14, also suggests smithing within or very close to the zone, but in this case in the mid-Saxon period, although no metalworking tools were identified from that area.

Chapter 5

The Worked Flint and Burnt Flint

by Phil Harding

Introduction

All worked flint from all stages of the project has been catalogued and quantified by zone (Table 5.1). In addition chronological characteristics were noted to technology and typology. The quantification by zone indicates distinct variations in artefact density across the route, with some zones being more productive than others. These variations in some cases reflect areas of colonisation by stone-using communities where flints were found in contemporary pits, but elsewhere often coincide with areas of later prehistoric, Roman and post-Roman activity, where artefacts were recovered from secondary contexts. The quantification of worked flint as calculated by all excavated features by zone, which represents an unbiased indication of the density of worked flint, shows a relatively low but consistent retrieval rate of this material. Worked flints therefore indicate that all landscape zones of the route have proved attractive to human populations at some time throughout prehistory. This provides an insight into early settlement patterns, much of the evidence of which has otherwise been truncated by subsequent agriculture.

Raw material

One of the most important features of the worked flint in this part of East Kent lies in the selective exploitation of specific forms of raw material through time. The exploitation of raw material types and their movement across the landscape, linked both to technology and tool typology, underpin variations in the distribution and chronology of prehistoric settlement in this part of Thanet from the Early Neolithic to the Late Bronze Age. Three forms of raw material have been recognised:

Bullhead Flint. This good flaking variety is easily identifiable by its distinctive green-stained cortex which overlies an orange rind. The Bullhead Beds outcrop in an east-west alignment below the crest of the Chalk ridge at between approximately 14m and 25m aOD. This broadly coincides with the northern edge of the 'head brickearth' and where the Chalk is overlain by Thanet Sand, minerals from which provide the source of the distinctive staining. This type of flint was preferentially used in Neolithic assemblages.

Beach cobbles. These sub-rounded nodules of flint weighing on average approximately 520g were undoubtedly collected from the storm gravel or marine beach deposits that fringe the inner arc of Pegwell Bay on the east coastline. These nodules are more difficult to break open on account of their sub-rounded surfaces and have heavily impacted exterior surfaces, but once broken the flint is of good consistent quality. Preferred use can be associated with Late Bronze Age industries.

Chalk flint. This variety is ubiquitous along the crest of the Chalk Ridge and north of the Bullhead Beds, occurring both as small irregular or columnar nodules. Both types are of relatively good flaking quality but invariably contain incipient thermal fractures acquired from frost action during periglacial conditions. Flint was readily available, occurring as fresh material direct from the Chalk encountered during the digging of pits and ditches, as nodules brought up from the up-cast of tree-throws or as surface material that had eroded naturally from the Chalk.

Results

Relatively few of the individual worked flint assemblages were well stratified or firmly dated by associated pottery. The majority were incorporated with other groups of later periods. These groups can be of limited value, but by comparison with data from securely stratified groups and combining established artefact typology and technology it has been possible to reconstruct patterns of activity across individual landscape zones. Artefacts from sealed deposits were frequently in mint or very fresh condition with only limited edge damage, a condition which often characterised material from secondary contexts. Collections from the 'brickearth' of the Ebbsfleet Peninsula and the Pegwell Bay/Cliffs End zones of the route were generally unpatinated, whereas artefacts from the Chalk Ridge often displayed a white or blue surface patina irrespective of their age.

Landscape Zone 1 (Ebbsfleet Peninsula)

Zone 1

Zone 1 produced 47 pieces of worked flint, which were primarily from secondary fills of medieval and, to a much lesser extent, Roman ditches. The entire collection

Table 5.1 Worked flint

Zone	*1. Blade cores*	*2. Bladelet cores*	*3. Flake cores*	*4. Broken cores/Core fragments*	*5. Blades*	*6. Broken blades*	*7. Bladelets*	*8. Broken bladelets*	*9. Flakes*	*10. Broken Flakes*	*11. Crested pieces*	*12. Rejuvination tablets*	*13. Microliths*	*15. Chips/micro debitage*	*16. Scrapers*	*17. Other tools*	*22. Axe thinning*	*23. Projectile points*
Unstrat	0	0	2	2	1	0	0	0	23	19	0	0	0	0	4	3	0	0
1	0	0	1	0	1	0	0	0	21	13	0	0	0	3	2	0	0	0
2	0	0	1	1	1	1	1	0	11	10	0	0	0	0	1	0	0	0
3	0	1	19	7	7	8	1	0	101	81	0	3	0	27	11	4	0	2
4	0	0	3	5	7	2	0	1	52	38	0	1	0	1	4	1	1	0
5	0	0	0	0	2	0	0	0	10	7	0	0	0	0	0	0	0	0
6	1	1	57	24	60	57	20	23	598	759	1	11	2	440	66	18	86	5
7	0	1	19	9	6	10	3	2	244	268	0	5	1	9	20	7	0	1
8	0	0	11	6	1	4	0	0	68	57	0	0	0	6	11	0	0	1
9	0	0	1	0	0	0	0	0	5	3	0	0	0	0	2	0	0	0
10	1	0	26	7	11	16	2	1	183	158	1	4	0	26	10	8	0	0
11	0	1	22	6	17	12	3	5	236	169	0	2	0	67	11	3	1	0
12	1	0	24	18	29	15	3	4	366	172	0	3	0	21	14	10	0	0
13	1	0	12	10	62	33	5	3	733	379	1	7	0	11	31	10	2	2
14	0	0	10	7	31	20	11	2	194	117	0	1	0	28	10	1	4	2
15	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0	0	0	0
17	0	0	0	0	0	1	0	0	3	10	0	0	0	0	0	0	0	0
18	0	0	1	0	0	0	0	0	7	2	0	0	0	0	0	0	0	0
19	0	0	3	0	2	2	0	0	66	66	0	0	0	12	0	1	1	0
20	0	0	0	0	3	0	1	0	75	73	0	1	0	5	5	0	0	0
21	0	0	15	6	51	20	6	8	628	502	0	3	0	32	4	1	0	0
22	0	1	8	2	12	7	1	2	141	102	0	5	0	2	5	0	1	1
23	0	0	33	21	83	38	6	15	989	746	0	7	0	297	12	1	2	2
24	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
26	1	1	11	2	17	6	2	1	123	64	0	1	0	3	7	2	1	0
29	0	0	0	0	0	0	1	0	4	2	0	0	0	1	0	0	0	0
Grand total	5	6	279	133	404	252	66	67	4889	3819	3	54	3	991	230	70	99	16

is flake-based and generally undiagnostic with the exception of a Neolithic microdenticulate, a disc core and two end scrapers, both made on flakes and which may also be Neolithic.

Zone 2

Low densities of material were primarily recovered from medieval ditch sections. Three broken flakes, that could be refitted, were found with a flake core in a posthole. This material is made from flint derived from a source of beach cobbles, a feature of Late Bronze Age material.

Zone 3

This zone produced 290 pieces of worked flint from 111 contexts, including 36 fills within an Early Bronze Age monument comprising an outer C-shaped ditch and an inner ring-ditch (172039, 172035, 172040 and 172041); only 18 pieces came from the primary fills. Four pieces of worked flint were recorded from Late Iron Age/early Roman gully 172034, which also included poor quality 'cobble' flint. Most of the remaining 53 contexts are from medieval features. However, the worked flint includes quantities of residual material, possibly extending back to the Mesolithic, in the form of a bladelet core made on a flake from a medieval ditch (172024). Neolithic material was listed approximately 12 times on the basis of the presence of Bullhead flint, abraded striking platforms and 16 blades, which are relatively rare compared to flakes. Retouched tools also provided a strong indication of earlier activity, including an unstratified Neolithic microdenticulate made on a blade of Bullhead flint from subsoil and two residual leaf arrowheads, both apparently broken in manufacture, one from Early Bronze Age monument 172039 and one from medieval ditch 172017. Less certainly dated, but none the less likely to include Neolithic material, are 12 scrapers.

The distribution of this material was concentrated on the slightly higher ground in the central part of the zone, with another concentration around the southern fringes of Ebbsfleet Hill to the north, coincident with the south part of Zone 4. The land separating these two areas of rising ground was largely devoid of worked flint, possibly reflecting marshy or periodically inundated land.

Later material, specifically of Late Bronze Age date, was noted by the use of cobbles as raw material, which

24. Denticulates	*25. Core Tools*	*26. Edge damaged*	*27. Piercers*	*28. Burins*	*30. Microdenticulate*	*31. Debitage*	*32. Miscellaneous retouched*	*Total worked*
0	0	0	0	0	0	3	3	60
0	0	0	0	0	1	5	0	47
0	0	0	0	0	0	2	1	30
0	0	2	0	0	1	5	10	290
0	0	0	1	0	1	5	7	130
0	0	0	0	0	0	0	0	19
0	7	10	6	0	6	58	56	2372
0	0	0	1	0	2	62	26	696
0	0	0	1	0	1	9	5	181
0	0	0	0	0	0	0	0	11
0	0	2	3	0	4	26	20	509
0	1	4	0	0	0	9	9	578
2	0	4	2	0	3	37	12	740
1	1	1	0	1	3	33	20	1362
0	0	3	1	0	8	13	7	470
0	0	0	0	0	0	0	0	6
0	0	0	0	0	0	2	0	16
0	0	0	0	0	0	0	0	10
0	0	0	0	0	0	15	1	169
0	0	1	0	0	0	0	1	165
1	0	0	1	1	2	43	11	1335
0	0	0	0	0	1	4	6	301
0	1	2	0	0	1	59	10	2325
0	0	0	0	0	0	0	1	5
0	0	0	0	0	0	12	4	258
0	0	0	0	0	0	0	0	8
4	10	29	16	2	34	402	210	12,093

appeared in 11 instances. However, it is difficult to justify using worked flint to date any features, especially any of five pits, which collectively produced only nine pieces of worked flint.

Zone 4

A total of 130 pieces of worked flint was collected from 67 contexts. Sixty-three of these contexts ranged in date from the Bronze Age to the medieval, with a predominance of material listed from 44 contexts in Late Bronze Age or Iron Age pits and ditches. This extensive use of the landscape during the first millennium BC was reflected in the composition of the worked flint assemblage, which included 13 records of probable Late Bronze Age artefacts, including 12 uses of cobble flints and seven pieces with miscellaneous retouch. However, traces of earlier activity persisted with six observations of probable Neolithic material clustered around the southern flanks of Ebbsfleet Hill, including a microdenticulate from an undated feature (177338) and four scrapers, one a probable Early Bronze Age thumbnail specimen from a Roman ditch (190271), and a well made end scraper made on a blade from a Late Bronze Age cremation burial (252229).

Zone 5

Zone 5 lay on the south-facing slope of Ebbsfleet Hill and produced only minimal quantities of worked flint, 19 pieces from 13 contexts, of which the largest quantity, three pieces, came from a post-medieval posthole. It is probable that this dearth of worked flint, which is mirrored on the north face in Zone 6, can be attributed to ploughing, which has scoured the slopes of the hill.

Zone 6

Zone 6, which corresponded to extensive multi-period settlement and field systems of Late Bronze Age and later date, produced the largest quantity of worked flint from the project, 2372 pieces from 638 contexts. Quantification shows that retouched material accounts for 7% of the assemblage of which the most prevalent form of retouched implements are scrapers, which totalled 38% of the retouched component. Despite this only one scraper was securely dated within a Neolithic pit (312047), with one other implement from a tree-throw feature (176167). Most other scrapers were poorly stratified or from derived contexts.

The worked flint assemblage is itself, like the site, multi-period; however patterns in the artefact distribution, technology and typology, linked to the distribution of archaeological features, made it possible to isolate Mesolithic and Early Neolithic activity from much of the later settlement.

Quantities of worked flint were relatively low from Ebbsfleet Hill at the southern end of the zone, although small assemblages were preserved in Early Neolithic pits that contained associated pottery. This distribution of Early Neolithic flint may suggest that activity was centred less on the summit of Ebbsfleet Hill than around the lower, more sheltered ground. Worked flints were more prevalent around the lower slopes of the hill coincidental with deposits of colluvium, which undoubtedly migrated down from the upper slopes. The colluvium, which was overlain by a deposit of 'dark earth', contained both Early Neolithic and Late Bronze Age/Early Iron Age material, which provides a *terminus post quem* for the deposition of the colluvium.

These later prehistoric deposits filled the southern part of a hollow, north-east of Ebbsfleet Hill, which defined the eastern boundary of the Ebbsfleet Peninsula. The precise extent of the prehistoric coastline is uncertain but much of the lowest lying land may have been waterlogged, marshy or a marine inlet and influenced the distribution of worked flint and occupation at its edge. There is a total absence of Bullhead flint from the hollow itself, although a band of worked flint containing this distinctive raw material can be traced around the landward rim of the hollow between 4.75m and 5.5m aOD. This spread of worked flint extended beyond the limits of the colluvium and 'dark earth', around the slopes below Ebbsfleet Hill and thinned gradually northwards away from the hill. The distribution thinned most noticeably north of Late Bronze Age/Early Iron Age ditches 190513 and 190514. These features appear to have marked the southern boundary of a field system laid out on the rising ground to the north which may have initiated plough damage to pre-Bronze Age deposits. The worked flint to the north of this field boundary comprised predominantly artefacts of beach cobble flint, which are more likely to have been contemporary with the field system than the Bullhead flint.

A tree-throw feature (176167), which was excavated completely, contained an obliquely blunted point, a bladelet core and an assemblage of debitage. This feature was found with two subsoil hollows (170051) around the lower coastal margins. All artefacts exposed on the weathered surface of these two features were collected and surveyed, providing a representative sample to characterise the technology but insufficient to undertake detailed analysis of distribution, refitting potential or consideration of taphonomy.

Mesolithic

Apart from the obliquely blunted point and bladelet core from tree-throw hole 176167, a second microlith, a straight backed point, was found at the southern end of Early/Middle Iron Age ditch 249101 approximately 55m south of the tree-throw. A burnt tranchet axe (ON 3978; Pl 5.1) was found approximately 25m north-east of the tree-throw in an early Roman pit (132098). It is uncertain to what extent these artefacts represent activity that is separate from or continuous with that of Early Neolithic date.

Pl 5.1 Mesolithic tranchet axe (ON 3978) from Zone 6

Neolithic

Worked flints of probable Early Neolithic date were also found in the tree-throw feature 176167 and two shallow hollows 170051. The tree-throw feature contained 550 pieces of flaking waste in mint condition with an additional 367 pieces of microdebitage. This collection included a large number of core tool thinning flakes and Bullhead flint and was concentrated in an area approximately 0.5m long by 0.3m wide at the south end of the feature. The assemblage had clearly survived below the level of ploughing. A dispersed trail of material extended northwards, possibly reflecting plough disturbance. Artefacts extended to the lip of the feature, suggesting that the upper parts of the assemblage had been truncated, possibly by ploughing. Objects were recovered from approximately four spits, each 20mm thick, demonstrating vertical movement of material through the sediment.

The flaking waste contained the output of two distinct 'industrial' processes; core tool production and flake and blade production. The core tool production was represented by at least 70, soft hammer struck, core tool thinning flakes (Newcomer 1971) which accounted for 13% of the total flake and blade component. Similar thinning flakes were found in features surrounding the tree throw feature. Flakes representing preliminary roughing out and shaping of the core tool were almost totally absent making it impossible to determine raw material type. However a number of flakes were sufficiently distinctive to have been from one nodule, although no refitting pieces were identified.

Flakes and blades derived from core trimming accounted for 87% of the flakes and blades, of which blades accounted for 13% of the total, thereby confirming that blades were a significant product of debitage. This part of the assemblage included recurring use of Bullhead flint sufficient to confirm its use for blade manufacture in the Early Neolithic period.

The 'industrial' character of the assemblage was confirmed by the large quantity of broken material and by the scarcity of retouched pieces, with only one well made end scraper made on a snapped flake that was possibly broken in manufacture. Cores were also under-represented; only one bladelet core made of Bullhead flint was found.

The small quantities of material recovered from the surface of the two sub-surface hollows (170051) were also in mint condition. This sample represents a more diverse set of objects than the collection from the tree-throw feature, including a small flake derived from a beach cobble and therefore more likely to be Late Bronze Age in date. In all other respects features of technology were more consistent with Early Neolithic material. The small retouched component included a well made end scraper on a flake and two Bullhead blades with edge retouch, all from the southernmost spread.

Assemblages of worked flints were found in a number of Early Neolithic pits on Ebbsfleet Hill, most notably on the lower northern slope and to the south of the areas of 'industrial' output. An isolated pit (125279), dated by pottery, lay further to the north but contained no other flint apart from one flake of beach cobble flint, which may be intrusive. Seven of the pits contained pottery, while a further four have been assigned to the Early Neolithic on the basis of the flint assemblages, which were of varying quantities, and their location relative to the other pits. Two pits with pottery were excavated near the crest of the hill, although these features contained only seven and three pieces of worked flint respectively. Utilised material was restricted to a blade with a highly developed bifacial surface gloss. The Early Neolithic pits around the lower slopes of Ebbsfleet Hill comprised five examples in a dispersed linear arrangement aligned down the slope, with a second cluster of four closely spaced pits to the east. Artefact density was noticeably greater towards the base of the slope; most notably six pits which contained 102 pieces of worked flint were of comparable volume to the pits towards the crest of the hill which produced very little. Retouched tools were also more numerous, including five microdenticulates, four scrapers and two piercers. The microdenticulates were all found in the same general area and, together with another example from an adjacent medieval ditch, indicate a consistent pattern of implement use in this area, possibly involving cutting.

The variation in worked flint density, type and the features they are contained within may hint at contrasts in the nature of Early Neolithic activity areas and site function at the base of Ebbsfleet Hill. Pits were concentrated around the base of the hill in contrast to areas to the north, where they were absent. The latter coincided with much greater concentrations of worked flint, including manufacturing debris, which may suggest that this area functioned as an open air workshop or possibly a refuse area beyond the area of principal occupation. The 'industrial' or refuse nature of the worked flint assemblage on land to the north of Ebbsfleet Hill was, to some extent, confirmed by retouched tools. Four arrowheads included one (ON 2161), found to the north of the scatter, which lacked its tip. However, a triangular blank (279146), one other snapped leaf arrowhead (ON 3888) and a retouched flake (279126), probably broken deliberately but apparently an unfinished arrowhead, were all found in the general area of flaking debris and appeared to be unfinished implements. This area also produced a number of fragments of polished axes (including ON 3233) as well as scrapers, and a more complete polished axe with a broken blade (ON 3917; Pl 5.2) came from a tree-throw hole approximately 100m to the north. Also from the northern half of the zone, came a flint hammerstone (ON 3211), from Middle Iron Age pit 289050, and a Cornish Group 1 Greenstone axe (ON 866) from Middle–Late Iron Age ring-gully 247083, described further below (Chapter 6, cat nos 11–12). An additional axe rough out (ON 696; Pl 5.2) was found in the fill (232056) of a Late Iron Age ditch (154172) at the north end of the zone.

Pl 5.2 Neolithic axes (ON 696, Zone 6; ON 3917, Zone 6; ON 412, Zone 11)

Zone 7

This stretch of the route provided 214 contexts with worked flint and was one of primarily Late Bronze Age and Iron Age settlement, which accounted for 74% of these contexts. This chronology was again reflected in the composition of the worked flint assemblage. Bronze Age and/or Late Bronze Age material was noted from 33 contexts in contrast to only six for Neolithic. Late Bronze Age flint technology dominated, characterised by hard hammer percussion, exploitation of beach cobble flint, flakes with cortical butts and hinged terminations, Siret fractures (accidental breakage) and incipient cones of percussion, denoting miss-hits, on core striking platforms.

That this flint working technology may have persisted into the Iron Age is suggested by a small group of 13 broken flakes that were found in the primary fill of Middle/Late Iron ditch 299019. The retouched component, which included two end scrapers, sharpened by denticulate retouch, a piercer and three flakes with miscellaneous retouch, also conforms to this chronological grouping. However, residual elements were also present in the same context, most notably a microdenticulate, differentiated not only by typology but also by a 'soapy' surface texture. A second microdenticulate, made on a blade of Bullhead flint, was found in Late Iron Age/early Roman ditch 201137 with a further retouched blade, also Bullhead, from contemporary ditch 201143. This ditch also produced a knife/sickle with a glossy ventral surface that was snapped, possibly smashed by voluntary fracture (Bergman *et al* 1983). Elsewhere, an Early Neolithic leaf arrowhead was found in Iron Age ditch 201100 and a possible tanged/backed microlith, the earliest artefact from this zone, in Late Bronze Age pit 179117.

Zone 8

Approximately half (52%) of the 181 worked flints from Zone 8 were collected from 273092, the southernmost of the two Bronze Age ring-ditches on Cottington Hill; this accounted for 43 of the 78 excavated contexts with worked flint. However, only two of these contexts produced material from primary fills, comprising two flakes, a core and a broken core. There is undoubtedly a direct relationship between the quantities of flint in the barrow ditch and its absence as a natural resource; the barrow ditch being cut through Thanet Sands and failing to expose the natural Chalk. The probable Early Bronze Age date of the monument was largely confirmed by the general absence of Late Bronze Age material, only one instance of cobble flint being noted. Conversely, there are eight contexts with Neolithic or Early Bronze Age material, at the latest, with six well made end scrapers, use of platform abrasion, a blade core, a microdenticulate and the use of Bullhead flint, both as a core and support for an end scraper. There was, in addition, a leaf arrowhead/plano-convex knife from the barrow ditch.

Zone 9

Only 11 pieces of worked flint, including two scrapers, came from five Iron Age or Roman contexts.

Zone 10

Recovery of worked flint here largely reflects the presence of Late Bronze Age and later activity. The zone produced 509 pieces of worked flint from 190 excavated contexts (mean 2.6 pieces per context) of which only 19 (10%) were dated earlier than the Middle Bronze Age. Only 12 contexts recorded flints from primary contexts. The observed increase in the use of Bullhead flint, with 22 records, undoubtedly relates to the fact that the Bullhead Beds, as mapped by the British Geological Society, outcrop immediately to the north; however, 13 occurrences of the use of beach cobbles generally coincided with features of Bronze Age and later date and associated features of later technology.

The most significant group of material from Zone 10 comprises 35 pieces of Early Neolithic flint working debris, from pit 123001. This total includes 22 pieces of microdebitage (chips), with two microdenticulates, a naturally backed blade with edge damage and four other blades, two of them broken. Three additional broken blades and a soft hammer-struck flake with edge retouch, which may have migrated down slope, were found immediately to the south of the pit in the secondary filling of ditch 194091. A retouched flake with an abraded striking platform was also found in a ditch to the west.

Slightly further to the north, pit 227010, dated to the Early Bronze Age by a sherd of Beaker pottery, contained 20 flakes with two flake cores, but no retouched tools. Some of these pieces were in mint condition, suggesting that they may not be derived. Evidence of earlier prehistoric, notably Neolithic, activity on the site was confirmed by material from a number of Iron Age ditches and pits, including a probable sickle with heavy gloss on the edge from ditch 197025, a knife with a faceted butt from ditch 249184, a microdenticulate from ditch 194109 and an end scraper made on a flake from a polished axe from pit 168010. A crested blade, a by-product of deliberate blade manufacture and in mint condition, was the only object found in an otherwise undated pit 144181, which lay among other features of much later date.

Zone 11

The line of the excavation here followed almost precisely the outcrop of the Bullhead Beds. Stratified assemblages from this zone heavily favoured excavated features of Iron Age or later date. The assemblage was predominantly flake-based with only 8% of all debitage listed as blades/bladelets. Nevertheless, elements of the reworked material confirm some pre-Bronze Age activity along this zone. Amongst the earliest artefacts is a probable Mesolithic tranchet axe sharpening flake, from an Iron Age posthole (211145).

The most significant collection of worked flint was recovered from a pit (212022) which contained 86 pieces including a core and six blade/lets, suggesting an Early Neolithic date. The assemblage also includes an end scraper made on a flake; however, the greatest number of pieces comprises 55 chips, which confirm the contemporaneity of the assemblage with the feature. The pit lay on the western edge of an undated palaeochannel and approximately 80m to the south of an undated pit (155037) which was also tentatively assigned a Neolithic date and contained two small, well worked flake cores and a broken blade. This pit was dug through the fill of the palaeochannel, indicating that the channel had silted up by the time the pit was dug. The location of these probable Early Neolithic pits may well have been influenced by the presence of the palaeochannel, a conclusion that is reinforced by a number of blades made using Bullhead flint that were found in later features within a corridor flanking the palaeochannel. In addition an axe, with a plano-convex cross section (ON 412; Pl 5.2) and probably also Neolithic, was found in a tree-throw feature (196009) also close to the paleochannel. Additional Neolithic artefacts, both of Bullhead flint, are represented by an opposed platform flake core from Early Iron Age ditch 190415 and a fabricator found in Roman structure 190431.

No conclusive evidence of flake-based Early Bronze Age industries was found. However, a thumbnail scraper, from Middle Iron Age grave 210003, and one other small end scraper, from Iron Age ditch 159320, were recovered, which may indicate activity of that date.

Evidence of material displaying established characteristics of late prehistoric flint working was also abundant. This includes relatively scarce use of Bullhead flint, more frequent exploitation of beach cobbles and retouched tools, notably denticulate scrapers, all synonymous with Late Bronze Age settlement in the area.

Zone 12

Zone12 produced worked flint from 243 contexts, most of which reflect Late Bronze Age or later activity, although pit 189001 may be earlier in date. This feature contained 10 pieces of worked flint including four blades, four flakes and a scraper, all in very fresh condition, that suggest that it may be Neolithic, possibly Early Neolithic in date. The assemblage was also associated with five sherds of pottery which collectively weigh only 10g, and are assigned a Middle or Late Iron Age date. Irrespective of its actual date, pit 189001 clearly contained a sufficiently large group of earlier material to suggest earlier activity in this area.

There are also a number of residual objects which confirm earlier activity, including a bifacial knife/laurel leaf, a backed knife and four blades of Bullhead flint from Middle to Late Iron Age ditch 190109, a microdenticulate from a similarly dated ditch 190195, one other microdenticulate from Early to Middle Iron Age posthole 154024, and a blade of Bullhead flint from Late Iron Age ditch 190126. A flake with a faceted butt from Late Iron Age ditch 190198 may be best placed with the Levallois type technology of the Late Neolithic, with two side/end scrapers from Iron Age ditch 190189 possibly of Early Bronze Age date. Two contexts were dated to the Middle Bronze Age and one other, a tree throw feature, to the Middle to Late Bronze Age. Elements of the Late Bronze technology were also evident, including use of beach cobble flint. Most of these artefacts were recovered from ditches; none were sufficiently numerous or well stratified to suggest that they constituted dumps of knapping debris.

Landscape Zone 2 (Cliffs End Spur)

Zone 13

An assemblage totalling 1362 artefacts was collected from 300 separate contexts, a mean of 4.4 pieces per context. Much of the assemblage comprised material derived from the Bullhead flint bed, which outcrops along the southern fringes of the zone. The collection includes no stratified Neolithic groups, although an undoubted scatter of residual material pre-dating the Early Bronze Age was incorporated in later features.

The largest monument, ring-ditch 134096, contained a mixed assemblage in both composition and condition. Flakes predominated, with only 8.7% listed as blades, while individual contexts frequently contained both patinated and unpatinated material. Material was concentrated in the tertiary and secondary fills; of 16 groups with relatively large artefact counts mean frequency was calculated as 28 pieces from tertiary contexts and 15 from secondary deposits, with primary deposits virtually sterile. Cores were also heavily under-represented with only three flake cores, two with multiple platforms, and a semi-discoidal core and five broken cores including a fragment from a single platform blade core. Despite the proximity of the Bullhead flint, isolated fragments of beach cobble were recorded, with similar rare instances of refitting flakes.

Ring-ditches 193125 and 134097 contained only relatively small quantities of flakes, of which only one large piece with characteristics of Levallois technology may be Late Neolithic in date. There were no cores, three blades and two scrapers. Early Bronze Age ditch 134098 also contained only eight undiagnostic flakes, all likely to be residual pieces.

Grave 177085, dated by radiocarbon to the Middle Neolithic, contained a single flake and four broken flakes. None of these could be considered to represent grave goods.

The retouched component includes 12 scrapers made on flakes. These implements are sufficiently numerous and well made that some may have predated the construction of the Bronze Age monument and be of Neolithic date. Other retouched tools worthy of note include a Late Glacial blade with double burin on a concave truncation from secondary ditch fill 132046, a chisel arrowhead of probable Middle Neolithic date from tertiary ditch fill 298001, and a similar arrowhead from Early-Middle Iron Age SFB 174060 near the centre of the ring-ditch. There are also a number of tools with less refined levels of retouch that may post-date the use of the ring-ditch.

Zones 14 and 15

These zones produced 476 flint artefacts from 165 separate contexts, which included 192 stratified pieces from a cluster of Early Neolithic pits. Eight out of 10 pits contained both pottery and worked flint, while four other pits, out of 12 that were less certainly dated, contained small quantities of worked flint and were probably contemporary. Of the 12 features containing worked flint assemblages only three (191086, 191093 and 191179) contained over 11 pieces of material; the remainder averaged only 3.6 pieces from each feature. The pit distribution was distinct. A large cluster of six, all with worked flint, including the two largest groups of material (191086, 191093), was surrounded by more diffuse groups, pairs and individual features, up to 25–30m away. The main pit cluster was located within a sparse distribution of Late Bronze Age linear features from which only one residual blade was found.

None of the pits contained sufficient material to allow metrical or refitting analyses to be undertaken, indicating that the contents did not represent systematic backfilling of flaking debris. These small groups did, however, illustrate consistent features of the local Early Neolithic flint technology. Raw material was represented in approximately equal amounts by Bullhead flint and weathered surface flint. The technology was primarily one of blade and flake production using platform abrasion to produce blanks with plain butts from single or multi-platform cores. Only one flake core was found, a poorly worked, single platform core made on a fragment, from pit 191179. Collectively, all phases of the flaking process were represented, including cortical material and broken blades and flakes and some retouched pieces. The three largest groups of material had a consistently high representation of blades, which accounted for between 25 and 35% of each assemblage. Small quantities of microdebitage confirmed that flaking was taking place in the locality, but accounted for only a small sample of the likely total.

Blanks could then be converted into a range of retouched flake tools. In contrast to most prehistoric assemblages, where end scrapers predominate, the most frequent retouched tools were microdenticulates made on blades, of which seven were found in the three large assemblages. There was only one end scraper made on a flake from pit 191086. The significance of microdenticulates was maintained by one other example, found with an end scraper made on a primary blade, in pit 186037. A broader aspect to the technology may be indicated by three flakes from pit 191086 that were reminiscent of core tool thinning flakes.

Ephemeral traces of Early Neolithic activity were present in later features elsewhere across the site, which confirms the distribution of activity. This included a blade from an undated pit (277004) approximately 150m to the west of the pit complex, and a leaf arrowhead from Late Bronze Age/Early Iron Age gully 168056 at the west end of Zone 14. Continuity of activity was demonstrated by a Late Neolithic/Early Bronze Age plano-convex knife (ON 512; Pl 5.3) from ditch 200009 aligned parallel to and immediately east of gully 168056, while an Early Bronze Age barbed and tanged arrowhead and a small end scraper, made on a flake, both probably contemporary, were recovered from Roman ditch 159219. Despite these distinctive pieces, worked flint was again dominated by material from features of Late Bronze Age or later date.

Pl 5.3 Late Neolithic/Early Bronze Age plano-convex knife (ON 512) from Zone 14

Landscape Zone 3 (Chalk Ridge)

Zones 17, 18 and 19

Zones 17 and 18 produced only relatively small quantities of worked flint from features of Iron Age or later date. Zone 19 produced material from 53 contexts, predominantly from Late Bronze Age and later features. Most of the artefacts are unpatinated, but a number of patinated pieces reflect the transition of the route from 'head brickearth' to the Chalk. The most closely dated but nevertheless insecurely provenanced pieces are 51 flakes from 13 contexts relating to a Late Bronze Age segmented enclosure (126230). Retouched material was scarce. Only one flake was noted that was considered might be of Neolithic workmanship.

Zone 20

A total of 62 contexts was recorded with worked flints, all but 17 being of Roman date. Stratified flints were found in pit 171252, on the northern edge of the zone, approximately 185m north-east of Early Bronze Age ring-ditch 194137. The pit contained the largest group of worked flint from this zone, comprising 31 flakes and broken flakes, including a pair of refitting Siret fractures (accidental breakage) and a blade. The four scrapers were all end scrapers made on flakes. They included a large snapped implement, originally made with a finely retouched blade that had been heavily used. Irregular retouch around one part of the blade may have been undertaken at the time of its breakage. One other scraper was found with a worn blade. Two scrapers were made using blanks with faceted butts. It is not certain to what degree this attribute was used to control the flaking angle, a feature on Late Neolithic scrapers, or merely resulted from alternate flaking. The pottery assemblage comprises Early Bronze Age Collared urn, which may provide the most reliable dating indicator.

A number of other isolated, but otherwise undated pits, includes pit 228055 which contained a blade with an abraded butt and soft hammer mode that suggest an Early Neolithic date of manufacture. Evidence of early settlement elsewhere in the area was sparse but included one end scraper and a truncated naturally backed blade, both from Roman sunken-featured-buildings. Significantly the zone produced no records of Bullhead flint.

Zone 21

A total of 1335 pieces of worked flint was collected from 76 contexts. Of these, 60 contexts were firmly associated with three Bronze Age ring-ditches and their related inhumation burials, with an additional assemblage from a tree-throw feature (302106). The remainder survived as residual material from 12 features, including two undated pits lying within ring-ditch 216090, with all other contexts likely to be of later date or undated.

Ring-ditch 216090 contained the largest assemblage of worked flint, 894 pieces, from this zone. The assemblage was recovered from four separate stratigraphic units within the ditch; the primary fill, a dump of material lying at the interface of the primary and secondary fills, with separate groups from the secondary and tertiary contexts. Five individual groups of material totalling 94 artefacts were also associated with three inhumation burials and pits at the centre of the monument.

Forty-seven worked flints were found in four closely related segments of the ring-ditch primary fills. These segments formed two clusters of which 18 and 23 pieces respectively lay directly on opposite sides of the monument, aligned on the axis with ring-ditch 126180 to the north-east. Both clusters included a flake core; that on the south-west side refitted to a tertiary flake with a hinged termination, providing the only evidence of *in situ* flaking. However, although both groups were in relatively fresh condition and undisturbed, neither group represented debitage from a single source. The material may therefore include elements of both deliberate dumping and natural silting. Cortical remnants also confirm variable sources of raw material, including some flint possibly direct from the Chalk, other material from surface deposits and one flake with a glossy surface, possibly from gravel. Core preparation and trimming aspects of the reduction sequence were represented. There were no retouched tools. Percussion was by hard hammers producing irregular squat or broad flakes with plain butts. The primary fills were otherwise barren, reflecting a trend in the barrows on the Chalk Ridge to have been kept clean or isolated during their primary use; the relatively narrow width of the ditch base is in any case likely to have reduced the probability that flaking took place there.

A group of lightly patinated material, with similar technology and composition to the clusters on the ditch base, lay in the base of the weathering cone at the interface of the primary and secondary ditch fills on the north side of the ring-ditch. The dump was relatively well defined, approximately 0.50m across, and lay at a depth possibly coincidental with an irregular turf line, indicating a hiatus in the silting process, recorded on the west side of the monument. These 180 pieces of debitage contained only 3% blades, with one broken core and no retouched tools, and were also in mint condition. This single act of refuse disposal suggests that episodes of flint working continued in the locality through the Bronze Age, following that associated with the construction of the monument.

By far the largest assemblages of worked flint from the monument were collected from the secondary and tertiary ditch fills. These groups of material accounted for 33% and 40% respectively of the worked flint from the ring-ditch, this density reflecting not only relative volumes of the excavated ditch sediments but also allowing for some degree of vertical migration by artefacts through the sediment profile. The material from both the secondary and tertiary fills was flake-based, blades accounting for only 6% of both totals, suggesting that the majority of the assemblage was again Bronze Age in date. Those few blades that were present included two from the secondary fills with abraded butts, one made of Bullhead flint using soft mode. A flake core and a microdenticulate, both also of Bullhead flint from the tertiary fills, hint at the possibility of earlier activity. Nevertheless the almost total absence of cores (only four were found, of which two were unproductive) was repeated, and the relative scarcity of retouched tools, one knife, one piercer and a scraper, also reinforces interpretation of the deposition as one of flaking waste.

The worked flint from the secondary and tertiary fills was undoubtedly incorporated into the ditch sediments by way of natural silting enhanced by plough erosion from both the surrounding area and the mound itself. Flint artefacts may, therefore, have come from a variety of sources reflecting activity on a pre-mound old ground surface, during the construction and any subsequent modifications to the mound, or from subsequent activity including agriculture in the surrounding area. The results may be expected to have created a homogeneous distribution; however artefact density within individual ditch segments was variable ranging from 111 to one piece in the secondary fills, which possibly reflect variations of activity distribution at the site. The greatest densities of artefacts from both secondary and tertiary fills coincided with segments containing the clusters of material from the primary fills on the western and eastern sides of the monument.

Worked flints were also found in the backfill of three inhumation burials (246134, 246139 and 216091) and two interconnecting, possibly natural, pit features (246137 and 147178) in the interior of the monument. Grave 246134 was cut through these pits and contained the largest assemblage from these features; the remainder contained only individual or small groups of undiagnostic flakes. The most noticeable distinction between artefacts was in condition; artefacts from the pits were all deeply patinated whereas those from the burial features were predominantly unpatinated with only isolated patinated pieces. The technology and condition of the assemblage from grave 246134 corresponds to that from the ring-ditch and is probably Bronze Age in date. It includes a flake core made on a thermally fractured fragment, core preparation and trimming flakes, including three of Bullhead flint, and a rejected bifacial tool rough-out, possibly a knife. However, the assemblage also included a small number of patinated pieces, which were more typical of the material contained in the pits through which the grave was cut. Grave 216091 similarly contained a small group of material containing both patinated and unpatinated artefacts. The likelihood is that the patinated material predated the construction of the monument, some of this material being later reworked into the burials with flint working debris produced during the Bronze Age construction or secondary use of the barrow.

Ring-ditch 194137 produced 129 pieces of worked flint from the ditch and a blade from burial 132095. Worked flint was rare throughout the fillings of the ring-ditch; nothing was recorded from the primary ditch fills and most parts of the secondary deposits were similarly barren. However, two groups of patinated dumped debitage, which accounted for 90% of worked flint from the ditch, were collected from the secondary fills of ditch quadrant segments 267103 and 282058, each 2m wide, on the south-east and north-east sides of the monument. These two groups of material, which post-date the principal use of the barrow, were both flake-based assemblages with blades accounting for only 5% of the total. Two poorly worked flake cores from segment 282058, which provided a core to flake ratio of 1:23.5 in this segment, indicate that cores are heavily underrepresented. The flint was of variable quality, as demonstrated by the quantity of thermally fractured debitage from 282058, and was probably obtained from the surface. Two flakes were of Bullhead flint. The technology also typified that of the Bronze Age, with hard hammer percussion associated with limited core preparation.

The fill of primary inhumation burial 132095 produced a patinated, naturally backed blade of Bullhead flint, which had been removed from an opposed platform core. The technology of this piece, notably the use of platform abrasion, is considerably more competent than that seen in the worked flint from the ditch sediments and may be earlier. There is nothing to indicate whether it was directly related to the burial as a grave deposit or merely a residual artefact that was incorporated into the grave fill.

Ring-ditch 232168 produced a nicely retouched end scraper, made on a flake, seven undiagnostic flakes and two blades, also undiagnostic, from the ditch, and a flake from the fill of the central grave (126180).

An assemblage of 173 pieces of worked flint was collected from a tree-throw feature, 302106, which lay approximately 40m south-east of ring-ditch 126180. The upper parts of this relatively small feature, approximately 1.2m across, are likely to have been truncated by both ploughing and machine stripping. The assemblage comprised predominantly flakes, two of which refitted, blades, which accounted for 12% of the collection, and a small number of pieces of microdebitage. There was only one broken core, numerous fragments of thermally fractured debitage, one denticulate and two pieces with miscellaneous retouch. A range of individual nodules was represented, all apparently derived from surface sources, with five examples of Bullhead flint, which may have been derived from a single nodule. The composition of this assemblage, which included some small broken pieces and microdebitage, suggests that it represented the residue of a truncated industrial flaking area where tool blanks and cores were prepared and taken away. The date of this assemblage remains uncertain. The blade component is sufficiently high to suggest that it may be of Late Neolithic date, although the technology and morphology of the flakes are similar to material in Bronze Age ring-ditch 216090. The material from the ring-ditch differed only in that pieces were generally larger, which may reflect selective collection and disposal of material. The contents of the tree throw are, therefore, probably of Late Neolithic or Early Bronze Age date and clearly predates the fragments of Iron Age pottery with which it was found.

Zone 22

This zone produced relatively low densities of worked flints, 301 pieces from 71 contexts. Most of the features comprised boundary or enclosure ditches, filled with relatively poorly stratified deposits of Iron Age or later date. There were nine unphased features and seven classified only as prehistoric. Most of the worked flint was, therefore, probably residual and related to flake-based Bronze Age activity in the area, blades accounting for only 8% of the total. However, variations in the technology and condition of this material hint that a range of types and phases of activity was represented on the site.

The most intriguing artefact comprises a hard hammer struck, naturally backed flake with an orange stain overlying a surface patina, from shallow linear ditch 290581. Some edge damage may be attributed to use but may equally be post-depositional. The distinctive surface stain and deposits of concreted chalk adhering to the surface strongly suggest that it is Palaeolithic in date. In addition, its sharp condition suggests that it has not moved far from its place of deposition or been subjected to repeated phases of cold glacial conditions and it may, therefore, date from the Devensian (Last Glaciation) Cold Stage.

Elsewhere, Early Neolithic activity was clearly represented by a leaf arrowhead from the surface of the possible Iron Age enclosure at the west end of the zone and a microdenticulate, made on a naturally backed blade, from Late Iron Age ditch 290573. In addition, a blade core, a blade, a rejuvenation tablet and an end scraper were found in undated pit 290068, which was cut through by the ditch of the possible Iron Age enclosure. Additional hints of broader Neolithic/Bronze Age activity are provided by the use of Bullhead flint in a small collection of flakes and a side scraper, made on a flake, from hollow or ditch 290596. This material is poorly stratified but may find parallels with spreads of Beaker material recorded from the area (Boast and Gibson 2000). The area produced very few cores, but six were found in the ditch sections associated with the possible Iron Age enclosure. Some of the cores are relatively poorly worked, suggesting that they may well be of Bronze Age, possibly Late Bronze Age, date. It may be significant in this respect to note that flaking debris associated with the ring-ditches in Zone 21 produced virtually no cores. The date of the enclosure remains somewhat uncertain; nevertheless in the absence of a convincing pottery assemblage it is possible that the worked flint substantiates the argument placing its construction in the Late Bronze/Early Iron Age.

Zone 23

A total of 2325 pieces of worked flint was collected from 133 contexts from Zone 23, of which the vast majority (79%) were related to three Bronze Age ring-ditches, with 12 contexts unphased, eight listed as prehistoric and, in contrast to many other zones along the route, only eight of Iron Age or later date.

The assemblage was dominated by debris from the three flake-based industries contained in the Bronze Age ring-ditches, reflected by the fact that only 7.5% of the assemblage comprised blades. Retouched tools were also scarce, accounting for less than 1% of the classifiable tool component, but small quantities of residual material survived that confirmed earlier use of the Chalk uplands. Buried soil 141094 contained 17 pieces of worked flint which, although possibly a mixed assemblage, contained an Early Neolithic leaf arrowhead and broken blades with characteristics of soft hammer percussion and platform abrasion. A microdenticulate made on a blade of Bullhead flint was also incorporated in the tertiary backfill of Bronze Age ring-ditch 195007.

Ring-ditch 195070 and its blocking ditch 193118 contained the largest assemblage, 1685 pieces, of worked flint from the zone. The assemblage was composed primarily of flakes, blades accounting for only 7% of the debitage total. Retouched tools were also poorly represented with only four scrapers recovered. Artefacts were very clearly distributed around the western arc of the ditch, directly opposite to the early (and later blocked) entrance (Fig 5.1). Significantly, this included material on the base of the ditch (290101, 290148) in the initial phases of the primary fills and included refitting pieces. Worked flints continued to be incorporated into the main body of undifferentiated basal ditch fills that probably weathered down from spreads of material on the ground surface around the lip of the ditch.

The junction of the primary and secondary silts was marked by renewed accumulations of flint waste that were added to ditch fills (290036, 290193, 290103) on the west side of the monument, directly opposite to the entrance causeway. The largest of these dumps (290036) contained 623 artefacts, including 18 flake cores and microdebitage. Similar material, including a core, refitting flakes and 197 pieces of microdebitage was also found with 413 flakes from 290103. The microdebitage contained a number of bulbar scars; diagnostic artefacts of debitage that rarely survive in anything other than primary contexts. These groups were mostly in mint condition and featured hard hammer struck primary and secondary flakes derived from core preparation and trimming. The cores, which weighed from 35-165g (mean 83g), were made on sub-rounded and columnar pieces of flint, which were readily available. The cores were frequently prepared with one striking platform, but were subsequently rotated as a means of rejuvenation to create cores with multiple striking platforms. Two small examples were of Bullhead flint.

This phase of activity, following the initial silting of the ditch, may be related to the construction of the shallow ditch that was dug to block the entrance causeway on the east side of the monument. A relatively large cluster of 63 artefacts was collected from fills, some possibly poorly defined primary silts, of this additional ditch. Artefacts continued to be incorporated into the secondary and tertiary fills, most consistently on the west side of the monument.

The quantity of material in this ring-ditch was greater than assemblages from other similar monuments in this zone, providing an added dimension to the monument use. Worked flint was generally absent in the primary silts elsewhere, but here knapping debris from the base of the ditch indicated that some flaking apparently coexisted with the use of the site as a funerary monument. It is unlikely that flint working took place in the ditch, but rather this served as a suitable place of disposal. The impression is one of considerable blank production and core preparation occurring immediately beyond the ditch edge, possibly, but not certainly, influenced by available flint. Additional deposition, possibly related to the construction of the blocking ditch, was represented by material added on or in the secondary silts. This material may have been derived from the same source as that represented in the primary silts; however, the quantities of material involved and the survival of microdebitage in this part of the assemblage suggest that it was derived from renewed procurement activity. Such reuse of an Early Bronze Age burial mound for the disposal of flaking waste in the Later Bronze Age is relatively common in southern England (Fasham and Ross 1978; Saville 1977/78).

Worked flints were also collected from a Roman pit (290305) which was cut through the filling of a quarry feature, which itself post-dated the construction of the ring-ditch. The largest component of this flake-based assemblage, which included two end scrapers and a broken fragment of a crude fabricator, but no cores, was found in the tertiary fills (290128) of the pit. Smaller groups of material were found in the secondary pit fills (290346 and 290347), which contained patinated and unpatinated artefacts. The latter were in mint condition and contained two refitting flakes. It is unclear whether these collections represent opportunistic use of flint in the Roman period or material reworked from the ring-ditch sediments.

Of the two remaining Bronze Age ring-ditches, monument 195004 and its terminals contained only 121 pieces of worked flint and these were distributed evenly around the ditch. None of the material was found in the primary fills, indicating that this monument remained relatively uncluttered throughout its principal period of use. There was only one flake core and a number of blades, most of which are likely to have been residual.

Outer ring-ditch 195007 and its inner counterpart, ring-ditch 195006, contained 116 and 23 pieces respectively; five pieces from the former were found in primary

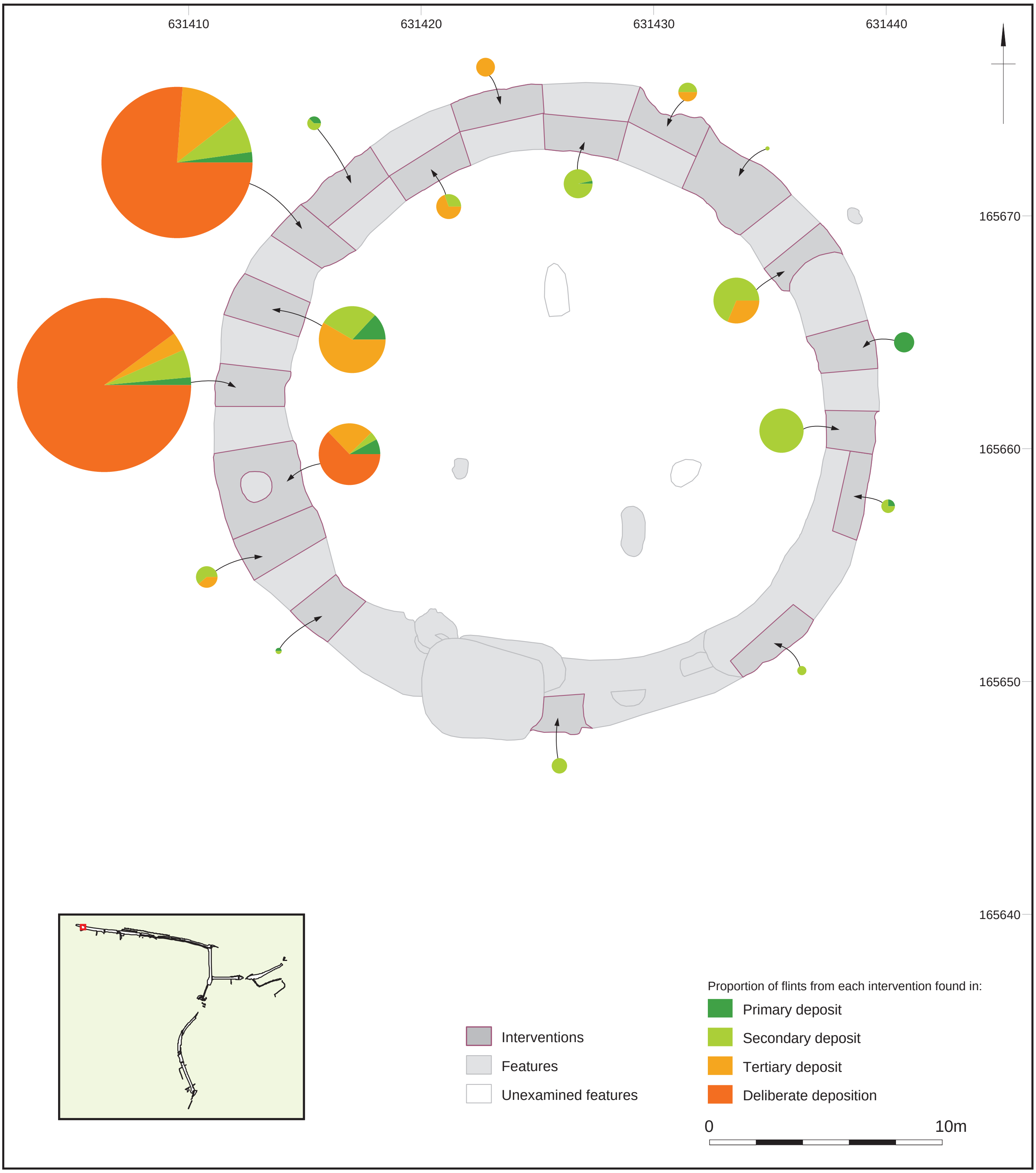


Fig 5.1 Distribution of worked flint in Zone 23 ring-ditch 195070

fills, while all material from the latter was from secondary and tertiary fills. The collection included only one core, which was found with a pot in a 'placed deposit' at the junction of the primary and secondary ditch fills. Apart from this object the small collection included four end scrapers and a number of blades which spanned a range of chronological periods.

Zones 24 and 29

No flint of significance was found in either of these zones.

Discussion

The worked flint assemblages described have provided a record of land use and settlement through time across a diverse transect of landscape zones and geological substrates on Thanet. The dataset documents an almost unbroken record of human activity in the area from the Palaeolithic period. Embryonic human presence is represented only by isolated artefacts; however from the Early Neolithic period onwards the density of material increases. This evidence, supplemented by ceramic assemblages, makes it possible to view systematic settlement patterns into the Late Bronze Age, which effectively marks the end of the 'stone age'.

The earliest occupation of Thanet is represented by one Palaeolithic flake from Zone 22 on the Chalk Ridge near Telegraph Hill, Minster. Such material is rare, but perhaps not unexpected, from the area. A hand axe was recorded previously from Telegraph Hill (Clinch 1908), the highest point on Thanet, which provided an attractive viewpoint from which to observe game movements. It also undoubtedly acted as a point of reference for groups migrating from the continent, possibly during a period of low sea level. Other hand axes have been found on Thanet from North Foreland, Broadstairs (Biggs 1972), Ramsgate, Westwood, Broadstairs and St Mildred's Bay, Westgate (Moody 2008). These implements, like the material from Telegraph Hill, are most frequently derived from or close to deposits of 'head brick-earth', which are mapped to the south of the road line at Telegraph Hill, or clay-with-flints, from which an increasingly large corpus of Palaeolithic material has been recorded from the Chalk uplands of Kent (Wessex Archaeology 1993; Scott-Jackson 2000).

Thanet undoubtedly continued to serve as a prominent landmark during the final stages of the Last Glaciation and into the Early Mesolithic before Britain was separated from continental Europe by the rising sea level. Some of the more low lying coastal locations that might have attracted occupation undoubtedly maintained strong maritime links. Many of these locations, which have been traced along the southern edge of the Thames Estuary, have now been inundated and possibly buried by marine sediments. Other sites have succumbed to coastal erosion, restricting potential areas of preservation to the present uplands. Surveys by Wymer (1977) and more recently by Moody (2008) have highlighted the ephemeral nature of evidence relating to late Glacial and Mesolithic recolonisation, its restricted levels of survival and the resulting difficulties of placing it within a clear chronology.

Despite these difficulties an isolated double burin made on a blade with a concave truncation (Fig 5.2, no. 1) probably illustrates human activity on Thanet in the Late Upper Palaeolithic/Early Mesolithic period. The artefact was found on Zone 13 in the secondary filling of a Bronze Age ring-ditch which was located on a Chalk eminence on the Cliffs End Spur overlooking Pegwell Bay. Artefacts from this period are especially rare in the area although another burin, thought to be of similar date, was found during the construction of the High Speed 1 rail link in an Early Bronze Age ring-ditch at Saltwood Tunnel near Folkestone (Harding *et al* 2002). This site, like that in Thanet, lay on a Chalk ridge high-spot overlooking the English Channel. Saltwood Tunnel also produced a collection of eight Early Mesolithic Horsham points from a pit (Harding 2006; Riddler and Trevarthen 2006). Evidence of Late Glacial and 'long blade' industries have also been found elsewhere in Kent including Riverdene, near Canterbury and Underhill Lane, Herne Bay (Harding 2006), with an isolated find of a probable Upper Palaeolithic blade from subsoil at Kingsborough Manor, Isle of Sheppey (Butler and Leivers 2008).

The corpus of Mesolithic find spots (Moody 2008) is dominated by records of tranchet axes and sharpening flakes, many from valley sites around Pegwell Bay, on both the north and south banks of the former Wantsum Channel. These implements are easily identifiable, although their distribution has been considered to reflect exploitation of woodland resources. Moody stressed the possibility that additional material may survive in colluvium that often fills the valleys. One site, Stone Bay, Broadstairs, produced a number of geometric microliths, which demonstrated the fate of many, having apparently eroded from the exposed cliff face onto the beach. The predominance of tranchet axes as an indicator of Mesolithic activity has been confirmed by the discovery of an additional example from the low-lying, east-facing embayment in Zone 6 below Ebbsfleet Hill. The discovery was supplemented by two microliths (Fig 5.2, nos 2 and 3), including one (Fig 5.2, no. 2) found with bifacial thinning waste and a bladelet core in a tree-throw feature. These small artefacts may owe their survival not only to their low-lying location but also the presence of sediments preserved in tree-throw features and sub-surface hollows. Such features are known to provide catchments for assemblages of material of this type (Healy 1983; Gardiner 1984; Evans *et al* 1999), possibly linked to the fact that tree boles may have provided favoured sheltered locations for flint working in the Mesolithic and Early Neolithic periods.

The date of this material within the Mesolithic remains uncertain. Reynier (2005), in a detailed study of Early Mesolithic Britain (10ka–8ka BP) excluded all groups of microliths containing less than ten pieces. This makes it impossible to apply direct comparisons with the two examples from Thanet, although both lie within the broad length range for Early Mesolithic microliths, especially the backed point. Obliquely blunted microliths are known throughout the Mesolithic. There were no geometric forms, more prevalent in the Late Mesolithic, or associated microburins, indicative of microlith production, to argue that this location represents a formal hunting camp (*cf* Barton 1992), although a number of blades/baldelets from the immediate area may be contemporary.

It remains difficult to demonstrate with certainty how the microlith from the tree-throw feature in Zone 6 relates to the much larger body of soft hammer-struck, bifacial core tool thinning waste. The soft hammer technology of the latter is more refined than that represented on the tranchet axe from Zone 6 (Pl 5.1). This suggest that the core tool debris field, which extends beyond the tree-throw feature, is of Early Neolithic date, a period that is well represented in the area. Alternatively this may represent transitional activity from the Late Mesolithic to Early Neolithic. Assemblages of worked flints containing elements of both periods have been documented from tree-throw features, including examples studied from the route of the High Speed 1 rail link through Kent (Hayden 2006b; Trevarthen 2006). In some cases Mesolithic

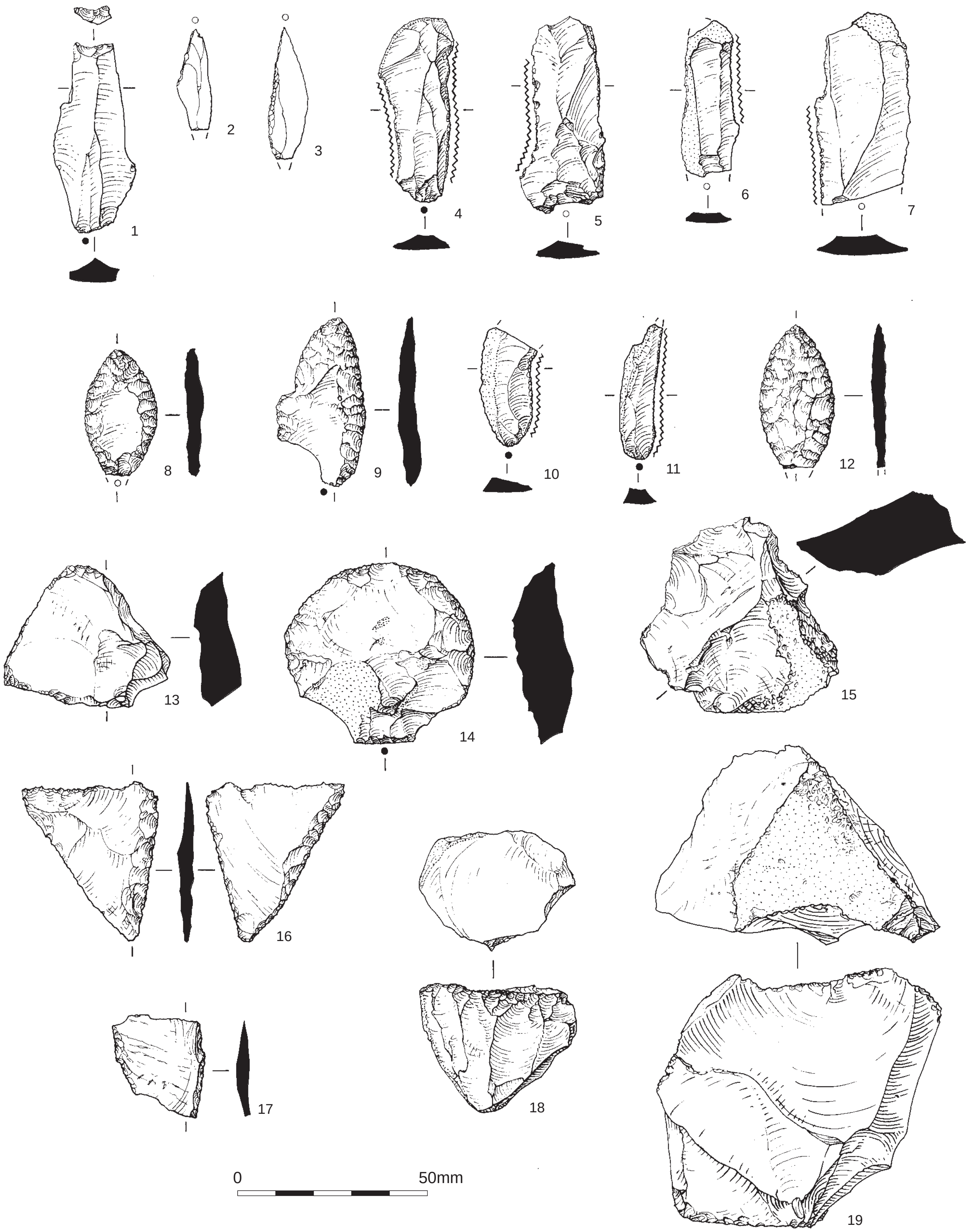


Fig 5.2 Worked flint nos 1-19

material was predominant, as at Sandway Road (Trevarthen 2006), while at Eyhorne Street (Hayden 2006b) the Neolithic assemblage was more plentiful than the Mesolithic. Irrespective of the chronology at these two sites, any associated blade technology was frequently indistinguishable and the separate elements merely defined by diagnostic retouched pieces.

The strongest evidence for Mesolithic activity along the road line therefore lies in the protected lower fringes of Ebbsfleet Hill. Seasonal Mesolithic campsites frequently favoured such low lying ground where they were often associated with well drained sandy substrates, famously the Greensand ridge of the Weald. These locations also often brought with them links to supplies of fresh water. It is possible that a fresh water source once issued from the base of the Ebbsfleet Peninsula, drawing people to the location. In addition it is uncertain to what degree Mesolithic, and subsequent Neolithic colonisation on Thanet, was determined by access to maritime resources which might also have attracted settlement to this sheltered part of the peninsula.

Thanet represents a very restricted land mass and the upland areas also undoubtedly contributed hugely to the Mesolithic economy, although this is much more difficult to demonstrate. A bladelet core made on a flake, from a medieval ditch (172024) on the highest part of Zone 3, towards the southern end of the Ebbsfleet Peninsula may provide a thin strand of evidence. It joins a notched bladelet, possibly failed microburin technique, from the same area that was found at Weatherlees WTW during the construction of the Margate to Weatherlees pipeline (Leivers 2009). A possible tanged/backed microlith from a Late Bronze Age pit in Zone 7 also supplements the body of evidence indicating Mesolithic activity on the Ebbsfleet Peninsula.

Observations made elsewhere in Kent and across much of southern Britain (Care 1979) indicate that the Chalk uplands served as a flint source for tranchet axe manufacture. A possible tranchet axe sharpening flake from an Iron Age posthole (211145) in Zone 11 on the 'head brickearth', immediately to the west of a palaeochannel, fits well with this scenario. Sites producing microliths on these uplands remain elusive, although a Mesolithic assemblage containing microliths was discovered during the construction of the Hadlow to Farningham Pipeline, near New Ash Green, on the dip slope of the Chalk at approximately 150m aOD (Harding forthcoming). Significantly, this site also lay at the edge of a palaeochannel, in a shallow coombe, features which provide suitable route ways by which to make incursions into upland areas (Harding 2006; Moody 2008).

The onset of more settled forms of lifestyle in the Early Neolithic period produced greater quantities of worked flint across the entire excavated route. This provided an opportunity to observe land use and settlement distribution in more detail than was possible for the earlier periods. Much of the Early Neolithic material was residual or of insufficient quantity to allow detailed metrical analysis to be undertaken, and the recurring trend for secondary and tertiary fills of features from all periods to act as catchments for worked flints has highlighted the quantity of worked flint that has otherwise been lost from the archaeological record by ploughing and topsoil stripping. Nevertheless it has been possible to identify a sufficiently large number of diagnostic pieces from these deposits to reconstruct settlement distribution. Artefacts were classified according to established criteria, using both typology (Wainwright and Longworth 1971; Green 1980; Riley 1990) and technology (Pitts 1978; Ford 1984; Harding 1991).

The identification of individual artefacts was underwritten by small assemblages of worked flints from excavated pits, which constitute one of the most common sources of material throughout the Neolithic period both locally (Hearne *et al* 1995; Harding 2006; Bennett *et al* 2008; Leivers 2009) and nationally (Clark *et al* 1960; Wainwright and Longworth 1971; Garrow *et al* 2005). The intensity of occupation was to some extent reflected in the incidence of these features which also contained artefacts of Bullhead flint. Pits were distributed from the Cliffs End Spur, across the 'head brickearth' and southwards towards the Ebbsfleet Peninsula, coincidental with the distribution of the Bullhead Beds. More detailed analysis of the distribution suggests that the pits occurred in discrete clusters, most notably in Zone 14, Zones 10-12 and Zone 6. This extensive band of activity in the north extends to a pit found at Chalk Hill (Hearne *et al* 1995) which, in turn, links occupation with the causewayed enclosure to the east on the hill (Shand 2000). The landscape characterised by pits, domestic activity and flint working within the environs of a causewayed enclosure enjoys similarities with that around Maiden Castle, Dorset (Woodward 1991; Harding 2010) where a similar pattern has been demonstrated. Pits were apparently absent from much of the area from Zone 10 to the southern part of Zone 6, on the lower slopes of Ebbsfleet Hill, although Early Neolithic worked flints were present. Bullhead flint and Early Neolithic flint technology occurred in relatively low density along the eastern end of the Chalk Ridge, but increased at the west end near Telegraph Hill. This cluster linked with a known Early Neolithic worked flint assemblage that was recorded, along with three shallow pits, during work to the west during the A253 Thanet Way improvements at Monkton, beyond Telegraph Hill (Bennett *et al* 2008, 11).

The Early Neolithic flint industry was inextricably linked to the exploitation of Bullhead flint, although there was nothing to indicate that it was 'mined'. Its use was not exclusive to the Early Neolithic although its selective exploitation in this period was observed by Butler and Leivers (2008) at Kingsborough Manor, Isle of Sheppey. They noted that Bullhead flint was closely associated with blade production and related retouched forms, particularly microdenticulates (Fig 5.2, nos 4-7, 10-11). In Thanet, the scheme-wide distribution of Bullhead flint correlates strongly with areas of Neolithic, particularly Early Neolithic, activity, with recovery from features with associated pottery, blade production (Fig 5.2, no. 18) and associated technology, notably the incidence of platform abrasion and soft hammer mode. Inevitably the greatest densities of Bullhead flint coincided with the natural outcrops (Fig 5.3). Remnants of cortex on cores, rejuvenation tablets and on the blades themselves indicate that these controlled products formed the primary output of production. No thinning flakes or axe rough outs were found to indicate that Bullhead flint was used for axe manufacture, possibly due to the size and shape of the nodules.

Transit of flint from the Chalk Ridge to activity areas towards the end of the Ebbsfleet Peninsula may have been via the peninsula itself or using dry valleys. A palaeochannel in Zone 11, which crossed the Bullhead

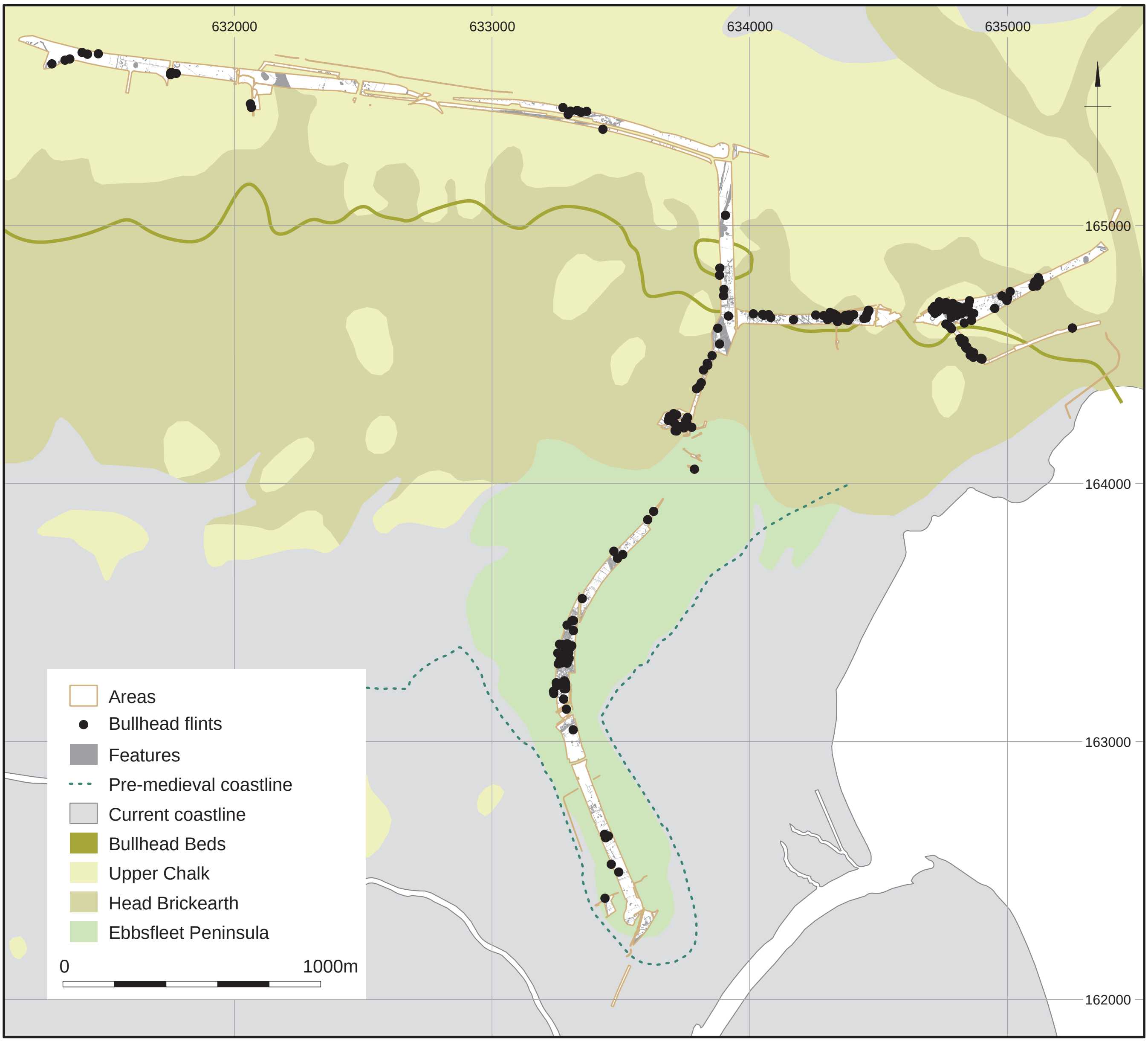


Fig 5.3 Distribution of worked flint made on Bullhead flint. Reproduced with the permission of the British Geological Survey ©NERC. All rights reserved

Beds at the north end of the Ebbsfleet Peninsula, drained south-east towards Pegwell Bay and apparently attracted a scatter of probable Early Neolithic worked flints along its flanks and a number of pits. One of these was dug into the fill of the channel, implying that the latter had already silted up and was possibly dry by the time the pit was dug. The importance of dry valleys linking high and low ground has been stressed above in connection with the Mesolithic activity. Their role and ability to preserve archaeological deposits is demonstrated by the discovery of a Neolithic post-built structure in a coombe at the base of the Chalk scarp at White Horse Stone in the Medway Valley during the construction of High Speed 1 (Hayden 2006a).

The distribution of artefacts made of Bullhead flint extends south along the entire length of the Ebbsfleet Peninsula, where flint does not occur naturally. This apparent deliberate movement of flint may to some extent relate to the fact that the Bullhead Beds were the most locally occurring flint source. Nevertheless, the pattern of flint exploitation suggests that it was the preferred flint of the Neolithic and was transported across considerable distances; 28 pieces were found from one of two pits at Saltwood Tunnel (Devaney 2005). This site was located along the southern edge of the North Downs escarpment, approximately 35km south of the Bullhead Beds outcrop, which lie on the dip slope of the Chalk. These nodules may alternatively have been collected from 'late Tertiary' drift on the Chalk, possibly from the Lenham Beds, although these are a similar distance from Saltwood. Apart from this apparent movement of Bullhead flint there may be evidence of reciprocal movement of flint in the opposite direction.

Polished and flaked axes, both complete and fragmentary, were clustered on the Ebbsfleet Peninsula (Fig 5.4; Pl 5.2). These finds complement one other axe from previous work on the peninsula (Hearne *et al* 1995), a

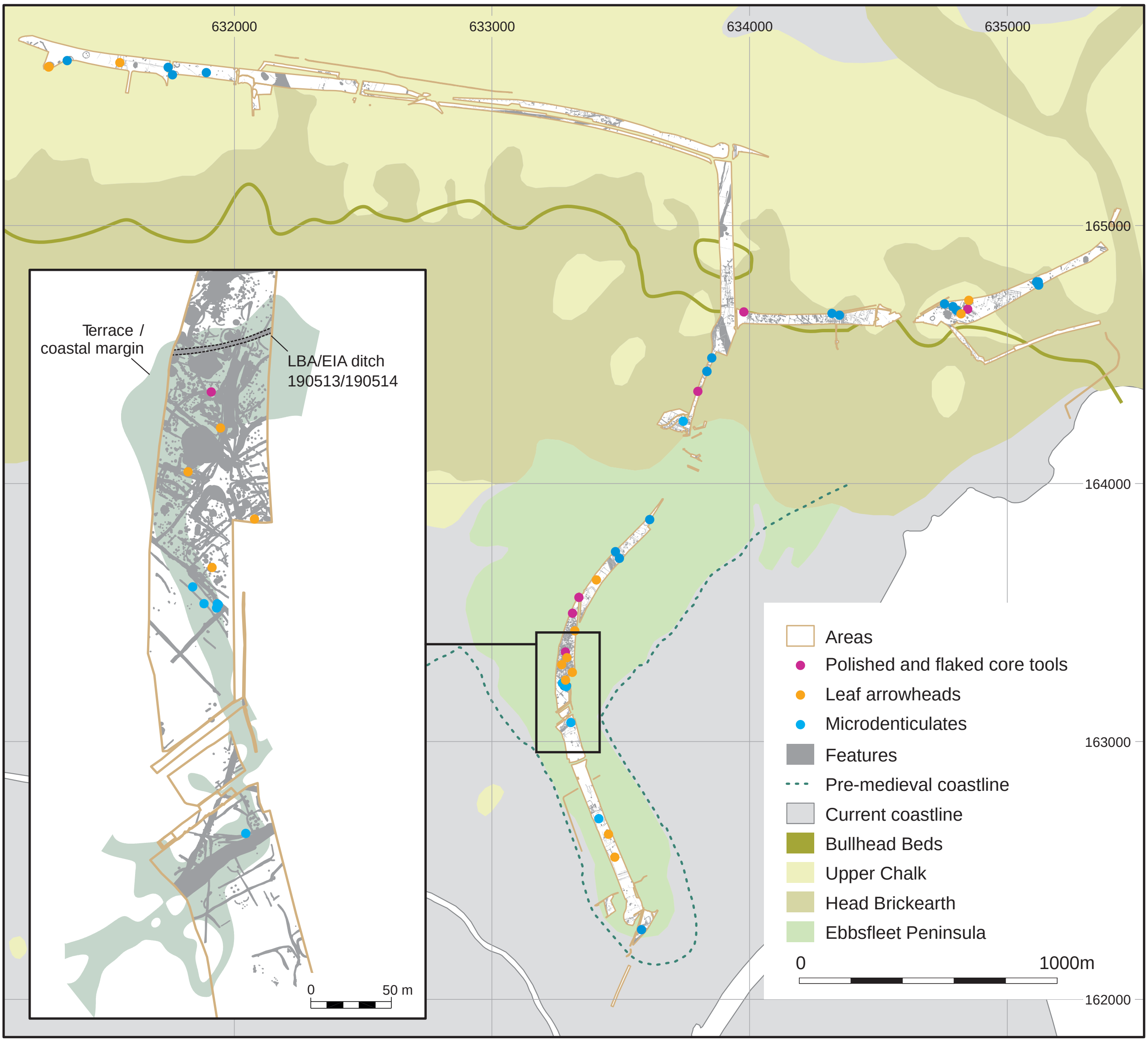


Fig 5.4 Distribution of polished and flaked core tools, leaf arrowheads, and microdenticulates. Reproduced with the permission of the British Geological Survey ©NERC. All rights reserved

location that has now produced an accumulation of soft hammer struck, core tool thinning flakes. That core tool manufacture was undertaken in the area can be demonstrated by the discovery of a flaked axe rough out from the north part of Zone 6. This axe (Pl 5.2) was probably of Neolithic date and was made using hard hammer percussion from dark flint with a thick chalky cortex that was probably taken from the natural Chalk. The Chalk Ridge, in contrast, has produced relatively sparse distributions of axes compared to the low ground. A flaked axe, also of dark local flint (Pl 5.2) and found in a tree-throw feature on the 'head brickearth' in Zone 11, might represent evidence of axe manufacture on the higher ground, supplemented by three core tool thinning flakes from Early Neolithic pit 191086 in Zone 14. Elsewhere, individual polished axes have been found at the causewayed enclosures at Chalk Hill (Shand 2000) and Kingsborough Manor (Butler and Leivers 2008), with fragments of others from Area 1 of the A253 Thanet Way improvement scheme, immediately west of Telegraph Hill (Wilson 2008). This material included several pieces from a posthole forming part of a structure.

Axe manufacture clearly took place in the area, although it is unclear whether this industrial activity was as strongly linked to the causewayed enclosure at Cliffs End, as it was at Maiden Castle, Dorset (Woodward 1991; Harding 2010) where axe manufacture played an important role in the economy of the area. The axes from the Ebbsfleet Peninsula have also included some made of light grey flint. This raw material is apparently unlike any other local flint in the area, but similar to that of the polished axe from Kingsborough Manor, which Butler (Butler and Leivers 2008) postulated might have been imported. Such a trade can only be guessed at, but the most likely, and entirely plausible, contemporary source is likely to have been the mines on the South Downs in Sussex (Barber *et al* 1999; Craddock *et al* 2012). To this can be added a Cornish Group 1

Greenstone axe from Zone 6, possibly a curated object and attesting to longer distance trade.

Microdenticulates (Fig 5.2, nos 4-7, 10 and 11) and leaf arrowheads (Fig 5.2, nos 8, 9 and 12) are also retouched pieces with strong Neolithic associations. The distribution of microdenticulates on Thanet, like those of leaf arrowheads, arguably provides a more reliable chronological indicator than scrapers (Fig 5.2, nos 13-15), which, although more numerous, are ubiquitous throughout prehistory. Associated occurrences of microdenticulates and leaf arrowheads provide a strong indication of Neolithic settlement, before regular field systems included systematic manuring of arable land. The distribution of these implements corresponds well with the anticipated distribution of Neolithic activity (Fig 5.4). Microdenticulates and leaf arrowheads were found on the Cliffs End Spur, in Zone 14 (Fig 5.2, nos 4 and 5), across the 'head brickearth', and extending southwards in a concentration across the Ebbsfleet Peninsula (Fig 5.2, nos 6-8). Broken or unfinished examples were found below Ebbsfleet Hill in Zone 6, with two more similar pieces on the slightly higher ground towards the southern tip of the Peninsula (Fig 5.2, no. 9). Additional microdenticulates (Fig 5.2, nos 10 and 11) and leaf arrowheads (Fig 5.2, no. 12) were clustered near Telegraph Hill in Zones 21, 22 and 23, adjoining traces of Neolithic settlement identified the A253 Thanet Way improvements to the west of the hill (Bennett *et al.* 2008). The combination of artefact types, their density and extent along the Chalk Ridge suggests that this represents relatively long term or repeated occupation rather than casual stopping points during hunting expeditions. It is likely that more material from this phase of activity has been eroded from the shallow soils on the ridge by ploughing.

Evidence of human activity in the Middle and Late Neolithic periods on Thanet, as demonstrated by worked flint assemblages, is sparse. However, a number of locations with associated pottery have been identified previously that have confirmed continuity of activity from the Early Neolithic. Blade technology apparently persisted into the Middle Neolithic period; a blade core, of Bullhead flint, and a broken bladelet were found in a pit containing Mortlake pottery amongst other pits at Cottington Road, to the east of Zone 10, during the construction of the Margate-Weatherlees pipeline (Leivers 2009). However, this period sees a reduced reliance on blade manufacture and an increase in flake production. This trend has been confirmed locally where a number of small flint assemblages have been dated by associated pottery. A pit from the Ramsgate to Weatherlees pipeline (Hearne *et al* 1995) contained 14 hard hammer struck flakes and a broken core that were otherwise undated apart from being accompanied by sherds of Peterborough Ware. At Ebbsfleet Lane, to the west of Zone 6, two groups of pits with Late Neolithic-Early Bronze Age pottery also contained small collections of flakes (Leivers 2009).

Certain aspects of the retouched tool component continue from the Early Neolithic into the Middle/Late Neolithic, notably the use of microdenticulates. However, distinctive changes occur in the design of arrowheads, from leaf shaped to chisel and oblique forms. Wainwright and Longworth (1971) noted that chisel arrowheads were more frequently associated with Mortlake, Fengate, Beaker and Collared Urn ceramics, while oblique arrowheads were more common with Grooved Ware forms. No Late Neolithic pottery was found on the EKA project, which has made it difficult to identify contemporary worked flint assemblages with confidence.

Despite the apparent absence, or difficulty in identifying Late Neolithic flint artefacts on Thanet, the area has produced a series of single-entrance hengiform monuments. These enclosures are similarly poorly dated, although Grooved Ware sherds were found at one such monument, the Lord of the Manor 1 (Macpherson-Grant 1977). Leivers (this volume) has speculated that ring-ditch 134096 in Zone 13 on the Cliffsend Spur may also be hengiform. The associated flint assemblage was undiagnostic, poorly stratified and inconclusive, but two chisel arrowheads were found during the excavation, one from the ditch (Fig 5.2, no. 16) and the other (Fig 5.2, no. 17) from an Early/Middle Iron Age sunken-featured building located inside the ring-ditch. These artefacts provide additional optimism that there was continued Neolithic activity in the area, possibly linked to the origins of the ring-ditch. They complement the evidence of Middle Neolithic activity in this immediate area, confirmed by a radiocarbon date for grave 177085, located immediately north of the ring-ditch, although the burial itself contained no diagnostic flint-work. Continuity of occupation is also suggested by the recovery of two chisel arrowheads from Zone 6 on the Ebbsfleet Peninsula. Less certainly dated were artefacts with evidence of faceted butts, a technological feature which, although not exclusive to the Late Neolithic, was employed as a technique of core preparation in that period. These examples included a flake from Iron Age ditch 190198 in Zone 12, a knife from ditch 249184 in Zone 10 and two scrapers from a pit containing Collared Urn pottery from Zone 20. Collectively these examples do not contribute definite detail to the period, but are worthy of consideration.

Evidence of Beaker activity was also only thinly represented in the worked flint from the project; only one pit (227010), from Zone 10, contained Beaker pottery and a small assemblage of flakes. One barbed and tanged arrowhead was recovered from the fill of a Roman enclosure ditch in Zone 14, although a number of small thumbnail scrapers were catalogued in that area which may hint at Early Bronze Age/Beaker activity. This relatively thin scatter of material joins a barbed and tanged arrowhead that was found with Beaker pottery in the fill of a probable enclosure ditch at Laundry Road, Minster (Boast and Gibson 2000), immediately to the south of Zone 22. Despite the proximity of the road line to this site no further evidence was detected in the worked flint assemblage from 2010 to confirm Beaker settlement in this area of the Chalk Ridge. The lack of evidence for settlement, as represented by worked flint, may result from heavy ploughing, but may also argue

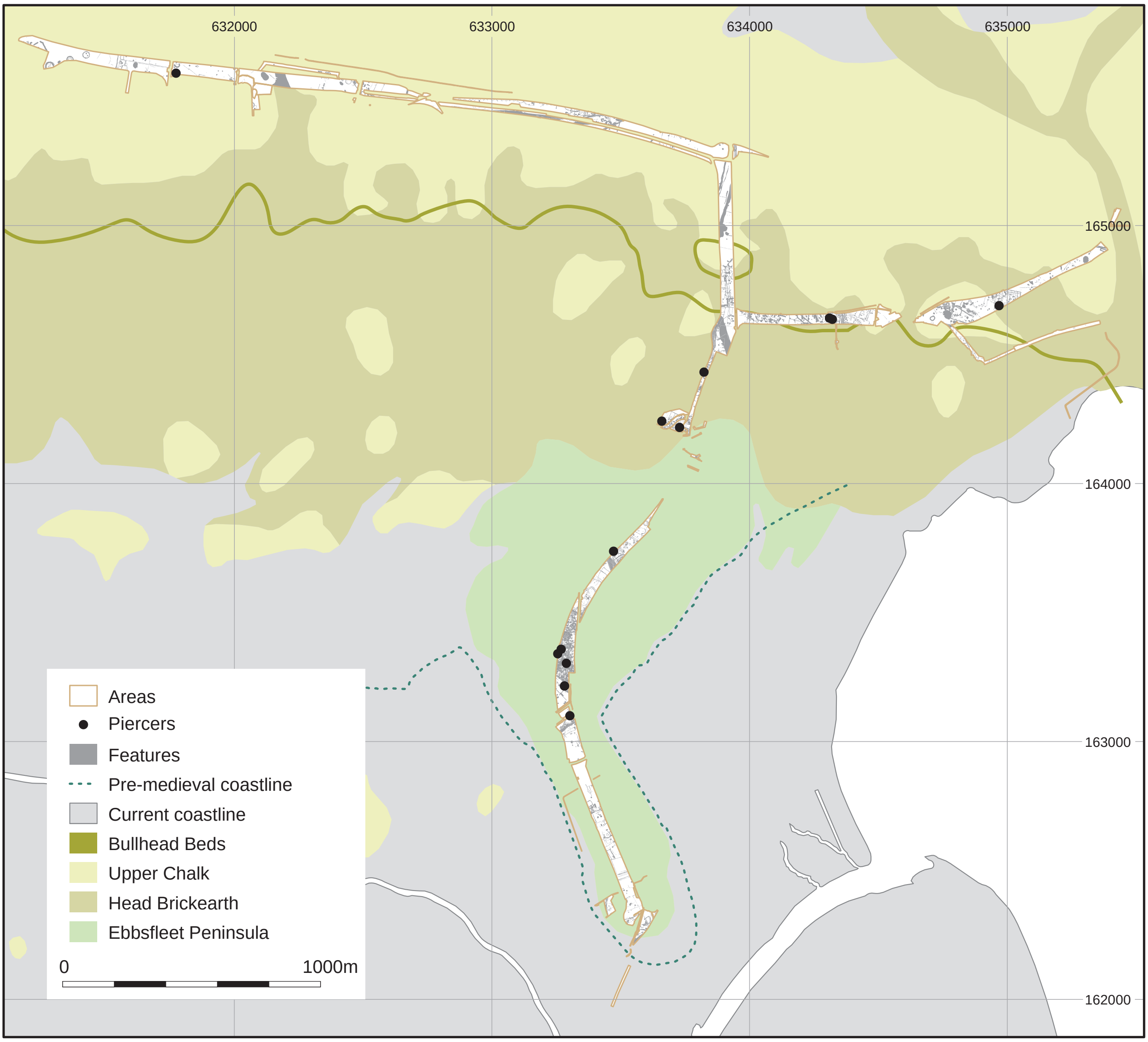


Fig 5.5 Distribution of piercers. Reproduced with the permission of the British Geological Survey ©NERC. All rights reserved

that settlements were more frequently located on the lower ground (*cf* Allen 2005). This possibility was suggested locally by Boast and Gibson (2000), citing Beaker sherds and a barbed and tanged arrowhead from Oaklands Nursery, Cliffs End (Perkins 1998).

Early Bronze Age land use of the Chalk Ridge was more extensive and marked by the construction of a number of burial mounds. Some of these locations may have been influenced by preceding Late Neolithic monuments, such as the possible hengiform ring-ditch in Zone 13 on the Cliffs End Spur. Activity predating the construction of a burial site is also implicit within ring-ditch 216090 in Zone 21. Worked flint assemblages from two graves, notably grave 246134, contained material that was similar in technology to that from the surrounding Bronze Age ring-ditch. It also included a small number of patinated pieces, which were probably derived from deposits through which the graves were cut. Late Neolithic or Early Bronze Age activity may also be represented by material from a nearby tree-throw feature, a typical catchment for Neolithic material. This assemblage is apparently derived from an isolated, open air workshop, of a type that may have been common in flint bearing localities. The activity remains technically undated, although the lack of blade material hints that it is unlikely to be of Early Neolithic date.

None of the burials from any of the ring-ditch monuments included grave goods of worked flint; however, a pressure-flaked plano-convex knife (Pl 5.3) from a Late Bronze Age/Early Iron Age ditch in Zone 14, approximately 60m east of hengiform ring-ditch 134096 in Zone 13, was sufficiently well made to have been included with a human burial. Plano-convex knives of similar quality formed part of a cache of worked flints from a probable grave within a ring-ditch at Cliffsend Farm, Thanet (Leivers and Harding forthcoming).

Expansion of activity across the Chalk Ridge as documented by the construction of burial mounds was also reflected in the pattern of flint exploitation. Fresh nodules that were encountered as ditches were dug were

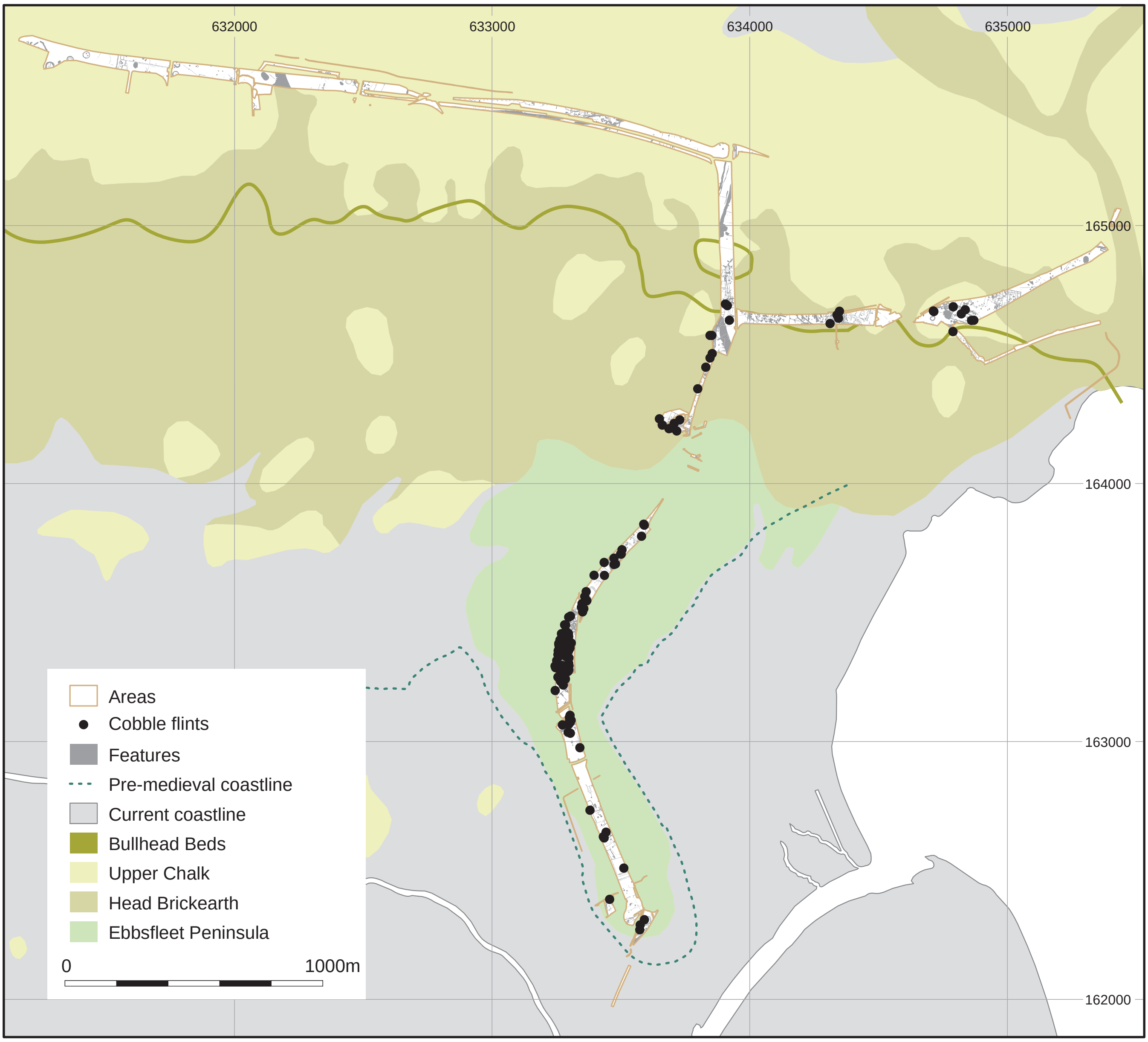


Fig 5.6 Distribution of worked flint made on cobble flint. Reproduced with the permission of the British Geological Survey ©NERC. All rights reserved

used in combination with surface nodules. Flaking debris was rarely found on the base of the ditches, possibly implying initial respect for the monuments in their funerary role. Spreads of debitage increased within primary fills, peaking in the secondary silts and tertiary deposits. In both Zones 21 and 23 flake-based core preparation waste lay in dumps at the interface of the primary and secondary fills. Limited refitting material, microdebitage and distinct variations in the density of material suggest that flaking took place at industrial 'workshops' situated at the ditch edge around the monument, retouched tools being generally absent. This changing emphasis of monument function from one of funerary use to one of flint disposal mirrors that noted within ring-ditches excavated along the A253 Thanet Way improvements west of Telegraph Hill (Wilson 2008), on sites along the High Speed 1 (Harding 2006) and across other parts of southern England (Fasham and Ross 1978; Saville 1977/78).

Flint working in the Later Bronze Age (Ford *et al* 1984) is marked by poorly controlled core technology, hard hammer percussion and retouched assemblages characterised by coarse, denticulate scrapers, heavy duty piercers and flakes with miscellaneous retouch (Fig 5.2, nos 15 and 19; Fig 5.5). It also features, in this part of Thanet, an apparent marked change in raw material selection, drawing more frequently on flint that was easily available on the foreshore beach deposits of Pegwell Bay. Limited exploitation of flint from this source may have preceded the Late Bronze Age, with two cores reported from a pit containing Middle Neolithic pottery at Cottington Road, near Cliffs End (Leivers 2009), but its use in the Late Bronze Age seems to be more specific and relatively localised. It was found in ditches and pits in an arc of approximately 500m around the part of Pegwell Bay extending down the Ebbsfleet Peninsula (Fig 5.6). Most importantly its distribution in the north overrides the Bullhead Beds which formed the preferred raw material of the Early Neolithic period, although it might be anticipated that some use of Bullhead flint also persisted into the later period. There are no obvious reasons why this marine-affected raw material was preferred to the more readily available Bullhead flint. The answer may lie in its abundant availability on the beach or in the fact that it was more easily flaked by less adept knappers; flakes with cortical butts were frequent. The distribution of this raw material by zone shows no specific concentration related to settlement, rather an even spread of material, some of which may have resulted from manuring. Harding (1995) noted the use of beach cobble flint in a small collection of material from previous excavations at Ebbsfleet, most of which was collected from features of Late Bronze Age or later date. The correlation of beach cobble flint, material with attributes of Late Bronze Age technology, particularly cores characterised by poor levels of flaking and associated retouched forms, especially flakes with miscellaneous retouch, is consistent.

The expedient use of this distinctive raw material was relatively localised, although the pattern is apparent elsewhere in this part of Kent. At Kingsborough Manor, Isle of Sheppey, Butler and Leivers (2008) described worked flint assemblages from two adjacent Early Neolithic causewayed enclosures. Enclosure K1 produced 854 pieces of worked flint (op cit, table 1) of which 706 were from Neolithic contexts. There was a strong correlation between the use of Bullhead flint and Early Neolithic blade technology. The K2 enclosure, in contrast, produced only 80 pieces (op cit, table 2), of which only six pieces were from primary fills. Butler and Leivers noted that much of the worked flint from the K2 enclosure was executed on raw material derived from a gravel source. In view of the conclusions drawn from work on the East Kent Access Road it is possible that some of the relatively poorly stratified worked flint from enclosure K2 at Kingsborough Manor was related to enclosures and features of Middle/Late Bronze Age date, which were well represented at the site. A similar, but less well defined, scenario was seen at Cliffsend Farm, approximately 500m to the south-west of Zones 13 and 14 (Leivers and Harding forthcoming) where raw material selection varied through time. Good quality nodules, which are present in the local cliffs, were used for the manufacture of grave goods in Early Bronze Age funerary monuments, while relatively poor quality derived flint, which may have been more readily available, was chosen in the Late Bronze Age. The Late Bronze Age is frequently seen to effectively mark the end of extensive stone use in Britain. Nevertheless, the record of a small group of material from the primary fill of a Middle/Late Iron Age ditch in Zone 7 provides a tantalizing hint that use of this easily exploitable raw material may have persisted locally beyond the Late Bronze Age.

Burnt flint

A total of approximately 589kg of burnt flint was recorded from the investigations, and this is quantified by zone in Table 5.2. Most of the zones produced some material, but the largest concentrations, in Zone 6 and Zone 13, correspond with the greatest number and density of Iron Age features. Elsewhere, this pattern broadly holds true, with other notable concentrations in Zones 4, 10/10a, 12, and lesser concentrations in Zones 3, 11, 14 and 19. The material has not been analysed further.

Table 5.2 Quantification of burnt flint by zone and weight

Zone	*Weight (g)*
1	3004
2	1391
3	15,339
4	28,882
5	2609
6	168,281
7	18,604
8	1391
9	33
10	9042
10a	26,300
11	10,457
12	21,409
13	243,340
14	12,948
15	-
17	-
18	43
19	17,661
20	2822
21	422
22	595
23	3216
24	-
26	1713
28	-
29	-
Total	589,073

Chapter 6

Worked Stone

by Ruth Shaffrey

Later prehistoric

Querns

A total of 21 contexts of later prehistoric date produced quern fragments. This group does not include the Late Iron Age material, which has been grouped with the early Roman artefacts. The later prehistoric material consists of a likely 21 items represented by 29 fragments, weighing 25.3kg. Six items are definite saddle querns, four from Zone 6 and two from Zone 13. The two from Zone 13 are both from Early to Middle Iron Age contexts (130033 and 248060; not catalogued) and have had a moderate amount of shaping to the base and some wear to the grinding surface. Four saddle querns from Zone 6 include one complete quern manufactured from a boulder with a pecked grinding surface (ON 3337, Fig 6.1, no. 1) deposited in an Early

Fig 6.1 Later prehistoric worked stone: saddle quern from Zone 6

to Middle Iron Age pit (248058). The other three fragments are similar in having a pecked grinding surface but with little or no shaping to the under-surface (ON 3281, 3282 and 3368).

Saddle quern fragments from Roman contexts are described below, but five examples from unphased contexts likely to be of prehistoric date are discussed here. One fragment (ON 4711, not catalogued) retains part of a worked surface but no edges while another fragment is part of a deep basin style saddle quern or mortar (ON 3242, Fig 6.2, no. 2). A third saddle quern has a roughly worked under-surface and pecked but worn grinding surface showing signs of both longitudinal and crossways use (ON 3244, Fig 6.2, no. 3). The two most substantial saddle querns both utilised large boulders, with little modification to the original shape of one (ON 2203, Fig 6.3, no. 4) and with some neat shaping of the base on the other (ON 3241, Fig 6.4, no. 5). Both querns have been pecked on the grinding surfaces but ON 2203 was also shaped into a deep basin style mortar. All five examples are made from Greensand from the Folkestone Beds and may have been collected as boulders on the beach.

Fig 6.2 Later prehistoric worked stone: saddle querns from Zone 6

One large fragment of rotary quern was recovered from an Iron Age context, as was a small fragment of lava, which is also likely to be from a rotary quern. The lava fragment was found in pit 211043 (upper fill 211051), which contained significant quantities of Middle Iron Age pottery and no later material. The lava is weathered and non-diagnostic, but as lava is not known to have been imported for any other function than for use as querns, that is its interpretation here. The pottery seems to indicate a secure Middle Iron Age date for the lava quern, but there is a chance that the lava is intrusive as another, undated pit cut pit 211043. Lava querns are normally dated to the Roman conquest onwards or occasionally to the very Late Iron Age. However, there are a very small number of examples recorded from secure prehistoric contexts and this example may add to a (still small) growing body of evidence for the pre-Roman importation of lava querns (Manby and Fenton-Thomas 2009, 185).

A single rotary quern fragment of Folkestone Beds Greensand (ON 3971) was included in the backfill of pit 291130 (291131). The context is securely dated to the Early-Middle Iron Age by a significant assemblage of pottery from the pit. The quern's full profile cannot be determined as the centre does not survive, but it appears to have had a sloping top and relatively flat grinding surface.

A further 13 contexts produced possible quern fragments of indeterminate form. Of these, context 151003, a fill of pit or tree-throw hole 151001 in Zone 3, is particularly significant as it contains five flakes of a glauconitic quartzitic sandstone, probably Folkestone Beds (the glauconite is weathered). Three of the flakes have a flat pecked surface indicating that they derived from a quern, or possibly two querns as the lithology of one fragment does not match perfectly. It is not possible to determine whether they are from saddle or rotary querns. The flakes appear to have been struck and, although this could be a result of frost action, it seems more likely that they were broken off deliberately. They may then be evidence for the 'killing' of a quern (Verbaas and van Gijn 2007).

Catalogue of illustrated querns

1. Saddle quern, complete. Greensand, Folkestone Beds. Large boulder with unshaped base but with edges roughly shaped into a saddle quern. Grinding surface is pecked and slightly worn; it is concave lengthwise but roughly flat across it. Measures 620 x 350 x 130mm. ON 3337. Zone 6. Ctx 124206. Secondary fill of pit 124205. Iron Age (Fig 6.1).
2. Saddle quern/mortar fragment. Greensand, Folkestone Beds. Part of deep basin style saddle quern/mortar. The

basin is worn very smooth inside. Measures >112 x 240 x 80mm. ON 3242. Zone 6. Ctx 130012. Unphased (Fig 6.2)

3. Saddle quern. Greensand, Folkestone Beds. Broken at one end with curved and roughly shaped underside. Grinding surface is pecked and worn, slightly concave in both directions. Measures > 2230 x 230 x 90mm thick. ON 3244. Zone 6. Ctx 130012. Unphased (Fig 6.2).

4. Saddle quern, complete. Greensand, Folkestone Beds. Unshaped boulder used as saddle quern or mortar with deep basin, pecked and slightly worn. Mortar on the upper surface indicates reuse in a structure. Measures 660

Fig 6.3 Later prehistoric worked stone: saddle quern from pit 194134

Fig 6.4 Later prehistoric worked stone: unphased saddle quern; chalk discs and chalk weights

x 290 x 230mm thick. ON 2203. Zone 21. Ctx 194135. Secondary fill of pit 194134. Unphased (Fig 6.3).

5. Saddle quern, complete. Greensand, Folkestone Beds. Large boulder pecked all over with neatly shaped base and crudely shaped edges. Grinding surface is distinctly concave lengthwise and worn. Measures 490mm x 290mm x 70mm thick. ON 3241. Zone 6. Ctx 130012. Unphased (Fig 6.4)

Catalogue of unillustrated querns

1. Saddle quern fragment. Greensand, Folkestone Beds. End fragment with flat, pecked and slightly worn grinding surface. The base is neatly shaped while the edges are rounded and slightly damaged. Measures >190 long x >230mm wide x 58mm thick. Zone 13. Ctx 130033. Deliberate backfill of circular rubbish pit 130032. Early to Middle Iron Age
2. Probable saddle quern fragment. Greensand, Folkestone Beds. Grinding surface is pecked and slightly concave with some smoother areas, notably towards one edge. Measures 64mm thick x >210mm long x >150mm wide. ON 3281. Zone 6. Ctx 296072. Tertiary fill of ditch 269069. Early to Middle Iron Age
3. Probable saddle quern fragment. Greensand, Folkestone Beds. Boulder with pecked, slightly concave grinding surface with some smoother areas. Measures 65mm thick x >150 long x 200mm wide. ON 3282. Zone 6. Ctx 296072. Tertiary fill of ditch 269069. Early to Middle Iron Age
4. Possible saddle quern. Greensand. Flat pecked and very worn grinding surface. The base is not shaped and is irregular and no original edges survives. ON 3368. Measures 420 x 480 x 90mm. Zone 6. Ctx 129138. Deliberate backfill of pit 129137. Early to Middle Iron Age
5. Upper rotary quern fragment. Greensand, Folkestone Beds. Thick quern with short vertical sides and curved top (but not adjoining ON 3366). Pecked all over but with some wear to the grinding surface. Measures approximately 400mm diameter. ON 3971. Zone 6. Ctx 291131. Deliberate backfill of pit 291130. Early to Middle Iron Age

Discussion

The excavations produced a single rotary quern of Early-Middle Iron Age date (Zone 6). Querns securely dated to the Early Iron Age and Early-Middle Iron Age transition are far less common than their Middle Iron Age counterparts, with those from Gussage All Saints being the most commonly cited, along with occasional examples from other regions (Buckley 1979; Shaffrey 2007a). Published examples of early rotary querns in Kent currently date only to the Middle Iron Age, for example from Dartford (Shaffrey 2011a, 145). However, there are a number of unpublished examples in the collection held by The Trust for Thanet Archaeology, which have been described by Elizabeth Blanning at Canterbury University in an unpublished survey. Two rotary querns in the study appear to be reliably dated to the Early-Middle Iron Age, one from North Foreland, Broadstairs (Blanning pers. comm.; Gardner 2006) and one from South Dumpton Down (Blanning pers. comm.; Perkins 1995). Both querns are also of Folkestone Beds Greensand and, together with this new example, they point to the manufacture of rotary querns at Folkestone at the very outset of rotary quern production in England. This is a clear indicator that the industry at Folkestone was forward thinking and quick to adapt to new technology. The early appearance of rotary querns in Zone 6 suggests that the occupants were probably of a higher than average status since the new form of quern took significantly longer to manufacture and was probably of far higher value than its saddle quern counterpart. As the numbers of rotary querns in use at that time must have been very small, owning one would have been a reflection of power and status

The querns from the East Kent Access site are also useful for investigating the chronological development of the quern industry in eastern Kent. The evidence from querns deposited in Iron Age features indicates that the principal quern material during prehistory was the Folkestone Beds Greensand. This is true for both saddle querns and rotary querns recovered from Iron Age features. A rubber and saddle quern from Roman contexts (ctx 145073, ONs 3340) are also made of Greensand and, if they are residual, support the pattern of mainly locally sourced querns during the Iron Age. This is in stark contrast to the Roman period, when there is a clear emphasis on the use of imported stones such as lava and Millstone Grit alongside the continued use of Greensand. Further research is needed on the early development of the quern industry, but the evidence from the current excavations is that the change in stone types used for querns was due to cultural changes around the time of the Roman transition, rather than technological advancement from the use of saddle to rotary querns.

Although Greensand was clearly the preeminent source for querns during the Middle Iron Age, the presence of lava in a prehistoric context hints at the possibility of cross-Channel movement of lava querns well before the Roman conquest. Lava does not survive well in the soils of much of Kent, so tantalising glimpses are all we may ever have, but this fragment is another indicator that we should continue to record the presence of lava, however meaningless the lumps may appear on site.

Other worked stone

Chalk was used for a number of objects from the Early Iron Age onwards and the evidence indicates that it was being actively worked within some zones at the EKA2 site. Chalk debris with worked surfaces was found in fill 291131 of pit 291130, dated to the Early to Middle Iron Age (291131, Zone 6), while a partially perforated disc was found in the colluvium (ON 4131, Fig 6.4, no. 6) and is of similar dimensions to an example from a stratified Early Iron Age context (ON 1107) and one from Iron Age ditch 130013 (ON 505, Fig 6.4, no. 7). A circular disc was also recovered from an Early to Middle Iron Age fill of pit 130083 (130084, ON 1512). It is not clear if this was a partially completed spindle whorl or intended to serve a different purpose as an unperforated disc.

Three large chalk weights recovered from Zones 13 and 19 are likely to be of Iron Age date, but are not from well-dated contexts (ON 1534, 1535 (Fig 6.4, nos 8 and

9) and 2094). They are of oblong form with a perforation towards the top showing evidence of wear consistent with suspension, but the two examples from Zone 19 (ONs 1534 and 1535) appear to have been suspended from a pole rather than from rope. In addition to the chalk weights, three large flints could have served a related function, although they are entirely unworked. One example was reused in the wall of a Roman SFB in Zone 20 (134094, not catalogued), while the other two were recovered from Early to Middle and Middle Iron Age contexts in Zone 13 (248060, 192040, neither catalogued).

A single grooved stone was recovered from the Middle Iron Age fill of pit 211043 (211046) in Zone 13 (Fig 6.5, no. 10). The groove is deep and V-shaped with wear marks inside it. Grooved stones of this type are not common finds in this country. The closest parallel is a smaller example from a Bronze Age context at the Breiddin hillfort, but thought to relate to Neolithic activity (Musson 1991, 156). Stones bearing such grooves are far more common on the Continent where they tend to be of prehistoric date (eg, at Geleen-Janskamperveld (Verbaas and Gijn 2007)). They are sometimes identified as arrow polishers or shaft straighteners, a term introduced by Cosner (1951, 147) and subsequently adopted by specialists in the Near East (Shaffrey 2007b). Analysis of such items now points to a more complex interpretation. The variable sizes and profiles of the grooves as well as the different level and types of wear point to multiple purposes for these tools (eg, Davis 1982, 110-111; Dorrell 1983). The function of this tool is therefore unclear at present. The V-shaped section appears not to have been caused by the rotation of rounded arrow shafts in order to straighten out kinks but by something straight-sided.

Two hammerstones were recovered from Zones 6 (ON 3211, Fig 6.5, no. 11) and 11 (210004, not illustrated). The former is a flint cobble with percussion wear over both ends, the latter a quartzite pebble with percussion damage around 75% of its circumference.
A Cornish Greenstone (Group 1) axe (ON 866, Fig 6.5, no. 12) was found in the secondary fill (247084) of gully 247083 surrounding roundhouse. It is not clear whether it was deliberately placed in the gully, but artefacts of this type deposited a considerable time after their initial manufacture had often been curated.

Catalogue of illustrated worked stone

6. Unfinished spindle whorl. Chalk. Partially worked and not quite circular. The shaped sides and flattened surfaces have lots of scratches resulting from shaping. The perforation is partially cut from both sides to 9mm deep on both sides. Measures 57-65mm across x 20mm thick. Weight 86g. ON 4131. Zone 12. Ctx 126015. Colluvium. Unphased (Fig 6.4).
7. Spindle whorl. Chalk. Biconical perforation measuring 5mm at the centre and 10mm at the edges. Flat disc type whorl with slightly rounded edges. Measures 55mm diameter x 15mm thick. Weight 42g. ON 505. Zone 6. Ctx 130015. Secondary fill of ditch 130013. Iron Age (Fig 6.4).

Fig 6.5 Later prehistoric worked stone: grooved stone (no. 10); hammerstone (no. 11); Cornish Greenstone axe (no. 12)

8. Oblong weight. Chalk. Large oblong weight of which top third- half survives. The perforation is circular with linear scratches on the lower inside edge and sides of the hole from manufacture, whereas the upper surface is smooth. There is no indication of cord wear outside the socket and the wear inside the upper surface of the hole suggests this was suspended on a pole rather than a rope. Only small areas of original external surface survive and these show the weight was reasonably well finished. The opposing face has a hollow formed by similar cuts and scratches indicative of a partially cut hole. Weight 1716g. ON 1534. Zone 13. Ctx 203067. Tertiary fill of pit 203066. Unphased (Fig 6.4).
9. Oblong weight. Chalk. Large oblong weight of which top third/half survives. The perforation is circular with linear scratches on the lower inside edge of the hole, whereas the upper surface is smooth. There is limited indication of cord wear above the socket although the wear on the opposing side of the weight indicates suspension from a pole. Only small areas of original external surface survive and these show the weight was reasonably well finished. Weight 1647g. ON 1535. Zone 13. Ctx 203067. Tertiary fill of pit 203066. Unphased (Fig 6.4).
10. Shaft straightener/grooved stone. Very fine grained micaceous grey sandstone. Pebble utilised on one face in a deep V-shaped groove with some wear and scratch marks inside it. L: 56mm, groove 10mm wide at the top and 5mm deep. Zone 13. Ctx 211046. Deliberate backfill of pit 211043. Middle Iron Age (Fig 6.5).
11. Hammerstone. Flint. Cobble with percussion wear all over both ends. Irregular but roughly sub-square cross section. Measures 75 x 65 x 62mm. ON 3211. Zone 6. Pit 289050. Middle Iron Age (Fig 6.5).
12. Axehead. Cornish Group 1 Greenstone. Has one narrow curved end and one wider bevelled end. Measures 105 x 33 x 28-32mm. ON 866. Zone 6. Ctx 247084. Secondary fill of gully 247083 surrounding round house (Fig 6.5).

Catalogue of non-illustrated worked stone

1. Spindle whorl. Chalk. Roughly half a crude spindle whorl. Gently rounded all over but of disc form with flat faces. Perforation is cylindrical and 9mm diameter. Measures 66mm diameter x 19mm thick. Weighs 76g. ON 1107. Zone 26. Ctx 158030. Secondary fill of pit 158029. Early Iron Age
2. Disc. Chalk. Circular disc with straight sides, 70% survives. Measures 36mm diameter x 13mm. ON 1512. Zone 13. Ctx 130084. Deliberate backfill of chalk lumps and other domestic waste in pit 130083. Early to Middle Iron Age
3. Hammerstone. Quartzite pebble. Flat pebble, polished on all original surfaces and with percussion damage around 75% of its circumference with large flakes removed as well as smaller areas of damage. Clearly used as a pounder. Measures 80 x 75 x 26mm. Zone 13. Ctx 210004. Pit 210003.

Discussion

The most significant worked stone artefacts are those of chalk, a material which formed the bedrock in some zones but was still easily accessible to others. Chalk was used to make various discs and weights and there is some evidence that it was worked in Zones 6 and 12. There is increasing evidence for the exploitation of chalk in Kent for a variety of purposes and it seems that where chalk artefacts are found there is often evidence for working. This should be no surprise since chalk is a relatively straightforward material to modify, certainly softer and easier than many quern materials, and would have been easily accessible.

Its no doubt striking appearance when fresh probably also made chalk appealing from a decorative perspective. This is particularly true for the three large weights. These have been recorded from a number of sites across Kent, with a notable collection from the A2 excavations where they were discussed in detail (Shaffrey 2012). The precise function of these weights is unknown and the very different levels of finish, size and types of wear mean it is almost certain that they did not all serve the same purpose. Possibilities for the less visible weights might have been to weigh down fishing nets or as counter-weights in a well (Philp 1958), whilst those that were intended to be visible could have been thatch weights or weights for gates. It is possible that large naturally perforated flints were also used in for some of these functions.

With the exception of the Greenstone axehead, all the worked stone from prehistoric phases is indicative of occupational and domestic activity such as spinning, food processing and possibly fishing. As with the querns, the principal materials of other objects (chalk and flint) would have been available on or very near the site. Thus the people who lived in this area need have travelled no great distance to obtain any of the stone tools they needed, or to find the raw materials to make them themselves.

Late Iron Age and Roman

Querns

Querns recovered from 61 Roman contexts and four unphased contexts include both hand querns and mechanically operated millstones. They are described by stone type below. Lava does not survive well in the soil conditions of this part of Kent so that quantification and comparison between stone types is impossible in terms of weights or fragment count. For this reason they are discussed by the minimum number of items represented, with any non-diagnostic fragments of each stone type from a single context counting as one record.

Fragments of Greensand quern were recovered from 13 Roman contexts, and there are a further four unphased examples of Roman form. All the Greensand querns are made of Folkestone Greensand identical to that used to make querns in the Late Iron Age at Folkestone. The likelihood is that manufacture at Folkestone continued into the Roman period, as evidenced by finds such as these. Of all the stone types used for querns along the EKA2 excavations, Greensand demonstrates the most variation in form, suggesting the longest period of exploitation. Of the 17 querns represented, two are of typologically early forms (a rubber and a saddle quern) and may be residual,

Fig 6.6 Late Iron Age – Roman saddle quern (no. 1) and rotary quern (no. 2)

although their continued use in the early Roman period is possible. The saddle quern is complete (ON 3340, Fig 6.6, no. 1) whilst the rubber is broken in half (145073, not illustrated). There are also three definite lower rotary querns, eight upper querns and four indeterminate fragments. Of those whose form can be identified, one (ON 4710, Fig 6.6, no. 2) is an upper stone of Kent 1 type, which is a particular Kentish form of Roman date (Blanning 2006, 11). One other example of the same form is unphased but presumably of similar Roman date (ON 3236, Fig 6.7, no. 3) and a further fragment appears to be of similar Kentish form but is fragmentary (156150). Two other examples are of flatter forms, one with a hopper (ON 3366) and one without (ON 4050).

Two other querns are of intriguing form. ON 4037 is similar to a Kent 1 quern but only has a very small hopper (Fig 6.7, no. 5). This could be unfinished. A second example (ON 3243, Fig 6.8, no. 6) is very straight sided with flat faces. It also appears to be unfinished, although there is some wear to the grinding surface. Handle sockets are present on four upper stones. Of these, two are circular (ON 612, Fig 6.7, no. 4, ON 3236, Fig 6.7, no. 3), one is sub-circular and almost a rounded triangle (ON 4710), and one is of indeterminate form (244243 Greensand). Quern 3236 has two handle sockets at slightly different heights and positioned at 90 degrees from one another. One complete example (ON 4037) has no handle socket and must have been operated by some other means. The three lower stones (ON 4045, ON 2951 and context 145251) are all fragmentary. Of these only the quern from 145251 retains its central hole and, in this case, a socket rather than a full perforation, and only crudely formed.

Three examples of puddingstone querns were recovered, one of Hertfordshire Puddingstone type and two of ferruginous puddingstone type. One of the ferruginous puddingstone querns is of an undiagnostic form though recognisable as a quern. The two other specimens are both beehive querns, one having been reused in a late Roman wall in a sunken-feature building in Zone 20 (ON 3805, Fig 6.8, no. 7) and one deposited

Fig 6.7 Late Iron Age – Roman rotary querns

in a mid-late 1st century AD rubbish pit in Zone 6 (ON 4050). Quern 3805 has a circular handle socket.

The excavations produced 30.5kg of lava quern from 59 contexts, of which 31 are Roman. These are, without exception, degraded and in some cases crumbling almost into dust, with the result that the fragment count of 929 is virtually without merit. It also means that no analysis of dimensions or form was possible. The majority of fragments were found in Zones 14 and 20 (26% and 31% respectively) with lesser but still significant quantities from Zones 6 and 11 (17% and 12%). Eight other zones produced only very small quantities, but indicate that lava querns were widely used in the area.

The possibility of pre-conquest use of lava is discussed above, with a fragment of likely Middle Iron Age date. Other possibilities include six fragments of lava from two fills of Late Iron Age-early Roman ditches 164055 and 176114 (contexts 164056 and 176017). Although neither fill can be definitively connected to pre-conquest activity, they may add to a small number that can. These include a fragment from Oldbury Hill, Ightham which was built into the AD 43 ramparts (Ward Perkins 1939, 181) and another deposited with Iron Age pottery and a sherd of pre AD 25 pottery in a pit at Scrubbs Lane, Maidstone (Maidstone Museum and Elizabeth Blanning pers. comm.). This small number of finds hints at the pre-conquest use of lava in Kent. This is intriguing, bearing in mind the survival rate of lava in Kentish soils.

Fragments of Millstone Grit rotary querns were recovered from 11 Roman contexts. They include three small non-diagnostic fragments and four quern fragments of uncertain diameter. Two of them have radial grooving on the grinding surface, and a third has what appears to be deliberate concentric grooving (144120). One fragment is from an upper stone of approximately 530mm diameter, probably from a millstone (ON 3106, not illustrated; Shaffrey in prep). Three further items can be positively identified as mechanically operated millstones based on their measured diameters of 670mm, 750mm and 800mm respectively. The smaller of these was incomplete and in 14 fragments; it may have fragmented post-deposition (ON 2703, Fig 6.9, no. 8). It was recovered from a colluvial layer in Zone 7 (201078) where it was found with a rotary quern of much earlier form (ON 4710). A small coin hoard was found in the same layer, of which the latest coin dates to AD 156.

The two larger millstones were recovered from the uppermost fill of well 170167 in Zone 6 (ON 3379 and 4487, not illustrated). Both are of the usual flat millstone form with deep-spaced pecking on the grinding surface, typical of Millstone Grit querns and millstones. Several lumps of flint were also found in the well and it is possible all these stones had been used in a structure somewhere nearby. The original source for the millstones could be significantly earlier and some distance from their final position in the well.

Only three querns could not be attributed to any of the major stone types typically making up assemblages of querns in Roman Kent. None were diagnostic fragments (they are not included in the catalogue), and it is possible that they served some other functione. One fragment is of a pale quartzitic sandstone, possibly a type of Greensand (291096). The second fragment is a ferruginous shelly grit stone, possibly also from the Greensand (178321). A third fragment is a medium grained well-sorted sandstone, possibly Triassic and of unknown origin (277025).

Catalogue of illustrated querns

1. Small saddle quern. Greensand, Folkestone Beds. Complete small saddle quern with grinding surface that is slightly concave lengthwise. Pecked all over and fairly neatly shaped. Burnt and blackened on the upper surface and around edges. The edges are straight and ends are rounded. Measures 240 x 170 x 70mm. ON 3340. Zone 6. Ctx 125239. Deliberate backfill of pit 125237. Early Roman (Fig 6.6).
2. Upper beehive rotary quern, complete. Greensand, Folkestone Beds. The entire top is a steeply sloping hopper down to cylindrical hole. Pecked all over except

Fig 6.8 Late Iron Age – Roman rotary querns

Fig 6.9 Late Iron Age – Roman worked stone: rotary quern (no. 8) and chalk weight (no. 9)

where there are crudely incised segmented grooves on the grinding surface. The sides are curved and steep with a single small sub-triangular handle socket 25mm wide. The iron rim of spindle remains in eye and juts out over grinding surface due to wear. The circumference is chipped. Measures 350mm diameter x 98mm thick. ON 4710. Zone 7. Ctx 201078. Colluvial layer (Fig 6.6).

3. Complete upper rotary beehive quern. Greensand, Folkestone Beds. Oval and cylindrical eye measuring 24 x 36mm. Two handle sockets pointed and not fully perforated. They are quarter around the quern from one another. Grinding surface is roughly flat although slight lip around the circumference. The circumference is badly damaged. The quern is roughly pecked all over. A large circular basin shaped hopper nearly fills the upper surface. Measures 300mm diameter x 92mm thick. ON 3236. Zone 6. Ctx 130012. Unphased (Fig 6.7).
4. Upper beehive rotary quern. Greensand, Folkestone Beds. With large basin shaped hopper, steep curved sides and grinding surface worn very smooth. Handle socket in side is circular and conical and does not perforate the centre. Pecked all over. Measures *c* 320mm diameter. ON 612. Zone 23, Ctx 128037. Unphased (Fig 6.7).
5. Complete upper rotary quern. Greensand Folkestone Beds. Roughly worked all over with small basin shaped hopper and flat grinding surface. Eye is narrow (26mm) and cylindrical. There is no handle socket. Measures 280mm diameter x 105mm thick. ON 4037. Zone 4. Ctx 172144. Subsoil (Fig 6.7).
6. Complete rotary quern. Greensand Folkestone Beds. Could be upper or lower as grinding surface and base are flat. Sides are straight and just lean in slightly. Circular cylindrical perforation measuring 28mm diameter. Measures 280mm diameter x 95mm thick. ON 3243. Zone 6. Ctx 130012. Unphased (Fig 6.8).
7. Complete upper beehive rotary quern. Puddingstone. Complete, tall quern with slightly curved steep sides, flat top and cone shaped hopper. Grinding surface is flat and the quern is pecked all over. Circumference is slightly damaged. Handle socket is conical and round. Measures 285mm diameter x 145mm high. ON 3805. Zone 20. Ctx 134094. Late Roman (Fig 6.8).
8. Upper millstone in 14 fragments (rotary). Millstone Grit. Grinding surface is worn into concentric grooves and has a lip around the circumference. Other surface is widely pecked. Part of a keyhole shaped centre measuring 233mm long x 185mm wide survives. Measures *c* 670mm diameter x 42mm max thickness on lip. ON 2703. Zone 7. Ctx 201078. Colluvial layer (Fig 6.9).

Catalogue of non-illustrated querns

1. Rubber. Greensand Folkestone Beds. Half a roughly circular rubber with domed upper surface and slightly convex pecked and worn rubbing surface. Measures 150mm diameter x 58mm max thickness. Ctx 145073. Deliberate backfill of pit 145076 containing domestic waste. Zone 12. Late Iron Age-early Roman
2. Upper rotary quern fragment. Greensand, Folkestone Beds. Edge fragment with part of pecked , flat and worn grinding surface. Side handle slot also survives – 63mm deep x unknown width. Only a very small section of edge survives, but this appears to lean inwards. Zone 6. Ctx 244243. Secondary fill of ditch 244242, Gp 190490. Early Roman
3. Rotary quern fragment, probably lower stone. Greensand, Folkestone Beds. Edge fragment with section of flat grinding surface, short vertical sides and curved convex base. Pecked all over but with smooth worn grinding surface. Measures 62mm thick. ON 4045. Zone 6. Ctx 291092. Mid-Roman
4. Rotary quern fragment, lower stone. Greensand, Folkestone Beds. Small fragment with short edge section. Edges are straight and vertical, grinding surface is flat but very slightly convex and has cross concentric grooving probably segmented. Other surface is pecked but damaged and the quern has been burnt and blackened on one side. Measures approx 500mm diameter x 60mm thick. ON 2951. Zone 6. Ctx 302037. Deliberate backfill of pit 302036. Late Roman
5. Lower rotary quern fragment. Greensand, Folkestone Beds. Central fragment with crudely shaped central socket and roughly flat grinding surface. Measures >100mm thick. Zone 6. Ctx 145251. Secondary fill of ditch 145252. Mid-Roman
6. Upper beehive rotary quern. Dark purple ferruginous puddingstone. Thick quern with steeply sloping and curved sides, flat grinding surface and pecked all over. Centre is missing and the circumference is damaged, but the quern measures >130mm thick. ON 4050. Zone 6. Ctx 256047, secondary fill of pit 256060. Early Roman
7. Rotary quern fragment. Millstone Grit. Three fragments, not adjoining, but probably from the same quern. The stone is quite friable and crumbly. No edges or centre survive so size cannot be determined. Has (deliberate) concentric grooves 15mm apart. Other side has some evidence for pecking. Measures 38mm thick. Zone 20. Ctx 144120. Dumped deposit derived from domestic waste fill of 144121 in SFB 249085. Late Roman
8. Probable millstone or rotary quern fragment (rotary). Millstone Grit. Probable upper stone. Grinding surface is pecked but has signs of radial grooving in the outer half. The ?upper surface is roughly tooled and approximately flat. The edges are neat and vertical. Measures *c* 530mm x max 60mm thick. ON 3106. Zone 20. Ctx 252096. Deliberate backfill of SFB 193106. Late Roman
9. Upper millstone fragment. Millstone Grit. Of disc type with parallel faces but with grinding surface slightly concave and upper surface slightly convex. Edges are straight and lean in slightly and the millstone is pecked all over, although the grinding surface is pecked with well spaced prominent deep pock marks typical of Millstone Grit millstones. Measures *c* 750mm diameter x 54mm thick on edge. ON 3379. Zone 6. Ctx 137338. From well 170167. Mid-Roman
10. Upper millstone fragment. Millstone Grit. Disc type millstone with flat top and curved, slightly concave grinding surface, so slightly tapered to centre. Pecked all over except where the grinding surface has deep spaced pecking typical of Millstone Grit querns. The edge has a notch in it with curved cross section. Measures 800mm diameter x 66mm thick. ON 4487. Zone 6. Ctx 239237. Well 170167. Mid-Roman
11. Upper beehive rotary quern. Greensand, Folkestone Beds. Two adjoining fragments with steep almost vertical curved sides and flat grinding surface. Top is mostly missing, but part of shallow straight sided hopper survives leading into vertical cylindrical eye measuring approximately 28mm diameter. Pecked all over. Measures *c* 360mm diameter x 125mm thick. Zone 13. Ctx 156150. Deliberate backfill of pit 156146. Early Roman

12. Upper rotary quern. Greensand, Folkestone Beds. With short vertical sides and curved convex top curving down into basin shaped hopper. Slightly concave pecked and worn grinding surface. Measures 480mm diameter x 75mm max thickness. ON 3366. Ctx 129136. Post-packing in posthole 129135. Zone 6. Roman

Discussion

Four of the major Kentish quern lithologies are present in the assemblage of querns and millstones from the site. Of these, puddingstone is least numerous, as would be expected in east Kent. Herfordshire Puddingstone typically occurs as single finds in this part of Kent (Green 2011, fig 1). The ferruginous puddingstone is typical of those from the extensive collection recovered at Springhead (Shaffrey 2011b). It was suggested that the unusually high numbers indicate a very local source, although that source was not located, and recent work by David Peacock and Chris Green indicates a possible source at Worm's Heath in Surrey (Chris Green pers. comm.). Further work should elucidate this source further.

Notable amongst the assemblage are the millstone fragments. Two of these were from a mid-Roman well, which points to an early Roman date for their primary use. They add to a growing picture of millstone survival in East Kent and on Thanet, where millstone fragments are reasonably common finds. As a result of their frequency, Moody (2008) has suggested that the processing of grain on Thanet was centralised during the early to mid-Roman period and a key part of the Roman economy at that time. However, no structural evidence for a mill has been found on Thanet, and the evidence from the millstones themselves may not be so clear cut.

The life history of a millstone, post-milling, is a key factor in interpretation. Although it has been suggested that broken fragments were reused very close to the site of the mill from which they came (Spain and Riddler 2010, 283), the frequency with which very small numbers of millstone fragments occur on sites with no evidence for a mill (water or animal powered) may suggest otherwise. A single pair of large millstones could be broken up into 10, 20 or more fragments and redistributed for other uses. Millstone fragments would have been a commodity in their own right and could have been reused once or several times, either as building material (as here) or as sharpening stones. It is, therefore, perfectly possible that millstone fragments travelled long distances, possibly over several years and served several functions. If this is the case, the well-documented watermill at Ickham may have been the original source of some or all of the millstones found in the region. Located approximately 15km to the west of the EKA2 and operational for approximately 200 years with three wheels (possibly not all simultaneously), only 23 fragments of millstones were found at Ickham (*ibid*, 288, fig 118). The remaining fragments, of which there must have been many, must have ended up somewhere else, possibly on Thanet. The discovery of structural evidence for a mill could settle the question.

Other worked stone

In addition to querns, a number of other categories of worked stone are represented, including tools such as whetstones, polishers, pestles, weights and spindle whorls. Structural stone includes functional pieces, such as pivot stones and flooring as well as more decorative pieces such as *opus sectile* and marble wall veneer.

As with earlier phases, chalk was utilised for a variety of purposes during the Roman period, but only in Zones 12, 13 and 19. The item from Zone 19 is a large oblong chalk weight, discussed in detail above (ON 2094, Fig 6.9, no. 9). Zone 12 produced a piece of worked chalk with tool marks on it that is possibly debris (137033). Zone 13 produced two perforated discs and a probable pestle. Of the two discs, one was found in the early Roman backfill of pit 156146 (ON 1543), and one was not dated but was of similar dimensions (ON 1525). Although they are of slightly irregular form these items may be spindle whorls, and if so, they probably indicate domestic spinning.

A piece of chalk from a fill of sunken-feature-building 173201 (ON 1518, Fig 6.10, no. 10) is cylindrical with a flat base and may have been a pestle. One side is incised with a rectangular pattern divided into eight, similar to a carved piece of chalk from Lord of the Manor, but in a far simpler form (Longworth 1995). Although chalk is easy to carve, decorated chalk items are not common. The decision to decorate an item, whether it is considered 'graffiti' or 'art', represents a conscious effort to mark an item out as different. There is an argument that decoration is as much about feel as appearance (Joy 2011, 211), a theory that could certainly be applied to a hand held item such as a pestle. The person that used this would have seen and felt the decoration each time they used it and it is unlikely that it was much seen or appreciated by others, so the decoration may have been about ownership and personal appreciation rather than status.

Six stones were utilised as tools for polishing or sharpening. A single whetstone fragment made from grey micaceous sandstone was found in pit 250094 in Zone 20 (ON 4164). The remaining processors used largely unmodified pebbles, other than through use. Two of these are pebble hones (ON 4206 (Fig 6.10, no. 11) and (ON 3965), while two other hones utilised unworked chunks of a similar stone to the whetstone (fill 124157 of pit 124156 and fill 230093 of pit 230088). A pebble with a single polished face suggesting that it was used for rubbing, and possibly as a pot burnisher, was recovered from Late Iron Age pit 291126 (291127). A further enigmatic item is unstratified but potentially of Roman date. This is a pebble with a socket worked into the stone and with a groove across the top (ON 2738, Fig 6.10, no. 12). The stone has split into two along the bedding plane, and the function is unclear, but it may have been used as a mould. A large perforated flint (ON 3803) found in wall 193106 (134094) may have been used as a weight, perhaps for fishing or weighting thatch or a gate. It is similar to weights from earlier phases (see above), though the perforation is natural and its precise purpose undetermined.

The amount of retained stone used in a structural or architectural way is limited but of interest. Two pieces of marble have not been analysed in detail but are fragments of white marble with large visible crystals, possibly Carrara marble. These were found in the late Roman fill of ditch 217122 in Zone 20 and in a mid-Roman fill (247175) of pit 247139 in Zone 6. They have smooth but not polished faces and may have been wall veneer.

Other flat slabs of stone may have been utilised as flooring, including naturally slabby stone (eg, that from pit 145076) that is otherwise unshaped. A neat triangular piece of very fine-grained sandstone found in Zone 20 in SFB 249083 (171228) could have been used in an opus sectile floor, although it is residual in its context here. The use of opus sectile was relatively short-lived and probably out of fashion by the 2nd century AD (Pritchard 1986, 182-5). Finally, a large block with a worn circular basin may have been used as a mortar (246170, not catalogued), but the square edges suggest that it fitted in between other squared blocks and that a function as a socket stone is more likely.

Fig 6.10 Early Roman worked stone

Catalogue of illustrated other worked stone

9. Oblong weight. Chalk. Large oblong shaped weight, very similar to examples found on the A2. Has sub-square cross section and sub-rectangular perforation. Inside the perforation is very worn and there are grooves along the bottom of the perforation, probably manufacture marks. Measures 240 x 120 x 120mm. Weight 4316g. ON 2094. Zone 19. Ctx 126177, deliberate backfill of kiln/oven 126175. Early Roman (Fig 6.9).
10. Possible pestle, decorated. Chalk. Cylindrical with oval cross section, flat base and broken top. Possibly originally a pestle. One of the sides is incised with a rectangle divided into eight. Measures >50 x 46 x 40mm. ON 1518. Zone 13. Ctx 173199. Secondary fill of SFB 173201. Early Roman (Fig 6.10).
11. Pebble hone. Fine grained pink sandstone. Pebble, distinctly waisted probably through use as a hone. Measures 75 x 30 x 30-49mm wide. ON 4206. Zone 10. Ctx 243132. Fill of enclosure ditch 247304. Early Roman (Fig 6.10).
12. Worked stone. Quartzitic sandstone pebble, split in two along bedding. Along one of these splits is a socket that has been worked into the stone and across the top edge of it is a groove. Possibly a mould or perhaps used to grind a tip or secure something? Socket measures 18mm deep x 15mm diameter at top although conical. Measures >50 x >50 x 48mm. ON 2738. Ctx 165018. Topsoil. Zone 7. Unphased (Fig 6.10).

Catalogue of non-illustrated other worked stone

1. Spindle whorl. Chalk. Half spindle whorl with cylindrical perforation measuring 5mm. Irregular shape but looks as though it was of disc form with straight sides. Measures 42-44mm diameter x 16mm max thickness. Weight 21g. ON 1543. Ctx 156221. Deliberate backfill of pit 156146. Zone 13. Early Roman
2. Spindle whorl. Chalk. Half survives. Biconical perforation measuring 6mm at narrowest point to 13mm. Crudely shaped but of disc form with flat sides and vertical slightly rounded edges. Measures 56mm diameter x 20mm thick. Weight 24g. ON 1525. Zone 13. Ctx 125106. Deliberate backfill of pit 125104. Unphased
3. Whetstone. Grey fine grained micaceous sandstone. Small central fragment. Sub-oval cross section. Measures >33 x 17 x 9mm. ON 4164. Zone 20E. Ctx 250097. Secondary fill of pit 250094. Mid-Roman
4. Pebble hone. Quartzite. Flat pebble with sub-rectangular cross section. Edges are bevelled through use as a whetstone but the pebble has not had its shape deliberately modified. Measures 54 x 16 x >93mm. ON 3965. Zone 6. Ctx 173369. Ditch 170045. Mid-Roman
5. Processor. Fine grained slightly micaceous grey sandstone. Chunk, unworked but with one very worn and slightly curved surface caused through extensive use for sharpening. Abundant black deposits on this surface. Measures 22mm thick. Zone 6. Ctx 124157. Deliberate backfill of pit 124156 from SFB 170175. Early Roman
6. Possible hone. Fine grained slightly micaceous yellowish brown sandstone. Large chunk, unworked. Has lots of shallow scratches/grooves on one face suggesting

possible use as hone. Measures 320 x 260 x 90mm. Zone 14.Ctx 230093. Secondary fill of pit 230088. Roman

7. Probable wall veneer. White marble/limestone with large visible crystals. Damaged edges, but one square corner. Flat faces, smooth but not polished. Measures 17mm thick. Zone 6. Ctx 247175. Deliberate backfill of rubbish pit 247139. Mid-Roman
8. Possible wall veneer. White marble. Oblong chunk of marble, white. Smoothed faces but not polished. Measures 26 x 26 x >50mm. Ctx 135041. Zone 20. Deliberate backfill of ditch 217122. Late Roman
9. Polished pebble. Flint. Pebble with one polished face, possibly a pot burnisher. Measures 76 x 50 x 29mm. Zone 6. Ctx 291127. Deliberate backfill of pit 291126. Late Iron Age
10. Possible pivot/socket stone. Fine grained grey sandstone, possibly Greensand. Block with two surviving sides that are roughly square. Quarter of stone with circular basin, quite deep and evenly worn/smoothed and measuring approximately 90mm diameter x 70mm deep. Zone 6. Ctx 246170. Post-packing in posthole 246169. Mid-Roman

Discussion

The number of stone tools and equipment other than querns found along the site is fairly small. The objects represented – whetstones, processing tools including a possible pestle, spindle whorls and weights – probably all represent small-scale activities associated either with food preparation or more generally with occupation. Few items amongst the assemblage are of high quality, although the decorated possible pestle (discussed above) is a notable exception. The possible *opus sectile* fragment provides a hint that there were high status buildings nearby, as do the two fragments of marble, and the villa at Minster provides one possible source. These represent the only 'exotic' imported stone across the site. Most of the other stone types used, such as chalk, would have been available either in the immediate vicinity or reasonably nearby.

Saxon

Only Zone 14 produced worked stone from Saxon contexts. These include 6.7kg of lava (272 fragments) which, in keeping with lava from other phases of activity, are all small and worn. It is not possible to determine whether they represent Saxon use of lava querns or were residual from Roman activity, but on balance the former seems most likely. Four other items of worked stone were recovered from Saxon features. One is a fragment of Greensand saddle quern (ON 511, not illustrated), perhaps a residual prehistoric object, which had been reused in the floor of a probable hearth (173051). Two unworked chunks of micaceous yellow sandstone are marked with several scratches and grooves, indicating that they had been used as hones (176071, 139087), whilst a further chunk of stone is slightly worn on one side and may have been used as some sort of rubber (202103).

Relatively large quantities of the same micaceous yellow sandstone, but unworked and with no evidence for use, came from various Saxon features in Zone 14, particularly the upper fills of some earlier ditches and several pits. This stone, of unknown but presumably fairly local source, also occurred in a few hearths and is likely to have been selected for use in these features, which have been linked to the processing of shellfish.

Catalogue of worked stone (not illustrated)

Saddle quern edge fragment. Greensand, Folkestone beds. Neatly worked and pecked all over. Edges curve into base. Neatly worked by pecking all over. Grinding surface is worn smooth and is concave lengthwise. Measures >150mm long x >75mm wide x 59mm thick. ON 511. Zone 14. Ctx 173050. Stone floor of probable hearth 173051. Saxon

Medieval

A total of 1.7kg (34 fragments) of lava were found in medieval contexts. These are all worn and non-diagnostic. A single unworked fragment of schist (ON 4039) from ditch 131018 has one worn side suggesting use as a hone.

Catalogue of worked stone (not illustrated)

Hone. Schist. Natural piece that has been utilised along one edge for sharpening. Measures 105 x 40 x 20mm. ON 4039. Zone 3. Ctx 131017. Secondary fill of ditch 131018. Medieval

Chapter 7

Miscellaneous Finds

by Sue Nelson, A P Fitzpatrick and Alistair J Barclay

Beads

by Sue Nelson, with a contribution by A P Fitzpatrick

Prehistoric beads *by A P Fitzpatrick*

Zone 12

A small amber disc bead, 5mm in diameter (Fig 7.1, no.1), came from Middle Bronze Age pit 214001 in Zone 12. It belongs to Beck and Shennan's type 1A (1991, fig 4.1) and assuming it is not residual, it is a rare find of this date. Beck and Shennan recorded no Middle Bronze Age finds of this type of bead as against eight from the Early Bronze Age and one from the Late Bronze Age (*ibid*, table 4.3).

Zone 13

A single small spherical bead, 5mm in diameter, in a pale blue faience, was recovered from grave 230115 in the interior of ring-ditch 134097. The burial was of an infant of Early or Middle Bronze Age date and, although little of the skeleton survived, the bead came from what appears to have been the area of the lower legs or feet. The simple spherical shape of the bead is one of the less common forms found in Britain where the use of faience is radiocarbon dated to between the 19th and 15th centuries BC (Sheridan and Shortland 2004). Faience is rare in Early Bronze Age Kent, known otherwise only from the Ringwould barrow (Champion 2004).

Roman beads

Zone 10

A total of 81 beads or partial beads was recovered from Zone 10, 79 of which came from a single grave (179267) of late Roman date. Nine of the beads from this grave are made of jet and the rest of monochrome glass. A single broken annular bead of blue-green glass was recovered from Saxon sunken-featured building 194086. It could be of either Roman or Saxon date as the colour and form were both long-lived. Another small fragment of a glass bead came from Roman ditch 194093. It is too small to discern its form.

Table 7.1 Beads from Zone 10

Grave/feature	*Object*	*Count*	*Material*	*Form*	*Colour*	*Comments*
194093	808	1	glass	unknown	opaque pale green	undiagnostic fragment
179267	4245	1	glass	annular	opaque yellow	
179267	4244	18	glass	globular	translucent blue	
179267	4244	4	glass	segmented	translucent blue	all have two segments
179267	4244	2	glass	drawn cylinder	translucent blue	longitudinal striations
179267	4244	11	glass	drawn cylinder	translucent blue green	longitudinal striations
179267	4244	3	glass	wound cylinder	translucent blue green	
179267	4244	8	glass	segmented	translucent blue green	two, three and four segments
179267	-	1	glass	wound cylinder	translucent blue green	fragmented
179267	-	1	glass	segmented	translucent blue	fragmented
179267	-	12	glass	globular	translucent blue	
179267	-	3	glass	wound cylinder	translucent blue green	fragmented
179267	-	1	glass	segmented	translucent blue green	fragmented
179267	-	1	glass	globular	translucent blue	
179267	4243	2	glass	globular	translucent blue	with jet pillar bead
179267	4242	2	glass	globular	translucent blue	with jet square bead
179267	4240	1	jet	pillar	black	
179267	4241	1	jet	pillar	black	
179267	4238	1	jet	pillar	black	broken
179267	4243	1	jet	pillar	black	
179267	4242	1	jet	square	black	
179267	4235	1	jet	square	black	
179267	4239	1	jet	domed disc	black	
179267	4236	1	jet	pillar	black	
179267	4237	1	jet	domed disc	black	
197086	212	1	glass	annular	opaque green blue	broken – 50% present

The beads from grave 179267
This grave yielded a necklace of nine jet beads interspersed with 69 translucent blue and blue/green glass beads and a single opaque yellow bead, all strung on fine copper alloy wire (Volume 1, Fig. 4.32). Two segments of the wire survive (ON 4244). The beads are quantified by type in Table 7.1.

Monochrome glass beads
Several of the monochrome glass beads are in segmented forms (Guido 1978, 93-4, fig 37, 3) and some of the blue beads recorded as globular may in fact be broken segmented beads. The blue globular beads are the most common form on this necklace, with 35 examples, whilst there are five segmented blue beads and nine segmented blue-green beads. A further 20 beads are cylinders (*ibid*, 94-5, fig 37, 4) with two drawn cylinder blue beads, and 11 drawn cylinder and seven wound cylinder beads in blue-green glass. All of the blue and blue-green beads are translucent, which is less common than opaque glass. The length of the cylinder beads ranges from 8mm to 20mm, consistent with Guido's proposed average length of 15mm (*ibid*, 94), and the width is between 3mm and 4mm. The presence of the wound cylinders and the noticeable longitudinal striations present in the drawn cylinders are indicators of a late Roman date, and they have a distinctly southern distribution in Britain. The single yellow opaque bead is annular, a long-lasting type, the majority of which date to the 3rd to 1st centuries BC, with a few from early Roman contexts (*ibid*, 73-6). This example is badly degraded.

Jet beads
The use of jet in this necklace is indicative of a date no earlier than the 3rd century, when jet became very popular in Britain (Allason-Jones 1996, 9). It continued to be popular in the 4th century and only declined in use towards the end of the Roman period. Five of the beads in this necklace are square-sectioned pillar beads (*ibid*, type 13). They are undecorated and have two holes pierced laterally and one longitudinally. This suggests that they were bought as multi-purpose spacers and could be strung either way, rather than being custom-made for this necklace. They vary in length from 8-10mm and in width from 3-4mm. One bead is broken but both parts are present. Two of the beads are almost square (13x11mm and 14 x 12mm) and 4mm thick, pierced twice through one edge, and have incised concentric circles around a central dot on one side, the other side being plain. The piercing on one of these beads (ON 4235) has been done badly and is off-line to the extent that it appears on both surfaces of the bead. The two remaining beads are both 'disc beads with domed faces and undercut sides' (*ibid*, type 50) and are pierced laterally with two holes. None of the beads is made with a particularly high level of craftsmanship and most have some faults and irregularities.

Saxon beads

Zone 6
Two glass beads were recovered from Roman grave 153095 (not illustrated). The first is an extremely small bead, pale orange and cylindrical; it measures 1mm in both length and diameter. The second is a quite badly abraded polychrome glass bead, opaque red with yellow trails and is globular in form (ON 411). The latter is likely to be of Saxon date and, therefore, intrusive in the grave (it came from the fill, rather than being clearly associated with the burial).

Zone 14
Nine beads were recovered from Zone 14, comprising seven monochrome glass beads and two beads of amethyst quartz, found together in a Saxon pit (126042). The glass beads from this group comprise five opaque green and two opaque red short cylinders with rounded sides and one opaque red globular form (Fig

Table 7.2 Bead type and quantity by grave (Zone 19)

Grave/feature	*Mono*	*Poly*	*Amber*	*Amethyst*	*Gypsum*	*Bone*	*Vessel*	*Crystal*	*Total*
126091	6		1						7
136111	1		1					1	3
136150	5								5
153034	1	1							2
153075	2								2
153084	5								5
166105	5								5
166116	2		1						3
166125	2	1	2						5
171171	3	1		5					9
220109	2								2
228047						1			1
252076	11	3	17						31
267072	202	17	18		3		1	1	242
279039	15		4						19
286013	1								1
Total	263	23	44	5	3	1	1	2	342

7.1, nos 2-3). All fall within Brugmann's 'wound spiral' type, which she dates after *c* AD 650 (Brugmann 2004, 76). At the Dover Buckland cemetery the rounded cylinders are considered indicative of a date of AD 675-750 (Evison 1987, 62). The two amethyst quartz beads are tear-drop shaped, drilled longitudinally (Fig 7.1, no. 4). The presence of amethyst beads suggests a date of AD 600-675 (Geake 1997, 12). Although this group comes from a pit, found in conjunction with general domestic waste, and therefore not classed as grave-goods, there is no reason to suppose the dating indicators should be any different.

Zone 19

A total of 342 beads (286 glass, 44 amber, five amethyst quartz, two rock crystal, three gypsum, one worked bone, and one re-used vessel glass), all of Saxon date, was recovered from 16 graves in Zone 19. Table 7.2 shows the breakdown of numbers and types of beads per grave. The numbers range from one to 239, the latter being clearly exceptional. The beads have been classified according to Hirst's (2000) scheme, with reference also to Brugmann's (2004) and Koch's (1977) classifications and to the assemblage from the Dover Buckland cemetery (Evison 1987, 57-67).

Monochrome glass beads

The majority of the glass beads (263) are monochrome types and are summarised in Table 7.3. Disc, annular, globular, biconical, barrel, short cylinder with straight sides and rounded sides, long cylinder, short and long square and pentagonal types are present, all except one being wound rather than drawn. The most common form is annular (70 examples) but the majority of these came from a single grave (267072). Geake (1997, 12-13) regards a high proportion of annular beads as being indicative of a 6th century or earlier date. There are also 70 cylindrical beads, but these are subdivided into long and short types, with straight or rounded sides according to both Hirst's (2000) classification and Evison's (1987) catalogue from the Dover Buckland cemetery. At Dover it was found that the short cylinder with straight sides was a form that appeared in Phase 3 (AD 575-625) then fell away again quite rapidly. The form reappeared in Phases 6 and 7 (AD 675-750), but with rounded sides (Evison 1987, 62). This form then can provide important dating evidence. Only three graves contained the short, straight-sided cylindrical beads, with single examples from graves 136150 and 166126, all the rest being, again, from the exceptionally rich grave 267072, confirming its relatively early date. Nineteen round-sided cylinders were found in eight graves, the highest number being six in any one grave. These were all graves with lower numbers of monochrome beads. Geake states that 'beads in Conversion-period graves [AD 600-850] occur in much smaller numbers than did the amber or glass beads found in 6th century graves' (1987, 45). These graves, then, are likely on this evidence to fall later in the chronological sequence (graves 126091, 153034, 153075, 153084, 166105, 166116, 220109 and 286013).

The colour of monochrome beads can also provide dating evidence. The most common colour in the assemblage is opaque red or brown-red, a shade that appears in phase 3 of Dover Buckland (AD 575-625) and continued through to AD 700 in smaller numbers (Evison 1987, 61). Of the 60 red or brown-red beads in the assemblage, 50 are from grave 262072 and all are annular or straight-sided cylinders. As at Dover, the majority of the later red beads are round-sided cylinders and only occurred in ones and twos. The second most common colour in the assemblage is opaque yellow. This was also the most common colour at Dover (*ibid*, 61), again found mainly in phase 3. The yellow beads from Zone 19 occur in several forms, with almost all of them found in grave 262072. The assemblage as a whole seems to be in contrast to Geake's (1998, 45) description of a Conversion-period assemblage, where the monochrome beads are 'usually green or blue or, slightly less often, red or yellow. They tend to be barrel-shaped or biconical…'. There are only five biconical and seven barrel forms in this assemblage. The evidence of the monochrome beads, therefore, suggests a late 6th or early 7th century date for grave 262072.

Grave 171171 produced an unusual group of beads: a blue, drawn cylinder bead, potentially the earliest bead in the assemblage, flanked by two opaque orange barrel-shaped beads (Volume 1 Fig 5.33). Brugmann dates the 'constricted cylinder' type to the period *c* AD 480-580 (2004, 75), while orange beads are a late appearance, dating to the 7th century (Evison 1987, 61; Brugmann 2004, 75), so the central bead may have been an heirloom. Brugmann (2004, 40) also points out that orange beads are almost absent from Saxon England, apart from Kent.

Polychrome glass beads

There are 23 polychrome beads, found in five graves, 17 of which were from grave 267072. A summary of types is given in Table 7.4. By far the majority of these beads have an opaque red or brown-red body with applied single or double trails in white or yellow, some interspersed with spots. Geake (1998, 43-4) suggests that beads with spots or double or single wavy trails or a combination of these can be found in 6th century graves, but that there does not appear to be any clear distinction between beads of this type found in Conversion-period graves as opposed to earlier ones. Only one bead has more than one colour applied; this is an elongated biconical bead with an opaque red background and opaque yellow and white trails, from grave 267072. These bead types correspond with Koch's types 20 (wide crossing trails and dots, mostly white on red or yellow on red) and 34 (narrow crossing waves in more varied colour combinations, with yellow on red being the most common). Both types occur frequently in Kent (Brugmann 2004, 38-9, figs 60, 61). At Dover Buckland the two types are dated to AD 575-675 (Evison 1987, 63); Brugmann (2004, 81) dates them as *c* AD 555-650 (Koch 20) and *c* AD 580-650 (Koch 34) respectively.

The single polychrome bead from grave 153034 (ON 1201) is an example of a cylindrical reticella

Table 7.3 Monochrome bead types by grave/ feature

Grave/Feature	No.	Colour	Form	Comments	Date
126091	4	pale green	short cylinder (rounded)	Buckland B19	AD 675-750
126091	1	blue green	short cylinder (rounded)	Buckland B19	AD 675-750
126091	1	opaque red	short cylinder (rounded)	Buckland B19	AD 675-750
136111	1	blue	annular	Hirst A2	long lasting form
136150	2	opaque yellow	globular	Hirst B1	AD 575-625
136150	1	semi-opaque green	short cylinder (straight)	Buckland B18	AD 575-675
136150	1	dark olive green	disc	Hirst A1	long lasting form
136150	1	opaque orange	biconical	Hirst C1	AD 625-675
153034	1	opaque red	short cylinder (rounded)	Buckland B19	AD 675-750
153075	1	green blue	biconical	Hirst C1	
153075	1	opaque brown red	short cylinder (rounded)	Buckland B19	AD 675-750
153084	2	opaque orange	globular	Hirst B1	AD 625-675
153084	2	opaque brown red	short cylinder (rounded)	Buckland B19	AD 675-750
153084	1	semi-opaque green	short cylinder (rounded)	Buckland B19	AD 675-750
166105	1	pale green	short cylinder (rounded)	Buckland B19	AD 675-750
166105	1	blue green	thin-walled cylinder	Hirst G2	
166105	1	semi-opaque green	short cylinder (rounded)	Buckland B19	AD 675-750
166105	1	opaque brown red	short cylinder (rounded)	Buckland B19	AD 675-750
166105	1	pale blue green	short cylinder (rounded)	Buckland B19	AD 675-750
166116	1	semi-opaque green	short cylinder (rounded)	Buckland B19	AD 675-750
166116	1	opaque red	short cylinder (rounded)	Buckland B19	AD 675-750
166125	1	dark blue	annular	Hirst A2	long lasting form
166125	1	green blue	short cylinder (straight)	Buckland B18	AD 575-675
171171	2	opaque orange	barrel	Hirst D1	AD 625-675
171171	1	dark green	drawn cylinder crimped	Hirst L2	AD 475-625
220109	2	opaque brown red	short cylinder (rounded)	Buckland B19	AD 675-750
252076	1	opaque white	pentagonal section	Hirst K2	AD 575 onwards
252076	5	semi-opaque green	pentagonal section	Hirst K2	
252076	2	opaque brown red	pentagonal section	Hirst K2	AD 625-750
252076	1	opaque yellow	annular	Hirst A2	AD 575-625
252076	1	opaque yellow	globular	Hirst B1	AD 575-625
267072	4	pale green	barrel	Hirst D1	
267072	1	opaque red	biconical	Hirst C1	AD 625-750
267072	1	pale yellow	long biconical		AD 575-625
267072	1	opaque yellow	barrel	Hirst D1	AD 575-625
267072	7	pale yellow	pentagonal section	Hirst K2	AD 575-625
267072	8	opaque red	pentagonal section	Hirst K2	AD 625-750
267072	1	opaque yellow	pentagonal section	Hirst K2	AD 575-625
267072	4	semi-translucent yellow green	short 4-sided cylinder	Buckland B08	AD 575-675
267072	2	opaque red	long square section	Hirst K1	AD 575-675
267072	1	green blue	long square section	Hirst K1	AD 575-675
267072	2	opaque yellow	long square section	Hirst K1	AD 575-675
267072	1	blue	short 4-sided cylinder	Buckland B08	AD 575-675
267072	3	green/ black	annular	Hirst A2	long lasting form
267072	1	dark blue	annular	Hirst A2	long lasting form
267072	5	pale green	annular	Hirst A2	long lasting form
267072	9	green blue	annular	Hirst A2	long lasting form
267072	14	opaque yellow	annular	Hirst A2	AD 575-675
267072	13	opaque brown red	annular	Hirst A2	AD 625-750
267072	22	opaque red	annular	Hirst A2	AD 625-750
267072	3	pale green	globular	Hirst B1	
267072	5	green blue	globular	Hirst B1	
267072	12	opaque red	globular	Hirst B1	AD 625-750
267072	8	opaque brown red	globular	Hirst B1	AD 625-750
267072	1	blue	globular	Hirst B1	
267072	17	opaque yellow	globular	Hirst B1	AD 575-675
267072	3	pale green	short cylinder (straight)	Buckland B18	AD 575-675
267072	2	semi translucent green blue	short cylinder (straight)	Buckland B18	AD 575-675
267072	15	opaque red	short cylinder (straight)	Buckland B18	AD 575-675
267072	10	opaque yellow	short cylinder (straight)	Buckland B18	AD 575-625
267072	7	green yellow	thin-walled cylinder	Hirst G2	AD 575-675
267072	3	opaque yellow	thin-walled cylinder	Hirst G2	AD 575-675
267072	7	semi translucent green blue	thin-walled cylinder	Hirst G2	
279037	7	green black	Coiled globular	Hirst B2	
279037	7	opaque green	Coiled globular	Hirst B2	
279039	1	opaque green	annular	Hirst A2	long-lasting form
286013	1	opaque green	short cylinder (rounded)	Buckland B19	AD 675-750

* Form classification follows Hirst (2000) or Dover Buckland (Evison 1987)

Table 7.4 Polychrome bead types by grave

Grave	Obj.	Form	Body colour	Decoration colour	Motif	Size	Length	Comments
153034	1201	triple annular	opaque brown red	opaque yellow	reticella	medium	long	reticella
166125	2076	disc	semi-translucent blue green	opaque red	single wave	medium	short	almost all inlaid glass missing
171171	1839	annular	blue	opaque white	irregular linear trails	medium	short	
252076	2339	disc	semi-translucent green blue	opaque white	double crossing wave	medium	short	Koch 34; fragmented; not illustrated
252076	2330	biconical	opaque brown red	opaque yellow	single wave	medium	long	
252076	2499	thick-walled cylinder	opaque orange	opaque white	attached irregular spots	medium	long	degraded surface so motif inconclusive; not illustrated
267072	4717	biconical	opaque brown red	opaque white	double crossing wave & spots	medium	standard	Koch 20
267072	2377	biconical	opaque brown red	opaque yellow	single wave	medium	long	
267072	2354	disc	dark blue	opaque white	single wave	medium	short	abraded
267072	2322	thick-walled cylinder	opaque brown red	opaque white	irregular linear trails	medium	long	
267072	2551	thick-walled cylinder	opaque brown red with black streaks	opaque white	single wave	medium	long	
267072	3079	globular	opaque white	opaque brown red	single wave	medium	standard	
267072	3004	globular	opaque brown red	opaque white	double crossing wave	medium	standard	Koch 34
267072	2533	globular	opaque brown red	opaque white	double crossing wave & spots	medium	standard	Koch 20
267072	2577	globular	opaque brown red	opaque white	spiral circle	medium	standard	
267072	2321	biconical	opaque red	opaque white/ opaque yellow	spiral & irregular trail	medium	long	not illustrated
267072	2560	barrel	opaque brown red	opaque white	single wave	medium	standard	not illustrated
267072	2559	barrel	opaque brown red	opaque white	single wave	medium	standard	not illustrated
267072	3086	barrel	opaque brown red	opaque white	single wave	medium	standard	
267072	2534	barrel	opaque red	opaque yellow	single wave	medium	standard	
267072	2558	barrel	opaque red	opaque yellow	single wave	medium	standard	not illustrated
267072	3010	barrel	opaque red	opaque yellow	single wave	medium	standard	not illustrated
267072	3036	barrel	opaque red	opaque yellow	single wave	medium	standard	not illustrated

* Classification of form, colour and size follows Hirst (2000); 'medium' = diameter of 6-10mm; 'standard' = length more or less same as diameter; 'long' = length distinctly greater than diameter; 'short' = length distinctly less than diameter

bead, with opaque yellow reticella trails on an opaque red ground, alternating 's' and 'z' twist in three parallel bands. The main distribution of these beads is on the continent, but there is a small concentration of occurrences in Kent. Brugmann (2004, 78, fig 50) dates the type in this country to the period *c* AD 530-580.

Amber beads

A total of 44 amber beads was recovered from seven graves. Graves 126091, 136111 and 166116 each yielded a single bead, grave 279039 four beads and grave 166125 two beads. Graves 267072 and 252076 contained 18 and 17 beads respectively. The bead forms have been classified according to Evison's (1987) scheme for the Dover Buckland beads, and are summarised in Table 7.5. Most of the beads are medium-sized (5-10mm) and irregular in shape with the majority falling into Evison's forms A01 and A02, with a single slightly larger bead that looks to have been made into a flattened barrel shape. The bead from grave 136111, however (Volume 1 Fig 5.10), has been carefully shaped into a flattened disc (Evison type A03) with the perforation off-centre, meaning that it would have been worn as a pendant.

Beads of amethyst quartz and other materials

Five amethyst quartz beads were recovered from grave 171171 (Volume 1 Fig 5.33), where they were found alongside monochrome glass beads, including two in opaque orange (see above). Opaque orange beads are often found in association with amethyst and both appear to be concentrated mostly in Kent, where they date to the late 7th to early 8th centuries. The amethyst beads are all either long barrel or teardrop-shaped, ranging from 14-24mm in length, and are perforated longitudinally.

The remainder of this group comprises two rock crystal and three fragmentary gypsum beads, one worked bone pendant and one piece of pierced vessel glass, the latter two of which are discussed under their respective material types (Nelson, below). All of the above are summarised in Table 7.5. The rock crystal beads are both large and irregular in form, but the

Table 7.5 Non-glass bead types by grave

Grave	*Object No.*	*Material*	*Form*	*Size*
126091	-	amber	Buckland A02	small
136111	862	amber	Buckland A03	medium
136109	2054	rock crystal	discoid irregular	large
166116	2062	amber	Buckland A01	small
166125	2078	amber	Buckland A02	medium
166125	4724	amber	Buckland A03	large
171171	1847	amethyst quartz	Buckland A05	17x10mm
171171	1849	amethyst quartz	Buckland A06	23x14mm
171171	1843	amethyst quartz	Buckland A06	15x8mm
171171	1848	amethyst quartz	Buckland A05	16x9mm
171171	1850	amethyst quartz	Buckland A06	24x13mm
228047	2417	worked bone	hemispherical (perforated off-centre)	13mm
252076	2482	vessel glass	pierced base of small vessel	
252076	2491	amber	Buckland A02	medium
252076	2497	amber	Buckland A02	medium
252076	2331	amber	Buckland A02	medium
252076	2496	amber	Buckland A02	medium
252076	2493	amber	Buckland A02	medium
252076	2338	amber	Buckland A02	medium
252076	2494	amber	Buckland A02	medium
252076	2495	amber	Buckland A02	medium
252076	2334	amber	Buckland A02	medium
252076	2340	amber	Buckland A02	medium
252076	2486	amber	Buckland A01	small
252076	2489	amber	Buckland A02	medium
252076	2332	amber	Buckland A02	medium
252076	2487	amber	Buckland A02	medium
252076	2335	amber	Buckland A02	medium
252076	2488	amber	Buckland A02	medium
252076	2341	amber	Buckland A02	Medium
267072	3029	gypsum	fragmented	
267072	3096	gypsum	fragmented	
267072	3037	gypsum	fragmented	
267072	2355	amber	Buckland A01	small
267072	2579	amber	Buckland A01	small
267072	2367	amber	Buckland A02	medium
267072	2586	amber	Buckland A01	small
267072	2587	amber	Buckland A02	medium
267072	2584	amber	Buckland A01	small
267072	2545	amber	Buckland A02	medium
267072	2563	rock crystal	discoid irregular	large
267072	3032	amber	flattened barrel	large
267072	3030	amber	Buckland A02	medium
267072	3034	amber	Buckland A01	small
267072	3019	amber	Buckland A01	small
267072	2391	amber	Buckland A02	medium
267072	2580	amber	Buckland A02	medium
267072	3015	amber	Buckland A02	medium
267072	2392	amber	Buckland A01	small
267072	2371	amber	Buckland A02	medium
267072	3078	amber	Buckland A02	medium
267072	2380	amber	Buckland A02	medium
279039	2465	amber	Buckland A01	small
279039	2469	amber	Buckland A01	small
279039	2472	amber	Buckland A01	small
279039	2477	amber	Buckland A01	small

overall shape is discoidal and the central perforation indicates that they were threaded onto necklaces, rather than worn as pendants. One was from the triple burial in grave 136111 (Volume 1 Fig 5.10), and was one of only two beads with skeleton 136115, found in the neck area. The other bead was a blue glass annular form found by the left arm. The second rock crystal bead was part of the very large bead group in grave 267072 (Volume 1 Fig 5.47). The three very fragmented gypsum beads also came from this group. Similar beads, which have been variously described as gypsum, apatite or magnesium carbonate, have been found at Dover Buckland (Evison 1987, 60) and at Cliff's End Farm, Ramsgate (Hopper forthcoming). Such beads have sometimes been described as made of 'chalk', though analysis of those at Mill Hill, Deal, showed them to be 'made of some other material' (Brugmann 1997, 56).

Distribution of beads in Zone 19
Beads were recovered from a total of 15 graves within Zone 19 (see Table 7.2). Over two-thirds of the monochrome glass beads, three-quarters of the polychrome glass beads and almost half the amber beads were recovered from grave 267072. Apart from this grave, the highest number from a single grave was 31 from grave 252076, which had 11 monochrome and 3 polychrome glass beads and 17 amber beads. Grave 279039 yielded 15 monochrome glass and four amber beads. All the other graves contained nine beads or fewer.

Discussion of beads from Zone 19
During the 7th to 9th centuries the presence of amber beads in graves declined markedly (Geake 1997, 12), although they may still be found singly in graves of this period. Geake considers these later examples to have probably been used as amulets. She states that 'strings of amber beads are… a type fossil of the 6th century' and that 'no 7th or 8th century grave has produced a long string' (Geake 1997, 47). Evison (1987, 57) emphasises that at Dover amber beads were found in association with jet, glass, stone and composite beads, but never with amethyst, shell or metal and the same pattern is borne out in this assemblage. The presence in two graves (252076 and 267072) of groups of 17 and 18 amber beads respectively therefore suggests that they possibly pre-date *c* AD 600. Of the monochrome glass beads present in the large assemblage from grave 267072, over 25% are annular and almost 20% globular but there are only two barrel-shaped and three biconical forms. The presence in this group of a number of straight-sided short cylinders (Evison's B18 form), and the absence of round-sided short cylinders (B19 form), is also suggestive of an early date. This grave also yielded 17 of the 23 polychrome beads from the cemetery, including Koch 20 and Koch 34 types, dated broadly from the mid 6th to mid 7th century.

The comparatively low numbers of polychrome beads in the assemblage as a whole, however, is indicative of a later date as they apparently became less common from the 6th century onwards, although continuing in use until the late 7th and early 8th centuries (Geake 1997, 44). The presence of amethyst beads in grave 171171 is also suggestive of a later date – Geake considers them to be a grave good type diagnostic of a post-AD 600 date, with continental parallels suggesting a date range of *c* AD 590-675 (*ibid*,12, 41). It is possible, therefore, that the cemetery was in use for a considerable period of time but, with the exception of the single blue constricted cylinder bead from grave 171171, possibly an heirloom, none of the beads definitely date earlier than *c* AD 530.

Zone 20
One broken monochrome glass bead was recovered from an unstratified context, but is probably of Saxon date. It is of coiled globular form and turquoise in colour.

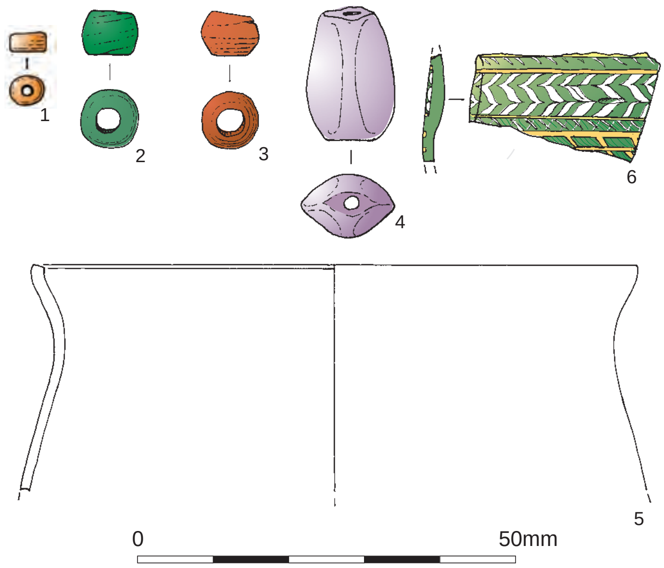


Fig 7.1 Amber and glass beads and vessel glass from pits

Catalogue of illustrated beads (Fig 7.1)

1. Amber disc bead. Middle Bronze Age. Zone 12, pit 214001
2. Opaque green, round-sided cylinder bead. Saxon. ON 4729, Zone 14, pit 126042
3. Opaque red, globular bead. Saxon. ON 4732, Zone 14, pit 126042
4. Amethyst quartz bead. Saxon. ON 4733, Zone 14, pit 126042

Glass *by Sue Nelson*

A total of 42 fragments of glass, other than beads, was recovered from all zones. The largest assemblage (17 pieces) came from Zone 6; all other zones produced five examples or fewer. The glass ranges in date from Roman to modern with Roman vessel glass being the most common type. The modern glass is not discussed here.

Roman glass

Zone 6
Seventeen fragments of glass were found in Zone 6, all but one of which are Roman in date. Two rim fragments of a jug or bowl came from spread 231002. They probably derive from a deep, tubular-rimmed bowl of blown glass and are a light yellow-green in colour. These vessels range in date from AD 60/65 to the third quarter of the 2nd century AD (Price and Cottam 1998, 78). Several examples were found at Colchester (Cool and Price 1995, 94-8) and they are considered to be common in Britain from the mid-1st to mid-2nd centuries AD, falling out of use in the second half of the 2nd century.

A fragment of a folded ribbon handle in blue-green glass was recovered from ditch 170041, and a piece of a square bottle or jar probably dating from the 1st or 2nd century AD (Price and Cottam, 1998, 135) came from layer 128039. One fragment from ditch 248194 comprises the folded rim of a jug or bottle in blue-green glass, but is too small to make a more specific form attribution.

A colourless beaker rim was made by being cracked off and polished down, with a wheel-cut line under the rim (Fig 7.1, 5). These beakers were 'the commonest form of drinking vessel in use in Roman Britain in the early and middle part of the 2nd century' (Cool and Price 1995, 79), although this example came from a late Roman sunken-featured building (170132). Such beakers were 'decorated with groups of wheel-cut and abraded horizontal lines at intervals on the body' (*ibid*, 79), although only the rim survives from this vessel. It probably also had a tubular pushed-in base ring. Seven pieces of vessel glass are undiagnostic body fragments. One (ON 4033) has traces of trailed decoration, while ON 882 from layer 130010 is a mould-blown piece in a deep cobalt blue, the strong colour indicating a 1st century AD date.

A single piece of Roman window glass, matt on one side and glossy on the other, was recovered from ditch 249099 and another two pieces from spread 231002; these most probably date from the 1st to 3rd centuries AD.

Zone 7

Several fragments of extremely thin vessel glass in a blue-green colour were recovered from grave 271009, and probably comprised part of a small cup. The form is not particularly chronologically distinctive, and could date anywhere from the 2nd to 4th centuries AD.

Zone 10

Fragments of four glass vessels were recovered from Zone 10, including one from a burial context. A body sherd from a bowl or jug in a light yellow-green glass, with some ribbing present, came from layer 178010. There is also a fragment of a ribbon handle in blue-green glass from ditch 249239. A small, undiagnostic blue-green body fragment was recovered from early Roman enclosure ditch 135066. None of these three vessels can be dated closely on form.

ON 4250, from grave 182340, was found in many fragments. It is of pale green glass and represents the base of a small, discoid unguent bottle (Price and Cottam 1998, 175-6) (Volume 1 Fig 4.33). It was placed by the lower right leg of the body, adjacent to a complete pottery dish. Most of the base survived but the neck is represented only by tiny fragments. It was found base uppermost in the ground, so was apparently incomplete when deposited. Price and Cottam describe these vessels as 'quite common, sometimes found in burials' (*ibid*, 176), and dating from the second and third quarters of the 2nd century AD. An example from Colchester is of similar size (Cool and Price 1995, 162, fig 9.12), although the profile of ON 4250 is somewhat flatter and less conical.

Zone 11

Five pieces of glass were recovered from Zone 11, including three post-medieval wine bottle fragments. Of the remaining two, ON 4688 is part of the neck of a long-necked jug, retaining the top part of the handle attachment. It is blue-green in colour and is probably mid-Roman in date. ON 800, from early Roman pit 158007, comprises two sherds from just below the rim of a small, very fine blue-green jar.

Zone 12

A single minute piece of glass was recovered from Zone 12, from Middle Iron Age grave 153043, but it is so small it is impossible to discern anything from it, and it is likely in any case that this fragment was intrusive.

Zone 20

Three fragments of glass were recovered from Zone 20. Two are of Roman date and the third is badly abraded and therefore impossible to date. One fragment, from pit 215215, is a piece from the side wall of a blue-green prismatic bottle, probably square in shape. These bottles are common finds from 1st and 2nd century AD sites (Price and Cottam 1998, 195). The second piece, from sunken-featured building 249081, is a small fragment of a blue-green bottle or jug.

Zone 21

Four fragments of glass were recovered from Zone 21, three of them modern. The fourth, however, is a small piece of Roman vessel glass in a blue-green colour. It is too small to assign to any particular vessel form, but its thickness would suggest a bottle or jug. This piece came from pit 126090.

Saxon glass

Zone 14

A small piece of reticella glass (Fig 7.1, 6) was recovered from mid-Saxon pit 202046, one of a group of 17 or so pits on the eastern edge of Zone 14. It is a fragment from just below the rim of a vessel, comprising less than 5% of its circumference, which was originally approximately 180mm in diameter. Three contiguous reticella rods had been marvered onto a base ground of blown translucent green glass, framed by borders of thin opaque yellow trails, also marvered. The reticella rods themselves have marvered opaque white trails, in alternating 's' and 'z' twists, to form a herringbone pattern between borders of opaque yellow, the whole forming a narrow horizontal band around the vessel. There is a trace of a third yellow trail above/below the band (the orientation of the piece is uncertain).

This fragment is of particular interest. It is from a very high quality vessel, with implications for the economic and social status of the site, and is unusual in both form and decoration. Dr Rosalind Broadley of University College, London believes it is from a bowl (pers. comm.), but it does not have the usual rim form, as most bowls of this type have an out-folded cavity rim. The herring-bone pattern is characteristic of bowl forms but 'the transition from opaque yellow reticella to white and then back again is very distinctive, as is the application of plain opaque yellow trails over or between the reticella trails. The top two trails appear to have been used to divide the white reticella zone from the rest of the vessel' (R Broadley, pers. comm.). The workmanship is exceptional and it is almost certainly an imported vessel, but no direct parallel has yet been found in Britain or on the continent. Two fragments from Whitby Abbey, North Yorkshire, one from a vessel and the other a small square plaque, illustrate the same decorative technique, but are not otherwise comparable (Evison 2008, cat. nos 16, 17). Dr. Broadley believes it may be from a bowl of the very late 8th or early to mid-9th centuries, which would explain the atypical rim form and the variation from normal decoration. The piece was found in association with sherds of Ipswich ware pottery of similar 8th-9th century date.

Zone 19

Two glass fragments came from Saxon graves in Zone 19. The first, from grave 280022, is a small blue-green fragment, probably from a beaker and is likely to be Saxon in date, but the sherd is too small to be truly diagnostic. The second fragment, the base of a stemmed beaker, came from grave 252079. The base had been broken off and pierced, slightly off-centre, in order that it could be used as a bead or amulet. It is 28mm in diameter and the glass is soft and is degrading, making it difficult to see the original colour, but the softness and the form make it more likely to be a piece of Saxon glass than Roman. This piece is unusual in that it was more common for rim fragments, from both Roman and Saxon vessels, to be re-used as beads. A comparable vessel was found in a grave in the Howletts cemetery at Littlebourne in Kent, and is dated to the 5th or early 6th century (Evison 2008, cat. no. 49).

Catalogue of illustrated glass vessels (Fig 7.1)

5. Rim from beaker, colourless glass; wheel-cut line below rim. Roman. ON 884, Zone 6, ctx 289043, sunken-featured building 170132
6. Fragment of vessel with reticella decoration (opaque white and yellow trails). Mid-Saxon. ON 528, Zone 14, ctx 202048, pit 202046

Jet, shale and other minerals *by Sue Nelson, with a contribution by Alistair J Barclay*

Bronze Age amber *by Alistair J Barclay*

A V-perforated button (ON 2266) was found 'inside the mouth' of skeleton 246136 (grave 246134) within Early Bronze Age ring-ditch 216090 on Zone 21. Surface condition is poor with the original surface oxidised to a whitish-yellow, which is crazed and exfoliated in places. The button is in two joining fragments with an old break, perhaps caused by perforation (Volume 1, Fig 2.16). The button is of hipped conical shape (D:23mm; H: 20mm; Wt: 10.53g) with a typical V-perforation in the base, and is closest in form to Shepherd's type 3 (2009, fig 2 and 340), a form found in Wessex and East Yorkshire and in a variety of materials. Beck and Shennan list 13 general occurrences of this type of amber object (1991, table 4.12); Shepherd (2009) lists up to 18, with the nearest findspot possibly at North Shoebury, Essex (Shepherd 2009, appendix, 357: type 4, details uncertain). In Britain this type of object occurs occasionally in Beaker (Yorkshire coast) and mostly in Early Bronze Age (Wessex and elsewhere in Britain) funerary contexts (Shepherd 2009). Association with a Food Vessel, as is the case with this example, is unusual, although both types of object are extremely rare for Thanet and indeed Kent generally. A radiocarbon date of 1930-1740 cal. BC (3505 ± 35BP; SUERC 40721) was obtained on the human bone.

Analysis of the amber to identify its place of origin is unlikely to be helpful (A Sheridan, pers. comm.), as material is known to have been exchanged from the Baltic and collected as erratics from the east coast of England. Other finds of amber from East Kent are rare and include fragments of a perforated spacer plate from the upper ditch fill of the Kingsborough K2 causewayed enclosure (incorrectly reported as a bead in Allen *et al* 2008, 294) and pommel and pendant fragments from the Ringlemere henge (Needham 2006, 39).

There is also a second piece of Bronze Age amber from the EKA2 site. This is a small amber bead, of disc form, which came from Middle Bronze Age pit 214001 in Zone 12 (see above).

Iron Age–Roman shale and jet

Shale

A total of 14 shale artefacts and one large piece of unworked shale were recovered from the site. The majority of these are either broken or unfinished pieces. None of the objects is decorated. One large, complete bracelet was recovered from an Early-Middle Iron Age grave and is described in detail below. Most of the shale objects conform to well-documented Iron Age and Roman types, generally associated with the large-scale shale-working industry at Kimmeridge in Dorset (eg, Woodward 1987). The presence of so many unfinished objects and rough-outs, however, coupled with the unworked piece, would suggest that shale was being worked in the vicinity. The recent discovery of a late prehistoric shale-working site in Kent at Burham, some 50km to the west (Wessex Archaeology 2010), lends weight to this argument.

Seven shale objects were recovered from Zone 6 (see Table 7.6). Apart from a large piece of unworked shale, all of these objects are armlet fragments, three of which are unfinished (Fig 7.2, 1-3). ON 3968 was clearly in the early stages of manufacture when it failed, as there are many visible tool-marks on all surfaces. All these objects are from Iron Age or early Roman contexts, the earliest is of Early-Middle Iron Age date.

Two fragments of a broken shale armlet rough-out, representing less than 10% of the whole object, were recovered from Middle Iron Age grave 166002 in Zone 12. It is 12mm wide, but split laterally.

Zone 13 produced five shale objects. The assemblage comprises one complete armlet (Fig 7.2, 4) and four

Table 7.6 Shale objects from Zones 6 and 13

Z	Context	Object	Description	Count	Percentage	Diameter	Width	Depth	Finished
6	274067	-	unworked piece	1	-	-	-	-	-
6	305018	870	armlet fragment	2	35%	80mm	10mm	10mm	unfinished
6	239186	893	armlet fragment	2	25%	90mm	14mm	9mm	unfinished
6	130012	3296	armlet fragment	4	80%	70mm	6mm	11mm	finished
6	130229	3901	armlet fragment	1	<10%	-	6mm	9mm	finished
6	291131	3968	armlet fragment	1	55%	100mm	27mm	16mm	unfinished
6	303169	4076	armlet fragment	1	<10%	-	18mm	15mm	finished
13	200066	1501	complete armlet	1	100%	100mm	11mm	16mm	finished
13	154082	1506	armlet fragment	1	20%	70mm	10mm	-	unfinished
13	200065	4654	armlet fragment	1	30%	70mm	7mm	8mm	finished
13	248089	4655	armlet fragment	1	20%	80mm	10mm	-	unfinished
13	168167	7124	armlet fragment	1	15%	80mm	6mm	6mm	finished

armlet fragments (Fig 7.2, 5), two of which are unfinished (see Table 7.6). The complete armlet is the only complete shale artefact found from all zones. The armlet is lathe-turned, with a circular cross-section, and an outside diameter of 100mm. It is highly polished and clearly made from good quality shale; it may therefore represent an imported item from the south Dorset industry rather than a local product. It was found in an Iron Age pit burial, in association with skeleton 200066. Another fragment of a much smaller armlet (Fig 7.2, 5) came from the same burial. This also has a circular cross-section and is finely smoothed; it would originally have measured approximately 70mm in diameter.

A broken shale loomweight was recovered from Saxon pit 212074 in Zone 14 (Fig 7.2, 6). Approximately 60% of the object survives, in two conjoining pieces. It is of roughly annular form, though fairly roughly made and therefore somewhat irregular. Although the pit is of Saxon date, it seems likely the weight is either a residual or curated Iron Age artefact. A single shale armlet rough-out fragment came from Roman pit 230088. It measures 100mm diameter, 32mm wide and 15mm deep.

Jet

Nine jet beads recovered from late Roman grave 179267 in Zone 10 are discussed in detail in the bead report for that zone. Two other pieces of jet were recovered. One is a very small fragment of a polished and worked artefact, found in a pit (244007) of probable Late Iron Age date in Zone 13, and is too small to be diagnostic. The other is an unworked flake from medieval ditch 172170 in Zone 1. This ditch contained pottery of Roman and medieval date, so the jet could be a residual Roman fragment.

Saxon shale and other minerals

Shale

A single shale object was recovered from Saxon grave 136111 in Zone 19 (Volume 1, Fig 5.9). It is an unusual object, particularly in a Saxon context, where shale working is not attested until the late Saxon period, in London (Vince 1991, 155-6), and is currently unparalleled. Nevertheless, it seems more likely that it is a 'found' Iron Age or Roman rather than Saxon artefact, and an example of a probable Iron Age shale armlet rough-out was recently discovered in a mid-Saxon pit at the Deanery, Southampton (Birbeck 2012).

The object from grave 136111 is ovoid rather than circular in shape. It was found by the lower left leg of the middle skeleton (136113) of a triple grave, that of a young adult female. A number of other objects were clustered in the same area, including a decorative copper alloy plate and a firesteel, suggesting that they were enclosed in a box of some kind. The only shale objects normally recorded in Saxon contexts are spindle-whorls, and even these are uncommon finds. One hemispherical example was found at the Dover Buckland cemetery, together with other objects, including another spindle-whorl made from the base of a Roman pot, all apparently contained in a wooden box at the feet of a woman (Evison 1987, 112). A biconical shale spindle-whorl was also recovered from Dover Buckland and, as similar objects are known from late Roman contexts, it was considered that the Dover examples could be curated or 'found' Roman artefacts (*ibid*, 113). A hemispherical example is also known from a 7th century context at Chamberlain's Barn, Leighton Buzzard (Hyslop 1963, 179). Geake refers to spindle-whorls as being found 'often apparently as part of amulet collections' and states that both toggles and spindle-whorls are commonly 'found away from the body in bag or box collections' (1997, 59). Although plainly not a spindle-whorl or toggle, this probably ancient object from Zone 19 may simply have been regarded even then as a curiosity, as something old, and may have acquired talismanic status and have been buried as part of this woman's treasured possessions.

Other minerals

Bead fragments made of possible gypsum from a Saxon grave (171171) in Zone 19 are discussed with the rest of the beads (Nelson, above). A small fragment of yellow mineral was found in Saxon grave 153075 in Zone 19. The mineral appears to be gypsum as it has the typical monocline crystal structure and is very soft, but is a bright sulphurous yellow. There is also a small piece of worked quartz from Zone 19, from relatively well-furnished burial 267072. This was carved to a cylindrical shape, but is not pierced, so may have been inlaid into a piece of jewellery or a box.

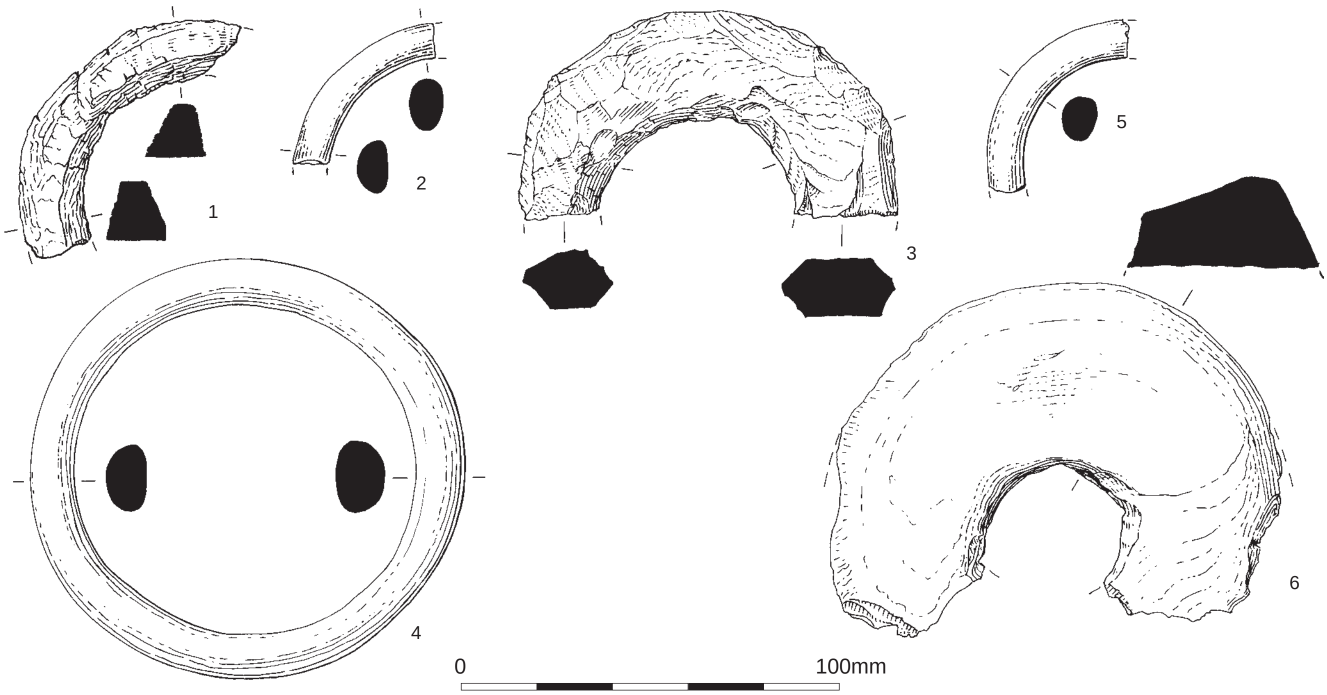


Fig 7.2 Iron Age – Roman shale objects

Unphased amber

A small fragment of amber was found in an unphased pit (211054) dug into an Iron Age pit in Zone 13. It is not possible to discern the original shape of the object, but it seems unlikely to have been a bead as one side is completely flat and apparently not perforated.

Catalogue of illustrated objects

Amber

1. Small amber disc bead. Zone 12, ctx 214005, Middle Bronze Age pit 214001(Fig 7.1, no. 1)

Shale (Fig 7.2)

1. Unfinished shale armlet. ON 870, Zone 6, ctx 305018
2. Finished shale armlet. ON 3296, Zone 6, ctx 130012, Early-Middle Iron Age posthole 214001
3. Shale armlet rough-out. ON 3968, Zone 6, ctx 291131, Early-Middle Iron Age pit 291130
4. Complete finished shale armlet. ON 1501, Zone 13, ctx 200066, Iron Age pit 200062, associated with burial 200066
5. Finished shale armlet. ON 4654, Zone 13, ctx 200065, Iron Age pit 200062, associated with burial 200066
6. Broken shale loomweight. ON 1712, Zone 14, ctx 212075, mid-Saxon pit 212074

Worked bone *by Sue Nelson*

Late prehistoric–Roman

Zone 6

A total of 41 artefacts of worked bone and antler was recovered from Zone 6, from contexts ranging in date from late prehistoric to Roman. Many of these objects are perforated or drilled long-bones, but one is a perforated portion of a sheep/goat pelvis, broken at the opposite end to the perforation so that its form is uncertain.

Three objects, two weaving combs and a needle, certainly fall within the functional category of textile-working implements. ON 4199 from Middle-Late Iron Age pit 288151 (context 288159) is a fragment of a weaving comb formed from a cattle scapula. No teeth survive on the comb but a serrated edge reflecting the stumps is discernible. The centre of the bone has been drilled out and the object has acquired a high level of polish through prolonged use. The second comb, also incomplete, is made from antler, with a T-shaped proximal end; again, the teeth are missing (Fig 7.3, 6). It came from Early-Middle Iron Age pit 193127 (context 297108). A preference for antler over bone for weaving combs is evident at other Iron Age sites such as Danebury, Hampshire, probably because antler is a more resilient material. Danebury also provides a parallel for the comb handle, the rectangular expanded butt being the most common form at the latter site (Sellwood 1984, 371). The bone needle with broken eye end (Fig 7.3, 7) came from layer 232034.

Twelve objects fall within the category of 'points' or 'gouges'. Two are complete, both made from the proximal ends of sheep/goat tibiae, and drilled along their length: ON 867 from Roman posthole 247088 (context 247091) (Fig 7.3, 2) and ON 3891, from Roman pit 125163 (context 125166) (Fig 7.3, 3). Three of the points are perforated (ONs 875, 4451 and 4452), but on one side only. Another artefact (ON 868), from Iron Age cobbled surface 258043, is hollowed longitudinally, but not perforated and also shows signs of tapering to a point, although the tip of the point has broken off. All four of these points have been made from the radial bones of sheep/goat, apart from ON 868 which was formed from the proximal end of a pig tibia. ON 4409, from Late Iron Age posthole 296069 (context 296070), is formed from the distal metatarsal shaft of a sheep/goat. It is broken along its length and at both ends so its precise form cannot be ascertained, but the remains of a perforation are clearly visible on one edge and the surface is highly polished.

Three bone points were recovered: ON 2968 from early Roman pit 256060 (context 254087), ON 2987 from Early-Middle Iron Age pit 302077 (context 302069), and another example from mid-Roman sunken-featured building 130277 (context 130229). The first is a broken fragment shaped from the long-bone of an indeterminate mammal, and the second is very roughly shaped, probably fashioned from a sheep/goat long-bone, and shows little evidence of use-wear, though the tip is slightly polished. The third is broken, probably fashioned from a sheep/goat long-bone, but displays polish on all surfaces.

The precise function of these points is unclear. All of them display varying degrees of polishing from use, in some cases evidently prolonged. Comparable objects are relatively common finds in Iron Age contexts, and are recorded, for example, at Danebury (Sellwood 1984, figs 7.33-7.35), where discussion of their function cites the suggestions made for the 'gouges' from All Cannings Cross, Wiltshire, including spoons, pins, skewers and weaving shuttles (Cunnington 1923, 86). At Danebury and at Maiden Castle, however, the level of surface polish on these objects led to a preference for a functional interpretation in the areas of weaving and/or hide- or leather-working (Sellwood 1984, 387).

There is a further group of nine objects, all made from the metatarsal or metacarpal bones of sheep/goat. These display no signs of modification, but seven of them are highly polished through prolonged use and the other two slightly polished. Four of the objects show signs of lateral grooves being worn into the bone, and this is particularly marked in the example from Late Iron Age/early Roman pit 314004 (context 314005) which has a 'waisted' profile. The objects are all of very similar size and the use-wear pattern seems consistent, so although the function is unknown it seems they were used for the same purpose and the lateral grooves make some sort of use in weaving a strong possibility. Parallels could be sought, for example, within a fairly diverse group of implements from Danebury, linked by being manufactured from sheep long bones, some of which may have functioned as spindles or bobbins (Sellwood 1984, fig 7.37). Other examples from Iron Age and early Roman contexts at Yarnton, Oxfordshire, have been discussed recently (Allen and Wallis 2011, 434-5).

Other portions of hollowed out long-bones include the ends of two bones from immature animals, probably cattle, with a hole drilled through the glenoid and displaying evidence of polishing through prolonged use. There is also a broken piece of cattle tibia from Middle-Late Iron Age ditch 302121 (context 303178) with a hole drilled axially through the distal metaphysis. From the same context there is a piece of cattle scapula with evidence of the beginning of a hole having been drilled through the glenoid but never completed. All of these objects are of uncertain function, but all display varying degrees of polish through use; some may fall within the category of 'points'.

Another group of four objects that could be considered larger versions of the possible weaving tools described above are formed from cattle bones. They display the same high degree of polishing but only one, from Late Iron Age/early Roman ditch 171037 (context 243099), bears evidence of lateral grooving. Two conjoining pieces of a burnt mammal long-bone with a very high degree of polish were found in Early-Middle Iron Age pit 256029 (context 256042) but are undiagnostic as to function.

ON 4456 from Late Iron Age/early Roman posthole 269248 (context 269249) is a small fragment of a polished antler artefact with a ring-and-dot motif. The thickness of the object and its slight curvature suggest that it was probably part of a handle. Another handle is hollow and formed from the central shaft of a horse metatarsal, with visible saw marks at both ends (Fig 7.3, 4). It is undecorated but highly polished. A third handle is formed from the antler of a probable red deer (Fig 7.3, 5). It is undecorated and the surface is degraded, but some polish is discernible.

Another piece of smoothed antler from mid-Roman pit 132098 (context 132101) is possibly part of a handle, but is too small to be certain. A central portion of horse metapodial from late Roman sunken-featured building 247100 (context 247097) is hollowed and polished. It could also have been part of a handle, but with both ends missing it is uncertain. A piece of antler tine from Roman ditch 170149 (context 168274) is completely smoothed and is perforated laterally, but was later broken at that point. It could have been suspended and has clearly been much handled.

Two conjoining fragments of an object formed from a tapered, smoothed piece of red deer antler were recovered from layer 182305. Both ends are sawn off and a deep groove sawn into the wider end of the object, which measures 110mm long. A hole was drilled laterally through the same end, diametrically opposite the cut groove and bisecting it. The function of this object is unclear, but all surfaces display a degree of polishing through prolonged use.

Zone 8

Object 883 from the upper fill of Early Bronze Age ring-ditch 278013 (context 273047) is a fragment of a bone point from which the tip is missing, roughly made from the long bone shaft of a large mammal. The pointed end is polished from prolonged use.

Zone 11

A single worked bone artefact was recovered from Zone 11. This came from mid-Roman quarry pit 262015 (context 143150) and is an almost complete bone pin, with just the narrow tip missing (Fig 7.3, 16). It has a plain conical head, and falls into Crummy's type 1 pins, with a date range spanning the Roman period (Crummy 1983, 20, fig 17).

Zone 12

Two worked bone artefacts were recovered from Zone 12. ON 1429 from Early Iron Age ditch 190188 is a squared-off hollow handle formed from a cattle metacarpal bone (Fig 7.3, 17). It is almost complete, with slight damage to one end, and has been drilled out along its length. There are three sets of two incised transverse lines, one at each end and one slightly off centre. The surface is degraded but traces of polish can still be detected. ON 811 from Iron Age ditch 190156 is the tip of a polished bone pin or point of unknown function, too small to determine its original form.

Zone 13

Zone 13 produced eight worked bone artefacts, all from probable Iron Age or early Roman contexts. Two are pins, both complete, and both retaining surface polish: ON 1537 from Iron Age pit 175153 (Fig 7.3, 18) and ON 1522 from Iron Age pit 177105 (Fig 7.3, 21). ON 1537 is fairly crudely made, with an asymmetrical shaft and head, while ON 1522 has no distinct head, but tapers straight down along its whole length.

ON 1528 is a probable amulet made from a pierced canine tooth of a dog (Fig 7.3, 19). It was found close to neonate burial 126143 in a Middle Iron Age pit (126141) and may have been associated with it. ON 1511 is a fragment of sheep/goat tibia with two holes drilled from the outside and evidence on the edges that there were at least two more holes around the circumference of this object, but not in exact alignment (Fig 7.3, 20). The surface shows a high degree of polish but its function is unclear. It came from the upper fill of Early Bronze Age ring-ditch134096.

There are two unmodified but highly polished sheep/goat long-bones, bearing a close similarity to the examples recovered from Zone 6. The one from Late Iron Age pit 156146 does not show any evidence of lateral grooves, but the example from early Roman sunken-featured building 193140 has a substantial groove worn into either end of the shaft. The condition of the bone in this object is poor and the surface is pitted, but small areas showing a high degree of polish remain. Another object from this feature is formed from the shaft of a long-bone from a mammal of indeterminate species and is polished but has no distinctive features. The other two objects are both fragments of points, probably made from sheep/goat long-bones, and both polished through use-wear.

Zone 14

A badly degraded fragment of a point was found in a Roman enclosure ditch.

Zone 19

ON 1808 was recovered from an Iron Age grave (205111). It is a pierced fragment of cattle carpal bone, highly polished on both surfaces but not carved or shaped, and not polished on its outer 'rim'. Its function is unclear.

Zone 20

Four items of worked bone were recovered from Zone 20, all of Roman date. ON 4032 from pit 126090 (context 126099) is a complete tapered bone pin with a plain, slightly flattened head (Fig 7.3, 8). The surface is very degraded so no decoration or polish is visible. ON 890 from pit 250094 (context 250098) is a double-ended bone pin, but one tip is missing. It has a polished surface but is undecorated.

ON 1902 is a handle formed from red deer antler (Fig 7.3, 9). It was recovered from a mid-Roman enclosure ditch (249051). The handle has split in two lengthwise, but still encloses the square-sectioned iron tang from a knife. A similar but smaller handle (ON 3757) was recovered from a late Roman sunken-featured building (249083). The handle is formed from a red deer antler tine and a broken off iron tang is still encased in it (Fig 7.3, 10).

Zone 21

A single worked bone object was recovered from layer 249042. This is a complete sheep metatarsal, measuring 116mm in length, with a hole drilled in the proximal surface. The surface is degraded but it is just possible to discern evidence of use-wear polish. Its function is unclear but it may have been the same as objects from Zones 6 and 13 possibly related to weaving or leather-working activities (see above).

Saxon

Zone 14

Four artefacts of certain or probable mid-Saxon date came from Zone 14. ON 835, from mid-Saxon pit 139075, is a roughly pierced fragment of sheep/goat pelvis, drilled from one side. There is no shaping or polish and there is no obvious function. Two further artefacts come from pits of probable mid-Saxon date. These are a small complete bone pin (ON 824) formed from a bird bone (Fig 7.3, 11), and a complete bone awl (ON 832) made from a pig fibula, the shaft polished through use (Fig 7.3, 12).

Several non-joining fragments of a composite antler comb (ON 1565, 4083 and 4686) came from fill 175089 of pit 175086 (Fig 7.3, 13-15). This is a side-handled comb, the handle and side plates formed from a single length of antler tine, with a longitudinal slot cut to accommodate the tooth-plates. Parts of both of the side-plates survive, one plain and the other decorated, with alternating bands of incised transverse lines and chevrons. The handle is also decorated with two distinct bands: alternating transverse lines and chevrons at the end, and another band of transverse lines at the end of the longitudinal slot. Iron rivets held the tooth-plates in place between the side-plates; only small fragments of the tooth-plates and teeth survive. The whole piece appears to have been made from a fairly straight antler tine. A similar example was found in the river Thames in London (MacGregor 1985, fig 50). The distribution of this comb type, which had a currency from about the 7th century through to the early medieval period, is limited to the east and south of England, and they may have originated in Frisia (*ibid*, 91-2).

Zone 19

All six bone or antler artefacts from Zone 19 were recorded from Saxon graves. Three of the objects are fragments of composite antler combs, one single-sided (ON 2435 from grave 279039) and two double-sided (ON 4682 from grave 153075; ON 2413 from grave 205115). The surface of all these combs is badly degraded so any decoration that was once present has disappeared.

ON 2053 from grave 136111 (Volume 1, Fig 5.9) is a complete, double-ended pinbeater. This is very similar to an object (75/5, described as a 'weaving pick') from the Dover Buckland cemetery (Evison 1987, fig 38, 75/5). Object 2053 has a badly degraded surface and it is not possible to discern from what animal it was made, but it may be antler rather than bone. Pinbeaters were probably used in conjunction with weaving combs on warp-weighted looms (Walton Rogers 2007, 33). Double-ended pinbeaters are common finds on early Saxon settlement sites from the 5th century onwards, but there is no evidence that they occur in cemeteries before the 7th century (Matthews and Hawkes 1985, 100). Examination of the lengths of double-ended pinbeaters has indicated a bimodal size distribution, with a smaller size ranging from 60-113mm in length and clustering at 90-110mm, and a second group at 120mm or longer. 'Pairs' of pinbeaters, one of each size group, are sometimes found together, and may have formed part of a differentiated 'set' of weaving implements (Waller 1993, 119). The example from grave 136111 falls within the smaller group (length 85mm).

A second bone object came from the same grave (ON 2029; Volume 1, Fig 5.9). This comprises several flat fragments of carved antler, possibly representing decorative plates from a box. The surfaces are degraded, but there are traces of incised linear and small ring and dot decoration. There are also traces of what appears to be a red pigment on some of the pieces.

A bone pendant bead (ON 2417) was recovered from grave 228047 (Volume 1, Fig 5.39). It is hemispherical and formed from the head of a femur, probably of sheep/goat. The hole was drilled off-centre, close to one edge, and drilled from both sides. The outer curved surface is somewhat degraded but the sawn surface retains some polish.

Medieval

A single worked bone artefact (Object 840) was recorded from early medieval ditch 172057 in Zone 3. This is a spindle whorl made from the proximal head of a cattle femur (Fig 7.3, 1). Femur head whorls have a lengthy currency, being used intermittently from at least the Iron Age through to the early medieval period (MacGregor 1985, 187).

Catalogue of illustrated worked bone (Fig 7.3)

1. Spindle whorl made from cattle femur head; central perforation. ON 840, Zone 3, ctx 204021, early medieval ditch 172057
2. Point, made from sheep/goat tibia; transverse perforation. ON 867, Zone 6, ctx 247091, Roman posthole 247088
3. Point, made from sheepo/goat tibia. ON 3891, Zone 6, ctx 125166, early Roman pit 125163
4. Tubular handle, made from horse metatarsal; some transverse cut marks. ON 3293, Zone 6, ctx 262113, early Roman ditch 170082
5. Handle, made from red deer antler; longitudinal perforation. ON 3283, Zone 6, ctx 242041, Late Bronze Age ditch 190513
6. Weaving comb, antler; T-shaped handle; teeth missing. ON 3906, Zone 6, ctx 297108, Early-Middle Iron Age pit 193127
7. Needle; broken across eye. ONs 656/657, Zone 6, unphased layer 232034
8. Complete pin with plain, slightly flattened head. ON 4032, Zone 20, ctx 126099, Roman pit 126090
9. Handle made from red deer antler; square-sectioned iron tang within. ON 1902, Zone 20, ctx 251013, mid-Roman enclosure ditch 249051
10. Handle made from red deer antler; iron tang within. ON 3757, Zone 20, ctx 171229, late Roman sunken-featured building 249083
11. Complete small pin, crudely made from a bird bone, irregular. ON 824, Zone 14, ctx 139066, undated pit 139061
12. Awl, made from pig fibula. ON 832, Zone 14, ctx 202052, mid-Saxon pit 202051

13-15. Three fragments of side-handled, composite antler comb(s) – not conjoining. ONs 1565, 4083 and 4686), Zone 14, ctx 175089, mid-Saxon pit 175086

16. Complete pin with conical head. ON 432, Zone 11, ctx 143150, mid-Roman quarry pit 262015
17. Tubular handle, made from cattle metacarpal. ON 1429, Zone 12, ctx 190079, Early Iron Age ditch 190188
18. Complete pin, crudely made; irregular. ON 1537, Zone 13, ctx 175154, Iron Age pit 175153
19. Dog canine tooth with transverse perforation; probable amulet. ON 1528, Zone 13, probable grave good with skeleton 126143, Middle Iron Age pit 126141
20. Fragment of sheep/goat tibia of unknown function; four perforations. ON 1511, Zone 13, ctx 200095, upper fill in Early Bronze Age ring-ditch 134096
21. Complete bone pin. ON 1522, Zone 13, ctx 177092, ?Iron Age pit 177105

Pipe-clay figurines *by Sue Nelson*

Three fragments of a pipe-clay figurine were recovered from Zone 20 and one from Zone 6. The fragment from Zone 6, ON 873 (Fig 7.4, 1), was found in an early Roman pit (269061) and is made of very white clay. The moulding may represent either drapery or a column and is probably part of a Venus figurine; several fragments of

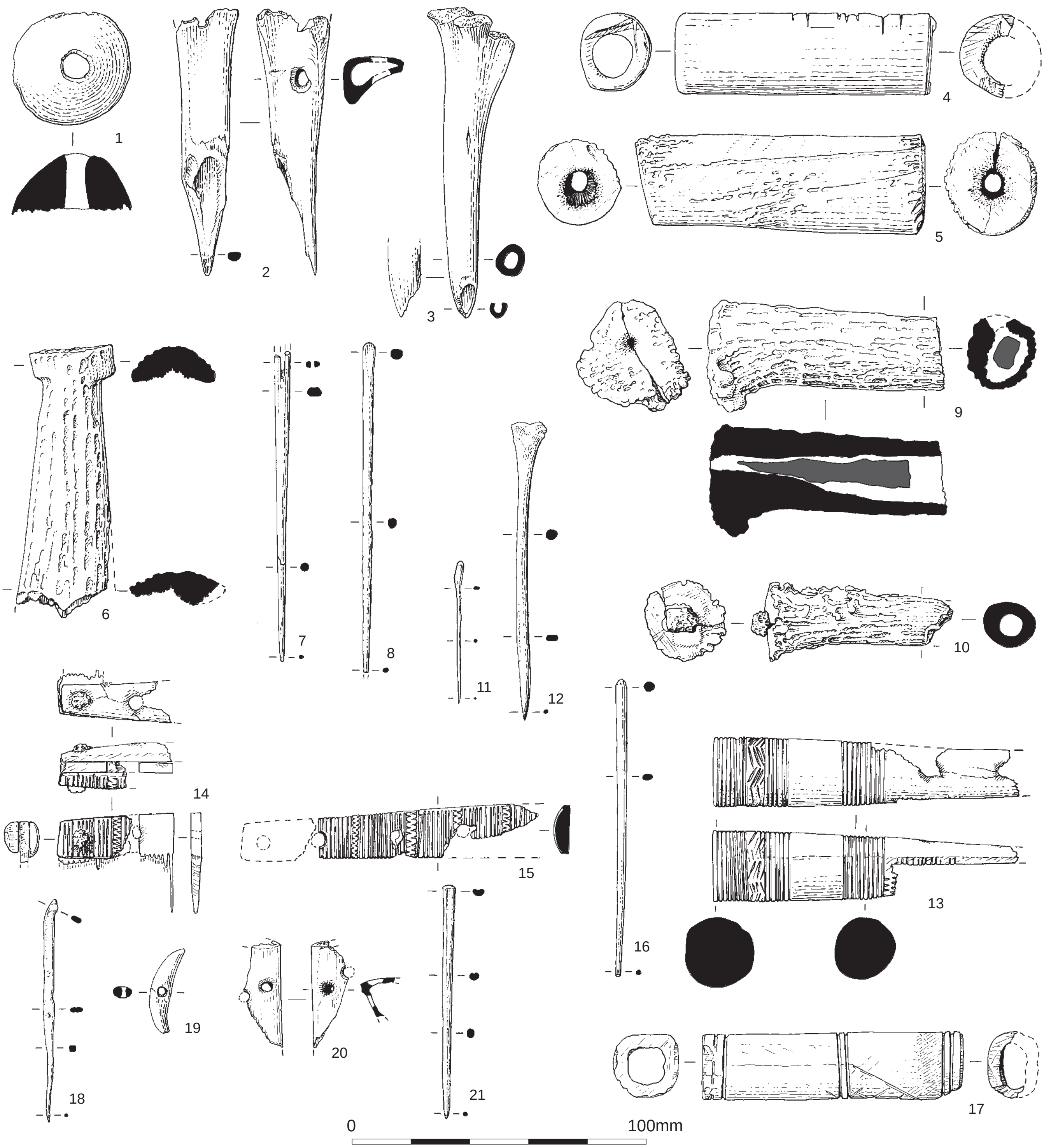


Fig 7.3 Late prehistoric – Roman worked bone

a similar example were found at Springhead in north Kent (Mepham 2011). Complete examples have been excavated from the Roman Eastern Cemetery in London (Barber and Bowsher 2000, 189).

The other three fragments all come from a late Roman sunken-featured building (249083) in Zone 20 (Fig 7.4, 2-3). Two are conjoining pieces and the other, although from a different context, is almost certainly from the back of the same figurine. The two pieces (ON 4162) are from the front of a Dea Nutrix (nursing goddess) showing the lower portion of a figure seated in a wicker chair, although the feet are missing. It was mould-cast in two halves and there is an air hole in the left hand side, placed to allow gases to escape during firing. The third piece represents the back of the wicker chair in which the goddess was seated. It was probably made in Central Gaul in the 2nd century AD. A complete example was discovered in an infant burial in Baldock, Hertfordshire, in 1988 (Burleigh *et al* 2006).

These figurines are more commonly found in Gaul than in Britain and the source of the clay is believed to be the Allier region of Central Gaul from where they were imported. They were used in temples and shrines and are occasionally found in burial contexts (Jenkins

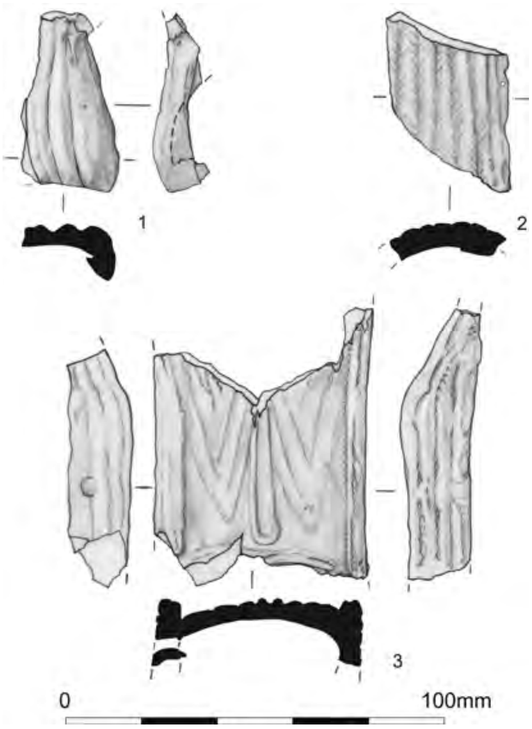


Fig 7.4 Pipe-clay figurine fragments

1995). The presence of the Dea Nutrix figurine in a sunken-featured building suggests the presence of a small household shrine. There is a concentration of findspots in and around London, and there may be an association in terms of export arrangements with the samian industry (*ibid*).

Catalogue of illustrated pipe-clay fragments
(Fig 7.4)

1. Pipeclay figurine fragment, possibly representing drapery. ON 873, Zone 6, ctx 269081, early Roman pit 269061.
2. Pipeclay figurine fragment, from the front of a Dea Nutrix figure. ON 4162, Zone 20, ctx 171228, late Roman sunken-featured building 249083.
3. Pipeclay figurine fragment, from the back of a Dea Nutrix figure. Zone 20, ctx 205163, late Roman sunken-featured building 249083.

Pierced oyster shells

by Phil Andrews and Sarah F Wyles

Five oyster shells had perforations of a variety of shapes and sizes which are not attributable to marine predators or damage during excavation. Four of these came from Late Iron Age and Roman contexts and one from a Saxon context.

One shell from a Late Iron Age–early Roman fill of quarry pit 292001 on Zone 13 had a pair of circular holes each 8mm in diameter and 30mm apart. Two shells came from middle Roman quarry pit (262015) on Zone 11, one with an oval hole measuring 7 x 5mm and the other with a hole 17mm in diameter. The final example from this period came from late Roman sunken-featured building 249083 on Zone 20 and had a rectangular hole measuring 14 x 12mm. A shell from early Saxon sunken-featured building 194086 on Zone 10 had an oval hole measuring 7 x 4mm, though the possibility that this was a residual Roman shell cannot be entirely discounted.

Apparently similar pierced oyster shells have been noted on other sites, where the holes are often attributed to damage during excavation (eg, Carisbrooke Castle, Isle of Wight. Wyles and Winder 2000, 185), but their function otherwise remains unknown. It is possible that they were accidentally pierced in antiquity, though deliberate perforation seems equally likely, certainly in the case of the EKA2 examples, and one suggestion is that they were attached to barrels or other containers to indicate their contents, or were attached to stalls as decorative items and perhaps to indicate the nature of what was available there (Sarah Wyles pers. comm.).

Chapter 8

Prehistoric Pottery

by Matt Leivers

Introduction

The excavations produced a total of 21,122 prehistoric sherds weighing 304.3kg. Varying quantities of Early Neolithic Decorated Bowl, Middle Neolithic Peterborough Ware, Beaker, Food Vessel, Collared Urn, Deverel-Rimbury, Late Bronze Age, Earliest Iron Age, Early to Middle and Middle Iron Age ceramics are present within the assemblage, which is dominated by Iron Age material. Important groups of material came from a series of Early Neolithic pits in Zone 14 and from an Early to Middle Iron Age settlement in Zone 13. Sub-assemblages by period are given in Table 8.1.

Table 8.1 Prehistoric pottery totals by period

Period	*No. sherds*	*Wt (g)*	*ASW (g)*
Early Neolithic	848	7352	8.67
Middle Neolithic	119	717	6.02
Beaker	7	29	4.14
Food Vessel	15	168	11.2
Collared Urn	100	228	2.28
Middle Bronze Age	833	19,417	23.31
Late Bronze Age	4998	40,239	8.05
Earliest Iron Age	1415	12,440	8.79
Early to Middle Iron Age	9006	149,645	16.62
Middle Iron Age	3781	74,107	19.60
Total	21,122	304,342	14.41

Methods

Following assessment of the entire assemblage, approximately 7,700 sherds (*c* 36% of the total) were selected for full fabric and form analysis, drawn mainly from large and well-stratified or contextually secure groups. The material was analysed in accordance with Wessex Archaeology's recording system (Morris 1994), which follows the nationally recommended guidelines of the Prehistoric Ceramics Research Group (PCRG 2011). Sherds were examined using a x20 binocular microscope to identify clay matrices and tempers, and fabrics were defined on those bases.

Condition

A large proportion of the assemblage is typified by a high degree of fragmentation, a lack of featured sherds, and varied wear patterns. The overall average sherd weight of 14.38g is largely a result of the presence of complete Middle Bronze Age jars and the large numbers of sherds in better condition associated with the Early and Middle Iron Age activity in Zone 13. In these groups, sherds were larger and both sherd groups from individual vessels and refitting sherds can be identified. This is an indication that several processes were responsible for the incorporation of ceramics in features.

Fabrics

In total 49 fabrics were defined on the basis of principal inclusion. The majority are flint-tempered, with less sand-tempered material, and grog, shell and other rock, calcareous and organic material only present as minority fabrics. In many cases (and especially with the flint-tempered examples) fabrics merge imperceptibly; consequently, many of these types mark points on a spectrum rather than bounded distinct entities. Fabrics are described below and quantified in Table 8.2.

xCF1 A soft, rough fabric containing a sparse amount of chalk, sub-rounded, up to 5mm; sparse flint, angular, up to 6mm; moderate black inclusions, unidentified, similar to grog but more crumbly like organics, up to 1mm

xCQ1 A soft, silty fabric with a moderate amount of chalk (may include occasional angular flint fragments of a similar size), sub-angular, up to 2mm, poorly sorted; common quartz, sub-rounded fine to rounded coarse-grained

D1 micaceous sandy fabrics; detrital – mix of clay, grog, sand, flint, iron minerals

F1 slightly micaceous sandy matrix; sparse fine to very coarse poorly sorted angular crushed calcined flint

F2 slightly micaceous sandy matrix; moderate fine to very coarse moderately sorted angular crushed calcined flint

F3 slightly micaceous sandy matrix; moderate fine and occasional coarse well sorted angular crushed calcined flint

F4 slightly micaceous sandy matrix; moderate fine to very coarse poorly sorted angular crushed calcined flint; sparse to moderate fine to very coarse sub-angular ?iron minerals

F5 slightly micaceous sandy matrix; moderate fine to very coarse poorly sorted angular crushed calcined flint

F6 slightly micaceous fine quartz sand matrix; sparse crushed calcined flint maybe an accidental inclusion

F7 slightly micaceous sandy matrix; sparse to moderate poorly sorted fine to coarse angular crushed calcined flint

F8 slightly micaceous sandy matrix; moderate poorly sorted fine to very coarse angular crushed calcined flint

F9 sandy matrix; sparse to moderate well-sorted very fine to medium angular crushed calcined flint

F10 quartz sand matrix; moderate fine to coarse well sorted crushed calcined flint

F11 quartz sand matrix; sparse very fine to coarse moderately well sorted angular crushed calcined flint

F12 slightly micaceous sandy matrix; abundant very fine and fine well sorted angular crushed calcined flint

F13 micaceous quartz sand matrix; moderate fine to coarse poorly sorted angular crushed calcined flint

F14 very slightly micaceous sand matrix; abundant fine to coarse well sorted angular crushed calcined flint

F15 micaceous sand matrix; moderate fine to medium well sorted angular crushed calcined flint

F16 micaceous sand matrix; sparse fine to medium well sorted angular crushed calcined flint

F17 micaceous sand matrix; moderate to abundant fine to very coarse poorly sorted angular crushed calcined flint; black mineral grains

F18 micaceous sand matrix; sparse fine to moderate well sorted angular crushed calcined flint

F19 micaceous sand matrix; moderate fine to medium well sorted angular crushed calcined flint

F20 slightly micaceous sand matrix; sparse fine to medium well sorted angular crushed calcined flint

xF1 A soft, rough fabric containing a v. common amount of flint, angular, up to 4mm, poorly sorted, in a silty clay matrix

xF2 A soft, silty fabric containing a common amount of flint, up to 1mm, poorly sorted, in a silty clay matrix

xF3 A soft, silty fabric containing a common amount of flint, angular, up to 2mm, poorly sorted; rare red fe oxides, sub-rounded, up to 1mm, in a fine, sandy clay matrix

xF4 A soft, silty fabric containing a common amount of flint, up to 4mm, poorly sorted, in a silty clay matrix

xFI1 A soft, silty fabric containing a moderate amount of flint, up to 1mm, angular, well sorted; sparse red iron oxides, sub-angular, up to 1mm

xFV1 A soft, slightly soapy fabric containing a moderate amount of flint, angular and calcined, up to 4mm, moderately sorted; sparse to moderate linear voids from organics; sparse ?argillaceous inclusions, sub-rounded to sub-angular, to 2mm

G1 micaceous sandy matrix; moderate coarse grog; sparse fine crushed calcined flint and sparse iron minerals probably naturally occurring

G2 micaceous sandy matrix; moderate coarse grog; very sparse fine flint probably natural

G3 micaceous sandy matrix; sparse grog; very sparse very fine flint probably natural

G4 fine silty matrix; rather detrital – mix of grog, clay pellets, calcined flint and iron minerals

xG1 A soft, silty fabric containing a moderate amount of sub-angular to sub-rounded argillaceous inclusions (?grog), up to 2mm, in a silty clay matrix with occasional flint fragments

xGC1 A soft, soapy, fine fabric containing a common amount of grog, sub-angular, up to 1mm, well sorted, and a moderate amount chalk, sub-angular, up to 1mm, well sorted and rare red fe oxides, up to 2mm

xGF1 A hard, slightly soapy fabric containing sparse ?grog, up to 2mm, sub-angular, poorly sorted; sparse flint, angular, up to 3mm, poorly sorted, in a fine, sandy clay matrix.

IG1 micaceous sand matrix; sparse very coarse angular poorly sorted igneous rock; dark iron minerals probably natural

IG2 micaceous quartz sand matrix; sparse very coarse poorly sorted igneous rock (including ?gabbro); dark iron minerals probably natural

Q1 slightly micaceous sandy matrix; very occasional very fine angular crushed calcined flint probably accidental

Q2 fine micaceous quartz sand.

Q3 fine micaceous quartz sand.

Q4 slightly micaceous sandy matrix; sparse to moderate very fine and occasional coarse angular crushed calcined flint

Q5 fine sandy matrix; occasional fine crushed calcined flint accidental.

Q6 fine, predominantly sandy fabric (very common; <0.25mm) with occasional fine flint (up to 1mm), grog (up to 2mm) and elongated voids indicative of organic inclusions

xQ1 A soft, sandy fabric containing occasional rounded coarse-quartz grains and rare detrital flint fragment, up to 4mm, in a fine sandy matrix

xQ2 A soft, sandy fabric containing a moderate amount of grog, sub-angular, up to 3mm, moderately sorted in a fine sandy clay matrix with a glauconitic component; moderate coarse sand, sub-angular

xQ3 A soft, sandy fabric containing sparse detrital flint, angular, up to 3mm and sparse shell, angular, up to 5mm, in a fine sandy clay matrix with a glauconitic component

xQF1 A soft, rough fabric containing sparse flint, angular, up to 3mm, poorly sorted, in a silty clay matrix with a common amount of fine to coarse-grained sub-angular quartz, poorly sorted, possibly temper and may have a glauconitic component

xS1 A soft, silty fabric containing a moderate amount of shell, platy, up to 5mm, poorly sorted, in a silty clay matrix

V1 slightly micaceous sandy fabric; moderate linear voids; occasional pellets of very sandy grog

With the exception of the Middle Bronze Age fabrics containing igneous rocks, which are likely to originate in the south-west of England, none of the fabric types need be of non-local manufacture. Generally, the types and their proportions conform to the pattern seen in other local assemblages of any size: Late Bronze Age and Early Iron Age assemblages at Cliffs End Farm (Leivers in press), Monkton Court Farm (Macpherson-Grant 1994) and Highstead (Couldrey 2007), for instance, share dominance of flint temper, in each case over 90% of the assemblage, with grog-tempered, organic-tempered and sandy fabrics together accounting for the remaining sherds.

Selection

Every sherd was assessed (dated, quantified, featured sherds and other notable traits recorded). Only a proportion of the total assemblage was then selected for full analysis. The sherds included in Table 8.1 but absent

Table 8.2 Prehistoric pottery by fabric type

Period	*No. sherds*	*Wt (g)*	*ASW (g)*
Early Neolithic			
F1	276	2175	7.9
F2	133	1092	8.2
F3	168	1300	7.7
F4	12	127	10.6
F5	250	2551	10.2
F6	8	76	9.5
Q1	1	31	31
Sub-total EN	848	7352	8.7
Middle Neolithic			
F7	82	609	7.4
F8	37	108	2.9
Sub-total MN	119	717	6.0
Beaker			
G1	7	29	4.1
Sub-total Beaker	7	29	4.1
Early Bronze Age			
G2	10	50	5
G3	90	178	2.0
D1	15	168	11.2
Sub-total EBA	115	396	3.4
Middle Bronze Age			
F9	145	8599	59.3
F10	459	7767	16.9
F11	37	298	8.1
F12	3	580	193.3
G4	12	116	9.6
IG1	6	70	11.7
IG2	11	100	9.1
Sub-total MBA	673	17,530	26.1
Late Bronze Age			
F13	1202	9320	7.8
F14	1282	10,320	8.1
F15	391	1718	4.4
F16	345	2065	6.0
Q2	27	98	3.6
Q5	19	61	3.2
V1	16	57	3.6
Sub-total LBA	3282	23639	7.2

Table 8.2 (continued)

Period	*No. sherds*	*Wt (g)*	*ASW (g)*
Earliest Iron Age			
F17	223	3335	15.0
F18	77	733	9.5
F19	116	397	3.4
F20	7	206	29.4
Q3	1	3	3
Q4	14	112	8
Sub-total EIA	438	4786	10.9
Early–Middle Iron Age			
xCF1	75	1758	23.4
xCQ1	34	805	23.7
xF1	297	7925	26.7
xF2	20	195	9.8
xF3	257	10,890	42.4
xF4	214	2413	11.3
xFI1	22	322	14.6
xFV1	191	1511	7.9
xG1	18	220	12.2
xGF1	23	475	20.7
xQ1	88	1793	20.4
xQ2	48	1583	33.0
xQ3	55	1397	25.4
Q6	36	358	9.9
xQF1	459	10,780	23.5
xS1	54	1091	20.2
Sub-total EMIA	1891	43,516	23.0
Middle Iron Age			
xCF1	9	227	25.2
xCQ1	8	281	35.1
xF1	119	4342	36.5
xF3	7	273	39
xG1	17	287	16.9
xGF1	3	365	121.7
xQ1	31	786	25.4
xQ2	48	1059	22.1
xQ3	16	624	39
xQF1	70	1627	23.2
xS1	*8*	*280*	*35*
Sub-total MIA	336	10,151	30.2
Total	7709	108,116	14.0

from Table 8.2 were not subject to full analysis. This amounted to 160 sherds weighing 1887g of Middle Bronze Age pottery (26% by count; 11% by weight); 1716 sherds weighing 16600g of Late Bronze Age pottery (35% by count; 42% by weight); 977 sherds weighing 7654g of Earliest Iron Age pottery (69% by count; 62% by weight); 6609 sherds weighing 98,269g of Early to Middle Iron Age pottery (73% by count; 66% by weight); and 3445 sherds weighing 63,956g of Middle Iron Age pottery (91% by count; 86% by weight).

All earlier ceramics (Neolithic and Early Bronze Age) were analysed, due to the relative scarcity of this type of material. With later ceramics, analysis was more selective, and was based on featured sherds and large groups from sealed contexts. Analysis focussed on the very large assemblages from Zone 13, with detailed assessment of the large (but less contextually secure) groups from Zone 6.

The assemblages

Early Neolithic

Seven Early Neolithic fabrics were identified, all flint tempered with the exception of a single sandy example. All are likely to be of local manufacture; the micaceous sand matrix of each appears to be the same, with variations of added opening materials. Although there are some sizeable sherds, and some sherds in very good condition, condition is for the most part quite poor with a high degree of fragmentation, abrasion, and burning. Most vessels are represented by a small number of small sherds.

Most of the identifiable vessels belong to Whittle's class of Decorated pottery (1977), which equates to Smith's Whitehawk, Abingdon and Mildenhall wares (1956). If the types proposed by Smith are valid, then both Abingdon and Mildenhall types are present.

Zone 6

In Zone 6 a group of nine features (the end of a ditch, a posthole and seven pits) at the southern end of the zone and a single pit at the northern end contained 198 sherds weighing 1062g. Although quantities were much lower than in Zone 14, diagnostic traits indicate that the ceramics belong to the same tradition of decorated bowls.

At the southern end of the zone, ditch 292072 contained 11 abraded sherds from vessels including one with a plain upright rim. Posthole 299023 contained 78 sherds from at least five vessels including two joining plain upright rim sherds from a large bowl and three plain upright rim sherds from two thin-walled bowls. Many of the other sherds are burnt. Pit 133181 contained 11 sherds from a thin-walled sandy bowl with an out-turned pointed rim. Pit 269178 contained seven plain body sherds. Pit 288118 contained five very abraded featureless body sherds. Pit 303061 contained nine plain body sherds from a single vessel. Pit 303074 contained 28 sherds from two vessels, one of which had a plain upright rim. Pit 312047 contained three body sherds; adjoining pit 312049 contained 54 sherds from two vessels. One is a bowl with a pointed upright rim, the other a bowl with a rolled-over rim. At the northern end of the zone, pit 123210 contained two abraded body sherds.

Zone 8

In Zone 8 Early Neolithic pottery is restricted to four sherds in two flint-tempered fabrics, recovered from ring-ditch 273013. One sherd is a slightly bulbous rim with a slashed top, one is decorated with unidentifiable impression on the outer surface, and the others are body sherds. All are redeposited.

Zone 14

The largest Early Neolithic assemblage came from Zone 14, where a group of nine pits (136075, 173041, 186035, 186037, 191083, 191086, 191093, 191095, 191179) contained 609 sherds weighing 5958g, mostly decorated and shouldered rather than carinated, indicating a date between the 37th and 36th centuries BC. Radiocarbon dates on charred flax seeds, emmer grains and hazelnut from pit 191086 confirmed this dating, with three determinations (4750±35: SUERC-40472; 4775±35: SUERC-40473; 4730±35: SUERC-40474) modelled to date the digging of the pit between 3640-3520 BC. All of the sherds are in quite poor condition, and there does not appear to be any pattern to the parts of vessels present.

Forms include heavy hemispherical bowls, shouldered bowls, and two vessels with angular carinations. Rims are rounded or flattened and upright, sometimes slightly pulled down internally; externally expanded; and everted. There is a single example of a flat, horizontal, crescentic lug handle, and another of a vessel with long oval lugs on the shoulder. The surfaces of some vessels retain an applied slip. Many have smoothed interiors and others are burnished externally and have internal wiping. Decoration consists of diagonal lines on rim tops; vertical tooling in necks; one rim has incised zig-zags; closely-spaced bone and other dot impressions on external surfaces are quite common; carinations have diagonal lines above (and in one example below) the angle; various other incised or tooled lines are present. The vessel with shoulder lugs has alternate panels of dot impression and finger fluting above the shoulder and panels of dots below.

Pit 136075

Five sherds from two vessels. One is represented by four slipped body sherds, the other by a single shouldered sherd.

Pit 173041

Ten sherds from three vessels. One is represented by two sherds including an out-turned rim; the second by six finely-tempered body sherds; the third by single fragments of the rim and body, very similar to the lugged vessel in 191093 and probably the same.

Pit 186035
Forty-five sherds from six vessels. One is represented by two body sherds decorated with bone impression, 15 sherds including a fragment of out-turned rim come from a second, an expanded rim fragment is from a third vessel and a single body sherd from a fourth. Two further vessels are decorated: one with incised horizontal and diagonal lines; the other a plain upright rim with a single horizontal incised line beneath.

Pit 186037
Ninety-seven sherds came from five vessels. Eighty-six of these belong to a single vessel with a rounded, upright rim and flat horizontal crescentic lug handles. The exterior surface of this vessel retains a smoothed slip in places. The remaining sherds derive from four vessels: one is a slip coated and burnished externally-expanded rim decorated with very faint diagonal lines on the top, a single horizontal line immediately below and narrow vertical fluting beneath; another is a flat slightly pulled-down rim; another is a group of sherds in a distinctive buff-orange fired fabric with an incised zig-zag (this vessel is also present in pit 191179). The remaining sherds are plain bodies.

Pit 191083
Four body sherds each came from a different vessel, one fragment of neck is slipped on both surfaces and tooled externally, one has stab marks, and two are plain.

Pit 191086
At least 16 vessels are represented by 270 sherds in this pit. Forty-nine sherds came from the rim, neck, shoulder and body of a large open shouldered bowl (Fig 8.1, no. 1). The rim is very irregular, but approximated to between 375-400mm in diameter. The rim top is decorated with closely-spaced short diagonal lines of twisted cord. The condition of different parts of this vessel varies, suggesting a complex pre-depositional history.

A second vessel was represented only by a pair of sherds with smoothed surfaces with lightly-tooled cross-hatch; a third by four sherds with a tooled slip coating on the exterior; a fourth by a shouldered sherd with short diagonal incisions on the angle and vertical finger fluting above and below; and a fifth by a thin slip coated sherd with two broadly-spaced incised parallel lines.

The remaining sherds include 28 rims from between 11 and 15 vessels, one with a pre-firing perforation driven through the wall from the outside.

Pit 191093
Eight vessels were represented among the 71 sherds in this pit. One is a shouldered bowl 340mm in diameter, with long oval lugs on the shoulder; alternate panels of dot impressions and vertical finger fluting are present above the shoulder, dot impressions alternating with blank panels below. This vessel is slip-coated and smoothed (Fig 8.1, no. 2). Two more fragments probably from this vessel were found in pit 173041.

An externally-enlarged rim and 23 body sherds came from a second vessel. A single fingertip or stick impression is present in the wall below the rim and slip coating survived on parts of the exterior. The remaining vessels are each represented by small numbers of (mostly plain body) sherds. Some are slipped and wiped and some are burnt.

Pit 191095
Fourteen body sherds derived from perhaps four vessels.

Pit 191179
Ninety-three sherds derived from eight vessels. Seventy-five sherds come from a bowl decorated with profuse irregular closely-spaced bone impressions. The sherds are very abraded externally (and some have been burnt); the interiors are slip-coated and wiped. One rim fragment was present; a marked lip with a tooled line beneath gives and almost bevelled effect.

Four body sherds with smoothed surfaces came from a second vessel. Two are decorated with impressed dots and a third with short shallow lines. A third vessel is represented by two body sherds, slipped and smoothed inside and out. Two more vessels are represented by single body sherds.

Ten sherds derived from a carinated bowl. The outer surface is slipped and burnished, decorated above the angle with faint short diagonal lines and below it with longer lines above faint tooling (Fig 8.1, no. 3). Six joining sherds come from the rim and shoulder of a bowl 300mm in diameter with a smoothed external surface and vertical tooling in the neck and on the shoulder (Fig 8.1, no. 4). A single sherd with an incised zig-zag appears to derive from one of the vessels also present in pit 186037.

Zone 23
A single sherd was recovered from the fill of ring-ditch 195004 in Zone 23. The sherd is decorated with rows of impressed dots.

Zone 26
A single pit on Zone 26 (213018) contained six sherds of decorated Early Neolithic pottery from two vessels. One had an expanded rim decorated with diagonal incised lines on its outer edge; the other a plain out-turned rim.

Discussion
The assemblage shares a number of features with other groups of Early Neolithic material in north-east Kent. Burnished surfaces, vertical finger fluting and slips are all present among the shouldered bowls from the causewayed enclosure at Chalk Hill, Ramsgate (Gibson 2006).

Middle Neolithic

Middle Neolithic Peterborough Wares were recovered from only two locations, in Zone 10, where 82 sherds weighing 609g came from pit 123001, and Zone 19, where 36 sherds weighing 100g came from pit 228052.

The Zone 19 material derives from the collar of a Fengate-type vessel 180mm in diameter (Fig 8.1, no.5), very similar in form and decoration to the examples from Baston Manor, Hayes (Philp 1973, fig 6). The Zone 10 pit contained sherds from two vessels, one a Mortlake-type vessel with typical expanded 'T'-shaped rim decorated with twisted cord impressions. The cavetto and body are decorated with a variety of impressed designs, mostly fingers, including fingertip impressions in the cavetto (Fig 8.1, no. 6). A single sherd from a second vessel had closely-spaced parallel lines of twisted cord impressions.

In north-east Kent Mortlake and Fengate-type Peterborough Wares are becoming more well-documented. The pit in Zone 10 lies at the western end of a zone of similar features that seem to lie along the shore as far east as Chalk Hill, Ramsgate, where Fengate material was recovered from the causewayed enclosure (Gibson 2006). A pit on Chalk Hill contained portions of three Ebbsfleet or Mortlake vessels (Cleal 1995). Peterborough Ware came from a pit at Cliffs End Farm (Leivers in press). A series of four pits containing portions of up to five Mortlake bowls were encountered less than 500m to the east at Cottington Road (Leivers 2009), and Peterborough Ware sherds have also been recovered from less than 500m to the south-west in Cottington Road at Oaklands Nursery (Perkins 1998).

The pit in Zone 19 appears to form part of another distribution of such features situated on the southern edge of the plateau now occupied by the runway of Kent International Airport, running from Manston in the east (stray sherds recovered from a barrow: Perkins and Gibson 1990) to the route of the Monkton Gas Pipeline in the west (Perkins 1985) and including Laundry Road, Minster (Boast and Gibson 1990).

Beaker

Only very small quantities of Beaker or possible Beaker were recovered. The only cases of certain identification were a single sherd weighing 6g from Iron Age pit 295010 in Zone 7 (an abraded body sherd with horizontal bands of probably comb impression), two sherds weighing 12g from ditch 190192 in Zone 12 (body sherds from a vessel with groups of horizontal lines of square-toothed comb with the spaces between the groups either empty or filled with vertical lines), and one sherd weighing 7g from ring-ditch 195007 in Zone 23 (a body sherd with an infilled panel of herringbone incision and an adjacent blank panel).

Beakers and Beaker sherds are not uncommon in Kent generally, or in the more immediate locality. Similarly small quantities were recovered from the barrow group at Cliffs End Farm (Leivers in press). More significantly, an almost complete vessel was found in a grave in Cliffview Road in 1967 (Macpherson-Grant 1968). The EKA2 sherds are too fragmentary to justify further discussion.

Early Bronze Age

Early Bronze Age ceramics comprised a small number of sherds from Collared Urns or probable Collared Urns in two grog-tempered fabrics, and a very unusual trio of small conjoined Food Vessels in a detrital fabric containing sand, grog, iron minerals, clay and flint.

Collared Urn

The only material which can be identified as Collared Urn with any degree of certainty comprises 90 sherds weighing 178g from pit 171152 in Zone 20. Some of these (mostly very small and abraded) sherds have incised chevrons on what is likely to be the collar of the vessel. The form, dimensions and type cannot be reconstructed. The remaining instances – six sherds weighing 42g from ditch 190130 in Zone 12 and four sherds from two vessels in Zone 8 – are plain body sherds identified as Collared Urns only on the basis of the fabrics.

Food Vessel

Only a single instance of Food Vessel was encountered, in grave 246134 within ring-ditch 216090 in Zone 21. This vessel (Fig 8.1, no. 7) is unusual in that it consists of three conjoined pots, each of approximately the same size, with external rim diameters of *c* 50mm, heights of *c* 45mm and small recessed bases in the region of 20mm across. The ratio of height to breadth means that the pots are strictly bowls (Gibson and Woods 1990, 157) although the visual effect of the narrow base and relatively high shoulder is to suggest a vase form. The three pots seem to have been built individually and then pressed together, with additional straps of clay worked into the angle between each above the shoulder to form a continuous external surface.

The vessels are decorated all over the external surface and inside the bevel of the rim. Externally, the decoration must have been applied once the pots had been joined together, as the motifs continue across the joining straps from one vessel to another. The motif is simple. On the bevel, a line of long diagonal slashes running downwards, predominantly to the right (on two vessels the execution is crude and the angle shifts from down to the right to down to the left) is situated below two horizontal lines of thin twisted cord. On the external surface, a line of diagonal slashes running downwards to the right sits above a horizontal band of plaited cord. Another band of diagonal slashes sits above a double line of plaited cord immediately above the shoulder, which is marked by another band of slashes. Below the shoulder, single lines of plaited cord alternate with bands of diagonal slashes; in total there are four such pairings below the shoulder. Towards the lower parts of the vessels (particularly beneath the joining straps) the motif becomes somewhat irregular with lines petering out or awkward gaps infilled separately.

This form of vessel – with three separate pots conjoined – is unique in Britain as far as is known. The only comparable example is a double Food Vessel from Aqualate Mere, Forton, Staffordshire (Chitty 1929). This vessel is considerably bigger (over twice the size in terms of both height and rim diameter), decorated all over the exterior and bevel with rather uneven twisted cord, and has horizontally-perforated lugs on the shoulder, but the techniques of construction appear to be the same, with two individual pots joined together with added straps of clay while still wet and decorated subsequently.

While not unknown is the eastern and southern parts of Britain, Food Vessels are much more commonly found in the west and north, making this example even more unusual. The decorative scheme on the triple vessel from East Kent – consisting of horizontal bands of plaited cord separating broader strips decorated with diagonal incision – is unusual in south-eastern examples, which tend to be decorated only on the upper third, and is most reminiscent of examples from Yorkshire and southern Scotland. The use of plaited cord is another unusual feature. This decorative technique is not common in any British prehistoric potting tradition, but it does occur on Food Vessels in the central lowlands of Scotland (Cowie (1978, 27) notes that it is well-represented in Lanarkshire) and Northumberland, which may strengthen the suggestion of a northern derivation. However, plaited cord also occurs on Early Bronze Age ceramics in the south-west of England (Gibson (2002, 103) notes an association with Trevisker ware). Links between Cornwall and Thanet in the Bronze Age have been attested previously: a Trevisker urn was recovered from a barrow at Monkton (Gibson *et al* 1997) and a single sherd from a second came from Zone 6 of the EKAR (see below).

Middle Bronze Age

A relatively small quantity of Middle Bronze Age pottery was recovered (673 pieces weighing 17.5kg), most of which consisted of five bucket-shaped jars containing cremation burials. All are flint tempered (fabrics F9-12) with the exception of 12 grog-tempered sherds (fabric G4) and 17 sherds in two rock-tempered fabrics (IG1 and IG2).

Bucket-shaped vessels (all with the exception of those in Zone 26 containing cremations) occurred in Zone 11 (the complete top of a bi-partite jar 250mm in diameter in 153017; the rim is upright, flat and plain; the wall splays out to a weak shoulder with a shallow applied cordon 120mm below the rim, with very abraded impressions of (probably) fingers; little survives below the cordon: Fig 8.1, no. 8); Zone 21 (prn 208-9: a bi-partite jar standing on its base in 125220, with a grooved everted rim and applied horseshoe handles immediately below); Zone 26 (prn 215: a jar with a markedly bi-concial profile in 222001, possibly barrel- rather than bucket-shaped; the rim is flat and upright, with fingertip and nail impressions on the top and below two adjacent lines of fingertip impression on the shoulder; above the shoulder is a dark slip; below the shoulder the vessel is destroyed until 100mm above the base; some portions are burnt – Fig 8.2, no. 9; within it was the base of a second thin-walled, curving-profiled jar (prn 216); prn 1174: the base of a second smaller jar in 213001 (immediately adjacent feature) very highly truncated – only portions of the finer thinner wall survive where they had collapsed into the base prior to truncation); Zone 6 – an almost complete bucket-shaped jar in 170073, 290mm tall, missing its base and a portion of the lower wall on one side; the rim is 250mm in diameter, upright and flat, finger-pressed on top; there is an uneven line of finger-pressing on the body 80mm below the rim (Fig 8.2, no. 10).

Apart from the cremation urns, most of the remaining pieces are merely sherds or groups of sherds dated on fabric grounds. Some are more diagnostic: pit 214001 and ditch 190108 in Zone 12 contained body sherds with applied cordons, and ring-ditch 195007 in Zone 22 contained fragments of a vessel with a flat expanded rim, finger-pressed on the inner and outer edges, while ring-ditch 194137 in Zone 21 contained a substantially complete jar with a flat base and slightly pointed rim with a plain applied cordon 65mm below it.

Ditch 194097 in Zone 10 contained fragments of a jar with a notched rim, along with 21 sherds weighing 188g derived from two fine ring-stamped bowls. This group is of particular interest. The jar rim (Fig 8.2, no. 11) is 260mm in diameter, thick and irregular, with lateral stick impressions across the top and an external slip coating. Neither the form nor the grog temper are immediately diagnostic of the Middle Bronze Age, but the association with the ring-stamped bowls is secure. The only similar ceramics in terms of fabric and finish are two joining sherds from ditch 165056 in Zone 7, 750m to the south-south-west. These sherds bear part of a pinched lug handle at the point where a horizontal and vertical cordon meet, and may derive from a bi-conical urn. Of the two ring-stamped bowls one is a globular vessel 180mm in diameter with a simple pointed out-turned rim, ring-stamped above and below a horizontal band of four or five horizontal tooled lines (19 sherds belong to this vessel – Fig 8.2, no. 12). The other is represented by only two sherds from the shoulder: the stamps are smaller than on the first, but the design is (presumably) the same, with stamps above and below tooled horizontal lines (Fig 8.2, no. 13).

In Zone 6, two ditches forming parts of a rectangular enclosure contained Middle Bronze Age ceramics. Ditch 249097 contained an almost-complete small jar or long-necked bowl with a vertical wall above a slightly convex belly (Fig 8.2, no. 14). The exterior is finger-smeared and the base gritted, but the vessel is otherwise featureless. The diameter at the mouth is 100mm. Of the same size and form is a finer vessel represented by two joining sherds with finger-pinched trefoil decoration below the 'shoulder' (Fig 8.2, no. 15). A further 16 sherds came from two vessels tempered with igneous rock. One contained fragments of what may be Gabbro. Additional sherds with similar temper were recovered from ditch 170170, including a flat topped, out-turned rim with an internal bevel and a row of impressed circles on the external surface, apparently from a large jar of Trevisker type (Fig 8.2, no. 16).

Discussion

The majority of the material belongs to Ellison's (1975) Lower Thames Valley group (present not only in Kent but in central and south Essex also). One of the distinctive traits of this group is that Globular forms are largely lacking (but not entirely absent – see Needham 1987) and finewares are instead highly distinctive globular bowls with stamped circlet decoration (the ring-stamped bowls).

Examples of these are not common. Six examples are known from Thanet, the most complete from Birchington (Powell-Cotton and Crawford 1924). This vessel had six rows of horizontal grooves around the girth and single lines of two-concentric rings above and below. It contained a hoard of 14 palstaves dated typologically to between 1300-1100 BC. Apart from this largely complete bowl, single ring-stamped sherds have been recovered from a ditched enclosure at Shuart/Netherhale Farms; a ditch at Margate Football Club; Westwood Cross; a ditch at Manston Road, Ramsgate (Hart 2007). A possibly related vessel was found at Broadstairs (Champion 1980).

Champion described the Birchington bowl and the Broadstairs urn (the latter decorated with diagonal impressions above and below horizontal bands – basically a variation on the same motif) as variants on the Globular Urn, 'though the Birchington vessel may also be a local copy of a Nordic metal bowl' (1980). Beyond Thanet, ring-stamped bowls have been recovered from the settlement at North Shoebury (Brown 1995) and Sipson Lane (Cotton pers. comm.). At Sipson Lane, the ring-stamped sherd was part of a group of ceramics recovered from the upper fill of a large cigar-shaped feature at Wall Garden Farm. Charcoal within the context provided a radiocarbon determination of 1460-1250 cal BC (3090±50: BM-2439) (Cotton pers. comm.).

The other notable component of the assemblage comprises the sherds tempered with igneous rock. The most likely source for these is Cornwall. Although the number of rock-tempered sherds is small, their presence is important for the evidence they provide of external contacts. Previously, the only incontrovertible evidence of links with Cornwall was the Trevisker vessel found in a ring-ditch at Monkton (Gibson *et al* 1997). This new material suggests that the Monkton vessel was not a unique oddity, but a part of a wider network of links.

Late Bronze Age

Seven fabrics were identified: four flint-tempered, two sandy and one vesicular. The flint-tempered fabrics between them comprise 98% of the Late Bronze Age ceramics by count (99% by weight). None of the fabric types need be of non-local manufacture, and the types and their proportions conform to the pattern seen in other local Late Bronze Age assemblages, for instance at Monkton Court Farm (Macpherson-Grant 1994), Highstead (Couldrey 2007) and Cliffs End Farm (Leivers in press), where the dominance of flint temper is similarly pronounced (in each case over 90% of the assemblage) with grog tempered, organic tempered and sandy fabrics together accounting for the remaining sherds.

Manufacture, technological attributes and surface treatments

The Late Bronze Age ceramics are typical of other east Kentish assemblages, with which they share a range of attributes, including the gritting of vessel bases with profuse finely crushed burnt flint (only one example noted out of approximately 20 individual bases, compared to 11 out of approximately 175 at Cliffs End Farm – five and six percent respectively, making the trait a minor persistent feature).

Surface treatments include wiping, tooled or finger smoothing, finger smearing, slipping, burnishing and rustication. Treated surfaces are more commonly fine above the shoulder (but not exclusively), or better above the shoulder than below it. All of the finishes vary in quality. Rustication is present, but only as a minor trait (a combination of small sherd size and the poor condition of the surfaces sometimes makes identification problematic). Rustication in the form of the application of thick, gritted slurry is very much more common on pots of the Early to Middle Iron Age, after around 500 BC.

Form

The assemblage is characterised by a high degree of fragmentation. Identification of form is impossible in most instances beyond a rudimentary jar/bowl division, and there are correspondingly few complete profiles. Although rim, neck, shoulder and base types can be defined, upper and lower parts of individual vessels can seldom be identified. Consequently none are illustrated.

The basic division is between high-shouldered short-necked jars with flat-topped rims and concave necks on the one hand, and round-shouldered bowl forms on the other. Bowls are often undecorated, although thin-walled finer examples do occur, some of which are decorated with incised or tooled parallel horizontal lines and, in fewer instances, chevrons. The only confidently identifiable minor form is a small tub or cup, quite plain and without lugs.

Handles

One fragment of a luted handle was present, in enclosure ditch 186231 in Zone 7. A second example, from 186182 in Zone 7 seems to be the central portion of a rather crude handle.

Rims

Nine rim forms were identified, as in Table 8.3. All are flint-tempered fabrics. As at Cliffs End Farm and Monkton Court Farm, simple upright or everted rims are the most common.

Necks

Necks are for the most part short and plain, but some jars have horizontal applied cordons with lines of fingertip impression; while some bowl necks have horizontal tooled lines.

Shoulders

Shoulders are either rounded or angular forms. Most rounded forms are quite slack, and angular forms are

Table 8.3 Late Bronze Age rim forms

		Total
R1	simple, upright, rounded	13
R2	simple, upright, pointed	1
R8	simple, upright, flat	3
R15	simple, out-turned, flat	9
R6	simple, out-turned, pointed	3
R7	simple out-turned, rounded	25
R10	internally extended, upright, flat	2
R11	externally enlarged, upright, flat	5
R12	externally enlarged, upright, rounded	4
		65

Table 8.4 Late Bronze Age decorated featured sherds by Zone and motif

Position/motif	*Zone*		
	4	*7*	*12*
Rim Top:			
Finger tip	1	1	
Short linear incision		1	
Below Rim:			
Tooled line	1	1	
On Shoulder:			
Finger tip			1
Tooled line	1		
In Neck:			
Applied cordon	1	1	
Tooled line	1	3	
Base/Wall Angle:			
Finger tip		1	
Total	5	8	1

not very sharply so. Shoulders are not often decorated, with only two motifs (both on jars only), consisting of lines of fingertip impressions and incised chevrons.

Bases
Bases occur primarily in two types, flat with and without feet (four and ten examples). One has decoration at the base/wall angle, consisting of finger dimples.

Decoration
A basic division of decorative technique has coarse jars with fingertip or nail motifs, sometimes on applied cordons, and fine bowls with tooled, incised or combed lines. Both are most prevalent on rims, in necks and on shoulders, although a few jars have finger impressions and/or fluting above the base/wall angle. A division of decoration by type and Zone is given in Table 8.4.

Tooled lines generally occur in the necks of bowls as simple horizontal bands of single or multiple lines. There is a single instance of a bowl with horizontal lines on the shoulder. Cordons occur in necks and are always finger pressed. Lines of fingertip impressions also decorate shoulders without cordons and rim tops on jars. More complex motifs are rare. A single rather heavy jar has its round shoulder decorated with an up/down chevron of three lines topped by three more horizontal lines, and with four horizontal lines in the base of the neck.

Function and use
Sooting and burnt residues (both internal and external) survive, suggesting cooking or the preparation of foodstuffs and other materials. Other uses are presumed: finer vessels can be assumed to have been tablewares; a division of coarsewares into storage and cooking pots may exist, but cannot be detected in most instances.

Only two vessels have perforations: a bowl with a single post-firing perforation under the rim and an angular shouldered bowl with two post-firing perforations drilled from the outside along the shoulder.

Feature group assemblages
Significant groups of Late Bronze Age material were recovered from Zones 4, 7 and 12, in each case from features making up parts of enclosures, trackways and field systems – variously settlements and parts of the associated agricultural landscape. Each of the three zones presents rather different evidence and is worth considering in turn.

Zone 4
Zone 4 produced 1458 sherds weighing 9605g. Material was recovered from ditches, pits, postholes and layers belonging to a settlement, parts of which were previously investigated during works associated with the Sandwich Bay Wastewater Treatment Scheme in 1992–1994 (Hearne *et al* 1996) and the Margate and Broadstairs Urban Wastewater Treatment Scheme in 2004–2006 (Egging Dinwiddy and Schuster 2009).

Pits
Five pits contained groups of over 40 sherds. All lay within or adjacent to the area defined by enclosure ditch 190286, which may have been a focus for domestic activity. Two (250152 and 127167) lay adjacent to the enclosure ditch on the eastern side, while three (254124, 254138 and 254140) lay to the west of the groups of structural postholes in the enclosure's interior.

Pit 127167 contained 55 sherds weighing 257g, all flint-tempered, including burnt sherds from a thin-walled round-shouldered bowl, and more sherds with external burnish. Other sherds have external sooting. Pit 250152 contained 68 sherds weighing 118g from several flint tempered vessels.

Pit 254124 contained 104 sherds weighing 2,496g from a single flint-tempered jar with a slightly splayed rim and a short neck with four horizontal lines at the base. Below the neck is a band of decoration on the curving shoulder consisting of an up/down chevron of three lines below three horizontal lines. The thick, flat, footless base and lower wall are much more heavily gritted (and with larger grits) than higher up.

Pit 254140 contained 44 sherds weighing 222g deriving from at least three flint-tempered vessels, some of which are burnt. A further 39 sherds from one of these pots were present in 254138 (which cut 254140) along with 55 burnt sherds from another vessel.

Layers

Layer 172262 formed the north-western part of a spread of alluvially reworked deposits filling a large natural depression. A larger portion of this deposit was investigated in 2004-6, found to contain 'a very large collection of Late Bronze Age pottery (1056 sherds, 9428g) (Jones 2009). A further 253 sherds weighing 2019g were recovered from 172262, all flint-tempered except for four sandy sherds (20g).

Most sherds are small and abraded, with a sizeable proportion burnt. Consequently it is very difficult to identify forms. Among the more diagnostic material is a group of 120 sherds (many burnt) from at least two jars with traces of internal and external slips, applied cordons, simple upright rounded rims and flat bases without feet or added grit. Other rims are simple, upright and pointed (one example with a single post-firing perforation) or simple, out-turned and flat. Small fragments of two other decorated vessels were present – a jar with an applied finger-pressed cordon and a bowl with tooled horizontal lines in the neck.

Ditches

In terms of their ceramic contents, Late Bronze Age ditches divide into two sets: an arrangement of what are probably field boundaries in the north-western parts of the Zone (177298, 190211, 190263, 190267, 190268, 190269, 190270, 190275 and 190276) none of which contained more than 11 sherds; and parts of what are probably two settlement enclosures in the north-eastern and southern parts of the Zone.

To the north-east, ditch 190262 formed two sides of an enclosure destroyed on the south by very much more substantial Roman ditches. The surviving parts contained 73 sherds weighing 440g from several flint-tempered vessels, some lightly rusticated jars, at least one a bowl with tooled lines on the exterior. To the south, a series of ditches (not all contemporary) form parts of a rectilinear enclosure defining the area occupied in part by the alluvial deposits noted above. Parts of the north-eastern, eastern and southern sections of this enclosure were excavated as part of the Margate and Broadstairs Urban Wastewater Treatment Scheme and the ceramics they contained reported on by Jones (2009). The north-western and south-western sections encountered during the East Kent Access Road excavations contained a very similar assemblage of pottery, again dominated by flint temper with very little in sandy fabrics. Identifiable forms include jars with vertical wiping and simple out-turned flat rims, a small round-shouldered bowl, and part of a luted handle. Many of the sherds are burnt, and most are small and abraded.

Zone 7

Zone 7 produced 1606 sherds weighing 12,022g which date to the Late Bronze Age. Material was recovered from ditches, pits, postholes and layers. Some of these features formed trackways and enclosures, presumably associated with a small agricultural settlement and its surrounding fields.

Trackway ditches

The main concentration of Late Bronze Age pottery lay immediately to the east of Ebbsfleet Lane, where a number of ditches formed a series of double-ditched trackways. While some of these ditches (186228, 186229, 186231, 186236 and 201092) contained only limited numbers of sherds, others (186227, 186230, 186232, 186237, 201091, 201113 and 239083) contained considerably more. For the most part, the groups consists of featureless base and body fragments, some of which are burnt. Featured sherds are limited to single examples of externally-enlarged upright and simple out-turned flat rims from jars.

Other ditches

Other lengths of ditch did not resolve into coherent patterns, but may have been enclosure or field boundaries. Again, several (140137, 201089, 201090, 201126, 201139, 267081, 270034 and 270059) contained small numbers of sherds while others (201088, 201093, 201127 and 201128) contained larger quantities including a simple upright rounded cabled rim, an externally-enlarged upright flat rim, and fragments of a neck-cordoned jar and a shouldered jar with a simple upright flat rim.

Pits

Several pits contained small numbers of sherds, but only three held any quantity. The 62 sherds (348g) from 179106 consist of the base and lower wall of a thin-walled high-shouldered short-necked jar, very similar to a vessel from the base of the midden sequence at Cliffs End Farm (prn 1516; Leivers in press) radiocarbon dated to the very end of the 11th or beginning of the 10th century. Pit 215148 contained fragments of a jar with a gritted base (55 sherds weighing 264g), while 270013 contained 70 sherds (967g) from a jar with a simple upright rounded rim and a base with a protruding foot.

The only other sizeable groups in Zone 7 came from a pit and three postholes in a group within and adjacent to a ring-ditch inside an enclosure both of which appear to be of Iron Age date. These three pits, however, contained ceramic assemblages which place them within the Late Bronze Age: pit 179117 contained 115 sherds (231g) most of which came from the base and lower wall of a finger-smeared jar while other sherds came from a shouldered bowl with horizontal lines in the neck. Posthole 179130 contained 50 sherds (173g) from an angular shouldered bowl with a simple out-turned rim and two post-firing perforations on the shoulder. Posthole 178173 contained 34 sherds (112g) from a base with a slight foot.

Zone 12

Only 145 sherds weighing 1441g were recovered from Zone 12, mostly in limited quantities from ditches and pits where the material may be redeposited. This element includes fragments of a short-necked jar with a flat everted rim and finger-pressed shoulder (ditch 268009) and fragments of a vessel with a simple out-turned rounded rim (ditch 148055). The most notable example from Zone 12 is a small coarsely flint-gritted cup with a flat base, 80mm in diameter at the mouth, recovered from cremation 219031. This vessel is very abraded and only parts of it are present (70% of the rim was not in the feature), but it appears to resemble other small cups known from the Thames valley.

Discussion
As a whole, the assemblage contains many of the same vessel types and decoration as the material from Cliffs End Farm (Leivers in press). Given this, most of the material might be expected to belong in the 10th and 9th centuries BC.

Most of the forms are paralleled in other assemblages from Kent, the south-east of England and more widely. In terms of local parallels, apart from Cliffs End Farm the closest are undoubtedly to be found at Monkton Court Farm (Macpherson-Grant 1994) and in the Period 2 assemblage at Highstead (Couldrey 2007). The Highstead and Monkton assemblages are considered to begin in the 9th century; for the Cliffs End material a sound 10th century date seems undeniable, more comparable to the first 'undecorated' phase of activity at Iwade (Bishop and Bagwell 2005).

Earliest Iron Age

Diagnostic Earliest Iron Age ceramics are uncommon compared to the generally Late Bronze Age Post-Deverel-Rimbury assemblage. In general, fabrics are still flint-tempered, although the flint tends to be finer, with a smaller proportion of sandy fabrics and a very small amount with grog. The more sizeable groups of sherds occurred in Zones 4 and 7, indicating continuity of occupation, with additional small concentrations in Zones 13 and 26.

Forms continue the basic division of coarser jars and finer angular and hemispherical bowls. On the former, decoration consists of finger-pressing on shoulders, necks or cordons; on the latter of tooled or incised lines, often simple horizontal motifs, sometimes chevrons or geometric patterns. Surfaces are often wiped, smoothed or burnished; two bowls from pit 141191 in Zone 4 have a red finish (probably haematite); another from roundhouse 201103 in Zone 7 has tooled line decoration, is also red-finished and was associated with sherds of a finger-pressed cordoned jar. There is one example of a vessel with a handle, from ditch 190286 in Zone 4.

Zone 4
Material from Zone 4 came from two pits and a series of ditches, some of which also contained Late Bronze Age ceramics. Significant deposits came from ditch 177304 (a small shouldered necked bowl 130mm in diameter (Fig 8.3, no. 17) and a cable-cordoned rim fragment among a small number of featureless sherds, and from pit 141191, which contained 88 sherds weighing 2531g deriving from six vessels. Three are fine burnished bowls in sandy fabrics, one with a simple upright rounded rim, two red-finished with simple upright flat rims. The other three vessels are flint-tempered jars, one with a flat base with a slight uneven foot, a finger-smeared external surface, a finger-pressed shoulder and short neck; one burnished externally and internally towards the top; the third burnished externally and with two rows of fingertip impressions on the weakly-curved shoulder. Ditch 312029 contained 90 sherds weighing 438g from several vessels including one with a finger-pressed shoulder, one with tooled horizontal line and one with very faint finger nail incisions.

Zone 7
Enclosure ditch 201143 contained 15 sherds (116g) from a small coarse bowl with a base with protruding foot and a simple upright flat rim. Ditch 193100 (another part of the same enclosure) contained 63 featureless sherds (242g) from several flint-tempered vessels.

Zone 13
Pit 163013 had 37 sherds weighing 1072g derived from at least four vessels represented by body sherds, bases, shoulders (one with a finger-pressed cordon; one with nail crescents; one with nail impressions; one stepped) and rims.

Zone 26
Significant deposits were limited to pit 158029 which contained 118 sherds weighing 1654g from at least three vessels represented by body sherds (some with wiped surfaces, some burnished), flat bases, rims and shoulders. Carbonised residues are present on the inner surfaces of some sherds. The deposit appears to be domestic rubbish.

Discussion
The best parallel for this material comes from Cliffs End Farm, where a range of forms and finishes which appear nowhere else are present amongst pottery in the upper two layers of an otherwise Late Bronze Age midden pit. These include sharp-shouldered bowls with diagonal cabling, red-finished bowls (including tripartite forms), long-necked jars with diagonal slashes and horizontal lines at the shoulder, and round-shouldered jars with herringbone slashes on the shoulder. This horizon is not very closely dated, but belongs in the 8th or more probably 7th century on the basis of the few associated radiocarbon determinations from carbonised food residues (Leivers in press). Other parallels for this material are not immediately obvious in the locality, although there are some similarities with Highstead Period 3 (Couldrey 2007).

Early to Middle Iron Age

Early to Middle Iron Age ceramics were current in the 5th and 4th centuries BC. There is no definite chronological division between assemblages dating to this period and those referred to as Middle Iron Age (4th century BC or later), although the absolute separation of the two types in features on Zone 13 demonstrates that the two groups are real, while the stratigraphy of pit 168115, the only feature in which both types occur, indicates the chronological sequence of the assemblages. The main focus of analysis was the very large assemblage from Zone 13, with detailed assessment of the large (but less contextually secure) groups from Zone 6.

Sixteen fabrics were identified in material examined from Zone 13. Fabrics are much more varied than previously: although flint is still common (xF1-4), other types (sandy (xQ1-3, Q6), shell (xS1), grog (xG1)) are much more prevalent than in earlier periods, marked particularly by the emergence of mixed-tempered fabrics (chalk and flint, chalk and quartz, flint and iron minerals, flint and organics, grog and flint, sand and flint). The flint-tempered or predominantly flint-tempered fabrics between them comprise 52% of the ceramics by count (53% by weight). The range of tempering agents and their mixing is paralleled in other broadly contemporary assemblages (as for instance Dolland's Moor: Macpherson-Grant 1990, 61).

Manufacture, technological attributes and surface treatments

There is nothing to suggest that the pots were not made locally, from nearby clay sources. In this respect, the ceramics are typical of other east Kentish assemblages, with which they share a range of other attributes, most persistently the application of various surface treatments. Vessel walls tend to be thicker than previously, especially (although not exclusively) for jars. There is a general (although not universal, and unquantified) trend for round-shouldered bowls to be thicker-walled than angular forms. Most vessels appear to have been coil or strap built.

Surface treatments can be understood as a basic division between burnishing on the one hand and rustication on the other. Treated surfaces are more commonly fine above the shoulder (but not exclusively), or better above the shoulder than below it. As in preceding periods, all of the finishes vary in quality. Rustication, in particular, varies considerably from a very thick applied slurry to a simple roughening of the exterior surface.

Form

While some markedly angular forms are present, particularly in the bowls, the period is marked by the emergence of convex and round-shouldered profiles in both bowls and jars. Jars tend to be high-shouldered, while bowls tend to have shoulders mid-way up or low on the body. The appearance of pedestal and other elaborations on bases is also typical of the period. Among the large numbers of featureless flint-tempered body sherds which typify the Iron Age assemblages, a number of forms could be reconstructed.

Bowls

Shouldered bipartite closed bowls with out-turned rims and concave necks; most are burnished externally (some very highly) and smoothed internally; well-marked shoulders (eg, Fig 8.3, no. 18, 16mm diam), some with a narrow base with foot (eg, Fig 8.3, no. 19, 215mm diam). Some are very large and slip-coated (eg, Fig 8.4, no. 28, 430mm diam). Some are more sharply shouldered (eg, Fig 8.4, no. 35, 190mm diam) and red finished (Fig 8.4, no. 29, 185mm diam).

Large shallow bipartite neutral bowls burnished inside and out; simple upright rims on short vertical walls above the shoulder (eg, Fig 8.3, no. 24, 275mm diam).

Small shallow bipartite closed bowls with high rounded shoulders and simple rims; burnished all over the exterior (on the illustrated example in Fig 8.3, no. 26 including the base) and interior above the shoulder. The illustrated example is 105mm in diameter.

Large globular bipartite closed bowls; simple rim above high gentle shoulder with burnish above (eg, Fig 8.3, no. 27, 210mm diam).

Closed onion-shaped vessels with flat upright rims on short necks. Some are round-shouldered (eg, Fig 8.3, no. 22 180mm diam) with external surfaces burnished quite roughly; others are angular (eg, Fig 8.3, no. 23, 250mm diam) with rusticated exteriors and wiped interiors.

Shallow saucer-like bowl; simple rim; omphalos base (Fig 8.5, no. 37, 150mm diam).

Jars

High-shouldered neutral jars with simple rims, shallow necks and well-marked shoulders (eg, Fig 8.3, no. 21, 185mm diam). Lower portion of exteriors wiped vertically; on and above shoulder horizontally.

Large closed convex-walled jars with simple upright flat rims and no neck; burnished inside and out; bases flat with vestigial foot (eg, Fig 8.3, no. 25, 240mm diam).

Large bipartite closed jars with 'T'-shaped upright rims and less well-marked shoulders; more heavily rusticated below (not smooth above), light burnish inside (eg, Fig 8.4, no. 30, 255mm diam).

Large thick-walled neutral to closed jars with expanded flat-topped rims on short necks above globular bodies. Some (eg, Fig 8.4, no. 32, 140mm diam) burnished externally.

Shouldered closed jars with simple upright rims on short straight necks. The illustrated example (Fig 8.4, no. 31) is much more heavily gritted below the shoulder than above it.

Others

A biconical vessel with the shoulder at the mid point. Rim absent and break ground smooth (Fig 8.5, no. 38).

Rims

Twelve rim forms were identified, as in Table 8.5. Simple upright or everted and externally-enlarged rims are the most common.

Necks

Necks are for the most part short and plain. There is a marked difference between the surface treatment of

Table 8.5 Early to Middle Iron Age rim forms

		Total
R1	simple, upright, rounded	9
R2	simple, upright, pointed	3
R8	simple, upright, flat	12
R6	simple, out-turned, pointed	1
R7	simple, out-turned, rounded	10
R15	simple, out-turned, flat	2
R14	simple, in-turned, flat	7
R10	internally extended, upright, flat	4
R11	externally enlarged, upright, flat	15
R12	externally enlarged, upright, rounded	3
R4	expanded, upright, rounded	1
XR29	expanded, upright, flat	1
		68

Table 8.6 Early to Middle Iron Age decorated sherds by motif

Position/motif	*Total*
Rim Top:	
Finger tip	4
Cabling 2	
Below Rim:	
Incised line	1
On Shoulder:	
Finger tip	6
Base/Wall Angle:	
Tooled line	1
External (unspecified):	
Applied droplets	1
Finger tip	4
Tooled line	4
Impressions	1
Incised line	4
Total	28

many necks (burnished, often finely) and elsewhere (untreated or roughened).

Shoulders

Shoulders are either rounded or angular forms. Rounded forms are mostly quite slack, although some of the more onion-shaped vessels have well-marked rounded shoulders. Angular forms can be sharp, but there is considerable variety. Shoulders are not often decorated, with only one motif (on jars only) of lines of fingertip impressions.

Bases

Bases occur in a wider variety of types. Most are either flat with or without feet. There is one pedestal base, and one omphalos (Fig 8.5, no. 37). One has decoration a little way above the base/wall angle, consisting of a single horizontal line (Fig 8.4, no. 34).

Decoration

Most of the decoration consists of fingertip or nail motifs on the rims of jars and bowls. A division of decoration by motif is given in Table 8.6. Other motifs are not common (see Table 8.6) but notable instances are two joining sherds from a vessel with a band of decoration consisting of pulled up or applied clay 'droplets' in between two horizontal lines of fingertip and nail impression (Fig 8.4, no. 33), a sherd with tooled crossing diagonal lines externally (Fig 8.3, no. 20), and a sherd with closely-spaced stab marks (Fig 8.5, no. 36).

Function and use

Sooting and burnt residues (both internal and external) survive, suggesting cooking or the preparation of foodstuffs and other materials. Only one vessel has a single post-firing perforation in the upper wall. Other uses are presumed: finer vessels can be assumed to have been tablewares; a division of coarsewares into storage and cooking pots may exist, but cannot be detected in most cases.

Feature group assemblages

Significant groups of Early to Middle Iron Age material were recovered from Zones 6, 13 and 19, in each case recovered from features making up parts of enclosures, trackways and field systems – variously settlements and parts of the associated agricultural landscape. Each of the zones presents rather different evidence and is worth considering in turn.

Zone 6

Two groups of features (pits 208068, 242081, 256029 and waterhole 254056 to the north; pits 173275, 274065, 291130, 302055 and 302077 to the south; and two isolated pits (193127 beween the two groups and 303091 further to the south-east) contained substantial assemblages of Early to Middle Iron Age pottery comparable to the material from Zone 13.

Northern group

Pit 208068 contained sherds from at least seven vessels. Two are burnished fineware bowls and two are jars. One of the jars is weakly shouldered with a row of finger-nail impressions on its shoulder; the other is shouldered jar with flat-topped rim. The remaining vessels are of uncertain form: sherds include thick-walled and burnished examples and one from an externally oxidised but untreated vessel.

Pit 242081 contained sherds from at least five vessels. Three are jars: one is barrel-shaped with an undifferentiated rim and slack shoulder; one has an externally-lipped rim and is rusticated externally; one is necked. The only definite bowl has an external fine, red finish. Other vessels of indeterminate form are represented by sherds from a flat-topped undifferentiated rim, rusticated body sherds and burnished body sherds.

Pit 256029 contained fragments of at least 24 vessels. Thirteen are jars, including three with plain rims; two ovoid jars, one with a flat-topped rim and one with a simple rim; two with finger-impressed rims, one with a flattened, out-turned rim; two with flat-topped rims; one with a flared rim and two with cabled rims. One jar is also represented by a flat base. Four vessels are bowls, including one red-finished example; one shouldered bowl decorated with fingertip impressions around the edge of the rim and on the shoulder and one round-shouldered bowl.

Waterhole 254056 contained at least 14 vessels. Seven are jars, including four shouldered jars, one with a short, upright, flat-topped rim; a jar with a flat-topped internally and externally thickened rim; and an ovoid jar with a simple rounded rim burnished on the rim and upper part of the wall and roughened lower down. Two are bowls, one finely burnished. Among the other forms are a lid or shallow cup/bowl, represented by only 10% of the 100mm diameter simple pointed rim, and a fine polychrome sherd with a red-finished and buff untreated exterior, light grey core, and black burnished interior surface.

Southern group

Pit 173275 contained portions of 15 vessels. Ten are jars, including sherds from a large externally expanded base and lower vessel wall with vertical finger-smearing; an upright-necked, shouldered jar; a high-shouldered jar with an in-turned T-shaped rim, fingertip/nail impressions on the shoulder and external burnish; and another shouldered jar with an upright rim, burnished on the rim/shoulder and vertically smeared below. Two ovoid jars have internally bevelled rims; a second has a simple in-turned rim; a fourth ovoid (almost globular) jar has a slightly irregular rim horizontally finger-smeared around the inside, giving it a slightly cupped appearance. There are traces of a birch bark tar-derived glue repair on its exterior surface adjacent to one of its broken edges. A single sherd from the body of a further jar has variously-spaced horizontal rows of finger-nail impressions.

Other forms include a carinated fineware bowl with a simple upright rim, well-burnished externally; fine red-finished sherds from a small-diameter cup-sized vessel with stub of an out-turned rim and external burnish; a hemispherical cup or small bowl with a simple rim, well-burnished; and a small omphalos base.

Pit 274065 contained various featureless sherds including a fine, carinated bead rim bowl, an externally-expanded flat base and a thick-walled flat base.

Pit 291130 contained parts of ten vessels. Seven are jars, including parts of a large, well-made, fineware, sharply-shouldered pot with a beaded rim defined by incised horizontal grooves, which are also present on the top of shoulder and just above and below the shoulder carination. This vessel is burnished on the exterior and has horizontal facets on the interior. Other jars include one with a slightly concave neck; one with a rounded rim; and one with a flat-topped rim. The three bowls include a large body sherd from a carinated example; parts of one with a straight, slightly flaring wall; and a coarseware bowl with a straight, slightly flaring wall and thickly rusticated exterior surface broadly similar to type F19 at Highstead (Couldrey 2007).

Pit 302055 contained fragments from at least 10 vessels. Two are jars, both highly fragmentary. Three are fineware bowls, including a flared vessel with the rim decorated all over with fingertip impressions. The other sherds include an example with combed scoring on the exterior, 11 with burnish (mostly fairly fine), 10 with rustication and one with finger pinched decoration. A single thick rusticated body sherd has internal burnish.

Pit 302077 contained parts of at least ten vessels. Eight are jars: two represented only by flat bases; one upright-necked jar; one bipartite jar with a simple round-topped rim; one small shouldered jar, with an in-turned flat-topped rim; one shouldered jar with a T-shaped rim; one small, flat-topped proto-bead rim jar with a neutral profile; and one shouldered jar with a pulled upright rim. A single sherd from a red-finished fineware bowl is also present, as are several rusticated sherds.

Isolated features

Pit 193127 contained sherds of a relatively small number of vessels (perhaps no more than three), all jars, including a very weakly-shouldered example, fragments of a T-shaped rim and a simple rounded rim. Most of the sherds seem to belong to a straight-walled, very slightly shouldered jar with vaguely fingertipped rim.

Pit 303091 contained parts of two vessels: joining sherds from a small open vessel smoothed internally with all-over finger-nail pinching; and a small weakly-shouldered jar with a flat-topped internally bevelled rim.

Zone 13

Early to Middle Iron Age pottery was encountered throughout Zone 13. The largest assemblages were retrieved from pits within and to the west of the trapezoidal enclosure. The more notable groups are summarised here.

Inside the enclosure

Pit 125053 was one of a group of pits within the enclosure's south-west corner. It contained 122 sherds weighing 3029g. Among these are thick sherds with heavy external rustication and sherds from a thick-walled strap-built vessel with both surfaces burnished. Notable identifiable vessels include a number of sharp and round-shouldered bipartite closed bowls with out-turned rims and concave necks, very highly burnished externally and smoothed internally (Fig 8.3, no. 18, 165mm diam), one of which has a narrow base with a slight foot (Fig 8.3, no. 19, 215mm diam). A vessel of unknown form is represented by a single sherd decorated with a tooled lattice pattern (Fig 8.3, no. 20).

Pit 168135 lay adjacent to the enclosure ditch on the southern side. It contained 1692 sherds weighing 7269g, among which are parts of at least 13 shouldered and hemispherical bowls. Burnish is common on external surfaces, sometimes only above the shoulder, with interiors generally smoothed or wiped. Sherds from other unidentified vessels have rusticated exteriors, sometimes only below the shoulder. One vessel has shallow fingertip and nail impressions on the shoulder. Also present is a large closed jar, 200mm diameter at the mouth, burnished internally and in the neck/on the rim with rustication below the shoulder. The vessel has a shallowly-concave S-profiled neck and is almost onion-shaped (Fig 8.3, no. 23, 200mm diam). A single sherd came from a red-finished burnished bowl. Other identifiable vessels include a large shallow bipartite neutral bowl burnished inside and out with a simple upright rim on the short vertical wall above the shoulder (Fig 8.3, no. 24, 275mm diam); a large closed convex-walled jar with simple upright flat rim and no neck, burnished inside and out, with a flat base with a vestigial foot (Fig 8.3, no. 25, 240mm diam); a small shallow bipartite closed bowl with a high rounded shoulder and simple rim, burnished all over the exterior including the base and interior above the shoulder (Fig 8.3, no. 26, 105mm diam); a large globular bipartite closed bowl with a simple rim above a high gentle shoulder with burnish above (Fig 8.3, no. 27, 210mm diam); and a very large and slip-coated shouldered bipartite closed bowl with an out-turned rim and concave neck, burnished externally and smoothed internally (Fig 8.4, no. 28, 430mm diam).

Outside the enclosure

Pit 130032 contained 84 sherds weighing 1351g. Among these is a high-shouldered neutral jar with a simple rim, shallow neck and well-marked shoulder (Fig 8.3, no. 21, 18mm diam), at least two angular-shouldered bowls, and a single sherd with polychrome decoration. Among the mass of sherds are many with the lower portion of the exteriors wiped vertically and horizontal wiping on and above the shoulder.

Pit 139049 contained 68 sherds weighing 1218g. A closed onion-shaped vessel with a flat upright rim on a short neck had a round-shoulder (Fig 8.3, no. 22, 180mm diam). The exterior is burnished quite roughly. Also present are small fragments of a jar with finger impressions on the shoulder and a base with a pronounced foot.

Pit 186095 was one of a complex of intercutting features. It contained 66 sherds weighing 2392g, among which a sharply shouldered and red finished bipartite closed bowl with an out-turned rim and concave neck, very highly burnished externally and smoothed internally, (Fig 8.4, no. 29, 185mm diam) is particularly notable. Also present is a large jar with a 'T'-shaped upright rim and slight shoulder, more heavily rusticated below the shoulder (although not smooth above), with a light internal burnish.

Pit 187007 contained 47 sherds weighing 1559g. A shouldered closed jar with a simple upright rim on a short straight neck (Fig 8.4, no. 31) is much more heavily gritted below the shoulder than above it. A large thick-walled neutral to closed jar with an expanded flat-topped rim on a short neck above a globular body (Fig 8.4, no. 32, 140mm diam) is burnished externally. Two joining sherds with a band of decoration consisting of pulled up or applied clay 'droplets' in between two horizontal lines of fingertip and nail impression (Fig 8.4, no. 33) came from a vessel of unknown form.

Pit 191054 contained 48 sherds weighing 742g. One vessel had a simple rounded rim and fingertip and -nail impressions on the shoulder. One very small sherd came from a red-finished bowl. Another vessel is represented by a base with decoration a little way above the base/wall angle, consisting of a single horizontal line (Fig 8.4, no. 34).

Pit 191066 contained 74 sherds weighing 3074g. A sharply shouldered bipartite closed bowl with an out-turned rim and concave neck is highly burnished externally and smoothed internally (Fig 8.4, no. 35, 190mm diam). Other fine shouldered bowls are present among the mass of sherd material, as are sherds from a vessel with two parallel lines of finger impression. Some coloured sherds are present, including one red finished burnished wall sherd with a line of horizontal fingertip/nail impressions, and some polychrome sherds: a thick walled jar with patchy heavy applied rustication externally and a well-burnished interior had bands of red/orange on the exterior, some partially over the rustication. While this may be a firing bloom the bands look deliberate and may be an applied finish. A single sherd from a different vessel has a vari-coloured exterior resulting from the application of differently-firing slips.

Zone 19

A particularly notable deposit came from pit 205106 in Zone 19. This contained four fine carinated bowls; three fine bowls; a sharply-shouldered small bowl; two footring bases; a straight-sided jar with a pointed rim decorated with scoring; a scored and red finished proto bead-rimmed jar; other jar rims and bases; burnished, untreated, scored and rusticated bodies; sherds with all-over fingertipping; a jar shoulder with fingertipping at the change of angle; 22 red finished sherds (including the bead-rimmed jar) and a single polychrome (red/silver) sherd. Cunliffe has placed the occurrence of footring bases from sites along the A2 (such as Barham Downs) in a 5th to 3rd century BC bracket (Cunliffe 1980, 179).

Middle Iron Age

As with the Early to Middle Iron Age material, the sheer quantity of sherds spot-dated to this period meant that only a fraction of it could be studied in detail. Consequently, analysis was restricted to the very large assemblage from Zone 13, with detailed assessment of the large, but less contextually secure, groups from Zone 6.

Eleven fabrics were identified in the sample from Zone 13. Quartz sand has emerged as the primary tempering agent (xQ1-3), with only two predominantly flint-tempered fabrics, (xF1 and xF3) and other types (shell (xS1) and grog (xG1)) very much in the minority. Mixed-tempered fabrics continue (chalk and flint, chalk and quartz, grog and flint, sand and flint), with sand and flint in particular being a very well-represented fabric.

The sand-tempered or predominantly sand-tempered fabrics between them comprise 49% of the ceramics by count (40% by weight). None of the fabric types need be of non-local manufacture. The range of tempering agents and their mixing is paralleled in other broadly contemporary assemblages (as for instance Dolland's Moor: Macpherson-Grant 1990, 61).

Form

Unlike the Early to Middle Iron Age assemblage, the Middle Iron Age material is typified by vessels with angular shoulders (although some round-shouldered forms are present, particularly in the bowls). Jars tend to be high-shouldered, while bowls tend to have shoulders mid-way up or low on the body (although there are exceptions).

Bowls

Bowls with simple everted or upright rims on short necks; shoulders at the mid point; flat bases without feet (eg, Fig 8.5, no. 43, 240mm diam)

Globular bowls with short deep necks and out-turned rims. External burnish on at least the upper half (eg, Fig 8.6, no. 47, 180mm diam)

High shouldered closed bowls with rounded slightly out-turned rims on short necks (eg, Fig 8.5, no. 41, 180mm diam). Some have light horizontal scoring below the shoulder.

Bowls with simple everted rims on short necks; sharply-shouldered two-thirds of the way up the wall; narrow, flat bases with vestigial feet (eg, Fig 8.6, no. 51, 250mm diam). Internal burnish on some.

Jars

High shouldered, convex walled jars with simple rims on short upright necks. The example illustrated in Fig 8.5, no. 39 (360mm diam) has rim and shoulder both with finger impressions; rusticated below the shoulder, smoothed in the neck. The example in Fig 8.6, no. 49 (185mm diam) has a line of circular stabs below the shoulder.

S-profiled jars with expanded rims and burnished exteriors (eg, Fig 8.5, no. 40, 360mm diam).

High-shouldered open jars with everted rims; exteriors highly burnished (eg, Fig 8.5, no. 42, 165mm diam).

High-shouldered neutral to closed jars with everted rims; walls taper to bases with pronounced feet. Narrow (eg, Fig 8.5, no. 46, 115mm diam) or broad (eg, Fig 8.6, no. 50, 165mm diam; burnished exterior).

Saucepan pots (eg, Fig 8.5, no. 48, 195mm diam).

Others

An odd sherd with three surfaces at right angles looks like the corner of a box or tray (Fig 8.5, no. 44). This is well-finished on all surfaces.

Part of a trimmed pedestal base with 3 tooled lines at the narrowest point (Fig 8.5, no. 45).

Rims

Nine rim forms were identified, as in Table 8.7. Simple upright and externally-enlarged rims are the most common.

Necks

Necks are for the most part short and plain.

Shoulders

Shoulders are either rounded or angular forms. Rounded forms are mostly quite tight. Angular forms are generally sharp, but there is considerable variety. Shoulders are not often decorated, with either lines of fingertip impressions (three examples) or impressed dots (one example).

Bases

Bases are either flat with or without feet, pedestal types (two examples), or omphalos (one example). Decoration is limited to horizontal lines of either tooling or fingertip impression above the base angle.

Decoration

Most of the decoration consists of fingertip or -nail motifs on the shoulders of jars. A division of decoration by motif is given in Table 8.8. Other motifs are not common.

Function and use

Sooting and burnt residues (both internal and external) survive, suggesting cooking or the preparation of foodstuffs and other materials. No perforations were observed. Other uses are presumed: finer vessels can be assumed to have been tablewares; a division of coarse-wares into storage and cooking pots may exist, but cannot be detected in most instances.

Feature group assemblages

Significant groups of Early to Middle Iron Age material were recovered from Zones 6 and 13, in each case recovered from features making up parts of enclosures, trackways and field systems – variously settlements and

Table 8.7 Middle Iron Age rim forms

		Total
R1	simple, upright, rounded	3
R2	simple, upright, pointed	2
R8	simple, upright, flat	5
R7	simple, out-turned, rounded	5
R14	simple, in-turned, flat	1
R3	rolled over, upright, rounded	2
R10	internally extended, upright, flat	2
R11	externally enlarged, upright, flat	8
R12	externally enlarged, upright, rounded	2
		30

Table 8.8 Middle Iron Age decorated sherds by motif

Position/motif	*NOSH*
Rim Top:	
Finger tip	1
On Shoulder:	
Finger tip	4
Dots 1	
Base/Wall Angle:	
Tooled line	1
Finger tip	1
External (unspecified):	
Finger tip	1
Tooled line	2
Impressions	1
Total	12

parts of the associated agricultural landscape. Each of the zones presents rather different evidence and is worth considering in turn.

Zone 6

A number of groups of Middle Iron Age features contained noteworthy ceramic assemblages. Most lay in three rows aligned roughly west-east (from the north, 208066 and 262167; 244259, 137222, 219095 and 244292; 216113 and 279145) with two isolated features: 262172 to the north of all the others, and 258230 between the two southernmost rows.

Pit 262171 contained 20 sherds from a single inverted pear-shaped thick-walled bowl with a flared rim (200mm in diameter, 20% survives). The base is *c* 100mm in diameter (10% survives); the height *c* 155mm. Both surfaces are smoothed, with the interior shinier than the exterior, perhaps a result of preservation rather than a deliberate effect.

Pit 208066 contained 43 sherds weighing 1673g. One very heavily rusticated sherd could be of earlier Iron Age date and redeposited here. Five other body sherds have lighter rustication more typical of the period, while one is an externally burnished, finely flint-gritted base sherd. Fourteen sherds belonged to an ovoid jar with a square beaded rim, lightly rusticated and with sooty deposits externally. Seven came from the internally bevelled, flat-topped rim of a shouldered jar. A single sherd derived from a highly burnished carinated fineware bowl. Other vessels include a flat based, large, oxidised lightly rusticated jar, a dark-fired, externally burnished vessel or unknown form, a jar with a flat base, lightly rusticated and sooted externally.

Adjacent pit 262167 contained 28 sherds weighing 1025g. Recognisable vessels include a bead rim jar; two ovoid jars with lightly inturned rims and a carinated bowl. This last vessel has an inverted pear-shaped profile; an externally wedge-shaped, recessed base, and a well-defined bead rim. The surfaces are smoothed. The exterior surface has spalled, and there is a slight suggestion of an ancient birch bark tar-derived glue repair.

Small pit 244259 contained nine sherds from an ovoid jar with a flat-topped inturned rim and an S-profiled jar with a thick, heavy shoulder decorated with a horizontal row of fingertip impressions.

Adjacent larger pit 137222 contained 21 sherds weighing 569g. Forms include a shouldered jar with a beaded rim. The shoulder and rim are burnished, and there are horizontal rows of fingernail impressions all over the surviving part of the lower body. A second shouldered jar with a simple rim has a relatively long shoulder which slopes in towards the centre of the vessel. The rim and upper part of the shoulder is lightly burnished. A small fineware shouldered jar/bowl has an upright rim and a small, S-profiled jar has an externally-burnished flared rim. An ovoid jar with a simple rim is externally rusticated.

Pit 219095 contained 45 sherds weighing 596g. Among the material are rusticated or burnished body sherds from several vessels, and also a small bowl or cup with a simple rim and wedge-shaped base.

Pit 244292 contained 51 sherds weighing 1791g. Many have rusticated external surfaces, or are smoothed or burnished. At least one round-shouldered and one angular-shouldered bowl have very highly burnished interiors. One round-shouldered externally burnished jar has a simple rounded upright rim 160mm in diameter.

Pit 216113 contained 57 sherds weighing 1057g, including many typically rusticated or burnished sherds. Recognisable forms include a shouldered jar with a flat-topped, externally-expanded rim; a fineware bowl with curvilinear burnished line decoration; a weakly-shouldered jar with a small, externally thickened rim with finger-nail impressions in its flat, upper surface; a sharply shouldered jar with a beaded rim; a saucepan pot with straight, flaring walls and a simple rim; a sharply carinated bowl burnished on both surfaces; and an internally bevelled sharply shouldered jar decorated with a horizontal row of finger-nail impressions.

Pit 279145 contained 77 sherds weighing 2552g. Although highly fragmented, the material contained bases from six jars (three flat – one with light horizontal wiping on the lower body and one externally burnished; three slightly externally expanded – one heavily rusticated and two well-burnished); a combed body sherd; burnished and rusticated sherds; and sherds from a slightly shouldered ovoid jar with a simple, rounded rim.

Posthole 258230 contained a sharply carinated jar or bowl with an everted rim. The base is missing as is much of the rim, but *c* 70% of the body survives. The diameter at carination is 180mm.

Other notable material includes sherds of what may have been saucepan pots (straight profiled jars with simple rims) in pits 145280, 244189 and 244253.

Zone 13

Pit 166009 contained 164 sherds weighing 6768g. Among the very large quantity of variously rusticated and burnished body sherds from numerous bowls and jars, several forms are identifiable. Fig 8.5, no. 39 is a closed, shouldered, finger-impressed jar with rustication below the shoulder and smoothing in neck. This different surface treatment was a common trait on Middle Iron Age jars, although this form is not well-represented in the assemblage as a whole.

Fig 8.5, no. 40 is an S-profiled jar with an expanded rim, highly burnished on the exterior surface. This rim form and finish is typical of jars of this period and was only an infrequent element of Early to Middle Iron Age groups. Fig 8.5, no. 46 is a small jar with an everted pointed rim and high quite angular shoulder, from which the wall tapers to a narrow base with a pronounced foot. A similar vessel with an even more angular and pronounced profile is shown in Fig 8.5, no. 42. This vessel is highly burnished. Fig 8.6, no. 50 is a high-shouldered, short-necked jar. The shoulder is rather angular, and the outer surface burnished. This vessel is virtually complete, although fragmentary.

Fig 8.5, no. 41 is a tall bowl with a rounded slightly out-turned rim on a short neck above a shallow rounded shoulder. Fig 8.5, no. 43 is a bowl with an everted rim on a short neck. The shoulder is at the mid-point and the base (not illustrated) flat and without a foot. Fig 8.6, no. 51 is a high-shouldered, broad, low bowl, burnished on the interior surface. Fig 8.5, no. 45 is part of a trimmed pedestal base with three tooled lines in the constriction. It is difficult to parallel this form, but it is perhaps a second example of a small conical cup, such as was found South-East of Eyhorne Street on the HS1 (formerly CTRL) Section 1 project (Morris 2006, 45). Fig 8.5, no. 44 is an unusual sherd with three burnished surfaces at oblique angles which appear to form the corner of a tall (perhaps pentagonal) box.

Two sherds came from a thin-walled vessel with all-over lightly tooled wavy line decoration. A sherd from a round-shouldered bowl has a birch bark tar-derived glue repair on its exterior surface.

Pit 168068 contained 64 sherds weighing 1343g. Most are body sherds from unidentifiable bowls and jars, with the usual ranges of rusticated and burnished surfaces. Rims are either simple, upright and rounded; internally extended, upright and flat; or externally enlarged, upright and rounded. One vessel has vertical regular wiping on the outside of the rim. Another sherd in a sand and flint-tempered fabric appeared to derive from a saucepan pot.

Pit 173188 contained 75 sherds weighing 1531g. Identifiable vessels include a thick-walled shouldered jar with burnish on the upper part and light rustication on the shoulder; a simple hemispherical closed bowl; fragments of a very highly burnished bowl; a thin-walled round-shouldered bowl with fine burnish on both surfaces and an out-turned (almost internally bevelled) rim; and a globular bowl with a short deep neck and out-turned rim, burnished on at least the upper half externally (Fig 8.6, no. 47).

Pit 211043 contained 69 sherds weighing 2101g. There are few identifiable forms, but they include fragments of a footring base; a high-shouldered jar with a short neck, simple pointed rim, and with a line of circular stabs below the shoulder (Fig 8.6, no. 49); and a saucepan pot (Fig 8.6, no. 48). Morris noted the scarcity of saucepan pots in Kent prior to the HS1 excavations (only three possible examples), although the results of that scheme added 36 further examples. The two examples from EKA Zone 13 and the four possible examples from Zone 6 (predominantly flint or sand and flint tempered, one with grog, surfaces either plain or burnished, reconstructable diameter of one vessel 190mm) fit within the range of vessels from CTRL, but expand the distribution of the type.

Discussion

It is clear that although the use of flint temper continued throughout the second half of the first millennium BC, the Middle Iron Age witnessed a significant shift towards the use of sand and fine flint-tempered wares, away from flint alone, which had been dominant in preceding periods. The remaining shell-, chalk- and sand-tempered fabrics never represented more than very minor components of the assemblage, but can be paralleled at other sites in the region (eg, Jones 2009, 31-4, fabrics C1, S1, Q8, QG1; Morris 2006, 82-3). Evidence from HS1 sites such as Little Stock Farm and Saltwood Tunnel indicate that grog temper began to be used in this part of Kent during the Middle Iron Age (Morris 2006, 70), becoming increasingly common during the Late Iron Age and Late Iron Age/early Roman periods.

The most common forms of Middle Iron Age date are angular-shouldered jars and bowls with upright or slightly out-turned, flat-topped or beaded rims in a variety of sizes, and neutral profiled vessels with internally bevelled or externally expanded (proto-bead) rims (*ibid*, fig 3.8, LSF/5 and LSF/49). Roughened surface rustication continued to be a common feature at this time, especially on larger forms; scratched or scored exterior surfaces were soon added to the repertoire with burnishing confined to the inside of bowl forms and both surfaces of a small number of fine, fairly thin-walled jars and bowls. Decoration is comparatively rare, a few vessels continuing to have fingertip or nail impressions on shoulders and rims.

Catalogue of illustrated vessels (Figs 8.1–8.6)

Early Neolithic

1. PRN 135. Ctx 191084. F1. Forty-nine sherds from the rim, neck, shoulder and body of a large open shouldered bowl. The rim is very irregular, but approximates to between 375-400mm diam. The rim top is decorated with closely-spaced short diagonal lines of twisted cord; very irregular applied and pinched-up shoulder has dropped or become flattened markedly at one point; interior is wiped and in better-preserved areas burnished/tooled.
2. PRN 167. Ctx 191092. F3. Large decorated shoulder bowl 340mm diam., with long oval lugs on the shoulder; alternate panels of dot impressions and vertical finger fluting present above the shoulder, dot impressions alternating with blank panels below. Slip-coated and smoothed
3. PRN 184. Ctx 191178. F1. Ten sherds from a carinated bowl. The outer surface is slipped and burnished, decorated above the angle with faint short diagonal lines and below it with longer lines above faint tooling.
4. PRN185. Ctx 191178. F3. Six joining sherds from the rim and shoulder of a bowl with a smoothed external surface and vertical tooling in the neck

Middle Neolithic

5. PRN 197. Ctx 228054. F8. The collar of a Fengate-type Peterborough Ware vessel
6. PRNs 188-191. Ctx 123003. F7. A Mortlake-type Peterborough Ware vessel with typical expanded 'T'-shaped rim decorated with twisted cord impressions. The cavetto and body are decorated with a variety of impressed designs, mostly fingers, including fingertip impressions in the cavetto

Early Bronze Age

7. PRN 207. Ctx 246135. D1. Three conjoined miniature Food Vessels

Middle Bronze Age

8. PRN 210. Ctx 153018. F10. The complete top of a bi-partite jar; the rim is upright, flat and plain; the wall splays out to a weak shoulder with a shallow applied cordon

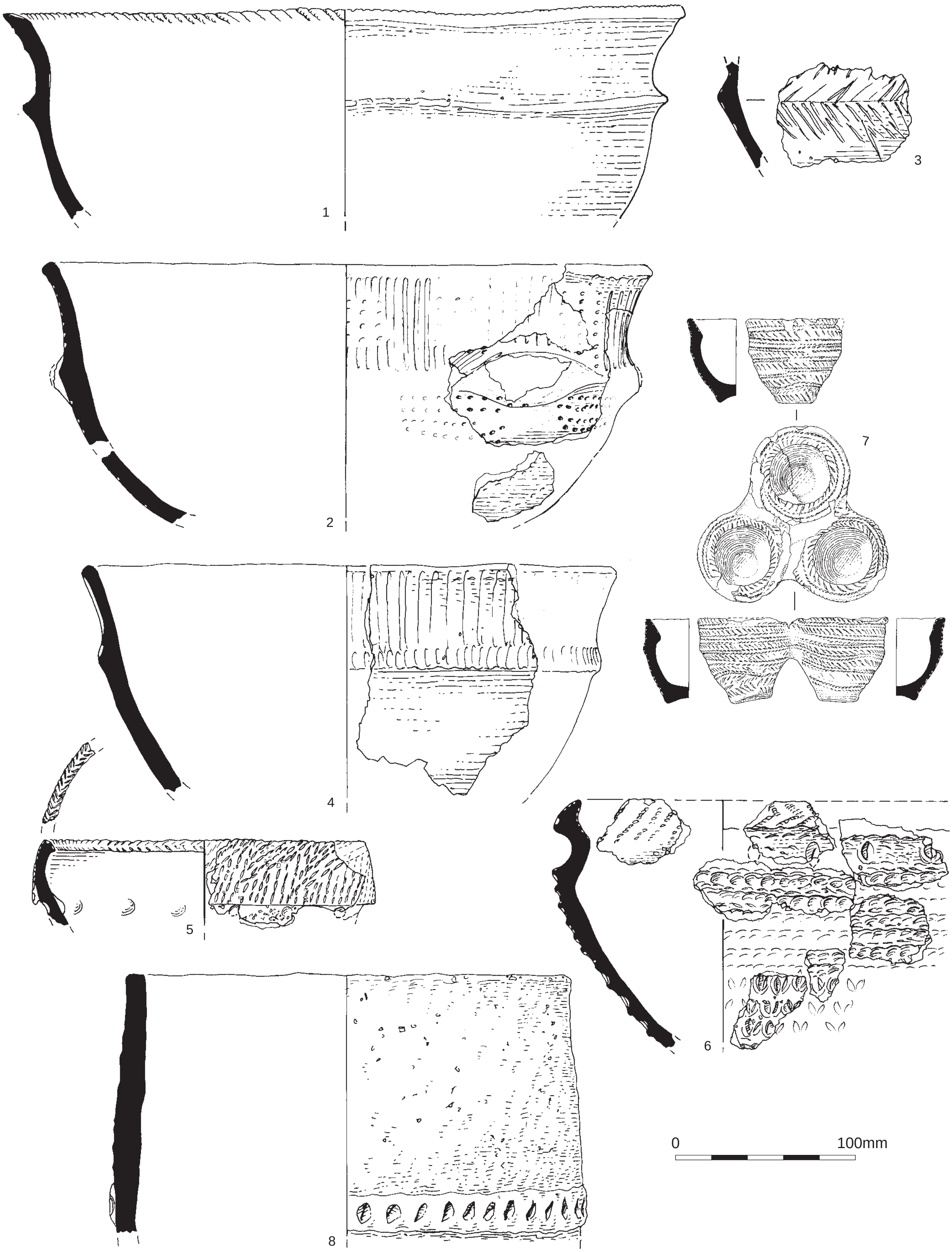


Fig 8.1 Early Neolithic – Middle Bronze Age pottery (nos 1-8)

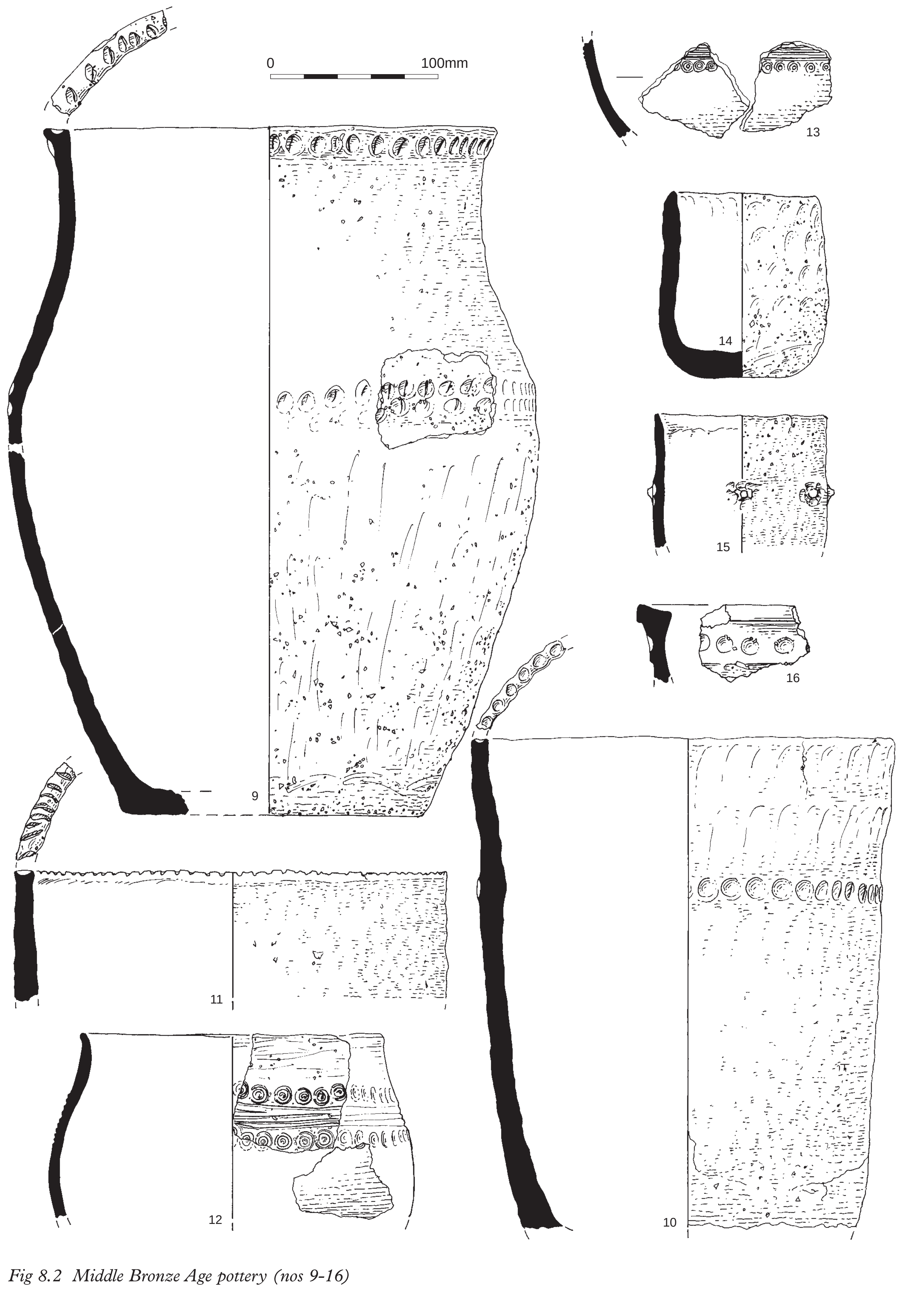


Fig 8.2 Middle Bronze Age pottery (nos 9-16)

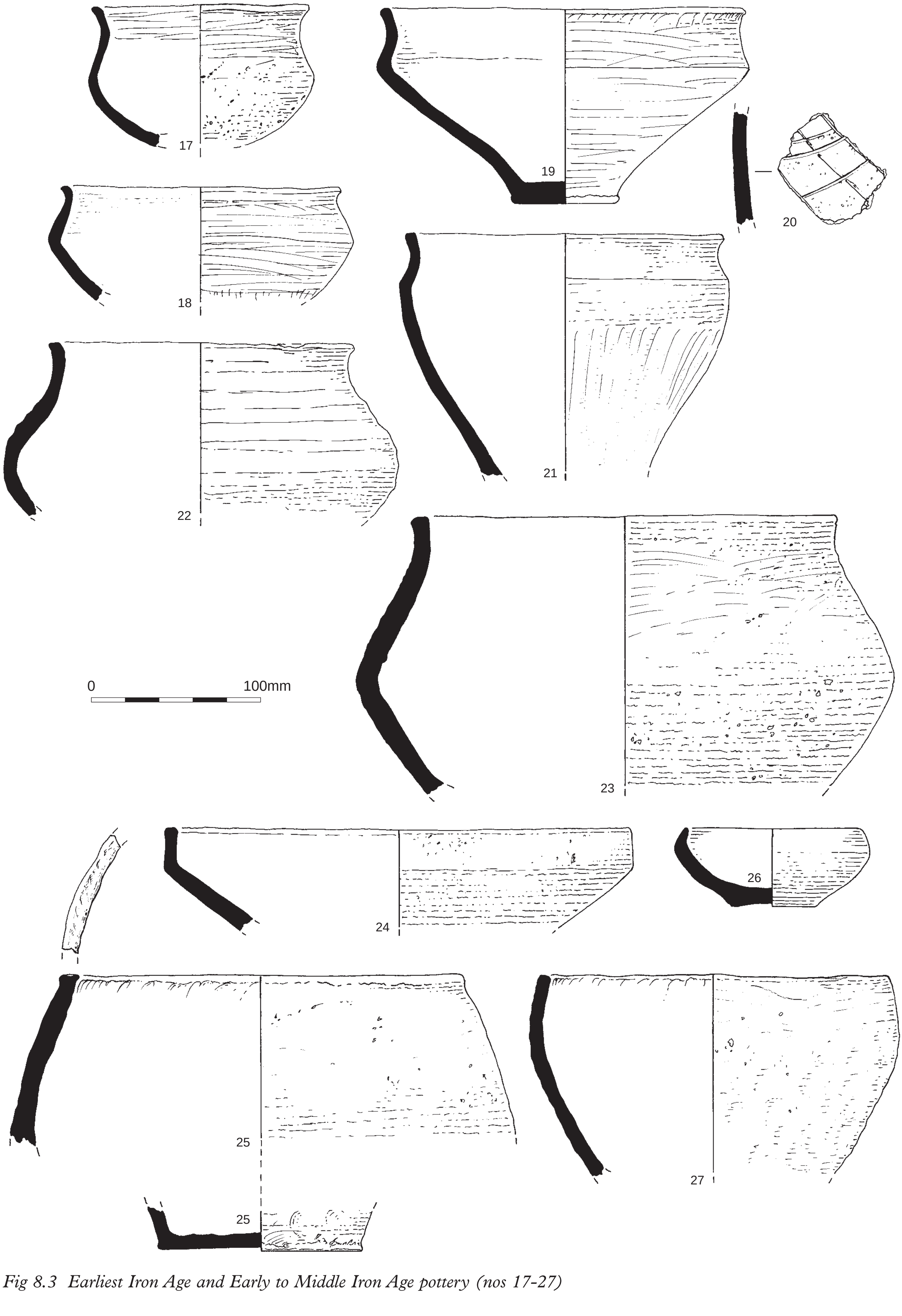


Fig 8.3 Earliest Iron Age and Early to Middle Iron Age pottery (nos 17-27)

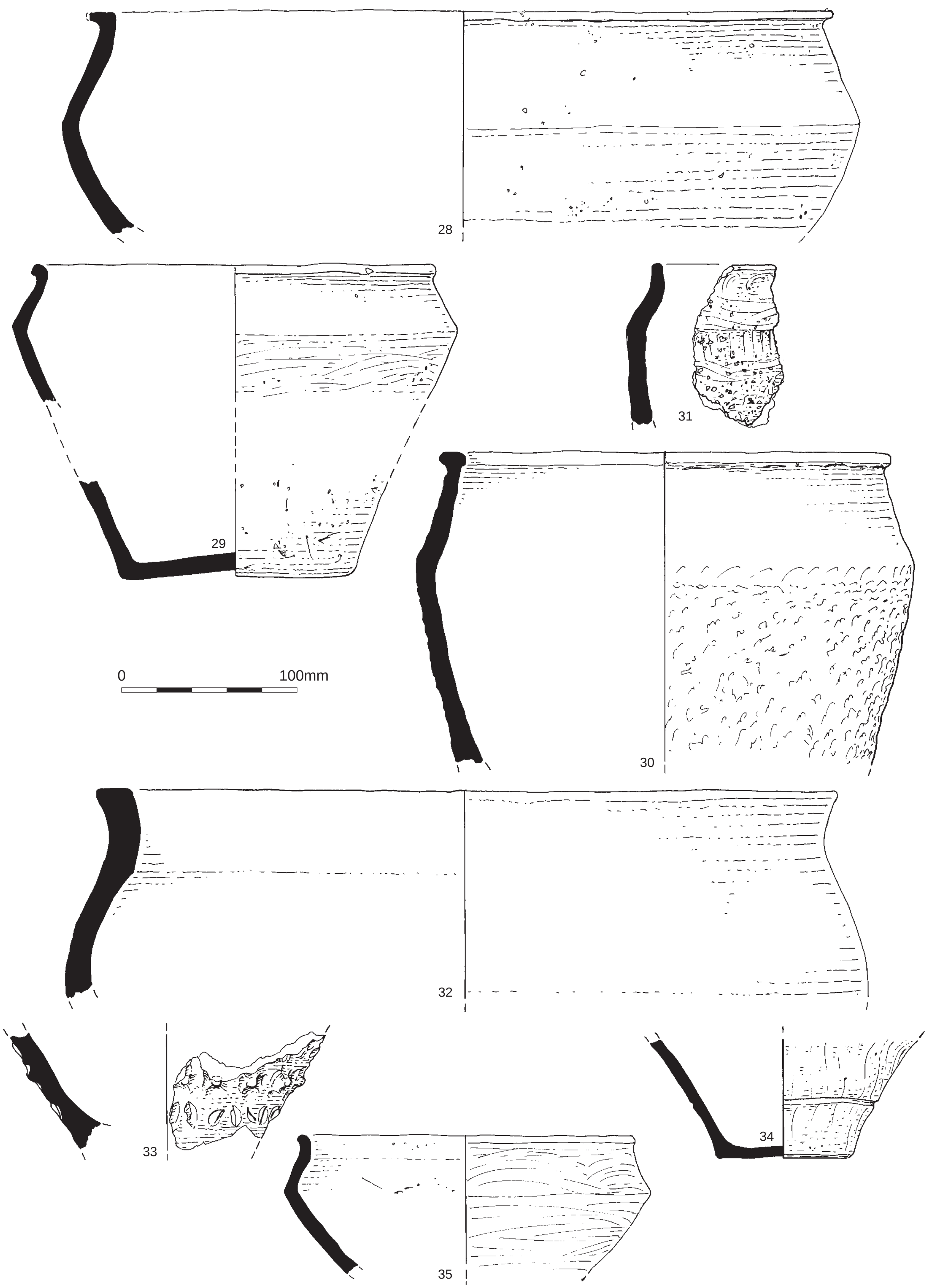


Fig 8.4 Early to Middle Iron Age pottery (nos 28-35)

110mm below the rim, with very abraded impressions of (probably) fingers; little survives below the cordon

9. PRN 215. Ctx 222002. F9. a jar with a markedly bi-concial profile, possibly barrel- rather than bucket-shaped; the rim is flat and upright, with fingertip and nail impressions on the top and exterior edge and two adjacent lines of finger tip impression immediately below on the body; above the shoulder is a dark slip; below the shoulder the vessel is destroyed until 100mm above the base; some portions are burnt

10. PRN 218. F9. Ctx 247151. An almost complete bucket-shaped jar, 280mm tall, missing its base and a portion of the lower wall on one side; the rim is upright and flat, finger-pressed in top; there is a line of finger-pressing on the body 90mm below the rim

11. PRN 211. G4. Ctx 197100. A thick, irregular jar rim with lateral stick impressions across the top and an external slip coating

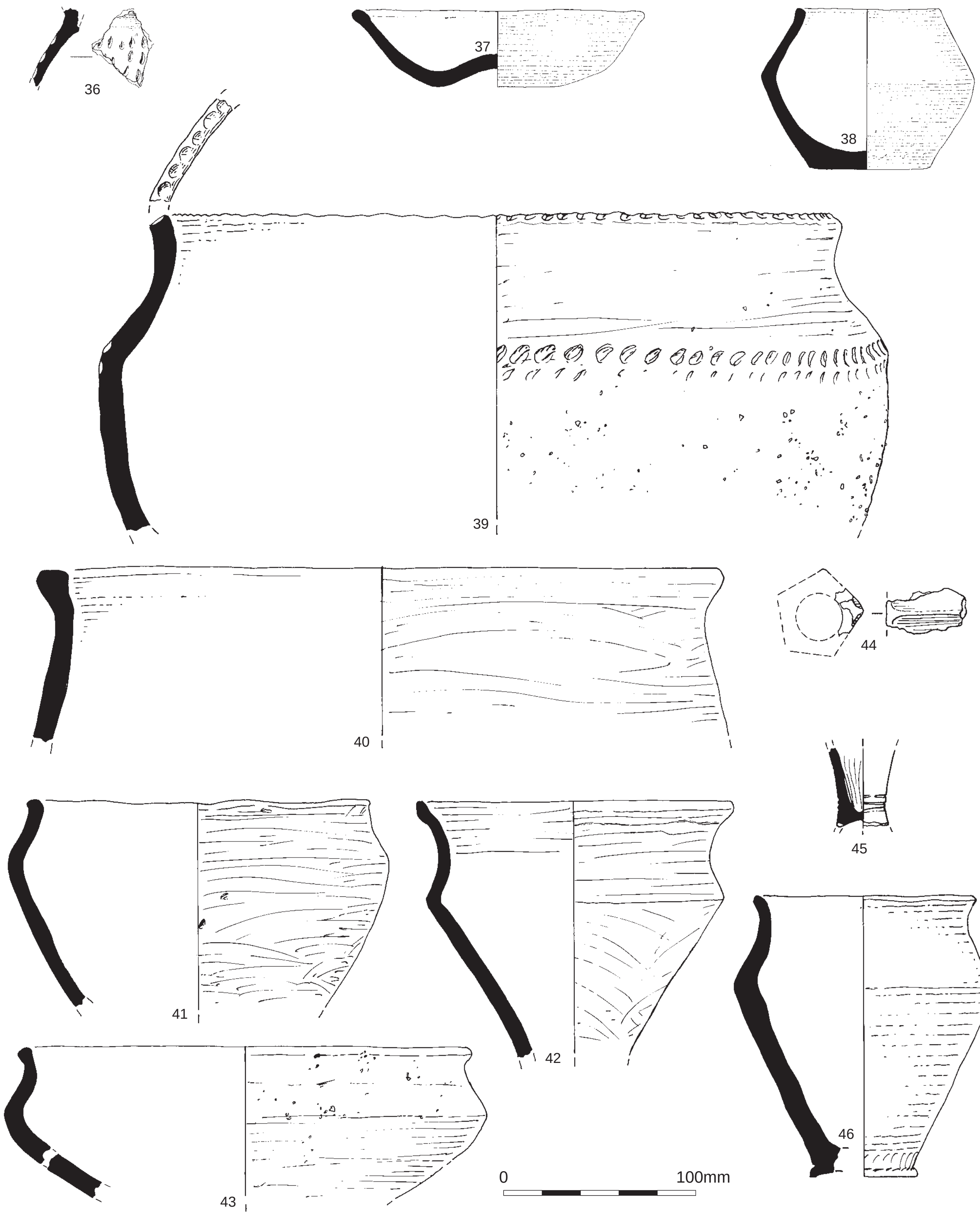


Fig 8.5 Early to Middle Iron Age pottery (nos 36-46)

12. PRN 213. F11. Ctx 197100. A globular bowl with a simple pointed out-turned rim, ring-stamped above and below a horizontal band of four or five horizontal tooled lines
13. PRN 214. F12. Ctx 197100. Two sherds from the shoulder of a bowl with circular stamps above and below tooled horizontal lines
14. PRN 1201. F12. Ctx 143268. An almost-complete small jar with a vertical wall above a slightly convex belly. The exterior is finger-smeared and the base gritted, but the vessel is otherwise featureless. The diam. at the mouth is 100mm
15. PRN 1205. G1. Ctx 143277. A fine vessel represented by two joining sherds with finger-pinched trefoil decoration below the 'shoulder'
16. PRN 1209. IG2. Ctx 145309. A flat topped, out-turned rim with an internal bevel and a row of impressed circles on the external surface, apparently from a large jar of Trevisker type

Earliest Iron Age

17. PRN 330. Q4. Ctx 177305. A small round-shouldered necked bowl

Early–Middle Iron Age

18. PRN 987. xFL1. Ctx 125054. Shouldered bowl, out-turned rim, very highly Burnished, sharp (but not angular) shoulder
19. PRN 991. xF1. Ctx 125054. High, sharp shouldered bowl with simple out-turned rim and narrow base with foot. Burnished exterior, smoothed interior
20. PRN 1000. xQF1. Ctx 125054. A sherd with incised/tooled lines externally
21. PRN 1008. xQ3. Ctx 130034. A high-shouldered jar with simple everted rim. Neck is shallow and shoulder weak, but rather well-marked. Below shoulder exterior is wiped vertically; on and above shoulder horizontally
22. PRN 1036. xQF1. Ctx 139046. A closed onion-shaped jar with flat upright rim on short neck. Burnished quite roughly
23. PRN 842. xF1. Ctx 168139. An onion-shaped vessel with proto-bead rim and rusticated exterior/wiped interior
24. PRN 843. F3. Ctx 168139. A large shallow bowl burnished inside and out
25. PRN 850. xQ2. Ctx 168140. A simple upright flat rim on convex-walled (?globular) jar with no neck; burnished inside and out; base flat with vestigial foot; 1 small sherd has parallel scoring
26. PRN 857. xQ1. Ctx 168141. A small shallow wide closed bowl with high round shoulder and simple rim burnished all over exterior (including base) and interior down to shoulder

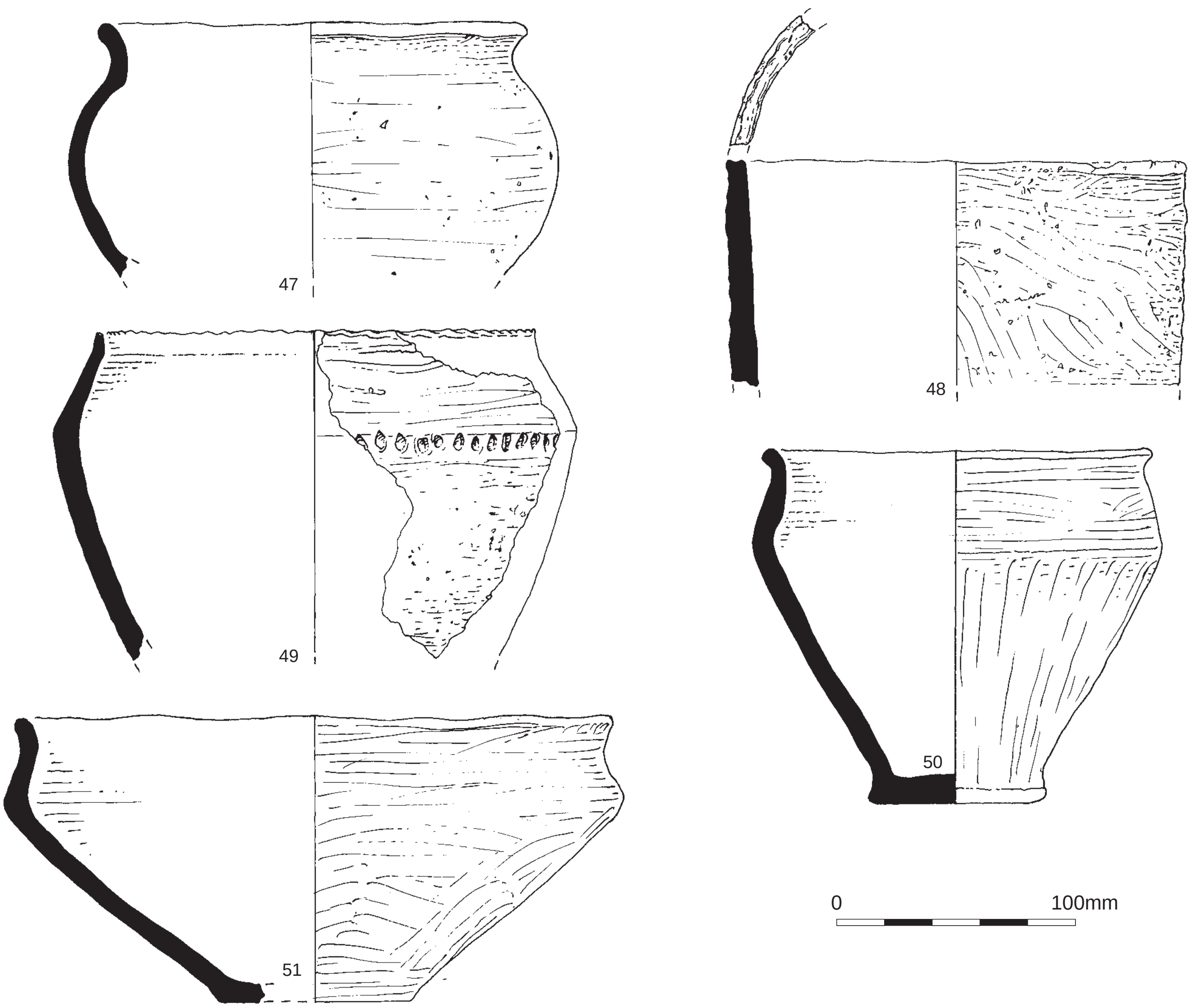


Fig 8.6 Middle Iron Age pottery (nos 47-51)

27. PRN 858. xF1. Ctx 168141. A large closed bowl, high gentle shoulder with vestigial burnish above
28. PRN 863. xQF1. Ctx 168141. A large bowl; angled shoulder with small portion of rim. Slip coated both surfaces, burnished exterior
29. PRN 905. xS1. Ctx 186099. A short upright quite facetted rim on angular high-shouldered jar. Above the shoulder is burnished and red finished, below the shoulder is rusticated. Flat base no foot
30. PRN 903. xQF1. Ctx 186099. A large jar, 'T'-shaped upright rim, slight shoulder, more heavily rusticated below (not smooth above), very heavy calcareous deposit on exterior. Light burnish inside
31. PRN 921. xF1. Ctx 187008. A shouldered vessel with short neck and simple rim. Below the shoulder is much more heavily gritted than above
32. PRN 925. xQ2. Ctx 187008. Large thick-walled jar with expanded flat-topped rim. Burnished externally
33. PRN 924. xQ2. Ctx 187008. Two joining sherds from a vessel with a band of decoration consisting of pulled up or applied clay 'droplets' in between two horizontal lines of fingertip and nail impression. The whole band seems to sit above (or below) a band with surface smoothing
34. PRN 926. xQ3. Ctx 191057. Two joining sherds from a flat-based vessel with a single tooled line low on the wall
35. PRN 977. xCQ1. Ctx 191063. A sharp-shouldered bowl with simple upright rim. Burnished exterior
36. Ctx 248060. A sherd with closely-spaced stab marks
37. Ctx 248060. Shallow saucer-like bowl; simple rim; omphalos base
38. Ctx 200066. A biconical vessel with the shoulder at the mid point. Rim absent and break ground smooth

Middle Iron Age

39. PRN 1069. xF1. Ctx 166010. The rim and shoulder of a closed shouldered jar. Rim and shoulder both with finger impressions. Very abraded. Rusticated below shoulder, smoothed in neck
40. PRN 1080. xQ2. Ctx 166010. S-profiled jar with expanded rim. Burnished exterior
41. PRN 1081. xF1. Ctx 166010. A tall bowl with a rounded slightly out-turned rim on a short neck above a shallow rounded shoulder
42. PRN 1061. xQF1. Ctx 166010. High-shouldered open jar with everted rim; exterior highly burnished
43. PRN 1062. xQ3. Ctx 166010. Bowl with simple everted rim on short neck; shoulder at the mid-point
44. PRN 1102. xCF1. Ctx 166011. An odd sherd with three surfaces at right angles – looks like the corner of a box or tray
45. PRN 1101. xG1. Ctx 166011. Part of a trimmed pedestal base with 3 tooled lines above
46. PRN 1087. xQ1. Ctx 166011. A short jar with everted pointed rim and high round shoulder, wall tapers to base with pronounced foot
47. PRN 888. xF1. Ctx 173189. A globular bowl with a short deep neck and out-turned rim. Burnished at least on the upper half externally
48. PRN 1143. xF1. Ctx 211044. Saucepan pot
49. PRN 1154. xQF1. Ctx 211052. High-shouldered bowl; short neck; simple pointed rim. Line of circular stabs below the shoulder
50. PRN 1220. xQF1. Ctx 166010. High-shouldered, short-necked narrow jar. Virtually complete. Burnished
51. PRN 1220. xQF1. Ctx 166010. High-shouldered, broad, low bowl. Interior burnish

Chapter 9

Later Prehistoric and Roman Pottery

by Rachael Seager Smith

Introduction

The pottery considered here spans the period from a rather loosely defined point in the Middle Iron Age (when the physical characteristics of the material change from those more diagnostic of the Early Iron Age to those of the Late Iron Age) through until the end of the Roman period (*c* AD 410). Overall, the assemblage amounts to 51,688 sherds, weighing 713.649kg. Its large size, wide chronological range and recovery from well-recorded contexts makes this material a major resource for understanding the chronological development of the settlements, their nature, status and economy as well as aspects of local, regional and international trade and exchange and the chronological development of the ceramics themselves.

Most of the pottery was recovered as bulk finds during the hand-excavation of archaeological features and deposits, although the assemblage also includes pieces from the greater than 5.6mm fraction of sieved environmental and artefact samples. A number of individually three-dimensionally recorded vessels, mostly more or less complete pots found in burials, are also included. However, the majority of later prehistoric and Roman deposits were relatively shallow, having been heavily truncated and damaged by ploughing. Stratification was limited to layers within isolated features (eg, pits, ditches and sunken-featured buildings) cut into the natural substrata. In some areas, especially in Zone 6, extensive residuality was apparent, resulting from the density of occupation and the continual re-working and re-deposition of material. Despite predicable variations by period, fabric and feature/deposit type, the overall condition of the assemblage is only moderate, with a mean sherd weight of 13.8g. A figure of between 10g and 20g is generally considered 'normal' for Late Iron Age and Roman assemblages across southern England, but within multi-period assemblages, it is highly unusual for the overall mean weight of the later prehistoric and Roman sherds to be lower than that of the earlier prehistoric as is the case at these sites (see Leivers, this vol.). Rates of fragmentation are high and featured sherds (rims and other pieces diagnostic of particular forms but excluding most bases) account for only *c* 10% of the sherds overall. Many of the rims were also broken at or above the neck/shoulder junction, hampering the precise identification of form. Wear patterns vary but the majority of pieces exhibit considerable surface abrasion and edge damage, resulting from a combination of taphonomic factors and post-depositional erosion.

Methods

The later prehistoric and Roman pottery assemblage has been subjected to a detailed scan, aimed at providing dating evidence to aid the stratigraphic analysis and at characterising the whole assemblage, providing basic quantified fabric and vessel form data conforming to minimum archive standards (Darling 1994, 3-5) and highlighting any unusual or interesting features (such as evidence of use or repair) as a foundation for future research.

All the sherds were examined on a context by context basis. With the exception of 1937 sherds (27.473kg) from Zone 13 which were spot-dated as a single group (designated 'Fabrics not examined') within each context, all the pieces were divided into fabric groups or broad ware categories based on predominant inclusion type, for example 'shelly wares', 'sandy fabrics'. Where appropriate, usually for the imported or regionally traded Roman wares, more specific fabric identifications have been used, for example 'Verulamium region whiteware', 'Dressel 20 amphora', 'Moselkeramik', cross-referenced to the National Fabric Reference Collection (Tomber and Dore 1998). Sherds were then quantified by number and weight (in grammes) within these fabric groups. At this stage, all the samian ware was separated out and sent to the specialist (J M Mills) for more detailed fabric and form identification and recording. All the samian ware from Zones 6 and 20, the two largest collections from sites along the route, and other vessels deliberately deposited in graves were fully recorded; sherds from all other area were scanned and recorded by fabric and form only. The samian ware information was later reincorporated into the main Access database so that the assemblage could be considered as a whole.

Within the more generalised fabric groups (eg, the grog-tempered, sandy grey and oxidised wares, in particular), no attempts were made to divide the sherds by chronological period based on fabric alone, as in the Canterbury Archaeological Trust's coding system (Macpherson-Grant *et al* 1995), or to assign pieces to particular sources within these groups, although information such as 'includes Canterbury sandy ware' or 'not from North Kent/South Essex – likely to be a local product' is included in a free-text comments field. The later prehistoric vessel forms were briefly described (eg, weakly-shouldered jar, jar with flat-topped rim) while standard type series (eg, Hawkes and Hull 1947 ('Cam' forms); Marsh and Tyers 1979; Thompson 1982; Pollard 1988; Monaghan 1987) were used to refer to the Roman vessel forms present in each fabric, quantified by the number of rims and, occasionally, other highly distinctive elements (eg, strainer bases, tazza frills, pedestal bases, spouts etc). Additional information, such as the condition of the sherds if exceptional, the presence of graffiti, stamps and residues, pre- or post- firing perforations or other evidence of use or repair, was also recorded where appropriate. Spot-dates were recorded, both for each fabric and for the context as a whole, while a subjective assessment of the intrinsic ceramic interest and perceived stratigraphic integrity of the context group was also made to highlight contexts considered potentially

Table 9.1 Quantification (number of sherds/weight in grammes) of the later prehistoric and Roman pottery by sherd date and zone. Mean weight shown to the nearest whole gramme

Zone	*Data*	*M/LIA*	*LIA*	*IA*	*LIA/ERo*	*ERo*	*MRo*	*LRo*	*Ro*	*Total*	*Mean wt.*
1	No	23	2	10	10	4	5	1	47	102	9
	Wt	262	58	48	128	19	22	2	383	922	
2	No	8	53	3					6	70	6
	Wt	26	356	5					20	407	
3	No	13	43	24	29	5			49	163	9
	Wt	183	469	83	229	184			372	1520	
4	No	676	60	20	78	40	21		31	926	10
	Wt	6586	480	57	934	670	230		368	9325	
5	No	14			1				4	19	4
	Wt	68			5				10	83	
6	No	3695	1034	4508	4724	3356	3337	547	2728	23929	13
	Wt	47079	12285	45896	58285	50199	53413	7994	41932	317083	
7	No	1239	236	15	104	62	97		221	1974	11
	Wt	10735	2514	131	887	1048	3268		3844	22427	
8	No	5	10	31	3	9	56		23	137	13
	Wt	14	41	416	15	49	954		352	1841	
9	No	5	3	19	3		9			39	12
	Wt	85	8	230	11		148			482	
10	No	654	218	27	689	1034	32	6	869	3529	16
	Wt	4748	2551	103	9865	17260	4416	784	16793	56520	
11	No	338	92	8	556	467	479		1458	3398	13
	Wt	2462	667	15	7065	6389	7613		19941	44152	
12	No	753	161	5	128	86	48	7	81	1269	11
	Wt	6529	1027	25	1169	721	2230	223	2179	14103	
13	No	259	1120	215	1088	2590	2		154	5428	17
	Wt	3420	23345	1862	13244	48137	14		2197	92219	
14	No	79	12	22	12	11	5	1	128	270	12
	Wt	434	43	168	182	78	57	36	2185	3183	
15	No			6						6	4
	Wt			24						24	
17	No	6	8		3					17	16
	Wt	40	167		64					271	
18	No	7	35			1	1		1	45	5
	Wt	12	220			9	1		1	243	
19	No	524	45	8	726	202	356	7	543	2411	15
	Wt	4270	546	68	8278	3344	6285	125	13168	36084	
20	No	17	3	1	24	304	3706	712	1787	6554	15
	Wt	272	26	28	229	4841	56424	10168	28386	100374	
21	No	70	3	16	4	6	94		72	265	10
	Wt	256	11	106	32	66	1465		739	2675	
22	No	65		1	3	50			15	134	8
	Wt	667		8	5	337			68	1085	
23	No	136	89			299	1		42	567	6
	Wt	1166	596			1233	29		268	3292	
24	No								1	1	-
	Wt								3	3	
26	No	99	10		40				4	153	3
	Wt	264	130		103				10	507	
29	No				5	41	69	2	113	230	17
	Wt				38	1201	1160	65	1503	3967	
Unass	No	31	1	4					6	42	16
	Wt	414	168	16					61	659	
Total no		8716	3238	4943	8230	8567	8318	1283	8380	51675	
Total wt		89992	45708	49289	100768	135785	137729	19397	134624	713292	
Mean wt		10	14	10	12	16	17	15	16	14	

suitable for further analysis by other researchers. All data is stored in a standard Wessex Archaeology Access database, linked to the stratigraphic information, but without reference to other material types.

Table 9.1 summarises the total quantities of pottery recovered from each Zone by chronological period, while Tables 9.2 (later prehistoric) and 9.4 (Latest Iron Age/Roman) provide a more detailed breakdown of the range of fabrics/ware types present, including the spot-dated only ('Fabrics not examined') sherds from Zone 13. In addition, a further 1105 unwashed sherds (5588g) from sieved environmental and artefact samples were rapidly scanned to establish the presence of any fabrics or vessel forms not present elsewhere within the collection. Most of these sherds derived from later prehistoric and Roman features in Zone 6 (1018 sherds, 5100g), with far smaller amounts from Zones 8 (53 pieces, 309g) and 26 (28 pieces, 67g) as well as other unlocated features/deposits elsewhere on the route (6 pieces, 112g). No significant additions to the assemblage were encountered, so these pieces were merely counted and weighed as a single group (designated 'unwashed, unrecorded sample sherds') within each context. As these pieces were not spot-dated, they have not been included in Tables 9.1-9.2 and 9.4.

Distribution

Tables 9.1-9.2 and 9.4 summarise the total quantities of pottery recovered from each Zone by chronological period, while the mean sherd weights (shown to the nearest whole gramme) provide a broad measure of the condition of the sherds. To the south, negligible quantities of later prehistoric and Roman pottery were recovered from the sites on the Ebbsfleet peninsula (Zones 1-3) where the main foci of activity lay within the earlier prehistoric and medieval periods.

Overall, approximately half the later prehistoric and Roman assemblage derived from the extensive and long-lived settlement lying at the neck of the Ebbsfleet Peninsula, within sight of Richborough (Zones 4-7). Trackways, enclosures, pits, wells and burials, round-houses and sunken-featured buildings were all identified here, the date range of activity lasting from at least the Late Bronze Age into the late Roman period. At some time probably around the middle of the 1st century BC, a substantial ditch, possibly associated with Caesar's expeditions in 55-54 BC, had been dug to enclose this strategically important area and a later ditch is conceivably associated with the Claudian invasion a century later. However, extensive mixing and residuality, resulting from the density of occupation and the continual re-working and re-deposition of material, was apparent within the ceramics of all periods from this area, and this has limited the significance of these groups. Further north, only a few stray sherds were found on Zones 8 and 9 on Cottington Hill, mostly from the upper fills of ditches.

Although activity on the Pegwell Bay/Cliffs End spur was dominated by earlier prehistoric monumental and funerary sites (Zones 12-16 and 29), the Middle Iron Age settlement on Foads Hill (Zone 13) clearly continued to be occupied through into the early Roman period. Overall, the Zone 13 assemblage represented 10% by sherd count and 13% by weight of the total and included the largest and best preserved groups of Late Iron Age (1st century BC) ceramics from the whole route. Continuation of this activity into the late 2nd century AD is further indicated by the assemblages from pits and at least three sunken-featured building. The pottery from Zones 10 and 11 on the Sevenscore scarp also indicated continued settlement and burial activity from the earlier prehistoric period into at least the late 2nd or early 3rd century AD, although late Roman ceramics were almost entirely absent. Nineteen complete or semi-complete vessels deliberately deposited in graves were included in the assemblage from this area, which may in part explain the higher than average mean sherd weight for the pieces from these zones. The sherds from these zones together formed 13% by sherd count, 14% by weight, of the total later prehistoric and Roman assemblage.

Elements of an Iron Age field system and three pits of late Saxon and early medieval date were the only features identified towards the top of the Sevenscore slope (Zones 17 and 18) and consequently very little pottery of the period considered here was recovered. At the eastern end of the Chalk Ridge, Iron Age and Roman settlement features, including at least five sunken-featured buildings spanning the entire Roman period, together with trackways and two cemeteries as well as two Saxon cemeteries and a hollow-way were identified on Thorne Hill (Zones 19 and 20), where significant concentrations of Iron Age and Roman features, and cemeteries of Roman and Saxon date were already known (Perkins 1985). The assemblage from Zones 19 and 20 accounted for 17% by sherd count, 19% by weight of all the later prehistoric and Roman pottery and included 54 vessels, now in various states of completeness, recovered from 27 graves. Only negligible quantities of later prehistoric and Roman pottery were recovered from the sites towards the western end of the ridge, on Laundry Hill (Zones 21 and 22) and Telegraph Hill (Zones 23-25) where the main focus of activity again lay outside the period under consideration here, in the earlier prehistoric (Late Neolithic-Bronze Age enclosures, funerary and monumental sites) and Saxon periods (cemetery).

Composition of the period assemblages

Later prehistoric (c 200–1 BC)

Despite significant advances (Macpherson-Grant 1991a; 1994, 248-9; Morris 2006, Couldrey 2007; Booth 2006, 5; Jones 2009) in the number of assemblages recovered from settlement sites, the chronological development of later prehistoric pottery in east Kent still requires much clarification (Champion 2011, 167-9). Recently, an independently dated ceramic type series has been established for the assemblage from the Bronze Age and earlier Iron Age domestic, mortuary and ceremonial site at Cliffs End Farm (McKinley *et al* forthcoming a) and it was initially expected that the material from the East Kent Access Road sites would provide an unrivalled opportunity to extend this sequence into the latter part of the Iron Age and beyond. Unfortunately, in the absence of stratigraphic sequences and/or useful associations with other datable objects, and given the extensively re-worked nature of many of the deposits, this has proved impossible. Even internal residues which would have provided suitable material for radiocarbon dating were found on a total of only 17 later prehistoric sherds, most occurring residually.

It is evident, however, that the long-established tradition of flint-tempered pottery continued throughout the second half of the first millennium BC, with gradually increasing quantities of grog-tempered and sandy wares from the Middle Iron Age onwards. Without diagnostic vessel forms, it has therefore

Table 9.2 Quantification (number of sherds/weight in grammes) of the late prehistoric fabrics by period and zone

	Zones											
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Middle/Late Iron Age												
Sand and flint	18/191	8/26	1/4	361/3328	8/35	2823/34273	629/6462	1/2	1/1	494/3397	254/1416	571/4208
Flint-tempered			12/179	134/1110		357/5972	309/1777	3/7	4/84	143/1255	64/934	160/2211
Sandy ware	4/38			175/2113	6/33	186/2247	103/1080	1/5		7/41	12/29	4/22
Grog-tempered ware				4/31		73/672	197/1414			2/3	3/21	
Sand, rare fine flint and grog	1/33			2/4		118/1669				6/43		
Shell-tempered						72/989				1/5		7/31
Fabrics not examined												
Grog and flint tempered						13/254				1/4		11/57
Sand and grog-tempered						18/381						
Grog and calcareous inclusions						10/429						
Sand/organics						10/65						
Flint and organic ware						9/80						
Igneous rock tempered							1/2				5/62	
Sand with fine shell						6/48						
Middle/Late Iron Age total	23/262	8/26	13/183	676/6586	14/68	3695/47079	1239/10735	5/14	5/85	654/4748	338/2462	753/6529
Late Iron Age												
Sand and flint			41/463	25/241		493/5667	98/1437			164/1666	46/258	57/367
Grog-tempered ware				13/112		124/1394	29/164		3/8	20/186	24/142	61/362
Sandy ware			1/5	12/60		202/1917	63/186	1/2		17/155	21/220	30/184
Fabrics not examined												
Flint-tempered		53/356		10/67		86/1237	41/704	9/39		13/501	1/47	
Sand, rare fine flint and grog	2/58					62/744						
Grog and flint tempered ware						2/21				1/3		13/114
Glauconitic sandstone-gritted			1/1			28/ 335	5/23					
Sand and grog-tempered						20/186						
Shell-tempered						12/240				3/40		
Dressel 1 amphora						3/531						
Flint and organic ware						2/13						
Late Iron Age total	2/58	53/356	43/469	60/480		1034/12285	236/2514	10/41	3/8	218/2551	92/667	161/1027
Iron Age												
Sand and flint	8/30	2/1	8/19	6/8		3714/37371	6/56	30/361	19/230	16/75	2/7	1/2
Flint-tempered	2/18		13/46	6/32		442/5241	9/75			11/28	5/6	
Sandy ware		1/4				108/639					1/2	3/3
Sand, rare fine flint and grog				6/6		83/984		1/55				
Shell-tempered						65/511						
Grog-tempered ware			1/3			19/149						
Flint and iron gritted						27/514						
Fabrics not examined												
Sand and grog-tempered						17/124						
Sand with fine shell						13/193						
Flint and organic ware				2/11		10/36						
Chalk tempered ware			2/15			7/118						1/20
Grog and calcareous inclusions						3/16						
Iron Age total	10/48	3/5	24/83	20/57		4508/45896	15/131	31/416	19/230	27/103	8/15	5/25
Later prehistoric total	35/368	64/387	80/735	756/7123	14/68	9237/105260	1490/13380	46/471	27/323	899/7402	438/3144	919/7581
	10g	6g	9g	9g	5g	11g	9g	10g	12g	8g	7g	8g

proved difficult to identify chronological differences within the fabrics used during the last centuries of the first millennium BC and approximately 51% of all the later prehistoric sherds (48% by weight) could only be assigned a Middle/Late Iron Age date (Table 9.2). A further 29% of the later prehistoric sherds (26% by weight; Table 9.2) were given a generalised 'Iron Age' date. These were predominantly found residually in the latest Iron Age and Roman features in Zone 6 and although including pieces spanning the whole of the Iron Age, they were recorded as a single group within each context mainly to provide an indication of the levels of residuality in this area. Overall, these residual, later prehistoric sherds accounted for 27% of the total number (25% by weight; 5543 sherds, 69552g) of pieces recovered from the latest Iron Age and Roman features. At 10g, mean sherd weights for the Middle/Late Iron Age and Iron Age sherds were below average for the assemblage as a whole, while rims were comparatively scarce, representing just 4%

						Zones						
13	*14*	*15*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*26*	*unass*	*Total No/Wt*
73/1202	22/113		6/40	7/12	394/3132	15/249	23/66	36/405	10/229	84/191	1/5	5840/58987
28/441	42/209				59/224	2/23	25/96	27/257	89/748	13/66	1/7	1472/15600
26/186	10/86				10/101		13/19	2/5		2/7	8/159	569/6171
4/36	5/26				38/294		8/71		5/52		21/243	360/2863
4/41												131/1790
1/117					14/339		1/4		26/68			122/1553
113/1204												113/1204
					9/180				6/69			40/564
10/193												28/574
												10/429
												10/65
												9/80
												6/64
												6/48
259/3420	79/434		6/40	7/12	524/4270	17/272	70/256	65/667	136/1166	99/264	31/414	8716/89992
12/68			2/27	25/151	24/306					2/107		989/10758
466/11279	10/29			8/65	16/180	2/13			31/69	8/23		815/14026
117/1853	1/12		1/4	2/4	3/25	1/13	3/11		13/62			488/4713
383/7487												383/7487
129/1993	1/2		5/136								1/168	349/5250
6/181												70/983
					2/35				45/465			63/638
												34/359
1/55												21/241
												15/280
6/429												9/960
												2/13
1120/23345	12/43		8/167	35/220	45/546	3/26	3/11		89/596	10/130	1/168	3238/45708
116/907	22/168	5/23			2/3			1/8			4/16	3962/39285
36/306		1/1					9/49					534/5802
37/460					6/65	1/28						157/1201
												90/1045
												65/511
6/14							7/57					33/223
												27/514
20/175												20/175
												17/124
												13/193
												12/47
												10/153
												3/16
215/1862	22/168	6/24			8/68	1/28	16/106	1/8			4/16	4943/49289
1594/28627	113/645	6/24	14/207	42/232	577/4884	21/326	89/373	66/675	225/1762	109/394	36/598	16897/184989
18g	6g	4g	15g	5g	8g	15g	4g	10g	8g	4g	16g	11g

of the sherds in both groups (compared with *c* 8% for the later prehistoric and Roman assemblage as a whole).

Middle/Late Iron Age (*c* 200–100/80 BC)

Despite these difficulties, certain patterns were apparent. Following on from the emergence of mixed-tempered fabrics during the Early/Middle Iron Age (Leivers, this vol.), the Middle/Late Iron Age assemblage was dominated by sand and flint-tempered fabrics (67% by sherd count), while flint alone accounted for just 17% of the sherds (Table 9.2). As in preceding periods, these fabrics varied so widely in terms of colour, degrees of hardness, size, frequency and range of inclusions, even within a single vessel, that individual fabric descriptions were more or less meaningless. Most, however, contained calcined off-white or grey flint, deliberately added as temper and probably obtained from the Upper Chalk. Sandy wares accounted for 6% of all the Middle/Late Iron Age sherds, while the grog-tempered wares, introduced to this part of Kent at some point during the Middle Iron Age (Morris 2006, 70) and certainly by *c* 120–100 BC (Couldrey 2007, 178), represented 4%, rising to 8% if grog is considered in combination with other inclusion types (sand, flint and/or calcareous inclusions). The precise composition and appearance of the grog-tempered wares also varied enormously, although most were soft to moderately hard and generally fired to dark colours. The mixed-temper fabrics never represented more than very minor components of the assemblage, but they clearly represent a fusion of styles between the "traditional" use of flint-tempering and the "new" grog and sand inclusions. Overall, the range of tempering agents and their mixtures are paralleled in other broadly contemporary assemblages in the region (eg, Morris 2006, 82-3; Couldrey 2007, 102-3, 176; Thompson 2007, 189-91; Jones 2009, 31-4, fabrics C1, S1, Q8, QG1). Only the small number of igneous rock-tempered sherds need to have been made outside the immediate locality (7–10km radius), although no direct evidence for manufacture or firing was encountered. However, as has already been pointed out (Stead and Rigby 1999, 29-31; Morris 2006, 75), the geology of northern France is very similar to that of Kent, making it extremely difficult to identify traded vessels from this region. Grog-temper, too, was extensively used in northern France during the second half of the first millennium BC, so imported vessels in these fabrics are similarly difficult to recognise, especially as cross-channel typological affinities were also strong (Pollard 1988, 30; Couldrey 2007, 167-70).

The igneous rock tempered sherds, then, represent the only definite traded wares belonging to this period. These fabrics are unusual in this region although, at first glance, they could be mistaken for flint-tempered wares. They probably derive from south-west England or a Continental source. The Middle/Late Iron Age pieces from Zone 11 included two from a single very coarse, hard, thick-walled oxidised vessel found in pit 155017 (context 155018) and ditch 159276 (context 155020) while the other three, including a small piece from a fine bowl/jar rim, were from ditch 159319 (context 123032). The sixth sherd, a small, plain body fragment, came from pit 244112 (context 244114) in Zone 7.

The vessel forms characteristic of the Middle/Late Iron Age period continue on from those of Middle Iron Age date; globular jars with simple upright or everted rims and ovoid or neutral profiled vessels with internally bevelled or externally expanded (proto-bead) rims (eg, Champion 2011, 167, fig 4.9). This latter form has its origins in the Middle Iron Age saucepan-pot continuum, although it was developed and used well into the Late Iron Age (Thompson 1982, 192, form C3). Small fragments from a number of the pre-'Belgic' Late Iron Age coarseware (flint- and sand and flint-tempered fabrics), jars with internally thickened, facetted rims like those from Barham Downs, Bridge Hill, the Castle Street/Stour Street area of Canterbury, Worth, and Highstead, Cottington Lane and Ozengell on Thanet (Macpherson-Grant 1991a, 43-5) were also noted, alongside gradually increasing numbers of new range of 'Belgic' style vessels (Thompson 1982, 4-5), such as higher-shouldered, more barrel-shaped bead rim jars (eg, Champion 2011, 168, fig 4.10). Bases were mostly simple, flat types although some were slightly externally-expanded and one or two low pedestal or footring bases (eg, Fig 9.3, no. 6) were also noted. Most vessels were hand-made. As in preceding periods, surface treatments varied widely in quality, although as a general rule, vessels were still better finished above the shoulder than below it. Surface roughening continued to be a common feature, especially on the larger forms, although the thick slurry applied in preceding periods had been replaced by a thin wash or by scratched, scored or combed surfaces. Burnishing, often of very high quality, was generally confined to jar rim/shoulder zones, the inside of bowl forms and both surfaces of a small number of fine, fairly thin-walled jars and bowls. Decoration was rare but a few vessels continued to have fingertip or nail impressions, while swirly, curvilinear burnished-line or tooled decoration was noted on jar sherds found, for example, in Iron Age ditch 190272 in Zone 4 (Fig 9.3, nos 2 and 8) and residually in mid-Roman sunken-featured building 130227 in Zone 6. Other forms of decoration included a row of impressed dots on a sand and flint-tempered body sherd from Middle or Late Iron Age ditch 249191 (segment 144168) in Zone 10, combinations of vertical burnished lines and horizontal grooves (eg, pieces from unphased pit 306015 in Zone 7 and Roman enclosure ditch 159219, segment 173001, in Zone 14) while a shell-tempered sherd from a thick-walled vessel found residually in mid-Roman deposit 258058 (context 126236) in Zone 6 was decorated with an irregular but finely-incised lattice motif. Two jar shoulder sherds showed traces of red-finish around/below the neck; one with grouped, burnished-line verticals beneath the red-finished band from mid-Roman pit 130243 and one with thick, dark brown painted diagonal lines beneath the red-finished zone from Late Iron Age or early Roman pit 164146, both in Zone 6.

Middle/Late Iron Age sherds were most commonly found in Zones 6 and 7 (Table 9.1; 56% by count, 64% by weight, of all the sherds of this date) with smaller quantities from Zones 12 and 13 (11% by count and weight), indicating a continuation of these settlements through into the later prehistoric periods. However, overall, only 29% of the Middle/Late Iron Age sherds (26% by weight; 2482 sherds, 22892g) were recovered from features considered to be of Middle or Late Iron Age date and over the whole route, only 18 features contained more than 50 sherds belonging within this period. Moreover, 13 of these groups occurred residually in later features (eg, sunken-featured buildings 130227 and 170135, midden 170028 and ditch 170116 in Zone 6 and ditches 201101, 249185 and 190190 in Zones 7, 10 and 12) and/or were insecurely stratified (cobbled surface 126275, colluvium 170010 and tertiary deposit 258058 in Zone 6, cobbled surface 287046 in Zone 7, colluvium 126015 in Zone 12 and periglacial feature 126280 in Zone 19).

The group from Iron Age ditch 190272 in Zone 4 (381 sherds, 4213g; Fig 9.3, nos 1-9) does, however, provide some indication of the character of the 2nd to 1st centuries BC assemblages, although it included a significant residual element in flint-tempered fabrics of Late Bronze Age/Early Iron Age to Middle Iron Age date (50 sherds, 389g; 13% by sherd count, 10% by weight), as well as two (13g) intrusive Roman sherds. The Middle/Late Iron Age assemblage, then, consisted of 329 sherds, 3811g. Just over half of these (172 sherds, 2066g) derived from a single upright, flat-topped rim jar in an unaltered sandy fabric (Fig 9.3, no. 1) found in segment 144142, the only other sandy ware sherd present being a decorated body (Fig 9.3, no. 2) from segment 252173 of the ditch. Sand and flint-tempered wares (135 pieces, 1490g) comprised a further 41% of the sherds; rims included pieces from at least four jars (Fig 9.3, nos 3-5 and 7), with plain or burnished surfaces, as well as a small piece from a jar with a slightly everted rim (not illus.), a footed base from a closed form, recessed underneath (Fig 9.3, no. 6), and a decorated body sherd (Fig 9.3, no. 8). The flint-tempered wares (21 sherds, 237g), mostly containing very fine flint, included a round-shouldered necked jar rim (Fig 9.3, no. 9), and pieces from a low pedestal/high footring base and a flat jar-type base.

In Zone 6, 74 broadly contemporary sherds (511g) were recovered from the backfill of Middle or Late Iron Age grave 292075. These were dominated by plain bodies in sand and flint-tempered fabrics (54 pieces, 393g), although some could be of Early/Middle Iron Age date and residual here, as well as nine pieces (67g), including a single fineware bowl rim, a body sherd from a carinated bowl and a flat, jar-type base fragment in sand, flint and grog-tempered fabrics and two plain bodies (21g) in flint-tempered ware. The remainder, nine unwashed pieces (30g) from a sample, were not recorded in detail but the low mean sherd weight (7g) and paucity of featured sherds limit the extent to which this group can be considered characteristic of the period as a whole. Similarly, the scarcity of diagnostic sherds amongst the groups from pit 164113 in Zone 13 (64 sherds, 565g), the backfill of Middle or Late Iron Age grave 126214 in Zone 19 (54 sherds, 627g) and the Middle/Late Iron Age ring-ditch terminus 198111 in Zone 23 (60 sherds, 509g), mean that these groups cannot be closely dated and do not warrant illustration.

Late Iron Age (*c* 100/80–1 BC)

The Late Iron Age, here defined (loosely) as the 1st century BC, witnessed a continuing reliance on locally produced ceramics. In line with both local and national trends, a steady decline in the importance of flint as a tempering material is apparent, in favour of the sandy and grog-tempered fabrics. During this period, the sand and flint-tempered wares represent 30%, and those tempered with flint alone just 11%, of the total number of sherds, while the grog-tempered wares had risen in importance to 25% of the assemblage by sherd count (Table 9.2). The frequency of sandy wares (12% by sherd count), may relate to the ceramic style zone postulated for the Deal/Folkestone area (Thompson 1982, 14-15), where such fabrics are common although sandy fabrics are also known from early deposits in Canterbury and Birchington Minis Bay (Pollard 1995, 600).

The range of minor, mixed-tempered fabrics remained largely unchanged from those seen during the preceding century or so, but a small number of sherds containing glauconitic sand were also recognised. This new fabric, not seen amongst the earlier Iron Age assemblages, comprised pieces, generally dark grey in colour, containing rounded quartz, glauconitic sandstone lumps up to 3mm across as well as loose glauconitic sand, <0.5mm across, either together or separately, sometimes with fine flint inclusions. Glauconitic wares can be paralleled in similarly small amounts at Highstead (Couldrey 2007, 102-3, fabrics 21 and 29), Bigberry hillfort (Thompson 1983, 250) and at sites such as Beechbrook Wood and Saltwood Tunnel towards the south-eastern end of the High Speed 1 route (Morris 2006, 48 and 50) but were clearly never common in this part of east Kent. Couldrey (2007, 168) has suggested the Bullhead flint which outcrops in an east-west alignment below the crest of the Chalk Ridge in the vicinity of Zones 11-17, as a potentially suitable source but it is possible that these wares were not made locally. Similar glauconite-rich fabrics form key elements of Middle and Late Iron Age assemblages from sites to the east of the Medway (Thompson 1982, 11, map 2), for example, and at least some of the vessels may have been imported from this region. In Thanet, however, use of this fabric seems to have ceased during the first half of the 1st century AD, although evidence from the High Speed 1 sites, especially those in the central part of the route, indicates its continuation well into the early Roman period (Booth 2009, 5; 2011, 249).

Dressel 1 wine amphora form only 1% by sherd count (2% by weight) of all amphora recovered from the East Kent Access Road sites but provide clear evidence for cross-channel contact during the 1st century BC, perhaps resulting from relationships forged after Caesar's expedition in 54 BC (Arthur 1986, 257). Most were made in the slightly calcareous Italian fabric but there was only one featured sherd, a handle fragment from just below the bend, found alongside other Late Iron Age coarsewares in late Roman pit 302036 in Zone 6. This piece is most likely to be from a Dressel 1B form, made from the end of the first quarter of the 1st century BC until the last decade of the century (Peacock and Williams 1986, 90). Identification of the remaining body sherds as Dressel 1 is more tentative, largely based on their condition and the date of associated sherds, as similar fabrics continued to be used for later forms (eg, Dressel 2-4) into the middle of the 2nd century AD. Notwithstanding this, the Dressel 1 sherds seem far less common than at Highstead, for example, where they represented 10% of the total number of amphora sherds (Arthur 2007, 237), but broadly comparable with their frequency at Canterbury where they represent 2.5% by weight of the sherds (Arthur 1986, 240). Just one Dressel 1 handle fragment was found at Bigberry (Thompson 1983, 265).

Vessel forms in the four main Late Iron Age coarseware fabrics predominantly conform to the standard range seen in the area (Thompson 2007, 191) and clearly fall within the classic 'Aylesford-Swarling' style of the second half of the 1st century BC and first half of the 1st century AD (Cunliffe 1991, 132-33). Forms consist of pedestal urns, usually represented by bases only, necked, cordoned jars, jars and a smaller range of bowls with rippled or corrugated shoulders, bead rim jars in a wide range of sizes, small, plain everted rim jars and a variety of larger, necked or bead-rimmed storage jars (Thompson 1982, types A, B1-1, B2-1, B2-2, D2-4, C1-2, C3, C2-2, C6-1). Although initially hand-made, later tournetted or wheel-turned examples were noted in this assemblage; surface treatments continued to be dominated by scratched or scored exterior surfaces, while burnishing became increasingly common. Decoration continued to be rare, even the use of cordons, corrugations and furrowed decoration appearing far less frequently than on the high-quality vessels from graves which provided the definition of the 'Aylesford-Swarling' style. This may well reflect the different nature of the 'everyday' assemblages recovered from settlement sites, especially those of small size and rural nature, compared with the 'outstanding' vessels deliberately chosen for deposition in graves, although chronology may also be of some relevance, the Late Iron Age vessels considered here mainly falling with the first half of the chronological range of this style.

The range of forms present amongst the minor, hybrid fabrics was not dissimilar, although the sand and flint-tempered wares also included single examples of a straight-sided jar with a flared rim (Fig 9.5, no. 32; cf. Couldrey 2007, 183, fig 101, 6), probably of 1st century BC date, and a thick-walled lid (Fig 9.5, no. 33). Diagnostic forms amongst the glauconitic sandy wares were limited to rims from three vessels; a round-shouldered, upright-rimmed jar (Fig 9.5, no. 34), an upright-necked jar, found residually in mid-Roman sunken-featured building 130227) and an internally-thickened, upright-rimmed jar from the primary fill of early Roman ditch 190492, all in Zone 6. Pedestal base fragments in the sand and flint-tempered, glauconitic and shell-tempered fabrics suggest that all these wares conformed to the distinctive styles characteristic of the 1st century BC.

Sherds of Late Iron Age date were recovered from 422 contexts in 322 features, most commonly in Zones 6 (174 features), 7 (27 features), 12 (26 features) and 13 (19 features). Most, however, occurred in very small groups, only eight features (ditches 201080 and 201136 in Zone 7, ditch 135056 in Zone 10, enclosure ditch 134099 and pits 156146, 156166 and 203056 in Zone 13 and ring-ditch 195004 in Zone 23) containing concentrations of more than 50 sherds of this date. Rims represented approximately 6.5% of all the sherds of this date (*c* 225 examples), but practically, many of the smaller groups assigned to this period were dated on the absence of anything more diagnostically early or late, and overall only 26% of the Late Iron Age sherds (33% by weight; 863 pieces, 15,023g) were recovered from contemporary phased features, rising to 42% by sherd count (41% by weight; 1376 sherds, 18,904g) if those from Middle/Late Iron Age and Late Iron Age/early Roman features are included too. The most significant 1st century BC groups derive from Zone 13, reflected in their high mean sherd weight (20.8g, compared with figures of 6-12g for Late Iron Age sherds from other zones along the route).

The single largest group was from pit 156146 which yielded 555 sherds, weighing 13,777g. Although numerous inter-and intra- context joins were noted, most were between freshly broken sherds, so the assemblage has been treated as a single group. In general, the fabrics were hard and well-fired, the pieces surviving in very good condition, with a high (25g) mean sherd weight but some surface discolouration (black pieces joining others with orange or grey colouration) which may be indicative of low-level burning or other post-depositional factors. A small but significant residual element is present with this group, represented by worn sherds in sand and flint-tempered fabrics (75 pieces, 1438g; 13% by sherd count) mostly of Early/Middle Iron Age date, but overall the assemblage has an overwhelming predominance of grog-tempered sherds (63% by sherd count; 351 pieces, 9605g). Belgic style sandy and flint-tempered wares occurred in approximately equal quantities (60 sherds, 1407g and 59 sherds, 992g respectively); these were mostly used for finely-made, thin-walled vessels with smoothed or burnished surfaces. Other fabrics comprise sand, fine flint and grog tempered wares (6 sherds; 181g) and four pieces (154g) of Dressel 1 amphora, suggestive of a late 1st century BC date. Rims from approximately 40 vessels were recognised; jars predominated in all fabrics (Fig 9.4, nos 10-12, 14-22, 24-30), most being wheel-thrown, although some handmade vessels were also noted and at least three of the vessels were decorated (Fig 9.4, nos 17, 21 and 29). Combing and other forms of surface roughening remained common on the larger forms in all fabrics, although some of the smaller vessels were extremely well-burnished with glossy black, highly reflective surfaces, sometimes associated with wide, shallow grooves (eg, Fig 9.4, no. 25) and rippled (eg, Fig 9.4, no. 22) or cordoned surfaces.

The assemblage from pit 156166 (97 sherds, 2853g) was also dominated by grog-tempered fabrics, with a smaller range of sand and flint-tempered and sandy wares, while earlier Iron Age residual sherds represented approximately 14% of the total by sherd count. Forms of Late Iron Age date were comparable with those from pit 156146, comprising at least four bead rim jars, four small, plain jars with upright and slightly everted rims, a jar with a corrugated everted rim (Thompson 1982, B2-1) and a round-shouldered, externally combed jar with an upright, internally thickened rim as well as a jar shoulder sherd with curvilinear burnished-line decoration. Conversely, the assemblage from pit 203056 (97 sherds, 1014g), was dominated by sandy wares (48 sherds, 234g), although only one rim, from an upright-necked jar, occurred in these fabrics. Eighteen sherds (290g) from a single flint-tempered jar/bowl decorated with curvilinear burnished lines surrounding three finger-tip impressions (Fig 9.5, no. 31) were also found in this feature but grog-tempered wares, including a fragment from a hooked bead rim jar, were far less common (12% by sherd count; 12 sherds, 201g) than in the other two pits of this date. Rims from two other Late Iron Age upright-necked jars were included among sand and flint-tempered (3 sherds, 16g) fabrics, while the remainder of the assemblage comprised residual Early/Middle Iron Age pieces (16% of the total by sherd count), including a single rim fragment from an ovoid jar.

Early Iron Age enclosure ditch 134099 in Zone 13 also contained a significant number of Late Iron Age sherds (396 sherds, 6386g), including two pieces of Dressel 1 amphora, but, as befitting mixed, frequently reworked ditch deposits, most occurred in contexts alongside greater quantities of earlier, Iron Age and later, Roman material. Sand and flint-tempered fabrics overwhelmingly dominated the sherds from Late Iron Age or Early Roman ditch 135056 in Zone 10, forming 71% of the total by sherd count although only 59% by weight as, even excluding the residual Neolithic (8 sherds, 3g) and Middle/Late Iron Age sherds (16 pieces, 212g), the mean sherd weight for this group was only average (12.6g). Rims were poorly represented among the sand and flint-tempered wares, however, comprising only two rims from round shouldered, upright-necked jars and one from a well-burnished bead rim jar/bowl. The remainder of the assemblage was made up from 11 (476g) flint-tempered sherds, including a rim from a large upright-necked jar, six grog-tempered (51g) and three shell-tempered (40g) body sherds as well as a rim from a small proto-bead rim jar and seven joining sherds from a low, hard-fired, well-finished pedestal base in sandy wares (8 sherds, 89g). The smaller concentrations of Late Iron Age sherds in ditches 201080 and 201136 in Zone 7 (56 sherds, 1473g and 51 sherds, 112g respectively) occurred residually while those (56 sherds, 526g) from Late Bronze Age ring-ditch 195004 in Zone 23 were found in the upper fills, indicating that it had almost completely filled by this time.

Iron Age

As noted above, the sherds assigned a generalised Iron Age date were largely residual and span the whole of the Iron Age. The majority consist of plain body or other poorly diagnostic pieces, often in comparatively poor condition. Overall, the mean sherd weight was just 9.9g (Table 9.1) and rims (*c* 181 examples) represent approximately 4% of this group by sherd count although most were small, representing less than 5% of the diameter, and/or broken at or above the neck/shoulder junction if any. The range of fabrics and vessel forms is entirely consistent with the later prehistoric assemblage as a whole and these broadly dated sherds will not be discussed in detail here. A limited number of pieces are, however, of intrinsic interest. One of these, an omphalos base fragment made in a fine sandy fabric found on trackway 249061 (context 128090) in Zone 20, may derive from a wide-mouthed, rounded cup (cf Thompson 1982, 389, type E2-4), a form rooted in the Late Bronze Age/Early Iron Age traditions of southern Britain and northern France. Although the form of the parent vessels remains uncertain, five other omphalos bases from the route of the East Kent Access Road, all in sandy or sand and flint-tempered fabrics, span the period from the Early or Middle Iron Age (eg, pit 173275, Zone 6) to the middle of the 1st century AD, examples being found in Late Iron Age/early Roman ditch 190515 and, residually, in the mid-Roman tertiary deposit 258058 in Zone 6. However, the straight-sided Middle Iron Age dish with an omphalos base (Leivers this vol; Fig 8.5, no. 37), again in sand and fine flint-tempered fabric and from Early or Middle Iron Age pit 248058 in Zone 13, provides an interesting, early addition to the range of vessels with omphalos bases known from east Kent. The rim of this vessel is rim not dissimilar to the form F19 and F20 vessels from Highstead (Couldrey 2007, 105); other bowls with omphalos bases have also been found at Bigberry, at least one occurring in a 3rd–2nd century BC context (Thompson 1983, 261, fig 10, 8 and 11). By the middle decades of the 1st century BC, however, similar bases are also found on cups (Thompson 1982, 389, type E2-4) and, particularly in the Folkestone area, on grog-tempered jars with distinctive burnished zones and incised curvilinear decoration, perhaps indicating a fusion of styles between the eastern Atrebates of Sussex (decoration) and the Belgae of Kent (grogged fabric) (Macpherson-Grant and Thompson 1991, 46).

Evidence for use, re-use and repair

Few of the later prehistoric sherds exhibited any particular evidence for use, re-use or repair. Internal sooty residues were noted on only 17 sherds, although it is unclear whether this reflects changes in cooking methods or merely the poorer condition of the later prehistoric material compared with that of earlier periods. Most sooted sherds were plain bodies, occurring either residually or in contexts also containing intrusive, later pottery. The only diagnostic pieces were a rim from a slightly shouldered, upright-rimmed jar from mid-Roman ditch 170050 in Zone 6 and two joining sherds from a thick-walled lid from Late Iron Age or early Roman ditch 201042 in Zone 26, both in sand and flint-tempered fabrics and likely to be of Late Iron Age date.

Abraded use-wear, as if the piece had been used as a grinder or smoother, was noted on the underside of a flat, flint-tempered jar base of Middle/Late Iron Age date recovered from Iron Age pit 269152 in Zone 6. A sandy ware jar-type base sherd from Late Iron Age pit 156146 in Zone 13 had been deliberately trimmed to form a thick, flat disc perhaps for use as a lid, counter or weight. Two other sand and flint-tempered base sherds had post-firing perforations, probably related to the preparation of the vessel for some sort of change of use. One, a low footring base from mid-Roman pit 130243 in Zone 6, had part of just one small perforation surviving, although there may originally have been several others. The second (ON 877), a Late Iron Age sand and flint-tempered dished pedestal base with a single oval perforation (*c* 5-7mm across) drilled through the centre of the base, came from the colluvium (layer 170010) in Zone 6. Such perforations are comparatively well-known in later contexts across southern England, traditionally associated with the production of cheese (Harding 1974, 88) although vessels modified in this way could have been used for a wide variety of domestic, industrial and even ritual purposes (see Fulford and Timby 2001 for detailed discussion).

Three rim sherds were also noted to have small (up to *c* 5mm across), post-firing perforations drilled through their necks. These comprised a large, necked storage jar sherd in a coarsely flint-tempered fabric probably of Middle/Late Iron Age date, from colluviual layer 170010, a Late Iron Age grog-tempered everted rim jar with a rippled shoulder (Thompson 1982, 117, type B2-1) from Iron Age posthole 156117 in Zone 13 and a simple, rounded rim from a grog-tempered, undifferentiated vessel of Iron Age date found residually in late Roman waterhole 247100 in Zone 6. These perforations probably represent the repair of the vessels using metal staples or leather thongs, a practice more commonly noted in Roman contexts, although unfortunately not enough of either vessel survived to show how the perforated pieces related to those around them.

In addition to six examples of earlier prehistoric date (Leivers this vol.) 10 of the later prehistoric vessels had been repaired with thick, dark greyish brown or black adhesive substances. In one or two instances, the joined sherds were still firmly fixed together but evidence of these repairs mostly survived as thick, resinous deposits, with dull or glossy lustres, sometimes with a melted or bubbly appearance, surviving on the broken edges of sherds and/or along the margins of the break, where the semi-liquid glue had spread onto the adjacent surfaces as the broken sherds were pushed together during the repair process. Some of these deposits adhered well while others were relatively flaky and easily detached (and would therefore be destroyed by activities such as finds washing or storing sherds together in plastic bags). All the repairs made in this way were to coarseware vessels, summarised by period and fabric in Table 9.3.

One was found in Zone 13 (Middle Iron Age round shouldered bowl in a sand and flint-tempered fabric, from Middle Iron Age pit 166009) but all the others were from Zone 6. The earliest, a large flint-tempered tripartite jar with a long, concave neck and finger-tip decoration, had tentative evidence (flecks of adhesive on the broken edges and staining on adjacent surfaces) for a glued repair along part of two horizontal coil joins mid-way down the vessel wall. This vessel came from Early or Middle Iron Age ditch 302123, although it is probably of Late Bronze Age/Early Iron Age date. Where it could be determined, most of the repairs seemed to be to jars, including a sand and flint-tempered ovoid (almost-globular) jar from Early or Middle Iron Age pit 173275 and three upright-rimmed and one flat-topped rim forms of Middle/Late Iron Age and generalised Iron Age dates. A Middle Iron Age sand, flint and grog-tempered carinated bowl from contemporary pit 262167 was the only other recognisable form with a glued repair.

Increasing numbers of glue-repaired pots are now known from sites spread widely across south-eastern Britain, particularly in Kent, although, to date, the practice is more commonly associated with Roman vessels (Marter Brown and Seager Smith 2012, 5). Similar repairs of Late Iron Age date are, however, known from the Cottington Hill/Ebbsfleet Lane area of

Table 9.3 Prehistoric glued repairs, number of examples by fabric and period

Ware	*Late Bronze Age/ Early Iron Age*	*Early/Middle Iron Age*	*Middle Iron Age*	*Middle/Late Iron Age*	*Iron Age*	*Total*
Flint-tempered	1	1		2		4
Sand and flint tempered		1	2	4	3	10
Sand, fine flint and grog			1			1
Sandy ware				1		1
Total	1	2	3	7	3	16

the Weatherlees-Margate-Broadstairs wastewater pipeline route (Jones 2009 online archive report, 25) and on Iron Age horse harness fittings from Wetwang, East Yorkshire (Stacey 2004). Iron Age pottery vessels actually used in the production and storage of adhesive materials have also been identified within the assemblage from Grand Aunay, France (Regert *et al* 2003). Although not undertaken here, chemical and/or elemental analysis has consistently identified birch bark tar, produced by heating birch bar to temperatures in excess of 300/400°, as the principal ingredient of these adhesives (eg, Charters *et al* 1993; Stacey 2004; Wicks and Shillito 2009), sometimes mixed with other materials such as beeswax (Regert *et al* 2003), animal fat (Dudd and Evershed 1999) or clay (English 2005), perhaps to serve as plasticisers and/or binding agents. Although not numerous within the East Kent Access Road assemblages, the significance of prehistoric glue-repaired vessels lies in the evidence they provide for the care and curation of 'everyday' ceramics extending back into the Late Bronze Age/Early Iron Age at least in this part of Kent, although the reasons why certain vessels were considered worthy of repair while the majority were simply discarded remain obscure. Although probably growing in the vicinity (although no direct evidence was recovered amongst the plant remains), no physical evidence for processing birch bark was recovered during these excavations.

Latest Iron Age/Roman

The date range of the material discussed in this section extends from around 1 BC until the end of the Roman period. Overall, 34,778 sherds (528,303g) belonging within this period were examined (Tables 9.1 and 9.4), occurring most frequently in Zones 6 and 13. Unusually for this region (cf Savage 2008, 156; Booth 2009, 4), there appears to be some overlap of activity with the earlier (Iron Age) sequences within Zones 6, 7, 10, 11, 12, 13, 19 and 23 but in most cases, limited sherd numbers and/or continued problems of residuality, especially amongst the numerically largest groups from Zones 6 and 7, have masked much of the detail, and only the large, well-preserved sherds from Zone 13 provide clear evidence for continued settlement. At the other end of the scale, most of the site assemblages appear to have terminated by the middle of the 3rd century AD, although the ceramic evidence has permitted the identification of discrete late Roman settlement features and burials in two locations on the route (Zones 6 and 20) and in burials alone in Zone 10.

Although writing of central southern England, Fulford's thesis that:

> "…there are no clear boundaries between Iron Age and Roman in south-eastern Britain. Distinctive, Roman material culture, mostly imported from Gaul or the Mediterranean world, is particularly evident from the last quarter of the 1st century BC, when a variety of manufactured goods and other commodities, particularly ceramics and decorative metalwork, flows into the south east from across the Channel. On the other hand distinctive, local fabrics and wares that are dated from the later 1st century BC continue to be manufactured well after the Roman conquest into the later 1st century AD. In material culture terms, therefore, there is little to distinguish a later 1st century BC 'pre-Roman' settlement from a later 1st century AD, early 'Roman' settlement." (Fulford 2010, 3)

holds no less true for this part of Kent. Although a very small number of imported wares do mark this transitional period, the Roman military campaigns of 55-54 BC and AD 43 onwards had little effect on the local ceramics of Thanet. Fabrics of Middle–Late Iron Age character (tempered with flint and/or sand) continued to be made and used alongside the grog-tempered wares characteristic of the east Kent 'Belgic' ceramic style zone (Thompson 1982, 12-14; Pollard 1988, 30-32) well into the early Roman period. Although these native-type flint and/or sand tempered wares probably did not last much beyond AD 70 (Booth 2009, 7), the use of grog continued in this area almost throughout the Roman period. These grog-tempered fabrics dominated the assemblage from Westhawk Farm, Ashford, for example, throughout the life of the settlement (mid 1st to mid-3rd century AD (Lyne 2008, 207)) and after perhaps a brief demise in the late 3rd or early 4th century, re-emerged in the handmade grog-tempered wares characteristic of the late 4th and early 5th centuries over much of southern England. Without associations with more Romanised forms and fabrics, it has proved difficult, if not impossible to reliably distinguish between many of the pre- and post-conquest coarsewares, especially those in sandy and grog-tempered fabrics, and it is for this reason that the latest Iron Age material has been considered alongside the Roman.

Latest Iron Age/early Roman

These mixed, Latest Iron Age/early Roman assemblages predominately date to the first half of the 1st century AD, spilling into the period up to *c* AD 70. Grog-tempered wares predominated, accounting for 39% by sherd count, 41% by weight, of all the pieces belonging to this period (Table 9.5). Fabrics varied from relatively soft, soapy, wares to conspicuously hard-fired pieces, the latter perhaps related to those found at Canterbury (Thompson 2007, 191). Most were dark brown or dark grey in colour, but a small number of pieces were made in fabrics with orange or brown surfaces and dark grey-brown cores, visually akin to the Patchgrove wares (Ward-Perkins 1939, 176-8) of west Kent although it is unlikely that they represent anything but local products. The grog inclusions were generally moderate to abundant; mica occurred naturally within the clay and, continuing on from the preceding periods, a small number of pieces containing grog together with sand, flint and/or calcareous inclusions were noted. Some of

Table 9.4 Quantification (number of sherds/weight in grammes) of all the Latest Iron Age/Roman pottery by fabric type and zone

Ware	*Data*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
South Gaulish samian	No.				2		81	1			23
	Wt.				7		585	3			210
Central Gaulish samian – Lezoux	No.	4			6		225	7	1		1
	Wt.	18			86		2367	86	3		1
Central Gaulish samian – Les Martres	No.						8				
	Wt.						133				
East Gaulish samian	No.						7				
	Wt.						60				
East Gaulish samian - Argonne	No.						6				
	Wt.						70				
East Gaulish samian – Rheinzabern	No.						8				
	Wt.						132				
East Gaulish samian - Trier	No.						20	1			
	Wt.						201	25			
Argonne roller-stamped ware	No.						2				
	Wt.						16				
Samian	No.			2			1				
	Wt.			25			9				
Colchester samian	No.						1	1			
	Wt.						2	20			
Terra rubra	No.						12				1
	Wt.						63				18
Lyons colour-coated ware	No.						1				2
	Wt.						4				3
Central Gaulish colour coated ware	No.						22				
	Wt.						83				
Pompeian red ware	No.						2				
	Wt.						9				
Terra Nigra	No.						18				
	Wt.						230				
Argonne colour-coated ware	No.						4	5			1
	Wt.						22	34			1
African red slipped ware	No.						1				
	Wt.						6				
Cologne colour-coated ware	No.						3				
	Wt.						13				
Central Gaulish black slipped ware	No.						3				
	Wt.						5				
Moselkeramik	No.						1				
	Wt.						2				
Dressel 20 amphora	No.			1			128	18			120
	Wt.			92			10663	1032			7523
North African amphora	No.						20				
	Wt.						550				
Other amphora	No.						16				
	Wt.						976				
Cam 186 amphora	No.						3				4
	Wt.						67				912
Gallic amphora	No.						10				
	Wt.						488				
Campanian black sand amphora	No.						2				
	Wt.						42				
London 555 amphora	No.						1				
	Wt.						110				
Dressel 2-4	No.						2				
	Wt.						126				
Furrowed-rim amphora	No.										
	Wt.										
Richborough 527	No.						1				
	Wt.						331				
Haltern 70/Cam 185	No.						1				
	Wt.						67				

11	*12*	*13*	*14*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*26*	*29*	*Unass*	*Total*
21	6	24	3			2	21	1							185
166	27	150	12			5	114	27							1306
35	3	2	5		1	14	381	11		1			7		704
430	44	14	57		1	1001	5574	42		29			109		9862
							3								11
							35								168
							7								14
							141								201
							5								11
							205								275
							26						1		35
							327						5		464
							5						1		27
							181						133		540
							1								3
							8								24
															3
															34
1															3
27															49
20															33
256															337
															3
															7
2	2														26
2	7														92
															2
															9
9		4				1									32
95		50				8									383
1															11
4															61
															1
															6
							2						1		6
							141						2		156
							3								6
							15								20
	2						6								9
	2						18								22
24	3	3	17			270	118	2					4		708
1834	654	647	890			10508	10934	134					519		45430
							1								21
							77								627
	2														18
	182														1158
3															10
250															1229
															10
															488
	5						1								8
	225						4								271
							2								3
							151								261
															2
															126
							2								2
							114								114
															1
															331
															1
															67

Table 9.4 (continued)

Ware	*Data*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
North Gaulish mortaria	No.						10				2
	Wt.						614				68
Massif Central mortaria	No.			1			1				
	Wt.			159			14				
Rhenish whiteware mortaria	No.							18			
	Wt.							688			
Verulamium whiteware mortaria	No.						1	1			
	Wt.						37	81			
Canterbury/Kent mortaria	No.						6	4			
	Wt.						223	465			
Colchester mortaria	No.						2				
	Wt.						302				
Unassigned mortaria	No.						14	2			
	Wt.						225	12			
Oxon colour coated ware mortaria	No.						5				
	Wt.						89				
Oxon whiteware mortaria	No.						12				
	Wt.						299				
Fine greyware	No.	5		3	6	1	802	34	15		166
	Wt.	11		19	41	1	6711	212	251		2060
Mica-dusted ware	No.						2				
	Wt.						2				
Marbled ware	No.										
	Wt.										
Ring and dot beaker fabric	No.						2				
	Wt.						9				
Nene Valley colour-coated ware	No.						4				
	Wt.						117				
New Forest colour-coated ware	No.						1				
	Wt.						11				
Oxon colour-coated ware	No.	1					42				5
	Wt.	2					711				342
Red-slipped ware	No.						5	1			
	Wt.						27	7			
Unassigned colour-coated ware	No.	1					11				
	Wt.	1					55				
Oxidised ware	No.	12		8	1	3	936	37	7		238
	Wt.	106		37	3	9	10350	473	51		1388
White slipped red ware	No.						178	5	1		19
	Wt.						1912	59	11		160
Whiteware	No.				3		107	3			5
	Wt.				41		1394	22			108
North Gaulish whiteware	No.						42	13			15
	Wt.						1444	180			169
Verulamium-region whiteware	No.						5				1
	Wt.						86				6
Hadham oxidised ware	No.										
	Wt.										
Oxon whiteware	No.						6				
	Wt.						165				
Grog-tempered ware	No.	21	5	43	67		5275	165	38	5	1002
	Wt.	166	18	295	1235		86292	2491	671	102	19047
Greyware	No.	19	1	19	30		3137	91	26	5	440
	Wt.	210	2	87	264		39766	2418	368	49	9582
Sandy ware	No.			3	48	1	1388	45	2	2	556
	Wt.			6	445	5	15036	318	8	8	6608
Sand and flint	No.	2			1		1378	9	1		10
	Wt.	16			42		15885	45	7		75
Flint-tempered	No.				3		184	14			15
	Wt.				16		3331	215			274
Shell-tempered	No.				1		144	2			2
	Wt.				14		2842	37			76
Sand, rare fine flint and grog	No.			1	1		152				1
	Wt.			52	4		2080				45

11	*12*	*13*	*14*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*26*	*29*	*Unass*	*Total*
		1					8	3							24
		48					435	25							1190
1							1								4
10							87								270
							3						1		22
							46						25		759
															2
															118
24							15	1					1		51
846							926	34					52		2546
															2
															302
							4								20
							168								405
							6								11
							83								172
							6						1		19
							196						59		554
666	18	17	3			42	1043	26	34	3			62	1	2947
4921	233	78	14			730	7815	115	102	3			804	5	24126
							10								12
							77								79
							3								3
							29								29
															2
															9
							7								11
							35								152
						7	1								9
						125	8								144
	2						54						1		105
	83						525						6		1669
			1				2								9
			36				18								88
1	2	1					2								18
2	5	9					9								81
200	24	22	9			95	482	9	11	2		3	25	1	2125
1693	876	196	63			384	5144	34	34	2		4	192	13	21052
76	2	15	1			2	108			15					422
1755	11	275	1			267	1490			58					5999
93	42	12					31	1				2	4	1	304
2075	2080	226					221	5				8	34	3	6217
49			1				39	1							160
576			14				561	10							2954
						1	7								14
						507	58								657
							11								11
							73								73
							2								8
							10								175
1007	163	977	14	2		1222	1919	93	14	18		9	38	2	12099
17133	1335	18720	220	12		14115	36472	1613	245	182		19	500	33	200916
312	30	1094	95		1	43	2057	25		4	1	1	77	1	7709
4335	505	21056	1080		1	2562	23975	236		23	3	6	1477	7	108012
341	40	22	7	1	1	131	3	1	3				5		2600
3386	322	210	135	52	9	926	48	3	5				38		27568
12	2	1	1			3	2	2		299		29			1752
98	23	92	16			59	32	24		1233		76			17723
2		207					10								435
20		2707					102								6665
60	1	1				1	70		5				1		288
1094	1	17				3	1650		15				12		5761
		3					11								169
		41					1038								3260

Table 9.4 (continued)

Ware	*Data*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Sand and grog-tempered	No.						136				
	Wt.						2666				
South-east Dorset Black Burnished ware	No.						31	7			1
	Wt.						422	124			442
Grog and calcareous inclusions	No.	2		2	1		63				
	Wt.	24		13	4		1094				
Fabrics not examined	No.										
	Wt.										
Total	No.	67	6	83	170	5	14692	484	91	12	2630
	Wt.	554	20	785	2202	15	211823	9047	1370	159	49118

Table 9.5 Quantification (number of sherds/weight in grammes) of the Latest Iron Age/early Roman fabrics by zone

					Zone				
Ware	*Data*	*1*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Grog-tempered ware	No.	6	23	21		1654	35		1
	Wt.	88	158	382		21912	300		3
Sandy ware	No.		3	48	1	1242	45	2	2
	Wt.		6	445	5	13017	318	8	8
Sand and flint	No.	2		1		1289	9	1	
	Wt.	16		42		14718	45	7	
Flint-tempered	No.			3		184	14		
	Wt.			16		3331	215		
Fabrics not examined	No.								
	Wt.								
Sand, rare fine flint and grog	No.		1	1		148			
	Wt.		52	4		2050			
Whiteware	No.			3		41	1		
	Wt.			41		310	9		
Sand and grog-tempered	No.					70			
	Wt.					1029			
Terra rubra	No.					12			
	Wt.					63			
Shell-tempered	No.					30			
	Wt.					607			
Grog and calcareous inclusions	No.	2	2	1		26			
	Wt.	24	13	4		348			
Terra nigra	No.					11			
	Wt.					157			
Greyware	No.					16			
	Wt.					714			
Campanian black sand amphora	No.					2			
	Wt.					42			
Amphora	No.								
	Wt.								
Oxidised ware	No.					2			
	Wt.					30			
Total No.		10	29	78	1	4727	104	3	3
Total Wt.		128	229	934	5	58328	887	15	11

these pieces could be residual while others are likely to be contemporary variants; some of those containing sand and grog, for example, may derive from the Stuppington Lane kiln, on the outskirts of Canterbury (Bennett *et al* 1980).

The sandy fabrics represented a further 27% by sherd count, 22% by weight, of the pottery belonging to this Latest Iron Age/early Roman period. Although including both hand-made and wheel-thrown examples, these wares tended to be softer, thicker-walled and fired in the dark brown-grey-black colour range than the harder fired, more 'Romanised' greywares of later periods. By this time, the flint-tempered and sand and fine flint-tempered wares tended to be used for finer, thinner-walled and harder fired vessels than their Iron Age predecessors, but, at 22% by sherd count, and weight, these wares still formed a significant proportion of the assemblage.

A similar range of forms was present in all these fabrics and although most were wheel-made or at least wheel-finished, hand-made forms were represented too.

11	12	13	14	17	18	19	20	21	22	23	24	26	29	Unass	Total
		5													141
		267													2933
	3						29		1						72
	89						519		9						1605
															68
															1135
		1421													1421
		18607													18607
2960	350	3834	157	3	3	1834	6530	176	68	342	1	44	230	6	34778
41008	6522	63592	2538	64	11	31200	99889	2302	410	1530	3	113	3967	61	528303

						Zone						
10	11	12	13	14	17	19	20	21	22	26	29	Total
224	171	82	456	4	2	599	8	1		9		3296
4207	1941	630	5138	31	12	7431	43	5		19		42300
437	257	38	22	7	1	123	3	1	3		5	2240
5243	2647	287	210	135	52	780	48	3	5		38	23255
9	11	2	1	1		3	2	2		29		1362
69	89	23	92	16		59	32	24		76		15308
15	2		207				10					435
274	20		2707				102					6665
			412									412
			5161									5161
1			2									153
45			12									2163
2	87	1	12							2		149
9	2026	4	226							8		2633
												70
												1029
1	20											33
18	256											337
			1									31
			17									624
												31
												389
	8		4			1						24
	86		50			8						301
												16
												714
		5					1					8
		225					4					271
			2									2
			182									182
												2
												30
689	556	128	1119	12	3	726	24	4	3	40	5	8264
9865	7065	1169	13795	182	64	8278	229	32	5	103	38	101362

Jar forms predominated, especially the necked, often cordoned (Thompson 1982, types B1-1, B1-2, B1-3, B1-4, B2-1, B2-2, B2-3, B3-8) and bead rimmed (types C1-2, C3, C4, C5-1, C7-3) types initiated during the Middle/Late Iron Age. Necked, cordoned bowls (types D1-1, D1-4, D2-3, D3-3), storage jars (type C1-6) and a small number of lids were also used while other, less common forms emphasise the increased cross-channel contacts available at this time. These included imitation Gallo-Belgic platters (types G1-1, G1-4, G1-5, G1-6, G1-7, G1-11), bowls (type G2-3), cups (type G3-1) and butt beakers (type G5-5 and G5-6) as well as a few pedestalled vessels (types A8, F3-4), most represented by bases only. A large handled jar or flagon (Vol 1, Fig 9.4, no. 29) in an orange-surfaced grog-tempered fabric was also found in grave 126195 in Zone 19.

The few shell-tempered wares are almost certainly from local, if currently unknown sources, the inclusions, sometimes including small quantities of sand, being more 'blocky' and consisting of a different range of species than those imported from the north Kent/south Essex marshes during the later 1st and early 2nd century AD. Vessel forms in these wares, which were found only in Zones 6 (30 sherds, 607g) and 13 (1 sherd, 17g), were limited to four rims from an upright-rimmed jar and three bead rim jars. Although unsourced, the 16 greyware sherds all derive from a single, large (190mm diameter), thick, externally expanded jar base made in a very fine-grained, grey micaceous fabric, unique in the assemblage. This vessel was found alone in an isolated post-hole (303173) in Zone 6; on-site spot-dating suggested a date of between 75 BC and AD 75 for this vessel.

Early imports included wine amphora from the Mediterranean region and Gallo-Belgic wares (Terra Rubra, Terra Nigra and whitewares) from northern Gaul. Together, the imports represented approximately 3% by sherd count, 4% by weight, of the pieces belonging within this period, although many were found residually in later contexts. While conforming to the standard range of products seen in early contexts in Canterbury and Richborough, imported wares seem better represented than at other rural sites in the Thanet area, perhaps emphasising the relatively high levels of cross-channel contact, especially within Zone 6. Green recorded 100 early Gaulish and other imported fineware sherds plus a few amphora from Highstead (2007, 238-9, tables 21 and 22) while a mere handful of pieces, all probably residual, occurred at Monkton although only very limited 1st century AD activity was recorded at this site (Savage 2008, 161).

Pieces from at least two Campanian black sand amphora were found in Zone 12 (Late Iron Age/early Roman ditch 190160 and early Roman ditch 268001), and residually, in mid-Roman pit 250071 in Zone 20. Although featureless, these pieces probably derive from Dressel 1sp or 2-4 vessels of 1st century BC – 1st century AD date (Peacock and Williams 1986, classes 3, 4 or 10), both of which were predominantly used to carry Italian wine. Two joining sherds from the rim and upper part of one handle of a Dressel 1/Pascual 1 form made in Peacock and Williams fabric 2 (*ibid,* 95) were found amongst the material filling early Roman sunken-featured building 193140 in Zone 13. These vessels, which also carried wine, were made from *c* 50 BC until at least AD 79, although most examples in the Western Empire are of Augustan date (*ibid,* 94).

Although the whitewares were united by their pale firing colour (white, pink, light orange, brown and grey), the texture of these wares varied from smooth and almost inclusion-free to very fine sandy fabrics. Most were probably imported from northern Gaul (Stead and Rigby 1989, 137), arriving during the first half of the 1st century AD into the early Flavian period (Symonds and Wade 1999, 472). Butt beakers (Cam 113) were the most common form; rims from at least five vessels were identified, together with at least 14 recognisable body sherds. However, these vessels were also made at centres such as Colchester (Hawkes and Hull 1947, 238-9; Symonds and Wade 1999, 473) and Verulamium (Davies *et al* 1994, 184), the fabrics being virtually indistinguishable amongst this non-standardised group. Other beakers include a globular-bodied form with a flared, red-painted rim and barbotine herringbone decoration on its body (Cam 114; Fig 9.6, no. 35). A small beaker body sherd in a smooth, white, fine-grained fabric, found residually in mid-Roman pit 130243 in Zone 6, was also decorated with self-coloured barbotine trails and is likely to be from a similar vessel. Both these vessels can be best paralleled by beakers made in the Marne-Vesle potteries between *c* AD 10 and AD 50 (Stead and Rigby 1989, 134-6, fig 54, type GB 25), their fabrics being far too fine for the British copies made at Verulamium in the period after AD 70, for instance. A thicker-walled body sherd in a very smooth, almost inclusion-free white fabric, from early Roman ditch 190444 (context 278194) in Zone 6, was decorated with a red-painted eye motif with a star forming its pupil/iris (Fig 9.7, no. 63), and may also be an import, although the form of its parent vessel remains uncertain. Flagons were also included amongst the whiteware group, most represented by body, handle and base fragments only. Two very fine, bright white 'pipeclay' Hofheim-type flagon rims, perhaps from the same vessel and probably of Tiberio-Claudian date, were found in the backfill of grave 147255 in Zone 4 and an unlocated layer 182276.

The Terra Rubra included rims from three Cam 5 platters, a form standardised before 10 BC and out of production by *c* AD 40 (Stead and Rigby 1989, fig 54, GB 6), although most of the sherds in this fabric were found residually in later contexts. Two of the Cam 5 rims (from mid-Roman layer 258058 in Zone 6 and Roman pit 42036 in Zone 10), were made in TR fabric 1A, dated to *c* 15 BC-AD 25 at King Harry Lane (*ibid,* 121), while the third (early Roman ditch 170148 in Zone 6), was in fabric TR 1C, dated to *c* AD 1–60 (*ibid,* 126). Only one piece of the earlier (15 BC-AD 15) TR 1B, a plain platter body sherd found in early Roman ditch 240067 in Zone 6, was recognised.

A small fragment from a flared rim beaker made in the fine, virtually inclusion free, red fabric with the fumed surfaces typical of TR 3 was found in mid-Roman pit 130237. The form of this vessel could not be more closely identified, but Stead and Rigby's types GB 21-4 (1989, fig 54), are all possibilities and of late Augustan date. Four other beaker bodies, all in TR3 dated to *c* AD 1-65, were found in early Roman pits 218241 and 245137 and ditch 170116 and in mid-Roman layer 258058 in Zone 6.

Early Terra Nigra forms from the Marne-Vesle potteries included a body sherd from a Cam 56 cup, found in early Roman sunken-featured building 191125 in Zone 13, a Cam 5A platter rim from early Roman ditch 170129 in Zone 6 and three pieces probably from a single Cam 8 platter from the backfills of early Roman sunken-featured building 139140. These forms spanned the period from *c* AD 9/10-65 but in Britain the Cam 8 form, in particular, tends to be of Claudio-Neronian date (*c* AD 40-65). Although perhaps marginally later in date (*c* AD 45–75), one small piece of black egg-shell Terra Nigra, probably from a beaker, from early Roman pit 264204 in Zone 6, has also been included in this group.

Roman imported finewares

After the conquest, imported finewares continued to form a minor component of the ceramic assemblage, together accounting for just 4% of all the Roman sherds (3% by weight; Table 9.4). Samian ware was overwhelmingly dominant within this group; all the other imported finewares totalling just 72 sherds, 455g. Although infrequent, these wares conform to the standard range seen at other sites in the region (Green 2007, table 26; Savage 2008, table 2/4).

Samian ware *by J M Mills*

with a note on the Black Samian by Rachael Seager Smith

The majority of the samian came from the main Southern and Central Gaulish production centres, La Graufesenque (18% by sherd count) and Lezoux (71% by sherd count) (Table 9.4), while three pieces of British samian, probably from Colchester, were also identified. Fewer vessels came from Eastern Gaul, from the kilns at Argonne, Rheinzabern and Trier. These represent 9% of the samian assemblage by sherd count, a far greater proportion than that seen at either Highstead (Green 2007, 216) or Monkton (Savage 2008, 157). Overall, the date range of the assemblage extends from the later 1st century AD through to the middle of the 3rd century, although production at some of the Argonne kilns continued without interruption from the Antonine period into the 4th century AD, with much the same fabrics used for different forms; two examples of these later products were identified. In general, the usual, well-documented fluctuations in supply to Britain (Marsh 1981, fig 11.15) are apparent.

Most of the samian survived in good condition with comparatively little surface erosion although some pieces, in particular the complete vessels deposited in graves in Zones 19 and 20, were coated with limescale accretions. The average sherd weight for the samian was 13g (personal observations by the author suggest an average weight of 6-7g is more typical of material from heavily reworked deposits). In all, 27 sherds were stamped (see catalogue for details); these included three too incomplete to be fully identified, three rosette stamps and two mould maker's stamps, both of Cinnamus ii (Hartley and Dickinson 2008b, 22-31, die 5b; AD 145-175). The decorated wares were generally reduced to small sherds, and only 41 pieces had sufficient decoration surviving to merit description and the identification of the potter/workshop (see the catalogue of decorated sherds). Unless otherwise stated, all the form numbers refer to Dragendorff's type series.

South Gaul

All of the South Gaulish samian is likely to have been produced at La Graufesenque. There are no sherds which pre-date the conquest and just one, a fragment from a dish base, stamped by Crestio and dated to AD 45-55 (Stamp cat no 2), which spans the conquest period. It was found in Late Iron Age/early Roman ditch 170137 in Zone 6. In general, the range of pre- or early Flavian samian is small but includes examples of forms 24/25, 15/17, 15/17R, 27g, 29, and a few form 18 dishes with early features. A plain bowl, perhaps a variant of Ritterling 8, was also identified; four sherds (0.16EVEs) were recovered from early Roman ditch 279028 in Zone 20. One stamped piece, a form 27g cup stamped by Vitalis from early Roman ditch 159314 in Zone 11 (Stamp cat no 10), may belong within this period, although Vitalis is known to have worked as late as AD 80. The majority of the South Gaulish samian, however, is probably Flavian. Forms introduced around AD 70 include examples of bowl forms 35 and 37 and Curle 11, although none were present in great quantity. Only three other pieces from Southern Gaul were stamped; a form 18 dish stamped by S_Verius (Stamp cat no 3), a dish (Stamp cat no 4) and a rosette stamped cup (Stamp cat no 8), all from Zone 6.

Central Gaul

The short-lived Les Martres-de-Veyre kilns exported samian to Britain during the first quarter of the 2nd century AD, and although far smaller quantities reached our shores, these vessels played in important role in fulfilling British demand for samian after the demise of the La Graufesenque industry around AD 110. This early 2nd century drop in the quantity of samian is matched on nearly all British sites (Marsh 1981). The Les Martres-de-Veyre sherds from Zone 6 included form 18/31 body sherds, a single cup base stamped by Ioenalis (Stamp cat no 5), a form 37 bowl sherd with only the top of the ovolo row surviving and a body sherd from a bowl in Igocatus' style (Decorated sherds cat no 6). The vessels from Zone 20 were limited to two form 18/31 dishes and a single form 37 bowl rim with just the ovolo surviving.

The vast majority of samian came from the Central Gaulish kilns of Lezoux. Twenty-one stamps were identified (Stamp cat nos 1, 6, 7, 9, 11-27). Nine more or less complete vessels survived, found as grave offerings in Zones 19 (graves 153060, 166082 and 220099) and 20 (graves 182241, 198300, 215193 and 215199). One of these, a form 33 cup stamped by Doccius ii (Stamp cat. no. 9; AD 160–200? (Hartley and Dickinson 2008b, 291-293)) was found alongside a rare handled beaker of Déchelette form 74 with applied decoration, in the so-called 'black samian' fabric as well as a small globular-bodied flask or flagon in a British oxidised ware fabric in grave 215193.

The Déchelette form 74 beaker was highly fragmentary (50 sherds, 110g) and only the lower half had survived. It was made in a fine, oxidised (pale orange) fabric with a light grey core and a good quality dark brown/black slip on both sides although finger-marks are apparent in the slip around the exterior of the base. The lower part of the vessel is rouletted and the two surviving applied plaques are equally spaced between the handle stumps on one side of the vessel, suggesting that it originally had four. As the surviving plaques both carry the same figure of Perseus (O.193A; shown naked except for a cloak over both shoulders and hanging between his legs, facing to the left with his left knee raised and both arms bent to his chest, where he is perhaps unsheathing a short sword/dagger/gladius),

Table 9.6 Zone 20 samian ware summarised by vessel form and fabric

Form	*SG*	*Les M*	*CG (Lezoux)*	*Argonne*	*?EG*	*Rz*	*Trier*	*Late Argonne*
?Ritt 8	1							
15/17R	1							
15/17 or 18								
18	4							
18/31		2	5					
18/31R			4	3				
18/31 or 31			3					
18/31R or 31R			7					
31			28					
31R			26					
31 or 31R			1					
27	1		5					
29	2							
30	1							
30 or 37			1					
33			20			4		
35	3							
36			3		2	2		
37	1	1	37		1	3		
38			4		1	2		
40			1					
43						1		
45			2					
Mortaria			1	1			1	
46			2			1		
33 or 46			1					
Curle 23			1			1		
Lud Sa/31						2	2	
Lud Sb/31R						1	3	
Lud Sa/Sb				1				
Walters 79			3					
Walters 79R			1					
Walters 81			1					
Chenet 320								1
Cup			5			1		
Dish			9			1		
Dish/bowl	1		22					
Bowl			9			2		
Flanged bowl			2					
Jar/beaker						1		
Closed form						1		
Platter	2							
Unidentified	2		48					
Total	19	3	252	5	4	23	6	1

it is probable that all four were originally the same. The O.193A poinçon is listed by Rogers (1999) as having been used by Maccira (*c* AD 140-160), Laxtucissa (*c* AD 145–170), Censorinus (*c* AD 160-180) and Iullinus (*c* AD 180-200) rather than any of the three potters most commonly credited with the manufacture of these black samian vessels (Libertus, Butrio and Paternus II; Simpson 1957, 32). Rogers' listing, however, does not preclude the use of the same poinçons by other potters, and there are known links between Laxtucissa and Paternus II (*c* AD 160/165-195/200?) who may have shared this poinçon, while the work of Libertus (mainly Trajanic), Butrio (mainly Hadrianic) and Paternus II indicates that they shared many poincons as well as the production of this specialist vessel type. Finds of 'black samian' are rare in Britain, in the region of 120 vessels of all types (commonly beakers of Déch 64, 66, 68, 72 and 74 and Drag 40 handled bowls) being listed by Simpson (1957; 1973) and Willis (2005, appendix 6.2) and of these, only 23 are considered to derive from the handled Déch 74 form. Local finds of 'black samian' include beaker sherds from Richborough (Bushe-Fox 1928, 59, pl.xxviii, 8; 1949, 159-60, pl.lxix, 328) and part of a Drag 40 from Canterbury (Bird 1982, 92).

A wide range of Central Gaulish forms (27, 33, 35 and 46 cups, shallow bowls/dishes of Curle 23 and forms 18/31, 18/31R, 31, 31R and 36, form 45 mortaria and bowl forms 37 and 38), date from the Hadrianic period through to the end of the 2nd century AD. A measure which can be used to demonstrate the chronological weighting of an assemblage of 2nd century AD material examines the proportions of forms which were in production in the earlier part of the century relative to those in production in the latter decades. Cup form 27, for example, ceased to be produced around AD 160 whereas form 33, the straight-sided cup, was available throughout the century. Similarly, the production of form 18/31 dishes and their rouletted counterparts, form 18/31R, ceased around AD 160 and while the form 31 bowls emerged as a development of the 18/31 dishes during the early Antonine period, the rouletted versions, 31R, were not introduced until perhaps as late as AD 165. Only the assemblage from Zone 20, however, was sufficiently large to make these comparisons viable. Here (Table 9.7), the form 33 cups outnumbered those of form 27 by 4:1 and the later dishes (forms 31 and 31R) were far more frequent than the earlier ones by around 6:1, implying a clear later bias to the collection. Other forms introduced in the mid- to late Antonine period and present among the Zone 20 assemblage included Walters 79 and 79R dishes, and mortaria. In general, the decorated wares survived only as comparatively small sherds with few surviving details. Few could be assigned to a particular workshop but, of the 12 pieces with

Table 9.7 Relative quantities of 2nd century AD Central Gaulish samian vessels (number of examples shown)

Dragendorff form	*No.*
27	5
33	20
18/31	5
18/31R	4
18/31 or 31	3
18/31R or 31R	7
31	28
31R	26
31 or 31R	1

Table 9.8 Zone 6 samian ware summarised by vessel form and fabric

Form	*SG*	*Les M*	*CG (Lezoux)*	*?CG/EG*	*?EG*	*Rz*	*Trier*	*Late Argonne*	*?Colchester*
15/17	2								
24/25	1								
15/17 or 18	4								
18	14								
?18	1								
18R	1								
18 or 18R	1								
18 or 18/31	1		1						
18/31		2	8						
18/31R			2						
18/31 or 31			1						
18/31R or 31R			5						
31			3						
31R			4		1				
27	10	1	9						
27g	2								
29	2								
30			2						
30?	1								
30 or 37			1						
33			18		1	2	1		
35	3								
36			2						
35 or 36			1						
37	5	2	29		1	1	1		
38			1						
42 (D1)			1						
45			1		1		2		
Mortaria			3	2	1		1		
46	1								
33 or 46			2						
Curle 11	1		1						
Curle 15?			2						
Lud Sa/31						1	1		
Lud Sb/31R						1	4		
Walters 79			1						
Walters 80			1						
Walters 81			1						
Chenet 313								1	
Cup	2	1	7						
Cup/dish	1								
Dish	8		21	1		1			
Dish/bowl	1		13			1			1
Bowl	1		111				1		
Jar			1						
Unidentified	7	1	25				9		
Total	69	7	180	3	5	7	20	1	1

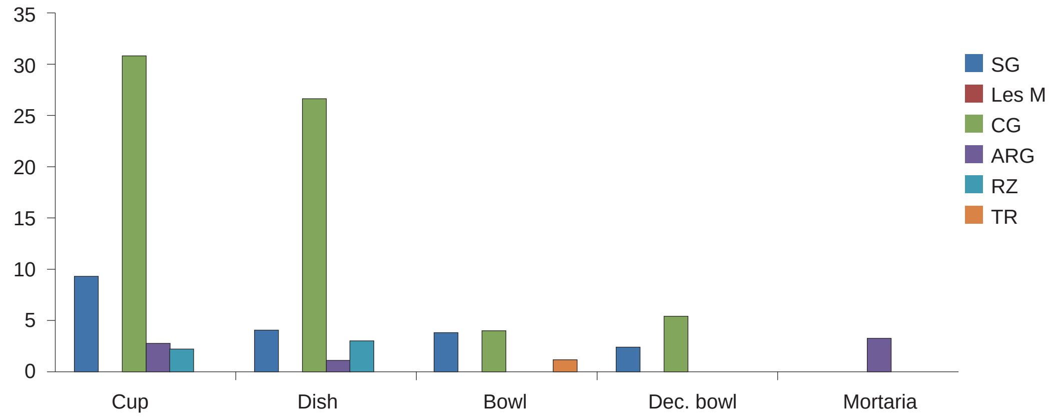


Fig 9.1 Samian ware from Zone 6: vessel class correlated with fabric as a percentage of the total EVEs (EVEs = 6.07)

enough decoration to warrant description, three or four were in the style of Paternus II while one was in the Servus IV style, again emphasising the strong later 2nd century AD component within this assemblage.

The slightly smaller collection of Central Gaulish samian from Zone 6 (Table 9.8; Fig 9.1) also included forms, such as the 27 cups and 18/31 dishes, which ceased to be produced around AD 160 as well as those typically introduced later on: the dish and cup set Walters 79/80, rouletted dishes of form 31R and mortaria. The diagnostic stamped and decorated sherds from this area also illustrate a wide date spread, including early, Trajanic-Hadrianic forms such as a form 37 bowl in the style of Libertus I (Decorated sherds cat no 7) found in mid-Roman quarry pit 216097 as well as late 2nd century pieces such as a form 33 cup stamped by Severus vi (Stamp cat no 7) found residually in late Roman deposit 170028, and a form 37 bowl sherd in the style of Ianuarius/Paternus II (Decorated sherds cat no 12) from mid-Roman working hollow 247146. Other stamped vessels include a dish with a rosette stamp, and another with a stamp of Paterclinus.

East Gaul

Several small samian production centres were established in the Argonne, Mosel and Rhine valleys in eastern Gaul during the late Hadrianic/early Antonine period but few of these early products ever reached Britain. None of the East Gaulish vessels identified here need pre-date the last decades of the 2nd century AD, but most were not closely datable (late 2nd-early/mid-3rd century AD only). No East Gaulish potters' stamps were recovered and only four decorated scraps, one (Decorated sherds cat no 13) from Zone 6 and the other three, all likely to be from Rheinzabern (Decorated sherds cat nos 38-40) came from Zone 20. In general terms, approximately 10% of all the samian from a site can usually be expected to be from East Gaul. At 9% of the samian by sherd count, the East Kent Access Road sites are no exception, although given the proximity of this area to the Continent, a greater quantity of vessels from the Rhineland might be expect to have reached all but the most humble of sites.

Within the assemblage as a whole, sherds from Rheinzabern were more frequent than those from Trier, although the Trier pieces tended to be larger (average weight of 20g compared with 13g for those from Rheinzabern). Within the collection from Zone 6, however, these ratios were reversed, with 20 pieces (201g) from Trier and just eight (132g) from Rheinzabern. Given the small number of vessels involved and the presence of a few sherds which could not be assigned to a particular area of production, these ratios are probably not statistically significant, but it is possible that they relate to differing levels of activity at these sites during the first half of the 3rd century AD. Rheinzabern products were also considered extremely rare in the much larger assemblage from Richborough (Dickinson *et al* 1968, 148; Trier vessels are not mentioned at all in this report), where it is suggested that greater levels of activity during the first half of the 3rd century AD would have resulted in a higher proportion of vessels from this centre.

As is often the case, the range of East Gaulish forms is limited; mortaria, dish/bowls of forms Ludovici Sa and Sb, form 37 bowls and form 33 cups (see Tables 9.6 and 9.8). Definite 3rd century AD vessels included a form 37 bowl from Trier, dated to *c* AD 220-260 (Decorated sherds cat no 13) and six sherds from an unusual round-bodied, barbotine-decorated jar from Rheinzabern (Decorated sherds cat no 40; Fig 9.9, no. 83). Other samian sherds from the same feature as the jar (late Roman pit 251005, Zone 20) included pieces from an Argonne mortariaum, a large form 36 dish and a form 43 mortarium, also of 3rd century AD date. Form 43 mortaria are not common finds in Britain; the presence of this vessel may reflect the coastal location and its comparatively easy access to Continental resources. Three sherds from a thick dish or bowl (probably a Lud Sb), as well as pieces from another Lud Sb vessel and a Lud Sa dish from pit 254104 in Zone 6 are also likely to be of 3rd century AD date.

Argonne samian was identified amongst the collections from Zones 6 and 20. Antonine Argonne sherds came from Zone 20 but the identification of those from Zone 6 remains somewhat tentative as they occur in a burnt but underfired fabric. The slip of these sherds is poor or missing, and mica is evident within them but it remains unclear whether the unusual appearance of these sherds is a result of their under-firing or post-depositional

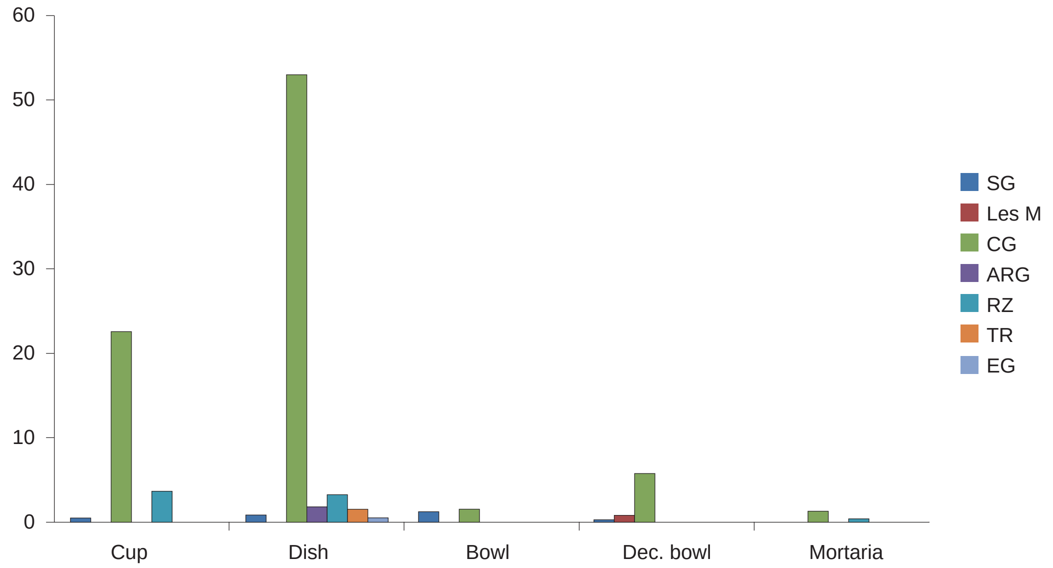


Fig 9.2 Samian ware from Zone 20: Vessel class correlated with fabric as a percentage of the total EVEs (EVEs =11.97), including graves

burial conditions. A sherd in similar condition from Zone 11 is thought to be from Colchester, but the Zone 6 material included three mortarium sherds, a form which was not, as far as we know, produced at Colchester, making an East Gaulish source more likely. These possible Argonne sherds included a form 33 (132079), a form 45 mortarium (130010) and other mortarium fragments (132079; 242104) as well as a form 37 bowl rim (242104). Unfortunately, this piece has only a scrap of ovolo extant so that its fabric cannot be corroborated by ovolo identification.

Two late Argonne roller-stamped ware sherds were also identified. One, found in the secondary fill of ditch 124162 in Zone 6, derived from a dish of Chenet form 313 (Chenet 1941, pl. XII and XIII) with a beaded outer lip and roller-stamped decoration comprising rows of small impressed squares (Fig 9-10, no. 102). This form is dated to the late 3rd–4th century AD. A sherd from a second late Argonne vessel, a Chenet 320/Drag 37 bowl of probable 4th century AD date, was found in late Roman sunken-featured building 249083 in Zone 20, and can be paralleled by a similar vessel found among a range of Argonne plain wares from the Marlowe car-park sites in Canterbury (Bird 1995, 775).

British samian: Colchester

Samian was manufactured in Colchester during mid-late 2nd century AD, probably by potters who had previously worked at East Gaulish factories such as those at Sinzig and Trier. The known distribution of these products (which, in the absence of a stamp or decoration, are easily mistaken for true East Gaulish wares), is mostly confined to East Anglia but they did occasionally cross the Thames and a decorated bowl has been found in Canterbury (Bird 1995, fig.343A, no. 701). A plain bowl sherd probably from Colchester has also been found on the Canterbury Whitefriars site (J Bird pers. comm.). The three sherds identified here were all found in mid-Roman features and comprise a tiny scrap from a dish or bowl rim found in ditch 249163 in Zone 6 and a burnt form 37 body sherd, probably of mid-Antonine date, from ditch 201084 (context 295005) in Zone 7. A bigger piece from the tertiary fill of pit 134043 in Zone 11 represents approximately half a form 27 cup. This piece occurred in a soft, abraded, underfired, pale orange fabric with mica. Examples of this form are known among the Colchester kiln products (Hull 1963, 80, fig 45, 10 and 11), probably made early on during the life of this industry, as production of this cup form ceased around AD160 as it did in Central Gaul. This vessel had also been repaired in antiquity using glue probably derived from birch-bark tar (see below).

Discussion

Most of the individual site collections of samian were too small to warrant further comment but the profiles of the two largest assemblages, from Zones 6 and 20, showed significant differences. The assemblages from these zones are summarised by fabric and vessel form in Tables 9.6 and 9.8. In part, these differences may be related to the chronology of activity in these area – both spanned the four centuries of Roman rule, but with differing emphasis, the activity in Zone 6 being predominantly early (continuing from the Iron Age sequence into the later 2nd century AD), while the settlement and burials in Zone 20 predominantly date from the early/mid-2nd century AD onwards. However, despite the considerable amounts of pre-Flavian ceramics recorded for Zone 6, there was nothing convincingly early within the samian assemblage.

Although slightly smaller, the Zone 6 assemblage contained the widest range of fabrics and vessel forms and a larger proportion of 1st and early 2nd century AD samian. Both collections were dominated by Central Gaulish vessels and both had a smattering of East Gaulish products, including pieces of the late 3rd or 4th century roller-stamped ware from Argonne. When the assemblages are examined in terms of the distribution of vessels by functional group based on rim EVEs (Figs 9.1 and 9.2), it can be seen that plain and decorated bowls and mortaria were comparatively poorly represented at both sites; Zone 6 having slightly more plain bowls and Zone 20 slightly more decorated vessels, but these differences were only marginal. However, if, for analytical purposes, the South Gaulish fabric is equated with 1st century vessels, the Central Gaulish fabric with 2nd century vessels and the East Gaulish fabrics with later 2nd to 3rd century vessels, a further difference between the two assemblages becomes apparent and appears to remain consistent through time – cup forms dominate the Zone 6 assemblage (44 cups : 33 dishes) whilst dishes, even excluding the figures from the grave goods, dominate the Zone 20 material (27 cups : 51 dishes). This may hint at samian being used and consumed differently on these two settlements. It may also be of relevance here that slightly more sherds from Zone 6 showed evidence for prolonged wear, although in both assemblages the proportion of worn vessels was comparatively low. Repaired samian vessels were also sparse. These factors may suggest ready access to the samian market, negating the need to use vessels heavily or to mend them (Willis 2005, section 8.7).

Other imported finewares

Pre-Flavian fineware sherds included two small pieces from the base of a Lyon colour-coated ware cup from early or mid-Roman pit 178371 in Zone 10 and a roughcast sand-decorated body sherd from early Roman pit 232086 in Zone 6. Five of the Central Gaulish colour-coated ware sherds also occurred in the slightly micaceous, buff fabric predominantly found in pre-Flavian contexts (Greene 1979, 43, fabric A). All were decorated with roughcast clay and were found in adjacent features in Zone 6 (four sherds from two contexts in early Roman pit 245137, the fifth from pit 245136) and could derive from a single vessel. The other Central Gaulish colour-coated wares were in the slightly later, white, non-micaceous Flavian-Hadrianic (*c* AD 70–120/130) fabric, again decorated with roughcast clay and from beaker forms. Two, possibly three, vessels were represented by rims. Three sherds from a roughcast, globular beaker with a simple, pointed, everted rim were found in early Roman ditch 190447 while a second group of four sherds found in unlocated layer 288126 were very similar in appearance and might even be from the same vessel although no joins could be made between these two groups. The other vessel, another roughcast globular beaker but with a slightly corniced rim, was found in early Roman pit 279155 in Zone 6.

Other 1st century AD finewares included the two pieces of Pompeian red ware, both from Zone 6. One, from early Roman ditch 190447, was from an open platter made in Peacock's Campanian black sand fabric (1977, 149, fabric 1), imported *c* AD 10–79, although associated sherds suggest a post-conquest, early Roman, date for this piece. The second sherd (early Roman ditch 170164) was made in a fine, highly micaceous ware with a thin red slip, possibly one of the Gaulish fabrics (eg, Peacock 1977, 154, fabric 3) imported *c* AD 50-85. Locally, a dish in this fabric was identified at Minster-in-Thanet villa (Lyne 2011, 243, table 5). Terra Nigra continued to be used into the latter part of the 1st century, evidenced by four Cam 16 platter rims and a body sherd probably from this form (mid-Roman ditches 190449 and 190454 and early Roman pits 240163 and 264204 in Zone 6; Roman ditch 159313 in Zone 11). This was perhaps the most common and latest form found in Britain; its importation is generally dated to *c* AD 45-85.

Colour-coated ware beakers from the Argonne region probably arrived between *c* AD 80–135. The pieces from Zone 6 included rims from two cornice rimmed beakers; one from early Roman ditch 170148 and the second, found residually in the late Roman colluvial deposit 170028, from an indented, roughcast form (cf Symonds 1990, fig 3, 18-24). The five sherds from Zone 7 (early Roman layer/placed deposit 178119) were all from a third cornice rimmed beaker, again with roughcast decoration. Although African red slipped ware vessels reached Britain throughout Roman period, associated sherds found with the single piece recognised here, a platter base with an internal off-set from unlocated layer 232109 in Zone 6, suggest that it is likely to be of early Roman date. Early African red slipped ware sherds are already known from the area, at Dover, for example, where they were associated with Flavian-Trajanic samian (Bird 1977, 272).

The Cologne colour-coated wares included a small, complete hunt cup with a cornice rim (mid-Roman grave 182241, Zone 20. Volume 1, Fig 4.102), probably of Hadrianic to early Antonine date (*c* AD 120-150); similar vessels occur at Richborough (Bushe-Fox 1949, 267, pl. XCII, 455-7). A rim from a bag-shaped beaker (mid-Roman ditch 159045 in Zone 29) was of slightly later date, *c* AD 150–250 (Anderson 1980, 14-15, figs 7 and 8). Two other body sherds were recovered from the fills of late Roman sunken-featured buildings 170132 and 170168 in Zone 6, while another piece with barbotine decoration, from mid-Roman sunken-featured building 249081 in Zone 20, might be from another hunt cup. Later colour-coated ware beakers in Central Gaulish black slipped ware (*c* AD 150/160–200/250) and Moselkeramik (*c* AD 200–250/300) were also present in small quantities. However, compared with other sites in the area, these wares were in plentiful supply, only single sherds of Central Gaulish black slipped ware being found at both Highstead and Monkton, while neither of them yielded any Moselkeramik at all (Green 2008, 245, table 26; Savage 162, table 2/4). These wares do not occur on the Minster-in-Thanet fabric list (Lyne 2011, 231-3) and Green also notes that they were never common in Canterbury (Green 2008, 245).

Amphorae

Overall, amphorae accounted for 3% (by sherd count; 11.6% by weight) of the Roman sherds. Rims, spikes and handles were rare and no stamped sherds were noted. As at Canterbury (Arthur 1986, 245 and 255, fig.7), only the ubiquitous Dressel 20 type, which carried olive oil from southern Spain, occurred in any quantity. Most of the pieces, however, were very small compared with the size of a complete vessel. Two rims (Martin-Kilcher 1983, types 10 or 11 and 23) indicated that these vessels were reaching Thanet by the third quarter of the 1st century AD, although the majority probably belonged within the later 1st to mid-2nd century AD, the main period of Spanish oil imports into Britain (Williams 1993, 215). One other rim (test pit 176001, Zone 6), also in a Baetican fabric, may be from an uncollared Haltern 70/Cam 185 vessel, a type commonly found in later 1st and early 2nd century AD contexts in London (Davies *et al* 1994, 11). These vessels carried *defrutum*, a sweet liquid made by boiling down grape must (Peacock and Williams 1986, 116). Although insufficient survived to be conclusive, it is possible that three freshly broken neck/handle sherds (382g) found in early Roman ditch 170032 in Zone 6, derived from a Dressel 28 amphora (Peacock and Williams 1986, 149, class 31). These sherds occurred in a variant (coarse, with a cream coloured surface over a beige-brown core; quartz, biotite mica, feldspar and white, sometimes calcareous particles) of the standard Baetican ware, while the handle of this vessel was flatter and more oval in cross-section than is usual for Dressel 20 vessels, and had a deep, finger-smeared central groove. Dressel 28s were most commonly made in Tarraconensis and southern France, but some may have been made in Baetica too, from Augustan times until the middle of the 2nd century AD; wine and/or fish products have been suggested as the principal contents of the Spanish vessels (*ibid*, 150). At least 25 of the Dressel 20 sherds (1042 g) occurred in the hard, dense Baetican fabric characteristic of the period after AD 170 in London (Symonds pers. comm.). These included ten fairly thin-walled body sherds found in late Roman sunken-featured building 170132 in Zone 6, which, although featureless, may belong to the smaller, later, Dressel 23 type vessels (Peacock and Williams 1986, 141 class 26; Carreras Monfort and Williams 2003) which brought olive-based products to Britain during the 3rd and 4th centuries AD.

All the other types were represented by a mere smattering of sherds (Table 9.4) but indicate the presence and use of fish-based products (Cam 186; Peacock and Williams 1986, 123, class 18) and olives (London 555; Davies *et al* 1994, 16) during the late 1st and early/mid-2nd century AD. Wine continued to reach the area at least in small quantities, carried in Dressel 2-4 and flat-bottomed Gallic amphorae; both these types were poorly represented, but neither was very common at Canterbury either (Arthur 1986, 155, fig. 7). The principal contents of Richborough 527 (mid-Roman sunken-featured building 170168, Zone 6) and furrowed rim amphora (mid-Roman pit 239082, Zone 20) remain unknown (Peacock and Williams 1986, classes 13 and 55) but both are probably of Gaulish origin. A source in the Puy de Dome region is most likely for the Richborough 527 vessels, which are predominantly of 1st century AD date (*ibid*, 112), while furrowed rim amphorae were probably imported from Normandy during the later 2nd to early 3rd century AD. A few examples of this latter type are known in coastal regions of south-eastern England (Peacock and Williams 1986, 210), with Kentish examples from the Thurnham villa (Booth 2006, 166), Springhead (Seager Smith *et al* 2011, fig 1.50, 717) and more locally, at Richborough (Bushe-Fox 1932, 180, 312), Canterbury and Monkton (Savage 2008, 163, fig 2/41, 144).

The North African amphora sherds were all from sunken-featured buildings (late Roman building 170135 in Zone 6 (20 pieces) and mid-Roman building 249081 in Zone 20 (1 piece). All were featureless body sherds and so were not closely datable but it seems reasonable to suppose that those from building 170135 all belonged to a single cylindrical amphora (Peacock and Williams 1986, class 33-35), one of a range of types brought to Britain in ever increasing numbers from the late 2nd century AD onwards. Such vessels are likely to have carried olive oil (Williams and Carreras 1995) and/or fish products. The remaining amphora sherds were all featureless bodies occurring in a wide variety of unsourced but probably imported fabrics.

Mortaria

The mortaria considered here include all examples from British and Continental sources with the exception of those made in Central and East Gaulish samian wares (approximately 17 vessels were recorded, including one Drag 43, a form rarely found in Britain) discussed above. These specialist vessels were poorly represented, accounting for just 0.6% (by sherd count; 1.5% by weight) of the Roman assemblage. Imported mortaria included examples of Gillam form 238 (Group II: AD 65-110) and Bushe-Fox 22-30 (AD 70-150) from the Oise/Somme area of northern Gaul (Hartley 1998, 203). Just four vessels, two of each type, are represented by rims. These fabrics occur in moderate quantities in the City of London (Davies *et al* 1994, 62) and elsewhere in Kent (Pollard 1988, 225; Booth 2006, 166-7). Most of these sherds were very well-worn with few trituration grits surviving. Four sherds, each likely to represent an individual vessel from the Massif Central region of France, probably around Vienne/Lyon (Tomber and Dore 1998, 68, CNG OX) and dated to between *c* AD 50 and 80/85, were also identified. A few mortaria in an off-white sandy fabric with abundant quartz trituration grits (Tomber and Dore 1998, 78, RHL WH), also arrived from the Rhineland between *c* AD 150–250. Eighteen of these sherds (688g) derived from a single, well-worn, wall-sided vessel with an inturned bead rim (Fig 9.9, no. 84).

During the second half of the 1st and early 2nd century AD, Verulamium-region whiteware mortaria also reached the area, but in negligible quantities. After *c* AD 130/140, cream-coloured mortaria, here grouped as Canterbury/Kent, were made at various small-scale production centres scattered across the county. Kilns are only known from the Dane John site, Canterbury (Webster *et al* 1940; Jenkins 1960) but others probably await discovery. These centres made vessels in fabrics and forms very similar to, and easily confused with, those used by the Colchester potters and may represent offshoots of this larger industry (Hartley and Tomber 2006, 81-2 and 97). Within this group, at least 16 vessels were represented by rim and spout sherds, two of which carried stamps. Both were feather stamps on bead and flanged vessels (Fig 9.9, nos 85 and 86). One of the two vessels tentatively identified as true Colchester mortaria also had the edge of a herringbone stamp dated to *c* AD 130–170 (Hartley 1999, 209) surviving on its flange. The unassigned mortaria comprise small groups of sherds in a variety of pale-firing, predominantly sandy fabrics, with trituration grits of flint, quartz, quartzite and ironstone. Only one rim was included, a Cam 501A from late Roman sunken-featured building 170135, in Zone 6. One or two pieces are white-slipped and may be examples of the East Kent untempered oxidised ware made from the late second century AD onwards and common at Richborough (Pollard 1988, 99, fig 49, 180).

By the later 3rd and 4th centuries AD, a small number of mortaria were obtained from the Oxfordshire region, and included vessels in whiteware and red colour-coated fabrics (six and five vessels respectively, represented by rims; Young 1977, types M10, M11, M17, M22, C97, C99 and C100). These all form part of the standard range produced by this industry, although Thanet lies outside the known, if now rather out-of-date, distribution of the 3rd century whiteware types M10 and M11 (*ibid*, 65, fig 15). Although previously found in the area (*ibid*, 148, fig 51), the stamp-decorated C99 remains an uncommon form and, with a date range of *c* AD 360–400+ (*ibid*, 174), it is one of the latest made by the Oxford potters. It was found in test-pit 212013 in Zone 6.

Although mortaria never represented more than a very minor component of the assemblage, the range of fabrics and forms is comparable with those of other sites in the region (Pollard 1988, 66, 99 and 155; Hartley 1981; 1989; Green 2007, 245, tables 27 and 28; Savage 2008, table 2/4; Lyne 2011). While samian mortaria appear to have been relatively common in Kent (eg, Bird 1989, 67; Mills 2011, 10), the scarcity of their pale-firing counterparts seems to have applied across the whole county. Pollard (1988) illustrated only eight vessels, while Hartley and Tomber's recent survey concluded that mortarium production was 'unexpectedly limited' within the county (2006, 98). Most of the mortaria recovered from the current sites had been very well-used, displaying worn, abraded interior surfaces and loss of trituration grits; this is perhaps as much a reflection of the difficulties of obtaining new supplies as any lack of demand for these specialist vessels.

British finewares

This category consisted of an array of relatively high quality, thin-walled vessels predominantly fulfilling roles in the serving and presentation of foodstuffs and beverages. Overall, they represented 14% of the assemblage by sherd count.

The period from *c* AD 70 to AD120/130 witnessed the development of numerous fine ware industries in south-eastern England, those clustered along the north Kent coast (Monaghan 1987) being especially important. Fine grey wares, broadly conforming to Monaghan's (1987, 249, 252-3) fabrics S5, S6 and N1-3, were the most prolific, alone accounting for 96% of the British fineware sherds (cf 70% at Monkton; Savage 2008, 157), although some may have been of more local manufacture (Monaghan 1985, 66). The vast majority of these fine greyware vessels were of very high quality – thin-walled and competently potted, using fine, well-levigated clay without added temper. Beakers predominated; initially, butt and biconical forms (Monaghan 1987, classes 2B and 2G) were favoured with smaller numbers of bead rimmed and globular types (classes 2H and 2I0), while 'poppy-head' beakers (class 2A) became increasingly common after *c* AD 120. Bag-shaped (class 2E) and funnel-necked (class 2C) beakers of 2nd to 3rd century AD date were also identified in these wares. Only the biconical (class 2G; 70 examples represented by rims) and the 'poppy-head' (class 2A; 65 examples) forms occurred in any quantity; the others each represented by fewer than 20 vessels, most by fewer than five. Other forms included a range of bowls, dishes and platters (*ibid*, classes 4A, F, G and J, 5B and 7A), narrow-necked flasks (class 1B) and jars (class 3A) as well as a single imitation samian Drag. 27 cup (class 6C). As at Monkton (Savage 2008, 161), shallow dishes (class 5B), dated to *c* AD 70–130, were the commonest form but even these were only represented by 15 vessels. Eleven fine greyware vessels had been selected as grave goods (Figs 4, 12: 3916; 4, 39: 4258; 4, 46:; 4, 47: 5004; 4, 78: 1247; 4, 109: 1815; 4,113: 3773; 4, 116: 3768; and 4, 117) and are discussed more fully below.

A small number of 1st and early 2nd century AD finewares may have originated in the London area. Amongst the earliest are the two sherds from ring-and-dot beakers (Marsh and Tyers 1979, type IIIB), found in early Roman pits 222142 and 240173 in Zone 6. These vessels were perhaps made in the Verulamium/London region where they predominantly occurred in late Neronian and Flavian assemblages (Davies *et al* 1994, 142). Locally, at least one vessel of this sort is known from Richborough (Bushe-Fox 1949, 261, pl. LXXXIX, 398). The mica-dusted ware sherds, also of late 1st or 2nd century AD date, probably derive from two vessels, both indented beakers (Marsh 1978, 152, fig.6.9, type 21). Two plain body sherds were found residually in late Roman well 176147 in Zone 6, while the remaining pieces were all from the base and lower body of a single beaker from mid-Roman sunken-featured building 228059 in Zone 20. Given the poor condition of the assemblage, a greater quantity of these wares may well exist, minus their micaceous slip, amongst the unsourced oxidised wares. Three marbled ware body sherds were found in mid-Roman sunken-featured building 249081 in Zone 20; one was from a closed form, the other two undiagnostic. In London, these wares are predominantly of Hadrianic date (Davies *et al* 1994, 122, LOMA).

After AD 150/170, small numbers of colour-coated wares were also being obtained from the Nene Valley. Nine of the sherds were derived from beakers, including three with under-slip barbotine and one with rouletted decoration. The other pieces were from an upright-necked jar, probably of later 2nd century AD date (Perrin 1999, 106) from mid-Roman levelling layer 215206 in Zone 20 and the base of a straight-sided bowl/dish probably of 3rd or 4th century AD date, from late Roman pit 170055 in Zone 6. Small quantities of these wares have also been found in post-AD 170 groups at Minster-in-Thanet (Lyne 2011, 250, table 10) and in larger numbers from Richborough, where a beaker depicting hounds hunting a stag was found in a later 2nd century AD amphora burial (Pearce 1968, 118, pl. LXX, 522).

Other late Roman finewares were dominated by the red and brown colour-coated wares from the Oxfordshire region, although their relative paucity (Table 9.4) highlights the lack of late Roman activity at these sites, and a few local red-slipped wares. Three vessels from the Oxfordshire region were deposited in graves; a small beaker (Fig 4, 22: 658; Young 1977, 152, type C22; AD 240–400) from late Roman grave 254020 in Zone 6 as well as a flagon (Fig 4, 40;4220; *ibid*, 148, type C8; AD 240–400) and a funnel-necked beaker (Fig 4, 40:4251); *ibid*, 154, type C29; AD 340–400) from late Roman grave 179267 in Zone 10. Other closed, brown colour-coated forms included pieces from a wide-mouthed necked jar (*ibid*, 152, type C18) and other beakers (type C22) including one with white-painted scroll decoration (type C27), made throughout the life of the industry. The red colour-coated bowls included the most common and widely distributed types made more or less throughout the life of this industry (*ibid*, types C45, C47, C48, C49 and C51) while others (eg, types C52, C75, C81 and C84) are of 4th century date. One abraded footring bowl base found in late Roman ditch 170029 in Zone 6 had a centrally-positioned finger-tip impression in its interior surface, perhaps representing a crude imitation of a maker's stamp. The New Forest colour-coated wares provided further evidence of the extensive trading networks perhaps existing at this time; a beaker (Fig 4, 67: 3635) of 4th century AD date (Fulford 1975, 52, type 33), being included in late Roman grave 176342 in Zone 19 while body sherds from two others came from Zones 6 (late Roman waterhole 247100) and 20 (sunken-featured building 249083).

One of the unassigned colour-coated ware sherds (2g; unphased ditch 248194) occurred in a fine buff, sandy fabric with an orange-red slip. It is faintly possible that this is an atypical Terra Rubra 1A or 1B fabric, but the sherd was too small to preserve any diagnostic features and is likely to be residual in this context. Three other pieces (19g) were made in pale coloured (off-white or pale orange), fine-grained sandy fabrics with thick, well-polished, brown colour-coats on their exterior surfaces, found in early Roman ditch 170142 (Zone 6) and sunken-featured building 193140 in Zone 13. The two joining pieces from the ditch were further decorated with horizontal rows of slightly irregular, barbotine white dots. A rim from an upright-necked, folded jar or beaker (Cam 396) with large particles of roughcast clay beneath the dark brown colour-coat is likely to be a Colchester product (Symonds and Wade 1999, 264, fabric CB, fig 5.32, 60-62) and of later 2nd century AD date. The 13 remaining sherds (36g) all belonged to dark brown colour-coated ware beakers; further products from Colchester, the Nene Valley, the Oxfordshire region and even north Gaul may be included amongst this group, but the pieces were all too small and featureless to be more specifically assigned.

Oxidised coarsewares

The oxidised wares comprise a wide range of pale-fired (white, buff, orange) fabrics, sometimes white-slipped, from various British (North Kent, Verulamium, Oxfordshire), Continental (North Gaul) and unknown sources. Overall, this group accounts for approximately 10% of the Roman sherds and was dominated by the unsourced catch-all 'Oxidised', 'Whiteware' and 'White-slipped red ware' groups. These fabrics spanned a wide date range, but few pieces could be closely dated, and were characteristically tempered with variable quantities of sand and/or mica. These wares provided a range of medium quality vessels for use in a variety of serving and storage roles.

Local sources included the Canterbury (Pollard 1995; CAT fabrics R6, R8 and R9) and to a lesser extent, the north Kent (eg, Monaghan 1987, 253, fabric N4/1s; Davies *et al* 1994, 38, 40), Hoo peninsula production centres. Flagon forms predominated in all three fabric groups, with collared, pulley-wheel, ring-necked, trumpet- and cup-mouthed variants all being recognised. The diverse range of other forms included upright-necked and everted rim jars, fine cordoned bowls, bead rimmed bowls, flanged dishes, shallow, straight-sided dishes, bead and cornice rimmed beakers, lids, imitation Gallo-Belgic platters and Cam 113 type butt beakers, but rarely more than a handful of examples of each. The white-slipped red wares also included a possible tazza rim from the topsoil (context 159018) of Zone 29, and a frilled, moulded rim (Fig 9.7, no. 64) from a handled jar, perhaps a honey-pot or face jar, paralleled among the early-mid 2nd century AD Canterbury kiln products (Webster *et al* 1940, 132, fig 61) but found residually in late Roman pit 251005 in Zone 20. A small perforated pourer cup (Fig 9.7, no. 65) of the type sometimes applied just below the rim of a face jar or honey-pot was found in mid-Roman ditch 170141 in Zone 6. A third sherd possibly from a face-pot was made in an unsourced sandy oxidised ware fabric while a sherd with small, pre-firing perforations probably from cheese-press was found in unphased feature 286018.

Part of a finely-rilled costrel (Fig 9.9, no. 87) made in a hard, fine, almost inclusion-free cream fabric was the only Roman sherd found in early or mid-Saxon ditch 178358 in Zone 10. A small group of similar vessels are known from Corbridge (Gillam 1970, 6, fig 4, 21; dated to *c* AD 150-200) and other northern military sites concentrated on the Antonine Wall, where Swan (1999, 468, illus. 4, 46) has suggested that they may have been imported for their contents over a relatively short period of time, perhaps from the eastern Mediterranean. Although not certainly in the same fabric, it is of particular relevance here that the only other British example listed by Swan, and the only one from a non-northern, non-military context, is from Canterbury. This vessel was also made from fine white clay with a cream coat and decorated with strokes and circles in sepia paint (Webster *et al* 1940, 132, fig 64); it is considered to have been imported from the Rhineland, probably Cologne, during the first half of the 2nd century AD (*ibid*, 134-6).

Small quantities of Verulamium region white ware also reached the area up to around AD 150 (Davies *et al* 1994, 41), recognised at Saltwood (Booth 2006, 169), Monkton (Savage 2008, 158) and Minster-in-Thanet (Lyne 2011). Only two vessels were represented by rims; part of a tazza (mid or late Roman sunken-featured building 249085, Zone 20), and a complete flagon of Flavian to Hadrianic date (Marsh and Tyers 1978, 549, fig.232, 1B.2) from grave 248104 in Zone 19. Most of the other pieces were flagon body sherds. The North Gaulish whitewares (Rigby 1995, 651, fabric WW4; Tomber and Dore 1998, 75, NOG WH 4) also of 1st to 2nd century AD date and dominated by sherds from flagon forms, were probably made alongside mortaria at Noyon, Oise and/or closer to the coast in the Pas de Calais, at Bourlon (Hartley 1998, 206). Only three vessels were represented by rims, all from Zone 6; two flagons with pulley-wheel rims (early Roman ditch 170148 and mid-Roman sunken-featured building 170136, Fig 9.7, no. 66) and one with a flared, collared rim, the shoulder rim and neck forming a continuous curve with two residual rings on the neck (mid-Roman well 324018). These wares were far more frequent here than on the adjacent Monkton site where only one sherd of this fabric was noted (Savage 2008, 159, fabric R89).

By the late Roman period, Oxfordshire whitewares reached the area, albeit in very small quantities. Sherds from at least three red-painted bowls, probably of the wall-sided, carinated form (Young 1977, 87, type P24), were recognised (late Roman sunken-featured buildings 170132 and 249083, Zones 6 and 20) while sherds from the base of a closed form were found in the upper fills of early Roman ditch 190468 in Zone 6. The red-painted bowls are the most common and widely distributed type made in this fabric (*ibid*, 82, fig 25), and although made throughout the life of the industry, there is some evidence to suggest that its popularity greatly increased during the 4th century AD (*ibid*, 87). Hadham oxidised ware sherds derived from two vessels, one with a footed base (Fig 9.10, no. 101), characteristic of this industry and the other represented by plain body sherds only. Although rare (Pollard 1988, 146), these wares occur in west Kent, where they represent a 4th century AD marker; it is unlikely that they would have reached Thanet significantly earlier. These wares are listed as present in the Minster-in-Thanet villa assemblage (Lyne 2011, 233) and may also occur at Richborough (eg, Bushe-Fox 1928, 104, pl. XXXII, 179 and 180).

Other coarsewares

This group of coarse, unoxidised fabrics formed the bulk of the assemblage – 66% by sherd count and weight (Table 9.4). Vessel forms were predominantly utilitarian, fulfilling a wide variety of food storage, preparation and 'everyday' serving roles, as well as the occasional industrial purpose. Most were products of Kent industries.

In common with other sites in east Kent (Thompson 2007, 189; Lyne 2008, 207; Savage 2008, 157; Jones 2009, 4), the grog-tempered wares continued to dominate assemblages well into the late 2nd or early 3rd century AD. Initially, during the 1st century BC and 1st century AD, and as noted above, these wares were fairly soft and dark-coloured, essentially identical to and firmly rooted within the native 'Belgic' traditions of the area (CAT fabrics B1 and B2). Gradually, during the later 2nd century AD and into the mid-3rd century, these wares, probably made on Thanet and the opposite shores of the Wantsum channel, became harder fired, more sandy and more often oxidised (CAT fabrics R1 and R1.2; Native Coarse Ware), sometimes with a white slip applied to the upper part of exterior surface. The late Roman grog-tempered wares (CAT fabric LR1), introduced during the late 3rd century AD, reverted to the darker colours of preceding centuries while remaining moderately hard-fired. These fabrics have been described and discussed by Pollard (1988, 98-99; 1995, 704-705) but as the distinctions remain largely subjective, often based on hardness of firing, and given the problems of extensive residuality within this assemblage, no attempts were made to separately quantify these chronological groupings. In the absence of diagnostic sherds, 22% of the grog-tempered ware sherds could only be assigned a generalised Roman date (Table 9.4).

As noted above, and as is normal for east Kent, considerable continuity was apparent in the use of ceramics after the conquest. The grog-tempered vessels continued to be dominated by jars, especially the necked, cordoned forms (Thompson 1982, types B1-1, B1-2 and B3-8) which became far more numerous during the second half of the 1st century AD, lasting into the 2nd century AD. Although still present, bead rimmed jars (types C1-2, C5-1, C7-3) declined in popularity, being outnumbered by the necked forms by 3:2 in many of the early Roman groups. Platters (Thompson 1982, types G1-6, G1-7, G1-10 and G1-11), butt beakers (type G5-6) and smaller numbers of cups (type E1-2), jugs (type G6), bowls (type D1-4) and lids (type L), often made in relatively fine-grained fabrics and copying continental prototypes, continued to occur. Small quantities of 'Belgic' style sandy wares (360 sherds, 4313g) continued to be used during the second half of the 1st century AD, but were gradually replaced by the more Romanised sandy greywares. During the later 1st and early 2nd centuries AD, this catch-all fabric group is likely to include local products such as Thanet silty/sandy ware (Savage 2008, 158; CAT fabric B/ER16) and vessels from the Canterbury area (Pollard 1995; CAT fabrics R4, R5, R7), commonly found on sites of Flavian-Trajanic date across east Kent, as well as products from other, as yet unidentified, kilns. A small quantity of early Thameside products may also be included in this group, although this industry had little impact in east Kent until at least the second half of the 2nd century AD (Pollard 1988, 96-7). Vessel forms in these fabrics continued to be dominated by jars, especially the upright-necked and various beaded rim types, including some with incised or 'comb-stabbed' decoration, with a smaller range of neckless jars, flanged bowls, dishes, lids (cf Green 2007, figs 130-133) and a few storage jars. A small, globular-bodied cup with a pre-firing perforation (7mm across) in and scarring around the base (Fig 9.7, no. 67; early Roman pit 245136, Zone 6), in a Canterbury 'North Gaulish' greyware fabric probably formed a pourer originally attached to the rim/shoulder of a jar, possibly a face-pot (Cam 390) and belongs within the second half of the 1st century AD (Pollard 1988, fig 116, 47, 48). Similar vessels occur at Richborough (Pearce 1968, 122, pl LXXV, 574). A small rim sherd possibly from an 'Atrebatic'-style bowl in a blue-grey, sandy greyware fabric found with other late 1st to early 2nd century AD sherds might be an early Alice Holt product (Lyne and Jefferies 1979, 30-31, fig 17, class 5) and highlights the possibility of further products from this region amongst the assemblage. Fragments from two late 1st to early 2nd century AD vessels from this region have also been found at Highstead (Green 2007, 231, fig 137, 566 and 567).

Fabrics tempered with combinations of sand, flint and grog also continued to be used for bead rimmed and upright-necked jars into the late 1st century AD, although some may be residual. An imitation Cam 16 platter was also identified in a sand and flint-tempered fabric (early Roman ditch 215037, Zone 11), but although numerically the most common amongst this group of minor wares, the majority of sand and flint-tempered sherds assigned an early Roman date actually derived from a single, highly fragmentary (299 sherds, 1233g) everted rim jar found in the tertiary fills of Roman pit 290305 in Zone 23. Approximately 20% of the early Roman shell-tempered wares probably derive from local sources, the remainder being from the north Kent/south Essex area. Most sherds are from the large, relatively thin-walled storage jars (eg, Monaghan 1987, 79-84, classes 3D1 and 3D3) characteristic of this fabric, although a few bead-rimmed jars (*ibid*, class 3E) of small to medium size were also recognised. These vessels were probably traded for their contents rather than in their own right (Davies *et al* 1994, 102), but they did not occur at Monkton (Savage 2008, 158-160, table 2/4), Highstead (Green 2007, tables 17 and 20) or Westhawk Farm (Lyne 2008, 208-9, table 6.1).

Although generally not seen in east Kent until after the expansion of the industry around *c* AD 120 (Pollard 1988, 89), small quantities of South-east Dorset Black Burnished were also found in early Roman contexts. These included seven joining sherds (124g) from a Durotrigian-style vessel with a low pedestal base found with other later 1st to early 2nd century AD sherds in mid-Roman ditch 201079 in Zone 7 and a rim from an upright-necked jar (Seager Smith and Davies 1993, 231, WA 1) from mid-Roman ditch 170047 in Zone 6. Similarly small quantities of early Black Burnished ware were identified at the southern end of the Weatherlees-Margate-Broadstairs wastewater pipeline route (Jones 2009 online archive report, 22) but these vessel probably represent one-off gifts or the personal property of a particularly mobile individual rather than any regular, economically-significant 'trade' between the areas, although their presence is nevertheless of interest.

During the 2nd century AD, the early Roman grog-tempered forms were gradually replaced by highly variable wide-mouthed everted rim bowls/jars (cf Savage 2008, 181, figs 2/36-37, nos. 60-70; Lyne 2011, fig 7, 67-72; fig 9, 95-7), generally made in the hard, oxidised, Native Coarse Ware fabric variants. Large grog-tempered storage jars (Thompson 1982, type C6-1) were made well into the latter part of the 2nd century AD if not beyond, and small numbers of shallow, plain-rimmed dishes, pie-dishes, narrow-necked jars, flagons and lids were also in use at this time. From around the second quarter of the 2nd century AD, the sandy greywares became much more common. Most were derived from the north Kent 'Thameside' industry (Monaghan 1987, 244-48, fabrics S1-3; CAT fabrics R14 and R14.1) but it is probable that local products from as yet unidentified kilns are included amongst this group. Many of the later 2nd–3rd century AD greywares from the East Kent Access Road sites were at least partially oxidised, often reddish brown in colour, and, as at Highstead (Green 2007, 227), many had lost their burnished surfaces, probably through post-depositional chemical erosion. Dishes, mostly roll-rim pie-dishes and shallow, straight-sided forms with plain or grooved rims (Monaghan 1987, classes 5C, 5D, 5E and 5F) predominated in these wares, outnumbering the everted rim and 'cooking pot' style jars (classes 3H and 3J) and a small number of S-profile bowls (class 4A2). Vessel forms in the Canterbury-region greywares included reed flange bowls, lid-seated flanged bowls, lids and lid-seated, neckless jars together with a few necked and everted rim jars, all types seen at Highstead (Green 2007, 225-7, figs 130-34) and made from the Flavian period until at least the mid-2nd century AD (Savage 2008, 162). Other, less common coarseware forms of mid-Roman date (*c* AD 120/130–early 3rd century AD) included pieces from three possible cheese-presses, one in grog-tempered ware from mid-Roman quarry pit 262015 (context 143155) Zone 11, and two in sandy greyware (from late Roman sunken-featured building 249083, Zone 20 (Fig 9.10, 100) and late Roman pit 269101, Zone 6). Similar vessels made on the north Kent marshes are dated to *c* AD 70–200 (Monaghan 1987, 164, class 10) and a greyware example from Richborough occurred in a pit with a coin of *c* AD 268-70 (Bushe-Fox 1926, 101, pl XXXI, 152). A grog-tempered cheese-press is known from Highstead (Thompson 2007, 205, fig 116, 194). Associated ceramics found with body sherds from an indented greyware jar (Pollard 1988, 136, fig 50, 192) in mid-Roman pit 159027 in Zone 29, suggest that this vessel also belonged within the late 2nd–3rd century AD.

The three sand and flint-tempered sherds considered to belong to this period (dated by associated sherds) were all plain bodies from a single, handmade vessel in a coarse, gritty fabric, probably detritally tempered, found in mid-Roman pit 301089 in Zone 6. Similarly, all the sand and grog-tempered sherds probably derived from three vessels. Joining sherds from an almost complete, plain, everted rim jar/bowl in a hard, crisp-textured oxidised fabric were found in a variety of contexts in late Roman ditch 170029 (context 301094), mid-Roman layer 301095 and mid-Roman pit 301097 (context 301096) in Zone 6, along with body sherds from a second vessel in a similar fabric, decorated with burnished line lattice (contexts 301094 and 301095). The fabric of the third vessel, an everted rim jar with distinct ledge at the neck/shoulder junction and a high, rounded shoulder of greater diameter than the rim, showed considerable variability within the profile, the grog inclusions being far more prevalent towards the base of the vessel while the rim was more or less exclusively sandy. The form is broadly comparable with the Thameside 3H8 vessels, dated to *c* AD 170/190-210/230 (Monaghan 1987, 100), although this is almost certainly a local product. Most of the pieces (20 sherds, 384g) were found in late Roman sunken-featured building 170135 in Zone 6, but fresh breaks indicate that not all were collected and the base is missing; an additional rim was recovered from an adjacent feature, late Roman pit 246251.

Although the difficulties of dating 3rd century assemblages are well-known, the ceramic evidence from the route of the East Kent Access Road clearly indicates a reduction in the level of activity taking place at this time. Overall, the ceramics from only 72 contexts from 45 features (Zones 6 (29 features), 10 (3 features), 12 (3 features), 19 (1 feature) and 20 (9 features) were assigned late Roman spot dates; this represents just 3% of the 2090 contexts assigned a Latest Iron Age/Roman date of any sort. This reduction in activity from around the middle of the 3rd century AD, coinciding with the decline of the Thameside pottery industry (Monaghan 1987, 228-30), has been noted widely in Kent (Booth 2006, 192; Green 2007, 216; Savage 2008, 163; Seager Smith *et al* 2011, 69), although the reasons for it remain unclear. However, the small quantities of late Roman coarsewares from the East Kent Access Road sites indicate the continued use of sandy greywares into this period, particularly narrow-mouthed and everted or hooked rim jars, shallow, straight-sides dishes with plain or grooved rims and dropped flanged dishes/bowls. Some probably derived from the ailing Thameside kilns while others may be from more local, as yet unidentified sources (eg, CAT fabrics LR2 and LR5.2) although the presence of a small number of blue-grey sherds characteristic of the Alice Holt production centre on the Surrey/Hampshire border (Lyne and Jefferies 1979) may indicate the infiltration of the east Kent markets at this time. Although noted in some local, post AD 250 assemblages (Bushe-Fox 1949, 269, Pl XCII, 468-70 and 473; Savage 2008, 164; Lyne 2011, 256), no examples of Overwey/Tilford (Portchester D) wares occurred on the current sites; similarly, none were found at Highstead (Green 2007, 216). By the late 3rd century AD, however, the three most common and widely traded South-east Dorset Black Burnished ware forms – everted rim jars, shallow, plain-rimmed dishes and dropped flanged bowls/dishes (Seager Smith and Davies 1993, WA types 3, 20 and 25) were also reaching the area in small quantities.

Vessels in the late Roman grog-tempered wares (CAT fabric LR1) also imitate, albeit rather poorly, the classic South-east Dorset Black Burnished ware forms, often with facet-burnished or wiped surfaces and lattice or other burnished-line decoration. Although not common, these wares were especially numerous in sunken-featured buildings 249083 (81 sherds, 1221g; late Roman) and 249085 (82 sherds, 1492g; middle or late Roman) in Zone 20. This fabric, together with the few mixed sand, rare fine flint and grog-tempered sherds (all from Zone 20), were probably relatively local responses to the decline of the nucleated pottery industries at this time. Indeed, the sand, rare fine flint and grog-tempered sherds may all be from a single large storage jar comparable with an example illustrated by Pollard (1988, 136, fig 50, 202). Two joining rim sherds were found in two contexts in pit 251005 while five joining sherds from sunken-featured building 249083 were from the base of a similarly large jar form.

Use, re-use or repair

Limited evidence for the use, re-use or repair of latest Iron Age and Roman ceramic vessels was encountered. Use-wear is perhaps most readily apparent in the form of surface abrasion, and the slip on samian is especially vulnerable to this. Abraded wear on the interior of the base and/or lower parts of the wall was noted on four of the Southern Gaulish samian vessels, six from Central Gaul and one from Rheinzabern, mostly occurring on vessels with rounded base profiles, such as cup form 27 and bowl/dish forms 37, 38 and Curle 11. In three instances (a Curle 11 bowl from mid-Roman pit 125305 in Zone 6 (Fig 9.7, no. 68), sherds from a form 37 bowl probably by Mercator from early Roman ditch 215037 in Zone 11, both South Gaulish, and a Central Gaulish Curle 11 bowl from mid-Roman quarry pit 216097 in Zone 6) enough of the vessel survived to indicate that this abraded wear was confined to discrete patches on the lower part of the vessel wall, as if the vessel had been repeatedly tipped to one side during use, as when beating eggs, for example. Similar wear pattens were noted on two decorated bowls from Springhead (Seager Smith *et al* 2011, 119, fig 6, 35 and fig 7, 42, Pl 1). As at Springhead, abraded wear of this type was sometimes associated with small pits or dimples, typically *c* 5mm across and 1-2mm deep, worn into the surface of the pots. These dimples were noted on a Southern Gaulish samian Curle 11 bowl (Fig 9.7, no. 68), which had also had its flange chipped-off and smoothed, leaving traces of file-marks while part of the broken edge of this sherd exhibited localised burning, perhaps suggesting that it functioned as an open lamp (cf Mills 2012, 319-20, fig 30.1) in its final incarnation. Dimples were also noted worn into the battered, abraded surface of the 'pre-export' Lezoux fabric form 27 cup of Trajanic date included in early or mid-Roman grave 216094 in Zone 20 (Fig 4, 114: 3808) and on at least four other samian sherds from Zones 6 and 12 as well as on a fine greyware dish or bowl (eg, Monaghan 1987, type 7A), probably from north Kent, recovered from early Roman ditch 190492 in Zone 6. Similar pits have also been recorded on samian from Highstead (Taylor 2007, 242), but this is the first time they have been noted on a non-samian vessel; the reasons for them remain obscure.

A base sherd from a form 18 dish stamped by S_Verius (Stamp cat. no. 3; *c* AD 75-95) from mid-Roman sunken-featured building 170168 in Zone 6, exhibited 'plate-spinning' type wear (Seager Smith *et al* 2011, 119-20; Mills 2012, 320-21) on the underside of the base, around the inner edge of the footring with a well-worn central spot. A footring base from a form 15/17 or 18 dish found in Late Iron Age or early Roman ditch 258341 in Zone 10 may also have been used in an inverted position as a small, shallow container, the walls of this vessel having been deliberately trimmed away.

Among the coarsewares, abraded wear affecting part of the circumference (usually 20–30%) was occasionally found on the underside of jar bases. In the worn areas, the base angle had been flattened, probably resulting from the repeated rocking or tipping of the vessel in one direction. Vessels affected in this way included a grog-tempered jar from early Roman pit 170186 in Zone 6, a small, grey ware, globular jar/bowl from early Roman ditch 135068 in Zone 10 as well as the later, perforated grog-tempered jar used as the cinerary container (Fig 4, 85: 2073) in mid-Roman grave 220099 in Zone 19. As at Springhead (Seager Smith *et al* 2011, 121), re-used sherds were comparatively rare. Five pieces (Zones 6 (2 examples), 10, 13 and 20) in grog-tempered, greyware and fine greyware fabrics (2, 2 and 1 example), had been pared down to form flat discs, varying from 50-80mm in diameter, perhaps for use as gaming pieces, weights or even lids. At 32g, one of the greyware discs (mid-Roman ditch 190454, Zone 6) is broadly equivalent to one *uncia* (29g), the basic unit of Roman weight measurement. Two other grog-tempered sherds, both from Zone 6 (early and mid-Roman ditches 170178 and 190484) had been trimmed to form smaller (22-32mm across, 7-8mm thick), roughly circular counters while a third, from early Roman sunken-featured building 193140 in Zone 13, had been formed into a rough oval (46x40x7mm) with a centrally-positioned post-firing perforation (*c* 5mm diameter) and may have functioned as a spindle whorl. A handful of Dressel 20 amphora sherds found in early Roman ditch 249250 in Zone 10 had also been re-formed into tesserae.

Fourteen coarseware vessels had been modified by the drilling of one or more post-firing perforations through the base and/or vessel walls. Perforations of this sort are generally interpreted as being indicative of a change of use and the practice is well-known in Late Iron Age and Roman contexts across southern England. It is traditionally associated with the production of cheese (Harding 1974, 88) although such vessels could have been used to drain/strain solids from liquids in a wide variety of industrial and domestic contexts, as time-pieces or as flower pots while others may have been rendered useless in more ritualistic ways (Fulford and Timby 2001, 294-6). Twelve of the holed vessels recovered here were of 1st-early 2nd century AD date, comprising four on grog-tempered wares, two each on sand and flint-tempered and greyware fabrics and one each on sandy ware, flint-tempered, sand and grog-tempered and fine greyware vessels. The only definite mid-Roman vessel treated in this way was the cinerary container (Fig 4, 85: 2073) from grave 220099 in Zone 19, although the perforated greyware jar base from mid-Roman sunken-featured building 130227 in Zone 6 may well belong within this period but could only be assigned a generalised Roman date. Flat, jar-type bases were most commonly altered in this way, with the number of perforations varying from one to three, although the 1st–early 2nd century AD vessels also included a sand and flint-tempered pedestal based form (unphased pit 135029, Zone 6). The full form of the vessel was only identifiable in one instance; a fine greyware cordoned bowl (Monaghan 1987, 132, type 4J2) from early Roman ditch 190485 in Zone 6. This bowl had three perforations, all 11-12mm across, one off-centre through the base and two in the lower part of the wall, situated at roughly the same height and 42mm apart. Two other vessels, both likely to be jars, also had post-firing perforations in their walls; one in a sandy ware fabric from early Roman pit 256062 and one with two large subsquare perforations 25mm apart in grog-tempered ware from mid-Roman pit 255053, both in Zone 6.

Smaller perforations, generally 3-7mm in diameter, were probably drilled to facilitate the repair of broken vessels, the sherds being held in place with metal staples, most commonly lead (Schuster 2011, 249, type 2) or perhaps, on occasion, leather thongs. Various classical authors, including Cato, described the methods used to repair ceramic vessels in this way (*De agri cultura* 39.1), and the practice appears to have occurred in Roman Britain from the mid-1st to at least the mid-3rd century AD, although predominantly involving the higher quality, gloss-slipped tablewares such as samian (Peña 2007, 213-49). Here, however, only two samian sherds, a form 31R body sherd from late Roman sunken-featured building 249083 in Zone 20 and a form 37 bowl rim from mid-Roman structure 190431 in Zone 11, carried perforations indicative of repair in this way. The only other staple-repaired 'tableware' vessel was a 4th century Oxfordshire colour-coated ware bowl (Young 1977, 166, type C81) from late Roman sunken-featured building 249083 in Zone 20. The 11 other examples were all made to vessels in local, coarseware fabrics (Table 9.9). Identifiable forms including a bead rim jar (backfill of Roman grave 147255, Zone 4) and a cordoned bowl (early Roman sunken-featured building 193140, Zone 13) both of 1st–early 2nd century AD date and in greyware fabrics, a large, grog-tempered rolled rim storage jar (early Roman pit 176313, Zone 10) and a shallow, plain-rimmed dish in grog-tempered ware (mid-Roman pit 159047, Zone 29). There was no direct evidence within the ceramic assemblage for the use of the lead plug (cf Schuster 2011, 247, type 1, pl 13) type of pot-mend.

In the same tradition as the later prehistoric

Table 9.9 Latest Iron Age and Romano-British staple-repairs, number of examples by fabric and period

Ware	*Latest Iron Age/Early Roman*	*Early Roman*	*Middle Roman*	*Roman*	*Late Roman*	*Total*
Grog-tempered ware	1	2	3	1		7
Greyware		2				2
Sandy ware	1					1
Flint-tempered ware	1					1
Central Gaulish samian			2			2
Oxon colour-coated ware					1	1
Total	3	4	5	1	1	14

Table 9.10 Latest Iron Age and Romano-British glued repairs, number of examples by fabric and period

Ware	*Latest Iron Age/Early Roman*	*Early Roman*	*Middle Roman*	*Roman*	*Total*
Cam 186 amphora		1			1
Central Gaulish samian			2		2
Colchester samian			1		1
Fine greyware		1			1
Flint-tempered	1				1
Greyware		2		1	3
Grog and calcareous inclusions		1			1
Grog-tempered ware	2	4	2		8
Sand and flint-tempered ware	2				2
Sandy ware	1	1			2
Terra Rubra	1				1
Whiteware	1				1
Total	8	10	5	1	24

examples, 24 sherds or groups of joining sherds had been repaired using glue probably derived from birch bark tar. Visually, evidence for this type of repair was similar to that encountered in proceeding periods and described above. This forms the second largest group of glued repairs known to date and represents a 'glued rate' of 1:1449 sherds, comparatively even more frequent than in the largest group from Springhead, where the glued repairs represented 1:2169 sherds (Seager Smith *et al* 2011, 124). Vessels repaired in this way were recovered from Zones 3, 10, 11, 13 and 19 (1, 3, 3, 1 and two examples respectively) although just over half (14 examples), were from Zone 6 but, again, no evidence for the preparation of the adhesive was encountered. As at Springhead, most the glue-repaired pots were of 1st or early 2nd century AD date and included a wide range of fabrics (Table 9.10).

It is hard to imagine that a glued repair to such a large, heavy vessel as a Cam 186 amphora could ever be successful, but glue deposits surviving on the broken edges of three joining neck sherds found in early or mid-Roman waterhole 135095 in Zone 11 indicate that it was at least attempted. Most of the other vessels were far smaller, but the three glue-repaired vessels (a Terra Rubra platter (Fig 4, 50: 439), a Central Gaulish form 33 cup (Fig 4, 50: 2074) and a grog-tempered flared rim jar (Fig 4, 88: 3617) used in graves indicated that the repairs were often extensive, affecting the whole or substantial parts of the pot. Eleven of the glued repairs survived only as plain body sherds, mostly from jars, but identifiable forms repaired in this way included a Colchester samian cup form 27 (mid-Roman pit 134043, Zone 11) and a whiteware butt beaker (early Roman sunken-featured building 191125, Zone 13) as well as upright- and narrow- necked jars, imitation butt beakers and lids in the local coarseware fabrics. One jar base in a Late Iron Age/early Roman sand and flint-tempered fabric from the Zone 6 occupation horizon 291103, came from a glue-repaired vessel that also had three irregular, post-firing perforations, although it remains unclear whether the repair, evidenced by surviving glue deposits around one-quarter of its circumference, was undertaken before, after or even as a result of breakage during the vessel's modification.

Together, then, 38 latest Iron Age/Roman sherds or groups of joining sherds had been repaired in some way, representing an overall rate of 1:940 sherds. Traditionally, the repair of pottery vessels, especially coarsewares, has been associated with inadequate supplies (Marsh 1981, 227) or lowly status. Peña, for example, has observed that the repair of utilitarian vessels occurred only occasionally and was perhaps mainly limited to ' settlements situated at the margins of the Roman economic zone that enjoyed less regular or economical access to these classes of pottery' (2007, 248), concluding that in Roman Britain, the value of even the highest-status ceramic tablewares was generally insufficient to warrant their repair. However, evidence from the current sites and others such as Springhead (Seager Smith *et al* 2011, 123-5) and Chilmington Green, near Ashford (Wessex Archaeology 2011) is beginning to suggest that repair was a regular, if not common, practice in Roman Kent, particularly during the 1st and 2nd centuries AD. Repaired vessels were certainly acceptable for use in the burial ritual (Philpott 1991, 36), and if such vessels were drawn from the domestic supply, it follows that they were acceptable there too. The reasons for repair may be more closely associated with the parsimonious nature of particular individual human beings, rather than any wider economic considerations. Certainly, there is little evidence from Springhead or the current sites to suggest that the inhabitants were unable to afford, or gain access to, relatively plentiful supplies of pots – with the possible exception of imported finewares and mortaria, but neither of these were the classes that were most frequently repaired.

Graffiti

Twenty-one examples of post-firing graffiti on pottery vessels were found, representing a graffiti rate of 1:1656 sherds. These comprise eight 'literate' graffiti consisting of two or more surviving letters, ten 'X' motifs (one in combination with an abstract mark), one other letter, one abstract mark and one example of a notch cut across the footring of a base. Recent surveys of Roman graffiti on pottery (eg, Evans 1987, 202; Biddulph 2006), have shown that most occur on tablewares and, in assemblages from northern Britain, around 60% of vessels with graffiti are normally of samian ware (Evans 2004, 359). Here, 16 or 76% of the graffiti were on samian vessels. All were plain forms, one from La Graufesenque and the others from Lezoux. Graffiti were also recorded on a Terra Nigra platter and two fine greyware beakers, as well as a local grog-tempered ware platter (Thompson 1982, 459, type G1-6) and an oxidised ware body sherd, probably from a flagon. Graffiti were most frequent at the northern end of the route, with 13 examples from Zones 19 and 20 and only six from Zone 6.

Of the literate graffiti, three, all from Zone 20, appear to be complete. One comprised just two letters scratched into the underside of a samian dish base (Fig 9.11, no. 103), the other two (Fig 9.11, nos 104 and 105), both on ancillary vessels included in graves (Fig 4, 113: 3772 and 115: 4029), were probably names. The others (Fig 9.11, no. 106-109) were all incomplete but consisted of two or more surviving letters. The level of literacy implied by the quantity of the graffiti appeared unusually high.

As in most assemblages (Evans 1987, 201; Biddulph 2006, 357), X was the most common graffito mark. Most (seven examples) were situated, unobtrusively, on the underside of the base although one of these occurred in combination with an abstract mark on the vessel wall (Fig 9.9, no. 82), two others were located on the exterior wall and one on the interior of the rim of a fine greyware poppy-head beaker found in late Roman ditch 217122 in Zone 20. The other single letter, an R (grog-tempered platter; middle or late Roman well 170184 in Zone 6) and the abstract mark on the form 18/31 dish from grave 153060 (Fig 4, 76: 1628) were also on the underside of the base. Such marks and letters are generally interpreted as initials or illiterate marks of ownership although alternatives may include numbers, indications of capacity, weight or intended contents, or apotropaic marks intended to charm the pot or to protect its contents (Going 1987, 108). Some X marks, especially if on the underside of bases, for example, may portray simplified wheels or degenerate 'double axe' motifs, which may have carried funerary or underworld meanings or were perhaps symbolic of the goddess Fortuna and good luck (Going 1992, 108; Biddulph 2011, 150).

Feature groups

Along the route as a whole, latest Iron Age/Roman (1st-4th century AD) sherds were found in some 1285 features and deposits. The majority of groups were comparatively small, with 792 (62%) comprising fewer than ten sherds and only 157 (12%) containing more than 50 sherds of this date. Although most were from broadly contemporary features, four of the larger groups occurred in the upper, slowly accumulated fills of earlier, prehistoric, features (Early Bronze Age barrow ditch 273092 in Zone 8 (52 sherds, 865g), Early Iron Age enclosure ditch 134099 in Zone 13 (410 sherds, 5745g), Early or Middle Iron Age pit 126141 (167 sherds, 847g) and Early or Middle Iron Age ditch 170101 in Zone 6 (95 sherds, 1623g), while a fifth, from medieval ditch 190440 in Zone 6 (54 sherds, 408g), consisted of residual material. Excluding these, the remaining 152 large groups (totalling 23265 sherds, 356181g) represented 67% by both sherd count and weight of all the pieces assigned to this period. For all phases of the latest Iron Age/Roman period, graves and the sunken-featured buildings were the only feature types consistently represented amongst these larger groups. For this reason, and to examine any contrast between the 'everyday' domestic assemblages and those deliberately chosen for use in burial contexts, the ceramics from these two features types have been selected to illustrate those used on Thanet during the 1st to 4th centuries AD.

Sunken-featured buildings

Overall, 6664 sherds (112185g), including some of residual Iron Age date and 44 unwashed undated pieces (372g) from samples, were recovered from the 17 structures of this type. The majority of pieces survived in relatively good condition and, at 16.8g, their mean sherd weight is above average for the assemblage as a whole. However, as very few sherds came from deposits which could be used to date the occupation of these structures and, even where stratigraphic sequences were observed within the backfills, little chronological variation was apparent amongst the pottery, the assemblages from these structures have mostly been considered as single groups. The chronological range of the material present in these features is shown in Table 9.11, while the fabrics are quantified in Table 9.12.

Negligible quantities (17 sherds, 342g) were recovered from Late Iron Age structure 205102 in Zone 19. Most were plain body sherds of Middle/Late Iron Age date (grog-, sand and flint- and shell-tempered fabrics), with a single flint-tempered, long, upright-

Table 9.11 Sunken-featured buildings; later prehistoric and Romano-British pottery by chronological period

Landscape	*Zone*	*Feature*	*Data*	*EIA*	*E/MIA*	*MIA*	*M/LIA*	*LIA*	*IA*	*LIA/ERo*	*ERo*	*MRo*	*LRo*	*Roman*	*Unknown*	*Total*
LIA	19	205102	No.			8	9									17
			Wt.			108	244									352
Early Ro	6	170175	No.				8	36	2	31						77
			Wt.				81	367	74	310						832
	10	249199	No.	1			7			30	72	5		11		126
			Wt.	24			34			357	1545	141		87		2188
	13	191125	No.		19			8		11	236			10		284
			Wt.		279			89		164	3977			168		4677
	13	193140	No.		44	4				237	1047			8		1340
			Wt.		1053	38				3693	23191			536		28511
	19	217091	No.				1			20						21
			Wt.				31			229						260
MRo	6	130227	No.		12		86	2	6	96	104	22		59		387
			Wt.		577		1914	20	39	1196	1319	381		1099		6545
	6	170136	No.				4			63	38	22		15		142
			Wt.				22			971	937	443		328		2701
	6	170168	No.				17		35	3	21	166		27		269
			Wt.				240		310	27	642	3331		471		5021
	13	295001	No.								3	1		82		86
			Wt.								7	3		882		892
	20	228059	No.							5	46	420		101		572
			Wt.							80	691	9245		1822		11838
	20	249049	No.								5	17		30		52
			Wt.								89	233		403		725
	20	249081	No.								15	414	1	68		498
			Wt.								770	6469	11	848		8098
LRo	6	170132	No.		8		12		62	13	39	47	12	207	33	433
			Wt.		117		163		900	208	778	1331	252	2649	247	6645
	6	170135	No.				58		3	1	30	722	24	76	11	925
			Wt.				748		51	12	306	9230	738	864	125	12074
	20	249083	No.								36	265	448	327		1076
			Wt.								504	3700	5900	5897		16001
	20	249085	No.								5	153	146	55		359
			Wt.								47	1872	2442	474		4835
Total No.				1	83	12	202	46	108	510	1697	2254	631	1076	44	6664
Total Wt.				24	2026	146	3467	476	1374	7247	34803	36379	9343	16528	372	112185

necked jar rim, probably of Middle Iron Age date. Otherwise, the earliest of the sunken-featured buildings is likely to be 170175 in Zone 6. Although the sherds (77, 832g) were comparatively small (mean weight 10.4g), all occurred in native-style coarseware fabrics, dominated by sand and flint-tempered wares (53% by sherd count). Grog-tempered wares accounted for a further 19%, and sandy wares 13%, of the sherds. Featured sherds were limited to rims from two bead rim jars, one in a flint-tempered and one in a sandy fabric, a grog-tempered necked jar (Thompson 1982, 87, type B1-1) and an upright-rimmed slightly shouldered jar and a flat-footed pedestal base fragment both in sand and flint-tempered fabrics. The assemblage also included ten residual plain body sherds (sandy, chalk-tempered and flint and organic-tempered fabrics) of Iron Age date, but overall, the range of fabrics and forms, coupled with the absence of any of the more 'Romanised' ceramics, indicated a late 1st century BC or early 1st century AD date for the filling of this feature.

Although only 21 sherds, 260g, were recovered, a Terra Nigra footing base fragment from sunken-featured building 217091 in Zone 19 suggested that it too was out of use sometime before *c* AD 85. Although the form could not be identified, all vessels in these fabrics ceased to be imported by about this time. All the others were plain bodies in local, Late Iron Age/early Roman grog-tempered and sandy ware fabrics, although one sand and flint-tempered Middle/Late Iron Age sherd was residual.

Larger early Roman groups were recovered from structures 249199 in Zone 10 and 191125 in Zone 13. Excluding the four large, heavy Cam 186 amphora sherds, the assemblage from 249199 survived in a comparatively poor, abraded condition. Native-style coarseware fabrics (flint-, grog-, sand and flint-tempered and sandy ware fabrics), together accounting for 78% of the sherds, continued to dominate this group, although a late 1st-2nd century AD date is indicated by the presence of the amphora and body sherds in 'Romanised' oxidised, white-slipped red ware and whiteware fabrics. Identifiable forms were limited to rims from two upright-necked jars (Thompson 1982, 87, type B1-1), two bead rimmed jars and a high-waisted bowl (similar to Monaghan 1987, 118, class 4C.1) in sandy ware fabrics, all of late 1st-early 2nd century AD date. However, five of the grog-tempered pieces (from context 130268) occurred in the hard, oxidised fabric more characteristic of the mid/late 2nd century AD, and may highlight the presence of other material of this date.

The assemblage from sunken-featured building 191125 in Zone 13 (284 sherds, 4677g) also consisted of a mixed group starting before the conquest and extending into the 2nd century AD. Greywares, including rims from eight bead rimmed jars, four S-profiled bowls (similar to Monaghan 1987, 112, class 4A1), three lids and two Canterbury-type sandy ware neckless, lid-seated jars, represented 59% of the group by sherd count. The grog-tempered wares (22% by sherd count) also included a rim from an everted rim jar/bowl in a hard, oxidised, white-slipped fabric likely to be of 2nd century date, as well as upright-necked and bead rimmed jars, storage jars and lids (Thompson 1982, types B1-1, B2-2, C2-1, C2-3, C6-1 and L) of late 1st–2nd century AD date. In this instance, all the other native-style coarsewares (flint-, sand and flint- and shell-tempered) were residual and of Early/Middle Iron Age or Late Iron Age date. Imported finewares included a piece from a Terra Nigra cup, probably of Cam 56, the most common TN cup form in Britain and imported from *c* AD 9-65 (Stead and Rigby 1989, 125) as well as South Gaulish samian form 15/17, 18 and form 15/17R or 18R platters and a form 27 cup, dating to *c* AD 50-110. Sherds from flagons, jars and butt beakers, one exhibiting evidence of a glued-repair, were identified among the oxidised, white-slipped red ware and whiteware pieces.

No sherds were found in layer 134091, described as being a 'floor' within sunken-featured building 193140 in Zone 13, and only negligible quantities occurred in oven 173198 (71g; greyware, flint- and grog- tempered fabrics; four of early Roman date and one residual Early/Middle Iron Age piece) and pit 173227 (four, 38g, residual Middle Iron Age body sherds) which also formed part of this structure. However, the largest (1331 sherds, 28,402g) and most significant early Roman group was derived from the post-abandonment fills (layers 173199, 173200, 172213, 173231, 1732321, 73237, 173238 and 200092) of this structure. The assemblage (Fig 9.6, 35-62) included numerous cross-context joins which may indicate rapid, deliberate backfilling, although most involved fresh, rather than ancient breaks. Although the assemblage was predominantly of later 1st-early 2nd century AD date, imports such as a globular beaker with a red-painted rim and barbotine herringbone decoration probably from the Marne-Vesle potteries and belonging within the first half of the 1st century AD (Stead and Rigby 1989, 134-6, fig 54, type GB 25), part of a Terra Nigra Cam 8 platter which probably reached Britain between *c* AD 10/25-65 (Stead and Rigby 1989, 124, fig 54, GB13) and the Dressel 1/Pascual 1 wine amphora sherds indicated the presence of at least some conquest material. Early Roman imports comprised two small pieces from South Gaulish samian form 15/17 and 18 platters (AD 50–110), and the Dressel 20 amphora sherds. Although from different contexts, the amphora handle sherds joined; further fresh breaks were noted at one end but the smoothed surface of the ancient break at the other end indicates that the handle was cut off its parent vessel and may even have been used as a rubber/polisher. The few sherds in oxidised and white-slipped red ware fabrics, from flagon and beaker/jar forms, further highlighted the 'Romanised' nature of this assemblage.

Overall, the greywares dominated the group (*c* 58% by both sherd count and weight) and included rims from at least 95 vessels, predominantly jars in a variety of narrow-necked, neckless, bead rimmed and facetted types (similar to Monaghan 1987, types 3A, 3B, 3E and 3F) along with necked cordoned bowls (*ibid*, type 4F), beaker (*ibid*, types 2B and 2I) and lid forms. One thick, flat base with a low footring on the underside may be from an unusual bowl or platter form (173200). The grog-tempered wares (22% by sherd count; 54 vessels) included 34 sherds, 662g (11% of the grog-tempered sherds by count, 9% by weight) made in fabrics with orange or brown surfaces and dark grey-brown core characteristic of the mid-1st century AD (Thompson 1982, 22). Vessel forms in these fabrics included three upright-necked jars (*ibid*, types B1-1 and B1-4) and at least one jug (Cam 161) comparable with an example from Whitehall Road, Canterbury (Thompson 1982, 532, type G6, no. 1193). The remaining grog-tempered sherds all occurred in soft, dark fired fabrics and included a wide range of forms, again dominated by upright-necked and bead rimmed jars, some of storage jar size (Thompson 1982, types B1-1, B2-2, B3-2, C2-1, C2-3, C3, C4, C6-1) and necked, cordoned bowls as well as cups (types E3-1, E3-5, E3-7 and an imitation Cam 57 form), platters (types G1-6 and G1-11) and butt beakers (types G5-5 and G5-6). Further bead rimmed and upright-necked jars, imitation butt beakers, lids and a shallow dish with curved walls (173200) occurred in the Late Iron Age/early Roman flint-tempered fabrics (16 vessels; 15% of the total by sherd count).

Ceramics from the three mid-Roman sunken-featured buildings in Zone 6 were also predominantly of late 1st to early 2nd century AD date, although there is some evidence from all three structures to suggest that these groups remained open into the second half of the 2nd century AD. As befitting the density of activity in this area, high levels of Iron Age residuality were apparent in the assemblages from buildings 130227 and 170168 (27% and 19% respectively by sherd count).

Late Iron Age/early Roman pottery from the primary fill (context 130230) of building 130227 consisted of a single sandy ware body sherd and six pieces (133g) of grog-tempered ware, including an imitation butt beaker rim (Thompson 1982, 525, type G5-6) and body sherds from rippled shouldered jar (type B2-1 or B2-2) and a thick-walled storage jar form, as well as four residual sand and flint-tempered sherds of Iron Age date. Residual Iron Age scraps were also recovered from the secondary fill (context 219123; 3 sherds 20g) and layers 176200 (2 sherds, 4g) and 176201 (1 sherd, 15g). The bulk of the assemblage, however, came from backfill deposit 130229 (369 sherds, 6336g) and was predominantly of mixed late 1st to early 2nd century AD date. All the samian was from Southern Gaul (*c* AD 50-110; cup forms 27 and 27g; possible form 30 bowl body sherd), the other imports comprising a small Terra Nigra

Table 9.12 Sunken-featured buildings; later prehistoric and Roman pottery by fabric type

Phase	*LIA*		*ERo*	*ERo*	*ERo*	*ERo*	*MRo*	*MRo*
Zone	*19*	*6*	*10*	*13*	*13*	*19*	*6*	*6*
Ware/Feature	*205102*	*170175*	*249199*	*191125*	*193140*	*217091*	*130227*	*170136*
South Gaulish samian				9/65	2/12		5/11	
Central Gaulish samian								
East Gaulish samian								
East Gaulish samian - Argonne								
East Gaulish samian - Rheinzarben								
East Gaulish samian - Trier								
Argonne roller-stamped ware								
Terra nigra				1/10	3/40	1/8	1/3	
Cologne colour-coated ware								
Central Gaulish black slipped ware								
Moselkeramik								
Dressel 20 amphora			1/6		2/436		6/483	5/216
North African amphora								
Amphora				2/182				2/126
Cam 186 amphora			4/912					
London 555 amphora								
Richborough 527 amphora								
Unassigned mortaria								
Canterbury/Kent mortaria								
North Gaulish mortaria								
Oxon colour-coated ware mortaria								
Oxon whiteware mortaria								
Fine greyware				1/8			19/79	
Marbled ware								
Mica-dusted ware								
Nene Valley colour-coated ware								
Unassigned colour-coated ware					1/9			
Oxon colour-coated ware								
New Forest colour-coated ware								
Oxidised ware			13/89	8/69	4/72		12/96	3/11
White slipped red ware			8/58	2/99	2/46		7/137	
Whiteware		1/2	2/10	9/213				1/31
North Gaulish whiteware							1/39	3/86
Verulamium-region whiteware								
Oxon whiteware								
Hadham oxidised ware								
Greyware			168/2306	774/16470		41/520	10/112	33/515
Grog-tempered ware	2/7	15/146	29/388	63/1689	302/7097	18/211	94/1434	56/1288
Sand and flint	2/7	41/440	10/73	18/266	29/659	1/31	169/3403	44/695
Flint-tempered	8/108	1/39	1/24	8/89	204/2991		2/24	
Sandy ware		16/126	59/636	2/24		1/10	28/296	21/293
Shell-tempered	5/220			1/13	1/17			
Sand and grog-tempered					5/267			
Grog and calcareous inclusions								
Sand, rare fine flint and grog				1/29				
Black Burnished ware								
Chalk tempered ware		2/74						
Glauconitic sandstone-gritted							2/20	
Flint and organic ware		2/7						
Fabrics not examined								
Unwashed sample sherds								
Totals:	17/342	77/832	126/2188	284/4677	1340/28511	21/260	387/6545	142/2701

rim of uncertain form, North Gaulish whiteware flagon body sherds and Dressel 20 amphora. Identifiable forms comprised upright-necked (3 examples) and bead rim (5 examples) jars in grog-, sand and flint- and greyware fabrics, a chanelled rim jar (Fig 9.8, 69) in a Canterbury-style sandy greyware fabric and a sharply carinated beaker in fine greyware probably from north Kent (Monaghan 1987, 68, class 2G), while two rims from everted rim jars/bowls in the hard, oxidised grog-tempered Native Coarse Ware style fabric may indicate that filling of this feature continued into at least the third quarter of the 2nd century AD.

Although still predominantly of later 1st to early 2nd century AD date, the smaller assemblage from structure 170136 included at least 22 sherds in these hard, oxidised grog-tempered fabrics, including a rim, broken

MRo 6 170168	*MRo 13 295001*	*MRo 20 228059*	*MRo 20 249049*	*MRo 20 249081*	*LRo 6 170132*	*LRo 6 170135*	*LRo 20 249083*	*LRo 20 249085*	*Total*
2/80	3/7				2/28		12/69		35/272
12/76	1/3	14/156	3/16	27/368	15/219	11/101	58/708	6/104	147/1751
							2/38		2/38
						3/51	1/79		4/130
				1/8			4/52		5/60
				1/24			2/96		3/120
							1/8		1/8
									6/61
1/3				1/2	1/3				3/8
						1/2			1/2
				1/4					1/4
		3/957		6/232	10/753		20/1664		53/4747
				1/77		20/550			21/627
					5/253			9/561	
									4/912
							2/151		2/151
1/331									1/331
				2/78		11/198	2/90		15/366
		2/102		1/60		2/82	2/230		7/474
				3/172		3/52			6/224
				1/11			2/43	2/23	5/77
					2/85	2/30		3/145	7/260
33/246		69/553	6/76	50/226	16/48	20/139	156/1283	25/148	395/2806
				3/29					3/29
		10/77							10/77
							5/9		5/9
						1/2			2/11
					7/51	4/188	20/185	21/243	52/667
							1/8		1/8
26/331		21/314	12/145	57/586	15/141	68/573	63/660	20/241	322/3328
2/16		1/23	1/16	13/119	3/44	9/50	4/39	3/12	55/659
				1/6	2/22	1/25		17/309	
				1/13		2/16	2/33		9/187
1/10								5/47	6/57
					2/100		2/10		4/110
							1/23		1/23
	102/1467	12/128	128/1311	106/1140	587/7182	450/5706	140/1973	2551/38830	
98/2586		325/7683	16/308	193/4222	99/1865	69/1104	248/4105	134/1899	1761/36032
44/433		2/32			68/944	59/765			487/7748
7/112					19/301	3/64			253/3752
		3/48			11/163				141/1596
5/120		20/426	2/36	8/556	7/170	11/129	4/147		64/1834
						20/384			25/651
1/5					14/304				15/309
					1/17	1/12	7/454		10/512
					1/16		4/86		5/102
									2/74
									2/20
									2/7
	82/882								82/882
					33/247	11/125			44/372
269/5021	86/892	572/11838	52/725	498/8098	433/6645	925/12074	1076/16001	359/4835	6664/112185

at the neck/shoulder junction, from an upright-necked jar form. Imports were limited to a residual North Gaulish whiteware pulley-wheel flagon rim and Dressel 20 amphora. A far wider range of fabrics was present in the assemblage from sunken-featured building 170168 and although residual Iron Age and 1st to early 2nd century AD material was present, approximately 62% of the sherds belonged to the period *c* AD 120/130-200, perhaps extending into the early decades of the 3rd century AD. Central Gaulish samian appeared for the first time, and included pieces from at least 12 vessels of forms 18/31, 27, 33, 37 and 42, dated to *c* AD 120-200. Other tablewares of 2nd century AD date included small pieces from a Cologne colour-coated ware roughcast beaker and 'poppy-head' beakers (Fig 9.8, no. 70) and high-waisted bowls in North Kent fine greyware fabrics

(Monaghan 1987, types 2A and 4A). A shallow dish with a grooved rim in an off-white fabric sparsely tempered with quartz sand (Fig 9.8, no. 71) may be of Gaulish origin, while a cup-mouthed ring-necked flagon (Fig 9.8, no. 72; similar to Marsh and Tyers 1979, 550, IB8, *c* AD 130-180/200) in a sandy oxidised fabric was probably of local origin. A new range of forms was apparent amongst the coarsewares too, with everted rim (Fig 9.8, no. 73 and 'cooking-pot' style jars, reed rimmed and decorated, triangular-rimmed bowls/dishes (Fig 9.8, no. 74), shallow, grooved rim dishes and lids (similar to Monaghan 1987, types 3H, 3J, 5D, 5F and 12) present among the 12 greyware vessels represented by rims. Many of the greyware sherds were at least partially oxidised and were probably mainly from north Kent, although at least one Canterbury-style sandy ware vessel (a reed rimmed bowl; (Fig 9.8, no.75) was included. Almost all the grog-tempered wares occurred in the hard, oxidised Native Coarse Ware style fabric, forms including at least seven everted rim jars/bowls, one everted rim jar and a lid.

Although not examined in detail, a similar mid-Roman date is likely for the filling of sunken-featured building 295001 in Zone 13, evidenced by a Central Gaulish samian form 27 cup body sherd (AD 120-160) along with hard, oxidised Native Coarse Ware style grog-tempered wares, greywares and white-slipped red ware flagon sherds. This structure is therefore likely to be the latest – or longest-lived – in this area.

The backfill deposits of mid-Roman sunken-featured buildings 228059, 249049 and 249081in Zone 20 also contained a similar range of ceramics (Fig 9.8, nos 76-81) dating from *c* AD 120/130 into the early 3rd century AD, indicating that these structures were abandoned and in a state of collapse by this time, the assemblage from building 249081 perhaps continuing later than the other two. Small quantities of mortaria from a variety of sources, including residual North Gaulish pieces of 1st century AD date from structure 249081, occurred in these assemblages, but were absent from all the earlier buildings of this type. Similarly, sherds North Kent/South Essex shell-tempered storage jars (Fig.9.8, no. 76; Monaghan 1987, type 3D1) were recovered from all three buildings. These vessels were produced up to *c* AD 140/50 although individual pots may well have persisted beyond this, especially if made close to the end of the production phase (Monaghan 1987, 223). Late 2nd century Central Gaulish samian was also found in each of these buildings while a sherd from a Mosel-keramik folded beaker and Rheinzabern and Trier samian (a form 37 body and a form 31R/Lud Sb rim), all of late 2nd–mid 3rd century date, highlight the later date of the assemblage from building 249081, which might just continue into the period after *c* AD 240 evidenced by a single piece of an Oxfordshire colour-coated ware mortaria (Young 1977, 173, type C97) and the North African amphora sherd, although no obviously late coarsewares were present.

Nine sherds, 115g, including a plain, hard, oxidised grog-tempered sherd probably of later 2nd to early 3rd century AD date, four earlier grog-tempered sherds, including one from an upright-necked jar, a whiteware body sherd and three residual pieces of Middle/Late Iron Age date, were found in the primary fill (context 289049) of late Roman sunken-featured building 170132 in Zone 6. Significant quantities of pottery (71 sherds, 1329g) were also recovered from an 'occupation horizon' (context 289045) within this structure. In addition to residual Iron Age and early Roman sherds, eight pieces of Central Gaulish samian (forms 18/31, 31, 30, 30 or 37 and 45; dated to *c* AD 120-200), five sherds in the hard, fairly thin-walled Baetican amphora fabric (Dressel 20 or 23) and eight pieces, including a rim from an everted rim jar/bowl, in the hard, oxidised Native Coarse Ware style grog-tempered wares indicated a later 2nd or early 3rd century AD date for this deposit and the use of this structure. A very small piece (6g) from an Oxfordshire red-colour-coated ware bowl was probably intrusive. Eight small Iron Age or Roman sherds (38g) were also found in an *in situ* burning deposit (context 246249) within late Roman building 170135 but none of them could be closely dated.

Very mixed assemblages were recovered from the backfill deposits in both these buildings (Fig 9.10, 88-94) and in each case about 3% of the sherds could be assigned a definitively Late Roman date. Most of the pieces, however, were very fragmentary, reflected in the lower than average mean sherd weights (15.3g and 13g respectively) for these features. Greywares (101 pieces, 1057g) accounted for 28% and grog-tempered ware 23% (99 sherds, 1865g, mostly from 2nd to 3rd century AD everted rim jars/bowls) of all the sherds from the backfill deposits (totalling 353 sherds, 5201g) in building 170132. In building 170135, the greywares represented 63% of the sherds while the grog-tempered wares were very much in the minority and probably residual, representing only 7% of the sherds. Greyware forms were limited to rims from everted rim and cooking-pot style jars, dropped flanged bowls, shallow, plain- and grooved-rimmed dishes of later 3rd or 4th century AD date, while the sherds from at least twelve 'pie-dishes', a large bead rim jar and an upright-necked jar/bowl are likely to be of 2nd to early 3rd century AD date and residual here. The samian, imported finewares (Central Gaulish black slipped ware and Cologne colour-coated ware), imported mortaria and amphorae all occurred residually in these deposits, although the North African amphora sherds may well be of late Roman date. Most of the oxidised ware, white-slipped red ware and whiteware fabric sherds occurred as plain bodies and few could be precisely dated. One of the unassigned mortaria from building 170135 was made in a red-slipped sandy fabric with irregular clear and white quartz/quartzite trituration grits up to 3mm across and may be of late Roman date. Vessels from the Oxfordshire region comprised red colour-coated ware bowls (Young 1977, type C51 and unassigned bead-rimmed fragments), a jar (Fig 9.10, no. 94) and brown colour-coated ware beaker sherds, some with rouletted and/or white paint decoration as well as whiteware painted bowls (Fig 9.10, nos 90 and 91) and mortaria (Young types M11 and M22). There was also a single beaker body sherd from the New Forest.

Although both contained material spanning the entire Roman period, at least 40% of the sherds from sunken-featured buildings 249083 and 249085 in Zone 20 were of late Roman date. A single Roman greware sherd (4g) was recovered from an 'occupation horizon' (context 144131) within structure 249085, but it could not be more precisely dated. All the other sherds from both structures were found in the backfill deposits, rims from at least 98 vessels occurring in building 249083 and 45 in structure 249085.

Within structure 249085, the greywares and grog-tempered wares occurred in almost equal quantities, but in the larger group from building 249083 (Fig 9.10, 95-101) the greywares outnumbered the grog-tempered wares by almost 2:1. By this time, at least half the grog-tempered wares in both groups occurred in the dark-fired fabrics typical of the later 3rd and 4th centuries AD, although many were still comparatively hard. Vessel forms included shallow, plain rimmed dishes, and dropped flange bowls as well as storage jars, a long-necked jar and numerous everted rim jars and jars/bowls, although the latter are likely to be residual. A similar range of late 3rd and 4th century AD everted rim and cooking-pot style jars, shallow, plain and grooved rimmed dishes and dropped flange bowls occurred among the greywares from both structures. Most of the greyware vessels probably derived from local sources or the ailing Thameside industry. However, sherds from two narrow-necked storage jars with D-shaped rims (Fig 9.10, no. 97) and a high-shouldered, jar with an inturned, moulded rim (Fig 9.10, no. 98) from structure 249083 are likely to be of similarly late date. The South-east Dorset Black Burnished wares included a single everted rim jar sherd (Fig 9.10, no. 99; Seager Smith and Davies 1993, 231, WA type 3) also of later 3rd–4th century AD date.

Part of a cheese-press (Fig 9.10, no. 100) in a coarse sandy oxidised fabric was also recovered from sunken-featured building 249083; other oxidised ware, white-slipped red ware and whiteware sherds were mostly assigned only a generalised Roman date. Most derived from flagons but a narrow-necked flask was also included. Although residual, unusual sherds from structure 249085 included a Verulamium region whiteware tazza rim and a piece with an applied 'eye-brow', possibly from a face-pot, both probably of 2nd century AD date. The assemblages from both structures included late Roman tablewares and mortaria, in whiteware and red colour-coated ware fabrics from the Oxfordshire region (Young 1977, types M17, C47, C49 and C51).

The more diagnostic elements of both assemblages, however, suggested that much of the backfill material accumulated during the 4th century AD. This was indicated by a rim from an Oxfordshire colour-coated ware necked bowl (Young 1977, 164, type C75; *c* AD 325-400) and bowl body sherds with rosette stamped decoration from sunken-featured building 249085. Fourth century material from 249083 comprised the piece of Argonne roller-stamped ware (Chenet 320), the Hadham oxidised ware body sherd, two Oxfordshire red colour-coated ware bowls (Young 1977, types C52 (*c* AD 350-400) and C81) and a mortarium of form C100. A wall-sided carinated bowl (*ibid*, type C81) had post-firing perforations indicative of a staple repair. A large jar base in a sand, rare fine flint and grog-tempered fabric may also represent a local response to the decline of the nucleated coarseware pottery industries at this time.

Vessels from Graves

In total, 81 ceramic vessels were found deliberately deposited in 41 graves and two probable cenotaphs, the number in each varying from one to five. The number of vessels per grave correlated with burial type is shown in Table 9.13; descriptions of the individual vessels can be found in the grave catalogues.

The date range of the burials spanned the period from the first half of the 1st century AD until the 4th century AD, but some of the vessels may have been antique at the time of burial. The number of graves containing pottery belonging to each phase and correlated with burial type is shown in Table 9.14, the total number of vessels present being given in brackets. All the urned cremation burials discovered along the route used pottery vessels as containers and exactly half of these also contained ceramic ancillary vessels in numbers ranging from one to three. The three unurned cremation burials accompanied by pots represent 16% of the total number discovered (19; four of Late Iron Age/early Roman and 15 of Roman date; McKinley this vol.). There was no evidence to suggest that any of the vessels containing or accompanying the cremated human remains had been included on the pyre. The 15 inhumation burials including ceramic vessels in numbers varying from one to three, represented approximately one-quarter of all those of this rite discovered on the route, which for this period totalled 62 (six of Late Iron Age/early Roman and 56 of Roman date; McKinley

Table 9.13 Number of vessels per grave correlated with burial type (number of graves shown)

No. vessels	*Urned cremation burials* – *Containers*	*Urned cremation burials* – *Additional ancillary vessels*	*Unurned cremation burials*	*Inhumations*	*Cenotaphs*
1	22				
1		4	1	9	1
2		3		5	1
3		4	1	2	
5			1		
Total no. of graves	22	11	3	16	2

Table 9.14 Burial type correlated with chronological period (number of graves shown with the total number of ceramic vessels present shown in brackets)

Period	*Urned cremation burials*	*Unurned cremation burials*	*Inhumations*	*Cenotaphs*	*Total*
LIA/ERo	4 (7)	2 (8)		1 (1)	7 (16)
ERo	3 (6)	1 (1)	1 (1)		5 (8)
MRo	13 (27)		10 (18)	1 (2)	24 (47)
LRo			4 (5)		4 (5)
Roman	2 (4)		1 (1)		3 (5)
Total	22 (44)	3 (9)	16 (25)	2 (3)	43 (81)

this vol.). The presence of worn, altered and/or repaired pots within the grave assemblage suggests that these vessels were drawn from the domestic supply; as Philpott (1991, 36) has pointed out "there appears to have been no stigma attached to the use of imperfect or used vessels as grave goods".

Within the grave assemblage, local fabrics predominated, with coarsewares being much more frequent than the finer fabrics (Table 9.15), especially amongst the vessels selected to contain the cremated human remains. Three of the grog-tempered vessels used as containers (Fig 4, 73: 3630, Fig 4, 81: 2051 and Fig 4.88: 3617) and one ancillary vessel, a decorated butt beaker (Fig 4, 74: 3639) from unurned cremation burial 126334, all in Zone 19, were made in the red-surfaced fabric considered by Thompson (1982, 22) to be most common during the period *c* AD 30–50. As at Each End, Ash (Savage 1998, 134), no clear examples of Canterbury greyware vessels occurred amongst the grave assemblage, although at least one Thameside greyware (BB2) pie-dish (Fig 4, 109: 1814) was included as an ancillary vessel (inhumation grave 128084 in Zone 20). Imported finewares (samian, Cologne colour-coated ware, Terra Rubra and Terra Nigra) occurred as ancillary vessels only, although a Dressel 20 amphora had also been chosen as a container for the cremated human remains found in grave 153060 in Zone 19. Burials made in Dressel 20 amphorae are comparatively

Table 9.15 Fabrics present amongst the grave assemblage (vessel count shown)

Ware	*Containers*	*Ancillary vessels*	*Total*
Grog-tempered ware	15	11	26
Greyware	5	9	14
Fine greyware	1	11	12
Central Gaulish samian		10	10
Oxidised ware		4	4
Oxon colour-coated ware		3	3
Sandy ware		2	2
White slipped red ware		2	2
Whiteware		2	2
Black Burnished ware		1	1
Cologne colour-coated ware		1	1
Dressel 20 amphora	1		1
New Forest colour-coated ware		1	1
Terra Nigra		1	1
Terra Rubra		1	1
Total vessels	22	59	81

well-known (Callender 1965, 25-7), especially in south-east England where most are of mid-late 2nd century AD date. Philpott, for example, listed 64 examples from Kent alone (1991, 22; 403, fig 4), and more recently, further examples have been discovered on the route of the Monkton gas pipeline (Perkins 1985, 54), at Each End, Ash (Savage 1998, 136) and in the Cottington Road cemetery (Egging Dinwiddy and Schuster 2009, 100). It is possible that redeposited human bone and Dressel 20 amphora sherds recovered from the backfills of inhumation grave 248221 and an adjacent pit 248231 in Zone 10 originated from a similar amphora burial destroyed by, and re-deposited in, the later grave but as the status of this deposit remains uncertain, it has not been included in the quantifications presented here. Vessels from more distant British sources (South-east Dorset Black Burnished ware, Oxfordshire and New Forest colour-coated wares) occurred only in 4th century AD graves and as ancillary vessels accompanying inhumations.

In addition to the amphora, jars and other large closed forms with capacities of *c* 4-5 litres, where measurable, were preferentially selected as cinerary containers. Nine of these vessels (one in greyware and eight in grog-tempered fabrics) survived as base and body sherds only and could not be closely assigned to type; one of these (Fig 4, 85: 2073), of 2nd to 3rd century AD date and from mid-Roman grave 220099 in Zone 19, had had a post-firing perforation drilled through the underside of its base prior to deposition. During the Late Iron Age/early Roman period, the distinctively 'Belgic' pedestal-based vessels (eg, Fig 4, 63: 1288, Fig 4, 81: 2051, and Fig 4.86: 3632) were preferentially selected for this role. The use of a jug or narrow-mouthed jar with at least one wide, strap handle (Fig 4, 73: 3630); Thompson 1982, 529, type G6) in the red-surfaced grog-tempered fabric in this role is more unusual, although examples are known in the King Harry Lane cemetery (Stead and Rigby 1989, 201). The narrow neck of this vessel may have resulted in the partial destruction of the rim/neck/handle to allow it to be filled.

By the mid-Roman period, vessels chosen as containers included greyware storage (Fig 4, 31 Monaghan 1987, type 3D) and everted rim jars (Fig 4, 79: Pl 13.43; *ibid*, type 3H), a wide-mouthed, S-profiled bowl in fine greyware (Fig 4, 117; *ibid*, type 4A) and, more unusually, a double-handled flagon (Fig 4, 47: 5003). This vessel, from urned cremation grave 42001 in Zone 10, was made in a white-slipped greyware fabric, and had a capacity of 5.1 litres. Although the rim and handles are now missing, its double-handled status is clearly indicated by the scars surviving on the shoulder. At only 30mm in diameter, the neck of this vessel was too narrow to allow the passage of the larger pieces of bone found within it (McKinley, this vol. Pl 13.1), and it appears that the rim/neck/handles were removed in antiquity, probably to make filling possible. The upper part of the vessel then seems to have been replaced in its correct position, prior to or during deposition. Some of the surviving neck sherds were found inside the vessel and a clear distinction can be made between the ancient breaks at the base of the neck and the fresh breaks around the top and one side, where the vessel was damaged during stripping/excavation, destroying the rim. A second narrow-necked greyware vessel (Fig 4, 116: 3767), was also adapted to provide a wider opening and used as the container for the cremated remains. Philpot (1991, 30) listed only three sites where flagons were used in this way during the post-conquest period, but these included another local example from Cranmer House, Canterbury (Frere *et al* 1987, 61-2). One side of the grog-tempered flared rim jar used as the cinerary container in grave 279096 in Zone 19 had been extensively repaired using glue (Fig 4, 88: 3617).

The ancillary vessels of all periods were biased towards eating (bowls, dishes and platters) and drinking (beakers, cups and flagons) related forms and occurred in a far wider range of fabrics. Few differences related to anything other than chronology were apparent between the ancillary vessel assemblages from cremation and inhumation graves. All the early imported finewares occurred in a single unurned cremation grave 147141 in Zone 11 where a suite of five vessels and a two-piece Colchester brooch, a type most common during the middle years of the 1st century AD date (Scott this vol) accompanied the cremated bone of an adult, probably a male, which may have originally been contained within a bag fastened with a second sprung brooch. Four of the vessels are likely to be of Gallo-Belgic origin – a single-handled, globular bodied flagon (Cam 131; Fig 4, 50: 436) and a Cam 113 butt beaker (Fig 4, 50: 437) both in fine whiteware fabrics, a Cam 8 platter in Terra Rubra fabric 1C stamped by Vervico (Fig 4, 50: 439; potter no. 139 in the Gallo-Belgic pottery database) and a stamped Terra Nigra Cam 56A cup (Fig 4, 50: 438; potter no. 378 in the Gallo-Belgic pottery database). The fifth vessel, a necked, cordoned bowl, was made in a local grog-tempered fabric (Fig 4, 50: 438). The butt beaker survived in good condition, but the surfaces of the other four vessels were all flaked, damaged or otherwise abraded so that little of the original surface finishes survived. Neither the bowl nor the flagon, which had unfortunately lost its rim, were closely datable, but the Cam 8 form was standardised between AD 10 and AD 25, continuing to be produced until *c* AD 65; at King Harry Lane, it was mostly found with Tiberio-Neronian vessels (Stead and Rigby 1989, fig 54, type GB13). This vessel may have been made in Reims (Rigby pers. comm.). The Cam 113 form belongs within the period AD 5–60 (Hawkes and Hull 1947, 238-9) while the Cam 56 cup form was also standardised before AD 9 and continued in production until *c* AD 65 (Stead and Rigby 1989, 125). It is also of some interest that the Cam 8 platter had been repaired in antiquity with glue probably derived from birch bark tar. Although this burial was certainly made during the middle decades of the 1st century AD, the juxtaposition of grog-tempered and Gallo-Belgic vessels and the absence of anything overtly 'Roman' (eg, early samian or sandy fabrics) suggest that it is of pre-Conquest date.

The three Central Gaulish (Lezoux) samian vessels found as ancillary vessels in urned cremation burials 153063, 166082 and 220099 in Zone 19 formed a tightly clustered chronological group dating from *c* AD 125–165. All three were stamped (Stamp cat. nos. 14-16) and belong to the most common forms found in Britain. The Drag 18/31 dish stamped by Malledo of Lezoux (Fig 4, 76: 1268; Hartley and Dickinson 2009, 225-8; AD 130–165) was found positioned on its side, inside and against the wall of the Dressel 20 amphora in grave 153060, and provides a closer approximation of the date of this burial. This vessel has a complex, abstract post-firing graffito scratched into the underside of its base (Fig 4, 76: 1268) and a chip missing from its rim. This form of damage was also noted on vessels from the Coldswood Road cremation cemetery (Jones 2009, 114), and may be an indication "that the pot itself rather than the contents was offered as a gift to the deceased' (Philpott 1991, 112). Unusually, too, in this burial, the amphora (Fig 4, 76: 1269) had been deposited in an inverted position, the upper half only surviving. It was found missing the rim, removed in antiquity, and with its handles deliberately sawn off, suggesting that it had already been adapted for re-use at some stage prior to its final usage as a cinerary container. In typical amphora burials, including those from Each End, Ash (Savage 1998, 136) and Cottington Road (Egging Dinwiddy and Schuster 2009, 100), the vessels, without their necks and handles, were deposited in an upright position, and closed by other pottery vessels or items such as quern stones (Philpot 1991, 23) or by the neck being repositioned on the shoulder.

The Drag 33 cup (Fig 4, 85: 2074), from grave 220099 had been repaired in antiquity with glue and was much larger than the slightly later vessel of the same form found in Zone 20 (Fig 4, 115: 4029). Monteil (2012, 333, fig 32.4) has shown that these cups basically occur in two sizes in Britain, and it may or may not be significant that one of each had been chosen for inclusion in graves. The Drag 18/31 dish stamped by Calava (Fig 4, 79: 1264) was complete with not even a small chip missing although it is of irregular shape. The footring, however, is moderately worn, and appears to have one or perhaps two deliberate grooves cut across it. The vessels included in this burial comprise the typical range seen in cremation graves across south-east England – a large jar as a cinerary container (Fig 4, 79: 1278; this example has a capacity of 4 litres), a flagon, although in this instance a flask had been substituted (Fig 4, 79: 1260), a cup or beaker (Fig 4, 79: 1261) and a plate or dish (Fig 4, 79: 1264). This combination probably represented the usual Roman table setting and as such, may indicate that a meal was set out for the deceased (Philpot 1991, 112).

Samian vessels were also found in the similar suites of vessels accompanying the three inhumations (182241, 198300 and 216094) and two (215193 and 215199) of the three urned cremation burials in Cemetery 249089 in Zone 20. Within this small group, the frequency of imported fineware vessels in burials of both rites, the occurrence of graffiti and the presence of a decorated 'black samian' jar are all features worthy of note. That said, samian is more frequently found in burial contexts associated with smaller rural centres and small towns in south-east Britain than it is in the cemeteries of the larger urban, civil or military centres (Willis 2005, section 9.4; Cool and Leary 2012, 312, table 29.7) and may therefore be considered a 'usual' part of both burial rites. Cool and Leary, for example, have suggested that cremation burials in the rural southeast 'have a disproportionate amount of graves with samian' as well as an increased frequency of graffiti (2012, 312-3) and it is perhaps more surprising that greater numbers of samian vessels were not found along the East Kent Access Road route. However, if the ceramic vessels associated with mid-Roman burials are considered in isolation, the samian vessels from these sites (nine out of a total of 46 vessels; 20%) are only slightly less frequent than those from the broadly contemporary burials at Each End, Ash, where 13 (26%) of the 48 pots recovered were samian, all undecorated (Savage 1998, 133).

All six samian vessels from Cemetery 249089 were from the Central Gaulish kilns around Lezoux. It is probable that all five plain ware vessels, three dishes (Fig 4, 112: 3782, Fig 4, 113: 3772, and Fig 4.116: 3769) and two cups (Fig 4, 115: 4029 and Fig 4.114: 3808), were stamped, but the Drag 27 cup (Fig 4, 114: 3808) from inhumation grave 216094 was heavily worn when deposited and this wear has obliterated any stamp that may have existed. All are types commonly found accompanying burials. In the Pepper Hill (Springhead) cemetery, for example, 25 of the 32 complete or near complete samian vessels were platter or dish forms, the most common being vessels in the Drag 18-18/31-31 series (Bird, typescript 2005). Cups, by comparison, were uncommon at Pepper Hill, but in the Ospringe cemetery, Drag 33s accounted for nearly a third of the samian (Whiting *et al* 1931). Although a wider range of forms was identified amongst the vessels from Each End, Ash, all were dishes or cups (Savage 1998). The sample from the East Kent Access Road sites is much smaller, but together with the three vessels from the Zone 19 burials there are five dishes and three cups. As noted above, the two cups are of distinctly different sizes, but the dishes are all of similar size, between 180mm and 190mm in diameter.

The Drag 27 cup (Fig 4, 114: 3808), in a micaceous fabric, is the earliest in the group, and of Trajanic date. Such vessels, often referred to as 'pre-export' Lezoux ware, pre-date the main phase of pottery production for export at Lezoux. This vessel, internally worn, battered and with a chip missing from the external face of the rim, seems to have been in use for a long time, and may have been old when deposited. Factors such as duration of use and the age of vessels when deposited are inevitably difficult to assess, and a note of caution must be sounded here as the early 2nd century AD Lezoux wares were not as hard-fired as the later products from this region, although this example is not particularly soft. It was accompanied in this burial by a white-slipped red ware globular bodied flagon (Fig 4, 114: 3809), probably of 2nd century AD date, but missing its rim so it could not be more closely dated.

Unusually, two graves in Cemetery 249089 included two samian or other imported fineware vessels. At Pepper Hill, only two burials were accompanied by two samian pots (Bird typescript 2005) and in the much larger cemetery at Ospringe, just eight examples were recorded. The inhumed burial of a two or three year old infant in grave 182241 included a Cologne colour-coated ware hunt cup (Fig 4, 112: 3781) as well as a deliberately chipped Drag 31 dish stamped by Tituro (AD 170-190 (Fig 4, 112: 3782) and a plain, greyware globular-bodied beaker (Fig 4, 112: 3783). The urned cremation burial of an adult female and a two year old infant (grave 215193) also included three ancillary vessels, comprising a Drag 33 cup stamped by Doccius ii (AD 160-200; (Fig 4, 115: 4029), a small, oxidised ware globular-bodied flagon or flask (Fig 4, 115: 4030) and a Central Gaulish 'black samian' handled beaker of Déchlette form 74 (Fig 4, 115: 4031). As noted above, these vessels are far from common in Britain, and although decorated beakers/jars were found by Willis to represent some 5% of the 2nd century AD samian vessels from burials associated with small civil centres (2005, section 9.5.3, chart 19), none of these were so-called 'black samian'. Indeed, the very presence of decorated vessels in grave assemblages is itself unusual and may perhaps have been restricted to individuals considered exceptional within their communities until the latter part of the 2nd century AD, when a certain relaxation or change of attitude to the use of decorated vessels in funerary contexts appears to have occurred (Cool and Leary 2012, 312-3, table 29.7). In a recent paper, Biddulph (2012) explored the use of samian as a tool for estimating funerary expenditure. If, for comparative purposes, the hunt cup is considered to be 'honorary' samian, these two graves, both containing two samian vessels (a red cup or dish and a rare, dark coloured decorated beaker), are likely to reflect greater expenditure than any of the other Roman graves along the route. Biddulph valued cups and beakers at £15 each and dishes at £25 (*ibid*, 297, table 28.3); using this model, the vessels from inhumation grave 192241 are likely to have cost the most (£40 compared with £30 for the vessels from grave 215193), although his values do not take into account the rarity of the handled Déchelete 74 form. These figures are broadly comparable with Biddulph's mean expenditure of £33.53 per grave for rural settlements, £30.46 for small towns and £28.81 for urban centres, but way below that for high-status graves (£81.75), while a single grave at Westhawk Farm, Ashford contained samian vessels totalling £155 (*ibid*, 197-9).

The Doccius ii cup from grave 215193 (Fig 4, 115: 4029) is also unusual in that it carried a literate graffito, probably a name, scratched into the exterior surface while the vessel was in an inverted position. Two other post-firing scratched graffiti also occurred amongst this group. One, again consisting of five letters, occurred on the underside of the base of the Drag. 31 dish stamped by Briccus (Fig 4, 113: 3772) included in the burial of a 12 to 14 year old sub-adult in grave 198300, while the Drag 18/31 dish stamped by Pater ii from urned cremation burial 215199 (Fig 4, 116: 3769) had an X on the exterior surface of the lower body and three cuts or grooves across the footring (one diagonal, the other two as a pair 8mm apart). This vessel may also have been cracked or broken in two before deposition; halved and quartered vessels have been noted in burial contexts at Ortons Pasture, Rocester, Staffordshire and Strood Hall, Essex (Cool and Leary 2012, 314) but in general, this seems to have been an uncommon practice.

In all, 27 of the ancillary vessels survived in a sufficiently complete state for their capacities to be measured. The three cups each contained between 100-180ml, the nine beakers varied more widely. At just 70ml, the smallest of these, an Oxfordshire colour-coated ware vessel (Fig 4, 22: 658) from late Roman inhumation grave 254020 in Zone 6, is perhaps better considered a 'miniature' and, as such, may date to the very end of the 4th century AD (Young 1977, 174, fig 66, type C104), although similar vessels in larger sizes (*ibid*, type C22) were made throughout the main late Roman production phase of this industry. Five beakers, including the Cologne colour-coated ware hunt cup, one in Oxfordshire colour-coated ware (Fig 4, 40: 4251) and three in fine greyware or oxidised fabrics, contained 180-225ml. The three largest, all fine greyware 'poppy-head' or globular bodied forms (Monaghan 1987, types 2A and 2I), contained between 480-500ml, broadly equivalent to the jar (500-850ml; 3 vessels) and flagon (600-800ml; 2 vessels) forms. The flasks also show greater variability with two of the four, both narrow-necked greyware vessels (Fig 4, 39: 4258 and Fig 4, 79: 1260; Monaghan 1987, type 1B5 or 6) containing *c* 500ml, and probably functioning as liquid containers within these grave assemblages. An Oxfordshire colour-coated ware flask included in grave 179267 in Zone 10 (Fig 4, 40: 4220) held 300ml, less than double that of the beaker (Fig 4, 40: 4251; 180ml) in the same fabric found with it. A second possible 'miniature', a small greyware pear-shaped flask with a flared rim (Fig 4, 69: 1246) included in inhumation burial 220054 in Zone 19, held just 190ml, but it was noticeable that this vessel did not pour water well, and may have been used for a more viscous liquid or semi-solid that could be dripped out or dipped into, rather than poured. The six measurable bowls and dishes all contained between 300ml and 400ml.

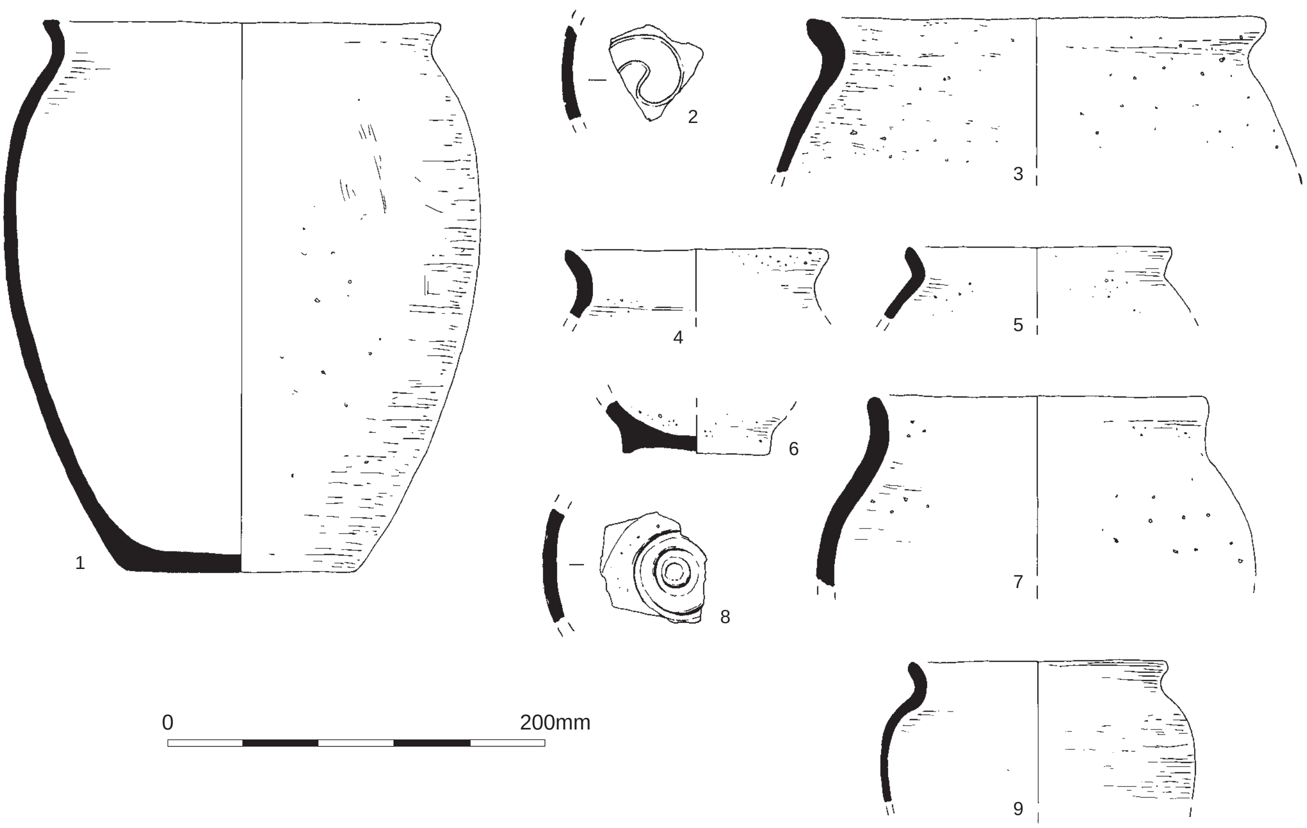


Fig 9.3 Middle/Late Iron Age pottery (nos 1–9)

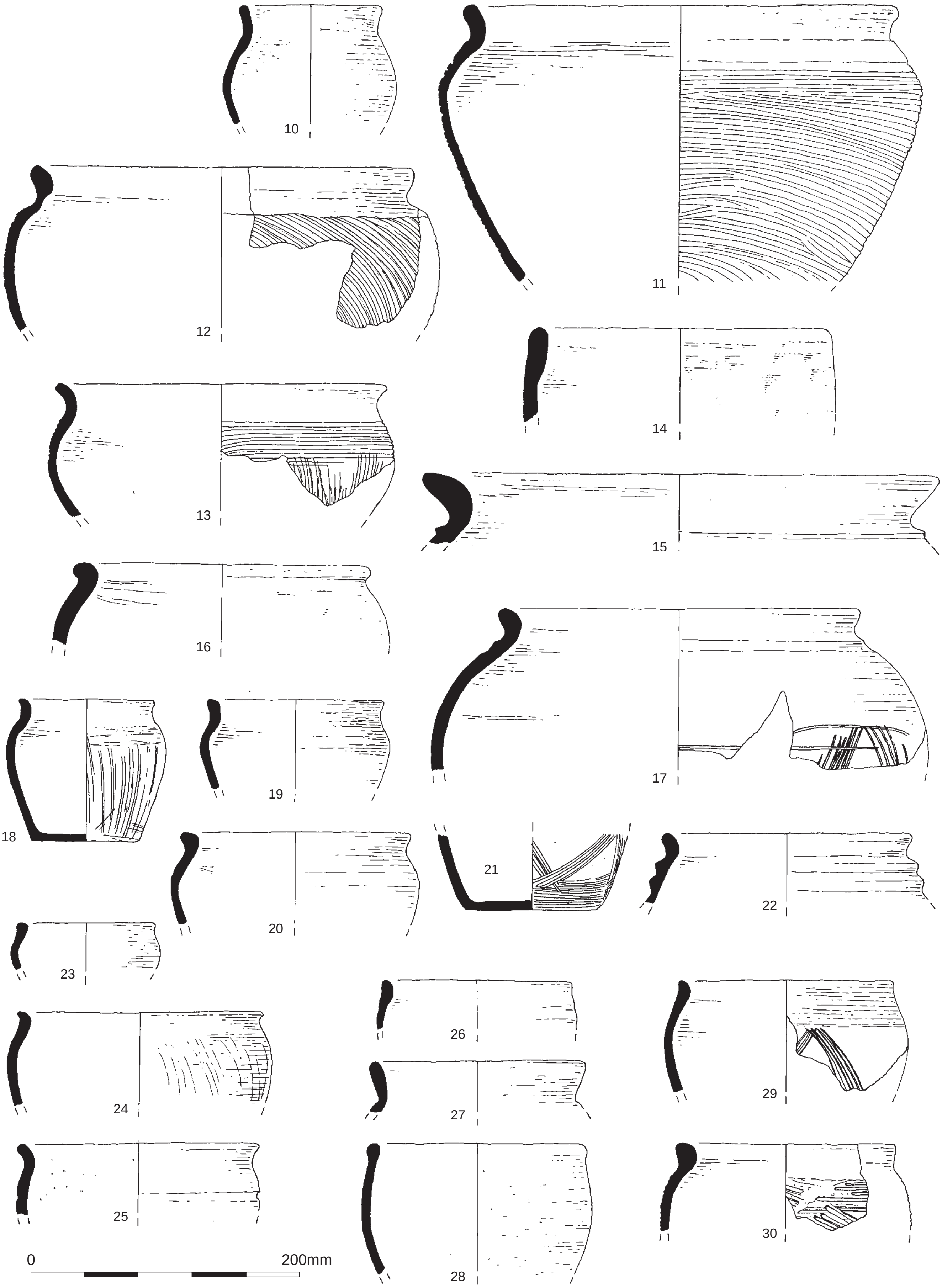


Fig 9.4 Late Iron Age pottery (nos 10–30)

Catalogue of illustrated sherds

Middle/Late Iron Age (Fig 9.3)

Zone 4 Ditch 190272

1. Upright, flat-topped rimmed jar; sandy ware. Ctx 144142
2. Decorated body sherd; internally burnished. Ctx 252174
3. Everted rim jar; sand and flint-tempered ware. Ctx 144142
4. Slightly everted rim jar; sand and flint-tempered ware. Ctx 144142
5. Upright-rimmed jar; sand and flint-tempered ware. Ctx 144142
6. Footed base from a closed form, recessed underneath; sand and flint-tempered ware. Ctx 144142
7. Upright-rimmed jar; sand and flint-tempered ware. Ctx 252174

Decorated body sherd probably from a jar. Ctx 252174

9. Round-shouldered necked jar; fine flint-tempered ware. Ctx 312043

Late Iron Age

Zone 13 Pit 156146 (Fig 9.4)

10. Small, upright-necked globular-bodied jar; burnished; sandy ware. Ctx 156147
11. Cordoned, externally riled (combed) jar; grog-tempered ware. Ctx 156150
12. Large, high-shouldered, faceted, internally-thickened pulled bead rimmed jar/bowl; combed; grog-tempered ware. Ctx 156149 (rim), 156150 (rims and bodies) and 156221 (body)
13. Round-bodied bowl with short, slightly everted rim, externally combed; grog-tempered ware. Ctx 156150
14. Jar with a plain, internally thickened rim; grog-tempered ware. Ctx 156150
15. Storage jar with an everted, pointed rim; grog-tempered ware. Ctx 156150
16. Bead rim jar; grog-tempered ware. Ctx 156150
17. Jar with a neck cordon, a short flared rim and burnished-line decoration; grog-tempered ware. Ctx 156150
18. Small, plain upright-rimmed jar (Thompson C2-2); complete profile; grog-tempered ware (much sand in this fabric). Ctx 156150 and 156221
19. Small, plain, slightly everted rim jar (Thompson C2-3); burnished; grog-tempered ware. Ctx 156150
20. Small, plain, everted rim jar (Thompson C2-3); burnished; grog-tempered ware. Ctx 156150
21. Flat, jar-type base with burnished decoration leaving triangular panels unburnished; grog-tempered ware. Ctx 156150 and 156221
22. Jar with corrugated slightly everted rim (Thompson B2-1); burnished; grog-tempered ware. Ctx 156150
23. Small, shouldered bead rim cup or beaker; burnished; grog-tempered ware. Ctx 156150
24. Small, plain, everted rim jar; burnished; sandy ware (some grog inclusions). Ctx 156151
25. Small grooved everted rim jar; burnished; flint-tempered ware. Ctx 156157
26. Small, internally-thickened plain rim jar/beaker; burnished; flint-tempered ware. Ctx 156157
27. Upright-rimmed jar; burnished; sand, flint and grog-tempered ware. Ctx 156157 and 156221
28. Plain rim jar (Thompson C3); grog-tempered ware. Ctx 156161
29. Plain rim jar (Thompson C3) with burnished-line decoration; flint-tempered ware. Ctx 156221
30. Internally-thickened, pulled bead rimmed jar, combed; flint-tempered ware. Ctx 156221

Zone 13 Pit 203056 (Fig 9.5)

31. Upright-rimmed, round-shouldered jar/bowl with burnished line-decoration surrounding finger-tip impressions; flint-tempered ware. Ctx 203058

Others contexts (Fig 9.5)

32. Straight-sided jar with a flared rim; surface roughened; sand and flint-tempered ware. Zone 6, early Roman ditch 170115, ctx 126265
33. Thick-walled lid; surface roughened; sand and flint-tempered ware. Zone 26, Late Iron Age/early Roman ditch 201042, ctx 193032
34. Round-shouldered, upright-rimmed jar, glauconitic sandy ware. Zone 6, Late Iron Age round house 190476, ctx 143293

Early Roman

Zone 13 Sunken-featured building 193140 (Fig 9.6)

35. Globular-bodied beaker with a flared rim; decorated with red paint on rim and barbotine herring-bone decoration on body; whiteware. Ctx 173200 and 200092
36. Cam 8 platter; Terra Nigra. Ctx 173200, 173231 and 200092
37. Bead rimmed jar, plain; greyware. Ctx 173200
38. Small squat, bead rimmed jar/bowl; greyware. Ctx 173200

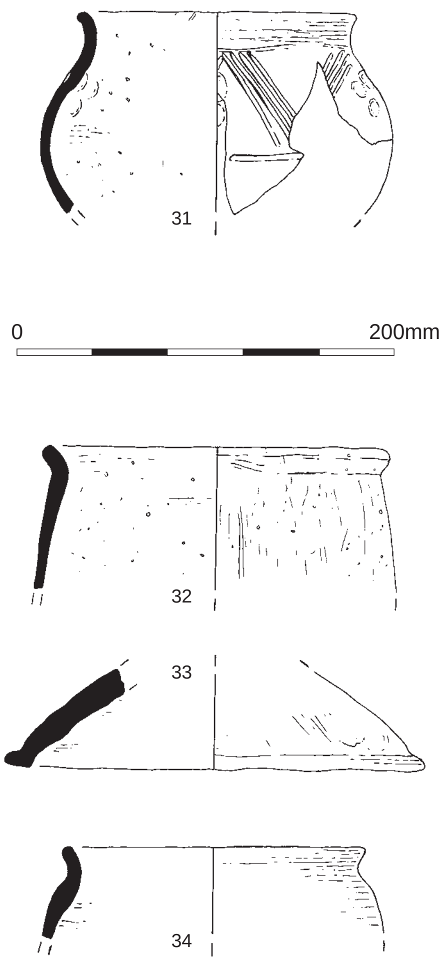


Fig 9.5 Late Iron Age pottery (nos 31-34)

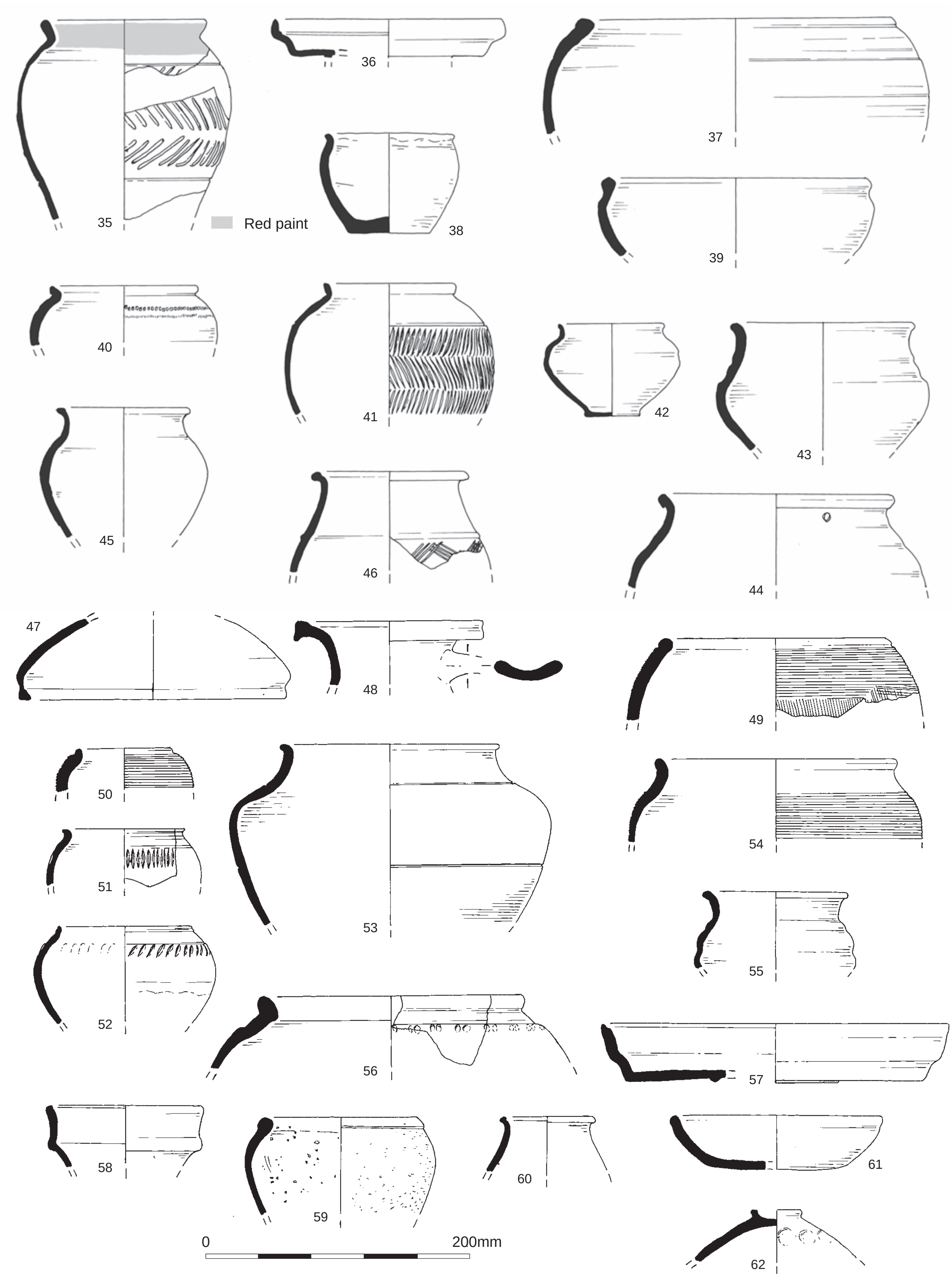


Fig 9.6 Early Roman pottery (nos 32–62)

39. Bead rimmed jar/bowl; greyware. Ctx 200092
40. Pointed bead rim jar with birch bark tar exterior coating and impressed decoration on shoulder; greyware. Ctx 200092
41. Globular-bodied beaker (Monaghan 1987, type 2I) with deeply incised herring-bone decoration; greyware. Ctx 173200
42. Small necked bowl/cup (Monaghan 1987, type 4B1) with slight girth groove. Ctx 173200
43. Necked, cordoned bowl (Monaghan 1897, type 4F3). Ctx 173200
44. Necked, cordoned bowl (Monaghan 1897, type 4F3) with post-firing perforation probably indicative of a staple repair; greyware. Ctx 200092
45. Narrow-necked globular-bodied jar/beaker with out-turned, ledged rim; burnished; greyware. Ctx 200092
46. Long, narrow-necked jar/beaker with out-turned, ledged rim; burnished-line decoration. Ctx 173200
47. Grooved rim lid; burnished; greyware. Ctx 173200

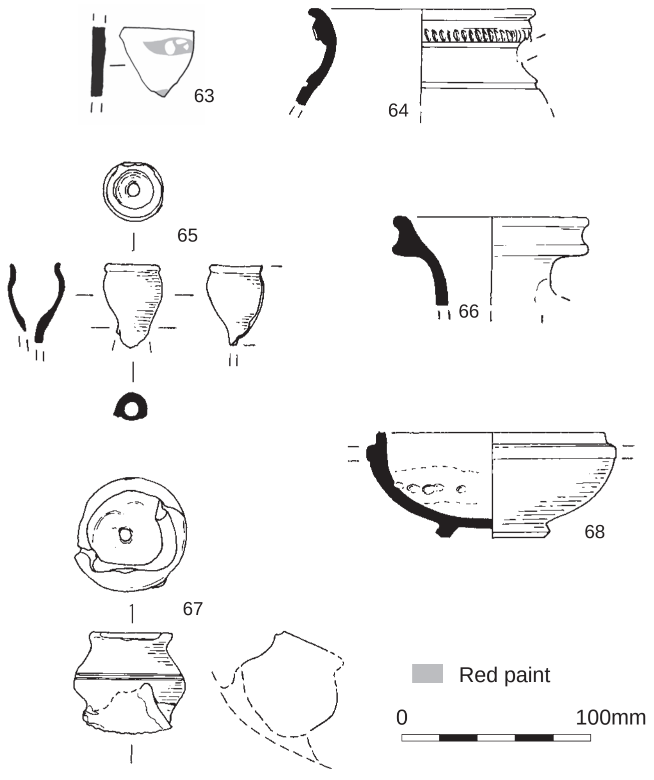


Fig 9.7 (right) Early Roman pottery (nos 63-68)

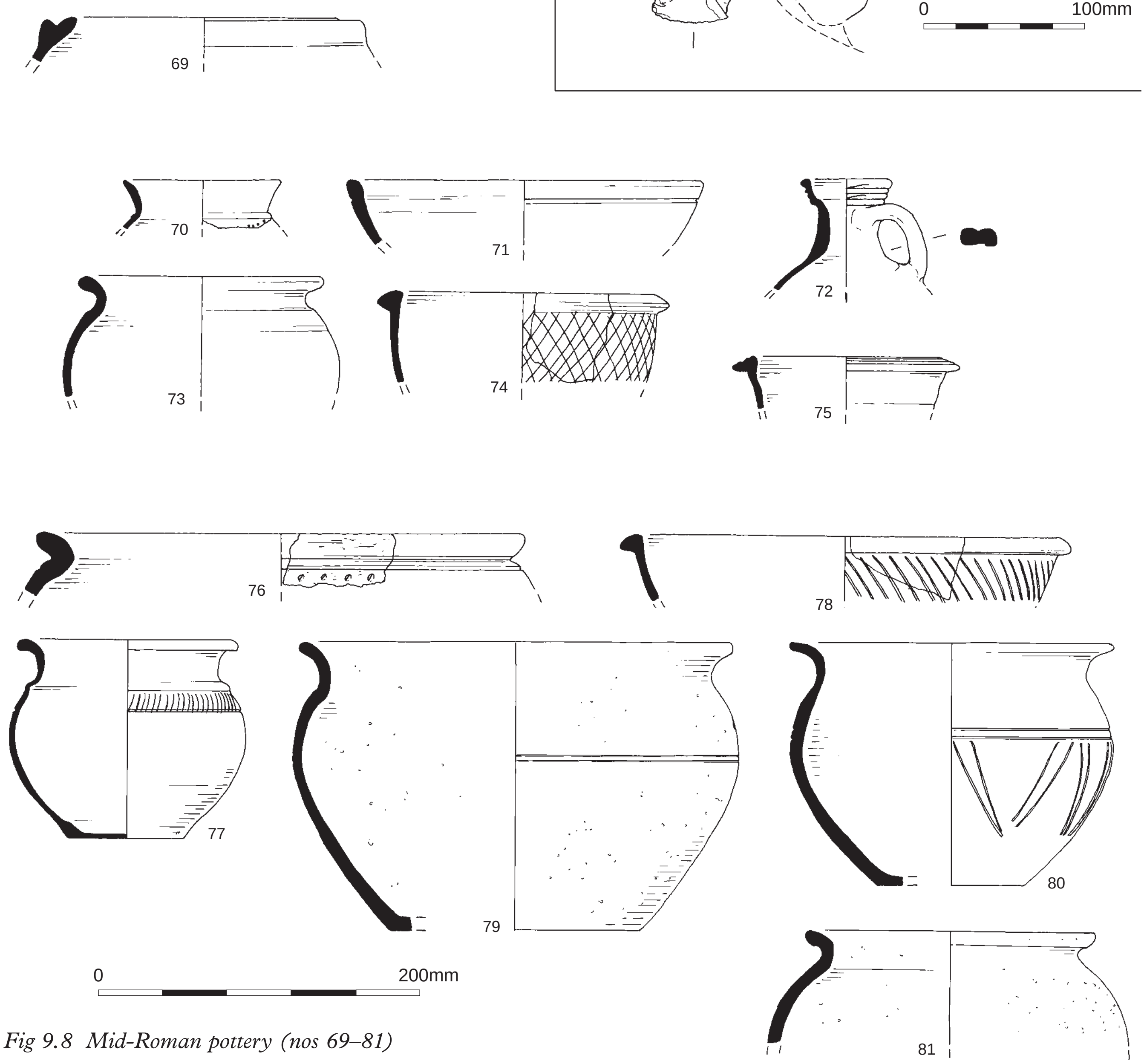


Fig 9.8 Mid-Roman pottery (nos 69–81)

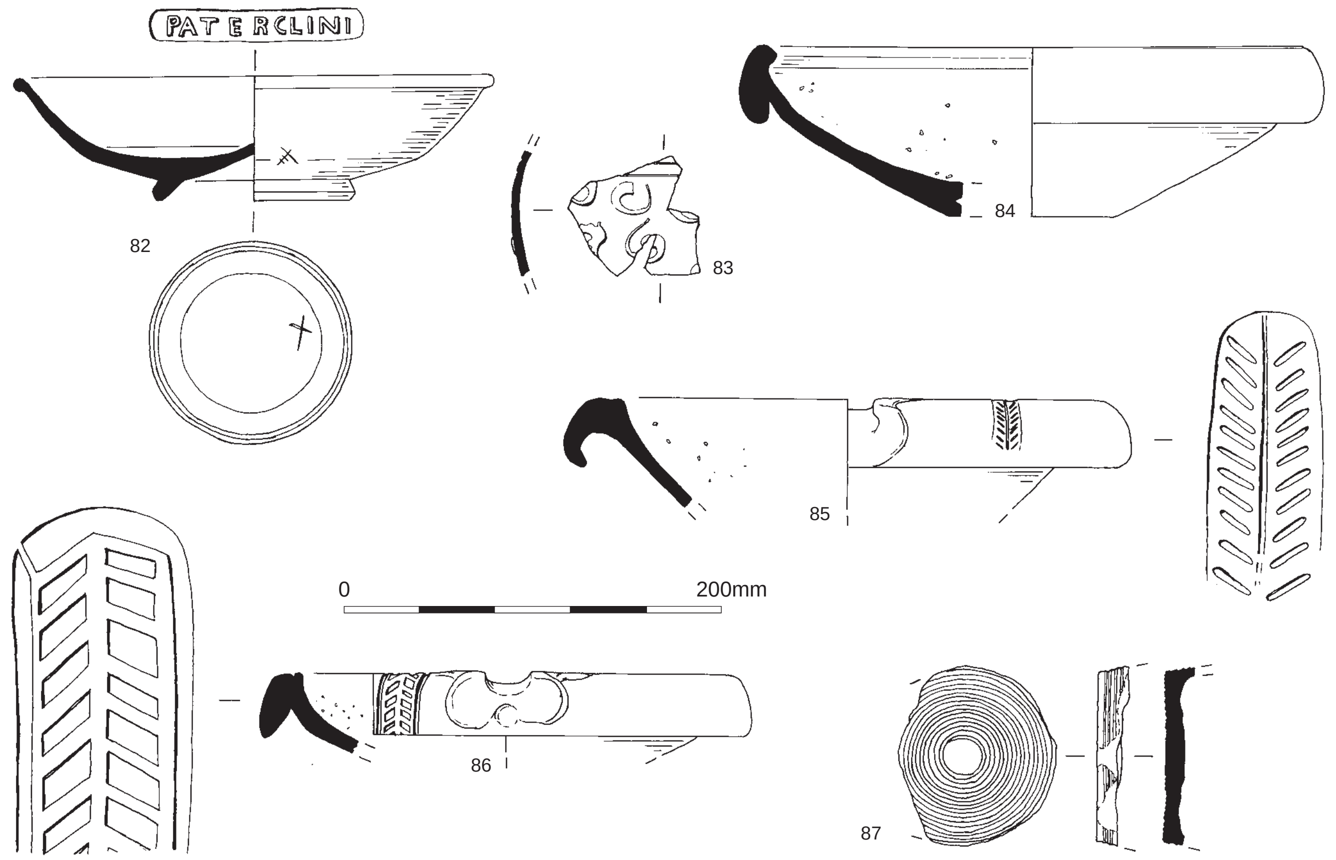


Fig 9.9 Mid-Roman pottery (82–87)

48. Imitation Cam 161 jug (Thompson 1982, type G6); burnished; orange-surfaced grog-tempered ware. Ctx 200092
49. Bead rimmed jar (Thompson 1982, type C1-2); combed; grog-tempered ware. Ctx 173200 and 200092
50. Bead rimmed jar (Thompson 1982, type C1-2); combed; grog-tempered ware. Ctx 200092
51. Small, round-shouldered, bead rim jar/beaker with incised decoration (Thompson 1982, type C4); grog-tempered ware. Ctx 173200
52. Small, round-shouldered, bead rim jar with incised decoration (Thompson 1982, type C4); grog-tempered ware. Ctx 200092
53. Plain, round-shouldered necked jar (Thompson 1982, B1-1); burnished; grog-tempered ware. Ctx 173200
54. Round-shouldered, rilled jar; grog-tempered ware. Ctx 200092
55. Tall, narrow cordoned jar/bowl (Thompson 1982, B3-2); burnished; grog-tempered ware. Ctx 173200
56. Faceted jar with internally-ledged rim; incised decoration; grog-tempered ware. Ctx 200092
57. Platter with off-set vertical wall and internal moulding (Thompson 1982, G1-6); grog-tempered ware. Ctx 173200
58. Cup or bowl imitating Cam form 56; burnished; grog-tempered ware. Ctx 173231
59. Bead rimmed jar; externally roughened; flint-tempered ware. Ctx 173200
60. Narrow-necked beaker with out-turned, ledged rim; burnished; flint-tempered ware. Ctx 173200
61. Shallow, bead rimmed dish; burnished; flint-tempered ware. Ctx 173200
62. Lid 'pull', exterior highly burnished and decorated with finger-tip impressions; flint-tempered ware. Ctx 173200

Others of early Roman date (Fig 9.7)

63. Body sherd from a closed form with a red-painted 'eye' motif; whiteware, possibly imported. Zone 6, early Roman ditch 190444, ctx 278194
64. Frilled, moulded rim from a handled jar, perhaps a honey-pot or face jar; white-slipped red ware. Zone 20, late Roman pit 251005, ctx 251018
65. Perforated pourer cup originally attached to shoulder of a jar; white-slipped red ware. Zone 6, mid-Roman ditch 170141, ctx 288042, ON 4198
66. Pulley-wheel rim flagon; North Gaulish whiteware. Zone 6, mid-Roman sunken-featured building 170136, ctx 315005
67. Perforated, globular-bodied pourer cup originally attached to shoulder of a jar; Canterbury 'North Gaulish' greyware. Zone 6, early Roman pit 245136, ctx 245143
68. Curle 11 bowl with flange removed, abraded wear (including dimples) and a single area of burning on interior surface; South Gaulish samian. Zone 6, mid-Roman pit 125305, ctx 125312

Mid-Roman

Zone 6 Sunken-featured building 130227 (Fig 9.8)

69. Channelled rim jar; greyware. Ctx 130229

Zone 6 Sunken-featured building 170168 (Fig 9.8)

70. 'Poppy-head' beaker (Monaghan 1987, type 2A); north Kent fine greyware. Ctx 264223

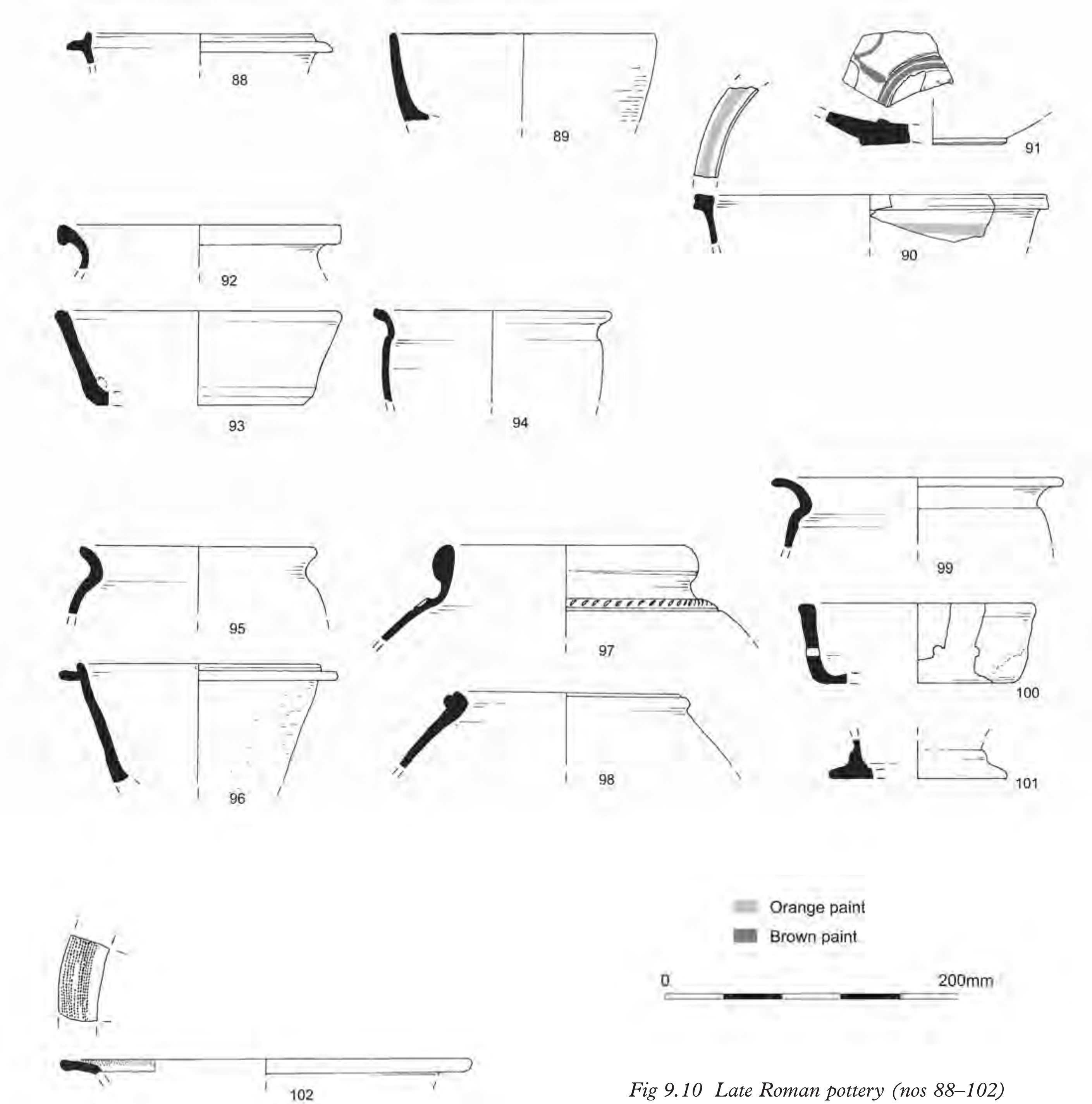


Fig 9.10 Late Roman pottery (nos 88–102)

71. Shallow, straight-sided, grooved rim dish; whiteware. Ctx 264222
72. Cup-mouthed, ring-necked flagon; whiteware. Ctx 264223
73. Everted rim jar; greyware. Ctx 264222 and 264243
74. Decorated 'pie-dish' (Monaghan 1987, type 5D1); greyware. Ctx 264242
75. Straight-sided, reed-rimmed bowl/dish; Canterbury greyware. Ctx 264223

Zone 20 Sunken-featured building 228059 (Fig 9.8)

76. Storage jar (Monaghan 1987, type 3D1); incised decoration; North Kent/South Essex shell-tempered ware. Ctx 228061
77. S-profiled bowl with rolled rim (Monaghan 1987, type 4A2); greyware. Ctx 228058, ON 321
78. Decorated 'pie-dish' (Monaghan 1987, type 5D1); greyware. Ctx 228066
79. Everted rim jar/bowl; grog-tempered ware (oxidised, Native Coarse Ware style). Ctx 228066
80. Everted rim bowl; burnished-line decoration; grog-tempered ware (oxidised, Native Coarse Ware style). Ctx 228066
81. Everted rim jar; grog-tempered ware (oxidised, Native Coarse Ware style). Ctx 228065

Others of mid-Roman date (Fig 9.9)

82. Form 31R bowl; stamped Paterclinus 4a (stamp cat. no 6); graffito X on underside of base, and an abstract mark on external wall; Central Gaulish samian. *c* AD 160-180. Zone 6, mid-Roman ditch 170049, ctx 136100, ON 670

83. Unusual round-bodied, barbotine-decorated jar (Decorated sherds cat no 40); East Gaulish (Rheinzabern) samian. Third century AD. Zone 20, late Roman pit 251005, ctx 251015
84. Wall-sided mortaria; Rhenish whiteware. Zone 7, layer 201078
85. Bead and flanged mortaria with a feather stamp; Canterbury/Kent mortaria fabric. Zone 7, mid-Roman layer 178118
86. Bead and flanged mortaria with a feather stamp; Canterbury/Kent mortaria fabric. Zone 20, late Roman sunken-featured building 249083, ctx 205152, ON 3115
87. Finely-rilled costrel; hard, fine, almost inclusion-free cream fabric. Zone 10, early or mid-Saxon ditch 178358, ctx 178332

Late Roman (Fig 9.10)

Zone 6 Sunken-featured building 170132
88. Dropped flanged bowl/dish; greyware. Ctx 289043
89. Shallow, straight-sided dish; South-east Dorset Black Burnished ware. Ctx 289043
90. Wall-sided painted bowl (Young 1977, 87, type P24); Oxfordshire whiteware. Ctx 289043
91. Painted bowl base (Young 1977, 87, type P24); Oxfordshire whiteware. Ctx 289043

Zone 6 Sunken-featured building 170135
92. Hooked rim jar; greyware. Ctx 132079
93. Shallow, straight-sided dish; greyware. Ctx 132079
94. Wide-mouthed necked jar (Young 1977, 152, type C18); Oxfordshire red colour-coated ware. Ctx 132079

Zone 20 Sunken-featured building 249083
95. Everted rim jar; late Roman grog-tempered ware. Ctx 205162
96. Dropped flanged bowl late Roman grog-tempered ware. Ctx 205163
97. Narrow-necked jar with D-shaped rim and incised decoration; burnished; greyware. Ctx 171229
98. High-shouldered, jar with an inturned, moulded rim; burnished; greyware. Ctx 171228, 205162, 205163 and 205165
99. Everted rim jar (Seager Smith and Davies 1993, 231, type WA3); South-east Dorset Black Burnished ware. Ctx 171233
100. Cheese-press with pre-firing perforations; coarse, sandy oxidised ware. Ctx 171234 and 205163
101. Footed base; Hadham oxidised ware. Ctx 171233

Others of late Roman date
102. Flat, roller-stamped dish (Chenet 1941, pl. XII and XIII, form 313) rim; Argonne roller stamped ware. Zone 6, mid-Roman ditch 124162, ctx 124164

Graffiti (Fig 9.11)
103. Graffito on underside of dish base; Central Gaulish samian. Zone 20, unphased levelling layer 215219
104. Graffito on underside of a form 31 dish base stamped by Briccus, AD 155-175; Central Gaulish samian. Zone 20, grave 198300, ctx 198301, ON 3772 (Fig 4, 113: 3772)
105. Graffito, written on exterior wall while inverted, of a form 33 cup stamped by Doccius ii, AD 160-200;

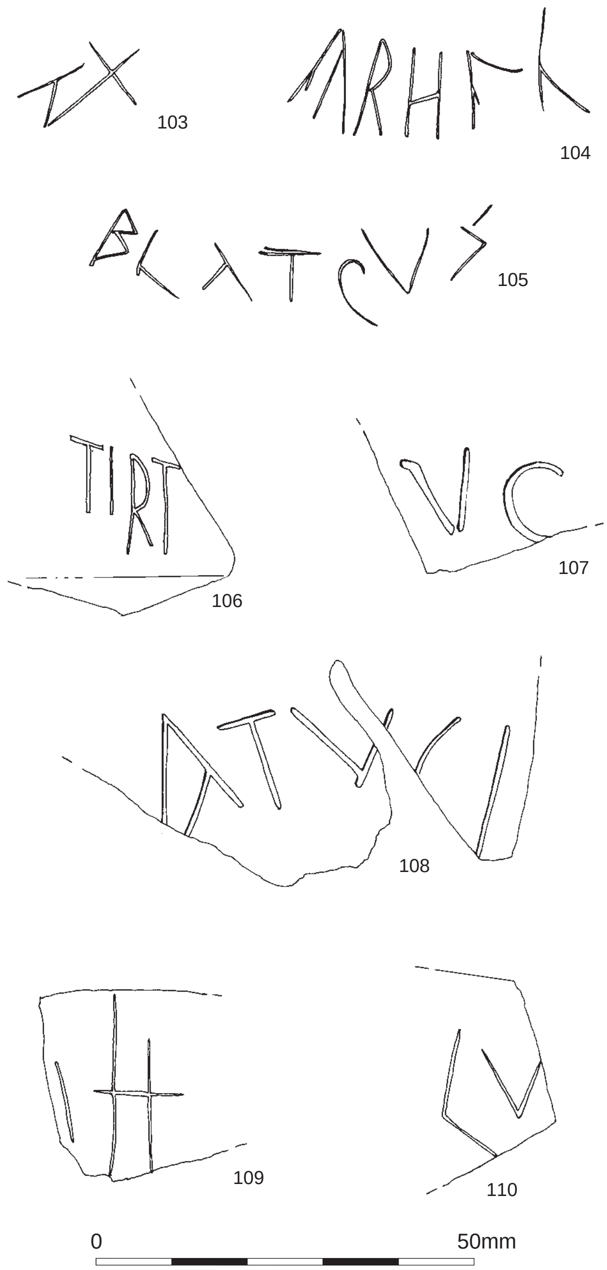


Fig 9.11 Graffiti on Roman pottery (nos 103–110)

Central Gaulish samian. Grave 215193, ctx 215194, ON 4029 (Fig 4, 115: 4029)
106. Incomplete graffito on exterior wall of a form 31R dish body sherd, Central Gaulish samian, *c* AD 165 – 200. Zone 20, late Roman sunken-featured building 249083, ctx 171233
107. Incomplete graffito on exterior wall of flagon/jar body sherd; unsourced oxidised ware. Zone 6, early Roman ditch 170041, ctx 255039
108. Incomplete graffito on underside of a footring base; Terra Nigra. Zone 6, mid-Roman layer 258058
109. Incomplete graffito on exterior wall of a dish/bowl body sherd, *c* AD 120-200; Central Gaulish samian. Zone 20, mid-Roman pit 250094, ctx 249062
110. Incomplete graffito on exterior wall of a form 33 cup, *c* AD 120-200; Central Gaulish samian. Zone 20, late Roman pit 251005, ctx 251011

The Samian Potter's Stamps

Each catalogue entry gives: potter (i, ii, etc, where homonyms are involved), die, form, pottery of origin, reading, date, phase, excavation feature and context numbers and, where allocated, object (ON) number.

The catalogue is ordered by Zone, pottery of origin date and name of potter.

Zone 4

1. Incomplete/unidentified.]IV CG, Dr 33. Hadrianic or Antonine. Topsoil (ctx 172147)

Zone 6

2. Crestio, 15b, dish, SG. [CRES]TIO The O is almost broken in the upper right quadrant which is characteristic of this die. *c* AD 45-55. Late Iron Age/early Roman ditch 170137 (ctx 243099)
3. S_Verius, 3a, Dr 18, SG.]VIIRIV A very poorly impressed stamp, and difficult to read. This stamp was used only on plain wares whilst the other die attributed to this potter was used on form 29 only. *c* AD 75-95. Mid-Roman sunken-featured building 170168 (ctx 264243)
4. Incomplete/unidentified.] ΛΛO [SG, dish. *c* AD 50-100. Mid-Roman ditch 170099 (ctx 321015)
5. Ioenalis, ?1a, Dr 27, Les Martres. [IO]ENΛI [ISF] This stamp is incomplete because each end is worn away (?by grinding), and is not certainly identified. Brenda Dickinson (pers. comm.) suggests this may be a die of Ieonalis' although it does not quite match any previously recorded. There does not appear to be a lower stroke on the last letter, Ꝁ usually follows the Λ or Λ on the known dies. *c* AD 100-130. Unlocated layer 245158
6. Paterclinus 4a, Dr31R, CG. PΛTERCLINI Almost complete vessel. Graffito X on underside of base, and extra cuts on external wall. *c* AD 160-180. Mid-Roman ditch 170040 (ctx 136100), ON670
7. Severus vi, 3d, Dr 33 (or 46), CG. ·SIIV[IIRIM·] The stamp is partly obscured by calcareous concretion. *c* AD 160-210. Late Roman colluvium 170028 (ctx 130012), ON3205
8. Rosette stamp with 10 petals, and a central circle and a thin line radiating out between each petal (diameter 12mm). SG, cup, interior is heavily worn and there is a graffito X on the underside of the sherd. *c* AD 50-110. Early Roman ditch 190494 (ctx 303237)
9. Rosette stamp with 12 petals and a central point (diameter 14 or 15mm). This is larger than any of the 12-petalled rosettes catalogued by Bet and Marques (1992, 44 and fig on 43). CG, dish. *c* AD 120-200. Unlocated layer 128039

Zone 11

10. Vitalis ii, 23b`, Dr 27g, SG. VITALIſ F *c* AD 60-80. Early Roman ditch 159314 (ctx 209092)
11. Cinnamus ii, 5b, Dr 30, CG. CINN[AΛΛI]← Retrograde mould stamp within the decoration. *c* AD 145-175. Mid-Roman quarry pit 262015 (ctx 143150)
12. Laxtucissa, 5a, Dr 33, CG. L ΛXTVCIſ F The fabric of this vessel is, unusually, underfired as is that of another sherd from this zone (from mid-Roman pit 212049, ctx 212050), *c* AD 150-175. Mid-Roman floor layer 143026

Zone 14

13. Cinnamus ii, 5b, Dr 37, CG. [CI]NNA[ΛΛI]← Vertical in decoration (no bead rows evident). *c* AD 145-175, Saxon pit 175086 (ctx 175090)

Zone 19

14. Calava, 2b, Dr18/31, CG. CAꓘAVA˙F This stamp is the same reading as die 2b, however, it is slightly longer, probably as a result of the die slipping as it was impressed. Complete with not even a small chip missing. The foot-ring is moderately worn, and appears to have one or perhaps two deliberate grooves cut across it. *c* AD 125-155. A placed vessel, accompanying mid-Roman cremation burial 166082 (ctx 166083), ON1264
15. Cerialis ii, 4a, Dr 33, CG. CERI˙AL ˙ΛΛ Complete vessel, with some ?modern breaks, but repaired in antiquity with glue probably derived from birch-bark tar. All surfaces are heavily encrusted with limescale. *c* AD 135-165. A placed vessel in mid-Roman grave 220099 (ctx 220103), ON2074
16. Malluro i, 8b, Dr 18/31, CG. MΛLLVR/I This vessel is almost complete – a body sherd may be a recent loss, but it is possible that both missing sherds or just the the rim sherd were ancient losses. A graffito on the underside of the base is formed from two large +'s the points of which converge in the centre of the vessel with two lines, parallel with this central axis, one above and one below. The vessel has quite high, curving sides similar to a Dr 31 although the base rises only in the centre like a true Dr 18/31. *c* AD 130-165, although based on the form, a date of AD 140-165 is perhaps more likely. A placed vessel in mid-Roman grave 153060 (ctx 153063), ON1268

Zone 20

17. Briccus, CG, Drag 31. BR[ICC]IM possibly die 3f, but the impression is very poor because it crosses the basal kick. Complete except for chip from rim. Graffito under the foot-ring reads (more or less) ΛRHΛL. *c* AD 155-175. A placed vessel in mid-Roman grave 198300 (ctx 198301), ON3772
18. Caupirra, 2a, CG, Drag 18/31 or 31. CΛV·P[IRI·ΛM] It is suggested (Hartley and Dickinson 2008, 306) that the second letter of this stamp is Λ, although the evidence is 'enigmatic'. This example looks as if the second letter is a blind A, but it has a vertical line through it, perhaps caused by damage to the die. *c* AD 150-180. Mid-Roman pit 279028 (ctx 279031), ON2310
19. Doccius ii, 4a, CG, Drag 33. DOCCIVSI Complete vessel, with the exception of a tiny chip from the inner rim. Graffito at base of side wall (written when vessel upside down) reads BꓘΛTCVS. *c* AD 160-200? A placed vessel in mid-Roman grave 215193 (ctx 215194), ON4029
20. Draucus ii, 1a, CG, Drag 33. DRAVCIΛΛ *c* AD 160-180. Mid-Roman pit 249082 (ctx 249052)
21. Pater ii, 2a, CG (Lezoux), Drag 18/31. PATER·F Complete vessel, broken approximately in half (possibly in antiquity). There is a single graffito X scratched on the lower wall near the foot-ring, and 2 parallel cuts across the (irregularly worn) foot-ring. *c* AD 130-150. A placed vessel in mid-Roman grave 215199 (ctx 215197), ON3769
22. Pottacus 3a, CG, Drag 31. POT·TΛCVS A die used only on forms 31, 31R and Walters 79/80. *c* AD 170-200, Unphased levelling layer 215219

23. Sanciro (Savciro), CG, Drag 33 (or 46). S\A/CIRO The backward slash between the S and A shows very poorly and may be damage to the die rather than a ligatured letter. The slash after the A, read either as a ligatured N or V, can also show poorly as in this example. *c* AD 150-180. Mid-Roman sunken-featured building 249081 (ctx 205139), ON3103
24. Tituro, 5b, CG Drag 31. TITVRONIS Complete with the exception of a small flake from the outer edge of the bead rim. *c* AD 170-190. A placed vessel in mid-Roman grave 182241 (ctx 182242), ON3782
25. Incomplete/unidentified. I[or]I Drag 31, CG. Antonine. Mid-Roman sunken-featured building 249081 (ctx 271053)
26. Rosette stamp with 8 petals with a central dot, 15mm diameter; this is the most common type of rosette stamp. Dr 46 with internal step and external moulding (cf Oswald and Price 1920, pl LV, 19), CG. Antonine. Late Roman ditch 217122 (ctx 249072)

Zone 21

27. Beliniccus iii, 2a, dish, CG. [BEⅡN]ICIM← *c* AD 140-170. Roman pit 266007 (ctx 266008)

Catalogue of decorated samian ware sherds

Zone 6

1. SG, Drag 29 body sherd with high gloss finish, very little decoration extant, only a vertical panel of overlapping leaf motifs and a small hare in the upper zone. *c* AD 50-65. Early Roman pit 256060 (ctx 258049)
2. SG, Drag 29 body sherd with trifid leaf motifs in the upper zone. *c* AD 50-75. Mid-Roman colluvium 258058 (ctx 126236)
3. SG, Drag 37 scrap from the basal wreath of trifid leaves. *c* AD 70-100. Late Roman waterhole 247100 (ctx 247097)
4. SG, Drag 37 large body sherd with S-shaped gadroons below a panelled design which includes a scroll with a bird within it. *c* AD 70-100. Early Roman pit 245137 (ctx 245149)
5. SG, Drag 37 body sherd with a trident tongued ovolo with bead row below. The only extant motif is erotic pair O.A. Mercator style. *c* AD 80-110. Late Roman sunken-featured building 170132 (ctx 289043)
6. Les Martres-de-Veyre, Drag 37 body sherd in Igocatus' style with wavy borders with Rogers U62 at the terminals and seated woman O.949 in one panel and motif Rogers L1 in the other. *c* AD 100-125. Early Roman pit 245136 (ctx 245143)
7. CG, Drag 37 body sherd in Libertus I style with characteristic ovolo (Rogers B214) and a cabled row below; partly impressed over the ovolo is large mask O.1209 and cherub O.378 The bowl is quite shallow, and up to 12mm thick in places and has a patch of internal abraded wear on the side wall. *c* AD 110-130. Mid-Roman quarry pit 216097 (ctx 216110)
8. CG, Drag 37 rim with a scrap of ovolo (Rogers B204) and the snake and rock motif O.2155. Two other sherds from context, one with the same ovolo and motif, the other has a part of a freestyle animal scene (legs and antlers but no identifiable animals), are probably from the same bowl. Attianus style, similar design to S&S pl 85, 7 and pl 86, 12 and 15. *c* AD 120-145. Late Roman sunken-featured building 170132 (ctx 289043 and 289044
9. CG, Drag 37 two sherds from the lower part of the free-style decoration, with two shallow ridges at the base of the decorated zone. Complete motifs include a horse and rider and a dog, both running to the left. The horse-rider is similar to, but not exactly the same as O.259, the left arm of this rider is clearly visible. The dog is unusual, the front legs are bent, and the rear legs are in a walking stance, but there is no tail. No parallel can be found for these motifs, but the style is consistent with a Hadrianic or early Antonine date. Mid-Roman well 170167 (ctx 137332)
10. CG, Drag 37 with ovolo B143 or B144. Single bordered festoon with astragalus (see S&S 159, 33) and untidily moulded. Identification uncertain but possibly Cinnamus. *c* AD 135-180. Late Roman layer 170028 (ctx 128009)
11. CG, Drag 37 body sherd with gladiator (possibly O.1057) and a palm leaf, both placed horizontally below a horse with a short tail (?with rider) running left. The palm leaf is closest to Rogers J22 which is listed for six potters (Austrus, Carantinus, Illixo, Ivliccus, Ivstus, Sissus II), none of whom are listed as using the gladiator. There is a vertical divider of small beads and a single line at the base of the decorated zone. The potter or workshop is not identified, but the style suggests a Hadrianic-mid Antonine date. Early Roman pit 245133 (ctx 245127)
12. CG, Drag 37 body sherd from panelled bowl with vertical beaded divider, a double-bordered medallion and tree N13. Ianuarius/Paternus II style. *c* AD 160-200. Mid-Roman waterhole (ctx 247182)
13. EG, Trier, Drag 37 scrap with ovolo Gard R14 used by Atillus-Pussosus. *c* AD 220-260. Late Roman occupation horizon 301091

Zone 11

14. SG, Drag 29 sherd from the lower zone, decorated with a saltire with a group of three poppy heads flanked by elongated bottle buds in the central section. *c* AD 50-75. Mid-Roman layer or placed deposit 143023
15. SG, Drag 37 sherd with part of kneeling stag O.1699 (Hermet 1934, pl.27, 3). Used by several potters including M. Crestio, Memor and Mercator who also employed a basal wreath of S-shaped gadroons. Stag above S-shaped gadroons used by Memor (Mees 1995, taf 126, 1). Flavian. Roman ditch 159312 (ctx 209089)
16. SG, Drag 37 body sherd with scrap of trident-tongued ovolo, the main design has much in common with some of Mercator's bowls; the incurving festoon with an inner spiral and pendant motifs between were used by him (Mees 1995, taf. 137, 13 – festoon, pendant, also running hare) but the basal wreath of bifid leaves and the plant motif are not the same as those usually used by Mercator. Mid-late Flavian. Early Roman ditch 215037 (ctx 215053)
17. CG, Drag 37 with part of a design between zig-zag borders, a pair of linked festoons (Rogers F70) containing a bird and with a plain ring below. The linked festoons were used by Potter X-9 (S&S 1990, pl.32, 374). *c* AD 110-130. Roman ditch 171060 (ctx 171093)
18. CG, Drag 37 rim (*c* 30%) from a small, abraded vessel with repetitive decoration of linked festoons with pendant trifid leaves between. Probably X-6B, a similar

vessel is shown by Rogers (1999, fig 135, 16). *c* AD 125-150. Roman ditch 171060 (ctx 171093)

19. CG, Drag 30 panel with Cinnamus mould stamp 5b CINN[AMI] retrograde within the decoration. The only motif remaining is putti O.401 in an adjacent panel. *c* AD 145-175. Mid-Roman quarry pit 262015 (ctx 143150)
20. CG, two Drag 37 scraps with ovolo Rogers B105, used by Albucius, Laxtucissa and Paternus II as well as a few other potters, although not necessarily in combination with the bead row seen on these sherds. Antonine. Late Roman occupation horizon 301091

Zone 12

21. CG, Drag 37 sherd with ovolo Rogers B52 over a guide-line with figure O.204 within a double-bordered medallion and leaf Rogers H185 impressed to the right of it. The ovolo and medallion (Rogers 1999, 89, 3), although attributed to Pugnus, is probably the work of Secundus I. *c* AD 145-175. Late Iron Age/early Roman ditch 229026 (ctx 229027)

Zone 14

22. CG, Drag 37 body sherd with ovolo Rogers B233 with wavy border below, used by Potter X-6D. *c* AD 125-150. Roman pit 258010 (ctx 258014)
23. CG, Drag 37 body sherd with part of Cinnamus mould stamp 5b to the left of dancer O.365 (as Rogers 1999, pl 32, 47). *c* AD 145-175. Saxon pit 175086 (ctx 175090)

Zone 19

24. CG, Drag 37 scrap with ovolo B143, bead row below and a fragment of winding scroll or medallion remaining. The ovolo was used by several potters, although most commonly by Cinnamus ii. *c* AD 135-180. Saxon grave 275002 (ctx 275003)

Zone 20

25. SG, Drag 37 scrap with trident-tongue ovolo. Flavian. Mid-Roman ditch 205059 (ctx 278046)
26. CG, Drag 37 body sherd in Docilis' style, with scrap of ovolo B24, a lion running right with a straight tail (S&S pl 93, 22), a row of beaded lozenges Rogers U28 with a large rosette below and small putti O.408. *c* AD 130-160. Early or mid-Roman trackway 249061 (ctx 278031)
27. CG, Drag 37 scrap with ovolo B144 which was most commonly used by potters of the Cinnamus ii workshop. *c* AD 135-170. Mid-Roman sunken-featured building 249081 (ctx 205139)
28. CG, Drag 37 rim in Cinnamus ii style with ovolo B144 and a winding scroll inhabited by a small flapping bird. *c* AD 135-170. Mid-Roman sunken-featured building 249081 (ctx 215185)
29. CG, Drag 37 body sherd from base of decoration with a free-style frieze of animals. *c* AD 130-180. Roman pit 215215 (ctx 215213)
30. CG, Drag 37 panelled sherd with small rings at corners of panels. Motifs include Apollo O.92, caryatid O.1207A and a running animal within a single-bordered festoon with plain rings below. Probably Divixtus or an associate. Early-mid Antonine. Mid-Roman pit 279028 (ctx 227014)
31. CG, Drag 37 body sherd from base of decoration with a vertical bead divider with a terminal rosette, deer O.1740 in a panel to left and a small plain ring to the right. The deer was used by several potters including Attianus, Cinnamus ii, Doeccus and Paternus III. Hadrianic-mid Antonine. Mid-Roman pit 279028 (ctx 279030)
32. CG, Drag 37 scrap with ovolo B105 and bead row below, double-bordered medallion, vertical border with large rosette. Paternus II style. *c* AD 160-190. Mid-Roman pit 279028 (ctx 205139)
33. CG, Drag 37 body sherd from lowest part of decoration, consisting of panels with scattered astagalli fillers. The remaining elements include dolphin O.2392 and column motif Rogers P3 placed horizontally below it. Paternus II style. *c* AD 160-190. Mid-Roman pit 279071 (ctx 248115), ON3187
34. CG, Drag 37 body sherd with ovolo B105 and a bead row below, animal and large rosette. Paternus II style. *c* AD 160-190. Mid-Roman pit (ctx 205142)
35. CG, Drag 37 burnt body sherd from base of decoration, with several chips/flakes missing from the decorated surface. Little decoration remains, but the legs of Pan O.710, a vertical fish Rogers R4043 and a large spindle are recognisable and suggest the work of Servus IV. All three elements appear in a similar arrangement on a signed bowl (Rogers 1999, pl.111, 7). *c* AD 160-200. Mid-Roman pit 250094 (ctx 250102)
36. CG, Drag 37 sherd with part of a small, double-bordered medallion containing gladiator O.1064. This figure was used by at least nine Lezoux potters. Hadrianic or Antonine. Mid-Roman pit 250071 (ctx 250072)
37. CG decorated scrap (burnt) with putti O.440 within a double-bordered medallion. This figure was used by 15 or more Lezoux potters. Hadrianic or Antonine. Mid-Roman sunken-featured building 249081 (ctx 271051)
38. EG, probably Rheinzabern, Drag 37 medallion with a single plain border containing a chubby putti. Not identified. Late 2nd-early/mid-3rd century AD. Late Roman sunken-featured building 249083 (ctx 20516)
39. EG, Rheinzabern, Drag 37 sherd with ovolo ?RF E40 and small ring RF O142 (Ricken Fisher 1963). Both motifs were used by several potters, including Cerialis, Commitialis, Attillus and Primitivus I and II. Late 2nd-first half of the 3rd century AD. Late Roman pit 215215 (ctx 215213) and rim fragment probably from this vessel from early or mid-Roman ditch 249267 (ctx 189189)
40. EG, Rheinzabern body sherds from a round bodied jar or beaker with two grooves separated by a wide, plain band marking the top of the decorated zone. The barbotine decoration comprises swirls, leaves and pairs of parallel lines. A small section of a larger, perhaps an animal or bird, figure survives, but not enough to identify its form. Probably early to mid-3rd century AD. Late Roman pit 251005 (ctx 251014 and 251015)

Zone 21

41. CG, Drag 37 body sherd with scrap of decoration including tree Rogers N 7 and small goat O.1836; both were used by the Attianus-Sacer group. *c* AD 120-145. Early or mid-Roman ditch 249 047 (ctx 249046)

Chapter 10

Post-Roman Pottery

by John Cotter

Introduction and methodology

This report deals with all the post-Roman pottery excavated along the length of the EKA2. A total of 1,908 sherds of pottery weighing 30.649kg and with a total EVEs (estimated vessel equivalents – a measure of surviving rim circumference) of 17.84 were recovered. An additional quantification by rim count yielded a figure of 248 rim sherds. The pottery comes from 19 individual zones, although many of these form contiguous 'sites'. The quantity of post-Roman pottery varies considerably from zone to zone from just a handful of sherds on the smallest to a maximum of 596 sherds on Zone 3. There is a reasonable assemblage of early to mid-Saxon pottery (mainly 6th–9th century), including material from a couple of sunken-featured buildings and a few graves, but the late Saxon period (*c* 850–1050) seems to be only slightly represented. The period best represented is the early medieval period (*c* 1050–1250) as typified by sites on the Ebbsfleet Peninsula – mainly in Zone 3 and contiguous Zones 1 and 4. After this there is a modest and declining quantity of medieval wares (to *c* 1500) and a surprisingly small and fairly insignificant collection of post-medieval wares (to *c* 1900). Some chronological zonation or spatial distribution is clearly visible in the assemblage, with the earlier Saxon material concentrated along the inland sites of the Chalk Ridge (Landscape 1), the mid-Saxon material concentrated on the Pegwell Spur (Landscape 2, mainly in Zone 14) and the medieval material concentrated further south on the Ebbsfleet Peninsula (Landscape 3). Although the assemblage is small compared to those from urban centres in east Kent, such as Dover and Canterbury, where individual sites have produced much greater quantities of pottery, it does provide a useful insight, both spatial and chronological, into the range of ceramic material used in this essentially rural part of east Kent.

The condition of the material varies considerably but it is mostly in a fragmentary state. The average sherd weight is 16g which is fairly good. One imported Saxon vessel from a grave is complete and at least two other local handmade Saxon vessels from graves were probably complete at deposition but subsequently disintegrated into dozens of sherds owing to inherent weaknesses in their fabric and particular burial conditions. In contrast, most of the early and high medieval pottery is in fairly robust Canterbury-type sandy wares, which in many cases survive as large fresh sherds including a few reconstructable vessel profiles from pit or ditch assemblages.

All the pottery has been examined, spot-dated and fully catalogued (details in archive). The catalogue includes, per context and per pottery fabric, quantification by sherd count, weight, rim EVEs and rim sherd counts. Other systematically quantified details include simplified vessel form and rim form. Rim forms were coded following a system of generalised codes devised by the author for a much larger medieval assemblage from Winchester (Cotter 2011). Other details of note such as decoration, evidence of use and wear etc, were recorded in a comments field. Late post-medieval (LPM) wares dating after *c* 1780 however, mainly modern 'china' etc, were recorded in more summary fashion (without EVEs), although these wares are comparatively rare. As the post-Roman stratigraphy is fairly shallow on most sites the pottery in effect dates itself and its dating is rarely refined by stratigraphic considerations – apart from exceptional cases where it is associated with closely datable objects such as coins etc. Only a relatively small number of more significant items were selected for illustration as, in most cases, better published parallels exist elsewhere.

Fabrics

Fabric codes employed here are those of the Kent fabric type series housed at Canterbury Archaeological Trust and which the author helped to develop. Saxon fabrics are fully described in the Canterbury Marlowe Car Park report (Macpherson-Grant 1995). Medieval (and some post-medieval) Kent fabrics are fully described in the report on pottery from Townwall Street, Dover (Cotter 2006), where a large assemblage of the period *c* 1150–1300 was excavated. This has descriptions of most of the medieval fabrics occurring on the EKA2 scheme. A small assemblage of early medieval pottery has also been published from Monkton in Thanet at the western end of the EKA2 (Cotter 2008a). Another mainly 13th-century assemblage from nearby Manston is also of some relevance (Macpherson-Grant 1998). Fabric descriptions for the EKA2 pottery given below are therefore rather general except for local variants worthy of comment or where the fabric has not been adequately described before. More detailed fabric and typological descriptions (form, manufacture etc.) have also been provided for some of the illustrated pottery, particularly

Table 10.1 Summary of post-Roman pottery types, with quantities

Fabric	*Description*	*Date*	*Sherds*	*Wt (g)*	*EVEs*	*No. rims*
	Early to mid Saxon (*c* 450-650)					
EMS1F	Sandy ware with flint	*c* 450-650	1	21	0	0
EMS1D	Fine sandy ware	*c* 450-700	1	11	0	0
EMS1.4	Coarse sandy ware with organic temper	*c* 450-700	7	126	0.07	1
EMS3	Fine sandy ware with chalk temper	*c* 450-650	2	15	0	0
EMS4	Organic-tempered ware	*c* 450-800	212	2080	1.29	15
EMS4A	Organic-tempered ware with chalk	*c* 450-650	1	8	0	0
EMS8	North France Black ware	*c* 630-700	91	364	0.39	4
EMS9	North French (Pas-de-Calais) grey sandy ware	*c* 575-750	30	1022	1.57	6
	Mid to late Saxon (*c* 650-850)					
MLS1	Sandy ware with organic temper	*c* 625-725	1	4	0	0
MLS1A	Fine sandy ware with organic inclusions	*c* 625-725	2	11	0	0
MLS2	Canterbury-type sandy ware	*c* 750-875	63	684	0.35	4
MLS4C	Fine sandy ware with shell	*c* 750-875	14	106	0.02	1
MLS6	Fine sandy ware with coarse flint and quartz	*c* 700-800	1	51	0	0
MLS7A	Ipswich ware: sandy	*c* 720-850	51	4711	0.38	4
MLS7B	Ipswich ware: pimply	*c* 720-850	14	457	0.34	2
	Late Saxon (*c* 850-1050)					
LS1	Canterbury-type sandy ware	*c* 875-1050	31	631	0.48	7
LS10	Thetford-type ware	*c* 850-1100	3	50	0.49	2
LS15	North France/Flanders grey sandy ware	*c* 850-950	1	11	0	0
	Early medieval (*c* 1050-1250)					
EM1	Early medieval Canterbury sandy ware	*c* 1050-1225	725	10998	6.32	114
EM1.BCR	Canterbury Brittoncourt Farm-type sandy ware	*c* 1140-1200/25	38	356	1.11	8
EM1.PL	Canterbury Pound Lane kiln-type ware	*c* 1145-1175	2	47	0.14	1
EM.M1	Canterbury shell-dusted ware (Tyler Hill)	*c* 1175-1250	12	181	0.2	3
EM3	Early medieval shelly-sandy ware	*c* 1075-1250/75	102	1184	0.64	10
EM41	Coarse flint-tempered ware (S Kent coast)	*c* 1050-1150/75	21	139	0.07	3
EM32	Flint and shell-tempered ware, sparse quartz (S Kent coast)	*c* 1050-1175	19	246	0.2	5
EM33	Shell and flint-tempered coarse sandy ware (S Kent coast)	*c* 1140-1225	4	27	0.1	2
EM46	Sandy ware with sparse-moderate flint temper (S Kent coast)	*c* 1175-1250	1	10	0.05	1
EM29	Fine sandy ware with flint and shell temper (S Kent coast)	*c* 1175-1300	1	12	0.05	1
LS4	North French/Flemish (?) profuse shelly ware	*c* 1050-1225	67	1177	0.92	18
EM23	North France/Flanders fine sandy ware	*c* 1075-1175	5	50	0	0
EM7	North France/Flanders grey sandy ware	*c* 1100-1175	1	5	0	0
EM18	North France/Flanders fine grey sandy ware	*c* 1100-1175	1	2	0	0
EM60D	North France/Flanders pale grey sandy calc ware: pasty	*c* 1100-1200	1	5	0	0
EM60B	North France/Flanders pale grey sandy calc ware: sandy	*c* 1100-1250	1	17	0	0
EM11RP	Beauvais-type red-painted ware	*c* 1050-1200	4	16	0	0
EM11A.RP	North France-type red-painted ware	*c* 1050-1200	2	58	0	0
EM12	Andenne ware (Belgium)	*c* 1050-1225	1	5	0	0
	Medieval (*c* 1225-1400)					
M1	Tyler Hill ware	*c* 1225-1375	267	3726	2.21	22
M40BR	Ashford/Wealden/Rye sandy ware	*c* 1175-1400	3	9	0	0
M5	London-type ware: general	*c* 1140-1375	3	11	0	0
M11B	Scarborough II ware	*c* 1225-1350	2	13	0	0
M14	Flemish Highly Decorated sandy ware ('Aardenburg')	*c* 1250-1350	1	51	0.02	1
	Late Medieval (*c* 1375-1525)					
LM1	Late Tyler Hill ware	*c* 1375-1525	29	311	0.28	4
LM1.2	Local transitional sandy ware	*c* 1475-1550	1	10	0	0
LM2	Local fine earthenware	*c* 1475-1550	15	285	0.15	1
	Post-Medieval (*c* 1525-1800)					
PM1	Post-medieval red earthenwares	*c* 1550-1800	11	634	0	1
PM2.8	Wealden buff sandy ware with marl	*c* 1525-1650	1	7	0	0
PM62C	Martincamp Type 3 Flasks (Normandy)	*c* 1600-1650	2	14	0	0
PM5	German Frechen stoneware	*c* 1525-1750	1	22	0	0
	Late post-medieval (*c* 1775-1950)					
LPM1	Red earthenware with late characteristics	*c* 1775-1925	4	88	0	0
LPM2	Fine red earthenware (flowerpot etc)	*c* 1825-1950	7	37	0	0
LPM3	South Yorks white-slipped kitchenware	*c* 1775-1925	3	89	0	0
LPM5	Yellow ware (Staffs/Midlands)	*c* 1800-1925	2	5	0	0
LPM7	English Porcelain	*c* 1745-1925	2	18	0	2

Table 10.1 (continued)

Fabric	*Description*	*Date*	*Sherds*	*Wt (g)*	*EVEs*	*No. rims*
LPM10	Modern English stoneware	*c* 1800-1940	6	143	0	0
LPM10E	Modern English stoneware (sanitary)	*c* 1800-1940	1	114	0	1
LPM12	Pearlware (Staffs/Midlands)	*c* 1780-1830	2	19	0	1
LPM14	Refined whitewares (Staffs etc)	*c* 1825-1925	9	125	0	3
LPM29	Late Normandy stoneware	*c* 1875-1940	1	4	0	0
	Unidentified (Roman/post-Roman)					
UNID	Unidentified wares	Rom/post-Rom	1	16	0	0
		Total	1908	30649	17.84	248

for the more unusual and intrinsically interesting vessels (see Illustration catalogue). Sixty post-Roman fabrics have been identified from the EKA2 scheme, although some of these are minor variants of the same basic type. The types and quantities occurring here are summarised below in Table 10.1. This is followed below by a selective list, in roughly chronological order, describing the more significant fabrics in more detail.

The assemblages

*Early to mid-Saxon (*c *450–650)*

EMS1F Sandy ware with flint, *c* 450–650
A single, isolated, burnished sherd from Zone 14 where the majority of post-Roman pottery dates to the 8th/9th century. The dating of this piece may, therefore, be the same despite its usual range.

EMS1D Fine sandy ware, *c* 450–700
A single isolated sherd in a fine silty grey-brown micaceous fabric with rare flecks of organic matter. Also from Zone 14 (see above).

EMS1.4 Coarse sandy ware with organic temper, *c* 450–700
Despite the name, the two vessels represented here (Zones 11 and 14) have a fine silty fabric with sparse organic inclusions. The isolated sherd from Zone 14 is possibly from a small globular jar with a trace of a sagging base. It may be mid-Saxon rather than earlier. The vessel from Zone 11 (Fig 10.1, no. 1), from Saxon sunken-featured building 268011, is a squat globular or sub-biconical jar/bowl with good quality horizontal burnishing externally and with incised/burnished chevron decoration on shoulder. It has an early 'look' and possibly dates to *c* 450-600 (See illustration catalogue).

EMS3 Fine sandy ware with chalk temper, *c* 450–650
A rare fabric from east Kent generally, despite the outcropping chalk. Two body sherds from the same vessel (possibly a large jar?) from Zone 10. It has a fine silty micaceous fabric, dark grey with a brown core, with abundant rounded chalk inclusions to 1mm across and sparse quartz. Externally smoothed or burnished. One of the sherds occurs in a sunken-featured building (SFB 194086) which also produced imported Merovingian pottery of *c* 575–750. The EMS3 vessel may therefore be of this date rather than earlier.

EMS4 Organic-tempered ware, *c* 450–800
At over 200 sherds (1.29 EVEs) this is easily the commonest Saxon fabric from the EKA2 – as it is throughout most of Kent, particularly during the 6th and 7th centuries. Its presence here, in terms of sherd count, is perhaps exaggerated by a small number of crushed vessels. Fairly crude, handmade vessels probably locally made and fired in bonfire kilns. The fabric is almost purely organic-tempered (coarse chopped grass or chaff) with a soft, fairly pure or finely sandy 'brickearth' matrix. The organic material is often burnt-out leaving a corky texture with a laminated fracture. Surfaces have a characteristic smooth soapy feel. Firing colour is generally reduced black, dark grey or brownish-grey. A few vessels here have been smoothed externally but burnishing is absent. In other parts of south-east England small quantities of organic tempered ware are present from the 5th century onwards, becoming the dominant fabric of the 6th-7th centuries, eg, at Mucking, Essex (Hamerow 1993, fig 17). At Canterbury organic-tempered ware mainly dates from *c* 575 onwards (Macpherson-Grant 1995). This may also be the case in Thanet, but secure dating evidence is lacking. The demise of the ware at Canterbury and at other east Kent sites (eg, Minster-in-Sheppey) seems to coincide or overlap with the introduction of Ipswich ware (current *c* 720–850, mainly after *c* 750) and the rise of the local Canterbury sandy ware tradition (see MLS2 below). The absence of organic-tempered ware from a group of pits on Zone 14 containing a fair quantity of Ipswich ware (associated with sandy MLS2) suggests that locally the tradition may have died out in the middle of the 8th century – in line with the picture from Canterbury.

The assemblage here probably represents around 30 vessels, all of them, apparently, simple baggy jars with plain upright or everted rims and rounded bases. Many show evidence of external and internal sooting and in some cases traces of carbonised food residues. Most have rim diameters in the 80-140mm range with one example at 180mm. Most of the vessels are from contiguous Zones 10 and 11 with a few also from Zone

19 nearby. Around a dozen fragmentary vessels came from a Saxon sunken-featured building on Zone 10 (SFB 194086), including a sub-biconical jar (Fig 10.2, no. 12), where they were associated with imported Merovingian pottery of *c* 575–750. One of the sherds from the sunken-featured building had a small perforation. A rare decorated sherd from the shoulder of a jar/bottle in EMS4 has a band of lightly incised decoration possibly including chevrons (Fig 10.2, no. 11). This might be a crude local attempt to copy an imported Merovingian vessel. A complete (crushed) narrow-necked pear-shaped jar was found as a grave good in grave 153084 in Zone 19 (Fig 10.2, no. 13).

EMS4A Organic-tempered ware with chalk, *c* 450–650

A single, isolated, burnished sherd from Zone 14 where the majority of pottery dates to the 8th/9th century.

EMS8 North France Black ware, *c* 630–700

Together with the commoner grey sandy fabric EMS9 (see below), EMS8 is part of a wider group of imported wheel-thrown Merovingian/Frankish vessels that are fairly common as Saxon grave goods in east Kent, particularly in Thanet (Evison 1979). A single sub-biconical jar in this fabric with incised wavy line decoration was found in Zone 19 in grave 166105 (Fig 10.1, no. 3). The form is similar to one from St Peter's, Thanet (Evison 1979, fig 15g). The fabric is distinguished from EMS9 by its much smoother siltier texture which is almost free of visible inclusions (quartz temper) and as a result has a highly laminar structure – prone to flaking if damaged (see Illustration catalogue for detailed description). The vessel here has disintegrated into dozens of small sherds plus a few larger ones. Vessels in this smoother fabric are relatively rare, even in Thanet. Some of the few vessels identified have characteristic 'Z-rouletted' decoration including two biconical jars from Canterbury (Macpherson-Grant 1995, 823, fig 348 and pl CXXVIII-IX) and a very similar jar from Dover (Evison 1979, fig 15i). This type of decoration is dated *c* 630–670/700 from its associations with dated metalwork both in Thanet and Canterbury. Although the Zone 19 vessel has different decoration the fabric is undoubtedly the same as the Canterbury examples.

EMS9 North French (Pas-de-Calais) grey sandy ware, *c* 575–750

A hard grey well-sorted sandy fabric with abundant quartz and usually with some red iron oxide inclusions, some red-brown clay pellets and rare flint or calcareous inclusions. There are many minor variations to this general description, a few of which are described in the illustration catalogue. One of the vessels here is completely oxidised but otherwise identical. Vessels are competently wheel-thrown and therefore very different to local handmade contemporary Saxon pottery. On the other hand it can sometimes be very difficult to distinguish undecorated sherds from coarse local Roman greyware pottery, although the forms are somewhat different and on the examples here the finishing of the base (usually flat and often wire-marked) is usually 'messier' than on Roman wares. Nevertheless confusion between the two can occasionally arise. This can usually be minimised by considering the context and associated finds (as in the case of the Saxon sunken-featured buildings here), or by resorting to scientific analysis. A sample of definite EMS9 sherds from EKA2 were submitted for scientific analysis (ICPS) to see how they compare to each other chemically and to samples from sites in north France. A few dubious Roman/Merovingian greyware sherds have also been included to see if they could be chemically distinguished (see scientific appendix by Mike Hughes). Along with the finer, much rarer, grey sandy Fabric EMS8 (above), EMS9 is part of a wider group of imported wheel-thrown Merovingian/Frankish vessels that are fairly common as Saxon grave goods in east Kent, particularly in Thanet (Evison 1979). These probably came from several production centres in northern France (mainly the Pas-de-Calais) and the adjacent southern part of Belgium (Flanders). Their importation into England is dated to the period *c* 575–750 at the widest, mainly by their association with more datable grave goods. Most examples however, particularly the taller biconical jars, are normally assigned to the 7th century. They occur most commonly in the form of biconical jars/bowls and tall bottles and often bear rouletted decoration. Evison has suggested they may have been used as accessories (and perhaps status symbols) for the consumption of imported French wine – hence their inclusion as valued grave goods (Evison 1979, 65). An increasing number of vessels, as here, are also known from domestic contexts. A group of at least ten fragmentary vessels of this type (including larger plain jars) has recently been published from Manston Road, near Ramsgate (Mepham 2009, fig 4.18.1-10).

If one includes the finer EMS8 vessel (above), a minimum of 11 imported Merovingian vessels has been identified. These are from Zones 10, 11 and 19. Two are from graves (Zone 19), four from a Saxon sunken-featured building (Zone 10) and the rest are from pit and ditch fills (Zones 10 and 11). Five vessels (all EMS9) have rouletted decoration, one has incised wavy line decoration (EMS8) and one has horizontal grooved decoration. The four other vessels are sherds from undecorated areas (bases) included here because of their general similarity and context. Zone 10 alone produced eight vessels, Zone 11 a single (undecorated) example and Zone 19 two examples. Nine examples, including most of the roulette decorated vessels, have been illustrated and are fully described and paralleled in the illustration catalogue (Fig 10.1, no. 3 (EMS8), nos 2, 4-10). Apart from one fairly likely bottle (Fig 10.1, no. 6) the only other form present is the jar or squatter jar/bowl. Three vessels are of carinated or biconical form; the others appear to be basically globular or of indeterminate form. None of the sherds shows evidence of applied features such as handles etc. The complete oxidised biconical jar (Fig 10.1, no. 2) from grave 166105 on Zone 19 is in perfect condition, as though unused. The form of this vessel is almost identical to one from Ozengell, near Ramsgate (Evison 1979, pl. IIIB). At least two of the Merovingian vessels show evidence of use in the form of external and internal sooting, including Fig 10.1, no. 9, a basal sherd from the Saxon sunken-featured building which shows marked wear and scorching–particularly internally–suggesting use as cooking or heating vessels.

Mid- to late Saxon (c 650–850)

MLS1 Sandy ware with organic temper, *c* 625–725
A single isolated sherd from Zone 14.

MLS1A Fine sandy ware with organic inclusions, *c* 625–725
Two small body sherds from Zone 14. Possibly from two vessels. These both have a fine silty/sandy fabric with sparse organic inclusions and are smoothed externally. Both have traces of incised decoration – perhaps a shoulder frieze? On one (context 133054) this appears to be lozenges or intersecting chevrons. The other (context 139072) has a pair of incised parallel lines. The latter was associated with Ipswich ware and may perhaps be contemporary.

MLS2 Canterbury-type sandy ware, *c* 750–875
This is the commonest relatively local mid-Saxon ware in east Kent and occurs exclusively here on Zone 14 where it is associated in rubbish pits with equal amounts of Ipswich ware (*c* 720–850). The fabric is usually dark grey or brownish-grey and contains abundant fine-medium quartz sand temper with occasional grits, and streaks from burnt-out organic inclusions. Fairly soft to hard. Handmade, thin-walled, jars/cooking pots are the normal form – often exhibiting internal/external knife-trimming and sometimes crude external burnishing. Production at or near Canterbury, where this is the predominant mid- to late Saxon type, appears very likely. Only four rims from four separate jars are represented in the very fragmentary assemblage – all with external sooting. These have diameters in the 150–230mm range (Fig 10.4, nos 28–29). Several body sherds exhibit quite a high quality horizontal burnish externally. A rounded base fragment is also present.

MLS4C Fine sandy ware with shell, *c* 750–875
A somewhat variable texture but generally black or grey with a very fine sandy/silty micaceous 'brickearth' matrix with sparse-moderate worn shell inclusions up to 4mm, including rare gastropod and boney ?barnacle. Also sparse rounded quartz (often brown) and rare-sparse flint to 1mm. Some sherds are burnished externally. The only vessel with a trace of a rim is a small thin-walled jar with external sooting (Zone 14, context 220039, not illus.). All the sherds are from Zone 14 apart from one vessel from Zone 15.

MLS6 Fine sandy ware with coarse flint and quartz, *c* 700–800
A single thick-walled jar body sherd from Zone 10.

MLS7A Ipswich ware: sandy, *c* 720–850
Wheel-turned grey sandy ware produced at Ipswich, Suffolk. Ipswich ware, in all its fabric varieties, has a wide, primarily coastal, distribution in eastern and southern England. It is fairly common along the north Kent coast, particularly at Canterbury and at Minster-in-Sheppey. It also occurs, though less commonly, on the south coast at Dover and Hythe near Folkestone. Closer to the excavations here, a complete Ipswich ware spouted pitcher with stamped decoration is known from Richborough Castle (Hurst 1976, fig 7.8.1). Its relative commonness in north Kent may be due to the trading interests of the early minsters at places like Canterbury and those at Minster-in-Sheppey and Minster-in-Thanet. The main currency of the ware at Canterbury is thought to be from *c* 750/775 onwards (Macpherson-Grant 1995, 896). A major survey of the ware in England, including Kentish evidence, has just been published (Blinkhorn 2012). The forms commonly found in Kent are jars and spouted pitchers. All the Ipswich ware from the EKA2 occurs exclusively on Zone 14, near Cliffs End, where it mostly came from mid-Saxon rubbish pits. These contained large quantities of shellfish which seem to have been processed on-site.

As with the smaller assemblage of 'pimply' Ipswich ware below, the 51 sherds of sandy Ipswich ware here mostly comprise a very fragmentary collection including quite a few worn and scrappy sherds from several vessels, although a few sherds are quite fresh. The exception to this is the largely complete reconstructable spouted pitcher (Fig 10.3, no. 20), probably the only vessel from a primary context (pit 202038). No physical joins were noted between sherds from different contexts except in one instance where sherds from two fills of the same pit joined (pit 133064). In one or two instances distinctively fired sherds – *possibly* from the same vessel – were found in separate pits (eg, pit 173112 and pit 185044). On the basis of firing colour and textural variations a minimum number of twelve vessels in this fabric exist. Add to this the seven vessels in the 'pimply' fabric below and the combined minimum number of Ipswich ware vessels is 19. After Canterbury and Minster-in-Sheppey, the 65 sherds (19 vessels) here constitute the third largest assemblage of Ipswich ware known from Kent – and all the more remarkable perhaps as they come from a single site.

Sherds from two vessels in the 'sandy' category occur in a very smooth variant of the fabric with few visible inclusions. This 'smooth' type is a minor constituent of most larger assemblages of Ipswich ware. One of these sherds is from the shoulder of a fairly large handmade jar with vigorous knife-trimming internally and externally (context 133067). Two smallish sherds, from separate vessels, are decorated with intersecting burnished lines, possibly part of a trellis scheme (contexts 202130 and 203016). One other shoulder sherd from large jar or pitcher has traces of an incised or combed diagonal line, possibly part of a decorative shoulder frieze (context 202133). Girth grooves or shoulder rilling is generally common. Only four rim sherds from two vessels survive, including the spouted pitcher profile (Fig 10.3, no. 20) and a small jar/cooking pot (Fig 10.4, no. 21). The majority of sherds seem to be from fairly large, thick-walled jars or pitchers (body and sagging base sherds). Most of these are sooted externally and sometimes internally. In a few cases the external sooting is very heavy. A few sherds from thicker-walled vessels, particularly the illustrated pitcher, are flaky and pitted internally – perhaps from repeated boiling and/or from the corrosive nature of their contents. One fresh sherd from the lower wall of a large jar has a small group of impressions acquired during manufacture – perhaps blurred fingerprints or textile impressions (context 173113). The near-complete spouted pitcher (Fig 10.3, no. 20) resembles the Richborough Castle pitcher in basic form and in having evidence for a handle (now missing) at the back, but unlike the Richborough pitcher does not have pierced lug handles on the shoulder or any obvious decoration. The vessel appears to have been quite old and 'well-used' by the time of its disposal, for apart from significant wear to the base and the marked internal flakiness (though no evidence of sooting), the broken rim/shoulder around the back of the vessel is unusually worn and may have been filed down after the loss of the handle to prolong the working life of the vessel (see illustration catalogue for detailed description). Some of these vessels were undoubtedly used as cooking vessels, others, like the spouted pitcher, may originally have been used for serving liquids but may have ended up as general cooking or storage vessels after they were damaged or had worn out. Whether these vessels had any connection with the preparation and processing of the abundant shellfish remains from the same rubbish pits remains a matter of speculation.

MLS7B Ipswich ware: pimply, *c* 720–850

Smoother matrix than MLS7A (see above), with moderate coarse to very coarse rounded quartz and some flint. The 14 sherds identified are very fragmentary, in some cases worn, and mostly sooted. They include the rims from two small jar/cooking pots (diameters 105mm and 120mm) with prominent girth grooves or shoulder rilling (Fig 10.4, no. 22), sagging base sherds from two separate vessels and two separate small body sherds with burnished line decoration. One or two body sherds come from large thick-walled jars or pitchers. No physical joins were noted between sherds from different contexts. On the basis of firing colour and textural variations a minimum number of seven vessels exist, and perhaps as many as nine.

Late Saxon (c 850–1050)

LS1 Canterbury-type sandy ware, *c* 875–1050

A later development of MLS2 (above). Usually reduced dark grey, with coarser quartz sand and more vigourous internal and external knife-trimming. This trait, however, was only typical of the period up to *c* 975/1000, after which vessels are usually plain and can be difficult to distinguish from Early Medieval Canterbury sandy ware (EM1, see below). This is the case with the very few vessels here – which are all from the same pit in Zone 17 (pit 143037), with a couple of small sherds in a nearby pit (155014) perhaps derived from the main group. Estimated from rims alone the group produced seven large diameter jars/cooking pots (Fig 10.2, nos 14–19) which are all in a transitional LS1/EM1 fabric with simple rims with a characteristic 'cavetto' form (S-shaped profile; Macpherson-Grant 1995, 890, Group III rims, dated *c* 950-1000). On the basis of these transitional characteristics, and the presence of a small sherd of late Saxon French greyware (LS15) in the same pit, a date of *c* 975–1050 is suggested for this group. The transition between LS1 and EM1 during the 11th century is poorly understood and the division here may be a somewhat artificial one as the fabric and even the typology can look very similar. The 'early medieval' features typified by EM1 were probably around well before the Norman Conquest. The overall 'primitive' character of the group here, however, and its isolation from the main early medieval settlements to the south (Zone 3 in particular), single it out as the only fairly certain late Saxon assemblage from the whole EKA2. Although some late Saxon or Saxo-Norman pottery types occur on the scheme (eg, Thetford-type ware), these are rare and appear to be in post-Conquest contexts (see below).

LS10 Theford-type ware, *c* 850–1100

Wheel-thrown grey sandy ware mainly produced at Thetford (Norfolk) and Ipswich (Suffolk). Ipswich is the more likely source for the examples here and in London (Vince and Jenner 1991, 89-91). Thetford-type ware is fairly rare in Kent, although a few vessels are known from sites along the north Kent coast and also from Dover and Canterbury. The assemblage here comprises three vessels, all from early medieval pit or ditch contexts in Zone 3 dated by local wares (EM1) to *c* 1075–1125. A near-complete profile of a small globular jar/cooking pot has been illustrated (Fig 10.4, no. 30) and is fully described in the illustration catalogue. A small rim sherd from a jar with flanged/lid-seated rim (diameter 190mm) came from pit 139026 and can be paralleled in published assemblages elsewhere (Jennings 1981, fig 5.111). Another small body sherd has possible traces of an applied strip (pit 269034). The absence of Thetford-type ware from the large post-1150 assemblage at Townwall Street, Dover, suggests the type had died out by then (Cotter 2006).

LS15 North France/Flanders grey sandy ware, *c* 850–950

Represented by a single smallish body sherd possibly from a large wheel-turned pitcher. This has a sandy well-sorted reddish-brown fabric with thin grey core and dark grey/black surfaces. It occurred in the same late Saxon pit group on Zone 17 as the LS1 sherds described above (pit 143037). It is slightly worn and may either be residual or, and perhaps more likely in this context, a very late example of its type.

Early Medieval (c 1050–1250)

EM1 Early medieval Canterbury sandy ware, *c* 1050–1225

This is the commonest post-Roman pottery type from the EKA2 (725 sherds, 6.32 EVEs). Early Medieval Canterbury sandy ware developed out of the late Saxon Canterbury-type sandy ware tradition (LS1). It was made at Tyler Hill after *c* 1140/50 but until recently the location of its earlier phase of production remained unknown. Excavations in 1999 at Canterbury Police Station on the New Dover Road, *c* 100m south of the city walls, provided evidence (mainly wasters) that it was probably made in a kiln or kilns near the site during the later 11th and early 12th century (Diack 2005). Thus the location of the early Norman phase of production now appears to have been discovered – although the kilns themselves were not found. The evolution and dating of EM1 has been summarised in detail elsewhere (Cotter 2006, 133-143; 1997, 58-61). This is the commonest early medieval ware found in east Kent. It is predominantly a jar/cooking pot fabric. The fabric contains abundant fairly coarse quartz sand and is generally grey or brown or shades in between. It is generally low-fired and unfused but occasionally very hard. Jars are handmade and generally quite large with a sagging base and turntable-finished rims (Fig 10.4, nos 31–36). Apart from a few vessels with thumb-decorated rims (mainly *c* 1150+) they are completely plain, unglazed and undecorated. Forms other than jars are generally quite rare, although roulette-decorated spouted pitchers were produced after *c* 1140 in a related fabric (EM1.BCR, see below) and a few glazed jugs/pitchers are also known from the later phase of the industry. The bulk of the EM1 assemblage from the EKA2 is from Zone 3 and the typology of this is predominantly early in character, mainly dating to *c* 1075–1150. Much smaller quantities of material from the later phase of the industry (*c* 1150–1225) also occur but are mainly confined to Zones 1 and 4.

Jars/cooking pots are overwhelmingly the predominant vessel form here, comprising 95.3% (by EVEs) of the EM1 assemblage. Only two other minor forms are represented: spouted pitchers (2.5%) and bowls (2.2%). Jar rim diameters are in the 160-360mm range. Rim diameters tend to be quite large. Diameters in the 160–240mm range comprise 37% of the assemblage and those in the upper range of 250–360mm comprise 63%. There is a small peak in the data around 210–220mm diameter, and a much clearer peak around 300–320mm which accounts for 31% of all jar rims (by EVEs). Most early jar rims are characterised by a straight flaring neck which can be quite long (or tall). Two rim types predominate here – as in most other 'Norman' assemblages. One of these is a flattened D-shaped bead which mainly dates *c* 1075–1150 (DB, Fig 10.4, no. 31 is a very flattened example of this). The other is an internally bevelled rim type with a more restricted date range of *c* 1075–1125/50 (IBEV, Fig 10.4, no. 32-34). These occur here with almost exactly the same frequency: D-bead rims comprising 31.4% (by EVEs) of the rim assemblage and internally bevelled rims 31.2%. There are, however, many minor variations in rim form detail and hybrids of the two main types are not unknown. The only other types worthy of note (all with straight necks) are a fairly upright rim with a thickened flat top (B2U, 7%, not illus), a sub-triangular beaded type (C3B, 6.1%, Fig 10.4, no. 35) and a more beaded type (C2, 5.3%, Fig 10.4, no. 36). Later EM1 rim types (*c* 1150+) tend to have shorter curved necks and big beaded or clubbed rims and often a more oxidised fabric. These are rare here (mostly from Zone 4), a fact which underlines the predominantly early character of the bulk of the assemblage. Thumbed decoration occurs on only three of the 114 rim sherds in this fabric and two of these are probably from the same vessel (Zone 4). The other rim is from Zone 1. By contrast thumbed rims are common in the large EM1 assemblage from Townwall Street, Dover, which mainly dates after *c* 1150 (Cotter 2006). The vast majority of jar sherds, particularly sagging bases, show evidence of external sooting and in some cases sooty vertical trails caused by the spillage of fatty liquids. Their identification as cooking pots rather than storage jars is therefore fairly certain – although some may have had a dual purpose.

Spouted pitchers (for serving liquids) are normally – in this fabric – narrower-necked jar forms with a short tubular spout on the shoulder and no handle. Only two examples were identified, both with rim diameters of 160mm (not illus.). The more certain example, from Zone 4, has a complete tubular spout and a big beaded rim and oxidised fabric typical of later products (*c* 1140–1225; Cotter 2006, fig 111.24-28). The other probable example is represented only by a thickened, flat-topped, upright rim from Zone 3. A few other, decorated, spouted pitchers occur in the variant EM1 fabric (see below, EM1.BCR). There are, likewise, only two definite bowls in this fabric, both from Zone 3. These are of wide shallow form with curving walls and internally bevelled rims similar to those on cooking pots (Fig 10.4, no. 37–38). One shows external sooting from use. Bowls tend to be quite rare in this fabric anyhow, but their low frequency here is notable. Wide bowls in the medieval and later period are sometimes associated with dairying practices (butter/cheese preparation etc). Bowls are also very rare in the much larger EM1 assemblage from Townwall Street, Dover, and it was suggested that their scarcity there might reflect a lack of concern with dairying practices caused by the unsuitable conditions for keeping livestock (ie, crowded beachside shacks) (Cotter 2006, 413). A similar lack of interest in dairying might be reflected here, although perhaps not for the same reasons. A single worn, oxidised, body sherd in EM1 bears splashes of clear glaze (Zone 4). This is probably from a fairly rare early jug/pitcher and dates to the late phase of the industry.

EM1.BCR Canterbury Brittoncourt Farm-type sandy ware, *c* 1140–1200/25

This sub-group of EM1, consisting almost entirely of roulette-decorated spouted pitchers, has been described in detail elsewhere – particularly in relation to Canterbury Pound Lane kiln-type ware below (Cotter 1997, 63-68). A kiln producing these wares was excavated at Brittoncourt Farm, near Tyler Hill, about three miles north of Canterbury. The fabric is basically the same as EM1 but better sorted and is often – as here – dark grey or grey-brown with a reddish core. The spouted pitchers, which are unglazed and lack handles, are usually of medium size with an ovoid or globular body, a short tubular spout, a sagging base and usually a collared rim (copying Continental prototypes or Pound Lane kiln ware). The body and often the rim are decorated with horizontal bands of square rouletting. Although handmade, most examples appear to have been finished off on a turntable to a high standard. They are common from 12th-century contexts in Canterbury and also from Dover (Cotter 2006, 140-43). Closer to Thanet, examples have been identified at St Nicholas-at-Wade and Stonar, near Sandwich. A minimum of three vessels, including two complete spouts, has been identified from the EKA2 – all from the Weatherlees Pond site adjacent to Zone 4 (not illus.). These include a fragmentary vessel profile (with 100% rim survival) from a ditch (context 380). One vessel is decorated in a more unusual style with a neat double band of rouletting on the upper projection of its collared rim (Cotter 1997, fig 58.7).

EM1.PL Canterbury Pound Lane kiln-type ware, *c* 1145–1175

A single jar/cooking pot rim identified from a pit context on Zone 3 (Fig 10.4, no. 39). A kiln producing this ware was excavated at Pound Lane, Canterbury, and a detailed study of the industry has been published (Cotter 1997). Pound Lane-type ware is a wheel-thrown grey sandy ware closely related to EM1 (above) and made from the same basic clay. It differs from EM1 (and EM1.BCR) in being competently wheel-thrown and its products include glazed jugs with diamond-shaped rouletting and jars and spouted pitchers with neatly made Continental-style collared rims. Plainer jar/cooking pots were also made. These pots were probably produced by an (unknown) immigrant potter from Normandy who settled in Canterbury in the mid-12th century. Despite its sophistication the industry at Pound Lane appears to have lasted only a few years and only a couple of dozen or so Pound Lane kiln products have been identified from other sites in the city. It seems that demand for Continental-style roulette-decorated pottery and glazed jugs was more than met by the local Tyler Hill/Brittoncourt Farm potters – as their copies of these are fairly common finds in east Kent (see EM1.BCR above). The significance of the piece from Zone 3 is that it is the first positively identified example of the ware from outside Canterbury itself. It is clearly wheel-thrown with a hard light grey sandy fabric with traces of external sooting from use. The externally flattened and hooked bead rim it presents is the commonest rim type from the Pound Lane kiln (Cotter 1997, 25, Type 15). A few unusual EM1 jar/cooking pot rim types from Dover (*c* 1150+) are also remarkably similar to the commonest types from Pound Lane but are perhaps best regarded as copies (Cotter 2006, fig 111.17-20).

EM.M1 Canterbury shell-dusted ware (Tyler Hill), *c* 1175–1250

Sandy oxidised or reduced fabric basically as Tyler Hill ware (M1) or transitional between EM1 and M1 (Cotter 2006, 143-6). Occurs almost exclusively in the form of jars/cooking pots with boldly squared rims in the Tyler Hill style. The rim and shoulder of the vessel is dusted with crushed marine shell (often dissolved). Fairly rare from EKA2 sites – perhaps six vessels represented including three squared jar/cooking pot rims. Mainly from Zone 3 (possibly just two vessels) and Zone 1, with single sherds from Zones 4 and 21.

EM3 Early medieval shelly-sandy ware, *c* 1075–1250/75

A sandy, often weakly oxidised, fabric tempered with moderate to abundant inclusions of marine shell. Locally, the main source of the ware found at Canterbury and Dover is thought to be somewhere along the north-east coast of Kent, and the banks of the Wantsum Channel around Thanet have been suggested as a possible location for its manufacture (Cotter 2006, 148-156). Shell inclusions in the assemblage here are mostly worn, probably water-rolled, and mostly under 3mm across. Species cannot be recognised. Most examples also contain sparse flint inclusions (see also flint-tempered wares EM41, EM32, etc, below). Quartz inclusions are generally moderate to abundant, medium-coarse and rounded. A few finer variant specimens might be from more westerly sources in Kent. While fairly common here, EM3 is not as common as one might have expected given the proximity of its supposed production area. This may, however, mainly be for chronological reasons as shelly-sandy ware at Dover is only really very common after *c* 1150. This impression is reinforced by the evidence from Zone 3 which has a large assemblage of pottery mainly datable to *c* 1075–1150 (EM1), but which only produced five sherds of EM3. Most of the EM3 assemblage in fact is from Zones 1 and 4, which mainly produced pottery dating after *c* 1150. The ten rims here represent a minimum of seven vessels, mostly jars/cooking pots with thickened flat-topped or more squared rims (Fig 10.5, no. 45). One example has a thumbed rim. There are two wide bowls including one with a thumbed rim (Fig 10.4, no. 40). A small sherd from Zone 1 probably comes from the expanded neck of a jug – several examples of this fairly rare vessel form are known from Dover. It is curious that the slightly earlier sand-free shelly ware (EM2) found in east Kent appears to be absent here; this role seems to have been filled by another type of shelly ware (see LS4 below).

Early medieval flint-tempered wares (EM41, EM32, EM33, EM46 and EM29):

Problems of classification, sourcing and dating.

These are fairly rare here and all but 10 of the total 46 sherds identified are from Zone 3 – a distribution which reflects their early medieval dating. They are visibly very similar and probably represent a range or continuum within the same ceramic tradition. They are almost certainly closely related and likely to come from the same general source area, possibly the south Kent coast and particularly from around Folkestone, Hythe and the Romney Marsh where flint-tempered fabrics are fairly common between the 11th–13th century (Cotter 2006, 156-167). Other sources such as east Sussex are also possible. The distinction between EM41 and EM32 here is a fine one (see detailed fabric descriptions below). In brief, EM41 is flintier with no shell whereas EM32 is sandier and contains some shell. At Dover after *c* 1150 a more shelly, sandier, more oxidised flint-tempered ware, EM33, becomes common and this seems to have developed out of the earlier EM41/EM32 tradition (*ibid*, 160-61). A single vessel in EM33 was identified from Zone 4 where its association with a distinctive Canterbury spouted pitcher of *c* 1140–1200/25 (EM1.BCR) provides useful confirmation of its later dating. The absence of EM33 from other EKA2 zones, particularly from the largest medieval settlement in Zone 3, suggests that the main period of medieval settlement was over by *c* 1175. After that, pottery from Tyler Hill near Canterbury supplied the area's more limited needs until *c* 1500. There is also some visual resemblance here between EM32 and the later shelly-sandy EM3 tradition (*c* 1075–1250/75) as the latter also contains some flint and the firing colour can be very similar, but EM3 is distinguished by its abundant shell and quartz inclusions. A north-east Kent source for the EM3 here seems likely but it was probably made at several coastal locations around the county. The single sherds of EM46 and EM29 (the latter a development of EM33), both from Zone 1, are sufficiently distinctive and probably represent stray imports of the later 12th and 13th century respectively.

EM41 Coarse flint-tempered ware, c *1050–1150/75?*
Examples here mostly have weakly oxidised orange-brown surfaces/margins and a grey core although some are grey-brown or grey-black (particularly if burnt/scorched). Fairly hard to fairly soft. Abundant coarse flint, mainly sub-angular to sub-rounded, mainly water-worn, commonly red or brown, also white and grey, 0.5–2mm, occasionally coarser/angular to 5mm. Sparse rounded/polished quartz to 1mm, clear and milky, occasionally orange or brown. Sparse red iron oxide and brown or grey clay pellets, rare coarse quartzite or sandstone. The matrix is generally silty with abundant very fine quartz sand and mica – not easily visible to the naked eye. Also some fine to coarse dark grey organic inclusions. EM41 contains no significant shell (see EM32). A slightly different, harsher, EM41 fabric occurs at Townwall Street, Dover, but is rare – probably because the sequence there dates after *c* 1150 (Cotter 2006, 159). The 21 sherds present from the EKA2 represent a minimum of about seven vessels, all jars/cooking pots with fairly simple everted rims (Fig 10.4, no. 24). All but one of these came from Zone 3; the other came from Zone 23. Its common association on EKA2 sites with Early medieval Canterbury sandy ware (EM1) suggests a main dating here of *c* 1075–1150/75. The ware probably has late Saxon origins.

EM32 Flint and shell-tempered ware with sparse quartz, *c* 1050–1175?
The basic fabric here is exactly the same as EM41 (above) with abundant coarse flint but EM32 is sandier and contains some shell. Visible quartz is rounded as in EM41 but sparse-moderate in frequency rather than sparse. There is also sparse-moderate coarse shell, although this has often dissolved out. Where present it is sized as the flint and either platy or as small worn fragments. Species are not usually recognisable but one or two examples contain rare small gastropod/snail inclusions. The 19 sherds here (like EM41 above) represent a minimum of about eight vessels, all jars/cooking pots (Fig 10.4, nos 25–26) apart from a single bowl (Fig 10.4, no. 27). All but two of these came from Zone 3; the others from Zones 4 and 22. As with EM41, its common association on EKA2 sites with Early Medieval Canterbury sandy ware (EM1) suggests a main dating here of *c* 1075–1150/75, although the ware may have late Saxon origins. This agrees with its predominance in late 11th- to early 12th-century contexts at sites near Hythe in south Kent where it is also associated with EM1 (Cotter 2006, 166). The fabric occurs at Townwall Street, Dover, in contexts after *c* 1150 but is rare (*ibid*).

EM33 Shell and flint-tempered coarse sandy ware, *c* 1140–1225
The fabric is like EM32 above but is more commonly oxidised orange-brown with moderate-abundant shell and distinctive coarse rounded quartz inclusions as well as red, white and grey flint grits A single vessel in this fabric was identified from Zone 4 where it was associated with a decorated Canterbury spouted pitcher of *c* 1140–1200/25 (EM1.BCR). The piece (not illus.) comprises a simple thickened everted jar/cooking pot rim containing moderate shell (contemporary marine?) including small gastropod (hydrobia?), an echinoid spine and boney-structured ?barnacle. It is common at Townwall Street, Dover, in contexts after *c* 1150 (Cotter 2006, 160-61) and its apparent absence from earlier contexts on the EKA2 scheme, combined with the Dover evidence, suggests a revised dating of *c* 1140–1225.

EM46 Sandy ware with sparse-moderate flint temper, *c* 1175–1250?
Represented by a single rim from a cresset oil lamp – the only example of this form from the excavations (Fig 10.4, no. 23, Zone 1). A rare fabric in east Kent, even at Dover (Cotter 2006, 159). The example here is dark grey with a dark brown external surface and looks superficially like EM1. It has a hard ill-sorted sandy fabric with sparse-moderate angular-rounded flint grits up 1.25mm and moderate rounded quartz grits of the same size. Quartz is clear and commonly orange-brown (possibly iron-stained) and there are sparse coarse iron-rich clay pellets to 3mm. No definite shell but some rare ?chalk. Some organic inclusions. Fairly micaceous. Perhaps a south Kent source? Its sandiness and association here with a few sherds of late-looking EM1 suggests a later dating than most of the flint-tempered wares from Zone 3.

EM29 Fine sandy ware with flint and shell temper, *c* 1175–1275/1300

This fabric is common at Dover where it appears to be a late development of EM33 (Cotter 2006, 161-65; see also EM33 above). A single possible example identified from the EKA2. This is a jar/cooking pot with a typical slightly down-turned squared rim, although this could just be a denser variant of EM3 with more flint than usual (not illus: Zone 1, context 130220).

LS4 North French/Flemish (?) profuse shelly ware, *c* 1050–1225

This type and the problems associated with its dating and source in east Kent have been fully discussed in the report on pottery from Dover where the ware is fairly common in early medieval deposits (Cotter 2006, 219-23). This is a fairly common type from the EKA2 – at least as common as the local shelly-sandy ware fabric (EM3). The LS4 assemblage here, however, raises some interesting questions about its distribution in east Kent and reopens the debate as to its possible source or sources. At inland Canterbury the fabric appears to have an exclusively late Saxon currency (Macpherson-Grant 1993) hence the fabric code LS4 (late Saxon Fabric 4) which has been retained here for consistency despite clear evidence from Dover and Thanet of its early medieval currency (*c* 1050–1225). There is no doubt that the fabric and unusually large jar/cooking pots forms seen from the EKA2 are the same as those from Townwall Street, Dover, and that a visually identical ware was made in the Pas-de-Calais area of north France/Flanders. There are, however, minor variations in the fabric, and the few sherds of LS4 from east Kent analysed by thin-section revealed that some contain glauconitic sand, a fairly common constituent of Kentish ceramics, while others do not. This suggested that some examples may be Continental imports and others are perhaps from an unknown Kentish source (*ibid*, 221; Blackmore 2001, 198). The most likely source of the highly crushed shelly limestone found in the possible Kentish version of this fabric is the Hythe Beds which outcrop, for example, at Folkestone. The contemporary early medieval shelly ware traditions in east Kent are EM2 and EM3 which are both common at Canterbury and Dover. These generally appear to be slightly earlier, sand-free (EM2), and slightly later, sand-tempered (EM3) variants of the same basic shelly ware tradition which commonly contains contemporary marine shell in which the species can often be identified (eg, Hydrobia – an inter-tidal gastropod; Cotter 2006, 148-156). The shell content in LS4 is very different in nature. It is usually abundant (or 'profuse') and very crushed and most probably derived from a shelly limestone rich in bivalves (oyster, mussel etc) but precise identification of species is usually impossible. The shell is often completely dissolved from the fabric leaving a soft corky texture, or survives only in the core. While this is sometimes due to scorching during cooking use, it is also probably due to its chemical instability. Most vessels here have a distinctive oxidised orange-brown, orange-red or light brown firing colour sometimes with a light grey core where thicker. Apart from abundant shell the fabric contains few other visible inclusions except (in some examples) moderate fine quartz, sparse iron oxide and rare flint. Most of the LS4 assemblage comes from Zone 3, with smaller amounts from other zones including seven sherds from Zone 4 and a couple of sherds each from Zones 1, 22 and 23.

On the basis of rims alone a minimum of 10 or 11 vessels are present – all jars/cooking pots (Fig 10.5, nos 41–44). These are characteristically large with rim diameters in the 240–400mm range, with six vessels in the 300–400mm range. No profiles survive but they evidently had flattish sagging bases. Vessels are handmade, probably with turntable-finished rims. Some larger wall sherds show characteristic shallow vertical dents or 'fluting' internally caused during the manufacture process. Most examples show external sooting from use as cooking vessels. The commonest rim type is a thickened internally bevelled form at the end of a flaring or gently curved neck. This, interestingly, is very similar – if not identical – to one of the two commonest rim forms seen on Early Medieval Canterbury sandy ware (EM1) and with which it commonly occurs (mainly on Zone 3). This association dates most of the LS4 here to *c* 1075-1150. A very similar association of early EM1 cooking pot rims with similar internally-bevelled LS4 rims was also seen at *Sandtun* near Hythe and dated there to the later 11th or early 12th century (Macpherson-Grant 2001, 223, fig 23.10-12, fig 39). This typological similarity between contemporary LS4 and EM1 cooking pot rims here may add weight to the suggestion of a Kentish source for most of the LS4 from the EKA2. The LS4 assemblage from Townwall Street, Dover, differs in mainly having more thickened or sub-triangular rims (Cotter 2006, fig 159) and this can probably be explained by the fact that the assemblage there is of slightly later date (*c* 1150+). It is curious that the local east Kent sand-free shelly ware (EM2), which is common at Canterbury and Dover, appears to be entirely absent from the EKA2 in the late 11th/early 12th century contexts where one would expect to find it and that in its place is the fossil shell-tempered ware LS4 – which cannot have originated in Thanet or very close nearby. As the distribution of LS4 in the early medieval period seems to be almost entirely confined to the southern and eastern coasts of Kent this suggests that it was traded coastally – possibly from a source near Hythe or Folkestone. This seems more plausible (at least by this date) than importation from north France or Flanders, although this source cannot be ruled out entirely. A larger scale study of these wares with more emphasis on scientific fabric characterisation is clearly needed if these problems are to be resolved.

EM23 North France/Flanders fine sandy ware, *c* 1075–1175

This is the earliest of a minor group of wheel-thrown grey or grey-brown sandy wares (including EM7 and EM18 below) thought to originate in north France/Flanders. They were first identified and discussed from Canterbury where they normally occur in the form of spouted pitchers, sometimes with lozenge rouletted decoration on the shoulder (Macpherson-Grant 1992). They are typical of mid 12th century contexts there but the date range has been widened slightly by more recent finds from Dover and elsewhere (Cotter 2006, 223-6). Even in large Norman assemblages locally they are never very common. The five body sherds of EM23 here represent two vessels. Four fresh sherds from a Zone 3 context dated *c* 1175–1250 are from a small globular jar/pitcher with external sooting which has a light brown sandy fabric with coarse red iron oxide inclusions (EM23A, a variant fabric). A single sherd also came from Zone 1.

EM7 North France/Flanders grey sandy ware, *c* 1100–1175
A single small sherd came from Zone 3 (see EM23 above).

EM18 North France/Flanders fine grey sandy ware, *c* 1100–1175
A single small sherd came from Zone 1, or just possibly Roman? (see EM23 above).

EM60D North France/Flanders pale grey sandy calcareous ware: pasty with chalk/shell, *c* 1100–1200
One of a minor group of hard pale grey wheel-thrown sandy wares first identified from Dover and almost unknown from inland sites (Cotter 2006, 227-9). The fragmentary assemblage from Dover comprises jars/cooking pot and spouted pitchers. Represented here by a single small body sherd from Zone 1 with characteristic internal knife-trimming.

EM60B North France/Flanders pale grey sandy calcareous ware: fine to medium sandy, *c* 1100–1250
A single medium-sized body sherd from Zone 4. Fairly thick-walled. Possibly from a globular pitcher? (see EM60D above).

EM11RP Beauvais-type red-painted ware, *c* 1050–1200
Wheel-thrown vessels in a fine, hard, sandy, off-white or cream fabric usually with evidence of red-painted decoration. This is usually much rarer in Canterbury and Dover than the coarser red-painted type discussed below (EM11A.RP) but the distinction between them is not always clear (Cotter 2006, 199). The vessels from Canterbury have been identified as probably coming from the Beauvais area of north-west France where there was a long tradition of red-painted whitewares from perhaps as early as the 8th or 9th century right through until at least the 15th century. Similar red-painted wares, however, were produced over much of France. The fragmentary collection here comprises four body sherds, probably from four separate vessels, all from Zone 3 and from contexts dated *c* 1075–1150 (not illus). The sherds, all from jars or pitchers, are of medium size (33–4mm across) and all from notably thin-walled vessels (3–5mm thick). One sherd is from the shoulder of a spouted pitcher with the scar and aperture of a detached tubular spout and with traces of a curved neck (context 206079). Three examples, including the latter, have traces of dark red-brown painted decoration (spots or splashes) and some have evidence of internal knife-trimming.

EM11A.RP North France-type red-painted ware, *c* 1050–1200
This is sandier and thicker-walled than EM11RP (see above) and is the commoner type of red-painted whiteware found at Canterbury and Dover, but is represented here by just two body sherds from separate jars (not illus). Comparison of the assemblages from Townwall Street, Dover (*c* 1150+) and Canterbury showed that most of the Canterbury examples were a late Saxon type probably from the Beauvais area whereas most of the Dover examples were a Norman period import, most probably from Normandy (Cotter 2006, 199-202). The two sherds here, from Zone 3, may be of this latter type although insufficient survives to be certain. One of the sherds (60mm across and 6mm thick), is from the lower wall of a jar and is in fresh condition with traces of decoration comprising faint parallel diagonal trails and spots of red paint (context 172007). The other sherd (70mm across and 8mm thick) is also from the lower wall of a jar in a more silvery-grey fabric with a possible trace of red paint externally (context 201024). Both examples have traces of internal knife-trimming.

EM12 Andenne ware (Belgium), *c* 1050–1225
A fine yellow-glazed white or pale buff fabric from Andenne in eastern Belgium. Usually imported in the form of spouted pitchers with collared rims. Although never very common, there are many examples known from Norman contexts at Canterbury and Dover (Cotter 2006, 232-3), and also from London (Vince and Jenner 1991, 104-106). A single fairly small sherd of the ware was identified from Zone 1 (context 259035) from a ditch which also produced local pottery of *c* 1175–1225.

High Medieval (c 1225–1400)

M1 Tyler Hill ware, *c* 1225–1375
This is the commonest high medieval ware here, as it is throughout east Kent. It was produced in and around Tyler Hill around 1.5 miles north of Canterbury where it appears to have developed out of the Early Medieval Canterbury sandy ware tradition (EM1, see above). It is hard, fairly coarse and very sandy. The medieval fabric is commonly oxidised orange-brown but can be reduced and grey. Oxidised fabrics decline after *c* 1375 in favour of the over-fired, reduced, late medieval fabric (LM1, see below). Jars/cooking pots are generally the commonest form but jugs and bowls are common too. Jugs are commonly glazed and sometimes decorated with designs in white slip or with incised designs (Cotter 2006, 146-8).

Except in Zone 2, most of the M1 assemblage from the EKA2 (total 267 sherds) is small and fragmentary (see below). Zone 2 is the only zone to have produced fresh and relatively complete vessel profiles in Tyler Hill ware – and here it is the only post-Roman pottery type present. These sherds probably represent a relatively short period of occupation which probably occurred between *c* 1275 and 1350. For these reasons the Zone 2 assemblage is the only one considered in any detail here. In total Zone 2 produced 126 sherds (3030g, 1.78 EVES and 13 rim sherds). Average sherd weight is 24g, which is one of the highest from the road scheme, and this small but quite well-preserved high medieval assemblage comprises jars/cooking pots, jugs and a single bowl. A single fairly large pit (244367) produced most of the assemblage (94 sherds, 2603g, 1.35 EVES, 9 rim sherds). Pit 244367 contained four fills (244368, 244369, 244372 and 244373) with cross-joining sherds between three of these; most of the pottery (84 sherds) was from fill 244372. A minimum of 14 vessels is represented from the pit with equal numbers of jars and jugs present. These include jars/cooking pots, mostly with squared and pricked rims (Fig 10.5, nos 46–49). Most of the sagging bases show evidence of sooting from use. Two jars/cooking pots have 'false' vertical thumbed strips impressed directly into the vessel wall (rather than applied as normal) which, along with the pricked rims, are a characteristic Tyler Hill feature (Fig 10.5, no. 47). The double-handled jar or 'cauldron' is a rarer form (Fig 10.5, no. 49). Also characteristic of this period are several large thin-walled globular jugs/pitchers with wide plain sagging bases and strap-handles, but these are more fragmentary and have lost their rims (not illus). Two of these have traces of vertical line decoration on the shoulder in painted white slip under a patchy greenish-brown glaze. Jugs of this type are common from the nearby deserted medieval settlement at Stonar, near Sandwich, which was burnt-down during a French raid in 1385 (Macpherson-Grant 1991). Also present in the group is the rim of a tulip-necked baluster jug (Fig 10.5, no. 50). This has close parallels with jugs from a 14th-century well at Canterbury Lane, Canterbury, which includes many other jugs with slip-painted decoration (Wilson 1983, fig 103.413, also fig 89.188). The form may be a loose copy of tulip-necked baluster jugs in London-type ware, common in London *c* 1270–1350+ (Pearce *et al* 1985, fig 37, fig 89). The pit group in Zone 2 probably represents fresh domestic rubbish from a relatively short-lived dwelling nearby, perhaps associated with medieval farmstead A to the east. Elsewhere in Zone 2 a typical Tyler Hill bowl was found in a ditch – the only example identified in this fabric (not illus). This has a hammerhead rim (diameter 380mm) and external sooting. Other smaller sherds also came from ditch fills and include jugs with thumbed bases and slip decoration.

Zone 1, to the east of Zone 2, also has a relatively large assemblage of M1 (101 sherds, 0.28 EVEs), but by contrast to Zone 2 this is very fragmentary and worn (average sherd weight just 4.9g.). Zone 3, to the north, has only four sherds – a fact that underlines its predominantly early medieval dating. Zone 4 has 22 sherds of M1. Other zones produced just one or two sherds or none at all.

M40BR Ashford/Wealden/Rye sandy ware, *c* 1175–1400
Three joining sherds from a single vessel were identified – from a sagging-based jar/cooking pot in a fine orange-buff sandy fabric with moderate coarse iron-rich clay pellets and a clear yellow glaze internally. A Wealden source is likely (Zone 6, context 123082).

M5 London-type ware: general, *c* 1140–1375
This code refers almost exclusively to the high medieval fabric. Jugs in a fine sandy oxidised or brownish fabric with all over white slip or white slip decoration under a clear or green glaze (Pearce *et al* 1985). The kilns producing London ware in the late 13th or 14th century have recently been discovered at Woolwich (Cotter 2008b). It is the commonest glazed medieval fineware found in Kent. The three small sherds here, all from Zone 1, represent a minimum of two vessels including a characteristic recessed jug base.

M11B Scarborough II ware, *c* 1225–1350
Produced at Scarborough in Yorkshire. Normally traded in the form of glazed and decorated jugs in a pale buff, white or cream fabric (Farmer 1979). Small amounts of the ware are known from coastal sites in Kent. Two small worn joining sherds from a single jug are present here (Zone 6, context 310015). These appear to be from the lower wall of a polychrome strip jug with decayed traces of applied vertical strips and red and green painted decoration.

M14 Flemish Highly Decorated sandy ware ('Aardenburg'), *c* 1250–1350
Glazed and often highly decorated jugs produced at a number of locations in the Flemish zone of west Belgium and perhaps also in north France and the Netherlands. The fabric is normally hard oxidised and sandy (similar to Tyler Hill ware) often with a thick white slip under a green or clear glaze. Fairly common in Kent particularly from coastal sites such as Dover (Cotter 2006, 231-2). Represented here by a single very worn sherd from the neck of a jug with a trace of rim surviving and a rod handle. A 1mm thick layer of all-over external white slip (applied before the handle) covers the surviving neck area. The handle is unslipped but retains traces of speckled green glaze (not illus; Zone 1, context 157082).

Late Medieval (c 1375–1525)

LM1 Late Tyler Hill ware, *c* 1375–1525
A later development of M1 above. A coarse, very hard, often over-fired, reduced grey or purplish-grey fabric. Often unglazed or with a patchy clear or purplish-brown glaze. Plain functional vessels are the norm, mostly jars, jugs and bowls similar to those in medieval Tyler Hill

ware but usually with a range of simpler rim forms. The small assemblage of the ware here is mainly from Zone 1 with a few sherds from other zones across the road scheme. These include two wide bowls, a jar and a jug (not illus).

LM1.2 Local transitional sandy ware, *c* 1475–1550
Similar to LM1 above but oxidised and less sandy. A single jar sherd identified from Zone 5.

LM2 Local fine earthenware, *c* 1475-1550
A fine oxidised sandy fabric, occasionally with a patchy clear glaze. Perhaps best seen as a forerunner of post-medieval red earthenwares (PM1). A very small assemblage of only 15 sherds here. These mostly come from a single large jug from a well on Zone 5 (well 254106). This includes a rim sherd with a rod handle which, unusually, appears to have a small post-firing perforation made to the right of the handle (not illus.). A couple of small sherds also occur on Zone 6.

Post-medieval (c 1525–1800)

PM1 Post-medieval red earthenwares, *c* 1550–1800
Ubiquitous fine glazed red utilitarian 'crockery' produced at many locations throughout Kent. The only vessel worthy of note is a rare annular 'chicken feeder' from Zone 19 which originally had four concentric rims or rings (Fig 10.5, no. 51, see illustration catalogue for full description). This is in a late-looking fabric (either PM1 or LPM1) and could be of late 18th/19th century date – or possibly even later given the fact that it came from the backfill of a World War II defensive ditch (context 193137).

PM2.8 Wealden buff sandy ware with marl, *c* 1525–1650
A single small sherd from Zone 4.

PM62C Martincamp Type 3 Flasks (Normandy), *c* 1600–1650
Spherical flasks with a long tubular neck in a hard light orange-red fabric. Produced at Martincamp in Normandy. Joining neck sherds from a single vessel from Zone 1 (context 133148).

PM5 German Frechen stoneware, c 1525–1750
Hard grey sandy fabric with a brown salt glaze externally. Represented by a single sherd probably from a 'Bellarmine' jug (Zone 1, context 175146).

Late post-medieval (c 1775–1950)

A small scrappy assemblage. Mainly local red flowerpot and mass-produced white tablewares from the Staffordshire/Midlands potteries plus some modern English stoneware. These have not been individually described (details in archive).

Chronological and spatial overview

Table 10.2 summarises the quantity of pottery from each of the nineteen zones that produced post-Roman pottery. These have been grouped by the three main landscape units defined in the early stages of this project. The comments field provides abbreviated date ranges (see below for key) and notes on the most significant items and, in some cases, their contexts.

Table 10.2 appears to show a fairly strong correlation between the three landscape units and the three main chronological groupings seen in the post-Roman pottery assemblage, a correlation unlikely to be purely coincidental. The Chalk Ridge unit correlates with the early-to-mid Saxon assemblage (*c* 450–750) and significantly includes all eleven examples of 7th–8th century Merovingian vessels imported from north France (plus other possible examples), and these support the assemblage's ascription to *c* 575–750. Local coarsewares, mainly organic-tempered wares, are harder to date with accuracy and the scarcity of decorated pottery characteristic of the early Saxon period (mainly 5th–6th century) suggests that this period is not so well represented on the Chalk Ridge and is virtually absent from the other two landscape units. The Pegwell Bay Spur unit correlates with an almost entirely mid-Saxon assemblage from a series of shell-rich pits dated by the presence of Ipswich ware to the 8th–9th century (specifically *c* 720–850). Finally, the Ebbsfleet Peninsula – which produced the bulk of the post-Roman pottery from the scheme – correlates with a mainly early medieval assemblage dating to *c* 1050–1250 and also with a modest assemblage of high medieval material of 13th–14th century date. Pottery from the latter unit came mainly from agricultural ditches and pits. These broad correlations might suggest that different landscape areas were exploited in different ways at different times during the post-Roman period. The 11th–14th century dating emphasis on the Ebbsfleet Peninsula, for example, might perhaps reflect an expanding medieval population on Thanet and the reclamation and occupation of new land exposed by the receding Wantsum Channel which separated the island from the mainland until around the 13th century. A more detailed overview of the main periods of occupation represented by the pottery is given below.

Saxon

Earlier Saxon material (up to *c* 750) is almost entirely confined to the Chalk Ridge landscape unit. Early (5th–6th century) Saxon pottery in the region is usually characterised by predominantly sand-tempered fabrics (EMS1 and relatives) and these include a relatively high proportion of stamped and decorated vessels, often of biconical form, and in more refined sandy fabrics often with burnished surfaces. Definite early Saxon material, as this, is very rare from the scheme here but some finer sandy sherds may be of this date. The most convincing example from this early period is a squat globular or sub-

Table 10.2 Summary of post-Roman pottery by zone and landscape
(abbreviations: ESAX - early Saxon *c* 450-650, MSAX - mid Saxon *c* 650-850, LSAX - late Saxon *c* 850-1050, EMED - early medieval *c* 1050-1250, HMED - high medieval *c* 1250-1400, LMED - late medieval *c* 1375-1525, PMED - post-medieval *c* 1525-1800)

Landscape	*Zone*	*NOSH*	*Wt (g)*	*EVEs*	*No. rims*	*Date range and comments*
Chalk Ridge	10	118	1989	0.75	9	ESAX, mainly MSAX incl 8 imported Merovingian vessels (4 from sunken hut), plus local copy
Chalk Ridge	11	69	711	0.72	12	ESAX (sunken hut), MSAX incl prob Merovingian vessel, some EMED
Chalk Ridge	17	37	665	0.48	7	Prob all LSAX incl imported Frankish sherd. Pit
Chalk Ridge	19	227	2428	2.65	19	MSAX incl 2 Merovingian vessels from graves. EMED. 1x prob 19C chicken feeder from WWII ditch
Chalk Ridge	20	7	59	0	0	HMED, LMED, PMED mainly 19C
Chalk Ridge	21	7	44	0.03	2	HMED, LMED, PMED incl 19C
Chalk Ridge	22	17	155	0.23	7	EMED, HMED, PMED all 19C
Chalk Ridge	23	21	251	0	1	EMED, HMED, PMED mainly 19C
Chalk Ridge	29	16	413	0	2	PMED mainly 19/20C
Subtotal		519	6715	4.86	59	
Pegwell Spur	14	153	6049	1.09	11	ESAX? Mainly MSAX pits containing much Ipswich ware. Includes complete spouted pitcher
Pegwell Spur	15	2	27	0	0	MSAX
Pegwell Spur	26	1	6	0	0	LMED
Subtotal		156	6082	1.09	11	
Ebsfleet Pen	1	243	2061	1.26	23	1x ESAX? Mainly redeposited EMED & HMED (poss fisherman's hut?). Some LMED & PMED
Ebsfleet Pen	2	126	3030	1.78	13	HMED, all 13-14C Tyler Hill ware. Agricultural hut?
Ebsfleet Pen	3	596	9982	6.33	109	1x ESAX? Mainly EMED incl a few N. French imports. Some HMED (13C). Mainly from enclosure ditches & gullies
Ebsfleet Pen	4	214	2131	2.03	28	Mainly EMED & HMED, rare LMED & PMED. Mainly from enclosure ditches, gullies and pits
Ebsfleet Pen	5	22	411	0.29	2	LMED. Mainly from a well
Ebsfleet Pen	6	25	191	0.2	3	ESAX, EMED, HMED, LMED, PMED incl 19/20C
Ebsfleet Pen	9	7	46	0	0	ESAX, EMED, HMED
Subtotal		1233	17852	11.89	178	
Total		1908	30649	17.84	248	

biconical jar/bowl with incised decoration and good quality burnishing (Fig 10.1, no. 1). This probably dates to *c* 450-600 and came from a Saxon sunken-featured building in Zone 11 (SFB 268011). Of the two other sunken-featured buildings in Zone 11 only SFB 137083 produced pottery – just a few small scraps from a single vessel in organic-tempered ware which is not closely datable (see below).

Organic-tempered ware (EMS4) is by far the commonest local Saxon pottery type from the scheme. These fairly crude handmade vessels, fired in primitive bonfire kilns, were probably made in every settlement and perhaps even by individual households. The tradition is difficult to date closely and varies slightly from county to county. Elsewhere in southern England it is dated from *c* 450 onwards (eg, Essex, London) but in Canterbury, and perhaps most of east Kent, the dating is thought to be from *c* 575–800 at the widest. The almost complete absence of organic-tempered ware from Zone 14, however, with its strong dating emphasis of *c* 720–850 (and perhaps *c* 750/75–850), confirms earlier suggestions from Canterbury that production of organic-tempered ware probably ceased in east Kent after *c* 750. Organic-tempered ware therefore, by virtue of its simplicity, shows little if any chronological development and by itself cannot usually be dated any closer than the early or mid-Saxon period, although the indications from the EKA2 are that most of it here mirrors the core dating of *c* 575–750 at Canterbury rather than earlier than this. Most of the vessels are from contiguous Zones 10 and 11 with a few also from Zone 19. Around a dozen fragmentary vessels came from a Saxon sunken-featured building in Zone 10 (SFB 194086), where they were associated with imported Merovingian pottery (see below). Many of the organic-tempered vessels from the sunken-featured building, including a sub-biconical jar (Fig 10.2, no. 12), were heavily sooted from use as cooking vessels. Also from the sunken-featured building was a rare decorated sherd from the shoulder of a jar/bottle which might be a crude local attempt to copy an imported Merovingian vessel (Fig 10.2, no. 11). A complete (crushed) pear-shaped jar was found as a grave good on Zone 19 (Fig 10.2, no. 13).

The eleven definite Merovingian vessels (Fig 10.1, nos 2-10) come from two graves on Zone 19, the Saxon sunken-featured building on Zone 10 and from pit and ditch fills on Zones 10 and 11. The most obvious significance of their presence here is the relatively tight dating (*c* 575–750) they bestow on the much-less datable organic-tempered wares with which they are associated, particularly in the Saxon sunken-feature building. That the core dating of organic-tempered wares in east Kent is the same as that for the Merovingian wares is not entirely coincidental for it was deduced in part from their occasional association in archaeological contexts in Canterbury (Macpherson-Grant 1995). However, the direct association of the two types, in quantity, in SFB 194086 and other contexts, is one of the strongest confirmations yet of their contemporaneity. Zone 10 alone produced eight of the 11 Merovingian vessels, including four from the Saxon sunken-featured building (Fig 10.1, nos 7 and 9) and the rest from the upper fill of nearby ditch 178358 (Fig 10.1, nos 4, 5, 6 and 8). The two Zone 19 vessels comprise a complete biconical jar from grave 153084 (Fig 10.1, no. 2) and a more decorated sub-biconical jar from grave 166105. The latter has the same general form and finer fabric (EMS8) characteristic of a small but distinct group of imported vessels in east Kent datable to the period *c* 630–670/700, which is about as closely dated as any vessel from this period can be. An organic-tempered jar from grave 220109 (Fig 10.2, no. 13) brings the number of pots used as grave goods to three. This vessel may be contemporary with the imported vessels as the latest organic-tempered jars tend to be somewhat taller and narrower, as here.

Evison (1979) has made a detailed study of imported wheel-thrown Merovingian pottery and demonstrated that they are rarely found in English contexts except in Saxon cemeteries in east Kent where they are relatively common – and in Thanet in particular. An increasing number of examples, however, are being recognised from domestic contexts, such as those here from the Saxon sunken-featured building and ditches on Zone 10, and from a group of Saxon sunken-featured buildings excavated near Ramsgate (Mepham 2009). Evison has suggested that they may have been used as accessories (and perhaps status symbols) for the consumption of imported French wine – hence their inclusion as valued grave goods. This still appears to be a plausible, and attractive, explanation for their presence in east Kent and faced with the coarseness and friability of local Saxon pots it is easy to see why these competently made and attractively decorated imports would have been valued by their owners both as drinking or serving vessels in this life and in the next. The increasing number of vessels from domestic contexts, however, might suggest that when readily available imported pots were not always treated with such reverence, as some examples are definitely sooted from use as cooking/heating vessels Evidence of slight heating/sooting might just indicate that wine or ale was heated to produce a warm beverage (hot 'toddy'), as is not infrequently the case with later medieval jugs, but the intense scorching and wear seen on some vessels (eg, Fig 10.1, no. 9) suggests a more robust use as everyday cooking pots, or the reuse of a worn-out former drinking vessel as a cooking vessel. The finds from the Ramsgate sunken-featured buildings include a number of fairly large globular plain jars evidently in the same fabric as the more obvious decorated Merovingian vessels in the same sunken-featured building (Mepham 2009, fig 4.18.1-3). This suggests that plain cooking or storage vessels were also imported but are either less common than the decorated beakers and bottles, or perhaps less commonly recognised owing to their plainness. In contrast the pristine condition of the complete beaker-like jar from a grave on Zone 19 (Fig 10.1, no. 2) suggests that it was never used for anything heavier than drinking, or perhaps had never been used except as a grave good. Wine consumption may have been their main function in Saxon contexts but it is increasingly evident that they could be multi-functional as well.

East of the Chalk Ridge is the Pegwell Spur landscape unit overlooking Pegwell Bay. Here only Zone 14 has a moderate assemblage of pottery (153 sherds) and remarkably all but a handful of these are mid-Saxon in date (traditionally *c* 650–850). Only nine sherds have been assigned to early Saxon fabric codes – mainly organic-tempered ware (EMS4) and minor variants – but these are not really diagnostic enough for it to be certain that they are much earlier than the bulk of the pottery. These earlier sherds, however, are nearly all from the fills of Roman ditches rather than the mid-Saxon pits which produced most of the pottery here. A single worn sherd of fine sandy ware (EMS1D, *c* 450–700) also came from a grave (223013), the only one to produce pottery. A single sherd of Saxon sandy ware with flint (EMS1F, *c* 450–650) was associated in one of the ditch fills with mid-Saxon Ipswich ware and thus seems more likely to be of the same date. Most of the pottery on Zone 14 comes from a series of rubbish pits which contained abundant shellfish remains. Some of the pits were grouped around a central hearth or possible drying oven and the over-all impression is that this was a shellfish processing (and possible crop drying) site where the shellfish were preserved in some way possibly by cooking or drying and perhaps other means. In terms of sherd count the pits contained equal quantities of wheel-turned Ipswich ware (*c* 720–850) and mid-Saxon Canterbury-type sandy ware (MLS2, *c* 750–875) – the only occurrence of these wares from the EK2. A few sherds of rarer mid-Saxon fabrics (MLS1 and MLS1A) are also unique to this zone and all but one of the seven vessels identified in mid-Saxon shelly ware (MLS4C) also come from here. Zone 14 has the highest average post-Roman sherd weight of any of the zones on the scheme (40g) and this is undoubtedly due to the very hard fabric of the Ipswich ware sherds and the fairly large thick-walled vessels they came from. Apart from a near-complete spouted pitcher in Ipswich ware (Fig 10.3, no. 20) the mid-Saxon assemblage comprises a very fragmentary collection of sherds, many of which are worn, although a few are quite fresh and some Ipswich ware sherds are quite large. The Saxon rubbish pits produced very little pottery other than Ipswich ware and sandy MLS2. This comprised a couple of line decorated sherds of fine sandy ware with organic inclusions (MLS1A) and five sherds from single shelly ware vessel (MLS4C).

Of the 65 Ipswich ware sherds only eight occur in contexts other than the rubbish pits – five from a Roman enclosure ditch (159224) and three from a quarry pit (159336). The sherds represent a minimum of 19 vessels and after Canterbury and Minster-in-Sheppey constitute the third largest assemblage of the ware from Kent (see Fabrics section above for fuller discussion). Following the suggested dating at Canterbury for the local occurrence of both Ipswich ware and MLS2 it is likely that most of the activity on Zone 14 occurred during the period *c* 750/75–850. Such a concentration of Ipswich ware at a small and fairly remote coastal site as this marks Zone 14 out as something rather special – as does the evidence for an on-site shellfish processing industry. The relative commonness of Ipswich ware in north Kent may be due to the trading interests and connections of the early minsters, particularly at Canterbury and Minster-in-Sheppey and – perhaps more relevant here – Minster-in-Thanet which may well have owned the lands in the Pegwell Spur and regulated commercial activities here. As the earliest wheel-turned pottery industry of the post-Roman period, Ipswich ware had obvious advantages over the contemporary sandy ware industry of east Kent – MLS2. Vessels in the latter fabric were handmade and more fragile than robust thick-walled Ipswich ware jars which may have been more attractive as containers for long distance transport. Many of the vessels from the Zone 14 pits, however, appear to have been used for cooking. It is highly likely that the Ipswich ware vessels here were used for everyday purposes such as cooking and storage (along with local wares) but they might also have been used in connection with the shellfish processing industry here – perhaps to cook, store and transport this commodity. Other containers (such as wooden barrels) might also have been used but have left no trace. The connection seems plausible but without scientific analysis remains unproven. If nothing else, the presence of Ipswich ware here provides a valuable dating tool for the site and for the less well understood local wares with which it occurs.

Pottery of the late Saxon period (*c* 850–1050) is only thinly represented on the EKA2, with virtually all from Zone 17 on the Chalk Ridge. Most of this came from a single pit (143037) which produced at least seven large jars/cooking pots in late Saxon Canterbury sandy ware (Fabric LS1, Fig 10.2, nos 14–19) and a single sherd of imported north French grey sandy ware (LS15). These date the pit to *c* 975–1050. Four other body sherds of Canterbury Sandy ware from nearby pit 147029 were dated to the period *c* 1050–1225 but these are so undiagnostic that they could equally be late Saxon.

Medieval and later

Evidence for medieval occupation, mainly in the form of farming activity, is heavily concentrated in the Ebbsfleet Peninsula landscape unit which produced the bulk (65%) of the post-Roman pottery from the EKA2 scheme. Almost half of this (596 sherds) came from Zone 3, but neighbouring Zones 1 and 4 also produced reasonably large quantities. The excavations here produced little in the way of medieval structures and most of the pottery came from agricultural features such as ditches, livestock enclosures, gullies and a few pits. The sites probably lay on the periphery of farmsteads whose buildings lay outside the footprint of the road scheme. Medieval farmstead 'A' is thought to have extended across Zones 1 and 2 and the principal structures probably lay to the east of these – possibly on the site of the present-day Ebbsfleet House. Those for medieval farmstead 'B' probably lay immediately to the west of Zone 3. A couple of very small worn scraps of possible Saxon organic-tempered ware (EMS4) were found on Zones 1 and 3 but were clearly redeposited. Zone 3, with the largest assemblage, has a strong early medieval dating emphasis suggesting occupation possibly from as early as *c* 1050, but mainly during the period *c* 1075–1150. The assemblage here is dominated by jars/cooking pots in early medieval Canterbury sandy ware (EM1, *c* 1050–1225) including many large fresh sherds which must derive from nearby occupation (Fig 10.4, nos. 31–38). Three vessels in Thetford-type ware (Fig 10.4, no. 30), a wheel-thrown Saxo-Norman ware from East Anglia (*c* 850-1100), appear to be late examples contemporary with the local Canterbury cooking pots but confirm the early dating of most of these. Some early medieval wares occur almost exclusively on Zone 3, including a small group of related early medieval flint-tempered wares probably from the south Kent coast around Folkestone and Hythe (Fig 10.4, nos 23, 24–26). Another group of distinctive large jars/cooking pots with profuse crushed fossil shell tempering (LS4) also come almost exclusively from Zone 3 (Fig 10.5, nos 41–44). The source of these is uncertain and although some may well be imports from north France/Flanders their frequency on Zone 3 suggests a more local source – again perhaps from the Folkestone area. Zone 3 also produced the only definite example of Canterbury Pound Lane kiln ware (Fig 10.4, no. 39) found outside the city of Canterbury; this wheel-thrown ware dates to the period *c* 1145–1175 (EM1.PL). Sherds from perhaps six vessels in red-painted whitewares imported from north-west France (EM11RP and EM11A.RP), including spouted pitchers, are also limited to Zone 3 but imported Continental greywares typical of the mid 12th century are found in Zones 1, 3 and 4. A few sherds of later 12th- and 13th century material (up to *c* 1250?) also occur in Zone 3. The dating emphasis then seems to shift immediately north and north-east to Zone 4, including the Weatherlees Pond site, which has a reasonable assemblage of mid-late 12th century pottery including all three examples of roulette-decorated pitchers in Canterbury Brittoncourt Farm-type ware (EM1.BCR) as well as some later medieval material.

Zone 1, at the southern limit of the road scheme, has a reasonable amount of pottery (243 sherds), mainly spanning the mid 12th to 14th centuries, but the average sherd weight here is the lowest from any of the EKA sites (8.5g). This mostly comprises small scrappy worn sherds of local wares – just a few from each context. Unlike the large fresh sherds from other zones nearby the assemblage here gives the impression of being general rubbish, largely redeposited and probably very peripheral to any significant settlement. The small and worn/abraded condition of most of it is suggestive of field scatters damaged by ploughing or of material from trackways damaged by human or animal tread. Most of the material comes from ditch or gully fills but a few dozen high medieval sherds of slightly larger size came from a post-built structure (172196) interpreted as a possible 'fisherman's hut' near the south of the Ebbsfleet Peninsula, and also from nearby pits. Zone 2, adjacent and immediately west of Zones 1 and 3, appears to have extended as far as the western bank of the Ebbsfleet Peninsula at a time when it was still surrounded by water. This has a modest but relatively well preserved assemblage of high medieval pottery consisting entirely of medieval Tyler Hill ware (M1), the successor to the early medieval Canterbury sandy ware tradition (EM1). Most of this came from a single large rubbish pit (pit 244367) which produced a minimum of 14 vessels with equal numbers of jars/cooking pot and large jugs or pitchers represented (Fig 10.5, nos 46–50). The large jugs, some of which had white slip decoration, may have been used by agricultural workers to store liquids. Pottery from Zone 2 provides a general dating of *c* 1250–1400, while that from the pit may date within *c* 1275–1350, although it might all have been discarded within the space of a few years.

The density of occupation on the Ebbsfleet Peninsula from the late 11th to the 14th century might perhaps reflect an expanding medieval population on Thanet and the reclamation and occupation of new land exposed by the receding Wantsum Channel which separated the island from the mainland until around the 13th century. Lands in Thanet formerly owned by the abbey at Minster were acquired by the poweful Abbey of St Augustine's, Canterbury, in 1027, and in the following decades and centuries St Augustine's and the other great religious houses of Canterbury appear to have played an active part in turning the receding channel into farmland (Moody 2008, 174). This scenario is particularly likely in the case of Zone 2 with its complete absence of 11th–12th century material followed by a discrete burst of activity after *c* 1250 and possible abandonment after *c* 1350 (perhaps related to the Black Death). Few sites in the immediate vicinity have produced comparably large quantities of medieval pottery but the former port-town of Stonar, near Sandwich, may be mentioned here. Stonar was founded by 1090 at the end of a long shingle bank or spit which was essentially an extension of the Ebbsfleet Peninsula projecting south into Sandwich Haven. Under the landlordship of St Augustine's Abbey it was a flourishing port-town until burnt to the ground by a French raid in 1385. Excavations here in 1969–72 produced some 11th century pottery, but most of it dates between *c* 1175–1385. It has a similar range of local wares to the EKA2 sites, dominated by Canterbury products, but a much higher proportion of Continental and regional English imports as befits its status as a port and market town. A formal report on the excavations is still in progress but a useful summary has been published (Macpherson-Grant 1991). Whether there was any connection between medieval Stonar and the largely agrarian community further north on the Ebbsfleet Peninsula can only be guessed at but the scarcity of imported wares from the latter suggests that it was not a very strong one. Alternatively this may just be a reflection of the fact that the farmhouses and manor houses where more costly pottery was used were simply not encountered along the road scheme. Canterbury wares and local shelly ware cooking pots were probably easily available at local markets and fairs throughout Thanet and east Kent and occasional imported pots could be picked up at ports like Stonar and Sandwich.

The range of medieval vessel forms used on these Ebbsfleet Peninsula sites is very limited and entirely domestic in character, in keeping with a fairly lowly rural status. Most of this came from local sources, mainly the Canterbury/Tyler Hill area with its long tradition of sandy ware production. Some shell-tempered wares (EM3) may have been produced in the Thanet area, perhaps along the Wantsum Channel, while other shell-tempered wares (LS4) and flint-tempered wares may have come from further along the south coast at Folkestone or Hythe, and perhaps even Sussex. Some shelly ware cooking pots might even be imports from north France/Flanders, although these cannot easily be distinguished from the possible Folkestone area examples (LS4). The early medieval period is dominated by large cooking pots, most of which show sooting from use, though some may have been used as storage vessels. A small number of spouted pitchers from Canterbury and Continental sources indicate the serving of liquids or beverages. A very small number of wide bowls occur throughout the medieval period and there is a single example of an early medieval cresset lamp from Zone 1 (Fig 10.4, no. 23). The scarcity of wide bowls (sometimes used as milk pans), or bowls of any size, might suggest a lack of concern with dairying activities here, although one cannot be sure that this role was not fulfilled by wooden or other non-ceramic vessels. The high medieval assemblage (*c* 1250+) has a higher proportion of glazed jugs, in common with national trends. Most of these again are in Tyler Hill ware with rare examples from as far away as London, Scarborough and Flanders. Apart from this single Flemish jug (M14), the high medieval assemblage from the Ebbsfleet Peninsula sites is remarkably lacking in Continental imports – even more so than the early medieval assemblage which at least has a few. However, a subsequent excavation immediately to the south-east, between Zones 1 and 2, did produce a few examples of Saintonge ware jugs from south-west France. A small quantity of late medieval Tyler Hill and other wares (up to *c* 1550) occurs on Zones 1 and 5, and as occasional sherds on other zones, but significant occupation of the area along the EKA2 seems to have ended by this date. Thereafter a thin and largely insignificant scatter of post-medieval and Victorian pottery types is all that is found.

Catalogue of illustrated pottery

1. Coarse sandy ware with organic inclusions (EMS1.4). Squat globular or sub-biconical jar/bowl. Originally perhaps with rounded base. Upright neck with slightly beaded rim. D: *c* 130mm. Good quality horizontal burnishing ext with incised/burnished chevron decoration on shoulder. Traces of sooting ext. Possibly turntable-finished? Fine silty reduced black 'brickearth' fabric with rare-sparse organic inclusions and rare reddish clay pellets or grog? Date *c* 450-600? Zone 11 (268014) Saxon SFB 268011, and (215042) Roman ditch 215037, upper fill
2. North French (Pas-de-Calais) grey sandy ware (EMS9). Merovingian import. Complete biconical jar in perfect condition. Wheel-thrown. Slightly flaring cylindrical neck with plain rim. Low carination with horizontal (spiral) finger grooving or ribbing on upper half of body accompanied by fine horizontal striations. Horizontal cordon at neck/shoulder junction. Flat base with bold concentric wire-marks underside where cut from wheel. H: 135mm; Rim D: 58-61mm; Base D: 52mm. Hard, well-sorted, light orange (oxidised) sandy fabric throughout. Probably an oxidised variant of the grey sandy EMS9 fabric. Some white-ish ground salt deposits on one side of the neck externally and diameteretrically opposite on the other side of the vessel on the inside of the neck and body – suggesting the vessel lay in a near-horizontal position. For almost identical vessel from Ozengell, near Ramsgate, see Evison (1979, Pl IIIB) and for similar from Ecques, north France, (*ibid*, fig 31g). Date *c* 575-750. Zone 19 (153086). ON 3438. Grave 153084. (Vessel 6A – not sampled for ICPS)
3. North France Black ware (EMS8). Merovingian import. Sub-biconical jar. Wheel-thrown. Rim D: 110mm; H: 125mm; Base D: 62mm. Shoulder with two horizontal cordons separating two bands of incised wavy line decoration. Horizontal burnishing – best on upper half. Wire-marks on underside of base. Smooth silty matrix. Highly laminar structure. Burnished dark grey/black surfaces. Brown margins with light grey core where thicker. Moderate-abundant fine quartz, up to 0.25mm across, sub-angular to rounded, clear and milky. Abundant very fine silver and brown mica. Moderate red-brown iron compound mostly under 0.5mm, occasionally up to 2mm across. Sparse fine angular grey and red flint. Found in 91 pieces (mainly 8 larger and dozens of smaller pieces/flakes). Fabric (slightly coarser and "severely laminar") also described in Macpherson-Grant (1995, 823) where formerly known as 'Middle Anglo-Saxon possible East Kent fine ware'. Date *c* 630-670/700. Zone 19 (166107). ON 2040. Grave 166105. ICPS Sample 6
4. North French (Pas-de-Calais) grey sandy ware (EMS9). Merovingian import. Profile carinated jar/bowl. Wheel-thrown. Decorated on shoulder (faint in places) with a band of wavy rouletting with small crossed square stamps in the valleys. Large fresh sherds. H: *c* 84mm; rim D: varies 120-130mm; base D: *c* 72mm. Flat base with wire-marks but slightly sagging or warped where pulled from wheel. Dark grey surfaces, light grey-brown margins with a thin pale grey core where thicker. Lower half darker in places – possibly sooted? Soft matrix. Abundant sub-angular to sub-rounded quartz mostly under 0.2mm, rarely up to 0.5mm across. Quartz mostly clear and milky, some brown or pink. Abundant very fine mica. Sparse-moderate coarse red iron compound. Sparse shiny black/brown pellets of ?glauconite or black iron oxide. Rare-sparse fine angular flint up to 1mm across, grey, white and red. Sparse fine white calcareous inclusions. Rare fine organic voids. Many similar form parallels in Evison (1979, fig 30-31). For almost identical decoration from Sarre and St Peter's, Thanet (*ibid*, fig 23 a-b). Date *c* 575-750. Zone 10 (178332). Ditch 178358. ICPS Sample 1
5. North French (Pas-de-Calais) grey sandy ware (EMS9). Merovingian import. Wheel-thrown. Smallish globular jar/bowl with confused, probably over-stamped, rouletted decoration on shoulder – possibly a wavy band or arcade with crossed square stamps in valleys. Lightly executed and obscured by burnishing. Rim D: 110mm; max body girth *c* 130mm. Dense light grey fine sandy Roman-looking fabric. Moderate coarse dark grey clay pellets or 'grog' including sub-angular and tabular pieces up to 2.5mm. long. Very fine mica. Large patch of sooting int and partly over break. Weak burnish or smoothing ext. Date *c* 575-750. Zone 10 (178332). Ditch 178358. ICPS Sample 2
6. North French (Pas-de-Calais) grey sandy ware (EMS9). Merovingian import. Wheel-thrown. Probable 'bottle'. Base sherd (D: *c* 96mm) and two body sherds clearly from same vessel. Shoulder with rouletted decoration of at least three wavy bands or arcades with circular wheel stamps (8-spoked) under the arcades and gridded rectangles in the valleys (15 cells in 3 rows). Fine sandy fabric with distinctive sandwich firing: light grey surfaces/margins and dull brown core with central grey core in places. Sparse coarse grey rounded clay pellets up to 10mm long. Abundant mica. Rare fine flint. Sparse red iron compound. Knifed underneath to remove wire-marks. Base sooted under and ext. Also trace of sooting int. Body sherds badly spalled in places int and ext. Overall fairly worn/weathered. Very similar (but not identical) decoration on a pot from grave 308, St Peter's, Thanet (Evison 1979, fig 6c, and stamp detail fig 23.d). Date *c* 575-750. Zone 10 (178332). Ditch 178358. ICPS Sample 3
7. North French (Pas-de-Calais) grey sandy ware (EMS9). Merovingian import. Wheel-thrown. Body sherd from near max girth of a globular jar/bowl with bold rouletted design comprising horizontal rows of opposed nested chevrons – 2 rows surviving. Max L: 40mm; T: 6mm. Roman-looking fabric. Dense sandy dark grey fabric with light grey core and sparse grey clay pellets. Three globular jars with almost identical decoration are published from Faversham and Howletts in east Kent and Broomfield, Essex (Evison 1979, fig 16.f,g,h). Very similar chevron decoration also occurs on sherds from Manston Road, near Ramsgate (Mepham 2009, fig 4.18.5 and 10). Date *c* 575-750. Zone 10 (197085). SFB 194086. ICPS Sample 4
8. North French (Pas-de-Calais) grey sandy ware (EMS9). Merovingian import. Wheel-thrown. Thick-walled neatly-made jar base in smooth, very fine sandy/silty, micaceous fabric with oxidised orange-brown int surfaces/margins, grey core and brown ext surface – mostly blackened from sooting. Abundant very fine quartz under 0.10mm with rare rounded iron-stained quartz to 1.5mm. Rare-sparse red iron-cemented quartz grains. Rare red iron compound and

Fig 10.1 Post-Roman pottery (nos 1–10)

calcareous inclusions. Base D: *c* 70mm. The base is slightly sagging or convex and the underside appears to have been smoothed or trimmed on the wheel. Date *c* 575-750. Zone 10 (178332). Ditch 178358. ICPS Sample 7

9. North French (Pas-de-Calais) grey sandy ware (EMS9). Merovingian import. Wheel-thrown. ?Jar base (D: *c* 100mm). Sandy buff-brown fabric with sparse red clay pellets or 'grog' including some very coarse grey-brown clay pellets and lenses. Rare flint to 1mm. Two horizontal grooves above base. Worn/abraded. Soot blackened, probably burnt, ext and especially int where surface very worn/flaky. Quite Roman-looking but more likely Merovingian import. Date *c* 575-750. Zone 10 (197085). SFB 194086. ICPS Sample 8

10. North French (Pas-de-Calais) grey sandy ware (EMS9). Merovingian import. Wheel-thrown. Jar/bottle base (several joining sherds). D: *c* 80mm. Fairly crude flat base showing clear wire marks. No evidence of decoration. Fresh. Very hard, Roman-looking fabric with sandwich firing – dark grey surfaces with reddish-brown core. Quartz mainly sub-angular, clear. Some coarse grey-brown clay pellets or mudstone. Date *c* 575-750. Zone 11 (189020). Pit F189018. ICPS Sample 10

11. Organic-tempered ware (EMS4). Body sherd from shoulder of jar/bottle with lightly incised decoration including horizontal band with spaced diagonal strokes and probable chevron decoration above this on shoulder. Soft black fabric. Slightly worn. Smoothed ext surface. Vesicular int surface. Max D: *c* 150mm; Max L of sherd: 82mm. Possibly a handmade Saxon copy of a wheel-thrown Merovingian jar/bottle? Similar to local copy from Prittlewell, Essex (Evison 1979, fig 26.a). Associated with genuine Merovingian wares. Date *c* 575-750. Zone 10 (178332). Ditch 178358

12. Organic-tempered ware (EMS4). Near-profile sub-biconical jar. Rim D: *c* 120mm. Joining sherds. Fresh. Light grey-brown surfaces with band of grey sooting below shoulder/carination ext. Associated with Merovingian imports. Date *c* 575-750. Zone 10 (197085). SFB 194086

13. Organic-tempered ware (EMS4). Profile pear-shaped jar with near-vertical rim and slightly sagging/rounded base. Rim D: *c* 80mm. Soft black fabric with brownish ext surface. Mainly 12 larger joining sherds and many smaller. No obvious sooting. Date *c* 550-800 (possibly 7/8C?). Zone 19 (220110). Grave F220109. ON 3437

14. Late Saxon Canterbury sandy ware (LS1). Hybrid LS1/EM1 characteristics. Jar/cooking pot rim and sagging base. Rim of late Saxon 'cavetto' form (S-shaped profile), plain/slightly thickened, everted (rim type B1). D: *c* 270mm. Dark grey surfaces. Irregular thickness. Fresh. Sooted ext. Date *c* 975-1050? Zone 17 (143040). Pit 143037

15. Late Saxon Canterbury sandy ware (LS1). Hybrid LS1/EM1. Jar/cooking pot rim. Cavetto. Rim type B1. D: *c* 260mm. Dark grey. Heavily sooted ext. Date and ctx as no. 14 above

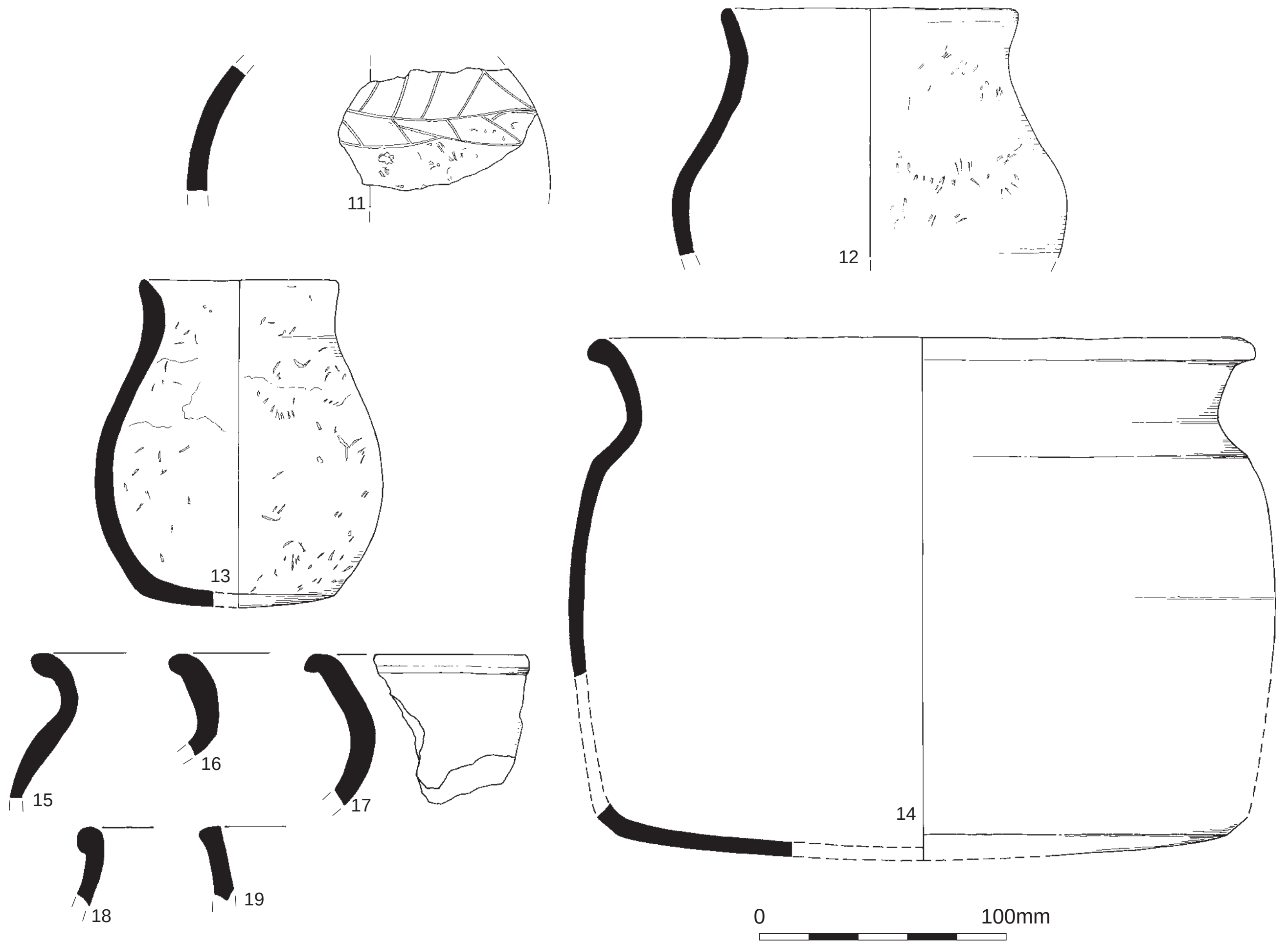


Fig 10.2 Post-Roman pottery (nos 11–19)

16. Late Saxon Canterbury sandy ware (LS1). Hybrid LS1/EM1. Jar/cooking pot rim. Rim type B1. D: *c* 340mm. Dark grey. Heavily sooted ext. Date and ctx as no. 14 above
17. Late Saxon Canterbury sandy ware (LS1). Hybrid LS1/EM1. Jar/cooking pot rim. Thickened flat-topped rim (type B2). D: *c* 310mm. Light grey. Date and ctx as no. 14 above
18. Late Saxon Canterbury sandy ware (LS1). Hybrid LS1/EM1. Jar/cooking pot rim. Beaded rim on fairly straight neck (type C2). D: *c* 200mm. Dark grey. Heavily sooted ext. Worn. Date and ctx as no.14 above
19. Late Saxon Canterbury sandy ware (LS1). Hybrid LS1/EM1. Jar/cooking pot rim. Straight everted flat-topped/ext bevelled (type A3B). D: *c* 250+mm. Dark grey. Heavily sooted ext. Worn. Date and ctx as no.14 above
20. Ipswich ware: sandy (MLS7A). Near-complete spouted pitcher (18 joining sherds). Probably almost whole at discard and probably fairly old/worn-out from use. H: *c* 250mm; rim D: 180mm. (23%). Complete sagging base D: *c* 195 mm. D-shaped spout (damaged). Hand-built/wheel-finished? Plain everted rim surviving at the front only. The rim/neck break has possibly been roughly filed-down around the remaining circumference to extend the working life of the vessel – probably after the rim/handle junction had broken around the back? D-shaped handle scar (W: 48mm) on opposite side to spout. In the centre of scar a roughly horizontal ? knife-stab – possibly for keying handle junction? Sagging base showing central use-wear underneath. Faint rilling/girth grooves on shoulder. Fairly crudely finished/wiped external surface varying from smooth to fairly rough. The lower half of the vessel exterior has been smoothed/finished with a series of vertical wipe marks or strokes – mostly faint but resembles weak burnishing in places. Horizontal turning marks only preserved on upper half of vessel interior but dented and wiped in places – especially handle area. Internal lower half very flaky/laminar and disintegrated, possibly leached/discoloured – perhaps from repeated boiling? Pale greyish ?limescale deposits on base floor including flaked areas. Lower wall 13-15mm thick in places. Dull, dusty, under-fired, very fine sandy fabric. Grey to dark grey surfaces with dull grey-brown core. One or two very large burnt-out organic (wood) voids up to 15mm long. Date *c* 720-850, possibly *c* 750/75-850? Zone 14 (202039). Pit 202038, deliberate backfill. ON 527

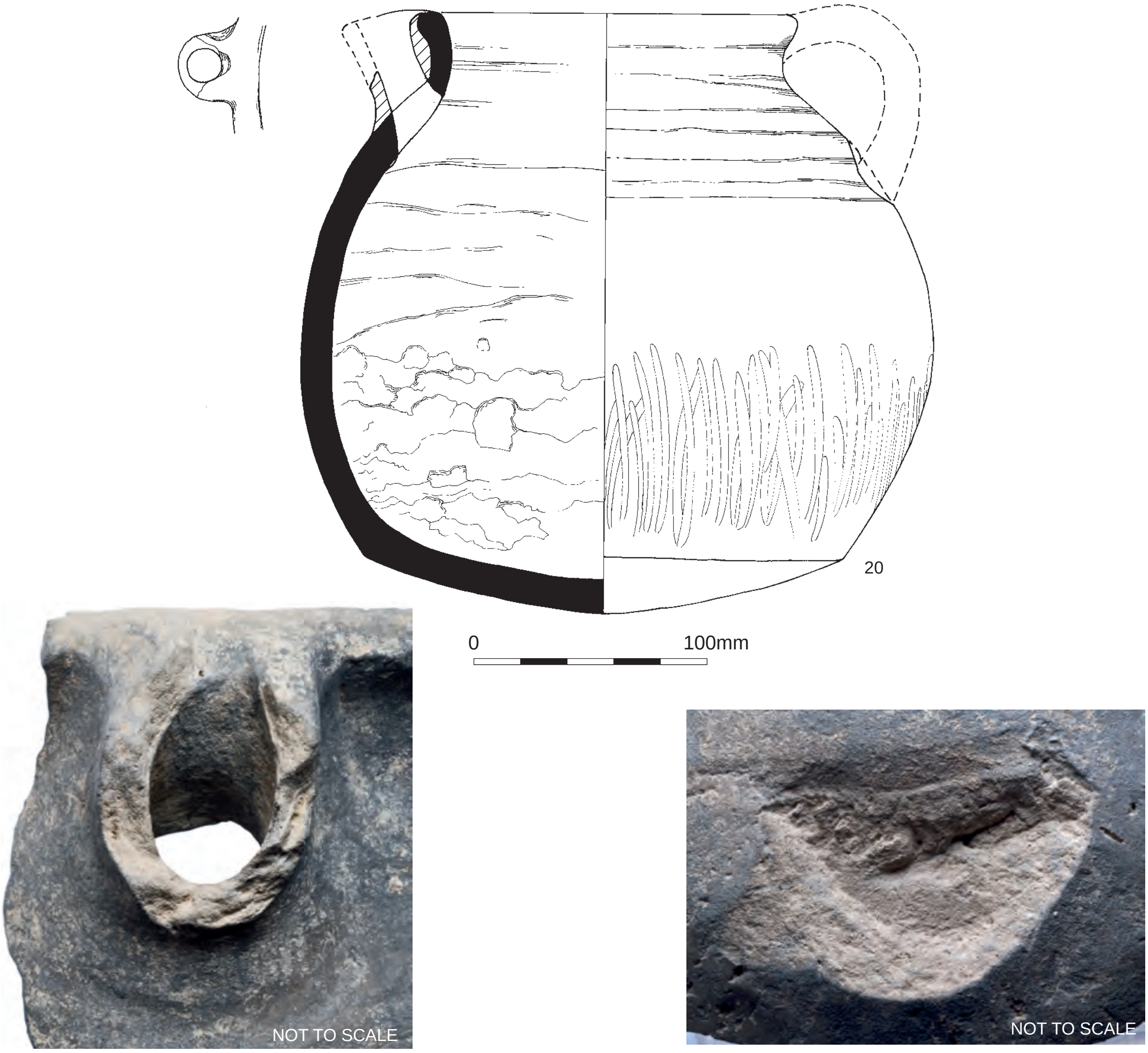


Fig 10.3 Post-Roman pottery: Ipswich ware spouted pitcher (no. 20)

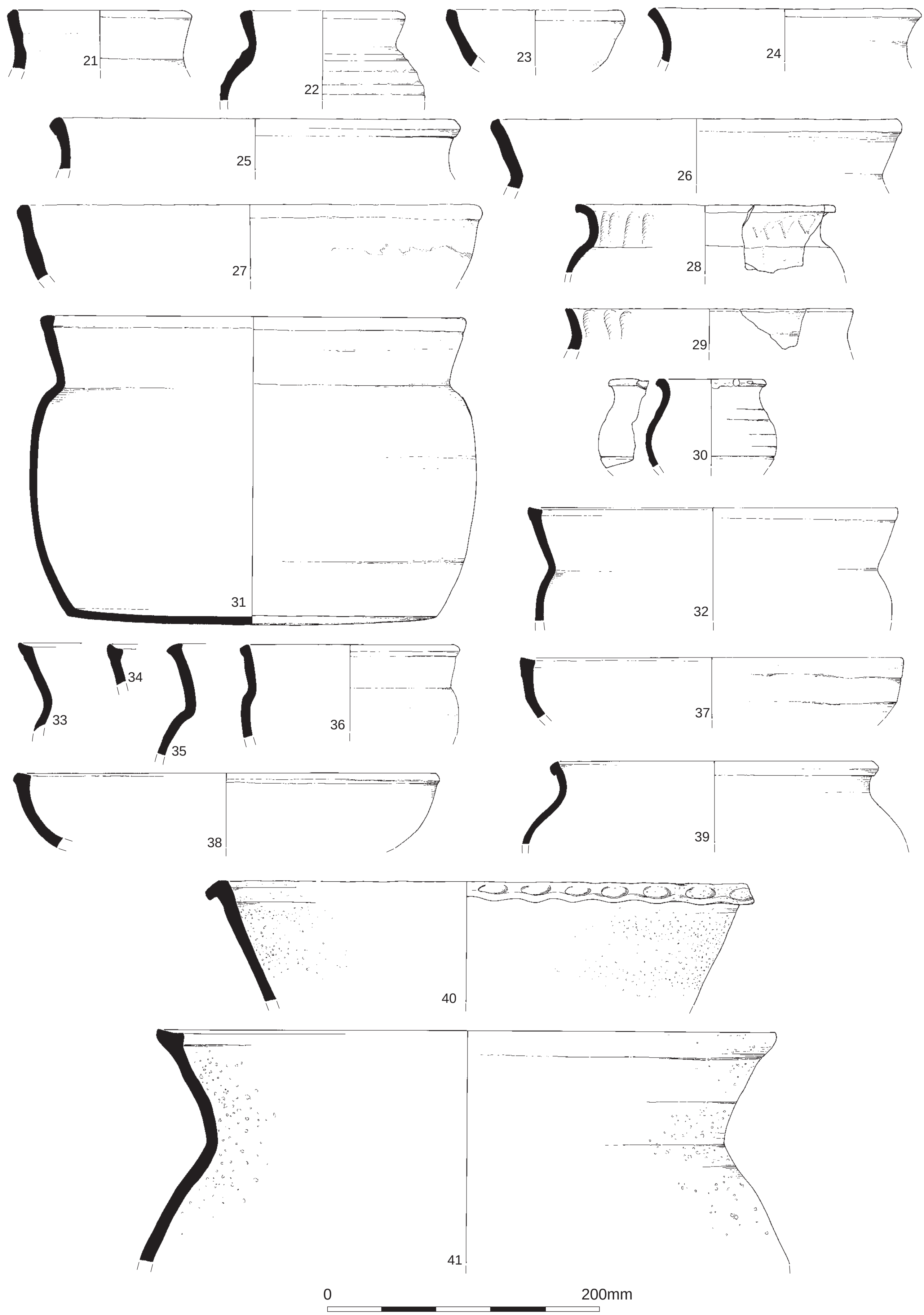


Fig 10.4 Post-Roman pottery (nos 21–41)

21. Ipswich ware: sandy (MLS7A). Smallish jar/cooking pot rim. Competently wheel-thrown. Long flaring neck. Rim slightly bevelled ext. D: 135mm. Fine grey sandy fabric. Sooted ext. Fresh. Date *c* 720-850, possibly *c* 750/75-850? Zone 14 (166071). Pit 166068
22. Ipswich ware: pimply (MLS7B). Small jar/cooking pot rim. Competently wheel-thrown. Rim slightly bevelled ext. Prominent girth grooves. D: 120mm. Fresh. Sooted ext. and just over rim int. Date *c* 720-850, possibly *c* 750/75-850? Zone 14 (230087). Ditch 159224, upper fill
23. Sandy ware with sparse-moderate flint temper (EM46). Rim of cresset oil lamp of conical form. D: *c* 130mm. Possibly turntable-finished? Dark grey fabric with dark brown ext surface. Heavily sooted int except in base of bowl. Also over lip ext. The only example of this form from the excavations. Possibly south Kent souce. Date *c* 1175-1250? Zone 1 (248154). Ditch 172191
24. Coarse flint-tempered ware (EM41). Jar/cooking pot rim. D: 200mm. Oxidised orange-brown with grey core. From fragmentary vessel including sagging base sherd. Sooted ext. Date *c* 1050-1150/75? Zone 3 (204041). Structure/posthole 172172
25. Flint and shell-tempered ware with sparse quartz (EM32). Jar/cooking pot rim. D: 300mm. Oxidised orange-brown, grey core. Date *c* 1050-1150/75? Zone 3 (172004). Ditch 172179
26. Flint and shell-tempered ware with sparse quartz (EM32). Jar/cooking pot rim with flaring neck. D: 300mm. Possibly turntable-finished? Dark brown with grey core. Sooted ext. Date *c* 1050-1150/75? Zone 3 (132014). Ditch 172031
27. Flint and shell-tempered ware with sparse quartz (EM32). Bowl rim. D: 340mm. Possibly turntable-finished? Dull brown with grey core. Sooted ext. Date *c* 1050-1150/75? Zone 3 (131017). Ditch 172031
28. Mid – late Saxon Canterbury-type sandy ware (MLS2). Jar/cooking pot rim. D: 190mm. Black fabric with brownish margins. Horizontal burnish ext. Heavily sooted ext. Shallow dents under rim from handmade manufacturing process. Date *c* 750-875. Zone 14 (185032) Pit 185033
29. Mid – late Saxon Canterbury-type sandy ware (MLS2). Jar/cooking pot rim. D: 210mm. Black fabric with brown core. Sooted ext. Date *c* 750-875. Zone 14 (175091). Ditch 175086
30. Thetford-type ware (LS10). Small jar/cooking pot. D: 80-90mm. Wheel-thrown. Dark grey fabric. Sooted ext and on lower half int (carbonised food residue?). Rim accidentally dented in places. Small possibly deliberate facet near broken edge of rim – possibly indicating a pulled lip (Small pipkin?). Coarse flint inclusion 3mm embedded in rim. Date *c* 850-11No. Context date *c* 1075-1125. Zone 3 (172127). Ditch 159269
31. Early Medieval Canterbury sandy ware (EM1). Jar/cooking pot profile. D: 320mm; H: *c* 220mm. Rim profile varies from slight D-shaped bead to plain upright with flattened top. Light grey-brown fabric with light grey core. Heavily sooted ext. with some vertical fat trails. Ctx date *c* 1075-1125. Zone 3 (172127). Ditch 159269
32. Early Medieval Canterbury sandy ware (EM1). Jar/cooking pot rim. D: 270mm. Internally bevelled rim type (IBEV). Sooted ext. Date *c* 1075-1125/50. Zone 3 (149014). Pit 172032
33. Early Medieval Canterbury sandy ware (EM1). Jar/cooking pot rim. D: 210mm. Internally bevelled rim type (IBEV). Sooted ext. Date *c* 1075-1125/50. Zone 3 (139037). Pit 172179
34. Early Medieval Canterbury sandy ware (EM1). Jar/cooking pot rim. D: 300mm. Internally bevelled rim type (IBEV). Sooted ext. Date *c* 1075-1125/50. Zone 3 (172084). Gully 221009
35. Early Medieval Canterbury sandy ware (EM1). Jar/cooking pot rim. D: 350mm. Triangular rim. Sooted ext. Date *c* 1075-1125/50. Zone 3 (149014). Ditch 172032
36. Early Medieval Canterbury sandy ware (EM1). Small jar/cooking pot rim. D:160mm. Bead rim. Sooted ext. Date *c* 1075-1150. Zone 3 (141020). Ditch 172031
37. Early Medieval Canterbury sandy ware (EM1). Bowl rim. D: 280mm. Knife-trimmed ext. Date *c* 1075-1150. Zone 3 (149014). Ditch 172032
38. Early Medieval Canterbury sandy ware (EM1). Bowl rim. D: 310mm. Sooted ext. Date *c* 1075-1150. Zone 3 (131017). Ditch 172031
39. Canterbury Pound Lane kiln-type ware (EM1.PL). Jar/cooking pot rim. D: 240mm. Wheel-thrown. Light grey. Traces sooting ext. Date *c* 1145-1175. Zone 3 (141038). Pit 141037
40. Early Medieval shelly-sandy ware (EM3). Bowl with thumbed rim. D: 400mm. Possibly wheel/turntable-finished? Light brown surfaces (mostly worn off), light grey core. Abundant worn shell mostly under 3mm, moderate rounded quartz, sparse-moderate flint. Ctx date *c* 1075-1150. Zone 1 (288103). Ditch 172190
41. North French/Flemish(?) profuse shelly ware (LS4). Jar/cooking pot rim. D: *c* 380-400mm. Internally bevelled rim. Colour varies from reddish-brown heat-reddened (mainly ext) to yellowish-brown (mainly int). Shell mostly dissolved from surfaces giving a corky texture. Sooted ext. Date *c* 1075-1150. Zone 3 (205032). Ditch 172031
42. North French/Flemish(?) profuse shelly ware (LS4). Jar/cooking pot rim. D: 300mm. Internally bevelled rim. Oxidised orange-brown. Shell mostly dissolved. Sooted ext. Date *c* 1075-1150. Zone 3 (141035). Ditch 172166
43. North French/Flemish(?) profuse shelly ware (LS4). Jar/cooking pot rim. D: 250mm. Internally bevelled rim. Grey, reduced. Shell preserved. Heavily sooted ext. Date *c* 1075-1150. Zone 3 (131017). Ditch 172031
44. North French/Flemish(?) profuse shelly ware (LS4). Jar/cooking pot rim. D: 270mm. Simple everted thickened rim. Oxidised light orange-brown. Shell preserved. Sooted ext. Date *c* 1075-1150. Zone 22 (195055). Ditch 195053
45. Early Medieval shelly-sandy ware (EM3). Jar/cooking pot rim. D: 250mm. Developed squared rim. Oxidised orange-brown ext, dark brown int with grey core. Shell mostly dissolved. Abundant quartz sand. Sooted ext. Date *c* 1150-1250. Zone 1 (123095). Ditch 132094
46. Tyler Hill ware (M1). Jar/cooking pot profile. D: 210mm. Classic squared/flanged rim pricked through causing exit marks on neck externally. Slightly under-fired brown fabric with greyish core. Surfaces lost in places due to soil conditions. Heavily sooted ext and under base. Ctx date *c* 1275-1350. Zone 2 (244372). Pit 244367
47. Tyler Hill ware (M1). Jar/cooking pot rim. D: 210mm.

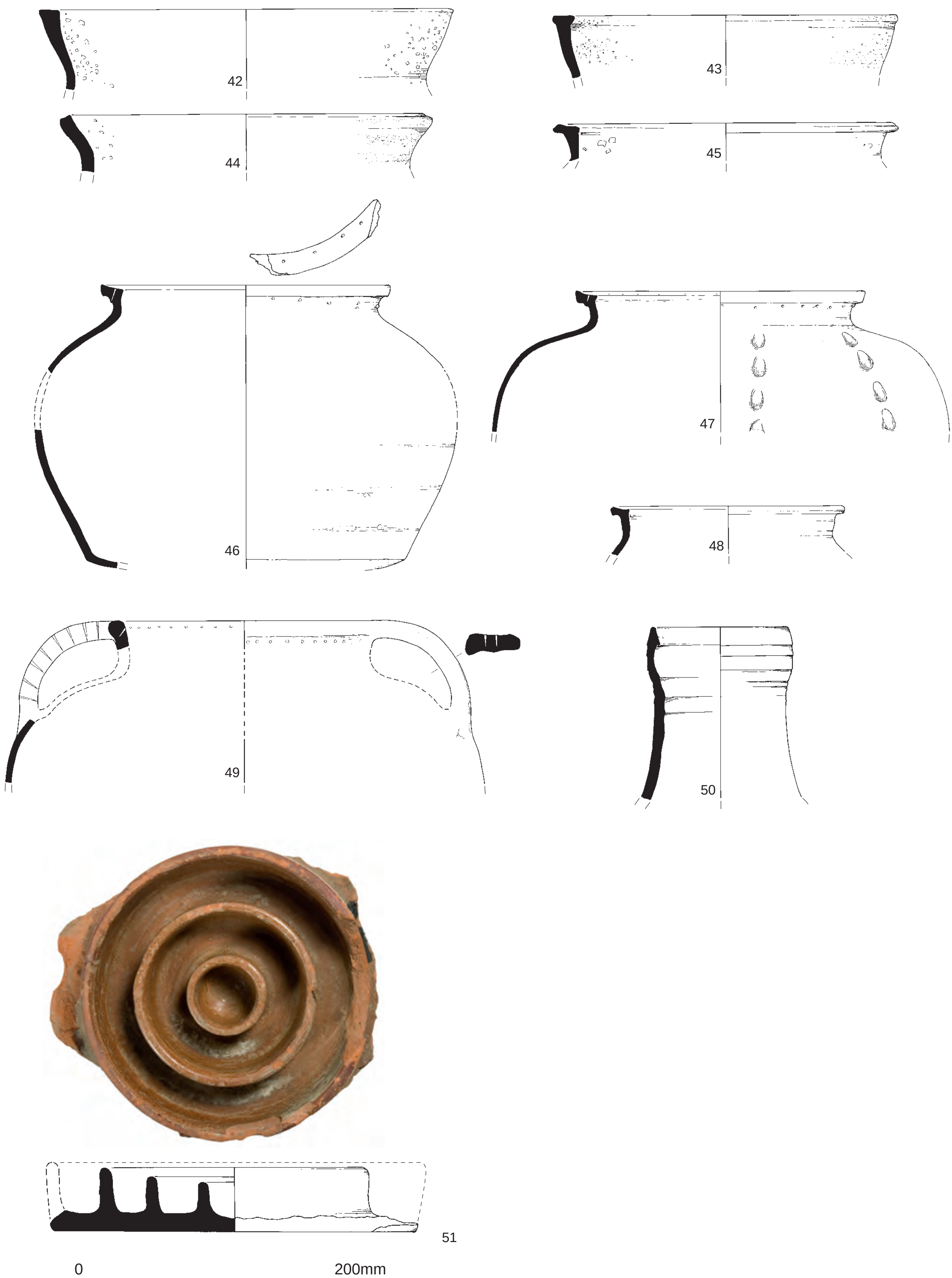


Fig 10.5 Post-Roman pottery (nos 42–51)

Rim pricked through. 'False' vertical thumbed strips on body (not applied but directly thumbed into body). Very hard. Oxidised surfaces (mostly worn-off), grey core. Sooted ext. Ctx date *c* 1275-1350. Zone 2 (244372). Pit 244367

48. Tyler Hill ware (M1). Small jar/cooking pot rim. D: 170mm. Oxidised orange-brown. Heavily sooted ext. Ctx date *c* 1275-1350. Zone 2 (244368). Pit 244367

49. Tyler Hill ware (M1). Jar/cauldron rim with handle. D: 180mm. Rim pricked through (possibly all way round or perhaps just to secure handle?). Single surviving handle – probably one of pair. Light pricking all over back of handle. Oxidised orange-brown with grey core. Spot of glaze int. Sooted ext. Ctx date *c* 1275-1350. Zone 2 (244372). Pit 244367

50. Tyler Hill ware (M1). Tulip-necked baluster jug. D: 100mm. Horizontal grooved decoration. Hard reduced grey fabric with patchy greenish-brown glaze ext. Ctx date *c* 1275-1350. Zone 2 (244372) and (244369). Pit 244367

51. Post-medieval red earthenware (PM1). Near-complete 'chicken-feeder'. Originally with four rings (in plan) of which only a trace of the outer ring/rim survives – but three inner rings complete. Outermost surviving ring (3rd) has a diameter of 144mm. Trace of basal angle diameter *c* 190mm. Rings stepped in height – *c* 30-36mm. high. Fine soft oxidised orange PM1/LPM1 flowerpot-like fabric. Upper/inner surface only covered with a thin/glossy orange-brown clear glaze which has clearly been painted on (rather than dipped). Splash of black pitch-like material on outer ring and over break – suggesting possibly that it continued in use after outer ring was lost? Fairly fresh. Date *c* 1780-1900. Zone 19 (Ctx 190310, from backfill of a World War II defensive ditch 193137)

Chapter 10 – Appendix

Characterisation by ICPS of Merovingian Pottery *by Michael J Hughes*

Introduction

The aim of the present scientific investigation was to determine whether chemical analysis using ICPS (inductively coupled plasma spectrometry) of imported mid-Saxon Merovingian vessels produced results comparable to each other and to examples of problematic ?Roman/Merovingian greywares from the scheme (the latter are undecorated sherds which cannot be distinguished by eye). Some recent examples of ICPS projects on ceramics from south-west England include pottery from Lundy Island (Allan and Blaylock 2005) and Saxo-Norman pottery in Somerset (Allan *et al* 2011).

The full list of samples analysed and their ICPS results are given in Tables 10.1.1 and 10.1.2. Samples 1–6 are all from decorated vessels and almost undoubtedly 6th–8th century imported Merovingian vessels. Sample 6 is in a distinctive smooth, highly laminar, rather grey fabric. There has been debate whether vessels in this fabric were made in Kent or were imports from northern France/Flanders. Samples 7–10 were described as 'probable Merovingian imports, or less likely, Roman period greywares'. Samples 11 and 12 are body sherds in 'uncertain Merovingian or Roman greyware'.

ICPS Analysis: Inductively-Coupled Plasma Atomic Emission Spectrometry (ICP-AES)

Powdered samples were obtained from the pottery by drilling with 2 or 3mm diameter tungsten carbide drills fitted into a hand-held low voltage electric drill. In addition, the samples sent for ICPS analysis included a portion of a Certified Reference Material (NBS679 Brick Clay – produced by the US National Institute for Standards and Technology, Washington DC) in the analysis batch but without identification to the laboratory as such. This acted as an analysis quality control sample and the analysis results from it were entirely satisfactory. The weighed samples were placed in small individual Teflon (PTFE) beakers, treated with a mixture of hydrofluoric and perchloric acids and heated overnight on a hotplate to dissolve the ceramic. The acids were evaporated off and the residue dissolved in nitric acid, then made to volume with ultra high quality water (Thompson and Walsh 1989; Potts 1987).

Results of the ICPS chemical analyses

The analyses did not show any very unexpected chemical compositions, but the simple plots of selected pairs of elements showed distinctions within the samples. A main group consisted of all except samples 7 and 11. Sample 7 (a Merovingian greyware WT jar base in fine sandy/silty micaceous fabric) had only about half the aluminium content compared to the rest of the sherds; aluminium in pottery clays comprise the clay minerals so it acts as an index of the percentage of clay (versus temper). Of the other major elements, potassium and titanium were also low, but iron, calcium and sodium were of similar levels to the main group. Of the trace elements, the rare earth elements (lanthanum, cerium, etc) were slightly low, but many other trace elements were significantly low. Overall, the chemistry of sample 7 suggests that the sandy/silty temper forms a much higher proportion of the fabric than any of the other sherds analysed. Sample 11 had a very unusual high level of cerium (247 ppm); it is a rare-earth element and the others of

Table 10.1.1 Results of ICPS analysis

Sample	*Al2O3*	*Fe2O3*	*MgO*	*CaO*	*Na2O*	*K2O*	*TiO2*	*P2O5*	*MnO*	*Ba*	*Co*	*Cu*	*Li*	*V*	*Zn*	*Sc*
RJ 1	14.0	4.86	1.82	1.09	0.24	2.44	0.71	0.50	0.020	434	23.5	29.0	49.5	166	114	15.5
RJ 2	18.5	6.71	2.07	0.75	0.42	3.59	1.05	0.19	0.022	397	39.5	36.8	82.2	203	123	19.7
RJ 3	16.5	5.70	2.18	1.28	0.32	3.20	0.87	0.39	0.021	345	26.1	32.5	74.3	187	104	18.0
RJ 4	16.1	6.02	1.79	0.84	0.33	3.09	0.92	0.23	0.016	377	35.6	30.4	70.1	181	97	16.8
RJ 5	12.7	5.47	1.33	1.25	0.30	2.37	0.76	0.43	0.013	399	20.7	22.3	44.1	156	71	13.8
RJ 6	18.5	6.63	2.38	1.14	0.33	3.36	0.96	0.63	0.025	417	23.9	28.5	76.9	211	118	19.4
RJ 7	7.5	5.45	0.85	1.34	0.31	1.34	0.56	0.70	0.011	417	14.2	7.0	23.8	73	46	8.5
RJ 8	14.8	4.93	1.87	1.13	0.30	2.47	0.75	0.50	0.015	412	21.9	25.3	51.6	160	100	16.1
RJ 9	15.3	5.82	1.75	0.83	0.35	3.06	0.85	0.26	0.021	414	33.8	30.0	65.6	176	108	16.6
RJ 10	16.2	7.12	2.18	1.01	0.30	3.03	0.91	0.11	0.036	328	26.5	20.4	88.2	168	113	16.6
RJ 11	15.1	10.27	1.76	0.79	0.36	2.60	0.84	0.29	0.583	465	123.5	39.9	75.2	204	126	17.5
RJ 12	14.1	3.61	0.96	2.22	0.30	1.86	0.65	0.48	0.026	427	14.8	11.8	96.1	103	65	12.4
RJ 13	20.1	13.55	1.35	0.30	0.17	2.93	0.91	0.13	0.223	464	27.8	26.6	81.2	166	119	21.4

Samples RJ1-12 correspond to supplied sherds nos 1-12; RJ13: certified reference material NIST679 for analytical quality control

Key: Al2O3 aluminium; Fe2O3 iron; MgO magnesium; CaO calcium; Na2O sodium; K2O potassium; TiO2 titanium; P2O5 phosphorus; MnO manganese; Ba barium; Co cobalt; Cu copper; Li lithium; V vanadium; Zn zinc; Sc scandium; Cr chromium; Ni nickel; As arsenic; Rb rubidium; Sr strontium; Y yttrium; Zr zirconium; Cd cadmium; Pb lead; and rare earth elements: La lanthanum; Ce cerium; Nd neodymium; Sm samarium; Eu europium; Dy dysprosium; and Yb ytterbium.

The results from Al2O3 to MnO inclusive are given as the oxide, in weight percent; all the rest are given as the element, in parts per million

RJ1 Merovingian greyware vessel. WT. profile carinated jar/bowl	Ill. no. 4	EKA 178332
RJ2 Merovingian grey ware. WT. prob 2/3 profile inc rim	Ill. no. 5	EKA 178332
RJ3 Merovingian grey ware. WT. I vessel Probably 'bottle' base	Ill. no. 6	EKA 178332
RJ4 Bodysherd merovingian greyware	Ill. no. 7	EKA 197085
RJ5 Prob 1 vessel bodysherds Merovingian greyware		
RJ6 A single WT Merovingian pot	Ill. no. 3	EKA 166107
RJ7 Merovingian grey ware. WT. Thick neatly made base	Ill. no. 8	EKA 166107
RJ8 Prob Merovingian? Worn flat ?jar base	Ill. no. 9	EKA 166107
RJ9 Prob Merovingian? Worn flat ?jar base crudely finished beneath		
RJ10 Very hard grey sandy. WT prob merovingian jar/bottle	Ill. no. 10	EKA 189020
RJ11 Uncertain ?Merovingian/Roman greyware		
RJ12 Uncertain ?Merovingian/Roman greyware		

that group showed raised levels. The iron content was much higher than in the other samples, and also the other transition metals cobalt and nickel. Published neutron-activation analyses of Roman flue tiles from Sussex (Cowell 1979) contained high levels of cerium, although only up to 125 ppm (ie, not as high as sample 11), and some flue tiles contained comparable levels of iron.

Of the rest of the samples, sample 12 stood out slightly, having a slightly calcareous clay fabric (2.2% calcium oxide, as against 0.7–1.3% for the others) and higher levels of potassium and magnesium (potassium is often associated in clays with feldspars).

Interpretation of the ICP analyses using Principal Components Analysis

To enhance our understanding of the relationships between the analyses of the pottery, the multivariate statistics technique of Principal Components Analysis (PCA) was used (Manly 2005; Tabachnick and Fidell 2007). Descriptions of its application to archaeology have been given elsewhere (see, for example, Baxter 1994 and 2003; Shennan 1997). The program MINITAB version 16 was used with the 'PCA' procedure (Ryan *et al* 2005). The Excel file containing the original analysis data was read into MINITAB and natural logarithms were taken of all elements before subjecting the data to multivariate statistics – taking logs is regularly used in such applications. Some of the analysed elements were omitted from the statistics, based on previous experience, including those that are volatile during pottery firing such as arsenic, cadmium and lead. Phosphorus was also omitted as it tends to be mobile in soil water post-burial. Zirconium is not completely dissolved during the laboratory procedures and was also omitted. To aid in interpreting the statistical plots produced in this project (Figs 10.1.1 and 10.1.3), each individual item analysed has been shown by a symbol and its sample number from Table 10.1.1. Such plots can be seen as chemical 'maps' for the items analysed, and pottery made of the same clay will appear in the same position of the figure.

Principal Components Analysis on the EKA2 pottery alone

All the samples analysed were included in the principal components analysis, but because the number of

Cr	*Ni*	*As*	*Rb*	*Sr*	*Y*	*Zr*	*Cd*	*Pb*	*La*	*Ce*	*Nd*	*Sm*	*Eu*	*Dy*	*Yb*
99	41	6	101	148	34.2	200	0.28	18	41.1	84.7	45.0	8.3	1.85	5.6	3.1
123	46	11	148	133	38.0	212	0.24	23	49.7	100.3	51.6	9.8	2.10	6.4	3.3
113	40	7	138	233	25.6	208	0.26	21	43.0	76.4	37.8	6.8	1.42	4.2	2.4
115	31	10	132	124	23.2	183	0.11	21	46.3	85.3	39.4	7.2	1.52	4.1	2.1
122	25	12	98	119	22.4	190	0.17	17	40.0	67.9	32.2	5.6	1.18	3.4	2.1
119	47	12	140	208	31.4	239	0.30	22	47.7	91.0	44.8	8.3	1.75	5.3	3.0
96	22	9	53	142	14.7	166	0.2	12	27.3	53.3	24.0	4.2	0.8	2.6	1.9
102	40	8	105	148	28.3	202	0.27	19	37.2	73.5	38.0	7.1	1.57	4.9	2.8
117	37	8	138	143	28.2	251	0.17	21	49.3	92.9	44.4	8.1	1.67	4.9	2.7
116	57	11	128	100	27.7	180	0.23	23	43.1	81.0	41.2	7.8	1.69	4.9	2.3
118	164	16	111	96	50.4	193	0.26	27	51.9	247.9	53.3	10.7	2.37	8.1	4.2
80	57	11	106	159	19.1	209	0.24	21	33.1	64.1	31.7	5.8	1.24	3.4	2.0
101	53	8	180	70	39.5	267	0.10	21	48.0	99.0	48.0	9.2	1.82	6.9	3.9

Table 10.1.2 Summary of ICPS samples

Zone	*Ctx*	*Spot*	*Fabric*	*Form*	*Comments*	*ICPS sample*	*Illus.*
10	178332	7-8C	EMS9	JAR	Merovingian grey ware biconical jar/bowl. Profile with wavy rouletting on shoulder and small crossed square stamps in valleys. Fresh. Diam varies 120-130mm.	1	3
10	178332	7-8C	EMS9	JAR	Merovingian greyware. Near complete profile globular jar/bowl with confused rouletted dec on shoulder.	2	4
10	178332	7-8C	EMS9	BOTT	Merovingian greyware. Probable bottle base. Rouletted dec on shoulder including three wavy arcades with Circular wheel stamps and gridded rectangles in the valleys.	3	5
10	197085	*c* 575-750	EMS9	JAR	Merovingian greywars. Body sherd globular jar/bowl with chevron rouletted decoration.	4	6
10	197085	*c* 575-750	EMS9	JAR	Merovingian greyware. Three small body sherds, one with traces of rouletted dec.	5	-
19	166107	7C?	EMS8	JAR	Merovingian smooth greyware. Profile tall sub-biconical jar. Highly laminar. Shoulder dec of two horizontal cordons and incised wavy lines.	6	2
19	153086	7-8C	EMS9	JAR	Merovingian (oxidised) greyware. Complete biconical jar with horizontal grooving on shoulder.	6A	1
10	178332	7-8C	EMS9	JAR	Probable Merovingian (oxidised) greyware. Jar base in very fine sandy/silty oxidised fabric.	7	7
10	197085	*c* 575-750?	EMS9	JAR	Probable Merovingian greyware. Jar base in sandy buff-brown fabric with coarse gre-brown clay pellets.	8	8
10	197085	*c* 575-750?	EMS9	JAR	Probable Merovingian greyware. Jar base, crudely finished underneath.	9	
11	189020	*c* 575-750?	EMS9	JAR	Probable Merovingian greyware. Jar/bottle base. Fairly crude with wire marks underneath.	10	9
11	215042	*c* 575-750?	EMS9		Uncertain Merovingian/Roman greyware. Small shoulder sherds from small tightly curved ?jar.	11	
11	215042	*c* 575-750?	EMS9		Merovingian or Roman greyware. Large base from ?cooking pot. Possibly handmade but turntable-finished? Fine grey sandy/silty ware with clay pellets and rare calcite/shell. Fine horiz striations ext.	12	

chemical elements used in this statistical program must be fewer than the number of samples analysed, just ten of the elements in the full set of analytical data were selected to represent all the elements: aluminium, iron, magnesium, calcium, sodium, potassium, titanium, vanadium, chromium and cerium. The output from the program showed that the first principal component contained 68% of the chemical variation between pottery samples in the whole dataset. The second component contained a further 15% and third only 7%. Thus the first two principal components contain 83% of all the chemical variation in the samples, ie, these two accurately represent the chemistry of all the samples.

Fig 10.1.1 shows a plot of the first two principal components, while Fig 10.1.2 shows the contribution of specific elements to the two components shown in Fig 10.1.1. Samples 7 and 12 are distinct from the rest, as are shown in in Fig 10.1.2. The main group of pottery plots in the lower centre and right of Fig 10.1.2, suggesting that all these samples have similar chemistry, ie, origin. Sample 12 is different to the main group, because of its higher concentration of calcium compared with the rest (note that Fig 10.1.2 shows that sherds with higher concentrations of calcium will be plotted towards the lower left of Fig 10.1.1). Nevertheless, it may represent a variation within the main group clay chemistry. No outliers were found among the samples based upon the calculated Mahalanobis distance of each sherd's clay chemistry from the average composition of all the sherds.

Sample 6, in a different fabric, has a chemical composition entirely consistent with the main group analysed. Apart from samples 7 and 12, the remaining queried examples of Roman or Merovingian pottery (8–11) all had analyses consistent with the undoubted Merovingian vessels (1–6).

Principal Components Analysis on the combined analyses by ICPS of EKA2 pottery and selected analyses by atomic absorption of 6th and 7th century wheel-thrown pottery

The only analyses of pottery of this period and region that could be usefully compared to the EKA2 pottery were obtained on 6th and 7th century wheel-thrown pottery from sites in southern Britain and northern Europe (Cowell 1979). This pottery had been analysed by atomic absorption spectrometry (AAS) at the British Museum. These analyses included the same major elements analysed by ICPS, although no trace elements were analysed. No standard reference materials were

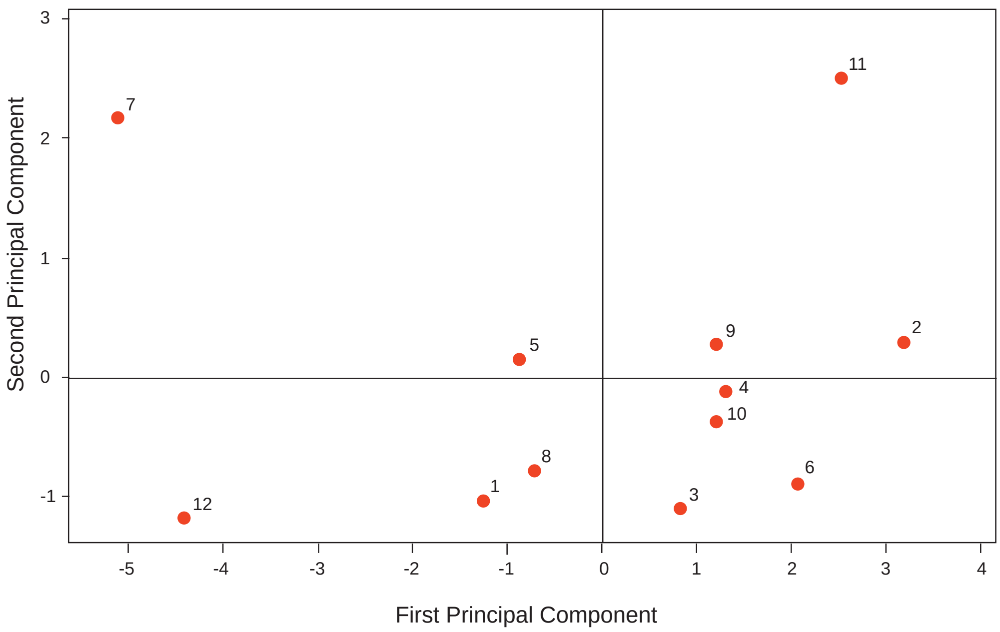


Fig 10.1.1 Principal components analysis of east Kent Merovingian pottery

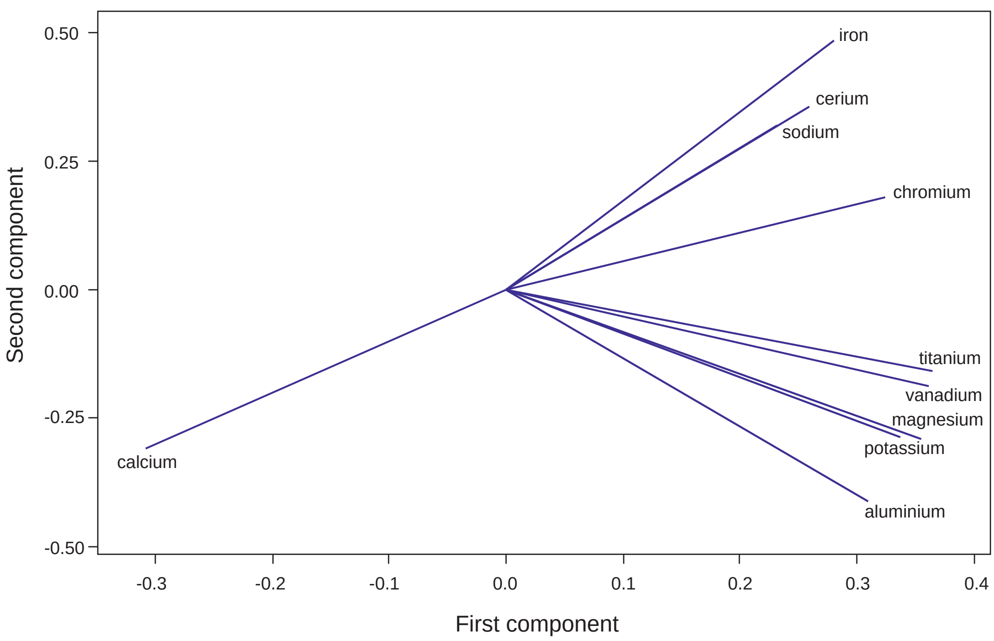


Fig 10.1.2 Elements contributing to the principal components of Figure 10.1.1 (Loading Plot)

analysed by AAS, so it is not possible to check inter-laboratory comparability between the two sets of analyses. The techniques have a number of similarities in terms of precision, so it is reasonable to assume that the two sets of data are comparable. A significant proportion of the wheel-thrown pottery analysed by Cowell (1979) formed a compact and consistent chemical composition group, and included sherds from kilns at Huy (op cit, table 2, nos 87–88) and from Wierre-Effroy (no 91) and Herpes (no 118). In the 1979 investigation, most of the pottery forming the main composition group were in the 'normal' fabric – group I identified by Evison (op cit, 54). The 'other continental' sherds analysed by AAS came from more distant parts of France and Germany.

Since the chemical composition groups identified in 1979 were quite distinct from each other, it was sufficient to select representatives of each group, based on Cowell's graph 1 (op cit, 98) to compare with the ICPS results. Some of the pottery analysed by AAS deviated from the chemical pattern for the rest of the type so were not selected for inclusion in the comparison. The aim was to select examples entirely typical of the majority of the particular type or source of pottery. All four sherds from Huy, etc were included as a 'continental' group' and, in addition, members of the following groups were selected:

- Local handmade pottery from Kent (nos 131, 133–5, 138–40)
- The 'main group' of 6th–7th century pottery (nos 12–22, 64–67)
- Other continental sherds apart from the Huy etc samples (nos 121—2, 124–7, 129–30)
  (34 comparative analyses in total)

The table of AAS analyses did not indicate whether the results were expressed as the element or (as for the ICPS) as the oxide, but since silicon was quoted as being around 65–75%, a typical amount for silicon as the oxide in pottery clay, it was assumed that the published data was given as the oxide and could be directly compared to the ICPS results. [Subsequent checking with files held at the British Museum confirms the published data is expressed as the oxide]. Principal components analysis was carried out on the combined data, using the eight elements analysed by both ICPS and AAS: aluminium, iron, magnesium, calcium, sodium, potassium, titanium and manganese. A plot of the first two principal components arising from the combined data (Fig 10.1.3) showed similar features to the results obtained by Cowell. The slight differences between graph 1 and Fig 10.8 in this work can be accounted for by differences in preparing the data for statistics: Cowell standardised the element concentrations to aluminium (so aluminium was not included), calcium was also omitted, but loss on ignition (a measure of the percentage of water in the powdered sample) was included. The latter was the largest contributor to the vertical distribution of graph 1, but it was not available for the ICPS results. Cowell's graph 1 shows close similarities to Fig 10.1.3: in both cases the 'main group' forms a single vertical elongated spread. Two of the four 'continental' sherds (87 and 118) overlap the EKA2 samples which also form a vertical spread slightly to the right. The local Kent pottery data are distinct and plots above both these groups at the top of Fig 10.1.3, while the 'other continental' pottery (typically characterized by very low potassium and magnesium, plus high aluminium found in kaolinite-rich clays) plots to the left well away from the 'main' and EKA2 groups. Some of the four continental kiln samples overlap with the EKA2. Comparing Fig 10.1.3 to graph 1 of Cowell (1979, 98), graph 1 shows the 'other continental' samples to be different to the 'main group', within which fall the four 'continental' samples. The local Kent pottery plots in yet another area of the graph.

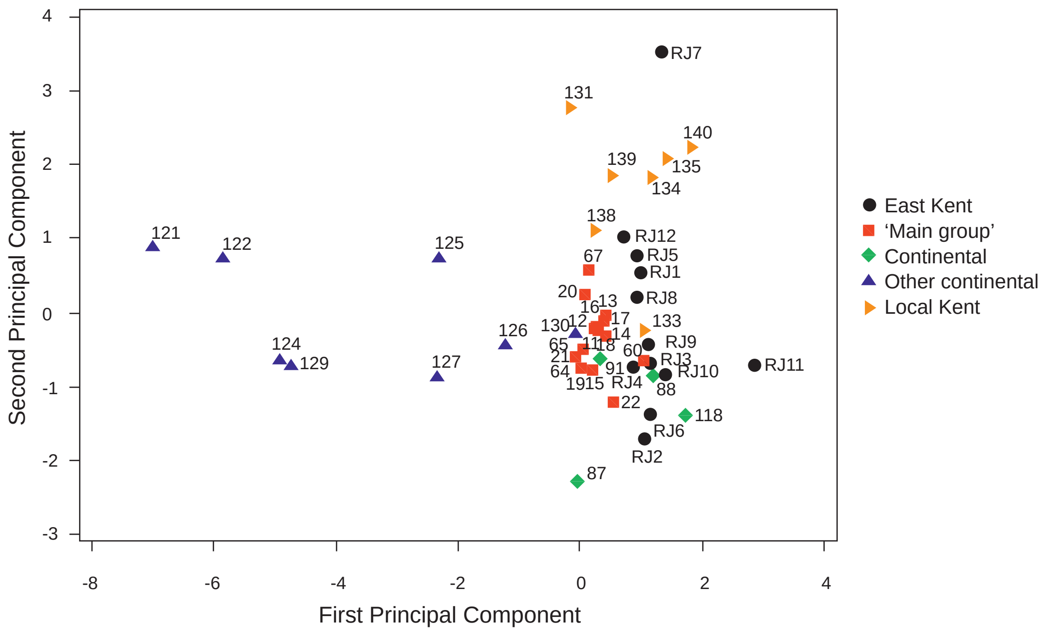


Fig 10.1.3 Principal Component Analysis (PCA) of combined East Kent and 6th-7th – century wheel-thrown pottery

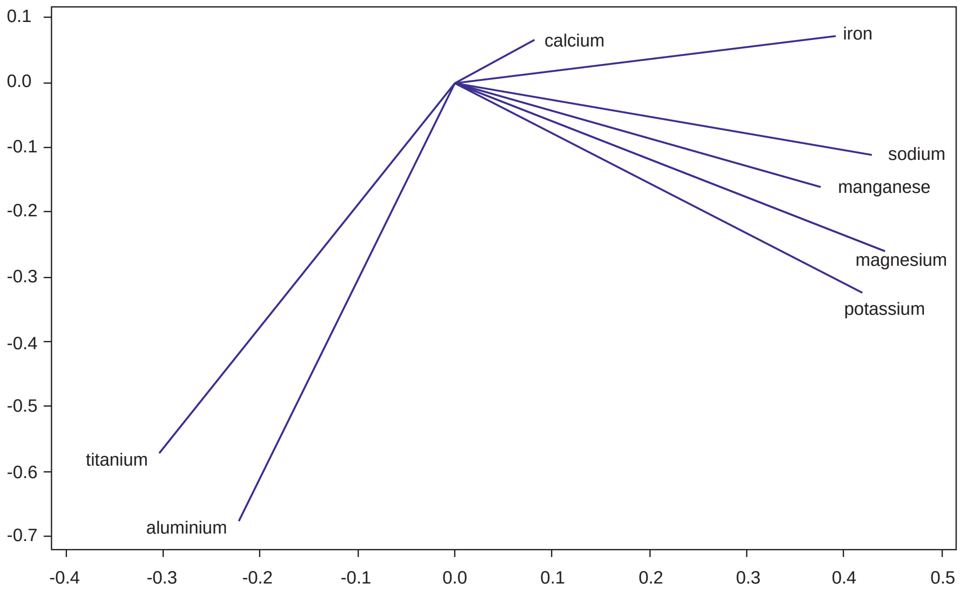


Fig 10.1.4 Elements contributing to the principal components of Figure 10.1.3 (Loading Plot)

It has to be considered whether inter-laboratory calibration factors could account for the slight horizontal separation between the 'main group' and the EKA2 samples. As noted above, we do not have independent means of checking whether the analyses of one laboratory might be somewhat out of step with the other Given the high level of care taken by each laboratory to obtain good quality analytical data, it seems likely that the slight separation is a real effect. Supporting this judgement is the close similarity of two of the 'continental' sherds to the EKA2 samples in Fig 10.1.3.

Fig 10.1.4 shows the contributions of the elements to the patterns seen in Fig 10.1.3. Samples with higher amounts of aluminium and titanium will plot towards the lower part of Fig 10.1.3 (and to the left), while those with higher iron, sodium, manganese, magnesium and potassium will plot to the right of Fig 10.1.3; however, calcium contributes little to the position of the samples in Fig 10.1.3. The third principal component accounted for only 14% of the chemical variation among all the samples in the combined dataset and showed less separation between groups than the first two.

Summarising the position of the EKA2 samples on the plot of the combined ICPS and AAS data, we can say there is a good consistency between the EKA2 pottery and the continental kiln samples, and a close similarity to the 'main group' identified by Cowell. The EKA2 pottery (with one exception) is unlike the local Kent handmade pottery or the 'other continental' pottery analysed by AAS. The single exception is sample 7, previously identified in Fig 10.1.1 as different to the rest of the EKA2 samples: in Fig 10.1.3 it plots on the same side of the figure as the local Kent pottery, though beyond the edge of the spread of the latter. Its position would suggest a local Kent origin for it. Sample 6, in a distinct fabric, does have a chemical composition consistent with the majority of EKA2 samples and therefore to be of continental rather than Kentish origin. Sample 11 has, as noted above, an unusually high cerium content (an element not used for Fig 10.1.3), but it lies to the right of the main spread of EKA2 sherds. It has slightly lower aluminium and titanium and this may be the cause of its higher score on the first principal component (ie, being more to the right of Fig 10.1.3). Its major element chemistry is not, however, otherwise much different to the rest of the main group, although it has a significantly higher iron content.

An important aspect of this short study has been to show that chemical analyses obtained by an earlier analysis technique (AAS) are entirely compatible with present-day analyses by ICPS. The ICPS study has, however, extended the range of elements analysed so the chemical characterization of this Merovingian pottery is now much fuller than previously known.

Conclusions

The selection of sherds analysed by ICPS analysis showed that with the exception of two samples (7 and 11), the pottery had a fairly similar chemical composition, suggesting a similar origin for these sherds. The ICPS data was compared to the atomic absorption analyses obtained in a previous project on 6th and 7th century pottery from southern England and northern continental Europe. Statistical analysis of the combined data and comparison with the graphs produced by similar statistical tests on the AAS data showed very similar patterns of distribution for different groups of pottery analysed by AAS. The EKA2 pottery was consistent with the main group of pottery analysed by AAS (which was concluded, therefore, to be a continental product) and with some of the local continental northern European pottery analysed, but distinct (apart from one sherd) from the pottery handmade in Kent.

Of the three categories of samples analysed (see introduction), all those (1–6) from decorated vessels and almost undoubtedly 6th–8th century imported Merovingian vessels have been shown to be consistent to each other and to a continental origin, including sample 6 in a distinctive smooth highly laminar rather grey fabric. Of samples 7–10, described as 'probable Merovingian imports, or less likely Roman period greywares', only sample 7 has the characteristics of Kentish pottery; the rest have the typical chemistry of the imported Merovingian vessels. Of the two body sherds in 'uncertain Merovingian or Roman greyware', sample 12 is also consistent with the imported Merovingian vessels, while 11 has an unusually high cerium content (and similarly unusual concentrations of other rare earth element), and so may be an unusual example of the main continental group or from another unrecognised source (?Roman; no other samples either from EKA2 or the selection from the 1979 AAS study are similar in chemistry. Analyses of Roman flue tiles from Sussex may be comparable – see introduction).

The use of previous AAS analyses to compare with the EKA2 results shows that careful re-use of previous analytical databases on pottery can be successful, while ICPS has now extended the range of chemical characteristics now known for the Merovingian pottery, and could be used to test further examples of this type of pottery.

Chapter 11

Ceramic Building Material

by Cynthia Poole

Introduction

The ceramic building material (CBM) amounted to a total of 840 fragments weighing 73.20kg (Table 11.1). Of this group 13% (210 fragments, 9.2kg) is of post-Roman date, for the most part post-medieval and modern rather than medieval, and mostly roof tile and brick. Roman tile amounted to 629 fragments (64kg) and was represented by tegula, imbrex, flue tile and brick, together with a high proportion of undiagnostic flat tile. Abrasion was generally low or absent, but no complete tiles were recovered, though a small number of complete or near-complete lengths and breadths survived. The mean fragment weight (MFW) of 87g is low. However, the MFW for the Roman assemblage was slightly higher at 101g compared to a post-Roman MFW of 46g. This difference is unsurprising in view of the larger overall size of Roman tiles compared to most types of later material.

Table 11.1 Quantities of ceramic building material by date

Date	*Count*	*% count*	*Wt (g)*	*% Wt*	*MFW*
C19-C20	54	6.4%	3265	4.4%	60.5g
Post-medieval	134	16%	5402	7.4%	40.3g
Medieval	15	1.8%	543	0.7%	36.2g
Roman	629	74.9%	63920	87.3%	101.6g
Undated	8	0.9%	72	0.1%	9g
Total	840		73202		87g

Consideration of material from fieldwalking and test pitting undertaken prior to excavation did not form part of the analysis. This material had been previously recorded to assign type and date. During the assessment, however, a random selection was very briefly scanned to get a feel for the character of that assemblage compared to the excavated assemblage. In summary the fieldwalking and test pits produced a total of 5607 fragments weighing 77,288g (MFW 14g) the majority of which was post-medieval, predominantly flat roof tile, together with sparse brick, water/sewer pipe and non-diagnostic tile. A very small quantity of Roman tile was also recovered. The fieldwalking assemblage bears no relation to that from the excavated sites and, therefore, no further analysis was undertaken. The fieldwalking assemblage is probably related to 18th and 19th century field drainage and agricultural improvement.

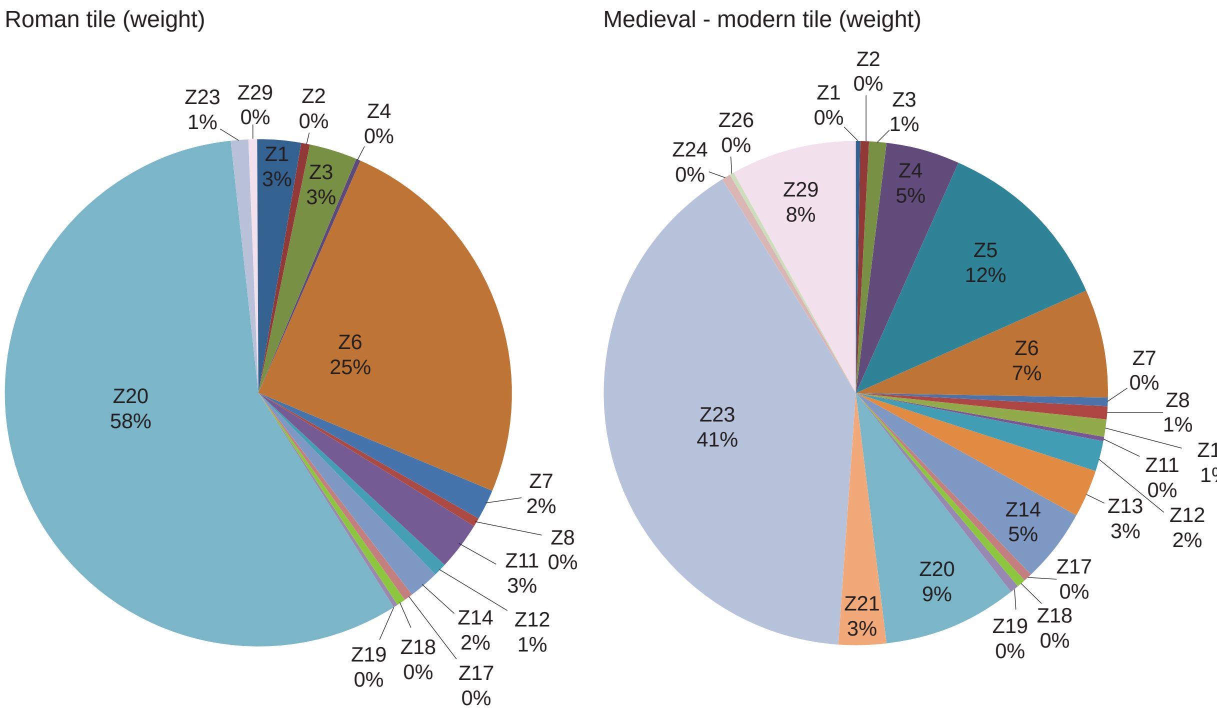


Fig 11.1 Quantities of Roman and post-Roman tile by Zone

The excavated assemblages are considered as a whole in the description of forms and fabrics. The post-Roman tile occurred as a scatter over most of the zones (Fig 11.1) rarely amounting to more than a handful of fragments weighing less than 200-300g. Only in Zone 23 was there a slightly denser concentration of *c* 50 fragments (5.5kg). There appeared to be no correlation between the medieval sites and the medieval tile. Over three quarters of the Roman tile was found in Zones 6 and 20 (Fig 11.1) with all other zones producing 3% or less of the Roman assemblage. The breakdown of quantities of forms per zone by count and weight are summarised in Tables 11.2a and 11.2b.

The assemblage has been fully recorded on an Excel spreadsheet, which forms part of the archive. The diagnostic tile was assigned to known form categories. The term flat tile has been used to designate plain flat fragments of Roman date without any diagnostic characteristics and 'indeterminate' has been used for any fragments too small or broken to establish date or form. During recording non-diagnostic and poorly preserved diagnostic material has been selected for discard in accordance with OWA discard policy.

Table 11.2a Quantification (fragment count) of CBM forms by zone (upper half Roman tile, lower half medieval – modern)

	Z01	*Z02*	*Z03*	*Z04*	*Z05*	*Z06*	*Z07*	*Z08*	*Z10*	*Z11*	*Z12*	*Z13*	*Z14*	*Z17*	*Z18*
Brick	6			1		22	42	1		1	1		3		
Flat tile	6	1	7	1		36		1		11	3		6	1	1
Tegula	1					48				3			2		
Imbrex	2		3			7	3								
Flue	1					2					1				
Tessera						1									
Tile Indet			2			13									
Roman total	16	1	12	2	0	129	45	2	0	15	5	0	11	1	1
PM Brick	2			5	1	2						4			
Arch. Brick															
Roof: flat	2	1	6	10	4	18	3	0	4	2	1	17	3	0	5
Roof: peg						3			1						
Roof: ridge?													1		
Wall tile															
Water Pipe															
Tile indet	2		2			4				1					
Med-Mod total	6	1	8	15	5	27	3	0	5	3	1	21	4	0	5
Total (all tile)	22	2	19	17	5	156	48	2	5	18	6	21	15	1	6

Table 11.2b Quantification (weight) of CBM forms by zone (upper half Roman tile, lower half medieval – modern)

	Z01	*Z02*	*Z03*	*Z04*	*Z05*	*Z06*	*Z07*	*Z08*	*Z10*	*Z11*	*Z12*	*Z13*	*Z14*	*Z17*	*Z18*
Brick	1354			70		4218	600	73		461	412		387		
Flat tile	230	2	1988	13		2488		236		615	35		676	268	24
Tegula	155					7842				698			426		
Imbrex			156			971	437								
Flue	86					195					15				
Tessera						2									
Indet	8		32			188				6					
Roman total	1833	2	2176	83	0	15904	1037	309	0	1780	462	0	1489	268	24
PM Brick	18			438	1182	55						40			
Arch. Brick															
Roof: flat	34	31	121	93	114	161	49		57	12	59	289	86		39
Roof: peg						114			26						
Roof: ridge?													39		
Wall tile															
Water Pipe															
Tile (indet)			3			4									
Med-Mod total	52	31	124	531	1296	334	49	0	83	12	59	329	125	0	39
Tile (undated)			30			414		91			130	29	371		
Total (all tile)	1885	33	2300	614	1296	16688	1086	400	83	1792	651	358	1985	268	63

Fabrics

Broad fabric categories were identified based on macroscopic characteristics and microscopic features using a binocular microscope or hand lens at magnifications of x10–x25 as appropriate for characterisation and identification. Six main fabric categories were identified with a number of others occurring in small quantity.

Roman fabrics

Fabric A: cream, calcareous clay with sparse molluscs; (it may be associated with a maroon/red moulding sand). Equivalent to London Fabric 2453

Fabric B: orange, red; fine silty micaceous clay with rare fine pores, contains rounded red iron oxide inclusions 0.3-2mm and rare rounded quartz sand grains <0.5mm. This was very similar to fabric D, but tended to be softer and more powdery in texture.

Fabric C: orange, red, reddish brown, light brown; generally moderate-high density of medium – coarse sized (*c* 0.5-1mm) rounded-subrounded quartz sand. Occasionally sparse burnt flint or small chalk grit present.

Fabric D: orange, reddish orange, red, reddish brown, brown; fine clay with a moderate scatter of pores, but normally no or few visible inclusions; occasionally red rounded ferruginous clay pellets 1-2mm is present. Rare examples with sparse grits of flint, quartzite, chalk or mudstone. Two thirds of the Roman tile in this fabric has a moulding sand (MS1) composed of rounded-subrounded fine-medium rose and brown quartz sand *c* 0.5mm.

Fabric E: orange, red, reddish orange, pinkish brown laminated clay with cream silt/clay pellets and laminae (E1 contains coarse rounded clay pellets; E2 contains angular unwedged clay up to 10mm; E3 is strongly laminated with cream streaks, but no pellets). Rare flint grits up to 15mm occasionally present.

Fabric F: Red, orange, reddish orange fine sandy clay containing frequent fine quartz sand, rarely coarser sand and sparse flint grits.

Fabric G: Pinkish brown, buff, grey clay matrix containing a high density of quartz sand – medium and coarse angular, plus grey, red and white rock sand and grits, chert/flint and rare chalk. This has some similarities to Group E fabrics at Northfleet Villa (Poole 2011, 327).

Fabric H: orange, pinkish red, light reddish orange, pinkish brown clay containing moderate -frequent density of coarse rounded quartz sand (rose, white and clear) and angular unwedged mudstone/siltstone *c*5-6g and small stone grits (rounded – subangular) *c* 2-5mm. This was similar, though not identical, to fabric 4 of the Group E fabrics at Northfleet (*ibid*).

There were single examples of an organic chaff tempered *fabric (V)* and a shell tempered *fabric (Sh)*.

The main Roman fabrics (D, B and F) are very similar and could represent a continuum of a single clay source with the minor differences in character reflecting slight differences in the clay, preparation or firing. Fabric D was dominant accounting for over 80% of the tile. However, the proportions of fabrics present in different zones (Fig 11.2) show considerable variation and suggest that the sources of tile available to the individual settlements were not constant. If all the Roman material is recycled, as is argued below, it may indicate that the

Z19	*Z20*	*Z21*	*Z23*	*Z24*	*Z26*	*Z29*	*Total*
	36		1				114
3	128					5	210
	196		3				253
	5						20
	3						7
	0						1
	8	1					24
3	376	1	4	0	0	5	629
	7	1	33			2	57
	1						1
3	0	6	7	2	3	23	120
			7				11
							1
						1	1
			4			5	9
	1						12
3	9	7	51	2	3	31	210
6	387	8	55	2	3	36	840

Z19	*Z20*	*Z21*	*Z23*	*Z24*	*Z26*	*Z29*	*Total*
	6251		130				13956
285	6301					122	13283
	22641		342				32104
	1017						2581
	352						648
							2
	68	2					317
285	36630	2	472	0	0	122	62878
	275	8	3939			163	6118
	27						27
50		335	75	26	39	509	2179
			94				234
							39
						31	31
			287			180	467
	9						16
50	311	343	4395	26	39	883	9111
	622						1687
335	37554	345	4867	26	39	1005	73673

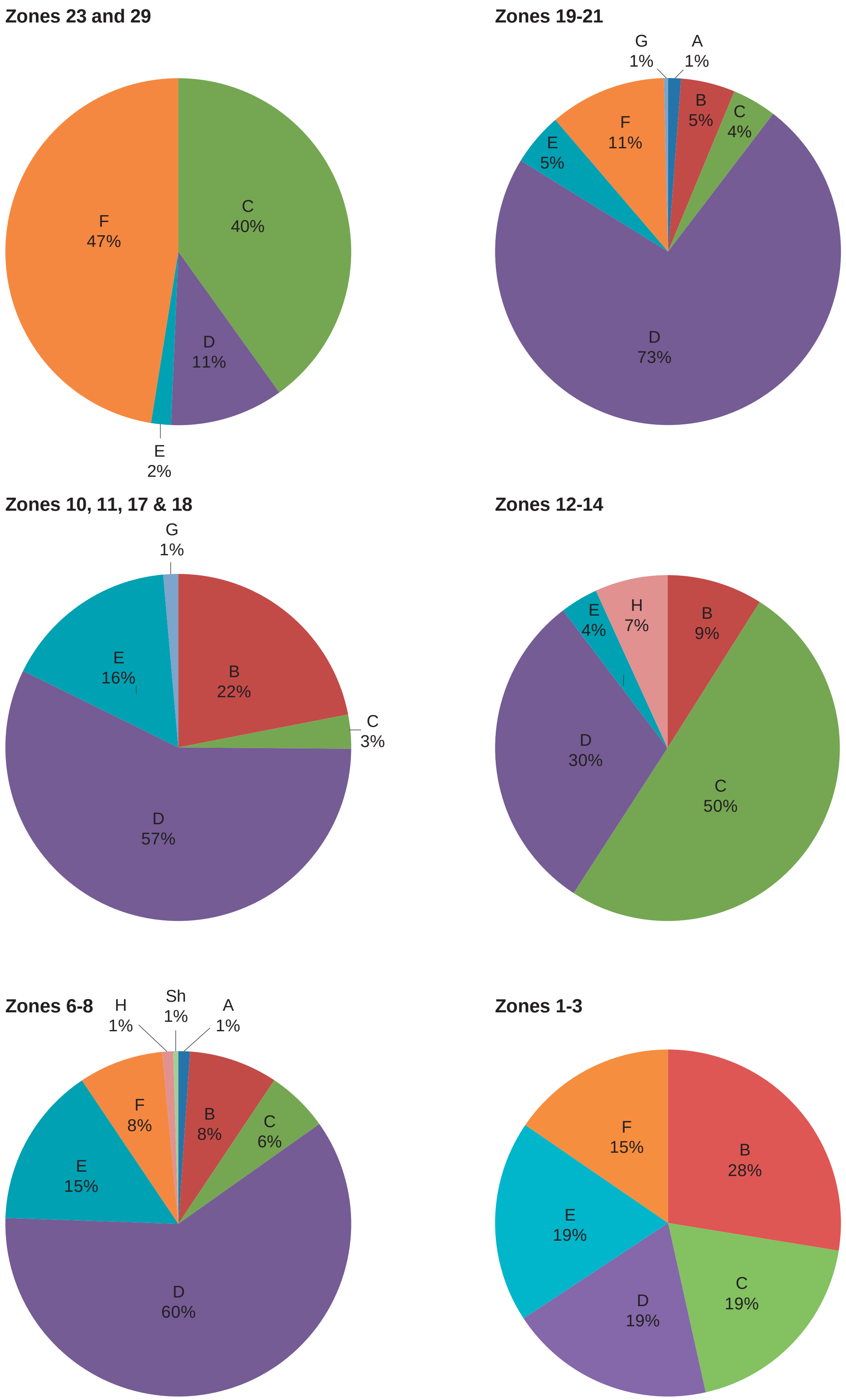


Fig 11.2 Variations in proportion of fabrics of Roman tile across the scheme

different settlements obtained tile from more than one primary focus. The general character of the fabrics suggests that they represent the exploitation of brickearth deposits throughout the Roman and medieval to post-medieval periods, though at present it is unclear whether this is from a local production centre serving the Isle of Thanet or more regionally based in Kent. This group is similar to the fabric from tile kilns near Canterbury (Jenkins 1956; 1960) which are a possible source. Evidence for more widely dispersed fabrics known from other sites was very limited. Fabric A, of which only five fragments occur, is a known late Roman fabric produced during the 3rd-4th century (Betts and Foot 1994, 32-3) and from an unknown source, possibly in Gaul. This fabric certainly has some broad similarity to fabrics from the Somme area of northern France (Poole 2012b). The equally small number of fragments in Fabrics G and H are similar to Group E fabrics found at Northfleet Roman Villa (Poole 2011).

Medieval, post-medieval and modern fabrics

Fabrics B, C, D and E also occurred during the medieval period. Fabric C was most common and included examples with a thin grey core. The clay matrix was often laminated and included lumps of unwedged clay. During the post-medieval period fabrics B, C, D and F were in use. Fabric D and F continued to appear in modern brick and tile and in addition London stocks appear in the typical yellow purple streaked colours together with stoneware pipes.

Forms

Roman forms

The Roman tile assemblage was dominated by brick, flat tile and tegula. Imbrex and flue tile occurred in small numbers and single examples of a small tesserae and a possible tegula mammata were found.

Roofing: tegula and imbrex

No complete tiles were found, the most complete being the lower half of a tegula from Zone 6 (247182) with a tapered form measuring 350mm at the lower end widening to 360mm towards the top and over 300mm long (Fig 11.4, no.1). One tile had a complete length of 450mm and the width was estimated to be *c* 390mm. The width of a third tile was estimated to be *c* 360mm or a little more. Another tile was over 410mm in length. For most tiles thickness was the only complete measurement and this ranged from 13-38mm, though most tiles were less than 30mm thick (Fig 11.3). It was not uncommon for individual tile thickness to vary by a few millimetres, but in a few cases it was more extreme with a variation of up to 11mm.

Upper surfaces were generally smooth and even, though sometimes with fine striations visible from wiping. Bases were usually rough and coated with moulded sanding: sixty (all fabric types) had the imprint of the rough ground surface, on one possibly the imprint of turf, and of these about a third had been additionally wire- or knife-cut, either to release them from the surface on which they were drying or to even the irregular undersides. Nine (fabrics C, D, E, F) had a more even flat rough sanded base, possibly indicating that they were made on a palette rather than the ground surface. Three (fabrics C and D) had a smooth flat base. Most end edges had been partly or wholly knife trimmed and one had been cut to a bevel. The outer edges of the flanges were usually flat and rough with moulding sand, though frequently knife trimmed, usually along the lower half, suggesting that a ridge of clay had squeezed below the mould, and less commonly additionally along the upper half or the full height of the flange. The observed characteristics suggest that the tegulae were made in four sided moulds – type D as described by Warry (2006, 29). A mark on the side of a

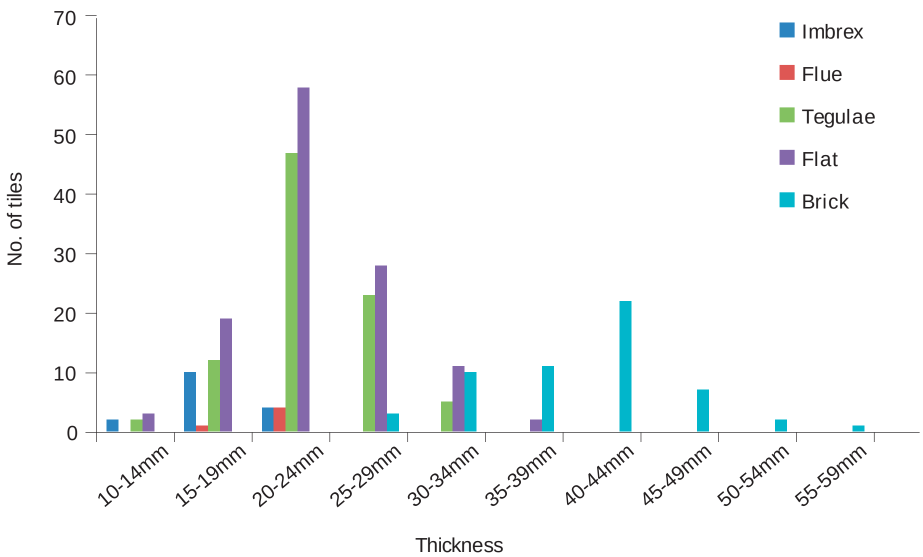


Fig 11.3 Comparison of thickness of Roman tile forms

tegula flange from Zone 20 was initially interpreted as a tally mark: it is a vertical slightly diagonal shallow groove with a concave profile measuring 6-7mm wide and occurs a short distance from the lower cutaway. However, since originally recording the tile the author has since seen similar examples on tegulae from two sites in northern France (Poole 2012a, b) and has concluded that these are related to a feature of the mould used to produce the tile.

The tegulae had both rectangular (types A and B) and curved flanges (types D and E) (Fig 11.4): details of sizes and associated fabrics appear in Table 11.3. It is interesting that no examples of type F, F2 and C were found, though these are common at other sites in Kent such as Northfleet Villa (Poole 2011). Upper cutaways were of standard rectangular form (type A2) removing a length of flange to the level of the tile body. In most cases it appears that the cutaway was produced by insets in the mould leaving moulding sand on the surface, which was subsequently knife trimmed to neaten the cutaway. Lower cutaways were almost entirely of Warry's (2006) class C (type 5), apart from one in his class D (type 1) and two of class B (type 6). Details of cutaway sizes and associated fabrics appear in Table 11.4. According to Warry's analysis of cutaway forms the majority of the tegulae would date to the mid 2nd–mid 3rd century AD.

Table 11.3 Tegula flange types and sizes

Flange type	*Nos*	*Width*	*Height*	*Fabric*
A	3	21–24mm	38–58mm	D, B, F, H
A1	2	25mm	39 – 43mm	D, V
A2	2	20–27mm	41–52mm	D
A3	2	26–30mm	49mm	D
A4	9	26–37mm	42 - 56mm	D, C, F
B	5	16–28 (top); 22–35mm (base)	36–48mm	F, C, E
D	22	18–36mm	38–60mm	D, B, F, A
D2	4	19–34mm	45–58mm	D
E	5	21–33mm	45–52mm	D, C, E, F
U	20	15–35mm	-	D, C, F, H
Total	74			

Two tegulae had nail holes made prefiring, one cylindrical measuring 6mm in diameter and the second conical measuring 10mm in diameter tapering to 3mm at the tile base. The latter was centred 25mm from the tile edge. A third had been chipped post firing and had a biconical form measuring 8mm widening to 15mm at the surface; it was centred 70mm from the top edge and 195mm from the left hand side.

The minimum number of tiles as represented by corners is ten across the whole project: Zone 1- 1; Zone 6 – 1, Zone 20 – 7 and Zone 23 – 1. The total weight of all the tegulae across all zones is equivalent to about four complete tiles.

Imbrex formed a small proportion of the tile and no complete examples survived, the maximum surviving length being 245mm. Nor did any compete breadths survive, though this was estimated to be 140 and 160mm on two tiles. The height of one tile measured 85mm and was estimated to be 80-85mm on three others and *c* 96mm on a fourth. The imbrices range in thickness from10mm to 23mm (Fig 11.3), though the thicker measurements of 20mm and above tend to relate to tile corners, which were commonly thicker than the main body of the tile. Most had a smooth surface finish, with only a few having longitudinal striations or finger marks. The underside was usually rough, but on a couple of pieces this was smooth and regular.

Four corner fragments survive from three zones indicating a minimum number of one tile per zone; the total weight of all the imbrex fragments is only equivalent to a single tile. Both curved and angular profiles occurred, though the latter were slightly more frequent, probably being preferred as they could be more easily split along the apex to form long flat tiles.

Brick

No complete bricks survived and the only indicator of size is thickness as the greatest surviving length is 170mm. Bricks ranged in thickness from 27 to 5mm (Fig 11.3), though the bulk were concentrated from 35-45mm suggesting a preference for the smaller tile sizes of *bessalis*, *pedalis* and lydion. Upper surfaces generally

Table 11.4 Tegula cutaway types and dimensions (lower cutaway groups follow Warry (2006), types are OA typology)

Cutaway types	*Nos*	*Length*	*Width*	*Depth*	*Fabric*
Upper c/a					
Type A2	12	60-70mm	16-29mm	20-30mm	D, C, F
Type A2a	3	63-70mm	15-29mm	20-30mm	E, C
Lower c/a					
Group B					
Type C1	2	*c* 75mm	>40	>23	D
Group C					
Type A3	2	~	10		F
Group C					
Type A3/C1	10	45-50, 60-70mm	7-15/23-48mm	10-30mm	D, B, C, E
Group C/D					
Type A3b	1	60	30	35	D
Group D					
Type A3a	1	~	26		D
Total	31				

Table 11.5 Signature marks

Signature	*Form*	*Tegula*	*Brick*	*Flat tile*	*Fabrics*	*Total*
Type 1.1		1	1	1	D, F, D	3
Type 1.2	As 1.1 with 2 finger grooves		1	1	B, D	2
Type 1.3	As 1.1 with 3 finger grooves		1		D	1
Type 2.1			1		D	1
Curved			1	4	D	5
Indet		1			D	1
Total		2	5	6		13

had a smooth finish and bases were rough sanded. Only five examples had evidence that the base was wire or knife trimmed. Knife trimming of edges was also rare, with only six examples.

Only five corners were found across Zones 6, 11 and 20, indicating a minimum number of one brick for each zone. One brick had a small sub-oval blob of clay attached to the surface, measuring 30 x 20 x 5mm, which may indicate that this piece is part of a *tegula mammata* of Brodribb's type A (Brodribb 1987, 60-2). However it is not typical of a mamma in form and it looks more like a lump of waste clay squashed on to the brick surface.

Flue tile

Fragments of flue tile were all small and measured 16-21mm thick. All were identified by the presence of keying and no side faces with vents were found. One piece may be part of a voussoir based on the angle of 104° to the adjacent edge. Keying was in the form of combing except for a single example of knife cut keying. The combed keying formed straight bands running perpendicular to the edge (where this survived), or in one case diagonally. On one tile the combing had been subsequently wiped and partly effaced. Combing tended to be coarse with wide teeth (3-4mm) often widely spaced. The bands ranged from 19-20mm wide with four or six teeth, to 25mm with six teeth and 30-35mm with *c* 5 teeth. One very faint example appears to be fine combing forming a band 30mm wide.

Flat tile

This category covered all undiagnostic plain tile. The thickness of fragments (Fig.11.3) encompasses all other varieties, though it is clear from the pattern that much of it must represent parts of tegulae, also suggested by the presence of knife trimmed edges and bases on a number of pieces. Pieces over 30mm thick are likely to include a high proportion of brick. One piece in fabric A appears to have a maroon red wash over the surface, the same colour as the cement matrix of the rose quartz moulding sand.

Markings

Markings included signature marks, imprints and keying. Keying has already been described above in relation to the flue tile.

Signature marks

The signature marks were found on tile from Zones 6 (4 examples), 14 (1), 17 (1) and 20 (7). All were partial, some very incomplete, and made with the fingers in the most common design of a hoop (type 1) drawn from the base edge of the tile with one, two or three fingers (Fig.11.4, nos 11-12). Only one was large enough to provide an indication of size, measuring *c* 67mm high and *c* 120mm wide. One where the mark appeared to be slightly inturned may be of the horse-shoe shaped variety (type 2). These marks were found on tegula, brick and flat tile and are summarised in Table 11.5.

Imprints

A small number of imprints were observed. A finger print from handling during production occurred on the base of a brick from Zone 6. Another brick from Zone 20 had part of an imprint, possibly the heel of a young child's foot. Two tiles, a tegula from Zone 20 and flat tile from Zone 8, had hoof imprints of sheep/goat/deer.

Tally marks

Two possible tally marks were observed. On the surface of a flat tile from Zone 6 were the ends of two cut straight lines running parallel lying 5mm apart, >14mm long. The mark is similar to tally marks from Northfleet villa (Poole 2011, 335), though these cuts are finer. Marks of this sort on the tile surface are sometimes referred to as batch marks. From Zone 20 came a poorly preserved mark on the base angle of a brick. Only the end of a deep V-shaped notch 7mm wide x 13mm deep survived at the base angle of the brick. It is unclear whether it just cut the base angle or ran up the side. An example of cuts across the base angle of a tile was found at Northfleet villa (*ibid*).

Medieval and post-medieval forms

No complete tiles or bricks were found and only one complete width was observed on a brick. Roof tile accounted for the greatest proportion of the material, numbering 129 fragments (2.5kg), followed by brick (51 fragments, 7kg). No more than 20 fragments were judged to be of medieval date. The fieldwalking and test pitting assemblages are large (over 5600 fragments and over 77kg) and were dominated by post-medieval roof tile, with a little brick, a few modern stamped bricks and rare pieces of Roman tile.

Discussion

Roman

The overall character of the Roman tile assemblage is similar across all areas of the scheme and the overarching theme is the deliberate collection of tile for re-use. The range of roofing tile, brick, flue tile and a single *tessera* certainly points to the existence of a building of some standing with heated rooms in the area, which served as a source for the tile, but this is likely to be one of the known villas of the area, most probably the villa at Minster, rather than an unknown building lying just outside the excavations. The varied proportions of fabrics in the different zones may indicate that Minster was not the only source of material, or the differences may reflect availability of material at different periods. The proportions and quantities of tegulae and imbrices are not indicative of their use as roofing within the excavated settlements, nor is there any reason to suppose that the other forms of tile were used for their primary purpose.

The precise mechanism whereby inhabitants of a lower status site obtained tile is not known and could depend on its relationship to villa estates in the area and whether the site had any dependency on the villa, for example housing estate workers, or whether a settlement was entirely autonomous. Tile was an expensive commodity and it is unlikely that tile was bought new. Tile was recycled even on villa sites, where tegulae and imbrices were frequently reused in subsurface structures such as pilae and flues of hypocausts, for lining and covering drains and conduits to and from bath houses as well as in other structures such as corndriers. Tile is most likely to have become available when a villa building was being refurbished, undergoing repairs or after it had been abandoned. Whether there was a formal trade in recyclable building materials is uncertain, though it has been suggested for London and also Cirencester. Outside of urban areas the means of obtaining brick and tile may have been less formal, perhaps dependant on implicit or explicit permission of villa owners allowing estate workers to make use of surplus or disused items, though whether at a price or as a perk of their work belongs even further in the realms of speculation.

The incentive for obtaining brick and tile in these lower status settlements appears to have been, from the high incidence of burning on the tiles, primarily the construction of ovens, corndriers and hearths. The use of fired clay in such structures, and of specialised fired clay oven and hearth furniture, decreases significantly during the Roman period as tile became more readily available. The assemblage is characterised by a deliberate selection of brick, tegulae and flat tile that could be used as general purpose building material in the manner of brick. There would also appear to be a preference for the smaller sizes of brick, which would have been more practicable for minor structures.

Evidence for use in ovens and hearths occurs as direct burning, sooting and heat discolouration on 70% (wt) of the tile (45.8kg; 425 fragments (68%)), which included all the tile types. Burning was absent on 200 fragments, though tile built into the core of a clay structure and not exposed directly or closely to the heat source may not exhibit any visible discolouration. There is a considerable range in the patterns of burning. Pieces burnt grey on just one surface with little or no effect on the core were probably used as hearth floor. Pieces with burning just along the edge were probably built into the wall of an oven or flue with just the tile edge exposed in the face of the structure. Tiles that have been discoloured from refiring but with no evidence of direct burning were probably built into the body of a clay structure or only exposed in the cooler areas of the structure. Tiles that were heavily burnt and blackened, especially throughout the tile thickness, would have been used in the arch over the flue, as flue cheek pieces or as suspended floor. Some of the most intensely burnt pieces may have been used in kilns or furnaces rather than domestic or agricultural structures. Heavily burnt tile may also have been built into a pedestal and exposed to the heat at the front of the structure. Tiles with patchy discolouration or sooting probably served as furniture within an oven or hearth, being covered by other objects and only partly exposed to the heat. One brick from a sunken-featured building (249085) in Zone 20 was burnt on the edge and in a distinctive margin alongside on the top face, suggesting that it had been partly projecting from the structure, perhaps forming part of a vaulted dome. Pieces with a patch of burning or sooting on just one side may have been used to cover a vent or flue to control air flow.

In Zone 20 over two thirds of the tile was found in five sunken-featured buildings (SFBs) (228059, 249049, 249081, 249083, 249085), whilst the remainder was found in ditches, pits and miscellaneous features. The concentrations in the SFBs suggest that these structures were a primary area where the tile was used, confirmed by the presence of two *in situ* ovens in SFB 228059 and 249085 and hearths in SFBs 249081 and 249083. These were constructed on the base of the SFB, perhaps implying that elsewhere any such structures were constructed on the ground surface with no subsurface element and hence only survive as demolished debris.

In Zone 6 tile was discarded in a much wider variety of structures including sunken-featured buildings, ditches, gullies, pits, quarries, waterhole, a hollow-way, a working hollow and a well, but with no emphasis on any one particular feature type. The same pattern of deposition occurred in the other zones, reflecting the final resting of the tile probably following constant reuse until it became too small to be useful.

Medieval and post-medieval

The medieval and post-medieval tile appears to bear little relationship to the excavated medieval sites and there is too little to suggest that it was being used in any primary structures. As with the fieldwalking material, the medieval and post-medieval assemblages are likely to relate to early modern agricultural activity, particularly drainage and improvement of arable. The large quantities of post-medieval roof tile found in the field walking and test pitting may be explained by the use of roof tile in the construction of early field drains of late 18th-early 19th century date.

Catalogue of illustrated brick and tile (Fig 11.4)

1. Tegula: lower half of tegula. Flange types A (LH), A2 (RH), Cutaway types: A3/C1T: 23-32mm, W: 350mm (lower end) – 360mm, L: >300mm. Wt: 5302g. Fabric D. Zone 6. Ctx 247182, working hollow 247146, Phase 565. Mid-Roman
2. Tegula: Flange type A, Cutaway type: A2 Fabric D. Zone 6. Ctx 254105, pit 254104, Phase 598. Late Roman
3. Tegula: Flange type A1. Fabric D. Zone 20. Ctx 286019, Phase 598. Late Roman
4. Tegula: Flange type A2. Cutaway type A2 Fabric D. Zone 20. Ctx 215185, SFB 249081, Phase 565. Mid-Roman
5. Tegula: Flange type A3/B. Cutaway type A3/C1 Fabric D. Zone 20. Ctx 249073, ditch 217122 Phase 598. Late Roman
6. Tegula: Flange type A4. Cutaway type A3/C1. Fabric D. Zone 20. Ctx 144120, SFB 249085 Phase 595. Mid- or late Roman
7. Tegula: Flange type B. Cutaway type A3/C1. Fabric E. Zone 20. Ctx 205125, Feature 286018. Unphased
8. Tegula: Flange type D. Cutaway type A3b. Fabric D. Zone 20. Ctx 171210, SFB 249083 Phase 598. Late Roman
9. Tegula: Flange type D2. Cutaway type A2. Fabric D. Zone 20. Ctx 144120, SFB 249085 Phase 595. Mid- or late Roman
10. Tegula: Flange type E. Fabric E. Zone 6. Ctx 262104, ditch 170041 Phase 515. Early Roman
11. Signature mark: type 1.1 on a tegula. Fabric D. Zone 20. Ctx 215239, SFB 249085 Phase 595. Mid- or late Roman
12. Signature mark on Roman brick: type 1.3. Type is uncertain as no tile edge survives. Fabric D. Zone 20. Ctx 215208. Unphased layer

Fig 11.4 Examples of tegula flanges, cutaways, and signatures

Chapter 12

Fired Clay and Briquetage

by Cynthia Poole

Introduction

Fired clay amounting to 10,090 fragments (174.325kg) was recovered by hand excavation and sieving from all zones except for 2, 24 and 28. The largest assemblages were from Zones 6, 13 and 14, which each formed between a fifth and a third (by weight) of the total (Fig 12.1). Two smaller but sizeable assemblages, each forming 6-7%, were found in Zones 12 and 20, and remaining areas produced 3% or less each. Preservation of material was variable across zones: mean fragment weight (MFW) overall was 17g, but ranged from 2g in Zone 1, 6-9g in Zones 7, 9 and 21-29, 10-14g in Zones 3-6, 8, 11 and 19, 16-20 in Zones 12, 13, 15-18 and 20, to 28g in Zone 14. Individual fragments ranged in weight from 1g to 1231g. The largest group from an individual context amounted to over 10kg, from 202102, the fill of a Saxon pit (202100), and the largest assemblage from a single feature was from another Saxon pit, 202128, which produced 16.5kg, both pits being in Zone 14. Abrasion was predominantly low to moderate, material in each category accounting for 38% of the assemblage, whilst highly abraded pieces accounted for just 2%, generally small fragments, and 14% of the assemblage was recorded as unabraded.

Percentages used throughout the report are based on weight unless otherwise stated. The assemblage has been recorded on an Excel spreadsheet, which forms part of the archive. Non-diagnostic material has been discarded following recording.

The assemblage consisted predominantly of oven and hearth structure and furniture, together with a significant group of briquetage and accessories, including the use of triangular perforated bricks as pedestals in the production process. The majority of fired clay was found in Iron Age, Roman and Saxon contexts and probably derived from domestic structures or crop/food processing ovens. Salt working was at its most intense from the Middle Iron Age until the mid-Roman phase. The absence of specialised salt working hearths suggests that domestic hearths may have been utilised in a small scale 'cottage industry' type of production. During the Saxon period the assemblage is dominated by wattle reinforced panels, which are interpreted as the drying floors of crop processing ovens.

Fabrics

Fabrics were characterised and identified on the basis of macroscopic features and with the use of a hand lens (x20) when required. The fabrics overlap in their characteristics and the fabric groups focus on the major constituent that distinguishes them from the others.

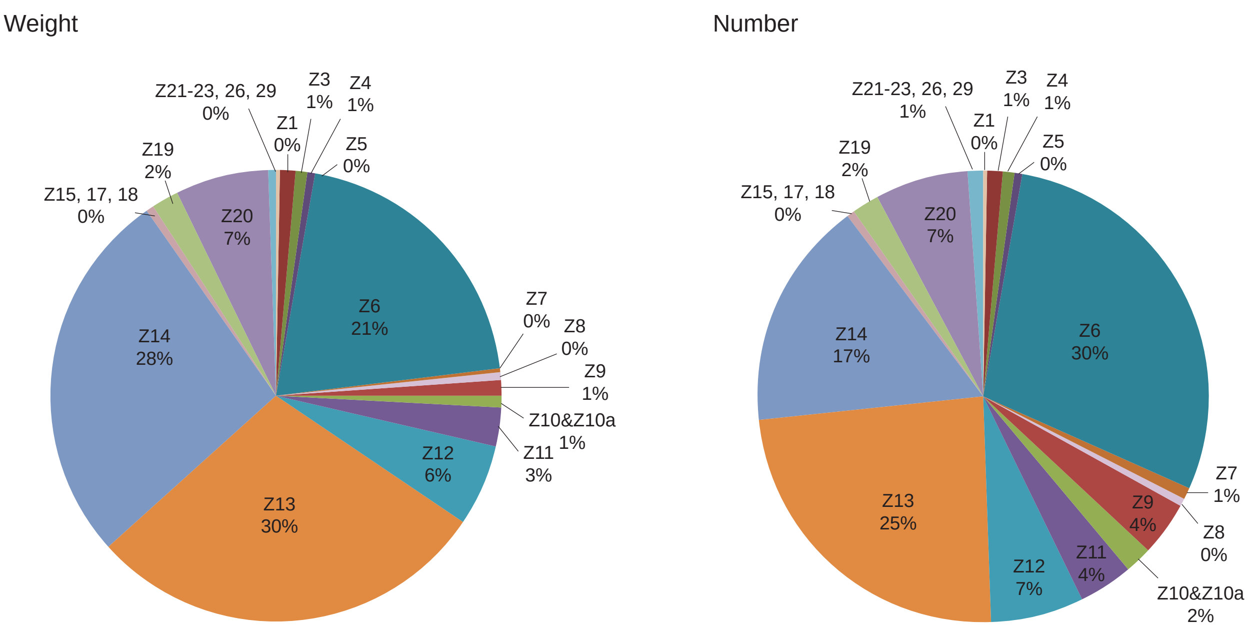


Fig 12.1 Distribution of fired clay by Zone

Fired clay fabrics

Fabric A

This fabric is composed of a fine-medium sandy or silty clay, sometimes slightly micaceous, and most commonly fired to orange brown, though it was found in a wide range of shades of red, orange, brown and grey. The quantity and size range of the sand could be very variable and this was clearly a naturally occurring constituent. There were a small number of pieces in a fine smooth clay or silty clay. It was not uncommon for the fabric to have fine pores, possibly from organic matter such as dung or decomposed humic material. The deliberate addition of chaff or broken straw was also not uncommon, occurring in *c* 20% of the fabric, but where this became a large component it was classified as fabric V. Other inclusions sometimes present, usually in sparse quantity, and found in *c* 15% of examples, were flint grits and pebbles, small rounded chalk grit <5mm, shell, red iron oxide grits or clay pellets. This fabric occurred commonly in all areas though dominating the assemblages in the more southerly zones. It was used universally for all categories of form and function.

Fabric V

The basic matrix of this fabric had the same range of characteristics as A, but was differentiated on the basis of the higher density of coarse organic inclusions, visible as voids and impressions in the clay. These were either cereal chaff or straw, separately or in combination, and were generally *c* 5-15mm long, though some straw stem impressions were up to 40mm long. A number of contexts were sampled for more detailed identification of the impressions by Kath Hunter: the results are summarised in Table 12.1. Unfortunately the level of preservation was poor due to the powdery silty character of the clay fabric and little information could be added in terms of species types, though the initial identifications made during recording were confirmed and indicate that much of the organic inclusions derived from cereal chaff and monocot stem and leaves, predominantly cereal straw and grass. The only identified species were single examples of wheat and oat chaff.

Table 12.1 Selection of plant impressions identified in fired clay

Zone	*Ctx*	*Id/S.no.*	*Form*	*Phase*	*F type*
Z06	173281	<7903>	Oven/kiln lining	Early or Middle Iron Age	Pit 173275
Z12	145045	<5090>	Oven structure	Early or Middle Iron Age	PH 145049
Z12	145046	<5091>	Oven wall	Early or Middle Iron Age	PH 145049
Z12	168081	~	Oven/hearth floor	Middle Iron Age	Pit 168068
Z13	156105	~	Oven structure	Early or Middle Iron Age	Pit 156104
Z13	156221	~	Triangular oven brick	Early Roman	Pit 156146
Z13	168088	~	Briquetage	Middle Iron Age	Pit 168084
Z13	168123	incl <5886>	Oven/hearth structure	Early or Middle Iron Age	Pit 168115
Z13	168142	~	Oven lining	Middle Iron Age	Pit 168135
Z13	168147	~	Oven structure	Early or Middle Iron Age	Pit 168115
Z13	168174	~	Oven structure	Early or Middle Iron Age	Enclosure ditch 134099
Z13	168199	~	Briquetage furniture	Early or Middle Iron Age	Enclosure ditch 134099
Z13	173200	Id: H & J	Oven structure	Early Roman	SFB [173201] oven 193140
Z13	173200	Id: F	Oven wattle structure	Early Roman	SFB [173201] oven 193140
Z13	173212	<7605>	Oven structure	Early Roman	SFB [173201] oven 193140
Z13	173214	<7606>	Oven wall structure	Early Roman	SFB [173201] oven 193140
Z13	173231	~	Oven structure	Early Roman	SFB [173201] oven 193140
Z13	173238	~	Oven wall structure	Early Roman	SFB [173201] oven 193140
Z13	173238	<7604>	Oven wattle panel with	Early Roman	SFB [173201] oven 193140
Z06	173281	<7903>	Oven lining	Early or Middle Iron Age	Pit 173275
Z13	200092	~	Oven structure	Early Roman	SFB [173201] oven 193140
Z13	244010	<5862>	Oven wattle structure	Late Iron Age	Pit 244007
Z13	248088	~	Briquetage str/furn	Middle Iron Age	Pit 248087
Z14	175090	~	Oven wattle structure	Saxon	Pit 175086
Z14	264056	~	Oven wall structure	Saxon	Pit 264022

Fabric B

The clay matrix was essentially the same as that of fabric A, with the addition of a moderate–high density of angular (burnt) flint grit 0.5-6mm, but often well sorted and predominantly 1-2mm in size. Other inclusions were rare, though clay pellets were noted in a few examples and some had organic inclusions of chaff or straw. Colour was highly variable, similar to A. Flint gritted fabrics are most common in the Late Bronze Age, particularly for perforated plates common in the Thames valley and estuary. A small number of examples were found in Early Neolithic contexts, throughout the Iron Age and into the Roman period with one example from a Saxon context. The fabric had been used for briquetage vessels and furniture and more frequently for oven/hearth furniture including a triangular pedestal, than for oven/hearth structure. The greatest concentration was in Zones 11-13, with a smaller group in Zone 6.

Fabric E

This fabric was characterized by the presence of rounded chalk grits up to 20mm in size and varying in density from moderate to frequent. The clay fabric was either identical to fabric A or sometimes slightly more calcareous, suggesting that pockets of chalky marls may have been utilized. Colours were predominantly brown, light brown, orange, reddish or pinkish brown and grey. A small number of examples contained organic inclusions of cereal chaff or straw. The fabric was found in contexts from the Late Bronze Age to the Saxon period and was mostly used for oven and hearth structure and rarely for furniture.

Fabric Q

A small quantity of fired clay was categorized as a sandy fabric characterized by a greater density and coarser grade of sand than fabric A. However, it was not consistent in its characteristics and may merely represent the coarsest extreme of fabric A. Colours were similar to fabric A and a few examples contained some chalk inclusions or organic inclusions of chaff or straw.

Fabric Sh

Several pieces contained one or two shell or mollusc inclusions, but only a single fragment of oven plate

Observed plant types	*Plant identification*
Impressions on the back from turf structure?	Some grass like impressions on back
Chaff <10mm	
Chaff <6mm	
Straw/grass/chaff	Monocot stem fragments
Chaff temper	Monocot stems
Straw/grass	Possible leaf impressions on surface, ?wheat lemna/palea fragment internally. Straw and indistinct remains
Chaff temper	Briquetage - abundant plant temper some appears to be chaff straw, lemna/palea. Fired clay -small monocot fragments
Chaff/straw temper <14mm	
Fine chaff	
Chaff temper; one piece with well preserved ?spikelet impression	Appears to be cereal chaff impression ?lemna/palea
Fine chaff impressions <5mm	
Chaff temper	Indistinct impression possibly grass fragments
Chaff and straw: high density of coarse impressions up to 30mm L	
Chaff and straw stems 2-4mm dia	
Straw/grass/reed: high density of stem and leaf impressions Stems range from 1-2 up to 8mm, but *c* 5-7mm appears most common. The widest leaf impression was 13mm W	?Wood ?monocot leaf
Chaff/straw: coarse inclusions of chaff and straw leaf/stem up to 20mm L most *c* 5-10mm	Indistinct powdery fabric
Straw/ grass: Small stems 3-5mm x up to 50mm L, probably straw. Also straw/grass leaf. Finer impressions may include chaff	Monocot stem internode fragments. Cereal straw sized. ?wood
Straw/small stems, chaff	Frequent plant impressions, much indistinct, appears to be straw/monocot fragments silicified monocot fragments in fabric
Stems: monocot stems / leaves probably of straw/grass/reeds organic layer or a combination. Stems 3-6mm forming clear impressions on inner surface. Also a grass/straw leaf impression.	
Chaff: frequent impressions up to 15mm L	
?Turf	Fine plant remains possibly grass
Straw frequent coarse straw/grass stem and leaf impressions up to 6mm W x >50mm L; fine impressions probably include chaff.	
Chaff/straw: frequent coarse plant impressions which appear to be a mix of chaff and narrow stems and leaves of straw/grass.	?Chaff lemna/palea cereal indet. Straw. Frequent silicified plant fragments in fabric. Some possible grass
Chaff: high density of coarse straw and chaff impressions up to 15mm L	
Chaff: frequent fine-medium chaff impressions, most <10mm.	?Oat floret, lemna/palea straw, ?seed
Straw stem and leaf impressions: particularly dense on one piece caught between wattles and clay – stems 3-6mm dia and leaves up to 10mm W	?Cereal leaves

Table 12.1 (continued)

Zone	Ctx	Id/S.no.	Form	Phase	F type
Z14	277008	~	Utilised	Saxon	Pit 278005
Z20	144120	~	Oven wall structure	Middle or Late Roman	Oven 144121 in SFB 249085
Z20	144131	<7766>	Oven wall/floor	Middle or Late Roman	Oven 144121/ SFB 249085
Z20	144132	<7765>	Oven wall structure	Middle or Late Roman	Oven 144121/ SFB 249085
Z20	166074	~	Oven/hearth structure	Middle Roman	Natural F. 193126
Z20	171233	~	Oven/hearth str associated with briquetage	Late Roman	SFB 249083
Z20	250074	~	Oven/hearth structure associated with briquetage	Middle Roman	Pit 250071
Z20	251014	~	Oven wall structure	Late Roman	Pit 251005
Z20	251015	~	Oven/hearth structure	Late Roman	P251005
Z20	251018	~	Oven structure	Late Roman	P251005
Z20	252080	~	Oven structure	Late Roman	P251005
Z20	252083	~	Oven structure	Late Roman	P251005
Z20	252096	~	Oven structure	Middle or Late Roman	SFB 249085
Z20	286019	~	Oven structure	Late Roman	P251005
Z21	205134	~	Oven/hearth structure	Middle Roman	Ditch 249051

contained shell fragments *c* 1-4mm in size in sufficient quantity to warrant denoting it as a separate fabric. It was a grey-black colour and the clay matrix was the same as fabric A.

Briquetage Fabrics

Three fabrics specific to briquetage vessels or furniture were identified. Structural material thought to relate to salt production was made in fabrics A, V and E.

Fabric X1
Red, orange, buff or pinkish brown sometimes with a grey core; fine silty micaceous clay containing frequent coarse chaff inclusions. Used for briquetage vessels found in Roman deposits, except for a single Middle Iron Age triangular pedestal.

Fabric X2
The most common briquetage fabric. Usually buff, pink, lavender, pale orange or grey in colour, fine smooth silty clay matrix containing a low–moderate density of fine organic temper, fine chaff, where identifiable, rarely larger than 10mm long and generally *c* 1-5mm. It occurred from Early Iron Age through to mid-Roman phases.

Fabric X3
High density of well sorted fine-medium quartz sand *c* 0.2-0.3mm. Colours are cream, buff, pink, pinkish orange or grey. Three examples only, used for a vessel and Late Iron Age-early Roman clip and a Early–Middle Iron Age vessel.

Discussion of the fabrics

Fabric A dominated the assemblage and formed the matrix for the other major fabric types. (Fig 12.2) Its general character suggests that it was derived from the local brickearth deposits that occurred commonly and were readily available on several areas including Zones 10–12, 14 and 26–27. Alluvial clays in the more southerly area may also have been a source for some of the finer smoother clay fabric, though these were not consistently differentiated from fabric A. The proportions of the fabrics in relation to the zones reflect the availability of brickearth or clay deposits in the southern and eastern area of the scheme. Fabric E forms a greater proportion of assemblages in the northern and eastern zones where chalk outcrops, but the chalk inclusions within fabric E are probably a natural component of locally available clays, especially where brickearth overlies the chalk, and both were liable to be exposed in deeper features. The basic materials used for fired clay reflect the local resources and suggest that clay was obtained within or very close to the settlements. Certainly the similarity of some of the *in situ* ovens to the immediate natural or subsoil deposits indicates that the raw materials could be obtained very close to the structures. The only consistently deliberately added

Observed plant types	*Plant identification*
Chaff: high density of chaff/straw: fine narrow impressions ≤10mm L probably stems, rachis or awns rather than glumes.	Indistinct impression
Straw: Frequent coarse straw leaf/ stem impressions 1-4mm dia up to 25mm L.	
Straw?	Monocot stem internode fragments. Cereal straw sized.
Straw: stem/leaf impressions up to6 mm W x 25mm L	Monocot stem internode fragments. Cereal straw sized.
Straw/grass stem/leaf impressions <10mm L. Stems circular up to 2mm dia.	?Cereal straw impression indistinct
Chaff/cereal straw: mostly coarse stems 2-4mm dia; some chaff, frequent fine-med organic	Straw, ?Grain impression
Straw/chaff: Frequent coarse vegetal impressions. Stems and possibly chaff glumes.	Straw
Very coarse chaff / straw impressions with remnants of silicified plant remains. Chaff/straw: high density of coarse impressions of chaff and cereal straw stems *c* 2-4mm W and up to 20mm L.	Lemna/palea impression
Chaff/straw: mod-high density of coarse impressions of chaff and cereal straw stems *c* 2-4mm W and up to 25mm L.	Straw/grass
Straw & chaff: high density of coarse-medium impressions 5-25mm L, most cereal straw stems/leafs. Stems circular with some oval x-section generally 2-4mm W but some up to 7mm and some only 1mm dia. Chaff is rare but some glumes present.	Straw, lemna/palea impression silicified remains
Straw/grass: coarse straw/ grass stems 1-3mm W x up to 20mm L	Monocot stem ?grass
Straw/grass: coarse straw/grass leaf/stems 1-4 mm W x up to 15 mm L	Straw
Chaff: moderate density of chaff glumes and possibly straw stem/leaf, poorly preserved.	Straw, other impressions indistinct
Straw: frequent impressions of straw leaf/stem, up to 25mm.	
Chaff/straw: mod density of coarse chaff and straw stem/leaf impressions.	Silicified grass stem and ?straw

inclusion was organic material in the form of chaff or cereal straw, which would have been available as waste from crop processing.

Form and function

The fired clay can be divided into broad groups of oven and hearth structure, oven and hearth furniture, briquetage and associated salt production structure and furniture (some of which overlaps with the preceding groups), industrial and building structure. The major categories are quantified and tabulated in relation to phase and zone in Tables 12.2-12.5. The majority of the fired clay is interpreted as deriving from oven or hearth structure or furniture. Although clay was probably a common building material it would only survive in exceptional circumstances, most of it degrading back into mud and soil.

Building daub

Only two sites produced fired clay that might be derived from a building. From Zone 13 in a Middle Iron Age pit (248087) came some small fragments of a render surface with a pinkish cream veneer that could be some sort of whitewash. A larger block 80mm thick had a flat moulded surface with finger marks, a wide bevelled edge at an angle of 140° and on the opposite side the impression of a large timber *c* 200mm in diameter. This was found in a Roman ditch (249029) in Zone 19. Material with wattle impressions is often described as wall daub, but the general characteristics and associations of the material found in this project suggest that such items formed some type of oven structure and it is described further below. The ready availability of brickearth and chalk in the excavated areas and the evidence for extensive quarries such as those in Zone 13 suggest that chalk and/or clay cob type walls was a probable construction element for many buildings; such material is unlikely to have left any trace following abandonment or demolition.

Oven, kiln and hearth structures

Hearths are taken to be open unenclosed structures consisting of a flat surface, generally circular or rectangular, sometimes raised above floor level, in which case they may have had some sort of edge or kerb. Where level with the floor surface, no defining edge may survive in demolished material. Ovens and kilns are taken to be enclosed structures, with one or two chambers and sometimes a flue extending from the main chamber. Domestic ovens for baking usually formed a single chambered domed structure with a single opening for loading and escape of smoke. Kilns are more commonly dual chambered with a sub-surface flue and lower chamber where the fire would burn with a suspended floor or oven plate separating the upper chamber and contents from direct heat. Crop or food processing ovens or kilns are dual chambered, though the upper chamber may be open or semi-enclosed, rather than fully enclosed.

Much of the fired clay material from any of these structures or their constituent parts will produce very little except plain surfaced fragments. Even where a structure has clearly curved elements they are difficult if not impossible to detect unless the curvature is quite pronounced, and even then it can be difficult to distin-

Fig 12.2 Proportions of fabric groups by weight and by Zone

Table 12.2 Quantities of fired clay tabulated by phase and major function categories based on fragment count. (Abbreviations for fired clay forms used in all tables: BRQ: briquetage; V: vessel; F/Furn: oven/hearth furniture; str: structure; H: hearth; Ov: oven; Indust: industrial (furnace lining, crucible); Bldg: building; Misc: miscellaneous, indeterminate)

Phase	*BRQ V*	*BRQ F*	*BRQ str*	*BRQ misc*	*H*	*Ov str*	*Ov/H str*	*Ov/Kiln str*	*Indust*	*Furn*	*Str indet*	*Bldg*	*Indet*	*Total*	*%*
1 Prehistoric	0	0	0	0	0	0	3	0	0	1	0	0	0	4	0.04
2 Early Neolithic	0	0	0	0	0	0	28	0	0	0	0	0	0	28	0.28
3.1 E-MBA	0	0	1	0	0	1	6	0	0	8	5	0	1	22	0.22
3.2 LBA & LBA/EIA	0	2	86	2	0	163	9	0	0	5	37	0	3	307	3.04
4.1 EIA	0	0	2	0	0	22	3	0	0	6	0	0	0	33	0.33
4.2 EIA-MIA	14	21	2	0	11	637	190	1	2	133	55	0	31	1097	10.87
4.3 MIA & M-LIA&IA	11	16	4	6	25	163	135	0	1	49	79	2	43	534	5.29
4.4 LIA & LIA/ERo	1	8	5	0	10	201	1551	134	0	11	47	0	125	2093	20.74
5.1 ERo & Ro	67	45	12	6	29	1559	215	0	2	72	97	14	73	2191	21.71
5.2 MRo	27	15	0	2	81	485	144	91	1	19	53	0	24	942	9.34
5.3 LRo	2	8	2	2	1	114	85	0	0	7	15	0	20	256	2.54
6 AS	0	0	1	0	418	1574	101	0	3	4	37	0	1	2139	21.2
7 Med	0	0	0	0	2	36	59	0	0	1	24	0	1	123	1.22
8 Pmed-Mod & U	8	2	36	1	0	45	89	0	0	28	69	0	43	321	3.18
Total	130	117	151	19	577	5000	2618	226	9	344	518	16	365	10090	
%	1.29	1.16	1.5	0.19	5.72	49.55	25.94	2.24	0.09	3.42	5.13	0.16	3.62		

Table 12.3 Quantities of fired clay tabulated by phase and major function categories based on weight

Phase	*BRQ V*	*BRQ F*	*BRQ str*	*BRQ misc*	*H*	*Ov str*	*Ov/H str*	*Ov/Kiln str*	*Indust*	*Furn indet*	*Str*	*Bldg*	*Indet*	*Total*	*%*
1 Prehistoric	0	0	0	0	0	0	4	0	0	161	0	0	0	165	0.09
2 Early Neolithic	0	0	0	0	0	0	125	0	0	0	0	0	0	125	0.07
3.1 E-MBA	0	0	177	0	0	10	78	0	0	617	8	0	6	896	0.51
3.2 LBA & LBA/EIA	0	9	474	27	0	956	183	0	0	592	145	0	17	2403	1.38
4.1 EIA	0	0	41	0	0	708	731	0	0	153	0	0	0	1633	0.94
4.2 EIA-MIA	104	3905	155	0	350	13753	2279	406	45	13918	306	0	243	35464	20.34
4.3 MIA & M-LIA&IA	72	282	34	24	766	3228	1837	0	25	9108	472	10	433	16291	9.35
4.4 LIA & LIA/ERo	42	249	27	0	74	2992	3153	7506	0	418	215	0	629	15305	8.78
5.1 ERo & Ro	309	868	230	41	325	16183	1754	0	82	6215	592	724	612	27935	16.02
5.2 MRo	132	247	0	9	1869	6343	968	1238	6	2007	453	0	259	13531	7.76
5.3 LRo	14	88	350	24	17	2139	969	0	0	121	161	0	294	4177	2.4
6 AS	0	0	6	0	2610	45264	1011	0	23	182	442	0	12	49550	28.42
7 Med	0	0	0	0	44	934	423	0	0	8	256	0	3	1668	0.96
8 Pmed-Mod & U	69	22	1225	12	0	1381	1493	0	0	312	144	0	524	5182	2.97
Total	742	5670	2719	137	6055	93891	15008	9150	181	33812	3194	734	3032	174325	
%	0.43	3.25	1.56	0.08	3.47	53.86	8.61	5.25	0.1	19.4	1.83	0.42	1.74		

Table 12.4 Quantities of fired clay tabulated by zone and major function categories based on fragment count

Phase	*BRQ V*	*BRQ F*	*BRQ str*	*BRQ misc*	*H*	*Ov str*	*Ov/H str*	*Ov/Kiln str*	*Indust*	*Furn*	*Str indet*	*Bldg*	*Indet*	*Total*	*%*
Z1-3	0	0	0	0	2	2	64	0	0	11	25	0	0	104	1.03
Z4-5	0	2	62	7	0	6	36	0	0	10	17	0	0	140	1.39
Z6	43	68	56	3	11	384	1715	134	0	121	131	0	346	3012	29.85
Z7-8	1	4	1	0	0	3	19	0	0	10	27	0	1	66	0.65
Z9-10	20	3	3	5	414	28	69	0	0	4	23	0	5	574	5.69
Z11	15	14	0	1	88	8	125	91	0	6	35	0	2	385	3.82
Z12	3	2	19	0	0	497	64	0	0	4	66	0	3	658	6.52
Z13 & 26	18	18	5	2	49	2006	222	1	3	152	44	2	1	2523	25
Z14-15	3	0	0	0	0	1567	76	0	5	6	44	0	0	1701	16.86
Z17-18	0	0	0	0	4	0	0	0	0	1	0	0	0	5	0.05
Z19	23	0	3	0	5	55	84	0	0	6	20	14	0	210	2.08
Z20 & 29	4	6	1	1	4	444	142	0	1	13	60	0	6	682	6.76
Z21-23	0	0	1	0	0	0	2	0	0	0	26	0	1	30	0.3
Total	130	117	151	19	577	5000	2617	226	9	345	518	16	365	10090	
%	1.29	1.16	1.5	0.19	5.72	49.55	25.94	2.24	0.09	3.42	5.13	0.16	3.62		

Table 12.5 Quantities of fired clay tabulated by zone and major function categories based on weight

Phase	*BRQ V*	*BRQ F*	*BRQ str*	*BRQ misc*	*H*	*Ov str*	*Ov/H str*	*Ov/Kiln str*	*Indust*	*Furn*	*Str indet*	*Bldg*	*Indet*	*Total*	*%*
Z1-3	0	0	0	0	44	41	474	0	0	288	186	0	0	1033	0.59
Z4-5	0	20	244	50	0	47	1108	0	0	212	44	0	0	1725	0.99
Z6	264	4380	1633	16	162	3283	5468	7506	0	10750	787	0	2781	37030	21.24
Z7-8	19	18	11	0	0	26	138	0	0	279	93	0	20	604	0.35
Z9-10	116	23	6	29	2527	133	607	0	0	63	140	0	60	3704	2.12
Z11	56	170	0	5	1336	179	749	1238	0	748	169	0	12	4662	2.67
Z12	23	7	56	0	0	9176	577	0	0	566	281	0	8	10694	6.15
Z13 & 26	170	890	371	16	1224	26058	3615	406	70	18468	428	10	12	51738	29.67
Z14-15	36	0	0	0	0	46405	881	0	105	356	549	0	0	48332	27.72
Z17-18	0	0	0	0	83	0	0	0	0	6	0	0	0	89	0.05
Z19	27	0	52	0	52	1281	423	0	0	278	138	724	0	2975	1.71
Z20 & 29	31	162	344	21	627	7262	961	0	6	1798	352	0	133	11697	6.7
Z21-23	0	0	2	0	0	0	7	0	0	0	27	0	6	42	0.02
Total	742	5670	2719	137	6055	93891	15008	9150	181	33812	3194	734	3032	174325	
%	0.43	3.25	1.56	0.08	3.47	53.86	8.61	5.25	0.1	19.4	1.83	0.42	1.74		

guish between different structural elements such as the rounded corner of a rectangular pedestal and the curved edge of the stokehole arch. Making the leap from identification of an undistinguished fragment of fired clay to understanding of its position or function in a structure is difficult, and particularly so when so little sampling of the relatively few *in situ* structures took place to allow comparison to known function categories. However certain types of finish, pattern or intensity of firing or burning can give an indication of structure type and its possible function.

Much of the material assigned to ovens and hearths had a single shaped surface with a broken back face or underside and no other distinguishing features. The general character, similarity to other oven material and uniformity of firing suggests that this broad general designation is correct. Material designated as indeterminate was generally small and entirely amorphous, and equally likely to derive from such structures. Fired clay will deteriorate or break up quite rapidly if left on ground surfaces where it can be subject to weathering and trampling. Rapid disposal of demolished structure in a pit is usually the best means of preservation, though it will then be divorced from its original setting.

Hearth and oven floor

In most cases the only feature of hearth and oven floor is a single flat moulded surface and for many pieces it is probably indistinguishable from general oven and hearth structure. However, hearth floor tends to be well finished and very smooth, burnt grey over the surface, most intensely in the centre of the hearth but quite lightly fired to the periphery. The very smooth surface on some pieces may have been obtained by using a striker rather than smoothing by hand. The grey colour rarely penetrates more than a couple of millimetres below the surface but changes to a reddish colour and grades rapidly into poorly fired or unfired clay below. Pieces more heavily fired and blackened to a greater depth are likely to be from an oven or kiln floor, particularly in the area of the flue rather than a hearth. The fragments recovered ranged from 10-55mm in thickness.

Some thin pieces (from Early/Middle Iron Age pit 191066) had an irregular underside of smoother areas alternating with rougher ones, which may reflect a stone and clay foundation on which the final clay surface was laid. One of the thickest pieces (from Early Iron Age enclosure ditch 134099) exhibited the typical gradation from light grey surface grading to orange brown fired clay 5-25mm below the surface, then red from 25-45mm, where the clay had either sheared from the construction surface or at the boundary with unfired clay below. Four joining pieces found in a mid-Roman ditch (205059) had a slightly concave smooth moulded surface burnt and blackened most intensely in the centre and sloping up to a curving or bowed edge. It was 35-55mm thick and had apparently been constructed in a shallow hollow over an irregular surface.

A large group (414 fragments, 2.5kg) was recovered from a mid-Saxon hearth (197092). The fragments were 10-25mm thick and had a very smooth well finished flat surface burnt to a light bluish grey. The underside was roughly flat and undulating, poorly fired and probably sheared at the boundary with unfired clay. One piece had a single straight line 2mm wide and 1mm deep surviving for a length of 30mm running across the surface. This appears to have been deliberately scored or impressed. It may have delineated a border enclosing the central area or have formed some type of decoration. Decoration is normally in the form of circles and has been found on Iron Age hearths at Glastonbury, Somerset (Bulleid and Gray 1911) and Danebury, Hampshire (Cunliffe and Poole 1991, 56-7, fig 4.18) and on a medieval hearth at Le Yaudet, Cotes d'Armor (Cunliffe and Galliou 2007, 115 and fig 101).

Oven walls and superstructure

There are few diagnostic features found to define oven walls and superstructure. In many structures floors and walls were a single construction and fragments from both will exhibit little difference in character. The full thickness of the oven wall is unlikely to survive as it is rare for the exterior to be sufficiently fired to survive after demolition. In ovens finger marks and palm prints may cover the inner surface and appear to be more common and pronounced in Saxon structures than earlier. The degree of firing may also differentiate upper walls, which, compared to the floor, may be more uniformly fired throughout their thickness and oxidised. A small quantity of thin lining up to 16mm thick was found in Early-Middle Iron Age and Roman contexts and was characterised by a flat or curving moulded face and the back face which had been plastered over another

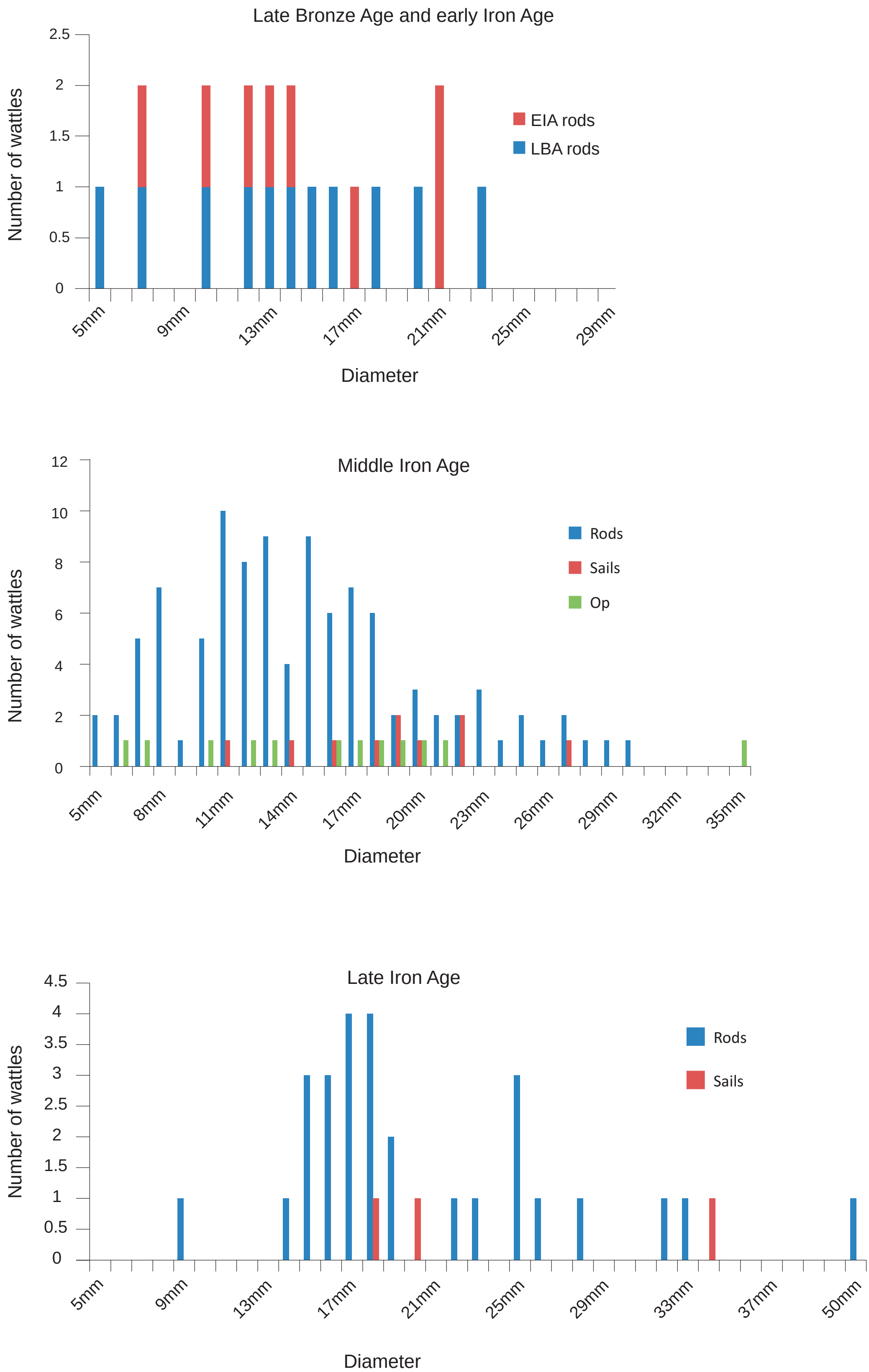


Fig 12.3a Wattle impression diameters by phase combining all contexts and areas of the designated phase

surface or sheared at a constructional interface. One piece had three layers of lining 3.5mm, 5mm and 6mm thick, but in most cases the fragments probably represent the finish of the oven wall rather than a relining. Only rarely are any features encountered that indicate any variation in plain walls and dome. A single example from a Roman sunken-featured building (173201) showed evidence of an opening or vent in the form of a rounded curving edge through the oven structure forming an opening of *c* 120mm diameter.

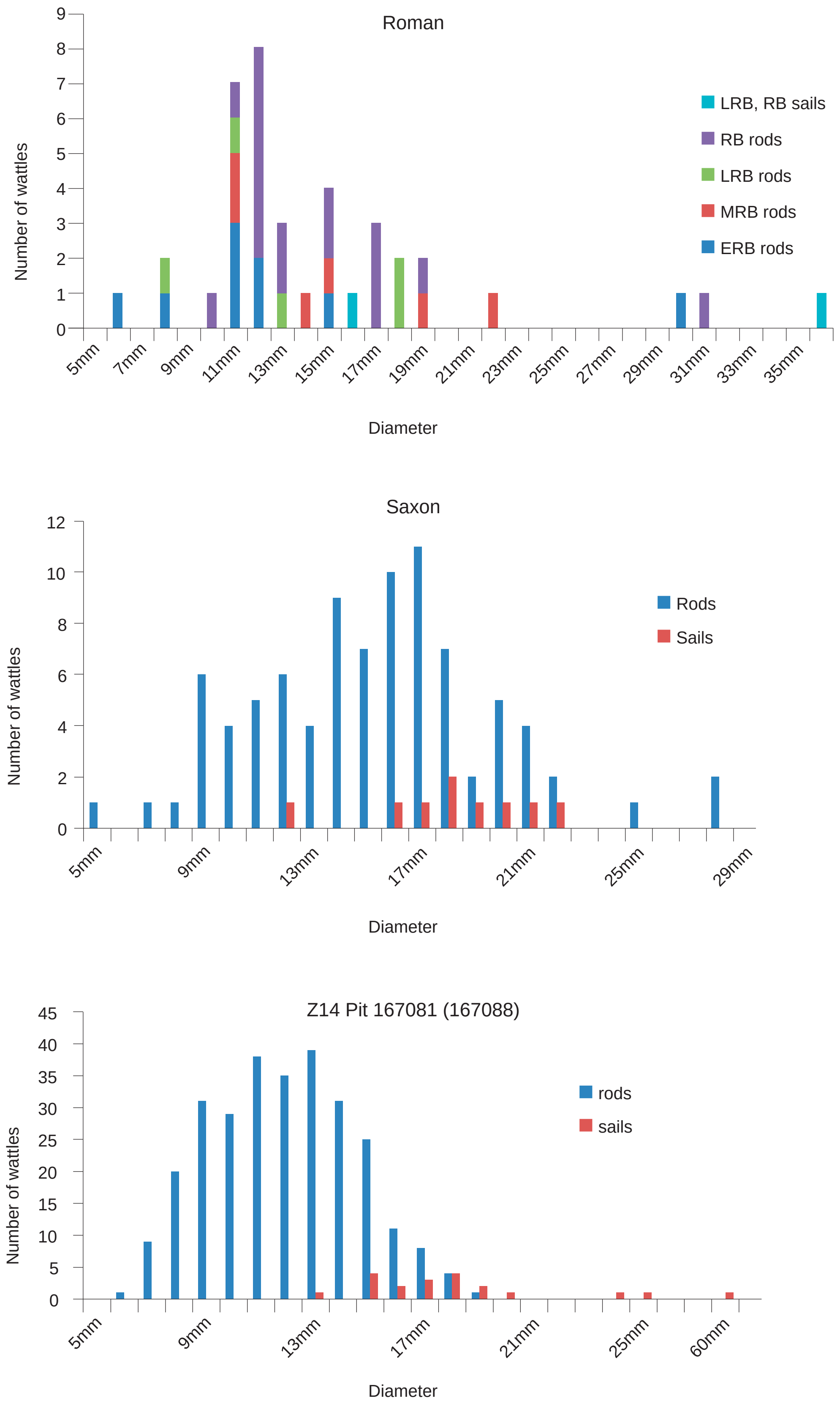


Fig 12.3b Wattle impression diameters by phase (Roman chart combines all contexts and areas; Saxon chart the larger groups are shown as separate plots following the combined plot)

Kiln structure

A small number of samples were identified as possible kiln structure. In one the pieces appeared to derive from a subsurface feature with a smooth moulded lining *c* 15mm thick overlying the fired natural clay or brickearth, which had been fired to a depth of *c* 20mm. It was found in a mid-Roman feature (143098) in Zone 11 described as a hearth, but is more likely to be the subsurface area of an oven or kiln. A large group came from a substantial Late Iron Age posthole (329005) in Zone 6, presumably reused as packing, consisting of large blocks with a moulded flat, convex and concave

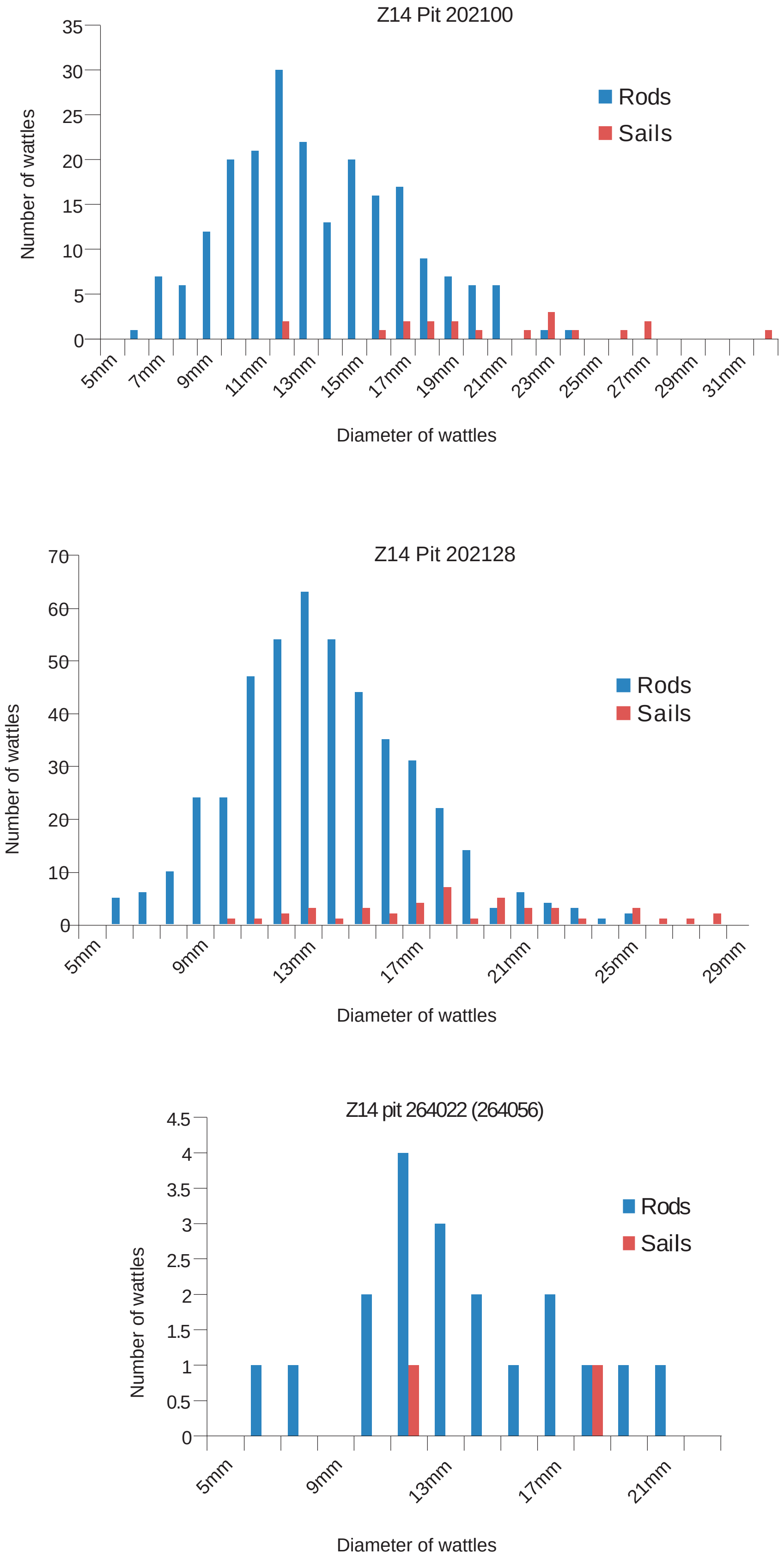


Fig 12.3c Wattle impression diameters: Pits 202100 and 202128 and context 264065

surface with finger marks and depressions, some deep and irregular (which usually occur at joints between different elements of structure such as wall and suspended floor or flue arch). Some pieces had edges or bevelled surfaces and others had a curving rounded edge, which may have formed part of the flue opening or stokehole arch. There were also pieces which appeared to form the flared base of a pedestal *c* 200mm in diameter joining with the kiln floor. The elements represented in this group suggest that the fired clay derived from a more complex structure than a simple single chamber oven.

Wattle supported structure

Fired clay with wattle impressions on the reverse is the most distinctive element of oven structure. In some cases ovens or kiln walls and superstructure may have been constructed using a wattle framework as reinforcement, but *in situ* evidence for this is sparse at any period. Occasionally there is evidence that wattles were used in limited areas such as the stokehole arch in an oven at Danebury, Hampshire (Cunliffe and Poole 1991, 145-6, plates 47-8), but in general ovens could be constructed without a wattle framework. Wattles were commonly used to reinforce the suspended floor or firebars in Saxon kilns (Musty 1974) and to support Iron Age perforated oven plates, such as those from Danebury (Cunliffe and Poole 1991, 146-8). It is likely that the fired clay structure supported on a wattle framework took the form of horizontal panels, to create a suspended floor over a lower firing chamber. This type is mostly represented by small numbers of fragments from any individual context, often with only one or two wattle impressions on any piece. It is only from larger groups, which contained better preserved pieces, that a clearer picture of the structure type can be obtained. Most have a flat moulded surface, with variable finishes, both rough and smooth and on a few pieces a thin finishing render layer. Finger marks and impressions were most pronounced on the Saxon examples from Zone 14. The structures measure 10-70mm in thickness, though most tend to fall between 25mm and 40mm; this remains standard through all periods. Rarely, pieces retained evidence of a rough flat edge. Where several wattle impressions are present on a single block, it is possible to see that the horizontal rods are interwoven around vertical sails. Sails usually tend to be present in a ratio of 1:10 to the rods and this appears to be the case in most of the groups. A common feature of the Saxon material was pairs of sails, but it is unclear whether smaller wattles were paired for their full length or whether this represents an area of overlap of two ends.

The general character of this form appears to remain unchanged from the Iron Age to Saxon periods, though there is a variant in the early Roman period, where a layer of thin monocot stems with leaves attached, probably straw or reeds, measuring 1-8mm wide, though mostly 5-7mm, occurred between the wattles and clay. This occurred only in the fills of two oven bases (173198 and 173202) in sunken-featured building 193140 in Zone 13, one of which had a 1.6m diameter ring of stakeholes (168330) penetrating the natural chalk in the base. Similar structural material has been found on a late La Tène settlement at Trégueux, Côtes d'Armor (Poole 2012a), and in Merovingian deposits at Ercheu (Poole 2012b), Somme, both in northern France.

Wattle diameters were measured where well enough preserved. These are illustrated in Figs 12.3a-c, grouped by phase with a number of individual groups shown separately, including the early Roman oven (173198) in sunken-featured building 193140 (Fig 12.4) and four from Saxon pits (167088, 202100, 202128 and 264056), which produced the largest and best preserved groups of this structural form. The numbers of wattles

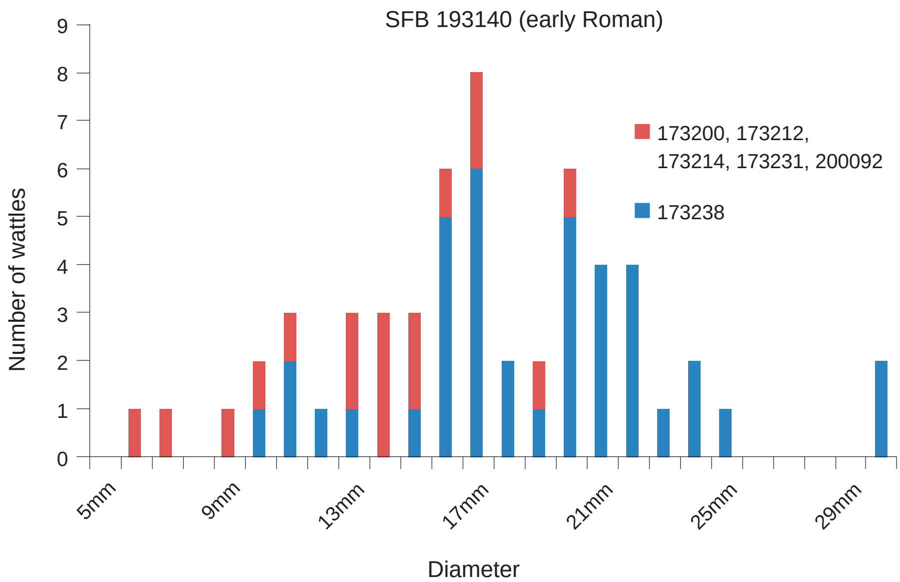


Fig 12.4 Wattle impression diameters from deposits in SFB 193140. Context 173238 is oven structure (oven 173202). Other contexts (red) are demolished oven 173198 (173212), cinders (173214) on base of oven 173202; the remainder from infill of SFB 193140

are low in all but the Middle Iron Age and Saxon periods, with 30 or fewer recorded for the Late Bronze Age, Early Iron Age, Late Iron Age, and Roman periods. Sizes remain similar throughout all periods: the rods range from *c* 7-20mm whilst sails are more variable, ranging between 10mm and 30mm with only eight larger than this, mostly less than 40mm and one each of 50mm and 60mm diameter. The mean, median and modal values for rods coincide usually between 11mm and 15 mm, whilst for sails it tends to be between 16mm and 20mm.

Only the early Roman group (173238) from sunken-featured building 193140 is slightly different, having a mean of 17mm and a bimodal distribution with peaks at

Fig 12.5 Fired clay (nos 1-9)

17mm and 21mm. There is no evidence that this group was interwoven and the wattles and straw may have been laid flat before being covered with clay. There were also three groups from Early/Middle Iron Age pits (173188 and 187007) and a posthole (154032) in Zones 12 and 13 of similar construction, which also appeared to have impressions of wattles laid parallel but not interwoven.

The large quantity of fired clay with wattle impressions from Saxon pits in Zone 14 provides some evidence of additional features. Some pieces have evidence of a straight edge, variously flat and perpendicular or bevelled, rounded and one with a large pole impression *c* 60mm in diameter. On one piece where the clay had squeezed through the wattles the rough flat surface was covered with straw impressions, perhaps indicating that the panels were initially prepared on a bed of straw. Scattered straw impressions were also observed on the outer surface as well as caught between wattles and clay. On the moulded surface of several pieces there appeared to be the vague impression of some organic material, perhaps matting or basketry. Some pieces have cherry or purplish coloured patches, which is often associated with salt. Where this occurs in the core of the structure it may indicate that saline clays were used, but there are some pieces with a whitened surface and cherry discolouration below, which is normally associated with salt working. Some pieces had vitrification over the surface, which extended over the edge and onto the adjacent wattle impression. A concave scoop *c* 70mm diameter had been cut into the edge of one of these pieces and on the adjacent moulded surface there was a hollow, possibly the impression of an inset pedestal (Fig 12.5, no. 5). No other material associated with salt working has been found in the Saxon deposits, so the salt effect on the clay may be derived from some other source. A large quantity of shellfish was also found in Zone 14, and it is possible these were being dried to transport them (see Chap 16). However, large quantities of carbonised grain were also found with the fired clay from pits 202100 and 202128, which fits the pattern elsewhere suggesting that these structures were used as crop drying platforms. Either interpretation suggests that the wattle-supported panels acted as drying floors in a food processing structure, which may not have been exclusively used for cereals. Very similar structural material was associated with a Saxon crop processing oven at Springhead (Poole 2011b, 40-1) where the wattle-impressed clay structure was interpreted as a drying floor.

Oven plates

Oven plates can be built as an integral part of the oven structure or as a portable item. Some may have been prefabricated and then inset as a permanent element of the oven structure. They usually take the form of a circular or rectangular slab, most recognisable when pierced by perforations to allow movement of heat between lower and upper chambers. Evidence for oven plates comes from the Iron Age and Roman phases in Zones 5–7, 12–13 and 20. In the Iron Age they possibly fall into two size groups. Thinner plates up to 35mm thick have one even moulded surface and one rougher surface, sometimes with organic impressions, and occasionally with evidence of a curving edge. One piece had part of a perforation 30mm in diameter piercing the surface. These thinner plates may have been portable items. Thicker plates between 30mm and 55mm thick had evidence of wattle impressions (not interwoven) on the underside ranging in size from 5-35mm in diameter (Fig 12.3). An example from Zone 5 (Fig 12.5, no. 9) has remains of two perforations 32mm and 34mm in diameter. The largest group with wattles and straw stem impressions on the base was found in the fill of posthole 154032 in Zone 12 and had a narrow edge with diverging surfaces, suggesting that the edge had been luted into the oven walls.

Oven plate was poorly represented in the Roman period, possibly because tegulae would have been an easier option to use for this function. The best preserved material from SFB 249085 had a slightly concave moulded surface forming an acute angle with the very smooth convex underside which appears to be the impression of a large ceramic vessel *c* 430mm in diameter, perhaps part of an amphora inset into the oven structure to support the oven plate.

Oven and hearth furniture

This category covers a range of material that was used in conjunction with ovens or hearths, either as supports for other structural elements or to support and stabilise other objects or items. Some items of oven furniture could transform a hearth into a semi-enclosed structure or separate containers or food from direct heat.

Pedestals and firebars

Pedestals and firebars cannot be easily separated where only very partial fragments survive: both may have circular or rectangular sections and be straight sided or tapered. Fragments with a curving plano-convex surface were found through all phases and where the diameter could be estimated this measured from 50-100mm, though most clustered around 70-80mm. One or two pieces had part of a flat end or base surviving. The size suggests that pedestals are the form represented by most of these pieces.

Firebars/rods

Nine firebars or rods were identified from Zones 5, 6, 7, 13 and 14. They were generally cylindrical in form, *c* 20-50mm diameter and roughly hand moulded. Two (from Middle Iron Age and Saxon contexts) had rounded ends 30-35mm in diameter. One (unphased) had a D-shaped cross-section and measured 20mm x 23mm wide. An Early Iron Age example formed a tapered bar with a triangular cross-section rounded on one side and was 20-33mm x 40mm wide and over 64mm long.

Pedestals

Four pedestals were identified from Zones 6 and 13 in contexts of Bronze Age and Late Bronze Age date. All

Fig 12.6 Fired clay (nos 12-28)

were incomplete but had smooth, well-finished, curving moulded surfaces. Pieces from four tapered cylindrical/pyramidal pedestals of Late Bronze Age type were identified (one residual in an Iron Age feature in Zone 3). All were from the top of the object with flattened top surfaces and pierced by a horizontal perforation 12mm, 16mm and 17mm in diameter and set 32mm, 40mm and 50mm from the top respectively. One measured 70mm wide and another 82mm x 90mm.

Most pieces identified as pedestals from Iron Age contexts were very fragmentary, without diagnostic features, though generally suggestive of a cylindrical form. Two were larger in size than average: one from pit 158029 (Zone 26) had a projected diameter of *c* 360-380mm and another from pit 254114 (Zone 5) measured *c* 300mm in diameter, which might suggest that both were constructed as an integral part of an oven structure, not as portable items.

Only six items from Roman contexts in Zones 6, 7, 11, 13 and 19 were identified as possible pedestals of cylindrical form. One from an early Roman pit (203056) had a tapered oval/subrectangular cross-section measuring 19 – >30mm by 45mm wide and over 50mm long. This may be a tapered firebar or a pedestal with spatulate end of the type which ended in a cup like top to support a briquetage evaporation vessel (Fig 12.6, no. 23). However examples found at Mucking, Essex (Jones 1977) are of Late Bronze Age date and in general in north-west Europe this form is of Bronze Age-Iron Age date, suggesting that the example in question is better interpreted as a tapered firebar.

Triangular perforated bricks

This object type is a well-known Iron Age form of triangular shape normally with a perforation across each of the three corners. A total of 74 examples were identified, and are concentrated in Zones 6 and 13 with one or two examples each in Zones 3, 4, 7, 11, 12, 14, 19 and 26. Although this type has been traditionally designated as a loomweight this function has been questioned (Poole 1999) and the association with other oven or kiln material and burnt debris is increasingly being noted (Poole 2012c; Stansbie 2012). This project has provided definitive evidence that they were used as oven or hearth furniture. The key pieces have white salt glaze over one of their corners and adjacent surfaces and sometimes have associated wear on one side of the corner that indicates they were used as pedestals to support briquetage evaporation vessels. The best example of this is from an Early/Middle Iron Age pit (137222) in Zone 6 (Fig 12.6, no. 18), though several have evidence of the cream, pink or lavender salt discolouration. In addition to those used in salt production two large groups were found on Zone 13 in Early/Middle Iron Age pits (130032 and 277042) and another in an early Roman pit (156146), associated with briquetage in the latter.

Major characteristics for all the more complete examples are tabulated in Table 12.6, with further details of illustrated examples in the catalogue. Most bricks had a smooth, well finished surface, though sometimes more irregular or rougher on the side surfaces, rounded angles and corners. The Iron Age examples tend to be of small-medium size measuring from 44-70mm thick by 125-150mm long, though some of the estimated dimensions are larger than this. Perforations are small, frequently 6-8mm diameter and rarely larger than 12mm. Normally all surviving corners were perforated, but on ON 519A only two corners had a perforation. A feature of several objects, especially the group from pit 130032, is a groove *c* 10-25mm wide by *c* 5mm deep across the outside of the corner running parallel to the perforations and made with the finger. Some examples had been flattened across the corner. Several had continued in use after a corner had broken off, with the broken surface either side of the perforation groove rounded and worn. An unusual example was ON 514 (Fig 12.6, no. 15), which had been decorated on one face with a triskele pattern made with the fingers. A second brick (ON 3918) had two finger marks forming a cross on one face (Fig 12.6, no. 19). Decoration on fired clay is very rare apart from hearths. A group of 16 triangular bricks from an Early Iron Age oven at St Martha's Hill near Guildford (Lowther 1935) had been used as vaulting in the oven flue and had been decorated with a four petal rosette ornament on each face, apparently formed with the thumb.

The early Roman bricks are slightly larger, measuring 60-104mm thick and up to 200mm long. Perforations were also generally larger measuring 10-15mm in diameter. Only two examples had evidence of an external finger groove over the corner and one had continued in use after breaking along the perforation.

It is clear from the salt working veneer and wear on corners that one function of these objects was as pedestals supporting briquetage evaporation containers during salt production. The flattened and grooved apices of some bricks also suggest use as pedestals with the modified corners designed to make the support of certain objects more secure. An ethnographic study of specialised pottery production in Serbia to make casseroles for bread making shows that the casseroles were fired and used over a hearth supported on truncated pyramidal pedestals (Djordjevic 2005), and suggests how the triangular bricks could have been used in a domestic setting.

However, these bricks may have had multiple functions as their use as oven flue vaulting mentioned above indicates. It is noticeable that they are often fired fully only on one side which suggests that in some circumstances the same side always faced the fire. If used as pedestals one would expect these portable objects to be moved around and face either way, but it is clear from the asymmetric wear on the corners of some that this was not the case and may imply that they were sometimes luted into place, though evidence of luting has not been observed. Another possible use is as oven or hearth floor. Laid flat a group of six could have formed a hexagonal floor suitable for small hearth or oven. The way the group in pit 130032 had been deliberately placed (Pl 12.1) suggests that this may reflect the manner in which some bricks were laid for use as a hearth. The rare decorated examples known may have originally been produced for use as a hearth.

Pl 12.1 Group of triangular oven bricks in pit 130032

Plaques and discs
A range of small, roughly hand moulded objects were found which probably served as supports and stabilisers and were probably not prefired before use, though some may have been allowed to dry before firing, whilst in other cases the plastic clay was moulded and pushed into position. They included flat discs and plaques, usually oval or sub-circular, roughly shaped with flat or convex surfaces, often with a lentoidal cross section and with organic impressions on the surfaces. They measured 7-30mm thick and 32-53mm long. One unusual example (Fig 12.7, no. 30) was atypical and appeared to have been fashioned from an unmodified nodule of clay, possibly by cutting, and looked rather like a clay pebble.

Hand squeezed lumps are irregular in form, oblong or sub-spherical in shape measuring between 37mm and 100mm long by 30-72mm wide and 19-50mm thick. They have finger marks and depressions over part of their surfaces, and usually one surface that has been pressed against another surface. They were all made in an organic tempered fabric with frequent chaff impressions. Six were found in Zone 13, all but one in early Roman deposits and three of these in sunken-featured building 193140. The sixth was found in a Middle Iron Age pit (248087) and one from Zone 14 was found in a mid-Saxon pit (200203).

Miscellaneous fragments include two wedge shape pieces and small props or stabilisers pinched to shape.

Industrial fired clay

This material comprises a small quantity of fired clay that may be associated with an industrial activity, most likely metalworking. A small number of fragments were classified as hearth or furnace lining on account of the vitrified or slaggy surface. Fragments were 12-22mm thick with a black or grey vitrified or sintered surface grading through purple to red and orange towards the exterior. One piece had a small area of concave edge which is probably part of a perforation *c* 26mm diameter for access for the tuyère of a bellows. The fragments were found in an Early Iron Age ditch (134099) in Zone 13, a Roman ditch (159244) and Saxon pit (203020) in Zone 14, and a Roman ditch (257050) in Zone 20.

A sherd of what may be mould wrap and another that may be crucible were found in Zone 13, though both of these are uncertain; the first could be luting and the second an atypical briquetage vessel, especially with a diameter *c* 140-160mm which would be large for a crucible.

Other evidence for metalworking in the form of slag is also very sparse, though some smithing activity might be expected, if only on a small scale to serve the needs of the local community.

Briquetage and salt production

Briquetage vessels
Sherds of briquetage vessels were found as a consistent spread across Zones 6-7, 11-14 and 20 and 29 in contexts dating from the Early Iron Age through to early/mid-Roman. Most sherds appeared to derive from a type of cylindrical vessel (type V1) with a simple rounded rim (type R3) or one with an acute tapered rim (R10) (Fig 12. 7, nos 44, 47, 48). These occurred predominantly in fabric X2 and to a lesser extent in fabric A, with single examples in X1 and X3. They

measured between 4mm and 11mm thick and diameters were mostly in the range of 80-110mm, though one rim measured 150mm in diameter. The height is unknown, but the greatest surviving length was 55mm. These vessels were used for brine evaporation. Two sherds had part of a tongue clip still adhering to the sherd, wrapped over the vessel rim (Fig 12.7, nos 38, 39), and others had differential colouration of the vessel surface where

Table 12.6 Triangular oven bricks: summary of major characteristics for the better preserved examples. Only the longest side length is given (most bricks have one longer edge by *c* 5mm). Dimensions shown as [00] are estimated

Context	*ON no.*	*Illus*	*Phase*	*Thickness*	*Length (max)*	*Perforations*	*Corner groove*
143212	4659	-	300 BA	[80mm]	-	1: 16mm	-
130033	514	10	415 E/MIA	50mm	>130mm	2: 9, 10mm	none
130033	519A	15	415 E/MIA	56mm	150mm	2: 12mm	none
130033	513	-	415 E/MIA	52mm	[170mm]	2: 7-13, 10mm	none
130033	522	-	415 E/MIA	*c* 55mm	155mm	3: 10mm	none
130033	519B	-	415 E/MIA	[80mm]	-	1	none
130033	517	11	415 E/MIA	48mm	144mm	3: 7-8mm	2
130033	521	12	415 E/MIA	55mm	160mm	3: 10, 13, 13mm	2
130033	524	14	415 E/MIA	44mm	140mm	3: 8-10mm	2
130033	516	-	415 E/MIA	53mm	150mm	3: 8-10mm	1
130033	515	16	415 E/MIA	60mm	145mm	3: 10-11mm	2
130033	518	-	415 E/MIA	60mm	>100	2: 10, 11-12mm	none
130033	523	13	415 E/MIA	55mm	130mm	3: 7, 8, 9mm	2
130033	520	-	415 E/MIA	56mm	[150mm]	1: 10mm	none
248026	1505	17	415 E/MIA	60mm	>120mm	2: 9-11, 13mm	none
130205	-	-	420 MIA	[85-90mm]	>80mm	1: 15mm	none
168142	4675	-	420 MIA	63mm	>85mm H	1: 7mm	none
192040	1510	-	420 MIA	53mm	125mm	3: 8, 9, 10mm	none
208018	288	-	420 MIA	46mm	>105mm	1:12mm	none
256042	2129	-	420 MIA	44-52mm	145mm	3	2
256042	2130	-	420 MIA	52mm	>140mm	1: 10-13mm	1
256042	2131	-	420 MIA	60mm	>120mm	-	-
256042	2132	-	420 MIA	66mm	165mm	2: 10-12mm	2
256042	3918	18	420 MIA	52mm	145mm	3: 7-8mm	2
256042	3919	-	420 MIA	45-60mm	145mm	3: 10, 12, 13mm	1
253101	-	-	425 M/LIA	>42mm	~	0	none
263047	-	-	425 M/LIA	[60mm]	~	1: 12mm	none
189067	-	-	425 M/LIA	[70mm]	>87mm	1: 10mm	none
291127	3950	-	425 M/LIA	[90mm]	~	1: 12mm	1
123194	4057	-	401 IA	55mm	>135mm	1: 6-8mm	1
170009	4042	-	401 IA	56 at apex 70mm	>55mm	1: 12-14mm	none
277044	2157	-	401 IA	53	140mm	3: 10, 11, 10-13mm	none
277044	3893	-	401 IA	60	135mm	3: 8, 10, 11mm	3
277044	3896	-	401 IA	55	>100mm	1: 12-15mm	1?
277044	3894	-	401 IA	56	c125mm	2: 8-10mm	1
277044	3897	-	401 IA	47	>110mm	1: 10mm	none
277044	2155	-	401 IA	~	130mm	2	none
277044	2158	-	401 IA	60	[170mm]	1: 10mm	none
277044	3895	-	401 IA	45-50 mm	c150mm	2	none
277044	3898A	-	401 IA	47 mm	>75mm	1: 10mm	none
277044	2156	-	401 IA	45	105mm	3: 5-8mm	none
277044	2154A	-	401 IA	45	>65mm	1: 14mm	none
277044	3898B	-	401 IA	~	~	1: 6-7mm	none
277044	2154B	-	401 IA	~	~		none
154028	4169	-	401 IA	60mm	>110mm	1: 11-12mm	1
205107	4656	-	401 IA	68	>70mm	2: 8-9x15, 12mm	none
216034	-	-	460 LIA/ERo	[50, 70mm]	-	2: 11mm	none
156150	4661	-	515 ERo	[90mm]	-	1: 14mm	none
156150	4661	-	515 ERo	67mm	>50mm	1: 10-12mm	none
156150	542	-	515 ERo	75mm	200mm	3: 12, 13, 13mm	1?
156221	4676	-	515 ERo	[80-90 mm]	-	2: 12, 13mm	none
156221	1544 & 4676	-	515 ERo	104	>120mm	1: 12-13mm	none
156221	1545 & 4661	-	515 ERo	[*c* 80mm]	>120mm	1: 10-13mm	none
173200	-	-	515 ERo	[*c* 70 mm]	-	2: 10, 13mm	none
203058	-	-	515 ERo	[60mm]	>110mm	2: 7mm	-
171077	424	-	500 Ro	54-61mm	[120-150mm]	2: 12mm	none

covered by the clip (Fig 12.7, no. 47). Many of the sherds had the typical cream, pink or lavender-grey colouration characteristic of salt. However, a body sherd from a larger sized cylindrical vessel, measuring 230mm in diameter, found in ditch 170137 of Late Iron Age-early Roman date, may have been a salt mould. It had vertical finger grooves down the outer surface, which is similar to the briquetage moulds from Stanford Wharf, Essex (Poole 2012c).

A base sherd (Fig 12. 7, no. 45) from a flared form (V2) made in fabric A came from an unphased ditch (239045). It was 9-13mm thick, 150mm in diameter

Comment
Side fragment
Decorated with tri-skel pattern on one face. Continued in use after corner broken off. Two corners missing (*c* 75%)
Only 2 corners perforated. Near complete (*c* 80-90%)
Slightly less than half surviving (40-45%); poorly fired on one side
Near complete (*c* 90%), one corner broken
Side fragment with lip of perforation
Complete
Complete
Complete
Near complete (*c* 90%), surface damaged on unfired face
On one side all corners worn
Corner fragment (*c* 35%). Poorly fired on one face
One corner cindered and near-vitrified. Complete
Corner fragment (*c* 40%)
About half survives including 2 corners. Lavender core and cream surface indicates use for salt making
Continued in use after corner had broken off
Central body section, corners missing
Near complete (95%), one corner damaged
Corner flattened and worn
One corner missing (*c* 80%)
Corner fragment (*c* 45%)
Unfired and poorly preserved
One corner missing (*c* 70%)
One corner damaged (*c* 85%). Decorated on one face with two finger grooves forming a cross with one line running vertically from the apex of one corner with the second line at right angles
One corner missing (*c* 85%). One corner flattened. Pattern of firing suggests this was resting on its face on another triangular brick and third was partly sitting on it on edge
Salt glaze
Broken corner fragment. Triangular face heavily fired black. Slight lavender colouring of margins
Corner fragment from large example
Corner fragment (*c* 30%)
Flattened corner apex. Corner fragment (*c* 20%)
One complete triangular face, split vertically; missing face ?unfired
Near complete (95%)
Discoloured white and pink from salt. Corner fragment (*c* 35%)
Continued in use after corner had broken off. One complete corner and one partial (c 50% of brick survives)
Fragment with one corner and part of one side (*c* 45%)
One corner missing (*c* 70%)
One corner (*c* 50%). Finger tip depressions and grass stem impressions on surfaces
One complete corner, others missing/damaged (*c* 80%)
Corner flattened (Corner fragment *c* 30%)
Complete small example. One edge curved; narrows to 2 corners
Flattened corner (Corner fragment *c* 25%)
Corner fragment
Fragment of corner apex
Corner and most of one triangular face (*c* 50%). Cerise and lavender colour indicative of salt working
Side fragment
Small fragments
Continued in use after breaking along perforation.
Corner worn or damaged on one side
All 3 corners worn on same side. Corner that had broken off has fired to different colour
Rim of surplus clay round perforation
Rim of surplus clay round perforation
Rim of surplus clay round perforation
Triangular face and part of edge
Discoloured white, pink and lavender indicative of salt working
Corner and central section (*c* 50%). One triangular face more heavily fired than opposite face

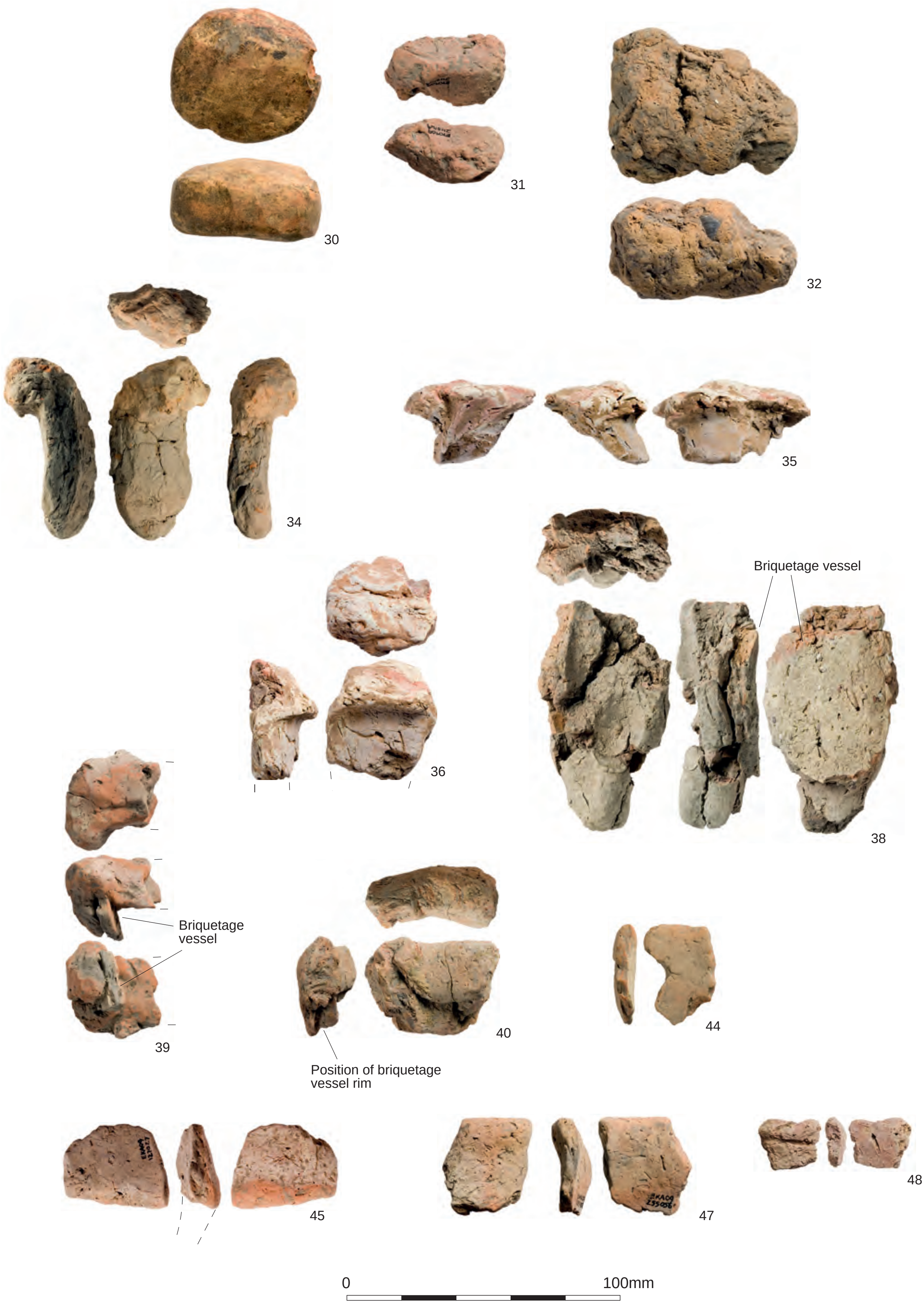


Fig 12.7 Fired clay (nos 30-48)

and survived only to a height of 35mm. Four examples of a rounded bowl shaped form (V3) came from an Early Iron Age and early Roman contexts. These had rounded rims (R3) of slightly everted form, which is similar to vessels from Stanford Wharf (Poole 2012c). The rims measured 5-10mm in thickness and had diameters of 60mm, 80-90mm and 150mm. These were made in fabric X2 with one in fabric A.

Many of the sherds were classified only as flat (V7) or curving (V8). The flat sherds measured 6-11mm thick and one of these from a Roman deposit appeared to be part of the base of a tray or trough type vessel. They were made in fabrics X1, X2, A and B. The curved sherds included rims of type R3, sometimes everted, and were 3-13mm thick with diameters of 45-50mm, 70-100mm, 110-120mm, 150mm, *c* 180-200mm and *c* 270-280mm. This suggests that they probably include the smaller evaporating cylinders, rounded bowls and larger cylindrical moulds. Most were made in fabric X2, with smaller numbers in X1, X3 and AV. Very poorly preserved fragments were classified as V9.

Briquetage furniture

This category includes a variety of pedestals, plates, supports and stabilisers used in the salt production process. Often pieces are roughly hand moulded with poorly defined form, typical of much debris associated with salt working. A few more readily recognisable forms have also been identified including pedestals, props and clips.

The main pedestal type in use during the Iron Age-early Roman phase was the triangular oven brick; 18 of these were specifically classified as briquetage furniture on account of the pink and lavender salt discolouration and areas of white salt veneer (Fig 12.6, nos 17 and 18). In other respects they are no different in size and finish to those described above (Table 12.5), which suggests that rather than using specialised pedestals, ordinary domestic hearth furniture was used. Five of these pedestals were deposited in pit 277042 in Zone 6 together with eight other examples with less obvious salt discolouration, which were recorded as standard hearth furniture.

More specialised supports occurred in the form of pinch props or small pyramidal or hourglass shaped pedestals roughly hand moulded and squeezed into position while the clay was plastic, probably placed between rounded vessels and the hearth structure or pedestals. These measured 25-34mm by 30-43mm and had heights from 10-15mm to 20-30mm. One was found in a Late Bronze Age ditch (201127) in Zone 7 and one associated with the mid-late Roman oven 144121 in SFB 249085 (Zone 20), whilst two from Zone 6 were from Roman features and a third unphased. From Middle Iron Age – mid-Roman contexts came fragments of eight larger pedestals, most with curving surfaces indicative of cylindrical, biconical or tronconic shapes with diameters of 45-50mm, 70mm, 80mm and 90mm, and prismatic/cubic pedestals *c* 60mm in size (Fig 12.6, no. 22). Two objects with oval cross section could be tapered fire bars or the spatulate base ends of pedestals ending in a cup-like top to hold a briquetage container (Fig 12.6, nos 23, 24). This type of object was found at Mucking (Jones 1977), but in Late Bronze Age contexts, whilst the two at this site are Roman.

Clips are the items used to separate and secure the evaporating vessels. All the clips with a classifiable form were of a single distinctive type, not previously recognised and possibly a local variety confined to this region of Kent. It took the form of a long tongue-shaped piece of clay wrapped over the rims of adjacent vessels with a narrow circular or D-sectioned bar separating the two vessels (Fig 12.7, nos 34-36, 40). Several examples with part of the briquetage vessel still embedded in the clip were found (Fig 12.7, nos 38, 39). Usually the tongue-shaped section with hooked top survives alone and measures 6-30mm thick, 13-40mm wide and 30-60mm long. Most fragments retain the clear impression of the vessel rim and internal surface, whilst the outer surface often has distinct finger marks and depressions from moulding and pressing the plastic clay into position.

Briquetage structure

Pieces of briquetage structure were identified by the presence of salt discolouration on the surface, usually a cream veneer with pink and lavender colouring and sometimes with associated vitrification. In some cases where the 'salt colours' were only observed in the core this may indicate the use of saline salt marsh clays rather than salt production. Fragments were found predominantly in contexts dating from the Late Bronze Age to early Roman periods. Most pieces had only a single shaped surface and in general were not significantly different to other oven and hearth structure apart from their colour. Two pieces were identified as suspended floor or oven plate. One from an Early Iron Age context was pierced by part of a cylindrical perforation 15mm diameter and appears to derive from a perforated plate 44mm thick, possibly supported on wattles. One large block of late Roman date had thick green glaze over the surface extending over the broken surface and was thinly vitrified on the underside. Green glazed hearth floor was found *in situ* in salt working hearths at Peldon, Essex (de Brisay 1978, 35-8).

Neolithic-Middle Bronze Age fired clay

The earliest material was a small group of fired clay with a moulded surface but no other distinguishing characteristics, but probably oven or hearth structure, from two Neolithic pits (191083 and 191093) in Zone 14. A quantity of carbonised cereal grain and hazel nuts came from pit 191093. An even smaller quantity of similar material came from an Early Bronze Age ditch (134096) in Zone 13 and two Middle Bronze Age pits (197101 and 214001) in Zones 10 and 12. A larger block of oven structure with cherry coloured mottles from a possible Early Bronze Age ditch (134108) in Zone 13 may indicate the use of saline rich clays rather than be evidence of salt production.

Late Bronze Age fired clay

It is not until the Late Bronze Age that fired clay starts to appear extensively and in any quantity. The largest concentrations of material were in Zones 4, 6, 7, 12-13 and 19 and the majority was discarded in ditches, with only small quantities in pits, postholes and a well. Much of the material is undiagnostic oven and hearth structure, but there were also small quantities of wattle-supported structure, and oven or hearth furniture including oblong pedestals with a single perforation of Late Bronze Age type. A fragment of triangular brick of Iron Age type in a Bronze Age ring-ditch (134096) was presumably incorporated in the fill accumulating in the upper levels of the ditch during the Iron Age.

Evidence for salt working activity appears to have its origins in the Late Bronze Age, with a scatter of small fragments found in ditches comprising salt working hearth structure from Zones 6 and 19 and a pinch prop from Zone 7. A slightly larger group from Zone 4 was found in an oblong pit 254140, measuring 0.7m by 0.4m and 0.47m deep, a size suitable for an evaporating hearth. The fired clay consisted largely of hearth structure, a flat slab fragment with part of a straight edge, possibly a piece of hearth furniture and a single curving fragment that may be a vessel sherd.

Early-Middle Iron Age fired clay

During the Early Iron Age fired clay occurred in small quantities confined to Zones 4, 6, 7, 12, 13 and 26, with just a few small fragments recovered from most areas. This included small fragments of perforated oven plate, pedestal and indeterminate oven or hearth structure. From the cobbled surface 126275 in Zone 6 came fragments of salt working hearth structure and an unusual clay disc apparently cut from a lump of unwedged clay (Fig 12.7, no. 30). A larger quantity of material was recovered from Zone 13, entirely from the ditch (134099) of the trapezoidal enclosure and comprised almost entirely wattle-supported oven structure including some with salt discolouration and a small curved fragment probably from a pedestal.

By the Early-Middle and Middle Iron Age quantities of fired clay increased significantly and their occurrence, although broadly concentrated in the same areas as previously, expanded to include areas peripheral to the main foci of Zones 6 and 12-13. During the earlier phase a small group was found in Zone 3 and scattered small fragments in Zones 10, 11 and 19, while in the later phase two individual groups were found in Zones 4 and 5. The fired clay comprised a wide range of oven and hearth structure, including hearth and oven floor, oven wall, and wattle-supported panels. Portable oven and hearth furniture included pedestals, triangular oven bricks, firebars, oven plates, discs and hand squeezed lumps. Quantities of briquetage vessels together with salt related hearth structure and furniture also increased and were spread over a much wider area.

Although the majority of the fired clay was found in ditches and pits as in previous periods, and smaller quantities occurred in a wide variety of features, a few small undiagnostic fragments were found in a primary situation within oven base 280119 in Zone 7. The fragments of oven structure found during this period suggest that a range of structures were represented. At its simplest the standard domestic oven was probably a circular single chamber structure with floors, walls and dome constructed as a single continuous solid structure. Such structures would be built at floor level or possibly even on a raised plinth, accounting for the sparse evidence for *in situ* ovens. There is also material that indicates structures of a semi-enclosed character with a lower chamber or flue, where the fire was situated, covered by a suspended floor formed of a panel of clay supported on wattles or timbers. The degree of firing can be variable, often with one much better fired surface grading to a poorly baked or unfired back. The character of firing suggests low temperature activity, which may relate to crop and food processing. This type of structure may have been rectangular or linear rather than circular. The sparse evidence for *in situ* ovens may indicate that any lower chamber was only partly sub-surface and cut into superficial deposits, not the natural bedrock.

During the Middle Iron Age salt production became more prevalent with a noticeable increase in the quantity of material and evidence for production concentrated in Zones 6 and 13, but with material also extending into Zones 4-5, 7, 10 and 12 and a single small fragment of possible hearth structure in Zone 22. The activity is small scale, probably of cottage industry type, characterised by cylindrical evaporating vessels and rounded vessels with everted rims, tongue-shaped clips to secure adjacent vessels during the evaporating process, and the use of triangular perforated oven bricks as pedestals to support vessels or possibly a plate on which vessels were placed. Structural fired clay is associated with the briquetage, but it gives little clue to the nature of the hearths used in the evaporation process. The absence of *in situ* structures suggests that no subsurface element was involved and that domestic-style hearths and equipment were used, especially in view of the use of perforated triangular bricks as pedestals, which are ubiquitous on all Iron Age sites and presumably normally functioned in association with domestic ovens and hearths, though specialised use in relation to pottery production has been noted at Dagenham (Poole 2010).

Triangular bricks formed a distinctive element of the assemblage and frequently occurred in association with oven or hearth structure: 18 out of 22 features producing triangular bricks in the Middle Iron Age also produced other oven or hearth furniture, though in a few cases in only very small quantities. The three largest groups of triangular bricks produced no other fired clay material in two instances (130032, 277042), and very little oven or hearth structure in the third (256029), which may indicate that sets of bricks were discarded once too damaged to remain in use, while the oven or hearth continued to function. However, there are examples in these three groups of both complete undamaged bricks and others that had continued to be used after one or two corners had broken off, so they may have been deliberately selected for deposition as a structured deposit in the pits.

The group in pit 130032 was associated with low densities of carbonised plant remains from the lower layer 130034 and a scatter of burnt flint throughout the pit fill. The deposit of triangular oven bricks (ON 513-24) had been placed in the upper layer (130033) in the south-east half of the pit (Pl 12.1). They appeared to be deliberately laid flat on their triangular face, some edge to edge or on top of each other. Though the pit does not appear to be an oven base in that no *in situ* burning was visible, the manner in which the bricks were laid may reflect the way such objects were placed to form a hearth base or stacked to form a support or wall. The pattern of firing of one triangular brick from pit 256029 suggests that it had been laid flat on top of another triangular brick with a third set on edge on top of it.

A large group of fired clay from the ditch (134099) of the trapezoidal enclosure in Zone 13 included evidence for salt working comprising hearth structure, furniture including a fragment of perforated plate and firebar, and seven briquetage vessel sherds from a cylindrical vessel *c* 80mm in diameter and a curved vessel with a rounded everted R3 type rim *c* 150mm in diameter. All are thin walled, measuring 5-8mm thick. Other fired clay not specifically identified as associated with salt working included oven structure comprising oven wall, hearth floor, several pieces of wattle supported panel, and a perforated fragment with sintered surface interpreted as furnace lining. Furniture included fragments of a tapered firebar with triangular cross-section, part of a flat slab – possibly a suspended floor, with a suggestion of luting to attach it to the oven or hearth structure, and possible pedestal fragments with a curving surface indicative of a diameter of *c* 80mm. A few of these pieces had small patches discoloured pink or purplish, but insufficient to be designated as salt working material on this basis alone. However, in view of the concentration of briquetage in this ditch it suggests that the other fired clay may also have been used for salt working. The scale of salt production is small and is likely to represent production by individual households in a domestic setting, possibly using a domestic oven or hearth structures rather than specialised single purpose structures.

Although much of the fired clay occurred in small quantities scattered through a range of features, a number of groups stand out either as isolated groups within a zone or as more substantial groups within the larger zone assemblages. From Zone 3 a small group of broken oven furniture comprising parts of cylindrical pedestals and a triangular brick was found in a shallow sub-oval hollow (151001). The single group from Zone 4 found in a shallow oval pit (182246) consisted of oven/hearth structure and was associated with carbonised cereal grain and chaff. The main concentration in Zone 5 was found in the top of pit 254114 and consisted of oven structure, including wattle reinforced structure, and fragments of pedestals and firebar. It is possible in all these cases that the pit or hollow in the top of the infilled pit served as an oven or hearth base.

In Zone 12 the majority of the fired clay was concentrated in five postholes (137101, 145049, 154024, 154029 and 154032) and consisted predominantly of oven and hearth structure, including wattle reinforced panels, oven wall and oven plate and a fragment of triangular brick. The material from postholes 154029 and 154032 was clearly from the same source, together with pieces in the fill (154035) of a Late Iron Age ditch. Another posthole (154028) of general Iron Age date containing triangular brick and oven wall also appears to be related to this group.

Much of the fired clay in Zone 6 consisted of small and scattered fragments, and apart from the pits (256029 and 277042) containing triangular perforated bricks (above) only one pit (244292) contained a significant quantity of material that included oven/hearth structure and floor, wattle-supported panels and sherds of briquetage.

In Zone 13 in addition to the groups of triangular perforated bricks in pit 130032, there were several other large groups of fired clay concentrated in pits. These included oven wall and plate in 125053 (1.8kg), and oven floor, wall, lining and triangular brick in 168135 (1.3kg). The greatest range of material came from pit 134099 (1.5kg), comprising oven/hearth structure including floor and wall, wattle supported panels, vitrified lining, possible pedestal and firebar, and briquetage vessels.

Late Iron Age-Roman fired clay

Zones 6 and 13 remained the principal areas producing fired clay, with lesser quantities from adjacent zones, and additional material from the northern area of the scheme in Zone 20 and to a lesser extent Zone 19. Briquetage and associated furniture exhibited a similar pattern with other smaller but significant groups in Zones 10 and 11. The largest quantity of fired clay derives from early Roman deposits with a decrease in mid- and late Roman periods, possibly reflecting the greater availability of tile, which could be used in oven and hearth construction and as substitutes for furniture; this is supported by the tile evidence (92% of the tile found in Roman phased deposits was in mid- and late Roman contexts in contrast to 6% in early Roman or unspecified Roman contexts).

The character of the Late Iron Age and early Roman assemblage is similar to the Iron Age one, suggesting there was little change in the construction of ovens and hearths: oven and hearth floor, oven wall, oven plate and wattle-supported panels all continue to feature in the record. Oven furniture consists predominantly of triangular bricks and curved pedestals. A group of broken triangular bricks was found in Zone 13 in pit 156146 together with fragments of oven plate and hand squeezed lumps. The triangular bricks were noticeably larger than the Iron Age examples, measuring 75-104mm wide, and the more compete example had sides

170-200mm long. Perforations were also larger at 10-15mm in diameter. Fragments of triangular bricks from other features were poorly preserved but sizes of 50-70mm thick and *c* 120-150mm long are closer to the preceding Iron Age measurements. Cylindrical pedestal fragments have diameters of 75-150mm. Other furniture included discs or plaques, oven plate, a fire bar fragment 35mm in diameter, and hand squeezed lumps.

Briquetage and salt working material is similar to the Iron Age assemblage and indicates that the character of the industry remained similar in the general production process, though increasing in intensity of production. Briquetage vessels were most commonly represented by cylindrical vessels (V1) found in Zones 6, 10 and 13, whilst rounded bowl type vessels (V3) were less common, occurring in Zones 6 and 10. Curved sherds of indeterminate form were more common than flat sherds. The small number of flat sherds suggests that some sort of troughs or trays were in use, though neither their form nor size could be defined. Furniture included tongue-shaped clips, small pyramidal pedestals or pinch props, larger cylindrical pedestals, triangular perforated bricks and single examples of a flat slab, plate, hand squeezed brick and a biconical pedestal. Structural material specifically associated included oven or hearth wall, lining, and a large block of floor with green glaze from a ditch (217122) in Zone 20.

The character of the briquetage assemblage suggests that there was little change in salt production technology from the Iron Age and it appears to have little in common with briquetage from other areas of Kent (Miles 1975). There is no evidence for specialised salt production hearths, suggesting that production continued as a small scale cottage industry utilising domestic hearths or ovens for production. The increase in production in the Roman period may indicate that the industry changed from supplying only local households in the Iron Age to producing a surplus to trade over a larger region. However, the increase may merely reflect an increase in population with households producing salt for their own use or that of the immediate community. The quantity of material does not compare to the industrial quantities produced at the Essex red hill sites and if production supplied more than the immediately local area it is unlikely that it served more than the surrounding region.

Several oven and hearth bases were preserved in Late Iron Age and Roman structures in Zones 6, 13 and 20, mostly surviving in sunken-featured buildings, where structures built at floor level survived without suffering total truncation. These structures together with the associated fired clay are described in the catalogue of ovens (below).

Saxon fired clay

The bulk of the fired clay from this period was found in Zone 14, with less than 0.5kg from other zones (10, 11, 15, 19, 20) apart from the floor surface from a hearth (197092) in Zone 9 from which 2.5kg of fired clay was recovered, including a fragment with an impressed line, possibly decoration (Fig 12.5, no.1). The assemblage was dominated by oven and hearth structure, especially wattle impressed fragments, with two large groups recovered from pits 202100 (12.3kg) and 202128 (16.5kg). These both produced very similar material consisting entirely of fragments covered with interwoven wattle impressions probably from flat panels forming drying floors (Fig 12.5, nos 4-5). A few pieces were lightly vitrified or had cerise mottles that might indicate the presence of salt. It is possible they served as drying platforms for the large quantities of shell fish recovered from the area, but a more direct association is perhaps the large amount of carbonised grain in the same pits, suggesting that some of the fired clay formed the drying floors of crop processing kilns. Similar material was found associated with a Saxon crop processing oven at Springhead (Poole 2010, 40-1). Oven or hearth furniture was extremely sparse, with a single example of a hand-squeezed lump, the rounded end of a firebar and a piece moulded to a small rounded knob (Fig 12.6, no. 27), possibly a support or stabiliser.

Medieval fired clay

Fired clay from medieval contexts amounted to 1.7kg, with the majority of contexts producing material concentrated in Zone 3, though the two largest groups were found in ditches in Zone 19. The assemblage from Zone 3 consisted of small fragments of oven and hearth structure, mostly with a single flat moulded surface but including hearth floor, wattle supported structure, oven plate and pedestal. The material from Zone 19 included a large piece of wattle-supported structure, oven wall with finger marks and possibly part of a pedestal.

Catalogue of selected ovens and hearths

Zone 6, oven 176181, late Roman (Pl 12.2)

Size: 1.3m (NNE-SSW) x 1.36m (WNW-ESE) wide; 0.18m deep

The oven was circular, set into a shallow hollow (289056) cut into layer 289045 in which the main oven chamber was constructed. The oven mouth was situated to the north-east and from this ran a long shallow flue base 289053 1.64m long by 0.54m wide. The flue had a slightly deeper circular hollow at both ends, which appear to have formed as a result of heavy wear in cleaning out the cinders from the oven and flue. The flue was filled with a thick black charcoal-rich layer (289044).

Across the base of the oven cut was constructed a chalk floor or foundation layer (176170) 40-50mm thick. On this the clay walls (176169) were built as a freestanding structure composed of yellowish-orange brown clay 60-100mm thick and fired uniformly throughout. The surfaces on both sides appear smooth and even. At the front of the oven the wall is sharply inturned to the oven mouth and probably formed a flat vertical façade around the oven mouth. Elsewhere the walls were sloping in slightly and probably formed a simple rounded dome. Patches of clay (176171) extending over the chalk foundation suggest that the oven floor was originally surfaced with a layer of clay continuous with the wall surface, but which has been worn away over much of the surface. A larger hollow towards the centre back of the oven has also destroyed the chalk foundation here. Deposits in the mouth of the oven, described as blocking and comprising blocks of sandstone and flint (176176) or clay (176175), may be collapsed superstructure from the stokehole arch.

The fill within the oven (289055 and 289054) contained fragments from the collapsed wall of the oven This was the only deposit from which any fired clay (11 fragments, 135g) was recovered for analysis, so there has been no possibility of comparing it to the *in situ* structure. The four small fragments from 289055 probably derive from the oven wall and had a single flat moulded surface and possibly a curved edge on one. The quantity is extremely small for a well preserved structure and suggests that most of the collapsed material was poorly fired or lacking in any features. The slightly larger quantity of material from 289054 included a single sherd of briquetage vessel and pieces from a flat plaque 7-20mm thick with a narrow straight edge, which probably served as some sort of oven furniture. A single small indeterminate fragment of tile from the flue indicates that no tile was used in the oven construction. The evidence suggests that the oven was a single chamber structure covered with a simple rounded clay dome with the single opening at the mouth for both stoking and to allow smoke to escape. This type of structure is typical of bread ovens. The plaque may have been used as a surface on which to place bread or other items which were to be baked in the oven, so as to separate them from direct contact with hot embers. The single sherd of briquetage does not necessarily mean that the oven was used in salt production, though the quantity of briquetage in Zone 6 indicates such activity somewhere in the settlement and it is possible that domestic ovens or hearths had a dual function doubling up for small-scale cottage industry in salt production.

Carbonised plant remains recovered from 289054 and 289055 included cereal grain, chaff and a range of weed and grass seeds, which could relate to either function or fuel used.

Zone 13, sunken-featured building 193140, early Roman (Pl 12.3)

Two oven bases (173198 and 173202) were found within this building.

Oven 173198

Size: 1.9m diameter; depth: 0.22m

This oven was circular with the mouth on the north-east side. The base was set on the natural chalk floor of the sunken-featured building and the floor and walls were constructed as a continuous structure of light yellowish brown clay mixed with small chalk and flint stones. A 1.6m diameter ring of stake-holes exposed when the base was removed is likely to reflect the presence of a wattle framework to reinforce the clay wall when initially constructed. The wall was 0.2m thick and

Pl 12.2 Oven 176181 (Zone 6)

Pl 12.3 Oven 173198 and oven/hearth 173202 in SFB 193140 (Zone 13)

survived only to a height of 0.4m above the SFB floor surface. The inner skin of the oven walls and floor was fired to a reddish orange to a depth of *c* 10-20mm. The outer clay walls appear not to be fired throughout their thickness. None of the *in situ* structure or fill was sampled so it has not been possible to compare fabric, degree of firing or other characteristics with those of the demolished oven structure found in the layers filling the SFB. The section drawing shows a slightly raised irregular area in the centre of the oven floor, which may represent the base of a pedestal. The interior was filled with collapsed orange fired clay superstructure (173212).

Oven 173202

Size: 1.05m wide; 1.18m long; depth: 0.1m

An oven or hearth base lay within a shallow dished hollow that was cut or worn into the natural chalk floor of the SFB. The chalk surface had been burnt grey, most notably around the outer lip. Although there was no *in situ* structure, this may have rested on the chalk natural surface and have been completely demolished if this structure was replaced by the better preserved oven 173198, less than a metre to the south-west; the relationship between the two could not be established.

Filling the base of the hollow was a dark charcoal rich soil (173214) representing debris from the final firing and above this was a layer of demolished oven structure (173238) composed of bright orange red lumps of fired clay. Fired clay recovered from 173214 (by sieving) amounted to 55 small fragments (163g) in fabric AV, mostly amorphous rounded lumps typical of debris worn from oven walls during use. There were in addition a few pieces 25mm thick with a rough flat moulded surface and wattle impressions on the back. A much larger group (790 fragments, 3.8kg) came from the upper deposit (173238), much of it recovered by sieving. This comprised oven superstructure 20-42mm thick constructed on a wattle framework, overlain by monocot stems covered with clay. The wattle impressions from both deposits ranged in size from 10-30mm diameter (Fig 12.4). This structure may have formed a flat panel such as a drying floor supported on oven furniture over the hearth base, rather than a domed enclosed permanent structure.

A large quantity of fired clay was recovered from the layers (173200, 173231, 173232 and 200092) infilling the SFB, though one cannot be certain that this relates to the *in situ* structures, rather than to ovens or hearths demolished elsewhere on the site and dumped in the disused SFB, especially in the absence of any fired clay sampled from the *in situ* oven. The fired clay amounted to 208 fragments (7.3kg) comprising a mix of oven and hearth structure, and furniture. The structural material included much with a single plain surface, which was identified as hearth or oven floor, *c* 20-26mm thick, when burnt black or dark grey at the surface grading to more poorly fired clay below, or oven wall or lining 15-50mm thick, when more uniformly fired to a reddish orange or brown, sometimes with wattle or monocot impressions on the back. The floor was made in fabric A and most of the oven wall in fabric AV or V. There were two groups with a rounded edge indicative of an opening on the oven wall. One had a curving rounded edge between two flat surfaces 38mm apart and appears to have formed a vent *c* 120mm in diameter through an oven cover or dome. The second consisted of large blocks 50-70mm thick, slightly curving with a semi-circular edge *c* 80mm in diameter with dispersed wattle impressions on the interior: this probably formed part of the stokehole arch reinforced with a wattle framework. The 10 wattles ranged from 6mm to 17mm in diameter. Five items of oven furniture were found in 173200, all made in fabric AV or V and comprising three hand squeezed lumps of spherical or sub-oval form, the central stem of a cylindrical pedestal or firebar and part of a triangular oven brick. Carbonised plant remains recovered from 173200 comprised large quantities of cereal grains, chaff and a range of weed seeds including a large quantity of henbane. This may indicate that crop processing was a function of the structure, though the presence of chaff and weed seeds may relate to crop processing waste used as fuel.

Zone 20, sunken-featured building 228059, oven 228060, mid-Roman (Pl 12.4)

Size: 1.1m diameter, top of wall 1.0m diameter; height: 0.4m

This oven was placed at the north end of SFB 228059. The oven was circular with a horseshoe-shaped wall and a mouth *c* 0.55m wide on the south side. The floor of the oven was formed by the natural flinty marl and chalk of the base of the SFB. The wall (228060) was constructed of yellowish brown chalk and clay marl cob (probably made from the constituents of the natural dug out in making the SFB. The wall measured 0.12m wide and survived to a height of 0.4m on the north side at the back of the oven. The *in situ* lower wall structure appeared to have been unfired, though there may be some slight reddening on the interior surface. In section, layer 228065 appears to form part of the oven wall collapsed face down into the partly filled chamber. Some orange fired fragments of clay were present in this deposit and the clay along the base was slightly reddened, suggesting that the fire may have been situated in an upper chamber. There is also a lower layer of unfired clean yellow brown clay (228062 and 228063) without any chalk inclusions (in contrast to the rest of the oven structure) collapsed or eroded from part of the structure. These lower layers of clay interleave with layers of charcoal and ash (228061 and 228064), which extend beyond the confines of the oven to form a thick accumulation of ash across the floor of the SFB.

The layers associated with the oven produced quantities of both tile (228061-2, 228065-8, 228075) and fired clay (228061-4, 228068, 228078). Most of the fired clay was recovered from sieved samples and amounted to 25 fragments (117g), in a mix of fabrics (A, E, V, AEv), and included structural fragments of wall lining and bedding with a tile impression, and oven furniture in the form of two small, thin, oval discs and a possible wedge. The tile comprised 48 fragments (4.5kg) of tegula, brick and flat tile, most of which was burnt or refired to some degree. Four individual tegulae were identified with joining fragments between layers, including a substantial part of one (tegula B) shattered into 22 fragments in layers 228066 and 228068. The lower cutaway (Warry type C) on another tegula (tegula D) suggests a date of mid 2nd-mid 3rd century AD. Tegula B had been deliberately shaped to a rough square *c* 250 x 220mm and had an area of burning concentrated over the central part. Most of the tile has burnt grey surfaces, with burning sometimes extending to the edges and in one case most heavily burnt along the flange. Other pieces of tegula from 228061, which may also be part of tegula B, had been burnt grey throughout their thickness suggesting that the tile had been broken up for use in different areas of the oven. Heavy burning of this sort usually indicates direct prolonged contact with the fire typical of the flue arch, or floor directly over the fire.

Carbonised plant remains were recovered from layers 228063, 228078 and 228062 and produced a moderate quantity of cereal grains and weed seed.

Zone 20, sunken-featured building 249085/144121, oven 193070, mid-late Roman (Pl 12.5)

Size: L: 1.7m, width: 1.05m, W flue: 0.6-0.8m, internal width: 0.25-0.47m, H walls: 0.37m

This L-shaped oven was set into the south-east corner of the SFB. It was constructed as a long flue aligned east-west with parallel sided walls widening to the east end, which may represent the main oven chamber where it turned north with an additional wide opening on the north side. At the entrance to the flue at the west end the floor was surfaced with a large, flat, green sandstone slab 0.55m long, and inside further smaller sandstone slabs covered the floor of the flue; the flue

Pl 12.4 Oven 228060 in SFB 228059 (Zone 20)

Pl 12.5 Oven 193070 in SFB 249085/144121 (Zone 20)

wall was reinforced with a sandstones slab set on edge on the north and probably originally matched by one on the south. The stone lining indicates that this was the main firing area with the stone used to prevent excessive damage and wear from the heat and raking out of the cinders. The rest of the oven was constructed of clay fired to a uniform orange colour throughout. The walls (144122) are *c* 100mm thick and stood to a height of *c* 0.37m at the back of the oven chamber. They appear to be built up of lumps of clay luted together. Outside the north flue mouth was an extensive area of trampled lenses of burnt puddled chalk, ash and orange fired clay.

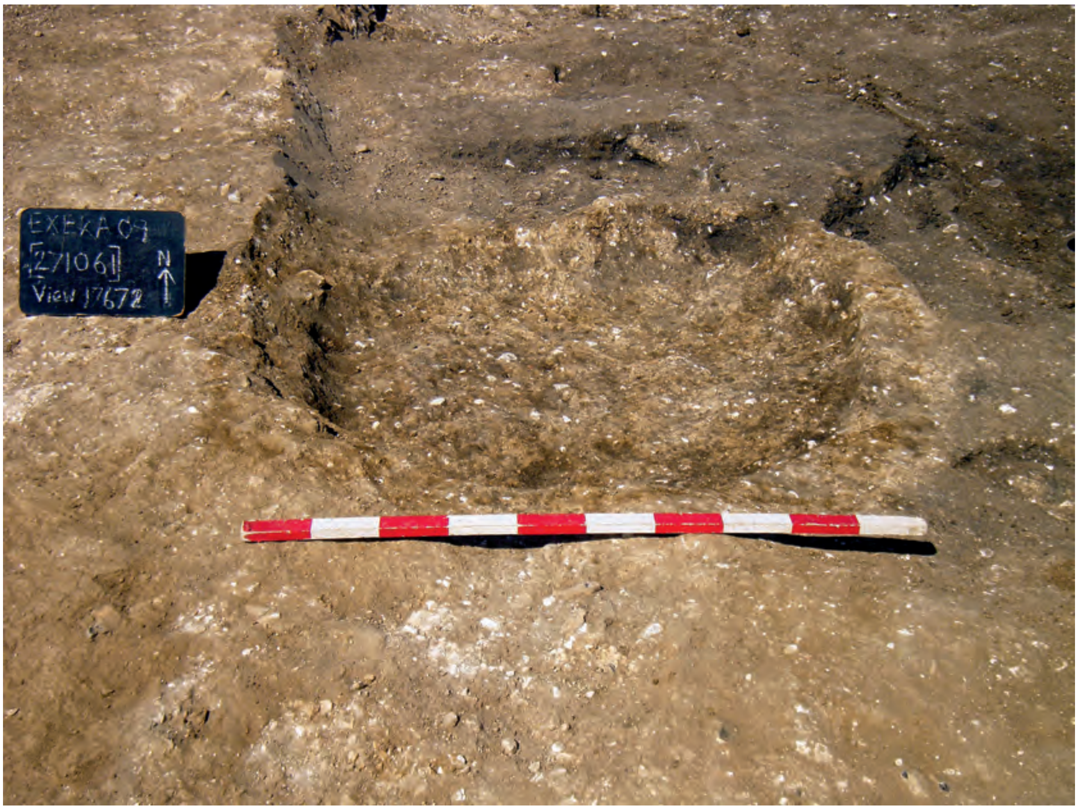
Large quantities of fired clay and tile were recovered from the fill of the oven and the SFB. On the base of the oven was a mixed layer of collapsed clay superstructure, mixed with soil, stones and charcoal (144123). Overlying this and filling the main oven chamber was a thick layer (144120) of charcoal flecked soil with small stones scattered throughout and a few large blocks of stone in the top which may be fallen superstructure. Other deposits which contained fired clay debris were the fill of the flue (144132) and a layer of occupation debris (144131) infilling the sunken-featured building. Fired clay recovered from layers 144123, 144120 and 144132 included large blocks of the same clay structure which had the impression of a large pot or amphora on one side (Fig 12.5, no. 8); clay had been laid on these blocks which probably formed the edge of the oven plate or a projecting ledge on which the suspended floor rested. This construction may have been positioned over the wider eastern section. Over the narrower section of flue to the west, the suspended floor may have been made of tile as large slabs of tegulae and brick, usually burnt on one side but with areas of heavy refiring and vitrification, were found shattered within 144120. A complete tegula could have spanned the main flue. The lower cutaways on the tegulae fall into Warry's category C indicative of a date in mid 2nd-mid 3rd century AD. Tile found within other layers in the SFB consisted of broken fragments, but similar in character and nearly all having evidence of heavy burning or sooting on part of their surfaces (often on the tile edges or tegula flanges), suggesting that some tile had been built into the oven superstructure with edges exposed to the heat. Fired clay from 144120 also included blocks of oven walling with elements made in the chalk-tempered fabric E, and others in organic-tempered fabric V with very large quantities of straw inclusions creating a very porous texture. These may have formed an internal wall skin 75-90mm thick, as they have one moulded surface and the back face pressed over another structural element.

The fired clay and tile indicates that the oven had a suspended floor and some sort of upper chamber, possibly only semi-enclosed rather than fully covered. A clue as to the function of this oven is provided by a small number of fired clay artefacts from layer 114132, which included a sherd of briquetage vessel, a fragment of firebar or pedestal and a small pedestal or pinch prop. There were also fragments of oven lining coloured pink and lavender and typically associated with salt working. It is interesting that some part of the salt production process was undertaken at some distance from the sea, this site being situated *c* 2.5km from the Roman coastline. It is most likely that the secondary stage of drying and packaging salt for redistribution was undertaken here, following primary evaporation on the coastal area. However, salt production may not have been the sole use of the oven and other products could have been dried and processed. Deposits were sampled for carbonised plant remains, but little was found.

Zone 20, sunken-featured building 249081, oven 271061, mid-Roman (Pl 12.6)

Size: 1.38 x 1.32m, 0.1m deep

This circular oven was set into the south-west corner of the SFB, forming a shallow bowl-shaped structure with flat base constructed of a yellowish brown clay marl mixed with chalk grit. The walls were 0.1-0.16m wide and survived to 0.8m



Pl 12.6 Oven 271061 in SFB 249081 (Zone 20)

above the floor. There were no obvious signs of burning or firing on the oven floor or wall surface, suggesting that there may have been some sort of grate and the fire itself set at a higher level, the base forming an area for ash to collect. Ash appears to have been scraped out over a lip on the south-east side into the adjacent stoking area 271057.

Fired clay fragments from the fill 271060 (29 fragments, 77g) were mostly amorphous, 14-22mm thick, with a flat or curving moulded surface. These were made in fabric AVE, with chaff and straw inclusions and scattered chalk grit, fired orange brown and grey. This probably derives from the oven superstructure and the chaff tempered fabric contrasts with the base, which appears to have utilised the natural clay available in the area of the SFB. In addition to fired clay, several pieces of tile were found in the oven and adjacent deposits (271051, 271053, 271054 and 271060); these included three pieces of tegulae and flat tile discoloured from refiring and one burnt black on one face, which may have served as part of a suspended floor. A substantial part of an imbrex (245mm long) may have served as a pedestal or support set on end.

Carbonised plant remains recovered from layers 271060 and 271053 included cereal grain, large quantities of chaff and a range of weed seeds. They may represent crop processing waste used as tinder or fuel.

Catalogue of selected objects

Hearth

1. Hearth floor. Generally with flat, very smooth well finished moulded surfaces burnt to a light bluish grey. One fragment has a single straight impressed line 2mm wide x1mm deep surviving for a length of 30mm. It may have delineated a border or an area of the hearth. Fabric A. T: 10-25mm. Zone 9, ctx 197094, hearth 197142. Phase 610 early or mid-Saxon
2. Salt working hearth floor. Flat smooth moulded hearth surface, very slightly undulating fired grey, resurfaced twice with three surfaces visible in section. The lowest has evidence of cindering/vitrification overlain by a greenish white salt veneer and the second also has a thin greenish white salt veneer. The final surface has little or no cream salt veneer surviving. The individual resurfacing layers are between 2 and 4mm thick. The underside is fired/baked orange, fairly flat but undulating, probably sheared off at the interface with the underlying unfired clay. Looks like ordinary hearth surface rather than industrial. Fabric A. T: 10-16mm; Wt: 55g. Zone 6, ctx 170002. Topsoil unphased

Oven and kiln structure

3. Wattle supported clay structure. Smooth flat undulating surface with marks from wiping smooth and fired grey, cracked crazed from contraction /rapid drying; well preserved closely spaced interwoven wattle impressions on reverse. A few short straw stem impressions also occur on the outer surface. Wattle impressions: rods set 1:12mm x 5; rods set 2:15, 13, 10, 11mm; sail D: 16mm. T: 20-44mm; Wt: 451g. Fabric A. Zone 14, ctx 143183, pit 143182. Phase 500 Roman
4. Wattle supported clay structure. Flat very roughly moulded outer surface, undulating and irregular with impressions from fingers and palm of hands. Occasional straw/grass impressions on surface. Interwoven wattle impressions cover the inside surface. Fabric E. T: 15-55mm. Zone 14, ctx 202120, pit 202100. Phase 600 Saxon
5. Wattle supported clay structure. One of the vitrified pieces appears to be pierced by a circular perforation D: *c* 60-70mm, possibly with a rough moulded edge adjacent suggesting it is a scoop cut into the edge.

Vitrification has extended over the moulded edge and the adjacent wattle surface. In the outer surface next to the scoop and edge there is an impression in the clay covered in a white deposit. This may be the position of an inset pedestal and the white colouring relate to salt working. Impressions of interwoven wattles occur on the inside. Fabric E. T:15-50mm. Zone 14, ctx 202130, pit 202128. Phase 600 Saxon

6. Structure over organic bed. The best preserved side is irregular covered in coarse stem or leaf impressions lying roughly parallel. Some may be straw and/or grass stem and leaves but some seem too large for this and may represent some sort of reeds or rushes. The opposite face is roughly flat or convex but appears to have lost any original moulded surface, suggesting this was the exterior distant from the heat source was never fired throughout its full thickness and the surviving surface represents the interface between fired and unfired. Fabric V. T: 20-43mm. Zone 13, ctx 173212, hearth/oven 193140, SFB 173201. Phase 515 early Roman

Oven plate

7. Salt working oven plate or floor (Not illustrated). Block of fired clay originally interpreted as kiln structure, but in view of the evidence for salt working, a salt working hearth is the most likely function. The upper/exposed surface has a moulded corrugated vitrified surface formed by three wide V-shaped finger grooves/ridges forming an arc. The glassy green vitrified surface extends thickly over the moulded surface and also over broken edges indicating the clay had cracked during firing. There is also thin vitrification on the underside which is very rough and irregular with lots of rounded depressions mostly *c* 6-10mm, but one 35mm long clearly held a chalk lump. The surface looks as though it results from the clay being pressed over a chalk surface, perhaps at the preliminary fabrication stage. Fabric A. T: 30-35mm; Wt: 344g. Zone 20, ctx 135041. Phase 500 Roman

8. Oven plate. Structural blocks forming the edge of a plate with two curving surfaces joining in an acute angled edge and diverging to form a lunate profile. One surface is hand moulded, undulating and slightly concave, whilst the other side is extremely smooth and appears to be the cast from a large pot. It suggest large chunks of amphora or storage jar or the complete truncated circumference of the body of a vessel were inset into the oven wall to project and thus form a ledge on which the oven plate could be constructed. Curvature of the impressed face is equivalent to D: 430mm horizontally and 260mm vertically, giving some idea of the size of vessel used. Straw impressions occur on the impressed face from material caught between the clay structure and the pottery vessel. Fabric AV. T: 7-55mm; Wt: 1218g. Zone 20, ctx 144120, oven 193070, SFB 249085. Phase 500 Roman

9. Oven floor (Not illustrated). Flat slab with a curved undulating smooth moulded surface, wattle impressions on interior. The second piece has an irregular flat surface, formed by some material pressed into the clay. It is unclear whether it is randomly arranged organic material or something like matting; surface is very worn. Fabric A. T: 40-53mm; Wt: 506g. Zone 14, ctx 143182, pit 143183. Phase 500 Roman

10. Perforated oven plate. fragment with flat undulating smooth moulded surface pierced by a cylindrical perforation D: 32mm with possible wattle groove D: 7mm on the underside. Fabric A. T: 44mm; Wt: 82g. Zone 5, ctx 123187, ditch 147207. Phase 425 Middle Iron Age

Furniture

11. Cylindrical pedestal (Not illustrated). Top only of LBA/EIA cylindrical/pyramidal pedestal ('loom-weight') flattened on top and pierced by a horizontal perforation 17mm dia. set 40mm from the top. At one end of the perforation but not the other is a narrow groove cut or worn into the clay: it may be a rare example indicating possible suspension. Fabric E. L: >40mm W: 82mm/90mm; Wt: 341g. Zone 13, ctx 245091, Ditch 134095. Phase 330 Late Bronze Age/ Early Iron Age

Iron Age Triangular perforated bricks

12. Triangular oven brick. Complete smooth flat surfaces, sharply rounded arrises and corners. Well finished example. One face brown with black sooting/burning patches on one edge; opposed face fired red. Fabric V. Three perforations D: 3 10, 13, 13mm. T: 55mm L: 160mm. Corner groove: Two corners have external pre-firing groove finger moulded W: 20mm T:10mm and W: 15mm by T: 7mm; Wt: 1231g. Zone 13, ctx 130033, Pit 130032 ON521. Phase 415 Early/Middle Iron Age

13. Triangular oven brick. Complete. Roughly moulded flat undulating surfaces, rounded arrises and sharply rounded corners. One face smooth and fired black; other surfaces covered in concretion, but appear to be fired to buff and pink. One of the corners cindered and near- vitrified on the buff fired face. Fabric A. T: 45mm L: 105mm. Perforations D: 3: 7, 8, 9mm. Corner groove two corners with external groove W: 15mm; T: 5mm; Wt: 658g. Zone 13. ctx 130033 Pit 130032 ON 523. Phase 415 Early/Middle Iron Age

14. Triangular oven brick. Complete. Hand moulded triangular brick with some well smoothed areas on the triangular faces, but some rougher patches with organic impressions. Arrises and corners sharply rounded. Fired black over most of one triangular face, reddened on other. Fabric V. L: 140mm; T: 44mm; Wt: 742g. Perforations D: 3: 8-10mm. Corner groove, two corners have pre-firing external finger moulded shallow groove. Zone 13, ctx 130033 Pit 130032 ON524. Phase 415 Early/Middle Iron Age

15. Triangular oven brick. 75% complete with 2 corners missing; Continued in use after corner broken off. Well finished surfaces; angular corner. One face decorated with triskel pattern, made by the fingers. Fabric A. L: 50mm; T: >130mm; Wt: 894g; Perforations D: 2: 9, 10mm. Corner groove: none. Zone 13, ctx 130033 Pit 130032 ON514. Phase 415 Early/Middle Iron Age

16. Triangular oven brick: Complete. Very well finished smooth moulded surfaces, sharp rounded corners and angles. Triangular faces convex, sides flat. All corners worn on one side, all on the same triangular face. Fabric A. L: 145mm; T: 60mm; Wt: 958g; Perforations D: 3: 10-11mm. Corner groove, two shallow groove moulded across two corners; third is damaged but probably had a groove (moulded by finger pre-firing).

Zone 13, ctx 130033 Pit 130032 ON515. Phase 415 Early/Middle Iron Age

17. Triangular oven brick. Complete. Hand moulded, even fairly smooth surfaces: triangular faces both slightly hollowed. One side surface was fairly smooth, one rougher and the third slightly damaged. One perforation very narrow D: 4-5mm made in two attempts from same side, resulting in a figure-of-8 shape on one side. Sharply rounded arrises and corners. Differential firing on opposite faces: one side partly blackened, the other face reddened. Corner groove: two very slight finger moulded external groove across two corners. Fabric V. L: 144mm; T: 48mm; Perforations D: 3: 7-8mm; Wt: 690g. Zone 13, ctx 130033 Pit 130032 ON517. Phase 415 Early/Middle Iron Age
18. Triangular oven brick. 30% complete. Corner of triangular brick with very smooth, flat and well finished surfaces. The edge surfaces are damage and part of triangular face also partly flaked, but it has continued in use and these surfaces both broken and unbroken covered in white salt residue over the apex of the corner. The rest is coloured pinkish mauve one side and light red the other. Fabric V. L: >80mm; W: 55mm; Perforation D: 12mm; corner groove W: 15mm; T: 5mm. Wt: 143g,, Zone 6, ctx 137225, Pit 137222. Phase 415 Early/Middle Iron Age
19. Triangular oven brick. 85% complete with damage to corner and surfaces. One face decorated or marked with two finger grooves forming a cross. Fabric V. One finger groove L: 85mm running vertically from apex of one corner and crossed by another finger groove L: 75mm at right angles. L: 145mm; W: 52mm; Perforations D: 3: 7-8mm; two corner grooves W:15mm; T: 5mm; Wt: 1044g. Zone 6 ctx 256042, Pit 256029, ON3918. Phase 420 Middle Iron Age
20. Triangular oven brick, *c* 95% of a triangular, damage to centre of one triangular face and one side surface. Surfaces smooth and well finished with well rounded corners. Coloured cream over one triangular face and one corner with pink-lavender mottles changing to orange around the sides and over the opposite face. The colours indicate it was used in salt working. Fabric A. L: 135mm, T: 60mm; Perforations D: 3: 7/8, 10x18, 11mm. Corner groove: 3: W: 10, 13, 20mm, T: 5-10mm, Wt: 766g. Zone 6, ctx 277044 Pit 277042, ON 3893. Phase 415 401 Iron Age
21. Triangular oven brick. 100% complete. Small example with smooth surfaces, sharp rounded arrises and angular but worn and rounded corners. It narrows at two corners. One edge is curved. Fabric A. L: 150mm, T: 56mm, perforations D: 3: 5-8mm. Wt: 412g. One corner groove. Zone 6, ctx 277044 Pit 277042, ON2156. Phase 401 Iron Age

Pedestal, Firebars and Miscellaneous supports

22. Pedestal. Prismatic square sectioned pedestal with roughly moulded surfaces with some finger grooves and one smooth surface possibly where a vessel base has been pressed into it. Fabric B. H: 50-63mm; W: 50mm; Wt: 341g. Zone 6, ctx 216123, Ditch 170101. Phase 415 Early or Middle Iron Age
23. Firebar/pedestal. Tapered end of roughly moulded bar with sub-oval/lozenge-shaped cross-section. The narrow flattened end has a concave groove across it 6mm wide. This could be the end of a tapered fire bar or the base of a tapered 'cup pedestal'. Fabric E. L: >50mm; W: 29-35mm/32-48mm; Wt: 341g. Zone 11, ctx 158008, Pit 158007. Phase 500 Roman
24. Firebar/pedestal. Rounded end of linear object with oval/sub-rectangular cross-section. It appears to be expanding in size at the broken end suggesting this formed a tapered bar. It could be either a firebar or a pedestal with spatulate end and at the missing top end a cup like top to hold a briquetage vessel. Fabric E. L: >50mm; W: 18->30mm/45mm; Wt: 49g. Zone 13, ctx 203058, Pit 203056. Phase 515 early Roman
25. Pedestal or firebar (not illustrated). End fragment with sub-square or rectangular cross-section and tapered. Surfaces roughly moulded and slightly convex and curve round to the narrow square end, though the end surface is broken or damaged. Two opposite faces are salt whitened. Fabric V. L: >60mm; W: 30-43mm/>34mm; Wt: 341g. Zone 20, ctx 144132, Hearth/oven 249085. Phase 595 mid- or late Roman
26. Pedestal. Small hour-glass shaped pedestal or pinch prop with concave sides and flat moulded undulating ends, converging slightly. The thinner side appears to be broken. Fabric A. L: 43mm; W: 20-30mm/34mm; Wt: 33g. Zone 20, ctx 144132, Hearth/oven 249085. Phase 595 mid- or late Roman
27. Support/prop. Small rounded knob shaped piece of moulded clay with a flattish base surface with two fingertip depressions, but possibly sheared off where luted onto a larger object or structure. On the top the clay has been drawn up into a rounded knob pinched in slightly at the base. Fabric AV. Base L: 35mm ; W: 31mm. Knob L: 19 x 23mm, H: 24mm; Wt: 14g. Zone 14, ctx 167088, Pit 167081. Phase: 600 Saxon
28. Pedestal/pinch prop. Part of small hour-glass shaped pedestal or pinch prop used as a stabiliser or support. Smooth undulating surfaces. Broken at wider end and part of one side face missing. Subrectangular cross-section and flattened end. Fabric A. L: >39mm; W: 11-20mm/26-27mm; Wt: 10g. Zone 6, ctx 305067. Colluvium 170010 Unphased
29. Sub-circular discs (not illustrated). Lentoidal cross section and impressions of straw stems on some surfaces. Fabric E. A – L: 32mm; W: 31mm; T: 11mm. B – L: 36mm; W 27mm/15mm; Wt: 18g. Zone 20, ctx 228062, SFB 228059. Phase 565 mid-Roman
30. Oval disc. Looks like a small oval flat pebble, but made from clay cut to shape from a solid lump of natural clay/mudstone. Smooth gently convex surfaces and a curving perpendicular edge cut in flat facets. Fabric A. L: 53mm; W: 47mm; T: 20-28mm; Wt: 86g. Zone 6, ctx 317035, Group 126275. Phase 410 Early Iron Age
31. Hand squeezed lump. Irregular lump, roughly oblong with semi-triangular profile, finger depressions on two sides and one rough flat pressed surface. Fabric A. L: 44mm, W: 26mm; T: 23mm; Wt: 16g. Zone 6, ctx 240149, Pit 254104. Phase 598 late Roman
32. Hand squeezed lump. Rounded oblong object with rough hand moulded surface, finger marks and grooves. Fabric AV. L: 67mm; W: 28-55mm; T: 23-36mm; Wt: 105g. Zone 13, ctx 173200, SFB 193140. Phase 515 early Roman
33. Hand squeezed lump. Irregular sub-oval form with one convex surface and one flatter with distinct finger depressions. Fabric AV. L: 65mm, W: >45mm, T: 35mm, Wt: 138g, Zone 14, ctx 202006, Pit 202003. Phase 610 early/mid-Saxon

Briquetage

Clips and Vessels

34. Briquetage clip, type CL10. Group of four hand moulded tongue-shaped briquetage clips with finger prints where clay has been pressed over vessel rim and imprints from the vessels' wall and rim on the opposite side. All coloured grey, buff and light orange and made in a distinctive variant of fabric X2 with the addition of red grog pellets. Zone 6, ctx 125257, Pit 170179. Phase 500 Roman
   Clip A (*illustrated*). L: 62mm; W: 30mm; T: 14-18mm; Wt: 24g
   Clip B (*not illustrated*). L: >25mm; W: 35mm; T: 12mm
   Clip C (*not illustrated*). L: 35mm; W: 36mm; T: 11-22mm
   Clip D (*not illustrated*). L: >25mm; W: >25mm; T: 17mm
35. Briquetage clip, type CL10. Roughly hand moulded clip with hand moulded surfaces, the top steeply angled, unless the vessel rim is inturned rather than vertical. On one side is the impression of the vessel wall and rim and on the opposite side a deep thumb impression. Coloured lavender, purple, pink and cream. Fabric: X2. L: 54mm; W: 35mm; T: 30mm; Wt: 21g. Zone 11, ctx 189076, PH 189075. Phase 500 Roman
36. Briquetage clip, type CL10. The fragment has been moulded over the rim of a vessel creating a projecting lip broken where the clip would have continued to the adjacent vessel. The cast of the vessel rim and inner wall face has produced a smooth convex surface. Surface is hand moulded with finger marks pressing into the clay and forms a rounded tongue shaped projection down the vessel side. Coloured lavender, purple, pink and cream. Fabric: X2. L: 43mm; W: 38mm; T: 14-21mm; Wt: 19g. Zone 11, ctx 189082, Pit 189077. Phase 500 Roman
37. Briquetage clip or pinch prop (not illustrated). Wedge shaped fragment with roughly triangular cross-section. Two moulded surfaces roughly flat with concave depressions and third broken edge, which has a narrow groove along it. Fabric: A. L: 35mm; Width 30mm; T: 22mm; Wt: 14g. Zone 20, ctx 252099, Pit 2521055. Phase 565 mid-Roman
38. Briquetage vessel. Type V1 and clip. Type CL10. This fragment consists of two parts. The outer skin is a thin walled cylindrical briquetage vessel with a flat rim and the exterior surface hand moulded with vertical finger marks and covered with a cream veneer. The interior surface of the vessel is entirely covered by a large tongue shaped clip with rounded edges and tip pressed over the rim and into the inside of the vessel resulting in a deep fingertip depression in the surface. Fabric: A (clip), B (vessel). Vessel H: >53mm; D: 80mm; T: 4-6mm. Clip: L: 81mm; W: 47mm; T: 12-24mm; Wt: 58g. Zone 11, ctx 156149, Pit 156146. Phase 515 early Roman
39. Briquetage clip. Type CL10. Upper section of clip wrapped over rim of broken sherd and with part of connecting bar separating the adjacent vessels. Vessel rim not visible and merges into the clip. The clip is thick with a rounded profile at the top and a smooth moulded surface with a finger mark. It has been wrapped over the vessel rim and down the inner wall of the vessel. Externally it is pinched in and moulded to form a bar with a roughly D-shaped cross-section extending 20mm or more beyond the vessel. Fabric A. H: 30mm; W: 33mm; T: 9mm. Connecting bar W: 27x18mm; Wt: 20g. Zone 6, ctx 301076, Circular Structure 170030. Phase 460 Late Iron Age or early Roman
40. Briquetage vessel. Type V1? and clip? type CL10. Thick layer of clay folded over the rim (type R3) of a briquetage sherd of which little remains. Clay wrap extends 27mm above the rim and looks more like an extension to the rim than a typical clip. Inner surface is folded over in two layers forming rounded stepped lips. Fabric A2. Sherd T: 6mm. Clip T: 17-22mm; D: 80-90mm (in side of clip), 110mm (exterior of clip), L: >40mm; Wt: 25g. Zone 6, ctx 245149, Pit 245137. Phase 515 early Roman
41. Briquetage vessel (not illustrated). Type V3; Rim type R3. Five sherds including two rim sherds (type R3, one everted) and thin curving body sherds. Fabric A. D: 150mm; T: 5, 6, 7mm; H: >37mm; Wt: 17g. Zone 13, ctx 143227, Ditch 134099. Phase 410 Early Iron Age
42. Briquetage vessel (not illustrated). Type V1. Surface discoloured cream on interior *c* 25mm below rim and on exterior from 10-12mm below rim. Fabric X2. Unaffected surface probably represents the area covered by a clip. D: 90mm; H: >37mm; T: 5-6mm thick; Wt: 7g. Zone 6, ctx 232088, PH 232095. Phase 515 early Roman
43. Briquetage vessel (not illustrated). Type V1. Body sherd of handmade vessel, large cylindrical vessel with coarse longitudinal finger grooves down outer surface and less pronounced on inner surface. Fabric: X2. D: 230mm; H: >52mm; T: 8-11mm. Zone 6, ctx 243099, Ditch 170137. Phase 460 Late Iron Age or early Roman
44. Briquetage vessel. Type V1; rim type R3. Smooth inner surface, outer surface more undulating. The rim of the vessel is differentially coloured to orange contrasting with the cream exterior surface over the rest of the sherd indicating it had been covered by a clip extending 5-10mm down exterior surface. Fabric X2. D: *c* 100mm; H: >38mm; T: 7mm; Wt: 6g. Zone 6, ctx 132147, Well 142144. Phase 515 Early Roman
45. Briquetage vessel. Type V1. Sherd from lower edge of a cylindrical vessel, broken at the base angle. Outer wall discoloured cream tinged with lavender, except along the lower angle, which is reddish orange, probably covered by clay luting or stabiliser pressed against the vessel base. Fabric: X2. D: *c* 120mm; T: 6-10mm; Wt: 9g. Zone 10, ctx 127027, Pit 127030. Phase 515 early Roman
46. Briquetage vessel (not illustrated). Type V1, rim type R3 with slightly scalloped effect horizontally. Greyish-mauve colour. Fabric X2. D: 100mm; T: 6-7mm thick; Wt: 6g. Zone 6, ctx 177476, Ditch 170089. Phase 565 mid-Roman
47. Briquetage vessel. Type V3 rim of curved cup/vase, rim type R3, slightly everted. Smooth surfaces – especially interior, more so than exterior. Fabric X2. D: 60mm; T: 5-8mm; Wt: 2g. Zone 6, ctx 255056, Pit 255053. Phase 565 mid-Roman
48. Briquetage vessel. Type V3 rim of curved cup/vase, rim type R3, slightly everted with chaff impression across it. Thin walled sherd, discoloured purplish grey. T: 5mm; D: *c* 80-90mm; Wt: 8g. Fabric: X2. Zone 6 ctx 255057, pit 255053. Phase 565 mid-Roman
49. Briquetage vessel. Type V3, rim type R3. Rim of a vessel with slightly everted rim or hint of a slight neck. T: 6mm; Wt: 6g. Fabric: X2, Zone 10 ctx 127027, pit 127030. Phase 515 early Roman

50. Briquetage vessel (not illustrated). Type V4? Base fragment from straight sided trough or tray-like vessel. Outer angle obtuse, internal angle rounded. Fabric A. L: >40mm; T: 8mm; Wt: 8g. Zone 29, ctx 159028, Pit 159027. Phase 500 Roman

Ceramic, clay and mudstone textile production artefacts

Iron Age clay spindle whorls

A total of ten objects, all spindle whorls, were recovered mostly from pits of Early-Middle Iron Age date except for one from a Middle-Late Iron Age cobbled surface. Nearly all of the spindle whorls are conical or tronconique in form, apart from one biconical and a very fragmentary piece which may have been cylindrical with a grooved waist. The complete whorls range in weight from 14g to 34g, maximum diameter from 32mm to 44mm and height from 20mm to 31mm. The central perforation is generally slightly tapered and measures between 4 and 8mm, except for one of 9-13mm. There are, in addition, three chalk spindle whorls, all from probable Iron Age contexts (see Worked Stone).

Catalogue (not illustrated)

1. Spindle whorl. Fired clay Fabric B. Form conical. Smooth sloping sides with small bevel at the wider end joining to the countersunk concave surface. D: 7-32mm; T: 23mm; Wt: 15g. Conical perforation D: 4-7mm. Zone 7, ctx 287046, Cobbled surface, ON 2771. Phase Middle-Late Iron Age
2. Spindle whorl? Fired clay Fabric A. Form: small fragment with well finished smooth concave moulded surface with curving angle to side edge. It may the edge of a perforation or the moulded surface of a small object such as a spindle whorl. W: >16mm; T: >17mm; Wt: 5g. Zone 13, ctx 125055, Pit 125053. Phase Early-Middle Iron Age

3. Spindle whorl. Fired clay Fabric B. Form: tronconique, 60% complete, damage to one side. Flat top and base with smooth sloping sides. Perforation, cylindrical: 7mm dia. Thickened halo of clay around perforation on wider end. D: 27-38mm; T: 31mm; Wt: 34g. Zone 13, ctx 139131, Quarry pit 139132, ON 4411. Phase Early-Middle Iron Age

4. Spindle whorl. Fired clay Fabric B. Form: bi-conical, 100% complete. Narrow end flattened; wider end has countersunk concave surface. Neatly finished, cylindrical, slightly tapered perforation: 6.5-8mm widening to countersunk end. D: 32mm; T: 23mm; Wt: 22g.; Zone 13, ctx 168147, Pit 168115, ON 886. Phase Early-Middle Iron Age

5. Spindle whorl. Fired clay Fabric A. Form: conical, c 90% complete, slight damage on one side. Even surfaces but cracked during drying/firing. Flat end; sides slope in to perforation at narrow end. Perforation D: cylindrical 5-7mm; D: 34mm; T: 20mm; Wt: 14g. Zone 13, ctx 186025, Pit 186021, ON 834. Phase Early-Middle Iron Age.

6. Spindle whorl Fired clay. Form: Unclassified Wt: 16g. Zone 13, ctx 200065, Inhumation burial 200062. Phase Early-Middle Iron Age

7. Spindle whorl. Fired clay Fabric A. Form: tronconique, 100% complete. Wider end very slightly hollowed/concave; narrower end slightly domed/convex. Smooth surfaces, very well finished. Resembles ON 1500. Very regular cylindrical perforation D: 9-1mm tapering to narrower end. D: 24-40mm; T: 26mm; Wt: 53g.; Zone 13, ctx 200066, Inhumation burial/skeleton 200062, ON 1504. Phase Early-Middle Iron Age

8. Spindle whorl. Fired clay Fabric B. Form: tronconique, 100% complete. Narrow end slightly convex and curves into sides; upper surface is slightly convex with shallow countersunk perforation D: 6mm. Iron staining on side. D: 20-43mm; T: 22mm; Wt: 35g.; Zone 13, ctx 200066, Inhumation burial/skeleton 200062, ON 1500. Phase Early-Middle Iron Age.

9. Spindle whorl. Fired clay Fabric B. Form: conical, 100% complete. Conical with wide slightly concave end, smooth even sides sloping in to very narrow rounded end. Tapered perforation D: 9-13mm; T: 23mm; D: 15-44mm; Wt: 30g.; Zone 13, ctx 248060, Pit 248058, ON 1520. Phase Early-Middle Iron Age

10. Spindle whorl Fired clay Fabric A. Form: cylindrical. Fragment from countersunk end with part of concave side. Probably cylindrical with grooved waist. D: *c* 40mm; T: >13mm; Wt: 4g. Zone 22, ctx 290064, Ditch 290581. Phase prehistoric

Late Iron Age-Roman ceramic, clay and mudstone spindle whorls

A total of 13 objects, all spindle whorls except for one which may be a clay ball or slingshot, were recovered from a variety of features of Late Iron Age-Roman date. The majority were from early Roman phased contexts. The predominant form of spindle whorl in this phase is discoidal, though two hemispherical and a very petite tronconique type are also present. A range of materials were used including pottery sherds, amphora, tile and mudstone, resulting in all being chipped or cut from the chosen material. Some of the potsherds were very roughly finished, including a pot base which may have been left unfinished. By contrast, those made from mudstone, amphora and tile were extremely well finished, with very smooth surfaces and neatly drilled perforations. The complete whorls range in weight from 8g to 70g, maximum diameter from 20mm to 73mm and height from 4mm to 22mm. The central perforation is generally drilled and slightly biconical measuring between 5 and 12mm in diameter. One is decorated with two scratched concentric lines encircling the perforation. There are, in addition, two chalk spindle whorls from Late Iron Age-Roman contexts (see Worked Stone), and a small number of perforated oyster shells could have served a similar function.

The diameter/weight index is often considered a better indicator than the diameter/height index to differentiate spindle whorls in terms of the types of fibre and size range of threads spun. The evidence from the assemblage considered here suggests that the fibre type and thread size range both remained similar through all periods even though the forms of the spindle whorls changed, particularly from the Iron Age through to the Roman period.

Catalogue (not illustrated)

1. Spindle whorl. Amphora Dressel 1 fabric. Form: hemispherical, 100% complete with one flat surface and one convex with decoration of two scratched concentric lines encircling the biconical perforation D: 11-9-12mm. D: 33mm; T: 18mm; Wt: 21g.; Zone 19, ctx 232078, Ditch 232077, ON 2481. Phase Late Iron Age-early Roman
2. Spindle whorl. Mudstone. Form: discoidal, 100% complete. Very neat finish. Flat discoidal form with narrow vertical edge and surfaces flat in centre but gently bevelled around edge to create gently domed profile. Slightly biconical perforation D: 12-9-12mm; D: 45mm; T: 10-12mm; Wt: 39g. Zone 6, ctx 255030, Ditch 255029, ON 671. Phase Late Iron Age-early Roman
3. Spindle whorl. Mudstone. Form: hemispherical, 100% complete. Smooth surfaces. One flat end with linear marks from shaping, other side smooth and convex. Well finished. Drilled perforation, cylindrical – slightly tapered to convex 'narrower' end, D: 9-13mm; D: 41mm; T: 22mm; Wt: 48g. Zone 10, ctx 258348, Ditch 258330, ON 4384. Phase Late Iron Age-early Roman
4. Spindle whorl. Fine sandy pottery fabric. Form: discoidal, slightly over 50% complete. Chipped potsherd of sub-circular shape with roughly chipped edge, poorly finished compared to some, neatly drilled bi-conical perforation D: 9-7-9mm; T: 9mm thick, 48mm; Wt: 16g. Zone 6, ctx 258049, ON 872, Pit 256060. Phase early Roman
5. Spindle whorl. Amphora Dressel 1 fabric. Form: discoidal, 100% complete. Very neat finish. Smooth, flat surfaces, very smooth vertical edge. Slightly biconical perforation D: 12-9-12mm; D: 48mm; T 13 mm; Wt: 36g. Zone 6, ctx 258049, Pit 256060, ON 2185. Phase early Roman
6. Spindle whorl. Pottery. Form: discoidal, c 60% complete. Chipped circular disc fairly neat but with rough chipped edges. Perforation, drilled, biconical D: 12–6-12mm; D: 62mm; T: 13 mm; Wt: 47g. Zone 6, ctx 302029, Pit 302028, ON 2954. Phase early Roman
7. Spindle whorl. Fired clay. Form: Unclassified. Wt: 34g. Zone 13, ctx 139191, Quarry pit 139172, Phase early Roman
8. Spindle whorl. IA fine sandy pottery fabric. Form: discoidal, 100% complete. Neatly chipped disc from potsherd. Rough edge has been fairly well smoothed, but not all irregularities removed. Drilled biconical perforation D: 8-6-9mm; D: 38mm; T: 7mm; Wt: 12g.; Zone 13, ctx156150, Pit 156146, ON 1517. Phase early Roman
9. Spindle whorl IA-RB fine sandy/grog fabric. Form: discoidal, 100% complete. Pot base with walls broken off in rough irregular manner and no further attempt to neaten the edge. The perforation has been roughly chipped out with a narrow oval ended point 3x4 mm, which has left a ring of marks surrounding the very crude, gross perforation. Eye shaped perforation D: 12x16 mm, off-centre. Possibly unfinished. D: 73mm; T: 12-19mm; Wt: 70g. Zone 13, ctx173200, SFB 173201, ON 1519. Phase early Roman
10. Spindle whorl. Fired clay Fabric A. Form: tronconique, 90% complete. Slight damage to surface. Very petite. Flat top and base; sides smooth and slightly convex. Scored line around circumference on wider end. Perforation D: 3mm; T: 15mm; D: 20mm; Wt: 7g. ON 3900; Ctx 130229, SFB 130228, Zone 6. Phase mid-Roman
11. Spindle whorl. RB grog-tempered pottery. Form: discoidal, 100% complete. Roughly chipped from potsherd and poorly finished, subcircular disc. Biconical perforation D: 5-8mm slightly off-centre. Badly finished. D: 33x36m; T: 9mm; Wt: 14g. Zone 6, ctx 246170, PH 246169, ON 4194. Phase mid-Roman
12. Spindle whorl. Coarse sandy ceramic/tile fabric ?Eccles. Form: discoidal, 100% complete. Very well finished with smooth flat surfaces except slightly irregular on one side, which looks like the sanded base of a tile and vertical smooth edge. Very well finished drilled bi-conical perforation D: 10-8-9mm; D: 42mm; T: 12mm; Wt: 23g. Zone 11, ctx 143150, Pit 143148, ON 434. Phase mid-Roman
13. Ball/Slingshot? Fired clay Fabric A. Spherical/ cylindrical object with a circular cross-section and more elongated long axis (though incomplete). It has a very smooth convex surface. It could be fragment of clay ball, slingshot or spindle whorl. D: 37mm; H: >23mm; T: 17mm; Wt: 7g. Zone 6, ctx 130010; 'Dark soil' 170028. Phase late Roman.

Saxon-medieval clay spindle whorls and loomweights

A total of six objects were recovered comprising four spindle whorls and two loomweights. The loomweights are of typical Saxon bun-shaped form, made in fired clay Fabric A and measuring 80-100mm in diameter and 43mm to over 46mm thick. One was found in a Saxon pit but the second came from a tree-throw hole with Iron Age pottery. The spindle whorls are made in fired clay or mudstone and exhibit hemispherical, tronconique and discoidal forms. One was found in a Saxon hearth, two were associated with Saxon burials and one came from a medieval ditch. One of those from a burial is quite small but is decorated with a series of concentric incised lines covering all surfaces. The hemispherical whorl from the medieval ditch is also decorated with two thin incised concentric lines, between which is a short length of incised zig-zag line. This hemispherical whorl is very similar to the Roman examples and it may be residual, as may be the tronconique type which is very similar in character to the Iron Age examples. There is also a single worked bone spindle whorl from a medieval ditch in Zone 3 (see Worked Bone).

Catalogue

1. Loomweight. Fired clay Fabric A. Form: bun-shaped with central perforation. D: *c* 80-85mm; T: >46mm; Wt: 84g. Zone 3, ctx 151003, tree throw 151001, ON 4041. Phase ?Early or Middle Iron Age
2. Loomweight. Fired clay Fabric A. Form: bun-shaped weight, smooth curving surfaces; part of surface of

central perforation suggests this was irregular hand-moulded wider at one end. D: 100mm; T: 43mm; Wt: 159g. Zone 14, ctx 203005, Pit 203004. Phase Saxon

3. Spindle whorl. Fired clay/Mudstone. Form: tronconique, 100% complete. Very flat top and base; very smooth sloping surfaces. Perforation D: 10-13mm, tapering to narrower end. Similar in form to the Iron Age spindle whorls, possibly residual. D: 25-35mm; T: 20mm; Wt: 30g. Zone 14, ctx 191117, Hearth 191119, ON 509. Phase Saxon
4. Spindle whorl. Fired clay/Mudstone. Form: discoidal, 80% complete. Damage to surface. Circular disc with rounded curving edge and slightly convex ends; 11 concentric incised lines scored on all surfaces. Drilled cylindrical perforation D: 7mm; D: 26mm; T: 10mm; Wt: 6g. Zone 19, ctx 166106, Inhumation burial/skeleton 166105, ON 2043. Phase Saxon
5. Spindle whorl. Fired clay. Form: Unclassified. Wt: 21g. Zone: 19, ctx 252078, Grave 252073. Phase early or mid-Saxon
6. Spindle whorl. Fired clay/Mudstone. Form: hemispherical, 100% complete; broken in four and refitted. Smooth flat surface on one side, convex hemispherical on the other. Two scored concentric lines around perforation on convex side with a short length of zig-zag line between. Perforation D: 10mm. The form is very similar to some of the Roman spindle whorls, possibly residual. D: 42mm; T: 18mm; Wt: 26g. Zone 3, ctx 247058, Ditch 247057, ON 112, Phase medieval

Chapter 13

Human Bone

by Jacqueline I McKinley and Kirsten Egging Dinwiddy

Introduction *by Jacqueline I McKinley*

Human bone, cremated and unburnt, was recovered from 15 of the 29 zones within the EKA2 scheme (Volume 1, Fig 1.1). The deposits covered a broad temporal range extending from the Middle Neolithic to the mid-Saxon period. In the absence of associated diagnostic artefacts, particularly with respect to many of the prehistoric deposits, dates were obtained via an extensive programme of radiocarbon analysis of appropriate bone samples (see Chap 21).

Unburnt bone was collected from 300 contexts across 13 zones (Tables 13.1-13.3). The one Middle Neolithic deposit was found in Zone 13, where almost half of the

Table 13.1 Number of prehistoric contexts containing unburnt human bone within each phase and MNI by Zone

Zone	*No. contexts/phase*	*MNI*	*Immature individuals*	*Adults*
4 (inc. WP)	LIA/ERo: 6	5 (3 *in situ*)	2 subadult (F, ?F)	3 adults (1F, 1M)
6	Prehist.: 1 E/MIA: 7 MIA: 2 M/LIA: 3 LIA: 3 LIA/ERo: 10	10 (5/?6 *in situ*)	2 neonates, 2 juveniles	1 subadult/adult (??F) 5 adults (1??F, 3M)
7	M/LIA: 1 LIA/ERo: 2	2 (*in situ*)	1 juvenile/subadult	1 adult
12	E/MIA: 1 MIA: 15 LIA: 1	16 (14 *in situ*)	3 infants, 2 juveniles 1 juvenile/subadult 1 subadult	9 adults (4 F, 1??F, 3M, 1 ?M)
13	M.Neo.: 1 EBA: 4 E/MBA: 6 MBA: 3 BA: 1 E/MIA: 10 MIA: 11 LIA: 1 IA: 13	26 (17 *in situ*)	1 foetal, 4 neonate 2 infant, 3 juveniles 3 subadults	1 subadult/adult (?F) 12 (4F, 1??F, 3M, 3?M, 1??M)
19	LBA: 1 M/LIA: 1 IA: 2	4 (1 *in situ*)	1 infant 1 juvenile/subadult	2 adults (1?F, 1M)
21	EBA: 4 E/MBA: 1 MBA: 1 LBA: 6 BA: 2 ?IA: 1 u/d: 1	15 (13 *in situ*)	1 infant 1 juvenile 1 subadult/adult (?F)	12 (2?F, 1??F, 1 ?M, 6M)
23	MBA: 1	1 (*in situ*)		1 (F)
24	LBA: 1	1 (*in situ*)		1 (F)
29	?LIA/ERo: 1	1		1

Key: WP - Weatherlees Pond

Bronze Age deposits (15 of 31 contexts) were also situated. The rest of the material from this phase was recovered across the northern zones (19 and 21–24). Most of the deposits were associated with the various ring-ditches found in Zones 13, 21 and 23. Burials, as singletons or forming small groups, had been made within the areas described by four of the ring-ditches and within the fill of two other ditches. Redeposited bone, some possibly curated and deliberately 'placed', was also recovered from the fills of contemporaneous and later features. The 72 Iron Age contexts were dispersed across six zones ranged along the length of the scheme (Zones 6, 7, 12, 13 19 and 21), with a further 14 Late Iron Age/early Roman deposits from Zones 4, 6, 7 and 29. The Iron Age deposits comprised singletons and small grave groups, with a substantial proportion of redeposited bone particularly from the extensively occupied Zone 6 and the heavily pitted Zone 13. The small, Middle Iron Age linear cemetery in Zone 12 represents the most cohesive group of this date. Some of the redeposited fragments of skull vault from pits and other contemporaneous features in Zones 6 and 13 may represent deliberately placed deposits of curated material.

A substantial proportion of the unburnt bone is of Roman date (95 contexts) and was recovered from eight zones (6, 7, 9, 13 and 19-21). Many of the burial remains came from one of the three mixed-rite (predominantly inhumation) cemeteries within Zones 19 and 20, though one other enclosed cemetery of this type lay in Zone 10 (Volume 1 Figs 4.30, 4.51, 4.98). Small burial groups and scattered singletons were found in the southern zones, particularly Zone 6, the latter also being the origin of much of the redeposited bone. Redeposited remains were also recovered from one inhumation and one cremation grave in Zone 10. In the former case, the bone may have been accidentally disturbed and redeposited

Table 13.2 Number of Roman contexts containing unburnt human bone within each phase and MNI by Zone

Zone	*No. contexts/phase*	*MNI*	*Immature individuals*	*Adults*
6	ERo: 12 E-MRo: 7 MRo: 4 M-LRo: 4 LRo: 1 Ro: 5	15 (10 *in situ*)	3 neonates, 2 infants 2 juveniles	1 subadult/adult 7 adults (1F, 3M, 1?M)
	Total: 33			
7	ERo: 1 E-MRo: 6	6 (5 *in situ*)	-	6 adults (2F, 4M)
10	ERo: 1 E-MRo: 2 M-LRo: 2 LRo: 1 Ro: 5	12 (7 *in situ*)	2 neonates 1 infant/juvenile	9 adults (3F, 1?F, 1??F, 3M, 1?M)
13	ERo: 7	3 (1 *in situ*)	1 neonate 1 infant/juvenile	1 adult
14	Ro: 1	1	1 infant	-
19	ERo: 3 M-LRo: 9 LRo: 1 Ro: 8	21 (21 *in situ*)	1 neonate, 3 infants 2 juvenile, 1 subadult	14 adults (8F, 1?F, 1??F, 4M)
20	MRo: 6 L-MRo: 5 Ro: 3	14 (12/?13 *in situ*)	6 neonates (1??F) 1 infant, 1 subadult	6 adults (1?F, 3 M, 1?M, 2 ??M)
21	Ro: 1	1	1 neonate	-

Table 13.3 Number of Saxon contexts containing unburnt human bone and MNI by Zone

Zone	*No. contexts/phase*	*MNI*	*Immature individuals*	*Adults*
14	MAS: 23	24 (23 *in situ*)	1 infant, 2 juveniles 1 subadult (M)	20 adults (7F, 10M)
19	EAS: 57	55 (50/?54 *in situ*)	4 infants, 4 juveniles (1??F) 1 juvenile/subadult 3 subadults (1M, 1??M)	43 adults (26F, 13M)

during the cutting of a later grave, but the presence of what appear to represent three 'empty' graves within the cemetery suggests some deliberate post-depositional manipulation or the presence of cenotaphs.

The Saxon material (80 contexts) largely derived from *in situ* deposits and was more confined in its distribution than that from other periods. All the material was recovered from one of the five cemeteries investigated; one small grave group was situated in Zone 14 and parts of three or possibly four others were excavated along the length of the scheme in Zone 19. Five of the graves in three of the cemeteries within the latter area contained the remains of multiple interments; in two cases the bodies had been laid adjacent (one triple, one double), and in three others two individuals had been placed one above the other (Volume 1, Fig 5.4, 5.19, 5.28).

Cremated bone was found in many of the same zones as the unburnt remains but had a slightly wider and more dispersed distribution (14 zones, 107 contexts: Table 13.4). The temporal range shows a slightly stronger prehistoric content than within the unburnt bone assemblage, though the highest proportion of contexts (54) are of Roman date. The 38 Bronze Age deposits were spread across 11 zones (4, 6–8, 10–14, 21 and 23), those in the Zones 13 and 23 being associated with the ring-ditches. The nature of some of these – and later – cremation-related deposits is inconclusive (see below), but they include the remains of four urned and a possible 10 unurned burials, most graves also incorporating redeposited pyre debris. The ten Iron Age and a further ten Late Iron Age/early Roman (LIA/ERo) deposits had a more confined distribution,

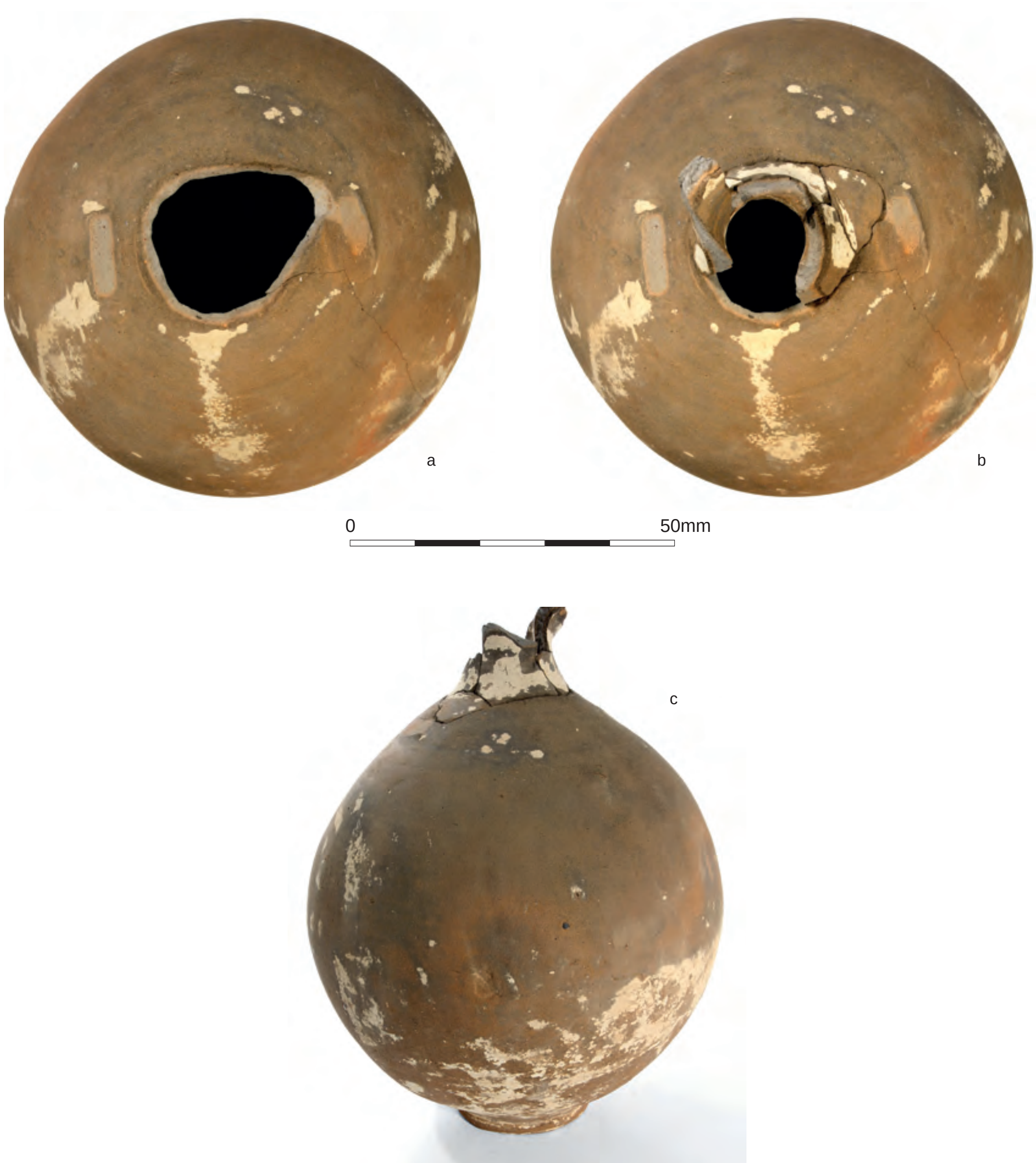
Table 13.4 Number of contexts containing cremated bone within each phase and MNI by Zone

Zone	*No. contexts/phase*	*MNI*	*Immature individuals*	*Adults*
4 (inc. WP)	M/LBA: 1 LBA: 11 LIA/ERo: 1	4 (inc. 1 no age/sex)	1 infant 1 juvenile/subadult	1 adult (F)
6	MBA: 1	1	1 neonate	
7	M/LBA: 1 MRo: 3	4	1 foetal	3 (1F, 2??F)
8	EBA: 3	1		1 subadult/adult
10	MNeo.: 1 ERo: 2 E/MRo: 1 MRo: 2 Ro: 1	5 (inc. 1 no age/sex)		1 subadult/adult 3 (1 F, 1??F, 1?M)
11	MBA: 1 M/LIA: 2 MIA-ERo: 3 LIA: 1	3/?4	1 juvenile	1/?2 subadult/adult (1??F) 1 adult (??M)
12	LBA: 6	3/?4	1 neonate/infant	2/?3 adults
13	EBA: 1 BA: 2 EIA: 1 E/MIA: 3 IA: 2	3	1 foetal, 1 infant	1 (??M)
14	MBA: 1 LBA: 1	2	1 infant	1 adult
19	M/LIA: 1 LIA/ERo: 6 ERo: 12 MRo: 10 Ro: 13	24	1 infant, 1 juvenile 1 subadult (??M)	1 subadult/adult 20 adults (5?F, 5??F, 1?M, 1??M)
20	MRo: 5 Ro: 2	5 (inc. 1 no age/sex)	1 infant, 1 infant/juvenile (??M)	3 adults (1F, 1 ??F, 1??M)
21	MBA: 2	1	1 juvenile	
23	E/MBA: 1	1	1 subadult	
29	ERo: 2 Ro: 1	1		1 adult (?F)

being concentrated in three central and northern zones (11, 13 and 19). They typically formed small burial groups or dispersed singletons, including the remains of four urned (LIA/ERo) and three unurned burials, two of the latter incorporating redeposited pyre debris. One LIA/ERo feature may represent the remains of a cenotaph.

There was some overlap in distribution between the Iron Age and the more common and wide-spread Roman deposits (54 contexts, five zones) in Zone 19, where the bulk of the latter were found. The LIA/ERo deposits from this zone clearly formed the earliest burials within a mixed-rite cemetery which was to continue in use throughout the Roman period. Elsewhere, as in earlier periods, the deposits comprised small groups of burials and dispersed singletons. A minimum of 16 urned and 12 unurned burial remains are represented, the graves of one of the former and three of the latter also including deposits of pyre debris. One other burial appears to have been of composite form, ie, partly urned and partly unurned, and the disturbed remains of two other burials are of uncertain form. Several burials appear to have included deliberate 'token' deposits of bone made in associated accessory vessels (ceramic grave goods). One deposit seems to represent a cenotaph.

Inevitably, with development schemes of this nature, many of the cemeteries and small burial groups lie on the margins of the areas of archaeological investigation. In several cases it is clear that the excavated graves related to larger cemeteries, as, for example, with the Late Bronze Age linear cemetery in



Pl 13.1 Vessel from Roman grave 42001 showing narrow opening through which bone was inserted: (a) opening made for insertion of bone (note marks where handles were removed prior to modification as burial urn; (b) broken neck replaced before burial; (c) side view with neck in situ

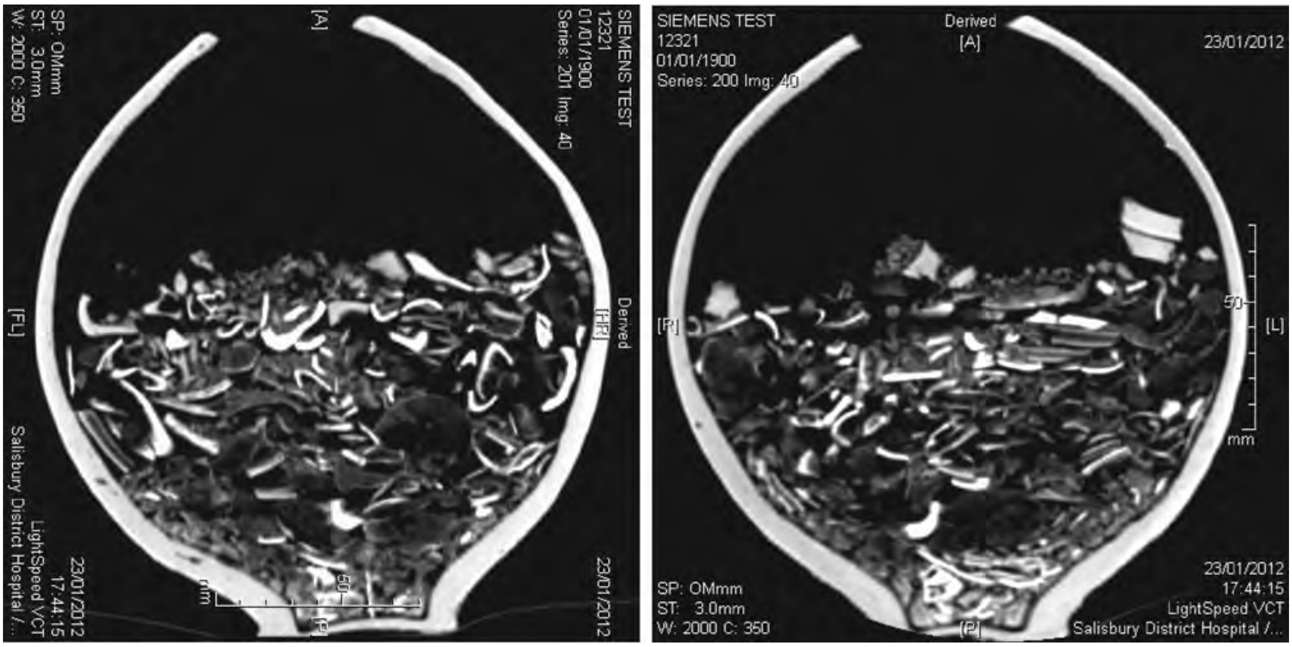
Zone 21, and the Roman and Saxon cemeteries in Zone 19. In the case of some small burial groups the same is likely to be the case but less obviously so, for example the small Roman group on the north-western margin of Zone 6, the Late Iron Age-Roman groups in Zone 7, and the Bronze Age group associated with the ring-ditch in Zone 13 (few of the ring-ditches with human remains fell fully inside the area of investigation). Occasionally, however, the excavated graves appear to represent complete or almost complete discrete groups; for example the Iron Age group in Zone 12, the Roman groups in Zones 10 and 20, and the Saxon cemetery in Zone 14.

Methods *by Jacqueline I McKinley*

Twenty-three of the ceramic vessels from what were believed in excavation to represent cremation-related features, including both those functioning as urns and as accessory vessels (together with several which proved not be directly cremation-related) were lifted with the contents *in situ* for excavation by the osteoarchaeologist. Most were Roman (Zones 6, 10 and 19), but several Bronze Age vessels (Zones 11, 14, 23 and 26) were also recovered in this manner (denoted $^{\$}$ in Table 13.32 below). The fills of each were excavated in a series of spits (generally 20mm deep) and quadrants by the writer, with annotated scale drawings and a photographic record being made at each stage to enable a detailed analysis of the burial formation processes to be undertaken (see below). The fortuitous lack of damage to the double-handled flagon found in grave 42001 (Zone 10) rendered this normal excavation process difficult to undertake due to the extreme narrowness of the opening (Pl 13.1a-c). Consequently, x-radiographs and a CT-scan of the vessel were undertaken prior to excavation to assist recording and interpretation (Pl 13.2a-b), and the bone was removed in spits but not quadrants.

Recording and analysis of the cremated bone followed McKinley (1994a, 5-21; 2000a; 2004a). All unsorted <5mm residues were subject to a rapid scan to extract any identifiable material, osseous or artefactual. Cremated animal bone was extracted, weighed, and identified by the archaeozoologist (Lorrain Higbee): a summary of this information is presented in Table 13.32 below. An assessment of the type of cremation-related deposit represented was undertaken using the results of the osteological analysis in conjunction with the primary site data. Various criteria have to be considered in such interpretation; the quantity of bone recovered, including that within the unsorted <2mm sieve residues; the age of the individual; the condition of the bone (eg, has there been taphonomic loss of trabecular bone); the surviving depth of the feature and potential level of disturbance; and the archaeological components within the feature and their relative distribution. Where a deposit was made unurned, reliable information on distribution is obtained by quadranted (and where necessary spitted) recovery of the fill enabling additional detail on the formation process to be recovered in osteological analysis (McKinley 1998; 2000b; 2013). In most cases at EKA2 uncontained cremation-related deposits were collected as single whole-earth samples, as a result of which the distribution of the archaeological components is unknown and the formation process of the deposits unrecoverable. Consequently, it was not possible to deduce the nature of some of the cremation-related deposits with confidence.

The degree of erosion to the unburnt bone was scored following McKinley (2004b, fig 6). The minimum number of individuals (MNI) amongst the unburnt remains was ascertained from the minimum number count of the most commonly occurring skeletal



Pl 13.2 Computer tomography (CT) scans of vessel from grave 42001 (vertical views)

elements in association with clear distinctions in age (McKinley 2004b).

Age for both cremated and unburnt bone was assessed from the stage of tooth and skeletal development (Bass 1987; Beek 1983; Scheuer and Black 2000), and the patterns and degree of age-related changes to the bones and teeth (Buikstra and Ubelaker 1994). As has been observed elsewhere (Molleson and Cox 1993, 150; McKinley 2011, 60; McKinley 2012a), the use of long bone lengths to estimate the age of non-modern immature individuals tends to underestimate to an increasing degree with the advancing age of the child in comparison to the age indicate by the more reliable method of dental development. Consequently, the latter has taken precedence over the former where available.

Sex was ascertained from the sexually dimorphic traits of the skeleton (Bass 1987; Buikstra and Ubelaker 1994; Gejvall 1981). The variable integrity of the attributed sex is denoted in Tables 13.5, 13.6, 13.13, 13.15, 13.16, 13.24, 13.25 and 13.32-35 as '??'most likely, '?' probable and un-questioned.

Where possible, a standard set of measurement was taken on the unburnt bone (Brothwell and Zakrzewski 2004) to facilitate the calculation of various skeletal indices including stature and cranial index (Trotter and Gleser 1952; 1958: Brothwell 1972, 88; Bass 1987). Non-metric traits were recorded (Berry and Berry 1967; Finnegan 1978).

Results and discussion *by Jacqueline I McKinley*

The results are presented in two parts, Section I dealing with the unburnt bone and Section II with the cremated remains. Within the former, following an initial overview of the condition of the bone, the data are split into three main phase divisions; prehistoric, incorporating the Middle Neolithic, Bronze Age and Iron Age phases up to the Late Iron Age/early Roman (Jacqueline I McKinley), Roman (Kirsten Egging Dinwiddy) and Saxon (Kirsten Egging Dinwiddy). The different phases within the cremated bone (Jacqueline I McKinley) section are covered in chronological order within each category of data.

A basic summary of the results for each context is presented by zone in Tables 13.5, 13.15, 13.24 and 13.32 below, which include sections on bone preservation grading (Tables 13.5, 13.15 and 13.24 below), pyre goods (Table 13.32 below), deposit type and pathology as well as quantifications and demographic data. The pathology summaries present the types of lesions observed and bones affected with diagnosis where appropriate. Under-resourcing has resulted in a necessary adjustment to normal reporting procedures. The prevalence rates (TPR) for the main pathological conditions have been calculated and are presented in the appropriate sections of the report, but there has been limited opportunity for detailed discussion. Although non-metric traits/morphological variations were recorded and a selection have been included in the summary tables, not all the data have been included in this report and there has been no discussion other than where potential links between individuals were readily observable. Discussion pertaining to pyre technology and ritual has also had to be curtailed, focusing on the 20 largely undisturbed deposits, including 12 urned and six unurned burials (denoted */** in Table 13.32 below). Full records related to all areas of analysis are held in the archive.

SECTION I

Unburnt bone

Taphonomy

There was evidence for disturbance to graves as a result of plough damage in many areas, doubtless resulting in truncation and a reduction in the surviving depth of the graves, and in parts of some zones (eg, 6 and 12) heavy damage was sustained during machine stripping of the site where skeletal remains lay directly beneath topsoil, subsoil or colluvium. Nonetheless, most of the inhumation graves survived to more than 0.15m in depth, with a very broad range extending from <0.01m to 1.11m for the Roman graves in Zones 6 and 10 respectively. Other than in a few cases where the depth fell below 0.10m it is unlikely that much if any bone was lost from the graves via this mechanism. There is no consistency in depth associated with specific periods or locations, though no shallow graves were observed in Zones 4, 10 and Zone 13. Intercutting between graves, and occasionally truncation of graves by other features, was observed in some zones; in the 'organised' cemeteries the disturbed remains from the underlying graves were often incorporated in the later grave fill (eg, in Zone 12). In Zone 19 some Roman and Saxon burial remains appear to have been disturbed and replaced within their original grave via one or more mechanisms. Deliberate human manipulation is likely in some instances. Ancient manipulation in the form of canid gnawing, indicative of exposure, was observed in three Middle Iron Age-early Roman deposits from Zone 6, one also having suffered deliberate removal of skeletal elements. Fine cut marks were observed to Early Bronze Age and Late Iron Age/early Roman bone from Zones 6 and 21, and scorching/charring of dry bone was seen in material from two Early/Middle Iron Age deposits in Zone 13 (Table 13.5).

The condition of the unburnt bone is very variable, both intra- and inter-cemetery/zone and sometimes within individual graves. Relatively little of the bone is well preserved (grades 0-2), the Iron Age remains from Zone 6 probably representing that most consistently in good condition. Most of the material from Zones 10 and 12 is moderately well preserved (grades 2-3), but the majority of the bone lies within the moderate-poor range (grades 3-4) with most of that from Zones 20-24 being poorly preserved (>grade 4), and some from most zones scoring grade 5. The majority of the sites lay on the acidic natural brickearth, with a few (Zones

13, 19, 23-24) on the chalk and Zones 20-21 on a mix of the two. The nature of the natural often exerts a major influence on the burial environment and represents a major factor affecting bone preservation, however, the variability within zones lying on the same geology illustrates that other issues were also of relevance. In general the date of the material is of little significance to its preservation, but the Roman material from Zones 6 and 19 tends to be less well preserved than the Iron Age and Saxon material (respectively) from the same zones; this may indicate the effects of different cultural or environmental factors within the different periods. There does not appear to be a consistent direct link between surviving grave depth and bone preservation.

Middle Neolithic

The remains of a single older adult male of Middle Neolithic date were recovered from a grave (177085) to the north of the Bronze Age ring-ditch 134096 in Zone 13. The burial remains were initially assumed to be Bronze Age, in keeping with others in the area, but were revealed to be earlier as a result of radiocarbon dating. Its location may have been related to that of the Neolithic hengiform monument which formed the precursor to the Bronze Age ring-ditch 134096, but in the absence of closer dating for the monument it cannot be stated which may have influenced the other (Volume 1, Fig 2.9). Only one other mortuary deposit of Neolithic date was found within the scheme, a small quantity of redeposited cremated bone being recovered from a Middle Neolithic pit (123001) in Zone 10, situated within an area described by the Early Bronze Age ditch 194091.

Osteological evidence for the Neolithic in Kent is sparse and mostly early in date, with both cremated and unburnt inhumed bone being recovered from sites in the north-western part of the county (MNI <20: Mays and Anderson 1995; McKinley 2006a fig 2). Although the numbers have increased slightly in recent years they remain low. Very small quantities (up to 3g) of redeposited cremated bone were recovered from several Late Neolithic and Late Neolithic/Early Bronze Age features on sites in the centre of the county during the Channel Tunnel Rail Link (CTRL) works, but the date of the bone (and by reflection the mortuary rite) could not be confirmed (*ibid*). In the north-west of the county the remains of a minimum of two Early and two Late Neolithic individuals were recovered from features associated with a causewayed enclosure excavated during construction of the Ramsgate Harbour approach road (Clarke *et al* in prep.; McKinley 2007).

The few skeletal indices it was possible to calculate for this individual are given in Table 13.7. Numerous pathological lesion were recorded, primarily representing minor dental conditions and various degenerative joint diseases commonly observed in the remains of older individuals (Tables 13.5, 13.8-12; see below for further discussion of conditions, rates not stated for this singleton).

Bronze Age

Demographic data

Minimum number of individuals (MNI)

A minimum of 29 individuals (MNI) were identified from the Bronze Age deposits, ie, 12.4% of the unburnt bone assemblage. The largest proportion (27.6%) were attributed to the Early Bronze Age phase, with 24.1% of Late Bronze Age date and 13.8% Middle Bronze Age (Table 13.6).

In Zone 13, all the redeposited material could have derived from one of the eight *in situ* burial deposits, all of which were found in association with one of two ring-ditches 134096 (southern) and 134097 (northern; Volume 1, Fig 2.10, 2.12). The redeposited bone from context 130080 in ditch 134096 could relate to the *in situ* 230119 *c* 75m away to the north, particularly given the rather unusual pattern of preservation amongst the *in situ* remains (mostly trabecular bone) which suggests the latter could itself have been disturbed and redeposited (ie manipulated) within the grave (unfortunately, a lack of site data renders the formation process and deposit type ambiguous). Similarly, all the redeposited adult bone from ditch 134096 could have derived from *in situ* remains associated with ditch 134097 (eg, the 'placed' skull could have derived from 136131, 166111 or 200071).

All except one of the seven Early and Middle Bronze Age burial remains in Zone 21 were associated with one of three barrows (Volume 1, Fig 2.13-15, 3.18). The redeposited bone from the ring-ditch 216090 does not derive from any of the adjacent *in situ* remains and indicates an individual not represented elsewhere within the assemblage. The bone is heavily degraded and could even be pre-Bronze Age. The small amount of bone from ring-ditch 194137 *c* 300m to the south-east could, despite the distance, potentially be from the same adult male (curation and manipulation). The Late Bronze Age linear cemetery to the north of ring-ditch 193147 (initially, prior to radiocarbon dating, thought to be Iron Age) extended across a *c* 22m length NE-SW. Some 40m to the south-west, on the same alignment, lay the 'empty ?grave' 125232. The fill was disturbed by animal activity and the un-bioturbated location of the single human tooth within the fill is not known. The alignment is intriguing and, together with the form of the feature, strongly suggests a possible cenotaph or robbed grave of the same date of those to the north. Although the single tooth could have derived from one of a possible three of the *in situ* burials, given the lack of evidence for disturbance to the latter (other than slight over-machining in places), the general good surviving grave depths, the distance, and the depth of cut 125232 (0.96m), accidental disturbance or deliberate manipulation is unlikely in this instance, and the individual from which the tooth originated has been included within the MNI.

Age and sex

Most (probably all) of the 24.1% immature individual within the assemblage are Early-Middle Bronze Age in date and were recovered in connection with the various

Table 13.5 Summary of prehistoric unburnt human bone

Context	*Cut*	*Deposit type*	*Phase*	*Quantification*	*Age/sex*
Zone 4					
127101	190288	R (ditch)	LIA/ERo	3 frags. s.a.	adult *c* 25-35 yr.
147256	147255	inh. burial (double)	LIA/ERo	*c* 85%	subadult *c* 16-17 yr. female
147257	147255	inh. burial (double)	LIA/ERo	*c* 65%	adult >50 yr. female
177324	177322	inh. burial (coffined)	LIA/ERo	*c* 50%	subadult *c* 14-15 yr. ?female
Zone 6					
132108	132107	R (ditch)	LIA	*c* 3% l.	neonate *c* 2-4 weeks
153091	153098	R (ditch)	LIA	*c* 8% s.	adult >40 yr. ??male
173286	173275	R (pit)	E/MIA	1 frag. s.	adult >18yr. ??female
173287	173275	R (pit)	E/MIA	1 frag. s.	juvenile *c* 7-8 yr.
176107	176106	inh. burial	LIA/ERo	*c* 80%	juvenile *c* 5-6 yr. ?male
176107	176106	R (grave)	LIA/ERo	1 frag. a.	neonate
176141	176140	inh. burial	IA	*c* 88%	neonate *c* 2-8 weeks
218253	218252	R (pit)	LIA/ERo	*c* 3% l.	neonate 0-1 week
219100	219095	R (pit)	E/MIA	*c* 2% a.	neonate 0-2 mth.
223106	223107	R (ditch)	LIA	1 frag. u.	neonate 0-3 mth.
244190	244189	R (pit)	IA	1 frag. u.	subadult/adult >15 yr.
246150	246148	inh. burial	LIA/ERo	*c* 60%	adult *c* 18-25 yr. male
247259	247232	R (pit)	MIA	*c* 4% l.	adult >20 yr.
256038 ??male	256029	R (pit)	E/MIA	1 frag. l.	adult >20 yr.
258026	258025	?R (in grave?)	LIA/ERo	*c* 8% s.u.l.	adult >30 yr.
258270	258230	R/?placed (post hole)	E/MIA	*c* 4% s.	subadult/adult *c* 15-30yr. ??female
263050	263052	?R/?*in situ* (well)	LIA/ERo	*c* 28% s. a. u.	adult *c* 40-55 yr. ??female
288147	288146	R (ditch)	M/LIA	1 frag. s.	adult >18 yr.
279148	279145	R (pit)	MIA	1 frag. l.	adult >18 yr.
291103	291102	R (layer)	IA/ERo	1 frag. s.	adult >18 yr. ??male
292076	292075	pit burial	M/LIA	*c* 54% a.u.l.	adult *c* 30-40 yr. male
297079 inc. 297078	297080	inh. burial	E/MIA	*c* 60%	juvenile *c* 7-9 yr.
298103		R (cobbled surface)	IA/ERo	*c* 2% s.	adult *c* 18-35 yr.
298113		R (cobbled surface)	IA/ERo	1 frag. s.	subadult/adult >13 yr.
317036		R (cobbled surface)	IA/ERo	c 1% u.	adult >18 yr. ?female
324006	324005	R (ditch)	E/MIA	1 frag. l.	adult *c* 18-35 yr. ?male
328008	328007	R (pit)	prehist.	*c* 3% a.l.	neonate 0-2mth.
331002	331001	R (pit)	M/LIA	1 frag. s.	subadult/adult >13 yr.
Zone 7					
136137	136136	inh. burial	LIA/Ro	frags. l.	juvenile-subadult >8 yr.
136140	136139	inh. burial	LIA/Ro	<1% s.	adult >30 yr.
287046	-	R (road metalling)	M/LIA	*c* 2% l.	adult >18 yr. ??male
Zone 12					
126013	136049	inh. burial	MIA	*c* 85%	adult *c* 21-25 yr. male
126015	-	R(colluvium)	MIA	1) 3 bones a.l. 2) 5%	1) infant *c* 2-3 yr. 2) adult *c* 30-45 yr. ??female
136030	136031	inh. burial	MIA	*c* 45%	infant *c* 4 yr.
136034	136033	inh. burial	E/MIA	*c* 85%	adult *c* 25-29 yr. female

Pathology	*Comment*
calculus; hypoplasia; periodontal disease; ?impaction	
calculus; hypoplasia; *cribra orbitalia*; pitting – right temporo-mandibular; mv – wormian bones, variant M3s, accessory transverse foramen (C)	
ante mortem tooth loss; calculus; dental caries; hypoplasia; periodontal disease; *hyperostosis frontalis interna*; *coxa vara*; op – C1-2 anterior facets, right proximal femur; pitting – right acetabulum; enthesophytes – fibulae, calcanea, tali; cortical defect – left navicular; mv – wormian bones, congenital absence M3, septal aperture, Vastus notch	
calculus; dental caries; hypoplasia; impaction; periodontal disease; *cribra orbitalia*; periosteal new bone – >6 left ribs (visceral); mv – palatine torus, variant maxillary I2s	
mv – absence maxillary M3	1-2; fresh breaks;
	1-2, dark stained
calculus	1-2, dark colour.
dental caries (deciduous); cortical defects – humeri, ?femoral heads; mv – wormian bones	
	1-2; some loss in stripping.
calculus; hypoplasia; periodontal disease; enthesophytes – clavicles; mv – metopic suture, shovelled I2s	
	taphonomy: canid gnawing
blunt weapon trauma – depressed fractures right & left parietals; mv - wormian bones	1; animal bone
calculus	1-2, *taphonomy*: canid gnawing to axial & upper limb elements
	1-2, dark colour
compression fracture T12; healed fractures – 2 left & 2 right ribs, left fibula; sharp weapon trauma – L1; Schmorl's node – L5; plastic changes - humerus shaft; op – left s-c, right scapula, left proximal ulna, left wrist joints, left 1st C-MtC joint, both hip joints, left medial knee joint, 3 left & 2 right c-v joints, T4 & T6-12 bsm, L1-4 bsm, S1 bsm, T7-11 rib facets; pitting – both a-c joints, left acetabulum, right c-v, T8 & T11-12 rib facets; sbc – scaphoid; enthesophytes – iliac crest, femur shaft; mv – accessory transverse foramen (C)	1-2; *taphonomy*: canid gnawing axial & lower limb elements, head removed in antiquity
surface defects – distal femora	1-2; truncated in antiquity;
	horse
	1-2 (abraded) *taphonomy*: human manipulation (cuts)
	skull
	2 (abraded)
calculus; hypoplasia	
calculus; dental caries; apical voids; periodontal disease; secondary sinusitis; ddd – L5-S1; Schmorl's nodes – T7-8, & 11-12, L1-3; plastic change – ulnae shafts; mv – wormian bones, ossicle at asterion, variant M3	2-3
2) calculus; dental caries; periodontal disease; op – 1L bsm, right c-v, right scaphoid, left MtT-P, right proximal IP (foot); mv – congenital absence M3	2-3
calculus (deciduous); hypoplasia; *cribra orbitalia*; mv – wormian bone, variant deciduous canines	2-3
calculus; dental caries; apical voids; hypoplasia; periodontal disease; endosteal new bone; hyperporosity – maxilla; op – atlas anterior facet; cortical defect – right 1st proximal phalanx (foot); mv – metopic suture, wormian bones, ossicle at asterion, additional tarsal facet, bunionettes, ?coalition left 1st distal phalanx (foot)	4

Table 13.5 (continued)

Context	*Cut*	*Deposit type*	*Phase*	*Quantification*	*Age/sex*
136036 inc. 136035	136037	inh. burial	E/MIA	*c* 35% a.u.l.	juvenile *c* 5-6 yr.
153012	153011	inh. burial	MIA	*c* 85%	subadult *c* 13-14 yr. ?female
153016	153014	inh. burial	MIA	*c* 25% s.u.l.	infant *c* 9-12 mth.
153027	153028	inh. burial	MIA	*c* 99%	adult *c* 40-50 yr. male
153039	153040	inh. burial	MIA	*c* 60%	juvenile *c* 7-9 yr. ??female
153039	153040	R (grave)	MIA	1 bone u.	subadult/adult >15 yr.
153042	153043	inh. burial	MIA	*c* 80%	juvenile/subadult *c* 11-13 yr. ??male
153047	153048	inh. burial (prone)	MIA	*c* 75%	adult *c* 40-50 yr. female
153054	153055	inh. burial	MIA	*c* 70%	adult *c* 35-45 yr. male
166001	166002	inh. burial (prone)	MIA	*c* 25% a.u.l.	adult *c* 30-45 yr. ?male
166004	166005	inh. burial	MIA	*c* 75%	adult *c* 45-55 yr. female
166004	166005	R (grave)	MIA	1 bone l.	subadult/adult >16 yr. ??female
268006	268005	?in situ (ditch)	LIA	*c* 18% a.l.	adult *c* 20-25 yr. female
Zone 13					
126144	126141	R (pit)	E/MIA	1 frag. s.	>10 yr.
126128	126127	inh. burial	MIA	*c* 58%	adult *c* 25-33 yr. ??female
126143	126141	?in situ (pit)	IA	*c* 65%	neonate *c* 5-6 mth ??female
130042	130038	R (Ro pit)	MIA	*c* 2% l.	adult *c* 18 yr.
130044	130039	R (pit)	MIA	*c* 1% l.	adult >18 yr. ?male
130080	134096	R (ring ditch)	E/MBA	*c* 2% l.	juvenile *c* 6-8 yr.
136128	136129	inh. burial	EBA	*c* 84%	adult *c* 35-45 yr. ?male
136131	136132	inh. burial	EBA	*c* 29% a.u.l.	adult >18 yr. ??male
143212	134096	R (ring ditch)	?E/MIA	1 frag. s.	subadult/adult >15 yr.
145187	134096	R (ring ditch)	E/MBA	1 frag. a.	neonate
145233	248097	inh. burial	EBA	*c* 25%	juvenile *c* 7-9 yr.
156166	156169	R (pit)	E/MIA	1 frag. l.	adult >18 yr.
159119 inc. 159129	159118	R (pit)	IA	v 10%	adult *c* 35-45 yr. female
159124 inc. 159128-9	159118	R (pit)	IA	*c* 21%	neonate 1-2 weeks + intrusive subadult tooth
159129	159118	R (pit)	IA	1 frag. u./l.	neonate (not = 159124)
159140	159139	R (pit)	IA	*c* 1% s.a.	subadult/adult >15 yr.

Pathology	*Comment*
	1-2; cut by grave 136033
calculus; hypoplasia; mv - wormian bones, bipartite canine root, septal aperture	3 machine damaged
	2-3
ante mortem tooth loss; calculus; dental caries; apical voids; hypereruption; periodontal disease; *cribra orbitalia*; spondylolysis – L5; fracture – left knee; osteoarthritis – T12 rib facets, 2 left carpals; Schmorl's nodes – T7 & 9; ddd – T8 & 10-12, L4-S1; op – T1-3, L & L4-S1 apj, T1-5 & 10-11 rib facets, T4, T6-10, L2-S1 bsm, 4 right & 2 left rib facets, glenoids, elbows, 2 left carpals, 2 left distal IP (hand), right 1st MtT-P; pitting – T7 rib facet; enthesophytes – right proximal humerus, patellae, calcanea; exostoses – right fibula; plastic changes – scapulae (bursitis?); cortical defect – 1st proximal phalanges (feet); mv – ossicle at lambda, ossicle at asterion, wormian bones, variant I2, Vastus notches, accessory transverse foreman (C7)coalition right calcaneum, fused 5th phalanges (feet)	1
calculus (incl. deciduous); hypoplasia; mv – wormian bones	
calculus; hypoplasia; impaction; *cribra orbitalia*; porotic hyperostosis; mv – bipartite canine root, variant I2s	2-3
periosteal new bone – left fibula; Schmorl's nodes – T6-11, L3-4; ddd – C5-6; osteoarthritis – T4-5 apj, T9 & 12 rib facets, left carpal; op – T8 apj, T4, T8, L3 bsm, T7 & 11 rib facets, 9 right & 7 left rib facets, left acetabulum, left distal ulna; pitting – T10 rib facet, left acetabulum; plastic changes - tibiae	2-3
ante mortem tooth loss; calculus; dental caries; hypercementosis; apical voids; periodontal disease; osteoarthritis – C3-4, L5-S1, T11-12 rib facets, 1 left & 1 right rib facets; ddd – C3-6, T3-12, L5-S1; ankylosis – L5-S1 apj; op – C1-2 anterior facets, C5-7 apj, T1/3/6-7/9 & 11 apj, L3 & L5 apj, L2-4 bsm, T1/6/9 rib facets, 9 left & 9 right ribs, glenoids, radii (elbows), 1st MtC-Ps, left hip, left knee; pitting – C7 apj, T1-4, T7 (apj), right s-c; enthesophytes – innominates, femur, patella; ossified thyroid cartilage; mv – wormian bones, congenital absence M3, enamel pearl, os acromiale, Vastus notch	1-2
destructive lesion – L5 bsm; Schmorl's nodes – L3-4; ddd - 1T, L2; op – L2 & L5 bsm, T12 rib facet	3-4
ante mortem tooth loss; calculus; dental caries; apical voids; hypoplasia; hypercementosis; hypereruption; periodontal disease; fracture – left clavicle; Schmorl's nodes – T9-10 & 12; ddd – 1C, 4T, T9-S1; osteoarthritis – T10 rib facet, left tarsal; op – 1C, L1 (apj), 4T bsm, L1 & 4 bsm, 2 left ribs, shoulder joints, knees; pitting – T11-12 rib facets, right temporo-mandibular, acetabulae, left distal radius; enthesophytes – humeri, tali; cortical defects – left scaphoid, left navicular, MtT-Ps; mv – wormian bone, mandibular tori, bipartite canine root	2-3, Fe stain left humerus
calculus; periosteal new bone - left 3-5th visceral rib; Schmorl's nodes – T6-12, L2; op - C1 anterior facet, T6-9 bsm; plastic change - endocranial vault; mv - maxillary supernumery, cusp variations, atlas transverse process incomplete, C5 right transverse process absent, C6 transverse foramen diminutive	4
porosity - skull, long bones; flaring - long bone ends	2-3, copper-alloy staining - vault
ante mortem tooth loss; dental caries; calculus; hyperostosis - T9-12, L2, calcified rib cartilage, osteoarthritis - T9-10 rib facets, right 12th rib facet; Schmorl's nodes – T12 + 1; lytic destructive lesion - L4-5; plastic changes - right humerus; op - right glenoid & distal ulna, left rib, right pisiform, T9-12 bsm, 1T apj, L2 & L4-5 bsm; pitting - left rib; enthesophytes – patellae & calcanea; mv - crown variation, rotation, absence 3 M3s (mandibular & left maxillary) & mandibular right P2	4, machine damage
	5+
	4 articulation not recognised on site – disturbed ?in machining
mv - wormian bone	5+
	5
	5

Table 13.5 (continued)

Context	*Cut*	*Deposit type*	*Phase*	*Quantification*	*Age/sex*
166010	166009	?placed deposit	MIA	1 frag. u.	adult >25 yr. ??female
166111	166108	R (ring ditch)	BA	1% s.	adult *c* 18-35 yr.
168082	168068	R (pit)	E/MIA	*c* 1% s.	subadult/adult *c* 15-25 yr.
173179	173161	R (pit)	IA	*c* 6% s.u.l.	infant *c* 8-9 mth
173189	173188	R (pit)	MIA	1 bone s.	subadult/adult >15 yr.
173193	173188	R (pit)	E/MIA	*c* 2% s.	adult *c* 30-50 yr. ?male
174057	174060	R/?placed (SFB)	EBA	*c* 5% s.	adult >45 yr. ?male
174072/5	174060	R (SFB)	E/MIA	*c* 40%	neonate 0-1 week ??female
174233	174231	R (ditch)	MIA	*c* 2% s.	juvenile/subadult *c* 12-14 yr.
175154	175153	R (pit)	MIA	2 bones u.	subadult/adult *c* 15-45 yr.
177086	177085	inh. burial	M. Neo.	*c* 81%	adult *c* 45-65 yr. male
186118	134097	R (ring ditch)	E/MBA	*c* 6% s.l.	foetus *c* 30-32 weeks
200066 inc. 200067	200062	inh. burial & R	E/MIA	*c* 90% 4 bones u.l.	adult *c* 35-45 yr. ?male + R frags. 2nd adult >35 yr.
200071	134097	R (ring ditch)	E/MBA	1 bone s.	adult *c* 25-45 yr.
200089	200090	inh. burial	MBA	*c* 98%	adult *c* 60-80 yr. male
203002	203001	inh. burial	MBA	*c* 34%	adult >20 yr. ??female
203073	203066	R (pit)	LIA	4 frags. s.l.	MNI: adult *c* 25-35 yr. ??female
211065	211063	R (ditch)	MIA	*c* 1% l.	adult >18 yr.
211071	211067	R (pit)	E/MIA	1 frag. u.	subadult/adult >15 yr.
220093	220092	inh. burial (prone)	MIA	*c* 96%	subadult *c* 14-16 yr.
221016	221014	inh. burial	MBA	*c* 68%	adult *c* 35-45 yr. female
230116	230115	inh. burial	E/MBA	*c* 2% s.	infant *c* 2-3 yr.
230119	230118	inh. burial	E/MBA	*c* 7%	juvenile *c* 5-12 yr.
245106	211063	R (ditch)	MIA		adult >20 yr.
246006	246008	R (pit)	IA	2 frags. a.u.	adult >18 yr.
246012	246011	inh. burial	IA	*c* 92%	adult >45 yr. male
246016	246015	R (pit)	MIA	1 frag. l.	subadult/adult >13 yr.
248012	248013	inh. burial	IA	70%	juvenile *c* 7-8 yr.
248039	248037	inh. burial	IA	26%	subadult/adult *c* 16-25 yr. ?female
248059	248058	R (pit)	IA	*c* 12% l.	adult *c* 18-25 yr. ?female
248064	248063	R (pit)	E/MIA	*c* 1% s.	adult >18 yr.
248088	248087	R (quarry pit)	IA	1) 1 bone a. 2) 1 frag. s. 3) 1 frag. s.	1) infant *c* 2-3 yr. 2) juvenile/subadult *c* 11-15 yr. 3) subadult/adult >16 yr.
248092	248091	inh. burial	IA	*c* 99%	subadult *c* 15-16 yr. male

Pathology	*Comment*
op - left glenoid	
	1-2
hypoplasia - deciduous	3-4 ?not spotted *in situ*
mv – coronal ossicles	3
sharp-weapon trauma	3-4
	2
	2
calculus; periodontal disease; ankylosis – C4-5; infection – S1-L5 body surfaces; osteoarthritis – C4-5, T1 & 3; ddd – C5-6, 3T; Schmorl's node - 1L; op - right glenoid, right knee, L1 + 1 bsm, S1 bsm; pitting - acetabulae; enthesophytes – patellae	4-5
ante mortem tooth loss; dental caries; calculus; ossification nasal cartilage; op - left distal ulna, right 3rd MtC-IP joint, right 1st MtC-IP joint, right IP (hand), left proximal femur, right acetabulum, medial knee joints; pitting- right a-c joint; enthesophytes – iliac crest, patellae, tibia & fibula shafts, calcanea; mv – Vastus notch (right), emarginated (bi-partite) left patella, enamel pearl, acetabulae crease. R: op - distal IP joint (hand), left 1st MtT-P	4-5 *taphonomy*: R finger phalanx slightly charred (as dry bone)
ante mortem tooth loss; dental caries; dental abscess; extensive tooth wear; calculus; periodontal disease; healed fracture – right distal ulna; nasal infection? (guttering); osteoarthritis - C1-3, C5, T7 & 10, left hip, rigth knee, right 5th proximal IP joint (foot); ddd - C3-7, T6 & 10, L5; Schmorl's nodes - T9, L1-4; ankylosis – right auricular surface; calcified thyroid & rib cartilage; osteoporosis; ?o.c. dessicans - right femur (& ?left); coalition surfaces iliac retroauricular surfaces; ?cortical defects - patellae; op – shoulder joints, right elbow, right wrists, both hands (carpals, MtC, distal IP), knee joints, left Mt-P joint (foot), right distal IP joint, rib facets (left & right), C4 bsm, T1-6 bsm, T8-12 bsm, L1-5 bsm, L4-5 apj, S1 bsm; pitting – s-c joints, left glenoid, right distal radius, left proximal IP (foot), rib facets, L1-4 apj, humerus tubercles; enthesophytes – patellae, ischial crest, iliac crest, left scaphoid, left 5th MtC shaft, femur & fibulae shafts, right calcaneum; mv - absence man. left M3, metopic suture, occipital bunning, wormian bones, atlas bridging (anterior), cervical ribs (one ankylosed to 1st rib, other separate), Vastus notch (right)	2-3
	5+
mv – cusp variation, absence man. left M3	
	taphonomy: slight scorching one side bone (to dry bone)
	taphonomy: heavy scorching one end of bone (to dry bone)
calculus; abnormal development *pars basiliaris*; spondylolysis – L5; ?fracture – medial condyle left tibia; plastic changes – left upper limb more gracile than right, clavicle shafts flattened p-d, tibia sabre-shin; cortical defects – medial clavicles; mv – pegged maxillary supernumery, cusp variations, atlas bridging (posterior)	3; fresh breaks & feet removed by machine
calculus; healed fracture – left ulna; pitting – left 12th c-v, 1T apj; op – C1 anterior facet; mv – cusp variations	4-5
	5+
	4-5
ante mortem tooth loss; dental caries; excessive tooth wear; dental abscess; maxillary fistula; ?nasal infection (guttering); o.c. dessicans - C2 articular surface; periosteal new bone – right tibia, left calcaneum; Schmorl's node – L2; op – C1-2 anterior facets, C6 bsm, right glenoid, left hip, right acetabulum; pitting – acetabulae; enthesophytes – calcaneum; mv – atlas bridging (posterior)	4-5 (root etching)
calculus (deciduous)	4
periosteal new bone – proximal femora, left tibia & fibula shafts	4-5
o.c. dessicans? – distal femora	2
	0-2
calculus; *cribra orbitalia*; periosteal new bone – right mandibular condyle, right calcaneum, right 3rd MtT, right 4th MtT, left navicular; new bone – left auricular surface, left distal tibia epiphysis; ?ankylosis - right 3-4th MtT; o.c. dessicans? – distal humeri; Schmorl's node – T6-L2; mv – wormian bones, atlas bridging (posterior), accessory transverse foramen (C6), septal aperture (left), Vastus notch	1-2

Table 13.5 (continued)

Context	*Cut*	*Deposit type*	*Phase*	*Quantification*	*Age/sex*
Zone 19					
166101	166100	R(pit)	?M/LIA	*c* 1% s.a.u.	infant *c* 2 yr.
166147	166146	R (pit)	IA	1 frag. s.	juvenile/subadult *c* 5-18 yr.
205108	209243	pit burial	IA	*c* 93%	adult *c* 45-55 yr. male
253012	253011	R (enclosure ditch)	LBA	*c* 8% s.	adult >40 yr. ?female
Zone 21					
125233	125232	?grave fill	?BA	1 bone s.	adult > 45 yr.
126005	126004	inh. burial	EBA	*c* 71%	adult *c* 40-55 yr. ?female
126181	126180	inh. burial	MBA	*c* 87%	adult *c* 45-55 yr. male
132094	132093	R (pit)	?	*c* 16 frags. u.	> 5 yr.
132096	132095	inh. burial	EBA	*c* 68%	juvenile *c* 5-6 yr. ??female
136102	136103	inh. burial	LBA	*c* 80%	adult *c* 35-45 yr. male
136105	136106	inh. burial	LBA	*c* 12% a.l.	adult c 30-40 yr. male
153065	153066	inh. burial	LBA	*c* 48%	adult >50 yr. male
166093	166094	inh. burial	LBA	*c* 6% a.u. l.	adult >18 yr. ?male
166098	166097	inh. burial	LBA	*c* 40%	adult >55 yr. male
216092	216091	inh. burial	EBA	*c* 45%	adult *c* 20-25 yr. ??female
220053	220051	inh. burial	EBA	*c* 85%	adult *c* 25-30 yr. ?female
246136	246134	inh. burial	EBA	*c* 86%	subadult/adult *c* 16-19 yr. ?female
246141	246139	inh. burial	BA	*c* 20%	infant *c* 10-12 mth
275009	275007	inh. burial	LBA	*c* 90%	adult *c* 24-29 yr. male
302083	302082	R (ring ditch)	BA	10 frags u.l.	adult >18 yr. ?male
Zone 23					
290482	290481	inh. burial	MBA	*c* 91%	adult *c* 20-23 yr. female
Zone 24					
198244	198245	inh. burial	LBA	*c* 85%	adult >55 yr. female

Pathology	*Comment*
	2
	5
ante mortem tooth loss; dental caries; apical void (abscess); calculus; calcified thyroid cartilage; osteoarthritis – C1-7, 2T, left distal radius & ulna, right distal ulna; ddd – C3, 1T; op - 3T & 5L bsm, shoulders & distal humeri, left proximal ulna, both wrists, 1st right MtC-P, left distal IP (hand), right acetabulum, both medial knees, right c-v; pitting – both temporo-mandibular, left a-c & s-c, left glenoid, distal humeri, right proximal radius, right rib facet, left 11-12th c-v joints; cortical defect – 1st distal phalanges (hands); plastic changes – ?cultural modification parietal vault, humeri shafts; enthesophytes – iliac crest, proximal humeri, left 3rd MtC, femur shafts & proximal notches, left patella, distal fibulae, calcanea; sbc – right hamate, lunate & trapezium; mv – slight occipital bunning, wormian bones, plural mental foramen (left), mandibular tori	2
mv – wormian bones, ossicle at asterion	2
extensive tooth wear	4-5
calculus; dental caries; dental abscess; fracture – left proximal fibula; periosteal new bone – right mandibular fossa; osteoarthritis – 1T apj; ddd – 1T; op – right distal humerus, left 1st proximal IP (hand), left acetabulum, 2T bsm; pitting – left acetabulum; enthesophytes – right proximal femoral notch; mv – wormian bone	
ante mortem tooth loss (extensive); calculus; fracture right 1st MtT, ?left 2-3rd MtT; ankylosis right 1st MtT-P joint, left 2nd-3rd MtT; periosteal new bone – left 2-3rd MtT; osteoarthritis – right hip, right c-v, C3-5, T5, T10 rib facets; ddd – C3-7, L1 & 4; plastic changes – T2 spinal process; osteoporosis; vertebral body collapse – L5; op – both scapula, left acetabulum, left & right c-v, C1-2 anterior facets, C2 & 5 apj, T4-5 & T7-12 bsm, L3-5 bsm, L5 apj, S1 bsm; pitting – left a-c & s-c joints, left c-v joint, T7 rib facet; enthesophytes – ischial tuberosities, femur shafts, patellae, right fibula; surface defects – right medial clavicle, left distal tibia	3-4
	5
periosteal new bone – left femur	4-5
ante mortem tooth loss; dental caries; osteoarthritis – 1T; Schmorl's node – 1T; ddd – C4 & 6; op – 1C apj, glenoid fossae, distal humeri, acetabulae; pitting – acetabulae, 1C apj; enthesophytes – femur shafts, ischial tuberosity; plastic changes – right humerus substantially more robust than left; mv - absence man. left M3, metopic suture	5
op – S1 bsm, right hip joint, left proximal femur	5
dental caries; op – C1 anterior facet, left acetabulum; enthesophytes – femur shafts, distal fibula shafts, calcanea; exostoses – axis odontoid process; marked *zygomaticus major* attachment; mv – wormian bones	5-5+ Green staining left proximal ulna
	5
ante mortem tooth loss; extensive tooth wear; calculus; periodontal disease; DISH -3L; osteoarthritis – C1-2 & C6; ddd – C3-5 & 6, 1L; op – 5L bsm, right glenoid, right proximal ulna, left hip joint, right acetabulum; pitting – right acetabulum; enthesophytes – ischial tuberosities, femoral proximal notches; mv – cusp variation	5-5+
mv - metopic suture	4 taphonomy: 'filleting' cuts on lower (?& poss. upper) limb bones
calculus; surface defect – medial clavicles; op – L6 bsm, S1 bsm; pitting – a-c joints; mv – metopic suture, mandibular supernumery tooth, L6, wormian bones	4-5
calculus; mv – wormian bones, maxillary I2s slightly shovelled	3-4
	4
dental caries; surface defects – medial clavicles; mv – gap teeth & rotation	4-5, machine disturbance
	5++.
dental caries; calculus; ?uneven tooth wear ?occupational/grinding; mv – enamel pearls, cusp variations, wormian bones	4-5, ?machine disturbance
ante mortem tooth loss; ?sharp weapon trauma – ?T1; lytic lesions – L5/S1; periosteal new bone – L5-S1; soft tissue trauma/exostoses – right ulna; ddd – C4 & 6-7, T8 & 10-11; Schmorl's node – T12 – L2; op – right glenoid, right acetabulum, left rib facet, T6 & L3-5 bsm; pitting – right s-c, acetabulae, 4 right & 5 left rib facets, L5 apj; enthesophytes– patella, calcanea; mv – absence man. left M3, ossicle at lambda	4-5

Table 13.5 (continued)

Context	*Cut*	*Deposit type*	*Phase*	*Quantification*	*Age/sex*
Zone 29					
111027	u/s	R	?LIA/ERo	2 frags. u.	adult >18 yr.
Weatherlees Pond (to west of Zone 4)					
228	227	R (?in grave)	LIA/ERo	*c* 2% s.u.	adult *c* 30-45 yr. ?male
235	234	R (ditch)	LIA/ERo	left femur	adult >20 yr. male

KEY: s.a.u.l. - skull, axial skeleton, upper limb, lower limb (skeletal areas represented where not all are present); op - osteophytes; ddd - degenerative disc disease; o.c. dissicans - osteochondritis dissicans; sbc - solitary bone cyst; mv - morphological variation; bsm - body surface margins; C/T/L/S - cervical/thoracic/lumbar/sacral vertebrae, MtC/MtT - metacarpal/tarsal; MtC/T-P - metacarpal/tarsal - phalangeal joint; IP - interphalangeal joint; apj - articular processes (vertebrae); tp- transverse process (vertebra); c-v - costo-vertebral; a-c - acromio-clavicular; s-c - sterno-clavicular; p-d proximal-distal; SFB - sunken featured building

Table 13.6 Bronze Age (unburnt) summary of age and sex by sub-phase

	EBA	*E/MBA*	*MBA*	*LBA*	*LBA/EIA*	*Total inc. unspec. BA*
Immature						
foetal		1				1
neonate		1				1
infant 10-12 mth.						1
infant *c* 2-3 yr.		1				1
juvenile *c* 5-12 yr.	1	2 (1??F)				3 (1??F)
Total	1	5 (1F)				7 (1F)
subadult/adult *c* 16-19 yr.	1 (??F)					1 (?F)
Adult						
adult *c* 20-25 yr.	1 (??F)					2 (1F, 1??F)
adult *c* 24-30 yr.	1 (?F)			1 (M)		2 (1?F, 1M)
adult *c* 30-40 yr.				1 (M)		1 (M)
adult *c* 35-45 yr.	1 (?M)		1 (F)	1 (M)		3 (1F, 1M, 1?M)
adult *c* 40-55yr.	1 (?F)		1 (M)			2 (1?F, 1M)
adult >40 yr.				1 (?F)		2 (1?F)
adult >50 yr.				1 (M)		1 (M)
adult >55 yr.				1 (M)	1 (F)	2 (1F, 1M)
adult *c* 60-80 yr.			1 (M)			1 (M)
adult >18 yr.	1 (??M)		1 (F)	1 (?M)	1	5 (1F, 1?M, 1??M)
Total	6 (3F, 2M)		4 (2F, 2M)	7 (1F, 6M)	2 (1F)	21 (8F, 10M)
Overall total	8 (4F, 2M)	5 (1F)	4 (2F, 2M)	7 (1F, 6M)	2 (1F)	29 (10F, 10M)

KEY: F - female; M - male

ring-ditches, often in association with the burial remains of adult females (Volume 1 Figs 2.13-15 & 3.18). The majority of the remains (72%) represent those of adults with, overall, the same percentage of males and females (34.5%) the rest being unsexed. Amongst the adults, however, there is a slightly higher proportion of males (47.5%) to females (38.1%) with further discrepancies in both location and date. There is a higher proportion of females within the two earlier phases, where they appear clustered in associated with the ring-ditches and by inference the immature individuals therein. The males are more spatially dispersed, but with a concentration in the Late Bronze Age where all six of those within the linear cemetery (discounting the off-set Early Bronze Age female in grave 220053) are male. This small cemetery is unusual in its make-up, though its apparent nature may change should further burials be discovered to the north external to the current area of investigation. Although not conclusive, there is an intriguing, albeit incipient, progressive increase in the age of the males from the 24-29 year old 275009 in the north-east to the >55 year old 166098 in the south-west (though most southerly 166093 could not be aged closer than 'adult').

The median age range for the adult males appears potentially slightly greater than that for the females, the latter falling in the 35-45 year range, with both young adults and the 16-19 year old subadult being female (Table 13.6). The male median adult range is potentially slightly higher at 40-55 years. A substantial proportion of the adults (*c* 28.6%) fall in the older adult categories, one male being in excess of 60 years of age, and there are slightly more males than females in this group (though the numbers are low).

Pathology	*Comment*
calculus; dental caries; mv – large, 7-cusp mandibular M3s with 3-4 root branches.	
enthesophytes – dorsal shaft	

There are few comparable data for the Early Bronze Age from elsewhere in Kent, and what does exist generally comprises inhumed adult singletons, including individuals of both sex, mostly from graves located in the east of the county (Perkins and Gibson 1990; Anderson 1994; Parfitt 2004; McKinley 2006a, fig 3). Small numbers of Middle-Late cremation (mostly) and inhumation burials have been recorded within the county (MNI *c* 60), most, again, comprising singletons or small groups mostly from sites close to the east coast (eg, O'Connor 1975; Cruse 1985; Mays and Anderson 1995; McKinley 2006a fig 3). These include individuals across the age ranges and adults of both sexes, suggesting generally limited, if any, discrimination in mortuary rite dependent on age and/or sex. Focusing on the Late Bronze Age in particular, comparative data, both regionally and nationally, are sparse. The *in situ* remains of Late Bronze Age burials are rare, and cremation is currently believed to have predominated with graves often being inserted into earlier barrows (Bradley 1990, 112; Brück 1995). Although the numbers have increased in the last decade or so and the distribution is more widespread – probably largely due to the increased employment of radiocarbon analysis to date otherwise undated/insecurely dated burial remains – the quantity continues to be small. Until recently in Kent the MNI for the Late Bronze Age was *c* 33, mostly derived from the remains of cremation burials, but this number has been almost doubled by the *c* 23 unburnt individuals found at the site at Cliffs End Farm located *c* 400m to the south of the ring-ditches in Zone 13 (McKinley forthcoming a). There, the mortuary rite suggests 'non-normative' activity, the majority of the MNI deriving from disarticulated remains recovered from a single mortuary complex, and comprising similar proportions of immature individuals to adults and divisions between the sexes.

Skeletal indices

A summary of the indices which it was possible to calculate for all the prehistoric material is given by phase in Table 13.7. Further details are held in the archive.

Estimated stature

Stature could be estimated for 10 Bronze Age adults (*c* 47.6%) including five males (50%) and five females (62.5%). The males derived from two zones and dating covered the three main phases. The two males from Zone 13 were both shorter than those from Zone 21 (40-60mm below the average). The Early Bronze Age individual was also slightly below the average (40mm); the two Middle Bronze Age individuals represented either extreme; and the two Late Bronze Age were identical at 30mm above the average. The five females were found in three adjacent Zones (21, 23 and 24) and showed a very tight range of heights, the two Middle and Late dated individuals all being in the medial range and the three Early dated individuals across it. Comment on the potential significance of the variations between the zones and phases is precluded by the small numbers involved. Both ends of the range and the mean for the males are higher than those given by Roberts and Cox for the Bronze Age as a whole (average 1.72m, sample MNI 61; 2003, 86). Similarly for the females, the stated average being 1.61m (*ibid*). A substantially lower average of 1.57m was recorded for the Late Bronze Age females from the site at Cliffs End Farm adjacent to Zone 13 (McKinley forthcoming a), but the potential significance of this observation is restricted, again, by the small numbers involved. At 1.74m, the male average from Cliffs End fitted the average for the period as given by Roberts and Cox (2003, 86).

Cranial index

Fragmentation, incomplete survival and some warping of cranial vaults severely limited the numbers available for measurement. Cranial index was calculated for only one Bronze Age male who fell in the dolichocranial (long-headed) range. This corresponds with that recorded for the Late Bronze Age females and one of the males from the neighbouring site at Cliffs End Farm (McKinley forthcoming a).

Non-cranial indices

The platymeric index (demonstrating the degree of anterior-posterior flattening of the proximal femur) was calculated for 12 individuals comprising seven males and five females (57.1% adults; Table 13.7). There is no observable temporal or zone-based variation. The means for both sexes are similar, but the male range is substantially broader and the standard deviation (SD) higher than for the females. Where both femora were available for measurement the figures for the right side are slightly greater in the females (two cases), and the left side in the males (three cases, in two by more than the SD).

The platycnemic index (illustrating the degree of meso-lateral flattening of the tibia) was also calculated for 12 individuals. The tibia are generally slight flattened laterally (platycnemic) in both sexes. In most cases

Table 13.7 Summary of the major indices recorded within the prehistoric assemblage

	Female			Male		
	Number	*Range*	*Mean*	*Number*	*Range*	*Mean*
Middle Neolithic						
platymeric index				1	81.1 (platymeric)	
platycnemic index				1	66.7-67.6 (mesocnemic)	
Bronze Age						
estimated stature	5	1.60-1.68m (*c* 5' 2¾" – 5' 6")	1.63m (SD 0.03m) (*c* 5' 4")	5	1.68-1.80m (*c* 5' 6" – 5' 10¾")	1.74m (SD 0.05m) (*c* 5' 8½ ")
cranial index				1	74.7 (dolichocrany)	
platymeric index	5	76.4-88.3 (platy-eurymeric)	81.6 (SD 4.1) (platymeric)	7	70.8-95.4 (platy-eurymeric)	82.7 (SD 9.1) (platymeric)
platycnemic index	5	65.0-83.6 (meso-eurycnemic)	69.8 (SD 6.1) (mesocnemic)	7	52.3-71.3 (hyperplaty-eurycnemic)	63.0 (SD 7.2) (mesocnemic)
robusticity index	2	117.0-128.3	122.6	3	120.8-128.2	125.6 (SD 3.4)
brachial index				1	79.01	
crural index				1	82.4	
intermembral index				1	68.7	
Iron Age						
estimated stature	7	1.54-1.63m (*c* 5' ½" – 5' 4")	1.59m (SD .03m) (*c* 5' 2½")	9	1.69-1.77m (*c* 5' 6½" – 5' 9½")	1.72m (SD .02m) (*c* 5' 7½")
cranial index	2	60.2-72.1 (dolichocrany)	66.1 (SD 5.9) (dolichocrany)	4	71.4-78.9 (dolicho-mesocrany)	75.7 (SD 2.8) (mesocrany)
platymeric index	8	71.8-98.8 (platy-eurymeric)	82.5 (SD 5.8) (platymeric)	9	63.5-96.4 (platy-eurymeric)	79.6 (SD 10.9) (platymeric)
platycnemic index	7	63.6-79.9 (meso-eurycnemic)	69.9 (SD 4.5) (mesocnemic)	9	60.3-102.1 (platy-eurycnemic)	70.6 (SD 11.9) (mesocnemic)
robusticity index	5	120-135	125.9 (SD 5.2)	6	118.7-142.7	132.7 (SD 7.3)
brachial index	2	71.0-77.8	75.7 (SD 2.1)	4	70.6-77.6	73.8 (SD 3.0)
crural index	4	79.7-82.1	80.6 (SD 0.9)	4	79.5-81.8	80.7 (SD 1.0)
intermembral index	1	70.94		3	66.3-73.0	69.5 (SD 2.7)

Key: brachial index (radius L x 100 /humerus L); crural index (tibia L x 100/femur L); intermembral index (radius L + humerus L x 100/ tibia L + femur L).

where both tibiae were recovered (seven cases) there is little difference between the sides, however, the indices of three males (one Early and two Late, all Zone 21) which fall in the hyperplatycnemic (strongly marked lateral flattening) and platycnemic ranges, show the right side more flattened than the left.

The robusticity index, expressing the relative size of the femur shaft, was assessed for three males and two females. Although the female range extended almost 4 points below the male with a 3 point reduction in the mean, the upper end of both ranges is similar.

The numbers for which the other three indices could be calculated are too low to warrant further comment (Table 13.7).

The numbers are too small to render any conclusive comment but results suggest a broadly homogeneous population, particularly amongst the females. The greater variability amongst the males might be more activity-related than reflecting a variation in the population pool since the grosser variations tend to be uni- rather than bi-lateral. The slightly higher than average stature is one indicator of a healthy diet in childhood, an observation supported by the absence of other childhood stress indicators such as dental hypoplasia and *cribra orbitalia* (see below) in the Bronze Age population.

Non-metric variations

Variations in skeletal morphology may indicate population diversity or homogeneity. The potential interpretative possibilities for individual traits is complex and most are not yet readily definable, particularly on a 'local' archaeological level (Tyrrell 2000). Several have been attributed to developmental abnormalities or mechanical modification (*ibid*, 292). Some traits, such as extra ossicles in the lambdoid suture (or wormian bones), are frequently observed (eg, prevalence at Cliffs End *c* 60% in the Late Bronze Age; McKinley forthcoming a), whilst others appear to be relatively uncommon in British prehistoric assemblages. As noted above, not all the data collected in analysis have been included in this report and it is not intended to discuss the subject in any detail. However, potential links between individuals buried within Zone 21 may be suggested by the repeated presence of a metopic suture in three cases (33.3%; overall rate for the period 26.7%).

The elderly male 200089 had a cervical rib on the left side (Pl 13.3); the facet for which is evident in the left side of the C7 vertebra. This condition is observed in less than 1% of modern populations and is asymptomatic in the majority of cases. Complications known as 'thoracic outlet syndrome' may develop in *c* 10% of

Pl 13.3 Elderly Bronze Age male 200089: right cervical rib with coalition

cases; compression of the *brachial plexus* (the nerve group passing from the neck to the arm) and/or the subclavian artery/vein (obstructing the blood supply) (Aufderheide and Rodríguez-Martín 1998, 68-9; Becker *et al* 2002; Sanders and Hammond 2002; http://www.patient.co.uk/health/Cervical-Rib/Thoracic-Outlet-Syndrome.htm). There are no lesions in this case which suggest the individual developed complications related to the additional rib.

Pathology

Table 13.5 includes summaries of the pathological lesions observed and the bones affected. Some form of pathological lesion was observed in the remains of 16 (55.2%) individuals, all adults (76.2%). In common with most archaeological assemblages, dental lesions and those associated with the various forms of joint disease were most frequently observed. The former yield valuable data regarding diet and the latter can reflect the severity and form of physical stresses experienced by individuals and populations.

Dental disease

All or parts of 17 permanent erupted dentitions were recorded, as well as three deciduous dentitions (Tables 13.8 and 13.9). An equal number of male and female dentitions were recorded (note that in view of the small numbers involved all the sexed individuals are considered together irrespective of the attributed confidence level).

Dental calculus (calcified plaque/tartar) harbours the bacteria which predispose to periodontal disease and the development of dental caries. Mild-moderate, and occasionally heavy (in older adults) calculus deposits were observed in ten dentitions, the female rate being more than twice that of the males (Table 13.10). Most deposits were observed on the molar tooth crowns, and occasionally roots (where there had been excessive tooth wear), with some recorded on the premolars. The lingual side of the teeth appears to have been most affected. The rate is substantially lower than that observed for the Iron Age, and is less than half that seen in the Late Bronze Age assemblage from Cliffs End Farm (TPR 65.7%; McKinley forthcoming a). Whilst this may indicate that the EKA2 Bronze Age populations enjoyed a diet less

Table 13.8 Summary of individual dentitions by phase and sex

Phase	*Permanent erupted dentitions*							*Deciduous dentitions*	
	Female		*Male*		*Unsexed*				
	Man.	*Both*	*Man.*	*Both*	*Man.*	*Max.*	*Both*	*Man.*	*Both*
Mid Neolithic									
M. Neo.				1					
Bronze Age									
EBA		4		1					
E/MBA						1			1
MBA		2		1			2		1
LBA		1	1	3					
Total inc. unspec. BA		7	1	6		1	2		3
Iron Age									
E/MIA		1		1				1	2
MIA	1	3		3				1	2
LIA	1		1						
LIA/ERo		4		1	1				1
Total inc. unspec. IA	3	9	1	8	1	1		3	8

Key: Phase divisions as shown in Table 13.5; man. - mandibular; max. - maxillary

Table 13.9 Summary of permanent erupted dentitions by sex and phase (NB Includes all sexing confidence levels)

	Max. teeth	*Man. teeth*	*Total no. teeth*	*Max. tooth positions*	*Man. tooth positions*	*Total no. tooth positions*
Mid Neolithic						
male (total)	4	12	16	7	16	23
Bronze Age						
female	72	71	143	50	79	129
male	61	61	122	45	89	134
Total (inc. unsexed)	149	140	289	100	182	282
Iron Age						
female	100	112	212	103	114	217
male	102	127	229	118	145	263
Total (inc. unsexed)	227	262	489	238	287	525

Table 13.10 Summary of dental lesions (permanent erupted dentitions). (NB Rates shown are true prevalence rates (TPR); * inclusive of other destructive lesions affecting the supportive structure, eg apical voids, to render comparable)

	Calculus	Ante mortem *tooth loss*	*Caries*	*Abscess**	*Hypoplasia*
Mid Neolithic					
Total	T 16. Rate 100%				
Bronze Age					
Total	T 89 (28 max.; 61 man.) Rate 30.8% (42.0% F; 18.0% M)	T 26 (6 max.; 20 man.) Rate 9.2% (1.5% F, 17.9% M)	T 13 (7 max.; 6 man.) Rate 4.5% (2.8% F; 7.4% M)	T 3 (2 max.; 1 man.) Rate 1.1% (0.8% F; 1.5% M)	
Iron Age					
Total	T 331 (128 max.; 203 man.) Rate 67.7% (70.7% F; 72.5% M)	T 33 (18 max.; 15 man.) Rate 6.3% (5.5% F; 8.0% M)	T 46 (21 max.; 25 man.) Rate 9.4% (11.3% F; 9.6% M)	T 23 (15 max.; 8 man.) Rate 4.4% (5.1% F; 4.6%M)	T 105 (49 max.; 56 man.) Rate 21.5% (32.1% F; 14.0% M)

dependent on carbohydrates than their later counterparts or their closer contemporaries buried at Cliffs End, caution is required in interpretation of these data. Calculus deposits are easily lost both in the ground and during excavation/post-excavation processing which can lead to an under-representation of the condition making intra-site comparisons particularly problematic. However, since there are differences between the temporal groups from EKA2 this may not be a factor in this case. Broader-ranging comparative rates for the condition are not forthcoming, partly due to the taphonomic reasons outlined but also because most of the available rates tend to be in the form of crude prevalence rates (CPR; ie, numbers of individuals affected) which are a less reliable and representative of prevalence than the true prevalence rates (TPR; ie, number of teeth affected; eg, Roberts and Cox 2003, table 2.29).

Periodontal disease (a gum infection; gingivitis) may lead to bone resorption with consequent loosening of the teeth and exposure of more of the tooth surface to caries attack. Mild-moderate lesions reflective of the condition were observed in one socket (molar) each within two males dentitions (TPR 0.7%).

Ante mortem tooth loss was observed in seven adult dentitions, one female (14.2% female dentitions) and six male (85.7%), and there was a similar disparity between the sexes in the TPRs (Table 13.10). The majority of the teeth lost were molars (81.2%), the others affected being the second premolar (9.4%), 1st incisors and a canine. The latter two may have been as a result of trauma rather than an associated disease process; at least two cases are likely to be linked to extensive occlusal wear. As is commonly observed, the frequency of the condition appears to increase with age (three mature and four older adults), one elderly male having lost 62.5% of his teeth. The overall rate is lower than the TPR of 13.2% given by Roberts and Cox for the period (2003, table 2.31), but is well above the figure of 2.6% for the Late Bronze Age from Cliffs End (McKinley forthcoming a), though the latter was probably influenced by the young age of many of the individuals represented in that assemblage.

Dental caries, resulting from destruction of the tooth by acids produced by oral bacteria present in dental plaque, were recorded in seven dentitions, two female (28.6%) and five male (71.4%). Although more lesions were seen in the older dentitions, adults of both sexes across the age range were affected. Most lesions were either cervical or interproximal in location, though in several cases total destruction of the tooth had masked the origin of the lesion and one young adult female had small lesions in the occlusal fissures of four molars. The molars were primarily affected but lesions were also seen in several premolars and one canine. The overall rate is close to the TPR of 4.8% given by Roberts and Cox for the Bronze Age (2003, table 2.27), that for the females being identical to the TPR for the Late Bronze Age at Cliffs End Farm (McKinley forthcoming a).

Dental caries would have been a contributory factor in *ante mortem* tooth loss and dental abscesses are also commonly associated with gross carious lesions; infection tracking down through the exposed pulp cavity of the tooth into the supportive structure (Hillson 1986, 316-318). Destructive lesions in the supportive structure (apical voids/dental abscesses) were seen in two older adult dentitions, both of which exhibited dental caries and one with *ante mortem* tooth loss. The overall rate and those for both sexes are similar to the 1% TPR given by Roberts and Cox for the period (2003, table 2.28), though it should be noted that there is a lot of variation within their samples for all these dental disease rates. The figure is also commensurate with those recorded at nearby Cliffs End Farm (McKinley forthcoming a).

Dental hypoplasia is a condition represented by developmental defects in the tooth enamel formed in response to growth arrest in the immature individual, the predominant causes of which are believed to include periods of illness or nutritional stress (Hillson 1979). No lesions were observed in the Bronze Age dentitions, compared with a TPR of 21.5% in the Iron Age. Comparative data are mostly in the form of CPRs, Roberts and Cox giving an overall average CPR of 12.3% for the Bronze Age, but the few TPRs available show lower percentages of 8.0% (2003, table 2.32 West Cotton, Raunds) and 1.7% (Cliffs End Farm; McKinley forthcoming a).

The disease patterns seen in the dentitions suggest a slight variation in the nutrition regime of the Bronze Age population on the basis of their sex, the females being more dependent on carbohydrates whilst the males enjoyed a higher intake of proteins. Both, however, appear to have fared better than their Iron Age counterparts. The higher rates observed for the latter in most categories suggest a greater consumption of carbohydrates than in the Bronze Age. The rate of hypoplasia in particular, suggests periods of nutrition stress in childhood which will have been instrumental in affecting the stature attained by individuals as previously discussed (see *Stature Estimates*). The much higher rate amongst the Iron Age females corresponds with the proportionally greater reduction in average height amongst the females compared with the males.

Metabolic conditions

Osteoporosis

Osteoporosis results in increased porosity and breakdown in the structural integrity, predominantly, of the trabecular bone (eg, vertebrae and articular surfaces) within the skeleton rendering it liable to breakdown under stress. The condition is most commonly correlated with increased age, females being particularly vulnerable due to hormonal changes during menopause, though other factors are also involved, particularly diet and lack of physical exercise (Roberts and Manchester 1997, 177-180; Aufderheide and Rodríguez-Martín 1998, 314-316). Two of the older adult males – 200089 and 126181 – clearly exhibited the condition, though it is likely to have been more widespread. In the case of 126181 (Zone 21), an x-radiograph of the collapsed 5th lumbar vertebra (*c* 5mm loss anterior body height) shows overall increased translucency suggestive of osteoporosis, the probable cause of its condition.

Trauma

Six individuals show evidence of trauma (CPR 20.7%); two Early Bronze Age (CPR 25%), three Middle Bronze Age (CPR 75%) and one Late Bronze Age (CPR 14.3%). Two cases – one Early and one Late – involve sharp weapon trauma.

Weapon trauma

The partial cranial vault of an older adult male, 174057 (dated by radiocarbon analysis to the Early Bronze Age), had been 'placed' within one quadrant of the Iron Age SFB 174060 (Zone 13; Volume 1 Fig 2.12). The incomplete lesion (damaged bone) is located in the central part of the left parietal, *c* 50mm distal to coronal suture, extending 27mm superiorly from the broken edge (Pl 13.4a-b). There is a clear sharp-margined cut through in the exocranial plate, the diploe having broken off with an internal bevel. The cut is not quite perpendicular to the sagittal line but is angled anteriorly in its superior aspect by *c* 5 degrees. The internal bevel extends to the broken lateral edge and continues medially beyond the edge of cut for a further 25mm in line with external broken area, the edges of which are uneven and indicative neither of a cut nor of an associated fracture (Pl 13.4c). The blow had been made with a relatively heavy sharp weapon to green bone, with no sign of healing. The angle of the cut and appearance of the bevelling suggest that the blow came from the anterior left side. In the absence of any supporting evidence the details of the situation leading to this injury (eg, battle wound, undefended attack, execution) cannot even be speculated upon.

The second potential case of sharp weapon trauma is unusual and inconclusive. The inferior body surface of the 1st thoracic vertebra of an older adult female (198244, Zone 24; Late Bronze Age) has what looks like a small/narrow blade cut in the anterior of the (damaged) surface, extending at least 6mm into body and about half-way through the anterior-posterior depth from the front (Pl 13.5a-b). The cut is angled at *c* 10 degrees to the right from vertical. Although damaged, the cut appears to have been made to green/semi-green bone but there are no cut marks in the adjacent vertebrae, though the 7th cervical does have a similarly located but more diffuse mark around which the bone has degraded, so it is difficult to be sure if there was ante- or peri-mortem damage. It has been observed in forensic cases that the

Pl 13.4 Elderly Bronze Age male 174057: sharp weapon trauma to left parietal vault. (a) view of skull vault from anterior left side; (b) exocranial detail showing sharp margin on anterior-inferior (lower left) side of lesion; (c) endocranial details showing sharp margin and internal bevelling (left side)

effect of sharp weapon trauma on trabecular bone with a thin cortex – such as that in vertebrae – can create a crushing effect rather than a sharp-margined lesion (Douglas Ubelaker, BABAO Conference 2012), which could go some way towards explaining the appearance of the possible lesion in this cervical vertebra. Such a blow as that indicated could have been made by thrusting a knife down into the neck from the superior anterior right side, thereby catching the front of these two vertebrae. It may be anticipated that such a blow would leave marks on one or more of the clavicles, manubrium or 1st rib, but the anterior portion of the latter did not survive and neither did the manubrium, and no marks were observed in the medial clavicles.

Evidence for weapon trauma, particularly that involving sharp weapons, in Bronze Age Britain is sparse, one suggested factor being the predominance the cremation rite in this period both here and across much of the rest of Europe (Boylston 2000; Osgood 1999; Osgood and Monks 2000). What little evidence there is from Britain is in the form of projectile trauma (ie spears and arrows) not injury via sharp bladed weapons. A recently discovered Late Bronze Age case, probably involving a sword, from nearby Cliffs End Farm, currently represents the only example of its type from the country (McKinley forthcoming a). The Early Bronze Age case described here could have been inflicted using an axe rather than a narrower heavy blade (post-mortem damage renders interpretation inconclusive) and certainly the proposed date of the individual is not commensurate with the use of the latter form of weapon. Although swords were in existence by the later part of the Early Bronze Age their use was not widespread (Harding 2011). Whatever the form of weapon, this represents one of, if not the earliest example of sharp-weapon trauma currently recorded from the British Isles. Swords and axes were common by the Late Bronze Age but the weapon used on the elderly female was much smaller and lighter, a dagger being a more fitting object in this case. Why this elderly woman would have been subject to such an assault is unknown (?murder, ?sacrifice) and the form of her burial (flexed on right side) and location (singleton) of her grave give no further clues.

Fractures

Four individuals have evidence for healed fractures to one or, in one case, several bones. The latter example, that of an elderly male (126181, Zone 21) involves the metatarsals of both feet which were probably all damaged in the same traumatic incident. The left 2nd-3rd metatarsals are fused together via a large, smooth bony callus across the posterior aspect (Pl 13.6), there is sight planter displacement of the 3rd metatarsal and 4mm distal fixation. The x-radiograph did not show the location of the fracture but the bone is incomplete. Lamellar (well-healed) new bone associated with the callus suggests there was probably soft tissue damage which became infected. The right 1st metatarsal-phalangeal joint is ankylosed with the phalanx set at a *c* 45 degree angle away from the planter position (Pl 13.7). The x-radiograph shows a clear transverse mid-shaft fracture in the 1st metatarsal for which there is no surface evidence. The junction between the two bones, which is completely smooth on the surface, appears diffuse in the x-radiograph, the base of the phalanx being evident, but the head of the metatarsal almost indiscernible. The lesions are clearly of long standing and are indicative of a heavy object having being dropped on the feet. The resulting bony fixations would have made it very difficult for this man to walk about with ease, the big toe in particular being of major importance for movement. The acute angle of fixation indicates a lack of medical intervention and may suggest that the man habitually stood/rested his foot with his big toe flexed in this way during the healing process.

Two individuals (one male and one female) had fractures to the ulna. The older adult male (200089, Zone 13) has a well-healed fracture in the distal third of the right ulna, with slight medial displacement of the

Pl 13.5 Elderly Bronze Age female 198244. (a) inferior view of the 1st thoracic vertebra showing sharp-weapon trauma to the vertebral body; (b) detail of lesion

Pl 13.6 Elderly Bronze Age male: dorsal view of left 2nd–5th metatarsals showing ankylosis of 2nd–3rd and displacement of latter

Pl 13.7 Elderly male 126181: lateral view of right 1st metatarsal and proximal phalanx, showing bony fixation at joint

distal end. There is no shortening of the bone or corresponding lesions in the radius. The x-radiograph suggests a slightly rotational/transverse force rather than a direct blow, probably the result of fall on a partially pronated arm. The slight mal-union may have limited subsequent rotation of the right forearm. The mature adult female (221016 Zone 13) has a healed fracture in the distal half of the left bone, the full extent of which is unknown since the distal end is missing. Associated exostoses (see below) indicate simultaneous damage to the soft tissues. The cause is likely to be similar to that affecting the male. The one other fracture was to the left proximal fibula of an elderly female from Zone 21 (126005). The x-radiograph shows the lesion to be of long standing, well-healed with minor angulation of proximal end and suggests a direct blow to the leg, possibly from behind. The poor condition and limited survival of the tibia shaft precludes any further diagnosis (ie, if both bones were involved).

Osteochrondritis dissecans

Osteochrondritis dissecans, a condition leading to fragmentation and disruption in an articular joint, is generally believed to be traumatic in origin resulting in the obstruction of the blood supply to the affected area and localised necrosis (Rogers and Waldron 1995, 28-30; Roberts and Manchester 1997, 87-89; Aufderheide and Rodríguez-Martín 1998, 81-83; Knüsel 2000, 116). Although the condition is supposedly confined to the convex area of an articular surface, concave surfaces can also be affected (Aufderheide and Rodríguez-Martín 1998, fig 5.5 a and c). Some researchers have questioned the traumatic origin of the condition, considering it to be an idiopathic metabolic disorder (*ibid*, 82). Males are generally more readily affected with common involvement of the knee joints, which is where lesions indicative of the healed condition were observed in the elderly adult male from Zone 13 (bi-lateral dorsal and anterior of right lateral condyles).

Enthesophytes and exostoses

Enthesophytes are new bone growths which may develop at tendon insertions most frequently as a consequence of repeat trauma from muscle exertion, and exostoses are commonly associated with injury or damage to the muscle as a result of strenuous exertion causing bleeding in the tissue with subsequent ossification of the haematoma (Rogers and Waldron 1995, 23-5). Both may be indicative of occupational stress or injury, though other causative factors may include advancing age or various diseases stimulating skeletal hyperostosis, some individuals possibly being predisposed to the formation of new bone (*ibid*, 53). It is not always possible to be conclusive with respect to the aetiology of particular lesions.

Age-related repeat trauma is likely to have been the main causative factor for enthesophytes in the cases recorded here, one possible exception being the older adult male from Zone 21 (166098) where at least some of the lesions may have been linked with the joint disease DISH (see below). Of the eight Bronze Age individuals (38.1% adults) with these lesions most (75%) were in the older adult ranges (>45 yr.) and male (60%; 25% females). As is commonly observed the anterior patella was most frequently affected, closely followed by the posterior surface of the calcaneum (Achilles tendon attachment). Both sites would be subject to regular and repeated stress as a result of everyday life. Insertions for the leg and thigh muscles also tend to be common sites for these lesions – femur shaft, ischial and iliac crests. Strenuous walking, particularly over rough ground, renders the muscle of the lower limb prone to minor repetitive trauma with an increase in extent and distribution as the individual ages. Minor sprains to the ankle may cause a degree of luxation between the distal ends of the tibia and fibula, demonstrated by enthesophytes in the interosseous ligament attachment of the fibula, as seen in three of the older males (Zone 13 and 21).

Only one case of exostoses was observed, in an elderly male from Zone 21, where slight lesions were observed in the tip of the odontoid process, indicating minor trauma to the man's neck. Although not traumatic in origin, this individual was observed to have very strongly marked *zygomaticus major* attachments, especially in the left malar. Since the action of this muscle is to draw the mouth upwards and backwards, as when laughing, it suggests that this elderly man may have been a fairly jolly chap.

Cortical defects

All are situated at tendon insertions and similar to enthesophytes and exostoses indicate muscle trauma, either from specific injury or, more likely from repeated stress. A common location for such lesions is in the medial clavicle, as seen in two young adults (one male, one female) from Zone 21.

Infections

Although many individuals in antiquity probably died as a result of some form of infection, most of these would have been too acute (rapid) to affect the bone or limited to the soft tissues and therefore largely inaccessible within the archaeological record. Skeletal lesions indicative of some form of chronic infection were observed in the remains of six individuals from across the temporal range (CPR 20.7%); one juvenile, two adult females and three adult males. The changes were manifest either as new bone formation or as lytic lesions, a combination of the two being present in one instance.

Periosteal new bone

Periosteal new bone is formed in response to infection of the periosteal membrane covering the bone. Infection may be introduced directly to the bone as a result of trauma, develop in response to an adjacent soft tissue infection, or spread via the blood stream from foci elsewhere in the body. It is often not possible to detect the causative factors involved in individual cases and lesions are frequently classified as indicative of a non-specific infection either active (woven) or healing (lamellar) at the time of death. Lesions were observed in between one and two skeletal elements from four individuals (CPR 13.8%).

The trauma-related infection in the left foot bones from the older adult male 126181 (Zone 21) has already been discussed above. Fine lamellar (healed) new bone in the right mandibular fossa of the mature adult female 126005 (Zone 21) probably illustrates the spread of infection into the mandibular canal from the dental abscess in the M1/P2 socket. The aetiology of the 13 x 8mm area of coarse woven new bone (*c* 2mm upstanding, signs of some healing) in the left femur proximal anterior-medial shaft of the young juvenile 132096 (Zone 21) is unclear, but is likely to be linked to a systemic infection.

Lytic lesions

Two individuals have similar lytic lesions in the surfaces of adjacent lumbar (136128, mature adult male; Zone 13) or lumbar-sacral (198244 older adult female; Zone 24) vertebrae. In both case the surfaces are disrupted by macro- and micro-pitting, with new bone formation in 'spicules' creating a slightly 'melted' appearance. There is also slight lamellar new bone over the anterior surfaces of the vertebral bodies. The lesions in the body surface appear lytic rather than degenerative and the new bone on the anterior surface is clearly related to some form of (healed) infection. These lesions may be indicative of brucellosis. This acute or recurrent infectious disease is caused by any species of *Brucella*, and is an occupational disease of individuals working with cattle or other animals which may form a host for these intercellular parasitic organisms (inter-personal transmission is uncommon), infection by which, though rarely fatal, can be debilitating and prolonged. Destructive and reparative processes tend to occur simultaneously, as appears to be the case here (Aufderheide and Rodríguez-Martín 1998, 192-3; Rogers and Waldron 1995, 89-95). Similar lesions were also observed in the adjacent L5-S1 surfaces of the Neolithic individual from Zone 13.

Slight guttering on the inferior nasal margins of the older adult male 200089 (Zone 13) may be indicative of some form of nasal infection, inactive at the time of death. The nasal aperture is narrow and the prominent spines are intact anteriorly.

Joint disease

The various forms of joint disease are amongst the most commonly recorded conditions in archaeological skeletal material. Similar lesions – osteophytes and other forms of new bone development, and micro- and macro-pitting – may be formed as a consequence of one of several different disease processes, some also occurring as lone lesions largely reflective of age-related wear-and-tear. Many of the conditions are known to increase in frequency and severity with age, consequently they are commonly viewed as degenerative in nature, though this is an oversimplification as other factors are frequently involved, and some conditions have a more complex and not entirely clearly understood aetiology. Lesions were recorded in the joints of 11 individuals (37.9% population; 52.4% adults) comprising seven males (70%) and four females (50%). The CPR is higher for the later phases of the period than for the earliest stage (*c* 50% of the Early, 75% of the Middle and 71.4% of the Late Bronze Age populations) but this probably largely reflects the greater proportion of adults in the younger age ranges in the early phase. The rates (TPRs) presented in Tables 13.11 and 13.12 are for the overall period.

Table 13.11 Summary of number and rates (TPRs) of spinal lesions by sex and phase (includes 1st sacral)

	No. vertebrae	*Osteoarthritis*	*Schmorl's nodes*	*Degenerative disc disease*	*Lone osteophytes*	*Lone pitting*
Mid Neolithic						
Male (total)	13	5 (38%)	2 (15.4%)	5 (38%)	4 (30.8%)	
Bronze Age						
Female	114	3 (2.6%)	3 (2.6%)	9 (7.9%)	7 (6.1%)	2 (1.7%)
Male	131	22 (16.8%)	16 (12.2%)	25 (19.1%)	39 (29.8%)	7 (5.3%)
Total (inc. unsexed)	256	25 (9.8%)	19 (7.4%)	34 (13.3%)	46 (18.0%)	11 (4.3%)
Iron Age						
Female	144	5 (3.5%)	19 (13.2%)	17 (11.8%)	5 (3.5%)	1 (0.7%)
Male	190	22 (11.6%)	22 (11.6%)	29 (15.3%)	41 (21.6%)	8 (4.3%)
Total (inc. unsexed)	359	27 (7.5%)	41 (11.4%)	49 (13.6%)	46 (12.8%)	9 (2.5%)

Schmorl's nodes

Schmorl's nodes result from a rupture in the intervertebral disc and the protrusion of the disc material into the vertebral body surface forming a pressure defect, often of irregular shape (Rogers and Waldron 1995, 27). They occur most frequently in the most stressed area of the spine – the lower thoracic and lumbar vertebrae – and stress-related trauma, generally in younger adults, is implicated as a major cause of the condition (Roberts and Manchester 1997, 107). Lesions were seen in between one and five vertebrae in the spines of four individuals, three males (mature-older adults) and one older adult female, the male rate being three times that for the females (Table 13.11). No lesions were seen above T9. The overall rate is slightly lower than that of 10% (all females) recorded at Cliffs End (McKinley forthcoming a), but similar to the 8.1% reported at Amesbury Down, Wiltshire (McKinley forthcoming b) and the 8% observed at Twyford Down, Hampshire, where there was also a substantially higher rate amongst the males (20%) compared with the females (10%; McKinley 2000c). The CPR (14%) is also similar to that of 16.4% given in Roberts and Cox (2003) for the period (though the questionable reliability of the CPR compared with the TPR has been outlined above).

Degenerative disc disease

Degenerative disc disease is characterised by coarse pitting in the surface of the vertebral body, invariably accompanied by osteophyte growth on the body surface margins (Rogers and Waldron 1995, 27). The condition results from the breakdown of the intervertebral disc and reflects age-related wear and tear. Lesions were observed in between one and eight vertebrae in six spines, two female and four male, the rate for the latter being more than twice that for the former (Table 13.11). Lesions were recorded in all areas of the spine, the cervical region being most frequently affected. All but one of the individuals was in the older adult (>45 yr.) range. The rates are higher than those recorded at Cliffs End (6.9%) and Twyford Down (5%), probably due to the greater proportion of older adults in the EKA2 assemblages (McKinley forthcoming a; 2000c). In contrast with the EKA2 assemblage, at both these sites the rates for the females was more than twice that for the males.

Osteoarthritis

Osteoarthritis is manifest by eburnation and/or pitting within the surface of a synovial joint in association with osteophyte formation on the surface margins, there may also be alteration of the bony contours (Rogers and Waldron 1995, 43-44). The aetiology is complicated and includes the effects of age, mechanical alteration through activity or injury, and genetic predisposition (Rogers *et al* 1987; Rogers and Waldron 1995, 33). Slight-heavy lesions were seen in between one and nine joints in six adults, all mature or older, comprising six males and one female. Spinal joints were affected in five individuals and non-spinal joints in three individuals (including two with spinal lesions and one without). In the spine, the cervical (three individuals) and thoracic vertebrae (four individuals) were involved. Extra-spinal lesions were seen in the costo-vertebral joints (two individuals) and the weight-bearing joints of the lower limb (hip and knee), an interphalangeal (IP) foot joint also being affected in the older adult male 200089 (Zone 13; Table 13.12). As with the other conditions in this category, the spinal rates (Table 13.11) show a much higher prevalence amongst the males compared with the females. The overall rate is considerably greater than that of 2% recorded at Amesbury Down, which is commensurate with that for the females from EKA2. No spinal osteoarthritis was recorded at Cliffs End and the number of extra-spinal joints affected was also relatively low under the influence of the prevailing young age of most individuals. The CPR of 21% is above that of 13.8% for Amesbury Down and the 12.2% given by Roberts and Cox for the period (2003, table 2.20), however, the pertinence of these rates, as explained above, is debateable.

Diffuse idiopathic skeletal hyperostosis (DISH)

Although not quite classic in form, lesions observed in the lower spines of two males suggest that they were suffering from diffuse idiopathic skeletal hyperostosis (DISH; Rogers and Waldron 1995, 47-54; Aufderheide and Rodríguez-Martín 1998, 97-9). In the case of the older adult 166098 (Zone 21), a minimum of three,

Table 13.12 Earlier prehistoric extra-spinal joints affected by degenerative joint lesions, showing rates (TPR) by phase and sex

Joint	*Female*	*Male*	*Total (inc. unsexed)*
Middle Neolithic			
Shoulder – Glenoid		op: R	
Hip – pelvis		pitting: R & L	
Knee – femur/patella		op: R	
Bronze Age			
Temporo-mandibular	5R 5L	7R 5L	13R 11L
Costo-vertebral (ribs)	25R 26L op: L 19.2% pitting: R 20%, L 19.2%	32R 32L oa: R 15.6%, L 6.2% op: R 18.7%, L 28.1% pitting: R 3.1%, L 9.4%	57R 59L oa: R 8.8%, L 3.4% op: R 10.5%, L 16.9% pitting: R 10.5%, L 13.6%
Acromio-clavicular	1R 2L pitting: R 100%, L 50%	3R 2L op: R 33.3% pitting: L 50%	4R 4L op: R 25% pitting R 25% L 50%
Sterno-clavicular	-	2R 3L pitting: R 50%, L 66.7%	3R 3L pitting: R 66.7%, L 66.6%
Shoulder – Glenoid	3R 4L op: R 33.3%	6R 4L op: R 88.3%, L 75% pitting: L 25%	9R 8L op: R 66.7%, L 37.5% pitting: R 20%, L 12.5%
Shoulder – humerus	2L	6R 3L op: R 16.7%	6R 5L op: R 16.7%
Elbow – humerus	3R 2L op: R 33.3%	5R 4L op: R 40%, L 25%	8R 6L op: R 37.5%, L 16.7%
Elbow – radius	1R 3L	2R 3L op: R 50%	3R 6L op: R 33.3%
Elbow - ulna	3R 2L	6R 4L op: R 50%	9R 7L op: R 33.13%
Wrist – radius	3R 3L	4R 4L op: R 25% pitting: R 25%	7R 7L op: R 14.3% pitting: R 14.3%, L 20%
Hand – carpals	7R 14L	13R 14L op: R 38.5%, L 50%	23R 28L op: R 21.7% L 25%
Hand – carpo-meta	6R 5L	10R 11L op: R 50%, L 45.4%	17R 16L op: R 29.4%, L 31.2%
Hand – proximal IP	5R 11L op: L 36.4%	9R 10L	18R 21L op: L 19%
Hand – distal IP	2R 4L	9R 5L op: L 80%	14R 9L op: L 44.4%
Hip – pelvis	4R 4L op: R 25%, L 25% pitting: R 25%, L 50%	6R 7L oa: R 16.7% L 14.3% op: R 66.7% L 57.1% pitting: R 50%, L 14.3%	10R 11L oa: R 10%, L 9.1% op: R 50%, L 45.4% pitting: R 40%, L 27.3%
Hip – femur	3R 3L	6R 6L oa: L 16.7% op: R 33.3%, L 14.3%	10R 9L oa: L 11.1% op: R 20%, L 22.2
Knee – femur/patella	3R 3L	4R 3L op: R 25%, L 33.3%	7R 6L op: R 14.3%, L 16.7%
Knee – lateral	3R 2L	4R 4L oa: R 25% op: L 25% pitting: L 25%	7R 6L oa: R 14.3% op: L 16.7% pitting: L 16.7%
Knee – medial	3R 1L	5R 3L op: R 20%, L 33.3%	8R 4L op: R 12.5%, L 25%
Foot – meta-phalangeal	2R 3L	7R 9L op: L 11.1%	R 9 L14 op: L 7.1%
Foot – proximal IP	1R	5R 6L oa: R 20%	6R 5L oa: R 16.7% pitting: L 20%
Foot – distal IP	1R	4R 1L op: 25%	5R 1L op: 20%

Key: oa - osteoarthritis: op - lone osteophytes: R/L - right/left; IP - interphangeal. NB. pitting = lone lesions possibly four lumbar vertebrae (damaged post-mortem) have thick new bone, with a smooth outer surface, extending across the anterior/lateral surfaces of the bodies. At least one adjacent pair is fused via this extensive new bone. The second case, a mature adult 136128 (Zone 13), has similar exuberant spurs of new bone extending out and across the anterior/right lateral surfaces of the 9th-11th thoracic vertebrae and in the 2nd lumbar. In this instance there is no ankylosis, but possibly associated lesions include large fragments of calcified rib cartilage and extensive enthesophytes (see above) in the patellae and calcanea. The spinal lesions indicate ossification of the anterior longitudinal ligament, potentially accompanied in the case of 136128 by a general tendency to hyperostosis elsewhere in the skeleton; the link is not conclusive, however, and these lesions may be related to the age and lifestyle of this individual rather than (or as well as) the DISH. Symptoms of the disease are generally minimal other than understandable stiffness and some aches/pains. It is predominantly seen in older males and, although the aetiology is unknown, there are indications of a link with diabetes and obesity (Rogers and Waldron 1995, 47-54; Aufderheide and Rodríguez-Martín 1998, 97-9).

Seronegative arthropathies
The seronegative arthropathies represent erosive inflammation of the synovial joints with involvement of the entheses (tendon insertions; Rodgers and Waldron 1995, 64-77). Ankylosis of the sacro-iliac joint is a common characteristic of these conditions, particularly ankylosing spondylitis where this joint represents the primary focus, though ankylosis may also occur in response to other conditions such as DISH (*ibid*; see above). Various lesions seen in the remains of the older adult male 200089 (Zone 13) may be indicative of one of these conditions. The right auricular surfaces (innominate and sacrum) are fused together and there are two small coalition surfaces (*c* 20 x 20mm) in the inferior anterior retroauricular area and inferior-dorsal of the inferior auricular surface (both pitted). This individual also has extensive enthesophytes at numerous sites and has calcification of the thyroid and rib cartilages (though both these conditions may be age-related).

Lone osteophytes
Lone osteophytes (new bone growth on joint surface margins) often appear to be a 'normal accompaniment of age' (Rogers and Waldron 1995, 25-26). Slight-heavy lesions were seen in the remains of 11 adults (CRP 52.4%); seven males (CRP 70%; four older, three mature) and four females (CRP 50%; two older, one mature and one young). Between one and 28 joints were affected in each individual, comprising 53 spinal and 50 extra-spinal joints. All of the affected individuals had some spinal lesions, and the spine alone was involved in two cases (one young and one mature female); the male rate is more than four times greater than that for the females (Table 13.11). Most of the spinal lesions affected the vertebral body surface margins (nine individuals), predominantly in the thoracic and lumbar spine; synovial joint surface margins were involved in three cases. The hip, shoulder and elbow joints were most frequently affected amongst the extra-spinal joints, one or both sides being affected but with a dominance of the right side in all three areas (Table 13.12). The rates for males continue to be substantially higher than those for the females.

Lone pitting
As with osteophytes, macro- and micro-pitting and other destructive lesions in the surfaces of synovial joints may develop in response to a number of conditions, but it is probable that they are most commonly reflective of the early stage of osteoarthritis. Lone lesions were seen in between one and 15 joint surfaces in the remains of nine adults (CPR 42.9%); five males (CPR 50%; three older and two mature) and four females (CPR 50%; two older, one mature and one young). Spinal lesions were observed in four individuals, affecting all areas but predominantly the lumbar region (Table 13.11). One or more costo-vertebral joints were affected in five individuals, one or both hip joints in four individuals, and the one or both acromio-clavicular joint in three (Table 13.12). As with all the other joint lesions, the female rates are lower than those for the males, with the single exception of pitting in the costo-vertebral facets.

The minor difference in the male and female demographic profiles, with a slightly greater proportion of the former falling in the older adult age categories, may in part be responsible for the gender-based differences in rates seen within this diseases category. The distinction is, however, clear and at times considerable, and age alone is unlikely to have been the only or even the major factor. The evidence for the males experiencing a substantially more physically stressful lifestyle than the females is compelling. The extensive distribution of some sort of lesion in most of the joints of the elderly male 200089 are testament to this man's physically demanding life, but also to his robusticity. He is likely to have been debilitated by his various ailments and would have required at least a modest level of care from his community to help him get by.

Miscellaneous lesions

Plastic changes
Over time bone will react to pressures exerted upon it by a number of physical mechanisms including muscle action, increased vascular/neural activity and soft tissue growths. This may simply take the form of the limb on one side being markedly more robust than the other, as in the case of the right humeri of two older adult males (136128 and 136102), suggesting preferential use/stress on that side. The marked angulation to the right of the T2 spinal process of the older adult male 126181 (Zone 21) also suggests predominant action in the right side (presumably with stiffness in the left) in one or more of the 10 muscles which attach at this point (mostly exercised in rotation and extension of the vertebral column and the head).

Iron Age

Demographic data

Minimum number of individuals

A minimum of 52 individuals (MNI) were identified from the Iron Age deposits, totalling 22.2% of the unburnt bone assemblage. The largest proportion (31.5%) were attributed to the Middle Iron Age phase, with 19.6% of Late Iron Age/early Roman Age date and 17.6% Early Iron Age (Table 13.13).

One of the two Late Iron Age/early Roman inhumation graves (147255) from Zone 4 contained the remains of a double burial, the two females having been laid side-by-side, facing one another, but slightly off-set longitudinally (Fig 4.2). The redeposited bone from the adjacent ditch did not derive from either of the excavated graves. The small amount of bone from an earlier excavation at Weatherlees Pond, *c* 110m to the south-west (the results from which have been incorporated within the EKA2 scheme) was redeposited in two features, one of which may have been a grave. These remains represent those of a fifth individual of commensurate date from this zone.

The remains of five, possibly six *in situ* burial deposits were found in Zone 6, the remaining MNI deriving from amongst the redeposited material. There was a substantial amount of activity within this zone throughout the Iron Age and Roman periods, with frequent intercutting and disturbance of earlier features/deposits. The date attributed to the redeposited human bone was largely based on that of the context from which it was recovered. Consequently some of that placed in the later parts of the phase could actually relate to activity in the Early Iron Age, or possibly earlier. Although there was no evidence for Bronze Age mortuary activity in this zone, a few field boundaries of this date were identified and such locations were frequently used for burial (often singletons). Similarly, it is likely that some of the redeposited material from the zone allocated to the Roman phase actually belongs in the Iron Age.

The remains of a minimum of one neonate were found in various features (ditches and pit fills) distributed over a *c* 150m area (Fig 3.26-27, 3.30). It is highly likely that these bones did derive from more than one individual but there were no duplicate elements, and all could have come from the same *c* 1 week old neonate of Early/Middle Iron Age date. The redeposited juvenile remains from pit 173275 could have derived one of the two graves in this zone containing *in situ* remains of this age; grave (297080), located *c* 55m to the south-west, had been cut through by a later ditch which removed some of the grave's contents (age and date correspond). The minimum number of adults amongst the redeposited material (three) was based on the number of duplicate skeletal elements. All or non-duplicate parts of three left femoral shafts were present giving a minimum of two ??males (one *c* 18-35 yr., other >20 yr.) and one unsexed adult (the only possible link was between the redeposited 247259 and *in situ* 263050, but the former is too early in date). There were also three duplicate left frontal bones; one ??male >40 yr. and one unsexed 18-35 yr. Either of the latter could have derived from the headless *in situ* male 292076, all the dates would match, though the former was found 105m to the south of the

Table 13.13 Iron Age (unburnt) summary of age and sex by sub-phase

	E/MIA	*MIA*	*M/LIA*	*LIA*	*LIA/ERo*	*Total inc. unspec. IA*
Immature						
neonate	2					5 (1??F)
infant *c* 8-12 mth.		1				2
infant *c* 2-4	1	2				3
juvenile *c* 5-12 yr.	1	2 (1??F)			1	5 (1??F)
juvenile/subadult *c* 8-18yr.		1 (??M)			1	3 (1 ??M)
subadult *c* 12-16 yr.		3 (1?F)			2 (1F, 1?F)	6 (1F, 2?F, 1M)
Total	4	9 (2F, 1M)			4 (2F)	24 (5F, 2M)
subadult/adult *c* 15-30 yr.	1 (??F)					2 (1?F, 1??F)
Adult						
adult *c* 18-25 yr.		1 (M)		1 (F)	1 (M)	4 (2F, 2M)
adult *c* 18-35 yr.	1 (M)					1 (M)
adult *c* 24-30 yr.	1 (F)					1 (F)
adult *c* 25-35 yr.		1 (??F)			1	2 (1??F)
adult *c* 30-45 yr	1 (?M)	3 (1??F, 1M, 1?M)	1 (M)		1 (M)	7 (1F, 1??F, 3M, 2?M)
adult *c* 30-50 yr.	1 (?M)					1 (?M)
adult >30 yr.			1		1	2
adult >45 yr						1 (M)
adult *c* 40-55yr.		3 (2F, 1M)			1 (?F)	5 (2F, 1?F, 2M)
adult >50 yr.					1 (F)	1 (F)
adult >18 yr.						1 (??M)
Total	4 (1F, 3M)	8 (4F, 4M)	2 (1M)	1 (F)	6 (2F, 2M)	26 (10F, 13M)
Overall total	9 (2F, 3M)	17 (6F, 5M)	2 (1M)	1 (F)	10 (4F, 2M)	52 (17F, 15M)

grave in a ditch and the other *c* 100m to the north in a cobbled surface. Also included amongst the MNI is the 'placed' skull of an Early/Middle Iron Age *c* 15-30 year old ??female (258270). One Middle/Late Iron Age context from Zone 7 contained redeposited human bone. Although recorded as Zone 7, its location shows that this really falls at the north end of the Zone 6 activity described. Consequently, as the remains would not add to the MNI from Zone 6 they have not been included in the overall MNI count.

The *in situ* remains in Zone 13 were generally associated with pits on the north side of the Early Iron Age enclosure ditch 134099. Some manipulation of remains is suggested by the presence of the possible placed deposit 173193 and potential links between redeposited bone across fairly large areas (up to 150m). A MNI of seven was identified from amongst the redeposited bone in this zone. There is no duplication in terms of age/sex and skeletal elements for the remains recovered from contexts 159124 and 174075 (neonates), 173179 (infant), 174233 (subadult), and adults 173193, 159119 (bone possibly redeposited adjacent to the grave of origin) and 248059. The remainder of the redeposited bone could have derived from either *in situ* burial deposits; for example 168082 and 1261644 could be from grave 248037, but the former is 150m to the west and would date the burial to the Early/Middle Iron Age rather than just the Iron Age). The most frequently occurring adult skeletal elements comprise right femora and frontal bones (vault), indicating a MNI of six adults.

Although the remains of only one Iron Age *in situ* burial was recovered from Zone 19 (within an area subsequent functioning as a Saxon cemetery), the sparse dispersed redeposited bone found equates to the remains of two immature individuals of an age not represented by the *in situ* deposit. Consequently, both have been included in the MNI count.

Age and sex

In contrast with the Bronze Age, almost half (47%) of the Iron Age assemblage comprises immature individuals. For the Middle Iron Age this figure is particularly high at 52.9%, but the proportions remain relatively high throughout (44.4% in the Early/Middle Iron Age, 40% in the Late Iron Age/Roman). Despite their comparative appearance, these figures fall within what would be considered the 'normal' range for a domestic population, though the lower Bronze Age figures are not out of kilter with what is commonly observed in archaeological cemetery populations. Almost a third of the immature individuals did not survive beyond one year of age, which again is as would be expected within a 'normal' population where this represents one of the stages in the life of a child where they are most at risk. The relatively high proportion of immature individuals (25%) dying as subadults is slightly unusual. In a 'normal' population this typically represents the least vulnerable group within the immature category (eg, Lewis 2007; Roberts and Cox 2003, 303-4, table 6.5). This suggests that they may have derived from populations where there was a higher mortality rate amongst the younger immature individuals and that the latter have been removed/excluded from the assemblage by some mechanism. Given the relatively high proportion of contexts yielding disarticulated neonatal bone from Zone 6 in particular, accidental disturbance and possible scavenging of what are likely to have been shallow graves may have been contributory factors. A representative view of the Iron Age 'domestic' populations may be offered by the small, Middle Iron Age cemetery in Zone 12 (Volume 1, Fig 3.46). Here almost half (*c* 44%) the individuals were immature, with a progressive fall in numbers with increasing age, and there is an equitable division between male and female adults (Table 13.13). It may be fortuitous that the adult males appear to have been buried at either end of the cemetery with the youngest individuals generally lying centrally.

The overall balance between males and females is fairly even, 33% of the overall assemblage being female and 29% male. These figures do include some immature individuals, however, and amongst the adults alone there is a higher proportion of males, 52% compared with 40% females, but the 8% unsexed adults could all have been in the latter group thereby redressing the balance. There is no notable difference between the sexes by phase or zone. As is commonly observed, the median age of death for adults of both sexes fell in the 30-45 year range, and a similar proportion appear to have survived into older adulthood (*c* 27%).

Early-Middle Iron Age burials from Kent are particularly sparse, Mays and Anderson citing a MNI of less than five in their 1995 review (380-1; Parfitt 2004, 16; McKinley 2006a, 12-3, fig 4), and although a few additional burials of this date have been found in the last decade (*c* 28 inhumation and four cremation burials, most of the former from the site at Cliffs End Farm), the overall numbers remain low (McKinley forthcoming a). Slightly greater numbers are intimated by the proposed early date for the Iron Age pit burials from several sites and 'conventional' graves from North Foreland (Moody 2008, 124; Perkins 1995a; 1995b, 21-24), but the confidence with which the date of some of these cases can be viewed would benefit from more secure dating.

With the notable exception of Mill Hill, Deal (Parfitt 1995; 2003, 16), most Late Iron Age and Late Iron Age/early Roman burials from the county are of cremated remains (*c* 40 sites: McKinley 2006a fig 4; Parfitt 2004, 16-17; Booth *et al* 2008). The few burials (11) of this date from the CTRL scheme were all by cremation and confined to the southern part of the route, but redeposited unburnt bone (MNI 2) of Middle/Late Iron Age date was recovered from a site close to Zone 6 during recent works, together with a small (MNI 7) Late Iron Age/Early Roman inhumation burial assemblage from adjacent locations (Egging Dinwiddy and Schuster 2009; McKinley 2009a). The potential discrepancy noted between the mortuary rites in term of proportions of immature to adult individuals (with few of the former amongst the cremated remains in comparison with the unburnt bone: McKinley 2006a) appears to be supported in some degree by the findings at EKA2. Here, whilst only one of seven cremated individuals was immature, one third of the inhumed individuals fell in this category, though all were from the Late Iron Age/early Roman transition phase as, indeed, was the one cremated immature individual (Tables 13.13 and 13.34). The cautionary note regarding the potential effects of taphonomic factors and others inherent within the cremation rite previously iterated still holds, however, and greater numbers of burials are required for this period to test the possible validity of an age-related variation in mortuary treatment (*ibid*).

Skeletal indices
A summary of the indices it was possible to calculate for all the prehistoric material is given by phase in Table 13.7: Further details are held in the archive.

Estimated stature
Stature could be estimated for 16 Iron Age adults (*c* 61.5%) including nine males (69.2%) and seven females (70.0%). The males derived from five zones and dating covered the three main phases. The tallest individual was found in Zone 13 (50mm above the mean; no sub-phase) and the shortest in Zone 12 (30mm below the mean; Middle Iron Age). The four individuals from the latter zone and phase all fell below the average. The females were found in three Zones (21, 23 and 24), with the tallest coming from Zone 12 (60mm above the average, Early/Middle Iron Age), and the two shortest from Zones 4 and 13 (50mm below the mean; Late Iron Age/early Roman and no sub-phase). In general, those from the earlier part of the temporal range fall at or above the average and those from the later part below it.

Overall there is a temporal decrease in the average and maximum heights recorded from the Bronze Age to the Iron Age, with some indication in a continued fall throughout the latter period. Roberts and Cox also observed a fall in the male averages between the two main periods within their samples, though this was slightly greater than observed here (40mm as compared with 20mm; 2003, 103). The figures for the females in the EKA2 assemblage are, however, at odds with their observations since they recorded a *c* 10mm increase in the average female heights between the periods compared with the 60mm fall seen here. As was observed for the Bronze Age, the figures from the neighbouring site at Cliffs End show a lower average and maximum (females only estimated; Early-Middle Iron Age) than at EKA2 (McKinley forthcoming a).

Cranial index
As noted above (Bronze Age section) the poor condition of the crania limited the numbers available for measurement. Cranial index was calculated for six Iron Age adults (23.1%; Table 13.7). The females both fell in the dolichocranial (long-headed) range, whilst the males showed greater variability and had a mean in the mesocrany (medium) range. This, in part, corresponds with the pattern observed at the neighbouring site at Cliffs End Farm (McKinley forthcoming a) where the females fell in the long-headed range, but the earlier, Late Bronze Age males (no Iron Age male crania survived intact), spanned the dolicho-mesocranial range as here.

Non-cranial indices
The platymeric index was calculated for 17 individuals (65.4% adults) comprising nine males and eight females. The categories match those seen in the Bronze Age, the female mean being very close (within one point) and the male slightly lower (by almost three points). The latter also illustrates the slightly greater variation between the Iron Age males and females, a variation not seen in the Bronze Age, with the male mean being almost two points lower than the females. There is no consistent pattern of differences based on zone or phase. Where both male femora were available for measurement (seven individuals) most had similar indices but in one case the difference was greater than the SD by 12.1 points (left side). The difference between the two sides exceeded the SD in three of the five females where both femora were measured, the left being greater in two cases and the right in one (by up to 12.1 points).

The platycnemic index was calculated for 16 individuals (61.5% of adults). The female categories and the male mean generally match those in the Bronze Age, the female mean being almost identical. Although the Iron Age male and female means are very close, the male SD is more than twice that of the females and is notably higher than those from the Bronze Age. This is largely due to the effect of one male from Zone 13 (no sub-phase) who had an index of 102.1 for the right tibia. This individual and one Middle Iron Age male from Zone 12 were in the upper reaches of the range, the rest were all fairly closely arrayed. The case from Zone 13 is the only one demonstrating a marked difference between the sides in the eight cases (males and female) where both bones were available for measurement.

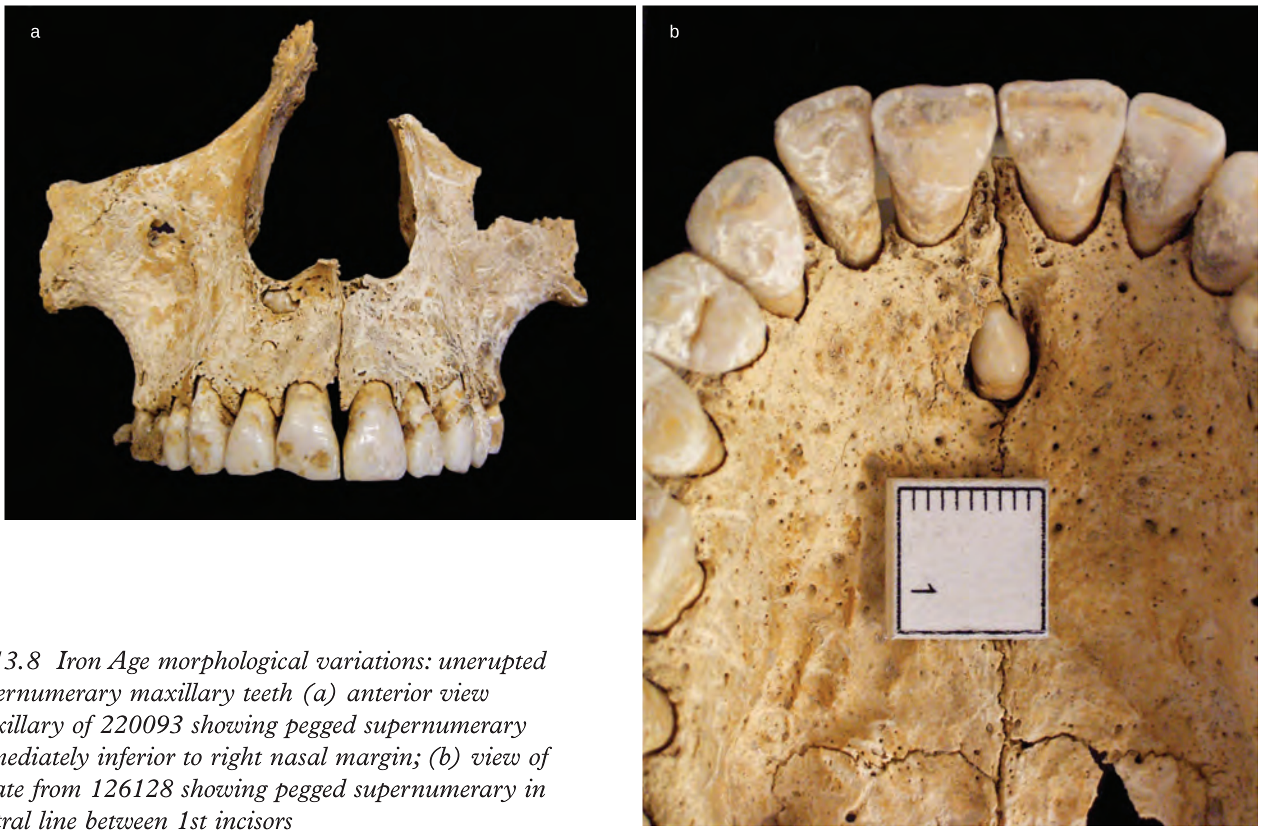
The robusticity index was assessed for 11 individuals (42.3% adults). There are no consistent variations based on zone or phase. In half of the six cases where both femora were available for measurement the difference was small with neither side being consistently preferred, but in three cases (one female and two male) where the difference was greater than the SD the left side scored highest (>SD by 7.6 in the female and 9.1-9.2 in the males). The upper limits of the ranges and the means are higher than those observed for both sexes in the Bronze Age, the latter by 3 points for the females and 7.1 points for the males. There is also a noticeably greater difference between the males and females in the Iron Age than was observed in the Bronze Age; the male index is almost 7 points higher in the former compared with only 3 in the latter (though this could reflect the effect of the greater number of measurements taken in the later phase). A general increase in robusticity within both sexes between the Bronze Age and Iron Age phases of activity was also observed at Cliffs End Farm (McKinley forthcoming a). It was also noted that the average index for the Iron Age females was higher than that for the Bronze Age males, and although very slight (0.3 points) the same is the case within the EKA2 assemblage. These observations suggest there was a temporal increase in the physical stresses experienced as part of everyday life by the local populations, with males in particular being involved in more load-bearing activities. It does appear, however, that there may also have been a shift in some gender-based roles, with females taking on more exerting physical activities since, despite the temporal decrease in the average stature for the females their mean robusticity index is equivalent to that of the Bronze Age males.

The numbers are, as with the Bronze Age, relatively small, precluding conclusive comment, but the data suggest a broadly homogeneous population, with no major deviations from the Bronze Age data, particularly amongst the females. There are some differences between and within the males suggestive of a greater admixture, but again, at least some of this is likely to be activity related. The apparently progressive temporal decline in stature for both sexes may be indicative of a poorer diet in the later period, a factor which appears to have affected the females in particular. The general impression is that life became tougher, both in terms of access to resources and the physical stresses exerted on the body.

Non-metric variations

There are several morphological variations which occur on a repeat basis amongst the Iron Age groups within the difference zones which may be indicative of at least broad genetic links between individuals. In both Zones 4 and 6, two individuals share the relatively common trait of lambdoid ossicles (rates 50% and 40% respectively). However, the overall rate for the period is 69.2%, suggesting that absence rather than presence of the trait may be of greater significance; a similarly high rate of *c* 66.7% was recorded for the Cliffs End Middle Iron Age assemblage (McKinley forthcoming a). Three individuals from the Zone 12 cemetery with lambdoid ossicles also each have an ossicle at the asterion (rate 44.4%, overall rate for period 28.6%) which represents slightly stronger evidence for a possible genetic link. Two of these individuals (126013 and 136034) were buried in adjacent graves, the other (153027) representing one of the southern outliers to the cemetery. Two subadults buried in adjacent graves within the cemetery also shared the trait of a bi-partite root in the canine teeth. In Zone 13 three individuals have posterior bridging in the atlas vertebra, the rate for the zone (50%) being substantially greater than the overall for the period (17.6%). The graves of these individuals are dispersed across the area, but one of those with this trait (220093) shared another – a supernumerary maxillary tooth (Pl 13.8a-b) – with an individual (126128) buried in close proximity to one of those with atlas bridging (246012).

Abnormal development of the basal occipital (*pars basiliaris*) centre was observed in the subadult 220093 (Zone 13). The bone appears to have formed from two centres, the dorsal segment of which appears to have developed more-or-less normally. The anterior portions of the occipital condyles each have narrow arches (11mm wide, *c* 6mm deep) extending anterior-medially, presumably to whatever form of joint existed between them and the anterior segment. The anterior segment is formed of a 19.5 x 13mm rectangular block. There is normal development of the anterior sphenoid-occipital synchondrosis, however, the junction with the dorsal segment is represented by a 7mm diameter protrusion in



Pl 13.8 Iron Age morphological variations: unerupted supernumerary maxillary teeth (a) anterior view maxillary of 220093 showing pegged supernumerary immediately inferior to right nasal margin; (b) view of palate from 126128 showing pegged supernumerary in central line between 1st incisors

the centre of the dorsal side (Pl 13.9). Unfortunately, the point of junction between the two segments/centres sustained fresh breaks during machine stripping of the site and the fragments which would have linked them were not recovered. Consequently, the full nature of this unusual development cannot be ascertained.

Pathology

Some form of pathological lesion was recorded in the remains of 37 individuals (71.1%), including seven immature individuals spanning the age range from neonate to subadult (29.2%). Many of the lesions and conditions recorded for the Bronze Age populations are common to the Iron Age assemblage. To minimise repetition, the background to these pathological features will not be presented here, and discussion pertaining to both assemblages, including comparisons between them, will largely have already been undertaken on the previous section to which the reader is referred. Most of the rates (TPRs) are presented in combined tables for ease of comparison (Tables 13.8–13.11). The basic data relating to the Iron Age material will be presented here, together with comparative contemporaneous data, and any pertinent discussion related to conditions not observed in the Bronze Age assemblage.

Dental disease

All or parts of 23 permanent erupted dentitions were recorded and 11 deciduous dentitions (Tables 13.8 and 13.9). Slightly more female compared with male dentitions were present (note that in view of the small numbers involved all the sexed individuals are considered together irrespective of the attributed confidence level).

Slight-moderate deposits of dental calculus were observed in 20 permanent dentitions (including two juvenile), and three deciduous dentitions. The rates for both sexes were almost the same, suggesting greater compatibility in diet between the sexes than appears to have been the case in the preceding period (Table 13.10). As in the Bronze Age dentitions most deposits were observed on the molar tooth crowns and occasionally the premolars, and the lingual side of the teeth appears to have been primarily affected. The rate is more than twice that seen in the Bronze Age assemblage (see above for further discussion), but is very close to those recorded for the Iron Age at Cliffs End Farm (65.1-66.7%; McKinley forthcoming a), suggesting a similarity in diet and dental hygiene within the locality.

Mild-moderate periodontal disease had affected the alveolus around individual tooth sockets in ten adult dentitions (43.5%), six female (50%) and four male (44.4%).

Ante mortem tooth loss was observed in six adult dentitions, two female (16.7% female dentitions) and four male (44.4%). The TPRs also show a slight disparity between the sexes in favour of the females (Table 13.10). The majority of the teeth lost were molars (60.6%), with relatively heavy involvement of the

Pl 13.9 Iron Age morphological variation in subadult 220093: basal occipital centres; dorsal view of damaged and incomplete anterior portion (left) and inferior view of dorsal portion (right) showing abnormal development of junction between two portions

premolars (27.3%) and the loss of several incisors (12.1% of teeth lost). As previously observed, the loss of some of the latter may have been as a result of trauma rather than an associated disease process but dental caries were observed in several of these teeth in other dentitions. Some loss may also have been due to extensive occlusal wear, but where this was observed it did not necessarily correspond with extensive tooth loss; for example. 246012, an older adult male in Zone 13, had flat occlusal wear through most of the crowns but had lost only two molars *ante mortem*, though seven teeth were also carious. There is, as is commonly observed, evidence to indicate an increase in the frequency of the condition with age (two mature and four older adults). The overall rate is greater than the TPR of 3.2% (table 2.51) given by Roberts and Cox for period, but there is considerable variation between the five sites in their sample and the EKA2 assemblage falls in the lower range of rates from individual sites. The rates shown in Table 13.10 are also well above those seen in the Iron Age assemblages from Cliffs End Farm (1.7-2.6%) but this is probably largely influenced by the young age of many of the individuals represented in that assemblage (McKinley forthcoming a).

Carious lesions were recorded in one deciduous dentition and 12 permanent ones including four female (25%) and eight male (88.9%). Although more older adult dentitions were affected (five) and to a greater extent, lesions were seen in the dentitions of adults of both sexes across the age range together with one subadult female. As in the Bronze Age, most lesions were either cervical or interproximal in location, with the total destruction of the tooth crown in several cases which included both anterior and distal teeth. The molars were primarily affected (60.9% of lesions) but lesions were also seen in several premolars (10.9%) and a fairly high proportion of the anterior teeth (28.3%). The overall rate is some way above the TPR of 2.9% given by Roberts and Cox for the Iron Age (2003, table 2.46), and is also greater than the rates recorded at Cliffs End Farm (2.4-5.7% Early and Middle Iron Age), the latter, again, being under the influence of the young age of many of the individuals recorded there (McKinley forthcoming a).

Destructive lesions in the supportive structure (apical voids/dental abscesses) were seen in seven adult dentitions, all of which exhibited dental caries and six of which had suffered some *ante mortem* tooth loss. Although the number of females (two, 16.7% female dentitions) affected is less than half that of the males (five, 55.5% dentitions), the TPR for the latter is slightly lower (Table 13.10) illustrating the varying extent to which individuals were affected. Although more older adults were affected (four), lesions were also observed in the dentitions of two young adults. The overall rate and those for both sexes is greater than the 1.1% TPR given by Roberts and Cox for the period (2003, table 2.50), being slightly closer to the 2.6-3.4% (Early-Middle Iron Age) recorded at Cliffs End Farm (McKinley forthcoming a). One of the young adults affected, a male from Zone 12 (126013) who had four interproximal carious lesions in the left side of his dentition, had one large lesion in the maxillary M1 which had contributed to the formation of a dental abscess. The infection from the latter had tracked superiorly into the left antrum and the individual had developed secondary sinusitis as a consequence.

Faint horizontal lines of dental hypoplasia were recorded in the permanent tooth crowns of 11 individuals (47.8% permanent dentitions) including six females (50%), one male (11.1%) and two juveniles; two deciduous dentitions were also affected. The latter indicates stresses – dietary or illness – in the mother being transmitted to the developing foetus. The data from the permanent teeth suggest that the 4th–6th years represented those in which most children were potentially under greatest stress; this may be linked to weaning and the development of the child's own immune system (at *c* 6 years) which can leave the child particularly exposed during these years (Lewis 2007, chapter 6). Several cases indicate repeat episodes with intervening periods of remission or reduction in the stress levels, one individual – the subadult female from Zone 4 – having evidence for recurrent periods of difficulty between the ages of at least 2 and 5 years. The substantially higher rates amongst the females compared with the males suggests that at times of shortage there was preferential treatment of male children over that of the females. This would also contribute to the observations on estimated stature which indicated that the Iron Age females were being nutritionally deprived in their growing years. Comparative data are mostly in the form of CPRs (16.7%), and the limited TPRs available are highly variable but still remain lower than seen in this assemblage (7.1% from the single individual from Bourton-on-the-Water in Roberts and Cox 2003, table 2.49; 4.8 and 16.1% from Cliffs End; McKinley forthcoming a).

A harmless condition involving the excessive formation of secondary cementation, hypercementosis was noted in the dentitions of two mature adults, one male and one female. The condition may be triggered by age, periapical inflammation, mechanical stimulation or trauma. In the case of the female, three anterior maxillary teeth are affected and the condition may be linked to the apical inflammation indicated in this part of the jaw, whereas in the excessively worn dentition of the male, age and mechanical stimulation is the most probable cause (single maxillary molar affected).

The contribution of the evidence derived from the disease patterns seen in the dentitions to our understanding of the diet, health status and potentially the social status of the individuals represented within the Iron Age assemblage has been discussed in part above (see Bronze Age section). Further to that is the observation that although in adulthood the male and female diets may not have differed greatly, there is strong evidence to suggest the preferential treatment of male infants at the expense of their female counterparts which had a detrimental effect on the growth of the latter. The numbers are low and the observation inconclusive but there is some slight indication that this problem may have become exacerbated as the period progressed.

Metabolic conditions

Metabolic conditions are generally reflective of deficiencies or excesses within the body's system, commonly – though not exclusively – linked to dietary intake; the resulting disorders are frequently described as 'stress indicators' (Roberts and Manchester 1995, 163-4). *Cribra orbitalia*, manifest as pitting in the orbital roof, is generally believed to be associated with childhood iron deficiency anaemia though other contributory factors, such as parasitic infection, are also recognised (Molleson 1993; Roberts and Manchester 1995, 166-9). Although changes predominantly develop in childhood the lesions can persist into adulthood. Some workers have observed that individuals with iron deficiency have an increased susceptibility to severe infections (Aufderheide and Rodríguez-Martín 1998, 349; Roberts and Cox 2003, 307).

No lesions were observed in the 11 pairs of Bronze Age orbits recovered (five female and six male), which corroborates the other evidence for a lack of, or at least non-detrimental levels of, stress to the system of the growing child within this period (see above). Within the Iron Age assemblage, however, lesions were observed in 9/38 orbits (23.7%), with a slightly higher rate for the males (33.3%) compared with females (20%). A greater proportion of the right (27.8%) compared with the left orbits (20%) were affected. Lesions are generally slight or moderate and porotic in form (Robledo *et al* 1995, fig 1), but one Middle Iron Age 11-13 year old ?male (153042, Zone 12) has severe porotic lesions which were clearly active at the time of death. This individual also has lesions indicative of porotic hyperostosis, which is of the same aetiology and similar appearance to *cribra orbitalia.* Thinning of the outer table of the vault, exposing the – often thickened – underlying diploe, creates the appearance of surface 'pitting' in the early stages of the condition (Roberts and Manchester 1995, 167; Aufderheide and Rodríguez-Martín 1998, 348-9). The lesions are often symmetrical, characteristically affecting the frontal and parietal bones (*ibid*) but in this case lesions were limited to the right posterior parietal.

The low overall numbers with *cribra orbitalia*, lower still for the individual phases within the period, render any confident statement regarding temporal variations open to question. However, it is pertinent to note the same incipient evidence for an implied deterioration over time in the diet and increased stress levels experienced by the populations as has been observed elsewhere in the collective data (see above); 6/16 (37.5%) Middle Iron Age orbits being affected compared with 3/6 Late Iron Age/early Roman. The overall rate is lower than the TPR given by Roberts and Cox for the period, derived from only two sites which themselves displayed a fairly broad range (25-37.5%; 2003, table 2.52). The data from Cliffs End Farm, based on relatively few specimens, also vary within the period (40-28.6% Early-Middle Iron Age; McKinley forthcoming a).

One of the neonates from Zone 13 shows lesions (abnormal increased porosity in the skull and long bones and slight flaring of the ends of the latter) indicative of a possible case of scurvy. The lesions are concentrated in the skull, particularly the mandible where the anterior buccal/labial bone is very open and woven in appearance, the exocranial surface of the basal occipital and temporal bones being similar. Both orbital vaults are damaged but appear to have fine open woven new bone across at least parts of them. The vault is incomplete but parts of the parietal bones appear much thicker than others (thickness of diploe increased to 2.7-4.8mm compared with 2mm elsewhere), the form of the diploic bone is normal, just thickened. The changes would be consistent with those seen in cases of scurvy, though a differential diagnosis of acute inflammatory infection or anaemia cannot be discounted (Brickley and Ives 2005). Scurvy results from a lack of vitamin C in the diet. Found in fresh fruit and vegetables, and to a lesser extent meat, vitamin C is necessary for the normal formation of collagen. A deficiency results in inadequate formation of the blood vessels which are then prone to haemorrhage, leading to new bone formation where the bleeding occurs (*ibid*; Roberts and Cox 2003, 105). Since the dietary needs would have derived from its mother's milk there may also have been a nutritional deficiency in the mother.

Trauma

Seven individuals show evidence of trauma (CPR 13.5%), with involvement of individuals from all phases.

Weapon trauma

Two individuals from Zone 6 had evidence for weapon trauma, one blunt (Early/Middle Iron Age) and the other sharp (Middle/Late Iron Age).

The partial cranium (parietals and most of occipital) of a *c* 15-30 yr. female (258270) had been placed at the base of a post-hole (258230) in Zone 6 and above it was deposited a substantial part of an Early-Middle Iron Age vessel. The placement of the skull appears deliberate and the choice of skeletal element, as with the case of the Early Bronze Age skull 174057 (see above), may have been due to the obvious peri-mortem weapon trauma inflicted on the individual's head. In this case there are lesions on both sides of the skull (Pl 13.10a). The larger lesion is in the right parietal, 43mm from the sagittal, 59mm from the coronal and 69mm from lambdoid sutures. The deepest portion of the lesion (*c* 5mm) lies superior-central, where a *c* 13mm roundel has concentric fractures radiating superiorly and medial-distal out to the 21mm diameter exocranial margins of the overall lesion (Pl 13.10b). Radiating fractures extend anteriorly to the coronal suture and medio-distal to the posterior end of the sagittal suture. Endocranially there is a 27.5mm diameter lesion, showing internal bevelling, the bone roundel having flaked off post-decomposition (one fragment only recovered; Pl 13.10c). A central, anterior-lateral to posterior-medial fracture extends through to the outer-plate within the lesion but the rest of the endocranial surface is intact. The same radiating fracture as was seen exocranially extends to the coronal suture, but the posterior fracture is not evident. There is, however, a fracture from the lesion towards the anterior/bregma area which is not evident in the exocranial plate. The forceful blow, made with a rounded blunt instrument (akin to a small round-headed hammer), appears to have come from the right side, slightly anterior. A similar lesion, but far less pronounced, can be seen in the left dorsal parietal. Here, a faint 'hairline' ovoid fracture (21 x 12mm) is visible in the exocranial surface only, with a very slight (<1mm) depression in the dorsal portion (<1mm) and a fracture radiating posterior-lateral to the lambdoid suture. (Pl 13.10a)

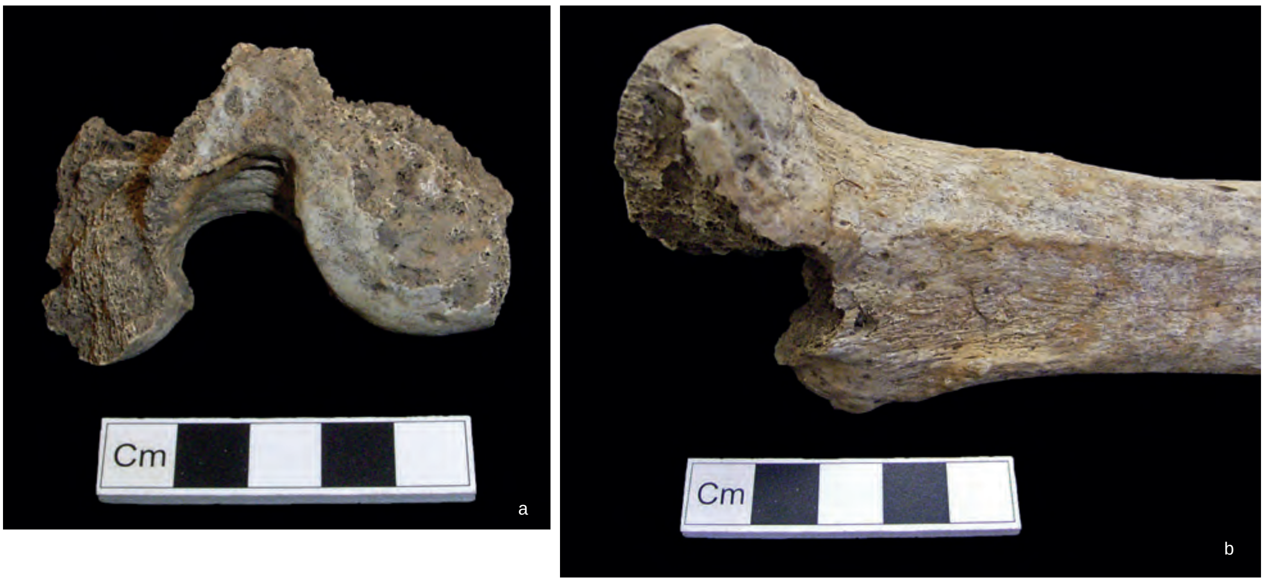
Pl 13.10 Iron Age young female 258270 (a) view of cranial vault from above left showing traumatic lesions in both parietals; (b) right parietal showing effects of violent blunt trauma in exocranial vault; (c) endocranial view of lesion showing impact spalling of inner plate

A very similar lesion was observed in the partial cranium of an adult female of commensurate date, also found as a placed deposit, at Little Stock Farm at the southern end of the High Speed 1 route in Kent (McKinley 2006c). There, as here, the blow was perimortem and is likely to have been at least a contributory factor in the individual's death, though postmortem ritual manipulation cannot be excluded. Violent trauma to the skull – resulting either from conflict, punishment or ritual activity – has been recorded from numerous Iron Age sites (Whimster 1981, 187; Dent 1983, 120-128; Hooper 1984, 471; Hooper 1991, 429-230; Anderson 1995, 121-122; Boylston 2000; McKinley 1999; 2008b). Whilst males appear to have predominated amongst the victims at least one other female is listed by Boylston as having suffered weapon trauma to the skull (2000, table 1). Currently the EKA2 and Little Stock Farm cases represent the only examples of skull trauma reported from Iron Age sites in the county.

The second case of weapon trauma is that of a mature adult male (292076), also from Zone 6, whose remains had clearly been subject to post-mortem manipulation of various forms prior to, and possibly following, final deposition in pit 292075. The individual's skull was missing together with the upper three cervical vertebrae (possibly subject to perimortem decapitation). There had also been what appeared to be post-depositional removal of the right upper limb (scapula *in situ*) and the left leg (femur *in situ;* Pl 13.11). There is evidence for canid gnawing to axial and lower limb elements indicative of exposure of the body (Pl 13.12a and b), but there are no cut marks to the bones supportive of the suggestion of removal of the limbs (or head) via violent dismemberment.

There is, however, unhealed, peri-mortem sharp weapon trauma to the dorsal portion of the 1st lumbar vertebra. Here, a clear sharp cut, set at a 45-50 degree angle to the horizontal, has removed the spinal and the inferior articular processes from the superior articular and transverse processes in an almost transverse line (Pl 13.13a-c). The cut has sharp margins in both portions across the whole width except at the extreme right superior side which has been snapped. There is no sign of damage to the 12th thoracic above (though the spinal process is missing post-mortem so the observation is not absolutely conclusive) or the 2nd lumbar below. To sever this one bone in this manner would have been a precision operation. The cut, as opposed to a blow, appears to have been made from the left side, where by going slightly up and across at a very slight angle (*c* 10 degrees) it could just have missed the various adjacent processes, snapping-off the remaining bone fragment on the right side. Even so, the operation would have been difficult. Given that this individual's remains had clearly undergone various manipulative episodes, it is possible that the cut was made some time after death but to bone that was still green (up to *c* 14 days post-mortem; Douglas Ubelaker, BABAO conference 2012). Despite missing several skeletal elements (see above) the body still appeared articulated when excavated; however, the photograph of the remains *in situ* (Pl 13.11) shows that the sacrum had moved substantially out of place (rotated minimum 90 degrees distally), and the lumbar vertebrae may also have been

Pl 13.11 Iron Age mature adult male 292076: in situ remains in pit 292075 demonstrating missing skeletal elements (skull, left leg and right upper limb)



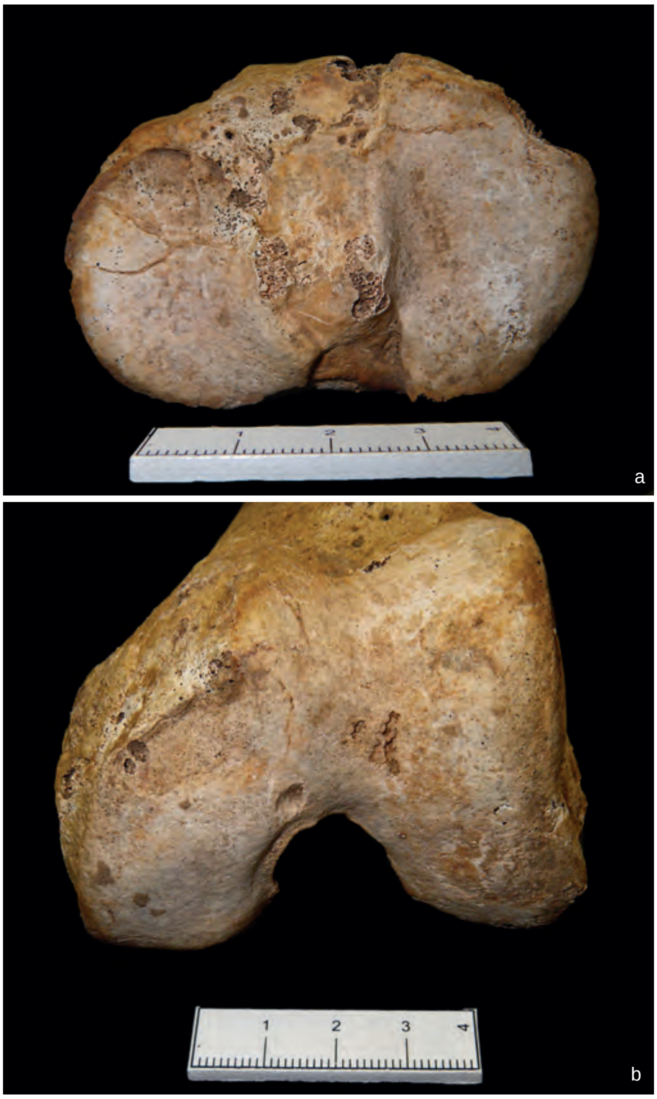
Pl 13.12 Iron Age mature adult male 292076: (a) distal femur; (b) proximal tibia showing puncture marks and crenulation resulting from canid gnawing

Pl 13.13 Iron Age mature adult male 292076: (a) dorsal view of the 12th thoracic and 1st lumbar vertebrae showing sharp weapon trauma in spinal process of the latter; (b) superior dorsal view of L1 showing sharp weapon trauma to spinal process; (c) detail of lesion in spinal process from left lateral

Pl 13.14 Iron Age mature adult male 292076: right lateral view of T12 showing callus marking healed compression fracture to the vertebral body

disturbed (neither the site drawings nor the photograph show the lumbar region). Forensic investigations have shown that where a decomposing body is moved the torso breaks up in the lumbar region leading to the vertebrae in this area falling out of position (C Duhig pers. comm.). Had this occurred in this instance it may have proved easier to access the 1st lumbar vertebra, and the cut may have been made in order to hasten the physical breakdown of this body, a transformation process supported by other evidence in this case.

The same male had suffered numerous fractures, all well-healed by the time of death, to parts of the axial skeleton and lower limb. A compression fracture in T12 (rate 7.1% T12; 0.3% vertebrae) had resulted in a 7mm reduction in the anterior height of the vertebral body; visually evident as a minor mid-line callus, the x-radiography shows only a very faint central increase in opaqueness (Pl 13.14). Such fractures are caused by flexion force imposed from above (heavy fall of material on the head) or below (heavy fall on feet or buttocks; Adams 1987, 100-103). The well-healed fractures in the anterior rib cage (two left mid-lower ribs and two right upper-mid; rate 1.9%) were probably the result of a fall on to a hard/immovable object at a slight angle (lower left to upper right); though a deliberate blow with an object across the upper abdomen would have the same effect. The transverse fracture to the distal end of the left fibula (rate 3.8%) had healed with slight dorsal displacement of the distal end, and the mild exostoses on the medial side of the bone indicate associated damage to the interosseous ligament demonstrating severe abduction to the ankle joint (Adams 1987, fig 267). Some or all of these injuries could have been sustained in one traumatic event but it is more likely that this individual represents a recidivist. The potential violent death of this male and the post-mortem treatment of his corpse may have had some connection with his suggested physically stressful lifestyle.



Pl 13.15 Iron Age male 153027: depressed fracture in left knee joint; (a) superior view tibia proximal articular surface with lesions in anterior of both condyles: (b) inferior view femoral distal articular surface with lesions in anterior of medial condyle

The healed mid-shaft fracture to the left clavicle of the older adult female 166004 is characteristic of a fall on the shoulder or, more rarely, an outstretched hand (Adams 1987, 119). There is slight displacement resulting in a loss of length, but generally the injury had healed well.

The other two individuals with fractures both had lesions in the left knee joint indicative of a depressed plateau fracture resulting from abduction of the tibia on the femur while the foot was fixed (Adams 1987, 250), i.e. they had each sustained a violent blow to the lateral side of the knee. The lateral condyle of the left tibia of the adult male 153027 (Zone 12) has a semi-circular depressed area (66 x 18mm) in the anterior portion of the condyle, which is delineated dorsally by a partially healed crack. There are several other healed fracture lines within the overall area but it is likely that the break was not severely comminuted. A small anterior-lateral area of the medial condyle was also affected, with some sclerosis between the condyles (Pl 13.15a). Lesions in the medial condyle of the left femur also suggest injury to the knee which, although potentially sustained in the same traumatic event must have involved a slightly different mechanism. The lateral margin of a shallow depression (*c* 22 x 18mm, 1.5mm deep) in the anterior of the medial condyle is defined by a partially healed semi-circular crack in the surface; as with the tibia, a depression fracture is indicated. A second, smaller but deeper lesion (5 x 5mm, max 2mm deep), is situated lateral-distal to it close to notch (Pl 13.15b). The greatest depth within the latter is meso-anterior, angling up towards the surface disto-laterally, and suggests some form of penetrating injury. No associated soft tissue injuries – in the form of enthesophytes/exostoses or periosteal new bone (see below) – were observed. A possible fracture to the left distal foot phalanx, generally resulting from either a heavy item being dropped on the foot (Adams 1987, 290), may also relate to the same event.

A similar but far less extensive lesion to that seen in the tibia of 153027 was observed in the medial condyle of the left tibia from 220093 (Zone 13), where a small (*c* $10mm^2$) slightly depressed section of bone was observed in the anterior margins of the condyle. Incomplete healing of the lesion indicates it was sustained shortly before the individual's death.

Spondylolysis

The aetiology of spondylolysis – involving the loss of bony continuity between the superior and inferior vertebral articular processes – has been subject to some debate (Adams 1986, 224; Roberts and Manchester 1997, 78; Aufderheide and Rodríguez-Martín 1998, 63-4). Some believe there is an underlying congenital weakness to the condition, which is likely to represent a stress fracture, arguably in the immature individual (Adams 1986, 224). The condition is often symptomless but may cause deep lumbar back pain (*ibid*). Lesions were seen in the L5 of two individuals (rate 10%), an adult male (153027, Zone 12) and an unsexed subadult (220093, Zone 13), both of whom had similar fractures in the left knee joint (see above).

Osteochondritis dissicans
Lesions indicative of the condition (see above) were observed in the remains of three individuals from Zone 13. Those observed in both condyles of the redeposited right femur from pit 248058, although small and shallow, are classic in their location and likely to represent well-healed remnants of the condition. The location of the lesion in the older adult male 246012 is unusual, the changes being observed in the dorsal-lateral portion of the right articular surface of the axis vertebra. The 6mm diameter lesion has the characteristic appearance of healed *osteochondritis dissicans*. Although causing pain and stiffness when active, which is likely to have been a particular problem given its location in the axis, there are unlikely to have been any long term effects once healed. Unhealed, bi-lateral lesions were observed in the convex surfaces of the distal humeri from 248092 (subadult male).

Enthesophytes, exostoses and cortical defects
The CPRs for enthesophytes are generally slightly lower than those seen in the Bronze Age assemblage with lesions seen at one or more sites in 11 individuals (34.6% adults), including eight adult males (61.5%) and two females (20%). Sites in the lower limb were again most frequently affected under the influence of the same overall factors. Several individuals also had lesions at sites in the upper limb, possibly reflective of an increase in upper limb activity from the Bronze Age; for example two males and one female have lesions in the proximal humerus. Cortical defects and enthesophytes recorded bi-laterally in several metacarpals (particularly left 3rd at the distal end of the transverse head of the *adductor pollis* attachment; abducts thumb and wrist) and phalanges (especially 1st distal phalanges at *flexor policis longus* attachments; flexing distal phalanx of thumb) from 205108 (Zone 19) suggest that this elderly male was regularly engaged in activities requiring a strong grip and movement of the hands. Bi-lateral, cortical defects at the *teres major* (medial rotation, adduction and extension of the arm) attachments in the humeri of a young juvenile from Zone 6 illustrate the potential involvement of all members of communities in strenuous activities – lifting and carrying – from a young age.

Infections
Lesions indicative of some form of infection were observed in the remains of eight individuals from across the temporal range; five females (including two subadults) and three males (including one subadult).

Periosteal new bone
Lesions were observed in one or more skeletal element in six individuals (CPR 11.2%). Two females have extensive lesions on the visceral surfaces of three to nine left ribs, indicative of some form of pulmonary infection which could include pleurisy, bronchitis or tuberculosis. In the former case (126128, mature adult; Zone 13) the lesions appear to have been active at the time of death, and in the latter (177324, subadult; Zone 4) they had healed.

The aetiology of the slight but extensive lamellar new bone seen in the left fibula shaft of the mature adult female 153047 (Zone 12) is unclear. There are no associated lesions in the affected bone or elsewhere in the skeleton. Although the bone appears marginally thickened mid-shaft there is no evidence for bone destruction/abscess formation. The condition may be related to a systemic infection in the younger individual. Some form of systemic infection is also suggested by the extensive area of thick, woven, plaque-like new bone across much of the dorsal and medial surfaces of the left tibia of the subadult female 248039 (Zone 13). The left fibula is similarly affected, and small areas (max 18 x 9mm) of slightly coarse-grained new bone were also observed on the posterior-lateral sides of both proximal femora.

Both coarse-grained (active) and partly 'plaque-like' lamellar new bone were observed in various of the foot bones of the subadult male 248092 (Zone 13). Most of the lesions were seen in the facet surfaces, including the right calcaneum anterior of medial talal facet, the left navicular medial talus surface and the medial cuneiform surface (no obvious lesions in adjacent surfaces). Three right metatarsals were also affected; with lesions in the medial side of the right 3rd shaft with some suggestion of fusion between this and the 2nd (post-mortem damage), and the planter side of the right 4th shaft. The latter lesions may suggest a traumatic origin with soft tissue damage and infection. The former, together with lesions seen in the distal epiphyses of the tibiae (new bone in left, increased porosity/pitting in the right) are more suggestive of a systemic infection. A very small area (*c* 7mm diameter) of lamellar new bone in the mandibular right medial ramus is probably unrelated but of equally indeterminate aetiology.

The 91 x 14mm area of fine-grained 'plaque'-like new bone on right tibia lateral mid-shaft of the older adult male 246012 (Zone 13) may have been related to minor, largely soft tissue, trauma, to which the tibia is prone due to its surface proximity. Trauma, with soft tissue damage, may also have been the cause of the small area of fine-grained periosteal new bone on the medial surface of the left calcaneum. The implication for recurrent infection is, however, illustrated by the slightly larger area of lamellar new bone on the dorsal side of the same bone and may suggest a more chronic condition possibly due to venous stasis and consequent ulceration. The same individual had shallow nasal guttering, *c* 4mm deep from the nasal margin, which may indicate a healed nasal infection (narrow nasal margins, very pronounced anterior nasal spines).

Endosteal new bone
A small area of hypervascular lamellar new bone was observed in the left parietal of a young adult female 136034 (Zone 12). Such endocranial lesions form as a consequence of meningeal infection or haemorrhage, and the aetiology of individual cases can be difficult to determine, various conditions potentially being reflected including trauma, vitamin C deficiency and tuberculosis (Lewis 2004). Given the discrete location of the lesions seen here a traumatic origin is postulated.

Destructive lesion

Although Schmorl's nodes (see below, joint disease) were observed in two of the six surviving vertebrae from the mature adult male 166001 (Zone 12), the destructive lesion seen in the superior body surface of the L5 did not conform with such a diagnosis. The lozenge-shaped lesion (32mm x 10mm, maximum 7mm deep) follows the interior margin of the annular ring. The margins are partly sclerotic with some open trabecular bone, and both a thickened and diminished structure. Although not classic in form and lacking supportive evidence, some form of chronic infection, possibly tuberculosis, is indicated.

Joint disease

Lesions were recorded in the joints of 17 individuals (32.7% of population; 65.4% of adults) comprising nine males (60% of all males, 69.2% of adult males) and eight females (47% and 80% respectively). The CPR is higher for the Middle Iron Age phase (52.9%) than for the Early/Middle (11.1%) or Late Iron Age/early Roman (20%). This may partly reflect the demographic make-up of the different groups, but other factors are likely to have had an impact. The rates (TPRs) presented in Tables 13.11–12 are for the overall period.

Schmorl's nodes

Lesions were recorded in from one to nine vertebrae in the spines of nine individuals (CPR 17.3%); six males (CPR 40%; age range subadult-older adult) and three females (CPR 17.6%; young-older adults). No lesions were seen above T6. The overall rate (TPR) is slightly higher than seen in the Bronze Age assemblage, and in marked contrast with the latter the female rate is slightly higher than that for the males (Table 13.11). It may be fortuitous that the two individuals from the Iron Age cemetery at Mill Hill, Deal with such lesions (CPR 5.3%, no TPR given; bone generally in poor condition) were both female (Anderson 1995), and that the only individual affected at Cliffs End was also a Middle Iron Age female (TPR 5.9%; McKinley forthcoming a). The CPR of 2% given in Roberts and Cox (2003, table 2.41) for the period is questionable given the small numbers recovered from most of the four sites within the sample and the wide variation between individual sites.

Degenerative disc disease

The condition was observed in from two to 15 vertebrae in seven spines (CPR 13.5%); two female (CPR 11.8%) and five male (CPR 33.3%). Lesions were recorded in all areas of the spine, the thoracic and lumbar regions being most frequently affected. In contrast with the Bronze Age data, most individuals were in the mature adult range including one of the two individuals (a male) with the most extensive lesions. Two older adults and one young adult were also affected. The overall TPR is almost identical to that for the Bronze Age but there is far greater compatibility between the sexes, although the male rate remains above that for the females (Table 13.11). No such lesions were recorded in the Iron Age assemblage at Cliffs End, doubtless due to the paucity of the pertinent skeletal elements within the mature/older adult categories.

Osteoarthritis

Lesions indicative of osteoarthritis were seen in from two to 11 joints in five adults (CPR 9.6%), all mature or older, comprising three males (CPR 20%) and two females (CPR 11.8%). Spinal joints were affected in three individuals and non-spinal joints in all five. All areas of the spine were involved, in one case (mature adult 153054, Zone 12) culminating in ankylosis of the L5-S1 transverse joints. Extra-spinal lesions were seen in the costo-vertebral joints (four individuals) and carpals (two individuals), the wrist joints of one older male (205108; Zone 19) and a tarsal joint of an older adult female (166004; Zone 12) (Table 13.12). The overall rate is slightly lower than for the Bronze Age, and although there is still a marked disparity between the sexes it is less than previously seen. The weight-bearing joints are no longer involved with a shift in emphasis to the upper limb, particularly the hand bones, possibly indicating activity-related changes (though there is a danger of over-interpretation given that the numbers involved are small). The overall rate is lower than the *c* 3% recorded at Cliffs End (McKinley forthcoming a), probably, at least partly, under the influences outlined above.

Lone osteophytes and pitting

Lone osteophytes were seen in the remains of 15 adults (overall CPR 28.8%; 57.7% adults); seven females (CPR 41.2%; three older, two mature and two young) and seven males (CPR 46.7; two older and five mature). Between one and 41 joints were affected in each individual (with the most in mature adult male 153054, Zone 12), lesions being recorded in 64 spinal and 110 extra-spinal joints. Most individuals had some spinal lesions, and the spine alone was involved in two cases (both young adult females). Most of these lesions were observed in the vertebral body surface margins (10 individuals); synovial joint surface margins were involved in six cases (Table 13.5). The overall spinal rate is lower than for the Bronze Age and, as with osteoarthritis, the persistent marked disparity between the sexes is less than previously seen (Table 13.11). As in the Bronze Age assemblage, the hip and shoulder joints were most frequently affected amongst the extra-spinal joints (seven individuals each, mostly males 71.4%), lesions being observed in one or both sides with no side preference. The costo-vertebral joints were affected in eight individuals, with greater equality between the sexes. Lesions were also common in parts of the knee and wrist joints (five cases each, predominantly – 80% – males), and the elbow joints (three males). Joints in the hand were affected in four cases (three males and one unsexed, all adults) and those of the foot in three (male and female). The rates for males continue to be higher than those for the females in all areas with the exception of parts of the hand and foot.

Lone pitting in synovial joint surfaces was observed at from one to ten sites in the remains of ten adults (CPR 19.2%); six males (CPR 40%; two older and four mature) and four females (CPR 23.5%; two older, one

Table 13.14 Later prehistoric extra-spinal joints affected by degenerative joint lesions, showing rates (TPR) by phase and sex (inc. LIA/ERo)

Joint	*Female*	*Male*	*Total (inc. unsexed)*
Iron Age			
Temporo-mandibular	8R 8L pitting: R 25%	6R 6L pitting: R 16.7%, L 16.7%	15R 17L pitting: R 20%, L 5.8%
Costo-vertebral (ribs)	47R 43L oa: R 2.3%, L4.2% op: R 21.3%, L 20.9% pitting: R 4.2%, L 4.6%	64R 55L oa: R 3.1%, L 3.6% op: R 28.1%, L 27.3% pitting: R 7.8%, L 10.9%	111R 99L oa: R 2.7%, L 4% op: R 25.2%, L 24.2% pitting: R 6.3%, L 8.1%
Acromio-clavicular	1L	6R 5L pitting: R 33.3%, L 40%	6R 6L pitting: R 33.3%, L 33.3%
Sterno-clavicular	4R 3L	5R 5L op: L 20%, pitting: R 20%, L 20%	9R 8L op: L 12.5% pitting: R 11.1%, L 12.5%
Shoulder – Glenoid	6R 6L op: R 16.7%, L 16.7%	7R 7L op: R 71.4%, L 57.1% pitting: L 14.3%	13R 13L op: R 40.1%, L 38.5% pitting: 7.7%
Shoulder – humerus	4R 5L op: R 25%, L 20%	6R 7L op: L 14.3%	11R 13L op: R 9.1%, L 15.4%
Elbow – humerus	5R 4L	7R 8L op: R 14.3%, L 12.5% pitting: R 12.5%, L 12.5%	13R 13L op: R 7.7%, L 7.7% pitting: R 7.7%, 7.7%
Elbow – radius	5R 3L pitting: L 33.3%	6R 7L op: R 33.3%, L 14.3% pitting: R 16.7%	12R 11L op: R 16.7%, L 9.1% pitting: R 8.3%, L 9.1%
Elbow – ulna	6R 6L	7R 8L op: R 14.3%, L 50%	14R 15L op: R 7.1%, L 26.7%
Wrist – radius	4R 3L	7R 8L oa: L 12.5% op: R 14.3%, L 12.5%	12R 12L oa: L 8.3% op: 8.3%, L 8.3%
Wrist – ulna	1R 3L op: L 33.3%	6R 8L oa: R 16.7%, L 12.5% op: L 12.5%	8R 12L oa: R 12.5%, L 8.3% op: L 16.7%
Hand – carpals	14R 15L oa: L 6.7% op: R 7.1%	38R 50L oa: L 4% op: L 4%	58R 73L oa: L 4.1% op: R 1.7%, L 2.7%
Hand – carpo-meta	11R 14L	30R 28L op: L 3.6%	46R 48L op: L 2.1%
Hand – meta-phalangeal	8R 12L	29R 29L op: R 13.8%, L 3.4%	42R 47L op: R 9.5%, L 2.1%
Hand – proximal IP	10R 10L	23 R 26L op: R 8.7%	38R 41L op: R 5.2%
Hand – distal IP	4R 6L	19R 18L op: L 16.7%	25R 25L op: L 12%
Hip – pelvis	6R 4L op: L 25% pitting: R 33.3%, L 50%	7R 7L op: R 57.1%, L 28.6% pitting: R 14.3%, L 28.6%	13R 11L op: R 30.8%, L 27.3% pitting: R 23.1%, L 36.4%
Hip – femur	7R 5L op: R 14.3%	8R 8L op: R 12.5%, L 50%	16R 15L op: R 12.5%, L 26.6%
Knee – femur/patella	R6 L5 op: R 16.7%, L 20%	6R 8L op: L 12.5%	13R 14L op: 7.7%, L 14.3%
Knee – lateral	5R 5L op: L 20%	7R 9L	13R 16L op: R 7.7%, L 6.2%
Knee – medial	5R 5L op: L 20%	6R 10L op: R 33.3%, L 30%	14R 17L op: L 23.5%
Foot – tarsal	R 25, L 37 oa: L 2.7%	R 36, L 35	R 61, L 75 oa: 1.6%
Foot – tarso-meta	18R 22L	16R 24L	34R 47L op: L 2.1%
Foot – meta-phalangeal	15R 19L op: L 5.3%	17R 20L op: R 5.9%	32R 40L op: R 3.1%, L 5%
Foot – proximal IP	11R 14L op: L 7.1%	16R 12L	27R 27L op: L 3.7%

Key: oa - osteoarthritis: op - lone osteophytes: R/L - right/left; IP - interphangeal. NB pitting = lone lesions mature and one subadult). Spinal lesions in the articular process joints were observed in one mature adult male (cervical and thoracic; Table 13.11). A similar pattern of involvement was seen as in the Bronze Age assemblage, with one or more costo-vertebral joints affected in five individuals, one or both hip joints in five cases, one or both acromio-clavicular joint in three and, at variance with the earlier period, one or both temporo-mandibular joints in three individuals (Table 13.14). As with all the other joint lesions, the female rates are lower than those for the males, with the exception of pitting in the acetabulum.

Solitary bone cysts

Solitary bone cysts or 'pseudo-erosions', generally small juxta-articular or peri-articular cyst-like formations, are particularly common in the wrist and ankle (Rogers and Waldron 1995, 61). Lesions were recorded the carpal bones of two adult males (overall TPR 3%; males 4.5%). The condition is generally asymptomatic.

Although the disparity between the sexes observed within this disease category in the Bronze Age remains, the difference is generally diminished. The evidence supports that of other osteological data suggesting that life became more physically stressful in the Iron Age, particularly for the females in terms of factors leading to joint disease, and the onset of at least some of these conditions appears to have been slightly earlier than indicated in the Bronze Age.

Miscellaneous conditions

Calcified cartilage

As with other forms of new bone, there may be a variety of triggers to the calcification/ossification of cartilaginous material within the body, including bone forming diseases such as DISH (see above) and a predisposition to hyperostosis. In the case of the mature adult male 200066 (Zone 13) the latter may have been a factor in the ossification of part of the nasal cartilage, giving the nasal bone an extended and slightly convex profile (no sign of fracture). This individual also has enthesophytes at numerous sites.

Plastic changes

In common with several of the Bronze Age examples, in most of the cases where plastic changes were observed they are likely to have been activity related and linked to repetitive physical stresses on the bone imposed by the action of specific muscles (all males). In two males with slight bowing in the humeral mid-shafts there is the possible implication of infantile rickets, active at crawling stage (see Roman section), but no associated changes were observed in the shafts of the forearm bones and in each case the deltoid muscle attachments were strongly marked. The upper limb was predominantly involved, but in one case the tibia shafts showed marked anterior bowing creating a 'sabre'-like appearance. This young subadult (220093; Zone 13) had various other skeletal anomalies (see Table 13.5 and above), but no lesions which would link them any to a specific condition.

Two individuals have cranial lesions. In one case some form of cultural/occupational modification is implicated. The parietals of the older male 205108 are 'flattened' across the superior aspect and there is a slight, *c* 25mm wide, medio-lateral depression crossing the vault immediately dorsal to the coronal suture. Such a change may develop where an individual persistently carries a load partly suspended by a strap across the head. In the second case, a young adult female (126128; Zone 13) has marked endocranial depressions in the anterior of the right parietal at the bregma and *c* 40mm distal to the coronal suture adjacent to the sagittal suture. The *c* 20 x 10mm depression is several millimetres in depth but the endocrinal surface is intact demonstrating a plastic rather than destructive change. There is also a 'shadow' of a similar lesion in the left side. The changes indicate a problem in the soft tissues, possibly a tumour or aneurysm, exerting pressure on the overlying bone. The same individual had markedly diminutive styloid processes (*c* 7mm long) suggesting a lack of activity in the *stylohyoideus* muscle (responsible for elevation of the tongue).

Note on Strontium/Oxygen (Sr/O) isotope analysis

The small Middle Iron Age cemetery in Zone 12 (Figure 3.46) was selected as the target population for Sr/O isotope analysis. Samples were extracted from four adults, two males (153027 and 153054) and two females (136034 and 166004a), who had been buried in various parts of the cemetery (see Appendix 1). The date and location of the cemetery in relation to that at Cliffs End Farm (McKinley *et al* forthcoming a), c. 600m to the south, were instrumental in its selection for this detailed analysis. Seven of the eight Middle Iron Age individuals recovered from the Late Bronze Age – Middle Iron Age cemetery at Cliffs End were subject to isotope analysis with intriguing results indicative of long-distance migration (McKinley *et al* forthcoming a; Millard forthcoming). The Zone 12 cemetery offered a source of comparative material which would enable the potential frequency, or lack of it, of such mobility in East Kent at this time to be further investigated.

The osteological report was completed prior to the commissioning of the strontium/oxygen isotope analysis. Delays in production of the report on the latter and the overall project timetable rendered it un-feasible to revisit this report in the light of the isotopic data, hence the lack of reference to the results and their potential significance within the target population discussed above.

The results are, however, of significance as they demonstrate the findings from Cliffs End – a very different form of cemetery to that represented in Zone 12 – are not as singular as they potentially appeared seen in their previous isolation. A dynamic mobility of individuals and groups is suggested, those examined from Zone 12 all originating from outside the area, potentially from similar regions to some of those buried at Cliffs End. The reader is referred to Millard's report (Appendix) for the results of the isotope analysis and discussion thereof.

Table 13.15 Summary of results from analysis of unburnt Roman bone

Context	*Cut*	*Deposit type*	*Phase*	*Quantification*	*Age/sex*
Zone 6					
123232	123231	R (ditch)	Ro	>1% s.	adult *c* 18–25 yr.
125246	125243	R (pit)	E-MRo	1 frag. l.	infant *c* 0.5–1.5 yr.
126236	125243	R (pit)	E-MRo	*c* 1% s.	adult >18 yr.
126239a	126238	coffined burial	M-LRo	*c* 60%	adult *c* 20–30 yr. female
126239b	126238	?R (grave)	M-LRo	teeth & scraps s.	adult >45 yr. ??female
130012	-	R (ON 666)	Ro	1 bone l.	adult *c* 18-30 yr.
130229 a-c	130228	R (SFB)	E-MRo	a) 1 bone u. b) 1 bone u. c) *c* 1% s.	a) neonate *c* 34–38 wk b) neonate *c* 38–40 wk. c) = a or b
132157	132156	inh. burial	M-LRo	*c* 50%	adult *c* 40–45 yr. male
136101	136099	R (ditch)	Ro	*c* 3% s.	adult >35 yr. male
136192	136191	?coffined burial	ERo	*c* 2% s.u.l.	adult >35 yr. ??male
139339	139340	R (ditch terminus)	MRo	1 bone u.	neonate/infant *c* 6 mth
145347	145348	R (ditch)	E-MRo	*c* 8% l.	adult >18 yr.
153096	153095	inh. burial	ERo	*c* 35%	adult *c* 45–55 yr. ?male
176030	176031	inh. burial	MRo	*c* 70%	juvenile *c* 9–11 yr. ??male
178221	178220	R (pit)	MRo	1 bone l.	neonate *c* birth
207051	207049	inh. burial	MRo	*c* 25%	adult *c* 18-30 yr. ?male
222126	222121	R (pit)	ERo	1 bone l.	neonate *c* birth
247091	?	R	ERo	1 frag l.	adult >18 yr.
248191	248190	R (ditch)	E/MRo	*c* 4% s.	juvenile *c* 10-12 yr.
254021	254020	coffined burial	LRo	*c* 40%	subadult/adult *c* 16–20 yr. ??male
254025	232027	R (ditch)	ERo	1 frag l.	adult >18 yr. ??male
256046	263043	R (pit)	ERo	1 frag u.	adult >18 yr. ?male
260012	260011	R (ditch)	ERo	1 frag l.	adult >18 yr.
260027	260017	coffined burial	ERo	*c* 1% teeth & frags.	infant *c* 6-9 months
278168	278165	R (ditch)	ERo	1 frag s.	adult >18 yr.
278171	278172	inh. burial	Ro	*c* 85%	neonate ??female
289027	289030	R (ditch)	E-MRo	*c* 1% teeth & frags s.	adult >45 yr. ?male
289027b	289030	R (ditch)	E-MRo	1 frag l.	neonate *c* birth
289046	289042	R (SFB)	M-LRo	2 frags s.	neonate/infant *c* 6 mth–2 yr.
295038	295035	R (ditch)	ERo	1 bone a.	adult >25 yr. ?male
297081	297082	R (ditch)	ERo	1 frag s.	juvenile/subadult *c* 5–17yr
297090 & 297091	297092	inh. Burial	Ro	*c* 25%	neonate *c* birth
297119	297120	R (ditch)	ERo	*c* 3% s.	adult >18 yr.
321015	321017	R (ditch)	E-MRo	1 bone u.	neonate *c* birth
Zone 7					
150082	150083	inh. burial	E-MRo	*c* 90%	adult >55 yr. male
216069	216068	R (ditch)	ERo	1 bone l.	adult >25 yr. male
248102	248103	inh. burial	E-MRo	*c* 75%	adult *c* 35–45 yr. female
267090a	267091	coffined burial	E-MRo	*c* 50%	adult >40 yr. male
267090b	267091	R (grave)	E-MRo	*c* 5% s.u.	adult >25 yr.
297016	297017	inh. burial	E-MRo	*c* 40% a.u.l.	adult *c* 30–40 yr. male
297021	297022	inh. burial	E-MRo	*c* 55%	adult *c* 30–35 yr. female

Pathology

periosteal new bone – left tibia; ?bowed left tibia
mv - occipital sutures
calculus; dental caries; hypoplasia; ?fracture – left 2nd MtT; osteoarthritis – right knee; cortical defect – left calcaneum & 1st MtT, r. talus & right 1st proximal phalanx; mv – occasional facets (tarsals)
dental caries; hypoplasia; mv – bipartite canine

c) ?endocranial new bone

ante mortem tooth loss; calculus; dental caries; hypoplasia; malocclusion; periodontal disease; crowding; hyper-eruption; fracture – right rib, ?right clavicle & proximal tibia; destructive lesion – right 2nd MtC; ankylosis – right 2nd proximal phalanx & sesamoids; ddd – 1C, T8 & 10, L2, L5-S1; Schmorl's – T7 & 11, L2; osteoarthritis – 2T, L4, right hip; op – 1C apj, T8-9, T11, L2-5 apj, T6-7, 3 c-v, T7 & 9, L3-4 (bsm), ribs, right glenoid & distal radius, 1st MtC-Ps, 3 left proximal , IPs right knee; pitting – T6 apj, ribs; enthesophytes – right scapula & ulna, femora, tibiae, left patella & calcaneum; cortical defect – radii, ulnae; ossified rib cartilage
op – right occipital condyle; hypervascularity – occipito-parietal; thickened skull (cortical); mv – wormian bones
op – right proximal femur

calculus; hypoplasia; osteoarthritis – T6-7, T11; op – T6-7 apj, T11 tp & c-v, 2T tp, 2 right & 1 left rib, left knee; pitting – T6-7 apj, T11 tp & c-v, right rib
calculus; hypoplasia; cortical defect – clavicles, left humerus; mv – wormian bones, atlas bridging

dental caries; hypoplasia; cortical defect – right 1st proximal phalanx

calculus
calculus; dental caries; hypoplasia; mv – wormian bones

hypoplasia

mv – bifid right 2nd rib
calculus; hyper-eruption; impaction; periodontal disease; mv – mandibular tori

op – C7 apj

endocranial new bone

mv – wormian bones

ante mortem tooth loss; apical voids; calculus; dental caries; hypoplasia; hypercementosis; impaction; periodontal disease; fractures – fibulae; ddd – C2-7, T3-4, 2T, L3-5; osteoarthritis – C2-5, T2, T11, L4-S1, elbows, 3 right carpals & 1st C-MtC, left knee, ?1st MtT-Ps; op – C2, T1, T11, 3T, L1-3 apj, T5, S1 (bsm), T4-7, T10 c-v, T9, 4T tp, right glenoid, elbows, left distal ulna, 1st Ips (hands), 2 left distal Ips, hips, knees, left ankle, tali, calcanea, 1st proximal Ips (feet), 5 right & 8 left ribs; pitting – left s-c, hips pelvis, knees, 1st MtT-Ps; enthesophytes – humeri, innominates; cortical defect – 1st MtT-Ps; mv – wormian bones, shovelled I2, mandibular tori, tarsal variation (flat-feet), fused 5th phalanges (feet)

cribra orbitalia; fracture – right tibia; periosteal new bone - right fibula; ddd – C5, T3-4, L4; Schmorl's – T8-10; osteoarthritis – T11; op – C7, T11 apj, C3-4, 6, T2, T8-10 bsm, T1, T10 c-v, T2, 3T tp, glenoids, left elbow, proximal IP (hand), right knee, 6 left & 5 right ribs; pitting – T12 c-v, s-c, 6 left ribs; enthesophytes – left calcaneum; mv – wormian bones, extreme femora & tibiae shaft flattening, occasional facets – tarsals
calculus; dental caries; hypoplasia; osteophytes – right hip; enthesophytes – right femur; exostoses – right femur; mv – wormian bones, extreme tibiae shaft flattening

periosteal new bone – tibiae, L5-S1; destructive lesion – L5-S1; ddd – L5-S1; op – left rib, right 1st C-MtC, hips; pitting – hips; cortical defect – left 1st MtT-P; mv – occasional facets – tarsals
ante mortem tooth loss; apical voids; calculus; dental caries; hypoplasia; hypercementosis; periodontal disease; secondary sinusitis (bi-); periosteal new bone – left maxilla; ddd – C4-5, L5-6; op – C1, L5 apj; exostoses – left rib; mv – metopic suture, wormian bones, atlas bridging, L6

Table 13.15 (continued)

Context	*Cut*	*Deposit type*	*Phase*	*Quantification*	*Age/sex*
Zone 10					
42021	42043	R (ditch)	Ro	*c* 3% s.	adult >18 yr. female
176335	176334	coffined burial (decapitated)	E-MRo	*c* 15%	adult 30–40 yr. ??female
179269	179267	coffined burial	M-LRo	*c* 10%	juvenile *c* 4–5 yr.
182342	182340	inh. burial	M-LRo	*c* 85%	adult *c* 35–45 yr. male
239262 a & b	239260	R/placed (grave)	Ro	a) *c* 12% b) 3 frags. S.	2 x neonates *c* birth–2 wks
239264	239260	R/placed (grave)	Ro	*c* 60%	adult *c* 45–50 yr. female
239268	239266	coffined burial	Ro	*c* 80%	adult *c* 45–55 yr. female
239281	239278	coffined burial	LRo	*c* 99%	adult *c* 45–55 yr. male
247314 (incl. 247316)	247315	R (cremation grave)	ERo	<2% l.	adult > 20 yr. ?male
248220	248221	inh. burial (prone)	E-MRo	*c* 70%	adult *c* 21–25 yr. ?female
258344	258342	inh. burial	Ro	*c* 99%	adult *c* 40–50 yr. male
Zone 13					
150058	150050	?R (quarry pit)	ERo	*c* 2% s.a.u.	infant/juvenile *c* 4–6 yr.
156151	156146	inh. burial/?R (pit)	ERo	*c* 35%	neonate *c* birth–1 wk.
156161	156146	R (pit)	ERo	1 bone l.	neonate *c* birth–1 wk.
156169	156166	R (pit)	ERo	1 frag s.	adult >25 yr.
156221	156146	R (pit)	ERo	1 bone l.	neonate *c* birth
174208	174207	R (quarry pit)	ERo	1 frag s.	adult >18 yr.
191127	191125	R (SFB)	ERo	1 bone l.	neonate *c* birth
Zone 14					
203041	203040	R (ditch)	Ro	1 frag s.	infant *c* 6 mth–4 yr.
Zone 19					
126101	126100	coffined burial	Ro	*c* 38% s.u.l.	adult *c* 35–45 yr. ??female
126205	126204	inh. burial	?AS/Ro	*c* 85%	adult >45 yr. male
126224	126223	inh. burial	?AS/Ro	*c* 65%	adult >45 yr. male
126332	126331	inh. burial	Ro	*c* 20%	infant 1-2 yr.

Pathology
ante mortem tooth loss; apical void; calculus; dental caries; hypercementosis; mv – shovelled Is, mandibular tori
dental caries (deciduous); hypoplasia
ante mortem tooth loss; apical voids; calculus; dental caries; hypoplasia; periodontal disease; op – C1, C4 apj, T6, 11 tp, left sacro-iliac, left rib; pitting – left a-c; enthesophytes – ribs, innominates; cortical defect – costo-claviculars, 1st proximal phalanx (right foot); mv – wormian bones, atlas bridging
ante mortem tooth loss; apical voids; calculus; dental caries; hypoplasia, periodontal disease, fracture – 1T, left rib; infection – maxilla; op – T1 tp, 2T, 1L apj, left acetabulum; pitting – 2T, 1L apj, left s-c; enthesophytes – pubis (?parturition), left humerus; cortical defect – left costo-clavicular; mv – wormian bones, mylohyoid bridging
ante mortem tooth loss; apical void; dental caries; hypoplasia; secondary sinusitis; fracture – left fibula; ddd – C5-6, S1; osteoarthritis – T1, T4-6, right temporo-mandibular joint, left 1st rib; op – C1-2, C3-4 bsm, C4-5, S1 apj, T1-6 tp, 2 right ribs, right hip, glenoids, tarsals ; pitting – T2-6, S1 apj, 2 right ribs; enthesophytes – calcanea; mv – asymmetric occipital condyles, atlas bridging, mandibular tori
ante mortem tooth loss; apical voids; calculus; dental caries; hypoplasia; periodontal disease; *cribra orbitalia*; DISH – T3-L3; infection – maxilla (secondary sinusitis), left temporo-mandibular joint, 1T, 1L; periosteal new bone – right scapula (?bursitis); weapon trauma – left frontal; fracture – 2 left ribs, manubrium; ankylosis – C2-3, T8-10; Schmorl's – T6-7, 11; ddd – C4-7, T1-2, T4, T7, T11-12, S1; osteoarthritis – left temporo-mandibular, C1, C2, C3-7, L4-S1, right a-c, right 1st MtC-P; op – right occipital condyle, C1 anterior facet, 4C apj, 2T apj, L1-S1 apj, T1 & T12 c-v, C3 bsm, 6T bsm, L1-5 bsm, 2 right ribs, right s-c, shoulders, elbows, wrists, hands, hips, left knee; pitting – right temporo-mandibular joint, 2T apj, T1 & 11 (c-v), s-cs, wrists; enthesophytes – clavicular notches, arms, legs (incl. anterior talofibular ligament, cf. 247314), 1st MtTs; ossified cartilage - ?nasal & vertebral discs; mv – metopic suture, wormian bones, occasional tarsal facets
enthesophytes – left fibula
calculus; hypoplasia; *cribra orbitalia*; Schmorl's – T5, T8-L2; enthesophytes – proximal humeri; cortical defect – costo-claviculars, proximal humeri; mv – wormian bones, Vastus notches, occasional tarsal facet
ante mortem tooth loss; apical voids; calculus; dental caries; hypoplasia; periodontal disease; infection – maxilla (inc. secondary sinusitis); periosteal new bone – L5; destructive lesion – right palatine, C6; cyst/fibroma – right orbit, endocranial left temporal, carpals; sharp weapon trauma – C4; fracture – C7, left rib; ddd - 3C, T8, L1-S1; osteoarthritis – C1-2, 4C, T1 & T3-5, right acetabulum; op – T9-10 bsm, T4-6 & L4-5 apj, T5 & T8-10 tp, T10-12 c-v, tarsals, 2 left & 2 right ribs, s-cs, glenoids, proximal & distal radii, proximal IPs (hands), hips, right knee; pitting – temporo-mandibular joints, C7 & 2T apj, 4T c-v, right rib, a-cs, left distal ulna; enthesophytes – femora, calcanea; ossified cartilage (thyroid); cortical defects – scapulae, left costo-clavicular, right proximal humerus; mv – wormian bones, mylohyoid bridge, mandibular tori, occasional facets – tarsals
?=156221
?= 156161
mv – metopic suture
calculus; dental caries; hypoplasia; enthesophytes – left radius, right femur, patellae, calcanea; cortical defect - 1st proximal phalanges (feet); mv – occasional facets – tarsals
ante mortem tooth loss; apical void; calculus; dental caries; hypoplasia; hyper-eruption; periodontal disease; *cribra orbitalia*; osteoporosis – Ls; hallux valgus (left); fracture – ?left mandible, L1, left 1st MtC, right 4th-5th MtC & talus; spondylolysis; ?cyst – incisive canal; Schmorl's – T10-12, L2-3; ddd – C6-7, L1-4; plastic change – L3-5; ankylosis – L2-3 apj; osteoarthritis – 3Tc-v; left wrist & 1st MtC, 1st MtT-Ps; op – C2 anterior facet, 3C/2T/5L/S1 apj, T10 & L5-S1 bsm, 3 left & 1 right ribs, s-c, shoulders, wrists, 2 right C-MtC, right hip & ankle, knees; pitting – 1C/2T/1L apj, T5 & 10 c-v, right temporo-mandibular joint, 3 left ribs, s-c, right a-c & hip, knees; enthesophytes – innominates, clavicles
ante mortem tooth loss; apical void; calculus; dental caries; periodontal disease; *cribra orbitalia*; osteoporosis; DISH; hyperporosity – maxilla; thickening – skull vault; Schmorl's – T3, T5-7 & T10-12, L1-3; ddd – 5C, 7T, 2L1, S1; ankylosis – L4-5 bsm, sacro-iliac; osteoarthritis – C1-2 anterior facets, C4-5, T2-5, right wrist, knee & hip; op – C7/T8/3L apj, T9 bsm, 4T c-v, 3 left & 5 right ribs, shoulders, elbows, left wrist & 5th MtT-P, hips, right knee; pitting – 5T c-v, left a-c; enthesophytes – left calcaneum; cortical defect – right glenoid; mv – congenital absence M3, L6, bunionette
hypoplasia

Table 13.15 (continued)

Context	*Cut*	*Deposit type*	*Phase*	*Quantification*	*Age/sex*
150099	150097	coffined burial	Ro	*c* 45%	infant *c* 3.5–4.5 yr.
151050	151051	inh. burial	M-LRo	*c* 25%	adult *c* 35–45 yr. female
171193	171194	inh burial (flexed)	M-LRo	*c* 75%	subadult *c* 13–15 yr. ?female
176343	176342	inh. burial	LRo	*c* 80%	adult *c* 30–35 yr. female
176346	176345	coffined burial	Ro	*c* 12% u.l.	infant *c* 2-3 yr.
205120	205118	inh. burial	M-LRo	*c* 80%	adult *c* 40–50 yr. male
216011	216010	inh. burial (disturbed/revisited)	M-LRo	*c* 75%	adult *c* 35–40 yr. male
220056	220054	coffined burial	ERo	*c* 90%	adult *c* 40–50 yr. female
220062	220060	inh. burial	Ro	*c* 10% s.a.u.	neonate 3 months
220113	220112	coffined burial	ERo	*c* 70%	adult *c* 40–50 yr. ?female
220137	220136	inh. burial	?AS/Ro	*c* 60%	adult *c* 40–50 yr. ?female
228048	228050	inh. burial	M-LRo	*c* 40%	adult *c* 30–35 yr. female
248106	248104	coffined burial	ERo	*c* 2% s.u.l.	juvenile *c* 9–10 yr.
248109	248107	inh. burial	Ro	*c* 75%	juvenile *c* 10–11 yr. ??female
248268	248266	inh. burial	Ro	*c* 10% s.a.	adult *c* 35–50 yr. ?female
250057	250055	inh. burial	Ro	*c* 55%	adult *c* 25–35 yr. female
257015	257016	inh. burial	M-LRo	*c* 60%	adult *c* 30-40 yr. female
257018a	257019	inh. burial	M-LRo	*c* 70%	adult *c* 35–45 yr. male
257018b	257019	R	M-LRo	1 bone l.	adult *c* 18–35 yr. ?female
262043	262044	inh. burial	M-LRo	*c* 50%	adult *c* 30–40 yr. female
262061	262062	inh. burial	Ro	*c* 65%	adult *c* 35–45 yr. male
278058	278060	inh. burial	M-LRo	*c* 90%	adult *c* 20–23 yr. female
Zone 20					
126067	126066	coffined burial	Ro	*c* 20%	adult >45 yr. male
126086	126084	coffined burial	MRo	*c* 40%	adult *c* 35–45 yr. male
144127	144128	R (pit)	Ro	*c* 2% a.l.	adult >18 yr.
182242	182241	inh. burial	MRo	*c* 2% s.	infant *c* 2–3 yr.
198301	198300	coffined burial	MRo	*c* 15% u.l.	subadult *c* 12–14 yr.
205137	205135	inh. burial	M-LRo	*c* 50%	neonate *c* birth–2 wks
205149	205147	inh. burial (pit)	M-LRo	*c* 25%	neonate birth–2 wk.
216095	216094	?coffined burial	M-LRo	*c* 35% s.u.l.	adult *c* 20–25 yr. ?male
249059a	249049	inh. burial (SFB)	MRo	*c* 15% s.a.u.	neonate *c* birth–2 wk.
249059b	249049	inh. burial (SFB)	MRo	*c* 25%	neonate *c* 38–40 wk.

Pathology
dental caries (deciduous), hypoplasia; *cribra orbitalia*; endocranial new bone; hyperporosity – palate; mv – wormian bones
calculus; osteoarthritis – T8, left rib; op – 2T & L5 apj, T7 bsm, T2 & T9 tp, 8 left & 12 right ribs; pitting – 5T apj, T11-12 c-v; exostoses – proximal phalanx (left hand); mv – wormian bone
calculus; *cribra orbitalia*; destructive lesion – L3 body; impaction; mv – retained m2s, wormian bones, L6
ante mortem tooth loss; calculus; dental caries; hypoplasia; impaction; periodontal disease; crowding; rotation; cribra orbitalia; fractures – ulnae (non-union); Schmorl's – T8, 11, L2-3; ddd – T9, L1, 3; op – T1-2, T4, T7, T10 (apj), T5, 8 (bsm), T4, T9 (tp); pitting – T2-7 (apj), left s-c; mv – wormian bones, pre-condylar tubercles, plural mental foramen, sacralised L5, septal apertures
ante mortem tooth loss; apical void; calculus; dental caries; hypoplasia; periodontal disease; trauma - ?weapon injury (left frontal); infection – maxilla; hyperporosity – palate; ddd – 4T, L2-5; osteoarthritis – left wrist; op – 4 right ribs, right glenoid, left knee, left 1st MtT-P & 3 proximal IPs; pitting – 5T tp, L1 apj, right s-c; enthesophytes – patellae, calcanea; cortical defect – 1st proximal phalanx (left foot); mv – wormian bone, supernumerary tooth (unerupted) sacralised L5, occasional tarsal facets
calculus; dental caries; periodontal disease; periosteal new bone - ?r. fibula; Schmorl's – T4-6 & T8-12, L1 & 4; ddd – 1C, 4T, 3L; ankylosis – L1-2; op – 3Tapj, 2T & 2L bsm, T12 c-v, 8 r. ribs, a-cs; pitting – T9 c-v, right s-c, left acetabulum; mv – occipital bunning, wormian bones, congenital absence M3s
ante mortem tooth loss; apical voids; calculus, dental caries; hyper-eruption; periodontal disease; sbc – right navicular; fracture – left rib; destructive lesion – skull vault; degenerative compression – C4, Ls, S1; Schmorl's – T7-8, L3; ddd – C4-5, T1, L2-S1; osteoarthritis – C1-2 anterior facets, C3-4, T2-6, L5, knees; op – C5, T6-8, L1-5 (bsm), T6 & 8 c-v, 3T tp, 9 right & 4 left ribs, clavicles, glenoids, hips; pitting – T7 apj, T1 c-v, 9 right & 4 left ribs, s-cs, hips, right 1st MtT-P; rotator cuff erosion – right humerus; plastic change – right knee (?bursitis); mv – wormian bones, diastema (maxillary I1s), congenital absence M3s, mandibular tori, septal apertures, occasional facet right navicular
periosteal new bone – right humerus shaft
ante mortem tooth loss; calculus; dental caries; hypercementosis; fracture – T & L1; Schmorl's – 1T; ddd – C3-7, 2L; osteoarthritis – T1, S1; op – C1-2, 4C/1T/1L apj, 4C/9T/3L bsm, 2T c-v, 8 left ribs, left distal ulna, left scaphoid, right 1st MtC-P & 2 distal IPs, knees; pitting – right temporo-mandibular, 2T c-v, 8 left ribs, acetabulae, s-cs; enthesophytes – costo-claviculars, left patella; plastic changes – bowed radii & ulnae (?rickets); mv – double occipital facets
ante mortem tooth loss; apical void; calculus; dental caries; hypoplasia; periodontal disease; infection – maxilla; Schmorl's – T7-9, L1-5; ddd – L1-5; op – T9/5L/S1 apj, 1C & 6T bsm, 4T c-v, T1 tp, 7 right ribs, sacro-iliacs, right glenoid, left elbow; pitting – T4-5 & L2 apj, T5 tp, temporo-mandibular joints, sacro-iliacs, right a-c, left wrist; mv – shovelled Is
ante mortem tooth loss; apical void; calculus; dental caries; hypoplasia; periodontal disease; periosteal new bone – mandible; Schmorl's – T11; osteoarthritis – left rib; op – T12 & L1 apj
calculus (deciduous)
impaction; *spina bifida occulta*; endocranial new bone; ?stunted growth
ante mortem tooth loss; apical void; dental caries; periodontal disease; infection – maxilla; mv - ?retained deciduous tooth
calculus; periodontal disease; variant M3
calculus; dental caries; hypoplasia; crowding; rotation; *cribra orbitalia*; ankylosis – T8-9, T11-12; Schmorl's – T7-8, T10-L5; ddd – C5, T9-11, L1-5; op – C1-2, 3L apj, 4T & 4L bsm, T11-12 c-v, 4T tp, 12 right & 11l. ribs; pitting – T1 c-v, 12 right & 11 left ribs; fused hyoid; mv – wormian bones, congenital absence M3s, S6
calculus; periodontal disease; periosteal new bone – tibiae; destructive lesion – left 1st MtT; osteoporosis; ankylosis – sacro-iliac, L4-S1; plastic change (cyst?) – C2 foramen; Schmorl's – T12; ddd – T12, 1T; osteoarthritis – C3-4; op – C1, L1-S1 apj, 2C/2T/2L bsm, T12 c-v, T1 tp, right upper limb, right hip, right knee, 1 right & 3 left proximal IPs (feet); pitting – L1-3 apj; mv – septal apertures
calculus; hypercementosis; fracture – T5; Schmorl's – T6-7, T9, 2L; op – L3 apj, L bsm, T11 c-v; cortical defect – C apj; mv – wormian bones, septal aperture, occasional tarsal facets
calculus; dental caries; hypoplasia; periodontal disease; weapon trauma – skull; spondylolysis; Schmorl's – T6, T8-12, L1-4; ddd – C5, L4; osteoarthritis – T6, T12, L4; op – C1-2, T4-7 & L1-4 apj, T9 bsm, T7 c-v, 6T tp, 3 left & 9 right ribs, 2 proximal IPs (right hand); pitting – 3T & L4 apj, T11 c-v, s-cs, right shoulder; enthesophytes – costo-manubrial, left forearm; cortical defects – costo-claviculars, humeri shafts; mv – double root C, sternal aperture
calculus; dental caries; hypoplasia; periodontal disease; *cribra orbitalia*; cortical defects – right costo-clavicular, 1st proximal phalanges (feet); mv – wormian bones, congenital absence maxillary I2s, septal apertures
calculus; hyper-eruption; periodontal disease; ddd – C5-6; osteoarthritis – C3-4; op – C2, C5 & C7 bsm, 11T apj
hypoplasia
calculus; hypoplasia; plastic change – femora shafts; mv – shovelled I2s
hypoplasia

Table 13.15 (continued)

Context	*Cut*	*Deposit type*	*Phase*	*Quantification*	*Age/sex*
252103	252101	inh. burial	M-LRo	*c* 65%	neonate *c* birth–2 wk. ??female
267001	267003	coffined burial (revisited)	MRo	*c* 65%	adult *c* 40–50 yr. male
271058	271052	R?/?inh. burial (SFB)	M-LRo	*c* 30%	neonate *c* 38–40 wks
273126	273124	R (ring ditch)	MRo	1 frag. shaft l.	adult >20 yr. ??male
Zone 21					
271051	271052	R (SFB)	Ro	1 bone a.	neonate *c* 0–6 mth.

KEY: s.a.u.l. – skull, axial skeleton, upper limb, lower limb (skeletal areas represented where not all are present); op – osteophytes; ddd – degenerative disc disease; o.c. dessicans – osteochondritis dessicans; sbc – solitary bone cyst; mv – morphological variation; bsm – body surface margins; C/T/L/S – cervical/thoracic/lumbar/sacral vertebrae, MtC/MtT – metacarpal/tarsal; MtC/T-P – metacarpal/tarsal – phalangeal joint; IP – interphalangeal joint; apj – articular processes (vertebrae); tp – transverse process (vertebra); c-v – costo-vertebral; a-c – acromio-clavicular; s-c – sterno-clavicular; p-d – proximal-distal; SFB – sunken featured building; R – redeposited

Roman *by Kirsten Egging Dinwiddy*

Demographic Data

Minimum number of individuals (MNI)

A minimum of 73 individuals (MNI) were identified from the Roman assemblage, equating to 31.2% of the unburnt human bone assemblage Table 13.15). The majority (24.6%) have been assigned to the middle-late Roman period. The early- and early-mid-Roman dated assemblages each comprise 15.1% of the MNI, and the remainder is divided between the middle-late and late Roman periods (12.3% and 5.5% respectively; Table 13.16)

Given the complex nature of Zone 6 (see above), much of the redeposited material was not assignable to the ten *in situ* burials. Based on the differing age ranges and minimum number of elements, five additional individuals were identified – a neonate, an infant, one juvenile, and two adults over *c* 18 years. However, it is likely that at least some of this material represents burials/deposits made in earlier periods (see Iron Age above). Associated with early-mid-Roman enclosure ditches, the burial remains from Zone 7 comprise a singleton and a group of four *c* 275m to the south-west. A single bone found in an early Roman ditch was identified as belonging to an extra, otherwise unidentified individual, a male over *c* 25 years, possibly deriving from an earlier phase. The unburnt remains from the enclosed mixed-rite cemetery in Zone 10 include five individuals identified within the redeposited assemblage. These deposits contrast with those described above, with the bones of an older adult female and two neonates purposely arranged in grave 239260, and a small quantity of bone placed in the top fill of cremation grave 247314. In other zones, small quantities of redeposited bone were recovered from later graves and other later features such as ditches, pits, and the occasional sunken-featured building. Using the methods described above, only one or two additional individuals were identified within these zones (Tables 13.2 and 13.16).

The three apparently empty graves in Zone 10 – 176330, 178354, and 279220 – may have been revisited and the bones removed, or were cenotaphs that had never held any remains. In Zone 19, revisitation is the most likely explanation for the rearrangement of the bones in grave 216010, whilst features 126330 and 176349 are probably cenotaphs. Two of the three graves excavated by Perkins in the 1980s were identified and recorded as features 126355 and 248258 (Volume 1, Fig 4.53; Perkins 1985).

Age and sex

Immature individuals were represented in the assemblages from all but Zone 7 (39.7% of MNI; Table 13.16). The rate is somewhat higher than that for the similarly dated cremated bone assemblage (see below), but only slightly lower than that of the Iron Age unburnt assemblage and within the 'normal' range for a domestic population. Most are represented in the 'catch-all' Roman phase (37.9%), followed by mid-late Roman (24.1%) and mid-Roman (17.2%). Early and early-mid-Roman phased assemblages comprise 13.8% and 6.9% of the immature material respectively. More than half of the immature remains comprise individuals under the age of *c* 1 year, a much higher proportion than the equivalent Iron Age group, which is considered comparable to the expected range in a normal population (see above). This may be explained by the demographic disparity between non-cemetery and cemetery populations of Roman date. At the nearby late Roman Cottington Road mixed-rite cemetery no neonatal remains were found though the immature individuals comprised 46.2% of the unburnt MNI (McKinley 2009a, 6). Most of the EKA2 Roman immature remains derive from non-cemetery contexts (19; 65.5%) within Zones 6, 13, 14, 20 and 21, where neonates form the major contingent (11; 57.9%). Other immature age groups consist of two infants (10.5%), and an infant/juvenile, a juvenile and a subadult (5.3% each). Of the ten (34.5%) immature individuals interred in cemeteries, all but the burial of a subadult (possible female; Zone 19) were made in the mixed-rite cemeteries in Zones 10 and 19. The age-range distribution differs from that of the non-cemetery assemblage, with 30% neonates, 30% infants, 20% juveniles and 10% infant/juvenile, ie more akin to normal domestic

Pathology
ante mortem tooth loss; apical void; dental caries; hyper-eruption; periodontal disease; *cribra orbitalia*; secondary sinusitis; destructive lesion – maxilla; op – acetabulae; enthesophytes – innominates, proximal femora, distal left tibia; mv – mandibular tori
?healed trauma – left femur

population proportions. The common exclusion of neonates from cemeteries and the recovery of their remains in association domestic contexts are well-documented, and factors affecting their placement have been subject to both general and site-specific discussion (Mays 1993; McKinley 2011; Philpott 1991, 101; Scott 1999, 30-32, 70 and 115-118).

The majority of remains derive from adults (58.9%), most of whom fall within the middle and older adult ranges, with 39.5% in the *c* 35-45 year range, and 30.2% in the over *c* 45 year category. Adult female deaths peaked slightly in the *c* 35-45 year group, whereas similar numbers of males died in the aforementioned and >45 year group. The full range of age categories were seen in most phases, the exceptions being the middle-late (all under *c* 45 years) and the late Roman phase (*c* 30-55 years only). The overall age/sex pattern holds true for most zones, with the exception of Zone 19, where the already under-represented males fall predominantly into the *c* 35-45 year old group.

The adults comprised 44.2% females, 51.2% males and 4.7% unsexed. When combined with the immature sexing data, however, the ratios are more balanced: 30.6% female, 33.3% male and 36.1% unsexed. Most of the adults are middle-late and early-middle Roman (26.2 and 21.4% respectively), with the fewest deriving from late Roman contexts (7.1%). In all but the early-middle Roman phase, male burials outnumber female burials from 1:0.8 to 2:1, with all middle Roman adults (and the sexed juvenile) being designated male. In Zone 19 the reverse is seen, where of the 15 sexed adults, 11 (73.3%) are female and four (26.7%) male. There is a notable absence of adult females in the adjacent Zone 20 (discussed below). The general imbalance of the sexes may also be somewhat rectified when taking into account the unsexed adults (see below).

Table 13.16 Roman (unburnt) summary of age and sex by sub-phase

	ERo	*E-MRo*	*MRo*	*M-LRo*	*LRo*	*Total inc. unspec. Ro*
Immature						
foetal/neonate *c* 34-38 wk.		1				1
neonate *c* 0-6 mth.	1	1	2	4 (1??F)		14 (2??F)
infant *c* 0.5-2 yr.	1			1		3
infant *c* 2-4 yr.			1			3
infant/juvenile *c* 4-6 yr.	1			1		2
juvenile *c* 9-12 yr.	1		1 (??M)			4 (1??F, 1??M)
subadult *c* 12-15 yr.			1	1 (?F)		2 (1?F)
Total	4	2	5 (1M)	7 (2F)		29 (4F, 1M)
subadult/adult >13 yr.					1 (??M)	1 (1??M)
Adult						
adult *c* 20-30 yr.		1 (?F)	1 (?M)	3 (2F, 1?M)		5 (2F, 1?F, 2?M)
adult >25 yr.	1 (M)					1 (M)
adult *c* 25-35 yr.						1 (F)
adult *c* 30-40 yr.		3 (1F, 1??F, 1M)		3 (F)	1 (F)	7 (5F, 1??F, 1M)
adult *c* 35-45 yr.		1 (F)	1 (M)	5 (1F, 4M)		10 (2F, 1??F, 7M)
adult >40 yr.	1 (M)	1 (M)				3 (3M)
adult *c* 40-50 yr.	2 (1F, 1?F)		1 (M)		1 (M)	6 (2F, 2?F, 3M)
adult *c* 45-55 yr.	1 (M)				1 (M)	3 (1F, 2M)
adult >55 yr.		1 (M)				1 (M)
adult >18 yr.	2 (1?M)	2	1 (??M)			5 (1F, 1?M, 1??M)
Total	7 (2F, 4M)	9 (4F, 3M)	4 (4M)	11 (4F, 5M)	3 (1F, 2M)	43 (19F, 22M)
Overall total	11 (2F, 4M)	11 (4F, 3M)	9 (5M)	18 (6F, 5M)	4 (1F, 3M)	73 (23F, 24M)

Most of the assemblage appears to be representative of the local populations inhabiting the scattered farmsteads and settlements in the vicinity, with some division of burial location and rite apparently determined to some extent by whether or not the individual lived beyond young infancy. The demographic composition of the small assemblage from Zone 20 (middle and middle-late Roman) stands out as rather non-'normative' comprising as it does the remains of immature individuals and adult males. However, these consist of the remains of neonatal burials from contemporaneous sunken-featured buildings (discussed above), a pair and a singleton male burial, and a small mixed-rite group. The unburnt assemblage from the latter (graves 182241, 198300 and 216094) comprise the remains of an infant, a subadult and an adult male, whilst the assemblage from the Roman cremation graves from the vicinity includes the remains of females and immature individuals (see below).

It is significant that the contemporaneous Zone 19 cemetery has many more adult females (2.75:1), and the few males fit into a tight age range (35-50 yr.). These demographic findings provide further evidence for the differential burial rites accorded to certain individuals and/or groups, who potentially originate from the same or neighbouring communities.

As with most osteologically recorded Kentish burials of Roman date, the EKA2 Roman inhumation burials comprise singletons or small groups distributed in dispersed clusters, which probably served family groups or limited social groups of communities living in farmsteads or settlements nearby (Mays and Anderson 1995, 381; Perkins 2001, 45; Moody and Boast 2007, 3; Schuster and Egging Dinwiddy 2009, 113). More substantial cemeteries comprise Pepper Hill (Biddulph 2006), Clubb's Pit, Isle of Grain (Cameron 1985), Cranmer House and St. Dunstan's, both in Canterbury (Frere *et al* 1987). The combined figures for the period from EKA2 place it amongst these larger groups, and although not representative of a single population the assemblage does present the opportunity to compare directly remains from closely contemporary groups, at least some of which are likely to have interacted with one another.

Skeletal indices

A summary of the indices it was possible to calculate is given by phase in Table 13.17. Further details are held in the archive.

Estimated stature

It was possible to estimate the stature for 24 Roman adults (55.8%) including 11 males (50.0%) and 13 females (68.4%). These derived from five phases, predominantly from the middle-late Roman phase (nine).

The overall average male stature is greater than the 1.69m average for the period as calculated by Roberts and Cox (2003, 163), and the late Roman males from the nearby Cottington Road cemetery (McKinley 2009a, 9). The average stature increases from one comparable to Roberts and Cox's calculation (2003, 163) in the early phase, to a much greater average of 1.77m for the few late phase males. The males from Zones 6 and 20 were generally taller, whilst an assortment of statures was calculated for the males from Zones 10 and 19.

The average female stature is marginally greater than the 1.59m average for the period (*ibid*), and taller than the late Roman female from the nearby Cottington Road cemetery (1.54m; McKinley 2009a, 9). Contrary to the males, the female average statures decrease over time from 1.67m in the early phase to 1.63m in the early-middle phase, and to 1.56m in the middle-later Roman phase. Only one late Roman female stature was calculated – 1.63m. The broadest range of female statures was seen in the material from Zone 19, which includes both the overall minimum and maximum estimates. The average stature of both sexes shows a small increase (both 10mm) from the Iron Age (Tables 13.7 and 13.17). Tighter stature ranges may imply a smaller contributing population, such as kin-related groups, whilst a more diverse range may suggest that the burials derived from a larger and more varied population (for example in Zone 19).

Cranial index

Poor condition and/or survival restricted the number of cranial measurements, allowing the calculation of only

Table 13.17 Summary of the major indices recorded in the Roman (unburnt) assemblage

	Female			Male		
	Number	*Range*	*Mean*	*Number*	*Range*	*Mean*
Roman						
estimated stature	13	1.46-1.70m (*c* 4'9½"- 5'7")	1.60m (SD 0.07m) (*c* 5'3")	11	1.67-1.80m (*c* 5'5¾"- 5'10 ¾")	1.73m (SD 0.05m) (*c* 5'8")
cranial index	9	70.53-80.23 (dolicho-brachycrany)	75.64 (SD 3.43) (mesocrany)	4	71.88-79.79 (dolicho-mesocrany)	76.28 (SD 3.31) (mesocrany)
platymeric index	14	69.60-91.88 (platy-eurymeric)	78.57 (SD 6.06) (platymeric)	13	67.99-98.98 (platy-eurymeric)	82.07 (SD 7.48) (platymeric)
platycnemic index	12	59.44-88.71 (platy-eurycnemic)	71.32 (SD 7.79) (eurycnemic)	13	61.19-87.23 (platy-eurycnemic)	71.92 (SD 6.90) (eurycnemic)
robusticity index	7	113.74-134.22	122.93	9	113.73-134.31	127.36 (SD 5.76)
brachial index	-	-	-	2	75.00-75.84	75.42 (SD 0.59)
crural index	3	79.27-83.91	82.21 (SD 2.56)	4	76.22-86.19	80.98 (SD 5.0)

Key: brachial index (radius L x 100/humerus L); crural index (tibia L x 100/femur L); intermembral index (radius + humerus L x 100/tibia + femur L).

13 cranial indices (nine female (47.4%) and four male (18.2%)). The mean cranial index for both sexes fell within the mesocranic range (medium/average size and shape); however, the range was larger in the females which extended from dolichocrany to brachycrany (long- to short-headed), compared to the dolichocranic to mesocranic male range. The late Roman female from the Cottington Road cemetery was also mesocranic (McKinley 2009a, 9). The male cranial index range is similar to that of the Iron Age examples, whereas the purely Iron Age female cranial indices were few, and may falsely suggest a smaller range (both dolichocranic).

Non-cranial indices

The platymeric index was calculated for 27 individuals (62.7%) including 14 females (73.7%) and 13 males (59.1%). Similar ranges were recorded for both sexes, with no change from the preceding period. Average male platymeric indices from the region also fall within the platymeric range (Pepper Hill, Saltwood and Cottington Road, Kent) whilst the Cottington Road female femora are eurymeric, ie, broader than the EKA2 female average (McKinley 2006, 17; 2009a, 9). Where both femora are present in the female assemblage (eight cases), scores differed by less than 5 points in most cases, though one pair of femora show a disparity of nearly 12 points (Zone 19, middle-late). In the males (eight pairs) scores were generally similar with only rare divergences, for example of *c* 7 and 14 points (Zones 10 and 19, both middle-late Roman). No side bias was apparent for either sex.

The platycnemic index was calculated for 25 adults (58.1%) comprising 12 females (63.2%) and 13 males (59.1%). Similar ranges and average scores were recorded for both sexes. In contrast to the platymeric index, there is some indication of temporal change, with the average platycnemic index falling within the eurycnemic range, ie, representing a general broadening of the tibiae shaft following the Iron Age. There is also an apparent increase in the standardisation of relative tibial shaft shape between the Roman males and females. The average female platycnemic index from Cottington Road is comparable to that of the EKA2 females. Recorded male platycnemic scores are more diverse, being mesocnemic in the Cottington Road assemblage (McKinley 2009a, 9), and platycnemic in the Saltwood example (McKinley 2006, 17). However, as is frequently the issue in Kentish assemblages, sample sizes are small. Where both tibiae are observable (nine cases for each sex), the disparity between paired female tibiae is rather erratic with the greatest divergences being *c* 10 and 12 points (220056 and 220057 – early and general Roman, both in Zone 19). The male tibia pairs were generally less divergent, though one pair varied by *c* 11 points (267001 – Zone 20, middle Roman).

It was possible to calculate the robusticity for 16 (37.2%) adults: seven female (36.8%), nine male (40.9%). Very similar ranges were seen in both sexes, though the average male robusticity score was slightly greater, ie, more robust than that of the females. The most robust females (126239a and 248102) were from Zones 6 (middle-late Roman) and 7 (early-middle Roman), and the least robust was from the latter zone and period. In the males the greatest and lowest robusticity were seen in the middle-late Roman assemblage (both in Zone 19). The only measurable female pair scored closely, whilst mostly small levels of variance were noted in the six male measurable pairs. One male pair of femora differed by just under 10 points, and it is worth noting that the same individual (257018a) also had the largest platymeric divergence – the least robust limb providing the highest (broadest) platymeric index. Compared to the Iron Age, both sexes show a rather lower minimum score, and a decrease in average femoral robusticity, as well as less sexual dimorphism.

Pathology

Table 13.15 contains summaries of the pathological lesions observed and the bones affected. Some form of pathological lesion was observed in the remains of 60 (82.2%) individuals, 44 adults including the subadult/adult and 14 immature individuals (48.3%). Many of the lesions and conditions recorded for the Roman populations are common to those discussed in previous sections. To minimise repetition, the background to these pathological features will not be presented here. Most of the rates (TPRs) are presented in tables (see Tables 13.19 and 13.20). The basic data relating to the Roman material will be presented here, together with comparative contemporaneous data, and any relevant discussion related to conditions not observed in the earlier assemblages.

Dental disease

All or parts of 42 permanent erupted dentitions and ten deciduous dentitions were recorded (Tables 13.18–20). All confidence levels of sexing are considered together, the dentitions therefore comprising those of 22 females (including one subadult and one juvenile), 18 males (including one juvenile), and two unsexed juveniles.

Slight to moderate deposits of dental calculus, manifest as 'tidemarks' at the gumline, and in one or two cases across the occlusal surface, were observed in 34 permanent dentitions, comprising 15 adult females (68.2%), 14 adult males (77.8%), two subadults (one ?female) and two juveniles (one male), as well as one deciduous dentition. The rates for both sexes are fairly equal suggesting the continuation of comparable diets of each of the sexes observed in the Iron Age assemblage. Most deposits occur on the mandibular teeth, where the first incisors and canines are most commonly affected. In the maxilla the molars, second premolars and canines have more involvement. The bias towards the mandibular canines and premolars becomes more apparent in the middle-later and later Roman phases. Overall the Roman rates and severity appear reduced from the Iron Age period, whilst the distribution patterns are noticeably different, possibly reflecting some improvement in dental hygiene, and/or changes in the nature of the average diet (ie, more 'self-cleaning')

Table 3.18 Summary of individual dentitions by phase and sex

Phase	*Permanent dentitions*						*Deciduous dentitions*		
	Female		*Male*			*Unsexed*			
	Man.	*Both*	*Man.*	*Max.*	*Both*	*Max.*	*Man.*	*Max.*	*Both*
Roman									
ERo		2	1		1	1	1		1
E-MRo	1	3			2	1		1	
MRo				1	3		1		1
M-LRo	1	7	1		5			1	1
LRo		1			2				
Total inc. Ro	2	20	2	1	15	2	2	2	6

Key: Phase divisions as shown in Table 3.18; man. – mandibular; max. – maxillary NB: includes all sexing confidence levels

Table 13.19 Summary of Roman permanent erupted dentitions by sex (NB includes all sexing confidence levels)

	Max. teeth	*Man. teeth*	*Total no. teeth*	*Max. tooth positions*	*Man. tooth positions*	*Total no. tooth positions*
female	170	187	357	180	214	394
male	105	168	273	102	202	304
unsexed	3	-	3	7	9	16
Total	278	286	633	289	425	714

Table 13.20 Summary of dental lesions (permanent erupted dentitions) by sex (NB Rates shown are true prevalence rates - TPR)

	Calculus	Ante mortem *tooth loss*	*Caries*	*Abscess**	*Hypoplasia*
Roman					
female	T 193 (82 max.; 111 man.) Rate: 54.1%	T 54 (25 max.; 29 man.) Rate: 13.7%	T 70 (35 max.; 35 man.) Rate: 19.6%	T 23 (16 max.; 7 man.) Rate: 5.8%	T 82 (36 max.; 46 man.) Rate: 23%
male	T 162 (48 max.; 114 man.) Rate: 59.3%	T 33 (18 max.; 15 man.) Rate: 10.9%	T 46 (20 max.; 26 man.) Rate: 16.8%	T 19 (9 max.; 10 man.) Rate: 6.3%	T 93 (41 max.; 52 man.) Rate: 34.1%
unsexed	T2 (2 max.) Rate: 100%	-	-	-	-
total	T 357 (132 max.; 225 man.) Rate: 56.4%	T 87 (42 max.; 42 man.) Rate: 12.2%	T 116 (52 max.; 56 man.) Rate: 18.3%	T 42 (20 max.; 17 man.) Rate: 5.9%	T 175 (77 max.; 98 man.) Rate: 27.6%

* inclusive of other destructive lesions affecting the supportive structure, eg: apical voids, to render comparable; includes all sexing confidence levels

and perhaps the use of the jaws for tasks other than for chewing food. The overall rate is a little above the 43.4% average calculated for the period by Roberts and Cox (2003, 132, table 3.11).

Slight to moderate and moderate periodontal disease had affected the alveolar margins in 20 adult dentitions, comprising seven females (31.8%) and 13 males (72.2%). There is a clear tendency for the condition to increase in extent and severity with increasing age. Males were more commonly affected by the condition, with the most severe cases (score 4-4+) occurring in two older adult males from Zone 20 (267001 and 126067).

Ante mortem tooth loss was observed in 16 adult dentitions, comprising seven males (38.9%) and nine females (36.4%). The maxilla and mandible were equally affected. Molars were most commonly lost, followed by premolars (mostly second) incisors, and two maxillary canines. There is a slight disparity between the sexes with the TPR slightly higher amongst the females, a pattern also seen in the Iron Age assemblage. As is commonly observed, evidence indicates an increased frequency with advancing age. Most affected individuals were over *c* 40 yr., with four females in the *c* 30-35 yr. range, whereas only one male was estimated to be less than 40 yr. Such a pattern might be explained by the recognised susceptibility of expectant mothers to the underlying causes of *ante mortem* tooth loss (caries and periodontal disease) due to changes in oral chemistry during pregnancy. The overall rate of loss is comparable with the 14.1% calculated by Roberts and Cox from their large Roman sample (2003, 135, table 3.12). These are slightly above those noted for the small late Roman assemblage from the Cottington Road site (8.7% in male dentitions; overall 9.0%). However, the rate of *ante mortem* tooth loss in the female dentitions was 14.3% (McKinley 2009a, 11, table HB5). The increase in rate from the previous period follows the trend exemplified by Roberts and Cox (2003, tables 2.51 and 3.12).

Carious lesions were recorded in two deciduous and 26 permanent dentitions, including 14 females (63.6%), 12 males (66.7%), an infant and an infant/juvenile. Although a greater number of older adults were affected (12), and more extensively so, lesions were seen in all adult age ranges in both sexes. More females than males were affected in the *c* 30-45 yr. age range suggesting an earlier onset of lesions in the females (see above). Both individuals with lesions in deciduous teeth (126332 and 179269) have nutritional and/or health stress indicators (see Table 13.15); these conditions may be linked. As in previous periods, where observable the lesion origins were predominantly cervical and/or interproximal in location. The molars, especially third, were most frequently affected, though lesions are present in several premolars and anterior teeth. The overall rate is considerably higher than the 7.5% average calculated by Roberts and Cox for the period as a whole (2003, table 3.10), though one or two rates in their table, and the Margate-Broadstairs pipeline average of 12.2% are closer to the EKA2 rate. The overall rates are substantially higher than those from Iron Age assemblage, whilst differences in distribution patterns may be related to the patterns of calculus and periodontal disease, and their determining influences. These may include changes in diet to include more caries-inducing foods such as refined carbohydrates, and/or poorer dental hygiene.

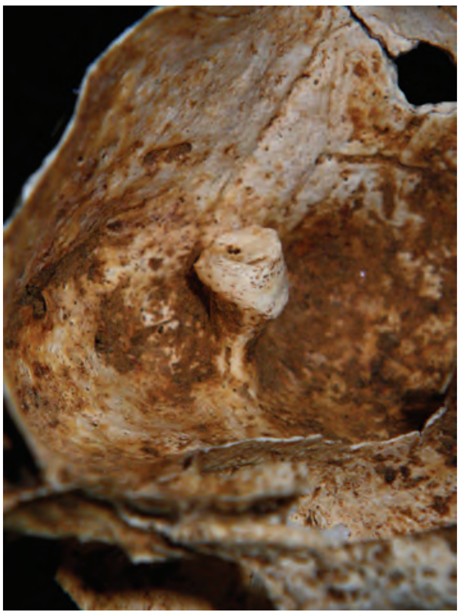
Destructive lesions in the supportive structures (apical voids/dental abscesses) were seen in 13 adult dentitions, seven female (31.9%) and six male (33.3%). All also had carious lesions and several had lost teeth *ante mortem*. The age- and sex-related pattern is similar to that of *ante mortem* tooth loss, with most of the males at least 40 years of age and females in the *c* 30-45 yr. range. The overall rate is slightly higher than that calculated for the Iron Age assemblage, but somewhat less than the rate (8.1%) from the Cottington Road late Roman assemblage (McKinley 2009a, 11, table HB5). Roberts and Cox (2003, table 3.13) give a lower average rate of 3.9% for the period.

Secondary sinusitis resulting from the tracking of infection from dental abscesses into the maxillary antrum was noted in five individuals (two females 297021 and 239268; three males 239281, 258344 and 267001). In two of the males and a female the infection extended onto the surface of the maxilla. In one male a fragment of molar root was incorporated into the new bone deposit (Pl 13.16). A deposit of new bone was evident in the left temporo-mandibular joint (239281), though this may have been the result of trauma (see below). The maxilla of one other male (205120) has signs of primary sinusitis, there being no determinable connection to dental infection.

Enamel hypoplasia was recorded in the permanent tooth crowns of 26 individuals, including 11 females (50%) and 12 males (66.7%) and three immature; lesions were also seen in three deciduous dentitions (30%; one young infant, two neonates), reflecting maternal health stresses. Most lesions comprise linear defects in canines and maxillary incisors, though examples were seen in all parts of the dentition. Severe pitting was evident in the incisors, canines and molars of 207051, a young adult male (middle Roman phase, Zone 6; Pl 13.17). The location, degree and frequency of these enamel defects indicate that most were subject to some nutritional or health stresses during the second and sixth years, ie, weaning and development of the body's own immune system (Lewis 2007, chapter 6).

The rate is slightly higher than that seen in the Iron Age dentitions, though the sex bias differs (see above). Overall, defects are seen more frequently in male teeth. Though the pattern is complex and potentially skewed by differing sample sizes, there is a general trend for a females to become less prone to enamel hypoplasia over time, whilst the converse is true of the males (Tables 13.20 and 13.21). This may be reflective of changes in access to resources, perhaps involving the favouring one sex over the other in childhood. Alternatively one sex may be better adapted to counteract any prevailing stresses.

The dental disease patterns suggest a broadly similar level of dental hygiene to that seen in other Roman sites



Pl 13.16 Roman male 239281: posterior-superior view of the left antrum floor showing a small fragment of molar tooth root, inverted and adhering to a pedicle of lamellar new bone

Pl 13.17 Roman male 207051: buccal and lingual view of pitted enamel hypoplasia defects in three mandibular molar teeth

Table 13.21 Summary enamel hypoplasia TPRs by sub-phase and sex

Phase	*Overall rate*	*Male*	*Female*
ERo	3.0%	25.0%	-
E-MRo	26.0%	27.5%	26.3%
MRo	76.9%	76.9%	-
M-LRo	29.1%	23.8%	32.4%
LRo	18.3%	26.7%	3.8%
Ro	20.0%	37.9%	10.7%

and in the earlier period, though calculus rates drop and caries rates rise compared to the latter. These may reflect a change in diet to one that is perhaps more 'self-cleaning', but includes more refined carbohydrates and sugars. Diet also seems to be the most likely cause of higher rates of caries (and consequent destructive lesions) at EKA2 and local sites compared to other Roman sites.

Non-masticatory tooth use

Diet, food texture and inclusions, malocclusion, trauma and dental pathology are influential in tooth wear and damage patterns. In addition to these, various patterns may be attributable to the use of the teeth and jaws for non-masticatory tasks such as grasping objects or materials, and/or processing various substances in the mouth. Characteristic manifestations on the teeth commonly include notches, grooves, buffing and polishing (often faceted and palatal), and uneven or oblique wear (Mower 1999). Chipping and vertical splitting commonly occur in conjunction with these (Egging Dinwiddy 2011, 103-4). Dental pathology can often influence or be exacerbated by such use, with apical granuloma and hypercementosis resulting from injury to and/or sustained pressure on the teeth and supporting structures. Bony eminences (tori) on the palate and mandible have been linked to repeated pressure from hard objects against the roof of the mouth and bruxism (tooth-grinding) (*ibid*; Neville *et al* 2002, 21).

Eleven dentitions (21.6%) have distinctive tooth wear patterns (three male, seven female, one juvenile).

Pl 13.18 Roman subadult female 147256: palatal view of the maxilla showing heavy tooth wear on the first incisors and a 'pegged' left third molar

The most commonly occurring characteristics for both sexes, phases and zones comprise greater wear on the anterior teeth (Pl 13.18), generalised buffing, and vertical splitting and chipping. Damage was more common and severe in the males, whilst in the female examples palatal polishing was widespread and more varied. Transverse notches are evident on the canines of one male and two females, and a maxillary first incisor of a third female. In another female dentition, a small, deep and rounded groove was observed on the interdental surface of a mandibular premolar.

Mandibular tori were observed in four males and two females, and all but one female (aged *c* 30-40 yr.) were well over 40 years of age. Of these, only the younger female (176335) has overt characteristics of non-masticatory tooth use, whilst a strong correlation between the trait and granuloma, hypercementosis and substantial *ante mortem* tooth loss was evident.

It would appear that a number of individuals utilised their teeth and jaws for tasks to an extent that resulted in osteological changes. Variations presumably indicate different activities and/or diversity in their execution. For instance, in both sexes there was evidence for holding or running soft and/or lightly abrasive substances behind the maxillary and in front of the mandibular anterior teeth, though this was most common in the females (suggesting activities such as leather or plant fibre processing). Clasping of harder material or objects between the occlusal surfaces was also apparent, though in females this produced notches suggesting a habitual nature grasping the same or similar types of narrow objects/materials (such as craft tools or threads), whereas the activity in the males resulted in damage suggesting a more forceful clenching (eg, crushing or tearing).

Metabolic conditions

Slight to moderate *cribra orbitalia* (see above) are manifest in 31.3% of orbits (nine individuals, seven adults (two male, five female) a subadult ?female and an infant (Table 13.15). Proportionally more female orbits (38.5%) than those of males (27.3%) had lesions, whilst a lower rate (18.2%) was seen in the immature material. The overall rate is higher than that calculated for the Iron Age, whilst the balance between the sexes is reversed due to males becoming slightly less prone to the condition, and females rather more so. Only a single late Roman male had cribotic lesions in the Margate-Broadstairs pipeline assemblage (10%; McKinley 2009a, 13), whilst Roberts and Cox record an average rate of 16.9% (2003, 141, table 3.17).

Vitamin D, produced by the exposure of the skin to sunlight, and present in small quantities in mother's milk, fish oil and animal fat, is essential for the mineralisation of bone. During the growing stage, under-mineralised bone is subject to plastic change caused by weight-bearing, and muscle contracture ie, rickets (Ortner and Putschar 1985, 274-6; Salter 1999, 184). Bowed limbs were observed in a neonate (femora), an infant (tibia) and an adult female (radii and ulnae). Bowed limbs in a very young baby may simply be due to cramped quarters in the last few weeks of gestation, though a more exaggerated example may indicate an ante-natal deficiency, whilst in infants causes of avitaminosis D include excessive covering (eg, swaddling) and inadequate maternal milk. Rachitic upper limb bones can develop during the crawling stage and can persist into adulthood. New bone formation on the infant's tibia indicates some form of irritation, such as infection, or perhaps scurvy (see above).

The endocranial new bone formation seen in two neonates and an infant may be the result of infection, unidentifiable trauma, or a reaction to scurvy-induced haemorrhage. The generalised poor mineralisation of the most recent bone deposits, or alternatively widespread periostitis in the remains of another neonate probably represents some form of infection or maternal deficiency (Egging Dinwiddy 2011, 129-31, plates 6.4-6.5; Lewis and Roberts 1997).

Osteoporosis is characterised by the reduction in trabecular bone mass and structure, which weakens the bones making them more prone to fracture. The condition affects both sexes, and is strongly associated with advancing age. However, factors such as disease, diet and lifestyle, and also genetics play a role (Roberts and Manchester 1997, 177-180). The condition was evident in the axial skeleton of adult male 257018a (Zone 19), who had been suffering from a chronic infection and various other conditions (Table 13.15).

Trauma

Evidence for traumatic injury was seen in 15 adults (35.7% adults; CPR 20.8%), consisting of seven males (31.8%) and eight females (44.4%) (Table 13.15). Comparative data are largely in the form of crude prevalence rates (CPR), Roberts and Cox providing a much lower overall rate of 10.7% for the period (2003, 151).

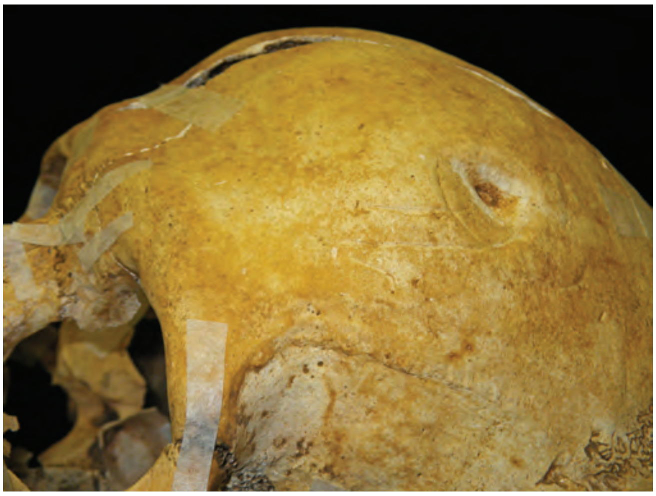
Weapon trauma

A notably high proportion of the EKA2 individuals have osteological changes most likely indicative of weapon trauma, with potential injuries identified in four adult males (18.2% males; 9.3% adults; 5.5% all individuals). The rate is far greater than the 0.3% CPR calculated by Roberts and Cox whose data comprise only single cases per site, two thirds of which are female (2003, 158, table 3.29).

The skull of late Roman male 239281 has evidence for healed weapon trauma to the left frontal eminence (Pl 13.19). On the exocranial surface is a shallow and concave sub-circular lesion (18mm x 18mm), with a triangular section on the mesial side (*c* 9mm x 15mm) and an elliptical apex (*c* 4.5mm x 2.5mm x 5mm deep). The lesion is in an advanced state of remodelling, with only a slight smoothing distinguishing the texture from the surrounding normal cortical bone. At least two vessel impressions indicate an enhanced blood supply to the lesion. Endocranially the injury is evident as a paler oval prominence (*c* 33mm x 20mm x 3mm). The inner table was clearly pushed inwards but had not fractured. There is no sign of infection. The evidence suggests that a long time prior to death this man suffered a heavy blow to the skull from a weapon with a triangular point, which stopped short of penetrating the cranial cavity.

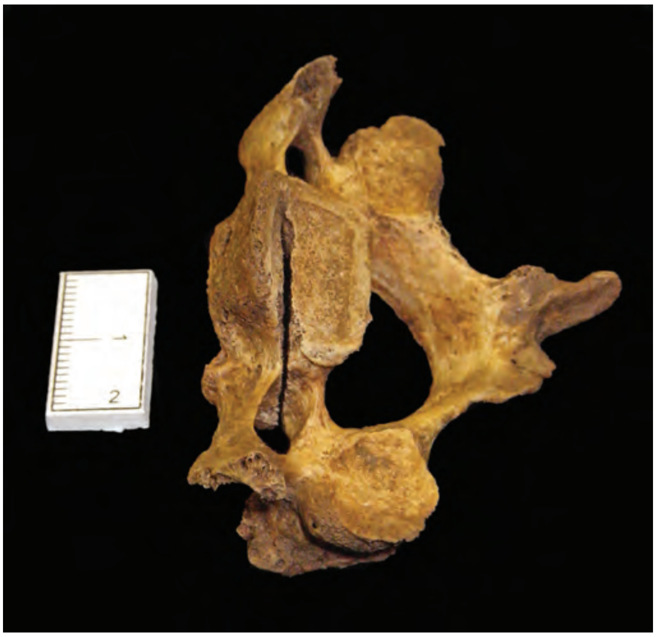
At least three medio-lateral sharp blade cuts are situated across and to either side of the sagittal suture (seen only as small fragments) of the skull of male 262061 (Pl 13.20). Undoubtedly made to fresh bone, all the cuts were clean and smooth, and probably made with the same weapon. The cuts are between 17mm and 20mm, and depths between 2mm and 4mm; slight curvature and/or tapering suggest a series of single slices, their angles implying differing positions of the blade relative to the skull. Small flakes of bone had been detached during the process, and there is bevelling of the inner table. In addition to these cuts, injury from a pointed weapon is suggested by a bevelled, 'punched-out' fragment of parietal or frontal bone. The exocranial portion is sub-square, *c* 13mm x 15mm, while the endocranial aspect is sub-square approximately 26mm x 23mm, with sharp, curved and straight edges (some damage). Alternatively this may be the result of the actions involving the sharp blades.

A sharp blade injury made to fresh bone was identified in the fourth cervical vertebra of older male 258344 (Pl 13.21). It pierced the inferior right side of the



Pl 13.19 Roman subadult male 239281: left lateral view of frontal bone showing healed weapon trauma

Pl 13.20 Roman adult male 262061: superior view of a fragment of parietal bones and the sagittal suture showing sharp blade cut marks



Pl 13.21 Roman adult male 258344: inferior-anterior view of the fourth cervical vertebra showing sharp blade trauma

Pl 13.22 Roman adult female 176343: lateral view of ulnae showing non-union fractures

vertebral body (*c* 0.75mm wide) and extended superiorly and laterally, partially penetrating the superior surface and cleanly slicing the right lateral aspect. The lateral margin of the right transverse process foramen was preserved as were the adjacent vertebrae. A slight change in plane (more oblique) was noted on the inferior aspect of the cut, which probably derived from the removal of the blade. This peri-mortem injury would have required the victim's head to be held back to its most extreme position, allowing a sharp, thin blade to be thrust up and back from the right side.

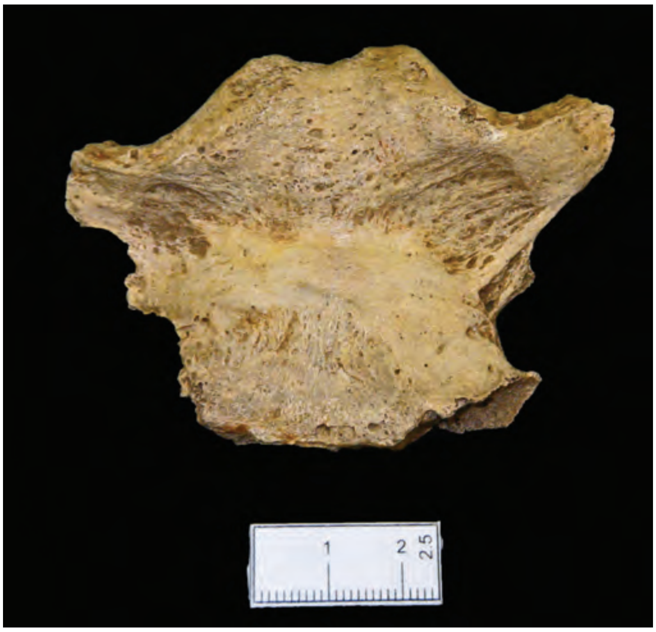
Probable traumatic injury to the left side of the left orbit of male 205120 was characterised by an oval lesion *c* 15mm x 8mm x 3mm, obscuring the superior temporal line (above left orbit), just posterior of the zygomatic process. The lesion, though eroded post-depositionally, is somewhat roughened and discoloured, and shows the early stages of remodelling. Possible interpretations include blunt force trauma or a glancing blow from a sharp weapon. A more conservative suggestion might be for localised infection of the overlying tissues.

Fractures

Proportionally fewer males (22.7%) than females (42.1%) had sustained fractures. This is the reverse of the trends seen in similarly dated collections where males frequently show greater involvement than females. At Poundbury, Dorchester, the male CPR was 37.4% and female 18.5% (Molleson 1993, table 47), whilst the dimorphism is more extreme in the adjacent Little Keep site, Dorchester (65.2% males and 10% females; McKinley and Egging Dinwiddy 2009). Wells (1982, 167) also found this to be the case at Cirencester (26.7 males and 6.6% females).

In the females, examples were seen in the vertebrae (compression and posterior breaks), ribs, knees, ankles and feet. One woman (176343) had broken both ulnae at the mid-shaft, neither of which had united (Pl 13.22). Fractures in the forearm are most commonly the result of a fall onto the hands, or a direct impact as with a parry fracture which can occur when a person defends themself from a violent blow. With these injuries it is notoriously difficult to secure coaptation of the fragments without intervention and as a result the function of the forearm and wrist can be impaired (Adams 1987, 158-62).

In the males fractures are predominantly located in the thorax (including a clay-shoveller's fracture, Adams 1987, 98; and spondylolysis (see above)), though there are also examples affecting the knee and ankle. One case comprises a transverse fracture of the manubrium, the upper portion of the breastbone (Pl 13.23). A thick band of smooth lamellar new bone is present just below the middle of the manubrium (anterior and posterior) of older adult male 239281. Clinically, manubrial fractures are rare, accounting for *c* 5% of all sternal fractures, which comprise only *c* 0.5% of modern clinical cases. Nearly all such fractures are the result of high impact trauma (such as car accidents) (Brown and Chew 2006, 116). When the other injuries manifest on this man's skeleton are also considered – two fractured ribs,



Pl 13.23 Roman adult male 239281: anterior view of the manubrium showing healed transverse fracture

mandibular trauma, nasal cartilage damage, and weapon trauma to the skull (see above) – it would appear that he had been subject to one or more episodes of violent trauma, at least one of which involved an attack from an armed opponent. It is also apparent from the degree of healing and remodelling that the event or events took place long before death.

Fractures were predominantly of the type associated with slips, trips and falls, accidents and heavy labour associated with everyday life. However there is clear evidence for interpersonal violence in the males, and potentially one of the females (eg, parry fracture).

Enthesophytes, cortical defects and exostoses

Descriptions and aetiologies are discussed in earlier sections. Roman examples are summarised in Table 13.15.

One case comprises enthesophytes at the anterior talofibular and distal interosseous ligament sites in two adult males from Zone 10 (239281 and 247314 (redeposited)). Injury to these ligaments occurs when the foot is in plantar flexion, the position in which a 'sprained ankle' most commonly occurs.

One or two circular and crescent shaped perforations were seen in both scapula blades of older adult male 258344 (Pl 13.24). Located below the medial end of the acromial spine and above the infraspinous fossa, these anomalies are probably the result of a lack of ossification ie, cortical defects, and are considered a normal variation in clinical contexts (Cigtay and Mascatello 1979), though in archaeological material scapula blades are seldom found undamaged and therefore examples are uncommon.

Infections

Lesions indicative of some form of infection were observed in the remains of a minimum of 18 individuals (CPR 24.7%), comprising eight males (36.4%), six adult females (31.6%) and four immature individuals (two infants, a juvenile and a subadult 13.8%). The changes are manifest as new bone formation, predominantly periosteal new bone, and lytic (destructive) lesions. Most relate to a variety of conditions, not all of which could be diagnosed (Table 13.15).

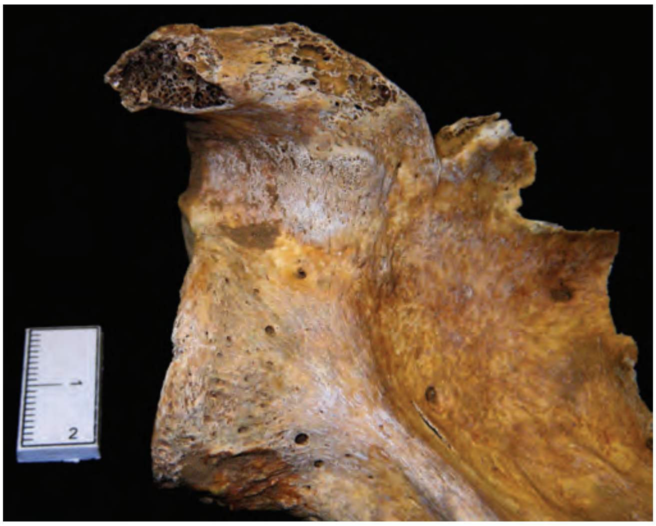
Pl 13.24 Roman adult male 258344: posterior view of right scapula blade showing a large cortical defect

Periosteal new bone

Lesions were observed in from one to three skeletal elements from 14 individuals (CPR 19.1%); seven males (31.8%), five adult females (26.3%) and three immature individuals (10.3%), including two infants, a juvenile and a subadult. A variety of elements from all areas of the skeleton are affected with most frequent involvement of the maxilla (eight cases), most, if not all (including a mandibular example), are likely to have been the result of dental pathology, with secondary sinusitis evident in five cases (see above). The majority of the infections recorded in the female assemblage are of this type.

Periosteal new bone was observed on the lower limb bones of five individuals, including one infant (tibia; possibly associated with metabolic deficiency – see above), one adult female (fibula; probably associated with tibial plateau fracture), and three adult males. The latter group include a possible tibial ulcer, non-specific deposits on a single fibula, and bilateral deposits on the tibiae of a further individual. Other locations include a temporo-mandibular joint (possibly associated with dental pathology and/or trauma), vertebrae – both posterior and bodies, and deposits within the cranial vault (an infant and a juvenile).

A further example was found on the posterior of the right scapula blade below the coracoid process (male 239281). A patch of lamellar new bone (*c* 10mm x 6mm) associated with a saddle-like anomaly corresponds to soft tissues such as the sub-scapular muscle, and the sub-coracoid and sub-scapular bursa (fluid-filled sacs that function as gliding surfaces to reduce friction between the moving tissues). It appears that the



Pl 13.25 Roman adult male 239281: anterior-inferior view of right scapula showing subcoracoid new bone formation and plastic changes probably associated with bursitis

area has undergone slight plastic changes resulting in a smooth depression with slightly raised margins (also apparent in the left scapula), with inflammation of the right lesion indicated by the new bone (Pl 13.25). Injury or overuse, such as repeated movement of the shoulder, can result in inflammation of the bursa (bursitis) and/or associated structures (eg, tendonitis; Wheeless 2012).

Destructive lesions

Destructive lesions were seen in the remains of five individuals: three adult males, an adult female and a subadult female. There are many potential causes of such lesions including localised infection (eg, infected cysts or wounds), as well as various forms of neoplasms.

Some lesions appear to represent localised infections following trauma and/or degenerative joint disease. These include a probable injury or lesion of the scalp above the left parietal (adult female 220056), trauma to the base of a right index finger (male 132157), and joint degeneration between a great toe and sesamoids (?septic arthritis; male 257018a).

A destructive lesion was seen in the anterior third of the right palate of adult male 258344, mesial to the right second incisor, canine and first premolar (Pl 13.26). The ragged sub-spherical lesion (11.5mm x 8.5mm x 6.6mm) exposes open trabecular bone, and has puckered margins and sclerotic walls. The cause may be one of a number of potential conditions (see above).

The large destructive lesion in the left side of a third lumbar vertebra (subadult female 171193) comprises a deep sub-circular cavity (*c* 5mm x 7.5mm x 8.5mm) encompassed by a shallower, sclerotic depression which extends to the left rib facet (Pl 13.27). Possible diagnoses include pyogenic infection such as osteomyelitis, or tuberculosis (Aufderheide and Rodríguez-Martín 1998; 118-140).

Joint disease

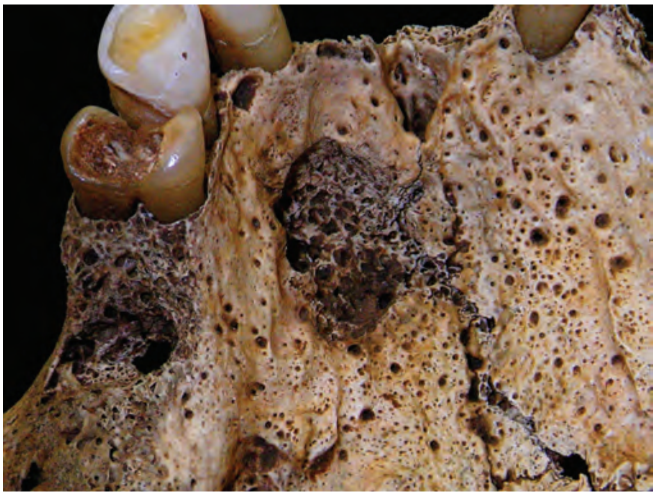
All or parts of 31 (15 male and 16 female) adult spines and 1816 extra-spinal joints (939 male, 875 female, two unsexed) were recorded. Lesions were identified in the joints of at least 25 spines (80.6% spines; 93.3% male 68.8% female spines) and in the extra-spinal joints of 24 adults (57.1%), including 14 males (63.6%) and ten females (55.6%). TPRs are summarised in Tables 13.22 and 13.23.

Schmorl's nodes

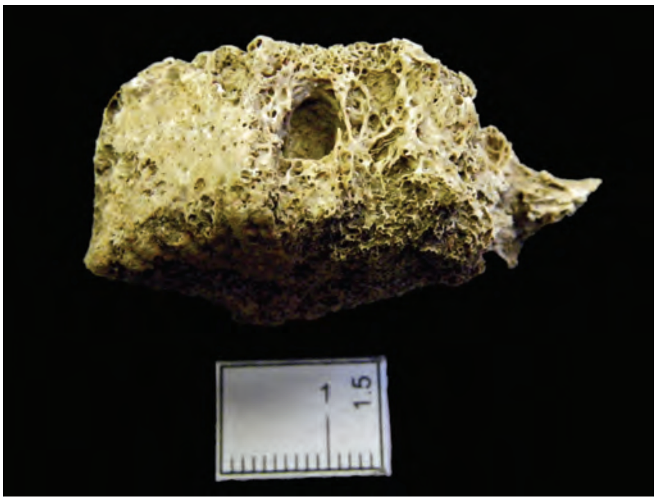
Lesions indicative of Schmorl's nodes were seen in from one to ten vertebrae in 11 spines (four male, seven female); T8-T12 being most commonly affected. In the females the lower thoracic was most commonly affected, particularly T8, though lesions were present from T5 to L5. In the male spines the most frequently affected vertebra was the T11, though the condition was evident on the T4 to L4 in fairly consistent proportions. The rate shows a slight increase from the Iron Age, though it is a little less than the 17.7% given for the period by Roberts and Cox (2003, 147, table 3.21).

Degenerative disc disease

Slight to moderate degenerative disc disease was evident in between from two and 11 vertebrae in 17 spines (54.8%);



Pl 13.26 Roman adult male 258344: right anterior palate showing destructive lesion



Pl 13.27 Roman subadult female 171193: anterior view of third lumbar vertebral body showing a destructive lesion

Table 13.22 Summary of number and rates of spinal lesions by sex NB. includes 1st sacral; excludes vertebrae not assigned to specific spinal location

	No. vertebrae	*Osteoarthritis*	*Schmorl's nodes*	*Degenerative disc disease*	*Lone osteophytes*	*Lone pitting*
female	301	18 (6%)	44 (14.6%)	39 (13%)	104 (34.6%)	36 (12.0%)
male	252	45 (17.9%)	38 (15.1%)	67 (26.6%)	101 (40.1%)	33 (13.1%)
Total	553	63 (11.4%)	82 (14.8%)	106 (19.2%)	205 (37.1%)	69 (12.5%)

10 male (66.7%) and seven female (43.8%). As is often the case (Rogers and Waldron 1995, 27), the most commonly affected vertebrae are the fifth and sixth cervical, followed by the lower lumbar region. A similar pattern is seen in both sexes, with the fifth cervical vertebra particularly affected in the females. The condition is strongly linked to age, with the majority of cases seen in middle and older adults (ie, over 35 years), though one male and three females may have been as young as 30 years of age. The extent and severity of lesions is also linked to age, though not consistently. There is a slight increase in rate from the Iron Age, though this may be a reflection of the relative proportions of older adults.

Calcification of intervertebral disc material and macroporotic lesions were noted in the thoracic spine of male 239281, who also suffered from DISH (see below). Disc calcification is common in the elderly, affecting the thoracic region in particular, and the condition increases in extent and severity with age, and correlates to the degree of disc space reduction (Chanchairujira *et al* 2004). An alternative interpretation may be chronic infection.

Degenerative compression of the vertebrae, possibly linked to osteoporosis (see above), was evident in a cervical vertebra and the lumbo-sacral region of older adult female 220056.

Osteoarthritis

Lesions indicative of osteoarthritis were seen in 13 adult spines (41.9% spines), comprising eight males and five females (53.3% and 31.3%), and in from one to eight extra-spinal joints of nine adults (20.9%); five males (22.7%) and four females (21.1%).

Most spinal lesions were seen in the articular process joints of the third and fourth cervical vertebrae, though examples are evident elsewhere affecting 71.4% and 83.3% of those bones respectively in male spines though the fourth lumbar vertebra is also commonly involved. In one male (239281) advanced osteoarthritis resulted in gross deformation and fusion of the articular process and posterior-lateral lips of the second and third cervical vertebrae. In the female spines the range of osteoarthritic vertebrae is considerably narrower, with no involvement of the lower thoracic and lumbar spine.

Table 13.23 Extra-spinal joints affected by degenerative joint lesions, showing rates (TPR) by sex (Roman)

Joint	*Female*	*Male*	*Total (inc. unsexed)*
Roman			
Temporo-mandibular	12R 12L oa: R 8.3% pitting: R 8.3%	11R 6L oa: L 16.7% pitting: R18.2%, L 33.3%	23R 18L oa: R 4.3%, L 5.6% pitting: R 13.0%, L 11.1%
Costo-vertebral (ribs)	104R 94L oa: L 4.3% op: R 38.5%, L 39.4% pitting: R 22.1%, L 31.2%	84R 72L op: R 81.0%, L 69.4% pitting: R 40.5%, L 22.2%	188R 166L oa: L 2.4% op: R 57.4%, L 52.4% pitting: R 30.3%, L 27.1%
Acromio-clavicular	1R 1L op: R 100%	6R 7L oa: R 16.7% op: R 16.7%, L 14.3% pitting: R 16.7%, L 28.6%	7R 8L oa: R 14.3% op: R 28.6%, L 12.5% pitting: R 11.0%, L 25.0%
Sterno-clavicular	8R 8L op: R 12.5%,L 12.5% pitting: R 37.5%, L 62.5%	7R 5L op: R 42.9%, L 20.0% pitting: R 71.4%, L 80%	15R 13L op: R 26.7%, L 15.4% pitting: R 53.3%, L 69.2%
Shoulder – glenoid	9R 9L op: R 33.3%, L 33.3%	9R 7L op: R 66.7%, L 28.6% pitting: R 11.1%	18R 16L op: R 50.0%, L 30.3% pitting: R 5.6%
Shoulder - humerus	10R 12L	9R 8L op: R 11.1%, L 12.5%	19R 20L op: R 5.3%, L 5.0%
Elbow - humerus	13R 7L op: L 14.2%	7R 8L oa: R 14.2%, L 12.5% op: R 28.6%, L 25.0%	20R 15L oa: R 5.0%, L 6.7% op: R 10.0%, L 20.0%
Elbow - radius	10R 5L	7R 8L oa: R 14.2%, L 12.5% op: R 42.9%, L 25.0%	17R 13L oa: R 5.9%, L 7.7% op: R 17.6%, L 15.4%
Elbow - ulna	13R 7L	8R 9L op: 2R 25.0%, 1L 11.1%	21R 16L op: 2R 9.5%, 1L 6.3%

Table 13.23 (continued)

Joint	*Female*	*Male*	*Total (inc. unsexed)*
Wrist – radius	7R 5L	7R 9L oa: L 14.2% op: R 57.1%, L 22.2%	14R 14L oa: L 7.1% op: R 28.6%, L 14.3%
Wrist – ulna	2R 3L	5R 6L op: R 40.0%, L 50.0% pitting: R 40.0%, L 50.0%	7R 9L op: R 28.6%, L 33.3% pitting: R 28.6%, L 33.3%
Hand – carpals	23R, 17L op: L 5.9%	32R 26L oa: R 9.4%, L 3.8%	55R 43L oa: R 5.5%, L 2.3% op: L 2.3%
Hand – carpo-meta	21R 21L	28R 31L oa: R 3.6% op: R 21.4%, L 12.9%	49R 52L oa: R 2.0% op: R 12.2%, L 7.7%
Hand – meta-phalangeal	15R 26L op: R 20.0%	31R 32L oa: R 16.1% op: R 16.1%, L 31.3%	46R 58L oa: R 10.9% op: R 17.4%, L 17.2%
Hand – proximal IP	7R 18L	25R 30L op: R 20.0%, L 43.3%	32R 48L op: R 15.7%, L 27.1%
Hand – distal IP	6R 11L op: 2R 33.3%	10R 14L op: L 28.6%	16R 25L op: R 12.5%, L 16.0%
Sacro-iliac	11R 9L op: R	9R 8L op: R 11.1%, L 25.0%	20R 17L op: R 10.0%, L 11.8%
Hip - pelvis	12R 12L op: R 25.0%, L 16.7% pitting: R 16.7%, L 16.7%	12R 11L oa: R 16.7% op: R 33.3%, L 36.4% pitting: R 33.3%, L 36.4%	24R 13L oa: R 8.3% op: R 29.2%, L 46.2% pitting: R 25.0%, L 46.2%
Hip - femur	12R 11L op: R 16.7%, L 9.1% pitting: L 9.1%	15R 12L oa: R 6.7% op: R 33.3%, L 25.0%	27R 24L oa: R 3.7% op: R 25.9%, L 16.7% pitting: L 4.2%
Knee – femur/patella	11R 10L oa: R 18.2%, L 10.0% op: R 9.1%, L 10.0%	12R 14L op: R 16.7%, L 28.6% pitting: R 8.3%, L 7.1%	23R 24L oa: R 8.7%, L 4.2% op: R 13.0%, L 20.1% pitting: R 4.3%, L 4.2%
Knee - lateral	8R 10L op: L 10%	11R 8L oa: L 12.5% op: R 18.2%	19R 18L oa: L 5.6% op: R 10.5%, L 5.6%
Knee - medial	9R 11L op: L 9.1%	10R 9L oa: L 11.1% op: R 30.0%	19R 20L oa: L 5.0% op: R 15.8%, L 5.0%
Ankle	10R 12L	12R 9L op: L 11.1%	22R 21L op: L 4.8%
Foot - tarsals	46R 48L op: R 13.0%, L 12.5%	44R 41L op: R 4.5%, L 18.2%	90R 89L op: R 8.9%, L 9.0%
Foot – meta-phalangeal	12R 20L pitting: R 8.3%	20R 14L oa: L 15.0% op: L 7.1% pitting: R 5.0%, L 7.1%	32R 34L oa: L 9.4% op: L 2.9% pitting: R 6.3%, L 2.9%
Foot – proximal IP	5R 5L	10R 18L op: R 20.0%, L 38.9%	15R 23L op: R 13.3%, L 30.4%

Key: oa – osteoarthritis; op – lone osteophytes; R/L – right/left; IP – interphalangeal; NB. pitting – lone lesions

There is a clear link between the extent and severity of spinal osteoarthritis and the age of the individual, with all cases occurring in adults over *c* 35 years of age and the greatest number of lesions seeen in those over 45 years old. Osteoarthritic changes including glassy eburnation are evident on the posterior-lateral lips and posterior margin of the sixth cervical vertebra and the corresponding body of the fifth in the spine of older adult male 258344. These appear to be associated with degenerative disc disease, and imply contact between the two vertebral bodies (Pl 13.28).

The overall data show a moderate increase in the condition from the Iron Age, whilst the greater prevalence in males is maintained at over twice the rate seen in the females. Roberts and Cox record a CPR of spinal osteoarthritis in 8.9% of adults from their sample of Roman material, a substantially lower rate than that seen in the EKA2 contemporaries.

Fairly low levels of extra-spinal osteoarthritis are manifest in most major joints, with slight peaks in rates for the acromio-clavicular joint (shoulder), and the meta-phalangeal joints of the hands and feet. The male and

Pl 13.28 Roman adult male 258344: superior-posterior view of the sixth cervical vertebra showing degenerative changes to the posterior and lateral margins

female patterns of distribution between the sexes differ, with more joint types affected in the males than in the females, the ribs being the only commonality (Table 13.23). Roberts and Cox (2003, 145) found that extra-spinal joint disease affected 12.8% of sexed adults in their sample, again a rather lower rate than evident in the EKA2 Roman assemblage.

It seems that the EKA2 Roman population had more physically demanding lifestyles relative to the period average, though apparently not as strenuous as that indicated for the EKA2 Iron Age. The varying male and female distribution patterns and rates may indicate sex-determined divisions of activities, and/or the way in which activities were undertaken.

Diffuse idiopathic skeletal hyperostosis (DISH)

A case of DISH (Aufderheide and Rodríguez-Martín 1998, 97-99) was identified from the classic 'dripped candle wax' profusions along the anterior and lateral (right) vertebral bodies of the thoracic and lumbar spine of older male 239281 (Pl 13.29). Roberts and Cox (2003, 138-9, table 3.15) note a correlation of the condition with a rich diet, and record 23 Roman cases (all male; CPR 1.3% from their sample).

Ankylosing spondylitis

Though incomplete, the sacroiliac joints and the posterior portions of the fourth lumbar to sacral vertebrae of adult male 257018a are in an advanced state of fusion. The ankylosis is smooth and not particularly exuberant. In section the sacroiliac joint shows little evidence of the original articular surfaces, though the periphery is still discernible. The body surfaces of the first and second lumbar vertebrae show some exposure of trabecular bone, and are osteoporotic (see above). The onset of fusion is also evident in the articular process joints of the upper lumbar vertebrae. The most likely diagnosis for this condition is ankylosing spondylitis, a relatively rare, inflammatory and genetically-linked seronegative condition (clinical prevalence: *c* 0.3 and 0.5%; Braun and Sieper 2007), that causes connective tissues in the spinal and sacroiliac joints to calcify. It affects males in *c* 90% of cases and

Pl 13.29 Roman older adult male 239281: right lateral view of T4-10 showing the 'dripped candle wax' bony profusion characteristic of diffuse idiopathic skeletal hyperostosis (DISH)

commences at the sacroiliac joints, progressing up the spine and ultimately causing what is often termed a 'bamboo spine' (Aufderheide and Rodríguez-Martín 1998, 102-104; Salter 1999, 242-5). Contemporaneous examples are rare; Roberts and Cox list two cases from Dorchester-on-Thames and in London (2003, 151). A more conservative diagnosis is undifferentiated spondylitis/arthritis, and alternatives include other seronegative spondyloarthropathies (eg, reactive, and psoriatic) most of which require soft tissue for conclusive identification.

Lone osteophytes and pitting

Lone osteophytes were seen in the articular joints of from one to 19 vertebrae from 22 spines; 11 of each sex (71.0% spines). Lesions were evident on the bodies of from one to 16 vertebrae in 16 spines, equally divided between the sexes (51.6%). Osteophytes were also seen on the extra-spinal joints of 20 adults (46.5%), affecting a greater proportion of males (63.6% *vs* 36.8%), of whom the range of affected joints was also larger (Table 13.23). From one to 32 joints have lesions and as expected, the extent of osteophyte formation increases with age, though not consistently.

Pl 13.30 Roman adult male 258344 showing marked asymmetry of the nasal aperture

Pl 13.31 Roman adult female 220056: medio-anterior view of the right distal femur and patella showing advanced osteoarthritis in joint and a large concavity, possibly a plastic change associated with chronic suprapatellar bursitis

Lone pitting is evident in the articular facets of from one to seven vertebrae in 16 adult spines, eight of each sex (51.6%). The rate is slightly greater in the male extra-spinal joints (45.4%), compared to 36.8% of female joints. Following the degenerative pattern discussed above, the range of pitted joints is wider in the male assemblage. In males spinal osteophyte formation is more prevalent in the middle thoracic to lumbar region, increasing in frequency towards the sacrum. Male spinal joint pitting shows a less clear pattern with middle and lower thoracic seemingly more affected. In the female spines there are no discernible patterns for osteophytes, whilst the majority of pitting occurred in the thoracic region.

The distribution of degenerative joint lesions indicates that wear-and-tear occurred in the majority of male extra-spinal joints, whilst in females the elbows, wrists and ankles are less prone. Combined with differential patterns of spinal degeneration between the sexes, there is a patent variation reflecting either a gender-based division in the types of tasks participated in and/or the way in which tasks were undertaken. To generalise, more males appear to have consistently used their whole body in their undertakings, whereas the majority of females seem to have participated in activities less demanding of full body exertion, instead wear and tear is more concentrated in the shoulders, hands, hips and knees.

Congenital conditions

The nasal aperture of male 258344 is grossly asymmetric and includes a severely deviated nasal spine. The left portion of the aperture is rather straighter and more elongated than the right, extending inferiorly a further *c* 2.5mm. The nasal spine deviates to the left at an angle of *c* 45 degrees, encroaching *c* 3mm into the left inferior meatus making it much narrower than the right, doubtless giving the man a characteristic appearance (Pl 13.30).

Spina Bifida Occulta (incomplete ossification and fusion of the vertebral posterior arch) was observed in at least the third to fifth sacral vertebrae of a female juvenile (248109), the first and second are damaged. The condition is not uncommon, occurring in 5–25% of the population (Aufderheide and Rodríguez-Martín 1998; 61-2).

Two cases of possible congenital vertebral fusion were also recorded, involving the non-proliferative ankylosis of the vertebral foramen margins in the first and second lumbar vertebra in male 216011, and of the anterior bodies, articular process joints and spinous processes in the eighth, ninth, eleventh and twelfth thoracic vertebrae of female 257015. In all cases the vertebrae are of otherwise normal morphology, whilst disc space was minimal or absent.

Unusual articular surfaces were noted in the ankles and feet of elderly male 150082. The posterior calcaneal/talal articular surface extends around onto the lateral side of the tali, and presumably corresponding surfaces were present on the calcanea (incomplete). The tubercles along the dorsal aspects of the calcanea articular surface for the cuboid are also prominent, projecting anteriorly. Both proximal phalanges of the great toe have noticeably large and shallow proximal articular surfaces with asymmetric cortical defects and some joint degeneration. The changes give the impression of prolonged contact or pressure along the dorso-lateral side of the mid-foot, consistent with prolonged dorsi-flexion and/or eversion of the foot, as seen in congenital *talipes calcaneo-valgus* (the opposite of 'clubfoot'), and *pes planus* (flat-footedness) (Adams 1986, 438). It is possible that this deformity altered the biomechanics of the lower limbs, and thus contributed to the osteoarthritic changes seen in the left knee.

Miscellaneous lesions

Calcified cartilage

Calcified nasal cartilage was found adhering to the nasal bones of older male 239281, whilst calcified thyroid material was found with the remains of a further male 258344.

Plastic changes

A large smooth-walled concavity corresponding to the outline of the right knee joint capsule (*c* 22mm x 20mm x 4mm), was observed on a distal right femur (Pl 13.31). The lesion, seen in the remains of an older adult female (220056), appears to represent a plastic change in response to prolonged pressure from an overlying soft tissue anomaly, probably associated with the grossly arthritically deformed femur/patella joint. The location corresponds to the suprapatellar bursa, superior the patella, under the *quadriceps femoris* muscle, and in communication with the joint cavity (McMinn and Hutchings 1985, 310). Injury, whether acute as in a direct blow/fall or repeated micro trauma (over-use, such as activities that require crawling on the knees) can result in inflammation (bursitis) and in some cases chronic infection and/or calcification (Wheeless 2012). The condition often coexists with arthritis and tendonitis of the knee joint. (See also *metabolic conditions and infections* above).

Cysts and neoplasms

Small lesions possibly indicative of cysts or fibromas were seen in the skull of male 258344, comprising a small (4mm x 5mm) smooth, oval cavity in the roof of the right orbit and a sub-circular void surrounded by a raised ring of lamellar and woven new bone, situated within the sphenoid sinus of the right temporal bone (endocranial) (Pl 13.32).

Asymmetric transverse foramina in the second cervical vertebra of male 257018a may be indicative of soft tissue proliferation/expansion such as a nerve ganglion, fibroma, tumour or cyst, or an imbalance of nerve and/or other vessel activity through the opening, which continues to a lesser degree in the third and fourth cervical vertebrae. Other types of cyst include a large solitary bone cyst in the right foot (navicular) of adult female 220056.

Idiopathic skull thickening

The skull of adult male 136101 had noticeably thickened cortical layers, potential diagnoses include the later stage of Paget's disease, a common condition in older adults, possibly caused by a virus (Salter 1999, 199).

Mortuary rites

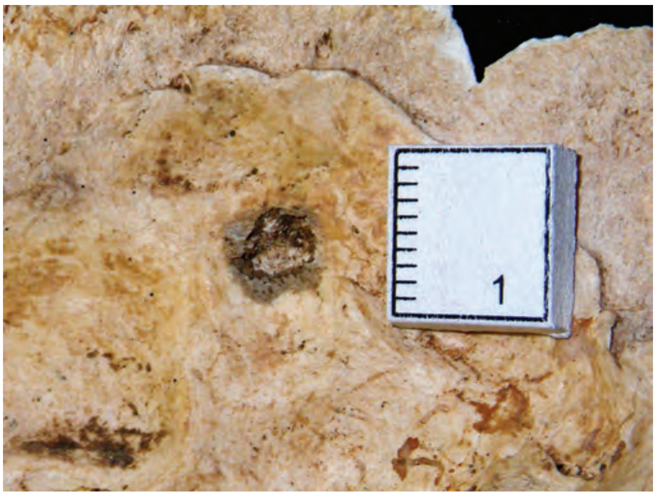
'Deviant' burials

The only 'deviant' burials comprise two osteologically unremarkable adult females 176335 (decapitated) and 248220 (pronated) from the Zone 10 cemetery. Whilst infrequent, such mortuary practices are well recognised within Roman cemeteries and proposed potential reasons include those of a practical nature, such as accidental inversion, and those based on superstition. These could indicate an intention to confuse/still the spirit of the dead, especially if the deceased had led an extraordinary life (whether positively or negatively so), or had died in 'unusual' circumstances (Harman *et al* 1981; Philpott 1991, 77-83; Boylston *et al* 2000; McKinley and Dinwiddy 2009).

Post-mortem *modification*

P*ost-mortem* modification was evident to bone redeposited in Roman contexts and as such probably derives from earlier deposits, most likely Iron Age (see above).

Recovered from ditch 42023 in Zone 10, an adult female frontal bone (42021) was found to have a small sharp blade cut, made whilst the bone was still fresh; the *c* 3.5mm long, medio-lateral cut – located on the posterior aspect of the right zygomatic process – is deeper medially with a slightly curled superior edge (Pl 13.33). Such a cut is likely to be related to defleshing of the bone as part of a mortuary right. The skull (especially the frontal) is a favoured choice for similar



Pl 13.32 Roman adult male 258344: endocranial view of the right temporal squalmous portion showing a small destructive lesion with new bone formation inferior to squamosal suture and in the region of the middle meningeal artery

Pl 13. 33 Roman female 42021: lateral view of the right zygomatic process showing a sharp blade cut made in green bone

treatment in the Iron Age (see above). Comparable examples have been found on the Margate-Broadstairs pipeline (McKinley 2009a, 4), and close to Margidunum near Bingham, Nottinghamshire (Egging Dinwiddy and McKinley 2012).

The proximal section of a robust adult right femur shaft was found redeposited in an early Roman ditch in Zone 6 (260012). A series of at least ten oblique transverse cuts are manifest in an area *c* 27mm x 27mm on the anterior aspect. These are probably associated with flesh removal, particularly of the *vastus intermedius* muscle and attachments. As above, this may represent some form of mortuary rite (see Iron Age section).

Hinged and curved breaks on a midshaft section of an adult left femur from Zone 20 (??male 273126) indicate that the damage occurred whilst the bone was still relatively fresh. This was found redeposited in a middle Roman ring-ditch and may have derived from a burial disturbed a fairly short period after it was made. It is also possible that, like those described above, the modification occurred as part of a mortuary rite, but the evidence here is less compelling.

Canid gnawing was found on fragments of limb bones (three lower, one upper) found redeposited in four contexts in Zone 6 (145347, 247091, 254025 and 256046). This area was considerably reworked in the Roman period, which no doubt disturbed a number of earlier graves and allowed animals to gain access to the remains.

Saxon *by Kirsten Egging Dinwiddy*

The majority of the early Saxon graves (Zone 19; 6th to late 7th century) can be divided into two groups (east and west) based on their location on either side of the hollow-way (126227); these may represent two cemeteries, though the extension of a single cemetery is a possibility (Volume 1, Fig 5.3). These form part of a series of Roman and Saxon cemeteries found along the route of Dunstrete in previous investigations (Perkins 2008, 304).

The eastern group consisted of 29 graves (two 'empty'/cenotaphs – 252053, 252037), most aligned roughly east-west to SW–NE and arranged in clusters of mixed ages and sexes possibly representing familial groups. Communal graves included a double and a triple, where the individuals were placed side by side during the same burial event. In both cases the graves contained the remains of an adult female and a subadult male, with a juvenile completing the triple burial (Table 13.24). Part of this cemetery was excavated in the early 1980s, when the graves of three adults were found in the area immediately south of the double burial, along the northern side of hollow-way 126227.

The western group comprised 21 graves, including five graves *c* 150m to the west of the rest, and two 'empty' graves/cenotaphs (189172, 218200). The graves are arranged in up to two demographically mixed rows of roughly east-west graves that align with the southern edge of the hollow-way. Three graves were found to contain two adult burials, where the grave had been revisited and a second burial neatly placed (stacked) above the primary burial. Two graves contained a male and a female, and one contained two males.

Outlying graves consisted of a trio (126204, 126233 and 220136) cut into the Roman hollow-way (193119/126277) on the eastern margin of the zone (Volume 1, Fig 4.52), the date of which is not conclusive (see Volume 1, chapters 4 and 5). They are included in Table 3.15.

Table 13.24 Saxon (unburnt) human bone summary

Context	*Cut*	*Deposit type*	*Phase*	*Quantification*	*Age/sex*
Zone 14					
126031	126030	inh. burial	MAS	*c* 50%	adult >35 yr. male
126046	126045	inh. burial	MAS	2 shafts + frags. s.l.	juvenile *c* 5–12 yr.
126058	126057	inh. burial	MAS	*c* 75%	adult >40 yr. female
126060	126061	inh. burial	MAS	*c* 30%	adult >23 yr. ?male
133045	133046	inh. burial	MAS	*c* 50%	adult >45 yr. female
136051	136052	inh. burial	MAS	*c* 30% s.u.l.	adult *c* 18–30 yr.
136057	136056	inh. burial	MAS	*c* 10% a.l.	adult >30 yr. ??male
136060	136059	inh. burial	MAS	*c* 25% u.l.	adult >18 yr.
136063	136062	inh. burial	MAS	*c* 45%	adult >30 yr. male
136086	136085	inh. burial	MAS	*c* 40% a.u.l.	adult >45 yr. male
166033	166032	inh. burial	MAS	*c* 45%	adult *c* 20–30 yr. male
166036	166035	inh. burial	MAS	*c* 20% s.a.l.	juvenile *c* 8–10 yr.
166044	166043	inh. burial	MAS	*c* 55%	adult >50 yr. female
176044	176043	inh. burial	MAS	*c* 80%	adult *c* 25–35 yr. male
176046	176047	inh. burial	MAS	*c* 38%	adult >30 yr. female
176052	176053	inh burial	MAS	*c* 35%	adult >45 yr. female
176056	176055	inh. burial	MAS	*c* 80%	adult *c* 40–50 yr. female
220002	220001	inh. burial	MAS	*c* 45%	subadult *c* 15–17 yr. male

The mid-Saxon cemetery (Zone 14; 8th century) comprised 24 east-west aligned graves, arranged in fairly uniform rows amongst which there was only one case of intercutting (probably deliberate revisitation – graves 126057 and 126061) (Volume 1, Fig 5.56). No human remains were recovered from grave 166041. The overall impression is that of a more orderly cemetery layout, with sex and age (other than the exclusion of the very youngest) continuing to have little influence over grave location.

Despite the prolific number of known Saxon burial sites in Kent, there are relatively few osteological reports as many of the sites represent old finds with no osteological analysis or non-recovery/survival of the bone. This limits the amount and level of detail of local comparative data (Anderson and Andrews 1997, 214; 2008, 301-305; McKinley 2006b; 2009b; Mays and Anderson 1995, 381-2; Powers and Cullen 1987, 197-8; Powers 2006; Tester 1968, 128).

Demographic data

Minimum number of individuals (MNI)

A minimum of 79 individuals (MNI) were identified from the Saxon human bone assemblage, amounting to 34.2% of the entire unburnt human bone assemblage. The majority (69.6%) has been assigned to the early Saxon period (Zone 19), with the remainder designated as mid-Saxon (30.4%; Zone 14) (Table 13.25). A small quantity of redeposited bone was recovered from grave backfills and a pit, with a single additional individual identified in each phase (an unsexed subadult *c* 13-17 yr. and an infant *c* 1.5-3 yr.). At least 12 early and two mid-Saxon graves had been disturbed, probably revisited, and the remains of at least two burials were in such poor condition (presumably because disturbance had adversely affected the burial environment) that in some cases it was not clear whether or not the bones represented *in situ* burials (see Volume 1, chapter 5).

Age and sex

Most of the Saxon remains comprise those of adults (797%) across the age-range. There are similar proportions of adults <30 years and >45 years (23.8% and 22.2%), with the majority of adults falling within the 30-45 years old age range (38.1%), as seen in the Roman period. This general pattern holds for the sub-phases and zones, and follows the trend seen elsewhere (McKinley 2006, 16; 2009b). Comparable proportions of males and females are represented in the young adult range (21.8% and 21.2% respectively), whilst more females than males died in the *c* 30-45 year group (48.5% and 39.1% respectively), with fewer of the former surviving into older adulthood (33.3% and 39.1%). In the early Saxon phase proportionally more males lived past *c* 45 years than did females (38.5% and 11.5%), whereas only 10% of mid-Saxon phase males and 57.1% of females did the same. This disparity may actually reflect mid-Saxon phase males dying younger, or that older males were being buried elsewhere; however it may be a result of the relatively small sample size of the mid-Saxon group.

Adults comprised 53.1% females, 35.9% males and 10.9% unsexed. A notable preponderance of females is apparent only in the early Saxon phase assemblage where the female to male ratio is 2:1 (60.4% and 30.2%), whereas only 35% of the mid-Saxon phase adults are designated as female, and 50.0% as male. Unlike the Roman assemblage, there are no cremated remains to rectify the apparent imbalances. A similar disproportion was noted at Ringlemere and Orpington (McKinley 2004, table 3; 2009b). Conversely at Wrotham and Saltwood (Kent), males outnumbered females by approximately 3:1 (Egging Dinwiddy in prep.; McKinley 2006,

Pathology
ante mortem tooth loss; periosteal new bone – tibiae; ddd – C3-4; osteoarthritis – C3-4; op – C5 (bsm); mv – wormian bones, congenital absence M3
ante mortem tooth loss; apical void; calculus; dental caries; impaction; periodontal disease; Schmorl's – T5, L3-4; osteoarthritis – T10; op – right knee; pitting – 5T apj, left hip; enthesophytes – right innominate; mv – wormian bones, palatine tori, T13
op – left rib; pitting – right temporo-mandibular joint; mv – wormian bones
calculus; dental caries; periodontal disease; ddd – S1; osteoarthritis – L5, S1; pitting – hips; mv – bipartite canine root
hypoplasia
op – L apj; periosteal new bone – femur shaft; exostoses – 1L apj
periosteal new bone– left tibia
calculus; dental caries; hypoplasia; periodontal disease; enthesophytes – left humerus; mv –wormian bones, mandibular torus
osteoarthritis – 1L, hips; op - L apj, wrists, right hip, knees, left ankle; enthesophytes – calcanea
calculus; dental caries; hypoplasia; periodontal disease; mv – congenital absence M3
hypoplasia; *cribra orbitalia*; mv – variant I2 & canine
ante mortem tooth loss; apical void; dental caries; op – right hip, knees; pitting – right temporo-mandibular joint; enthesophytes – patellae; mv – wormian bones, mandibular torus
ante mortem tooth loss; apical voids; calculus; dental caries; periodontal disease; hyper-eruption; *cribra orbitalia*; pitting – right s-c; mv – wormian bones
ante mortem tooth loss; apical void; dental caries; hypoplasia; periodontal disease; endocranial new bone; op – C1; pitting – right temporo-mandibular; mv – variant M2, palatine tori
apical voids; hyper-eruption; op – C2
ante mortem tooth loss; apical voids; calculus; dental caries; periodontal disease; ivory osteoma – mandible; ?cyst – C1; ddd – C5-6, L5, S1; osteoarthritis – T12 & 3L apj, right wrist; op –T9-10 & S1 apj, T10 (tp), right knee; pitting – temporo-mandibular joints, hips; cortical defect – right distal femur; mv – palatine tori
calculus; hypoplasia; impaction; periodontal disease

Table 13.24 (continued)

Context	Cut	Deposit type	Phase	Quantification	Age/sex
223006	223004	inh. burial	MAS	*c* 8% u.l.	adult >18 yr. ??male
223009a	223007	inh. burial	MAS	*c* 15% s.u.l.	adult >18 yr.
223009b	223007	R (grave)	MAS	frag. + teeth s.a.	infant c 1.5–3 yr.
223012	223010	inh. burial	MAS	*c* 70% s.u.l.	adult *c* 20–30 yr. male
223015	223013	inh. burial	MAS	*c* 32%	adult >35 yr.
223031	223033	inh. burial	MAS	*c* 60%	adult *c* 25–35 yr. ?female
Zone 19					
126055	126054	inh. burial	EAS	*c* 65%	adult *c* 18–23 yr. female
126092	126091	inh. burial	EAS	*c* 55%	juvenile c 9–10 yr.
126184	126183	?inh. burial	EAS	*c* 2% u.l.	subadult *c* 13–17 yr.
126215	126214	inh. burial	EAS	*c* 90%	adult *c* 35–45 yr. female
136108	136109	inh. burial	EAS	*c* 45%	infant *c* 1.5–2 yr.
136112 = 136114	136111	inh. burial	EAS	shaft + frags. u.	juvenile/subadult <16 yr.
136113	136111	inh. burial (triple)	EAS	*c* 85%	adult *c* 18–25 yr. female
136114	136111	inh burial (triple)	EAS	*c* 45%	subadult *c* 14–16 yr. ??male
136115	136111	inh. burial (triple)	EAS	*c* 35%	juvenile *c* 10–12 yr.
136151	136150	inh. burial	EAS	*c* 90%	juvenile *c* 6.5–8 yr. ??female
137216	137217	coffined burial	EAS	shaft + frags. l.	adult >18 yr. ??female
153033	153034	inh. burial	EAS	*c* 95%	adult *c* 40–45 yr. female
153057	153058	inh. burial	EAS	*c* 95%	adult *c* 35–45 yr. male
153077	153075	inh. burial	EAS	*c* 60%	adult *c* 35–45 yr. female
153086	153084	inh. burial	EAS	*c* 3% s.u.l.	adult >45 yr.
153093	153092	inh. burial	EAS	*c* 35%	juvenile *c* 7–9 yr.
166103	166102	coffined burial	EAS	*c* 30%	adult *c* 30–40 yr. male
166106	166105	inh. burial	EAS	*c* 45% a.u.l.	adult *c* 35–45 yr. female
166117	166116	inh. burial	EAS	*c* 98%	adult *c* 30–35 yr. female
166126	166125	inh. burial	EAS	*c* 75%	infant *c* 1–2 yr.
166142	166141	inh. burial	EAS	*c* 8% s.u.l.	adult *c* 20–35 yr.
171170	171168	inh. burial	EAS	*c* 25%	adult *c* 30–40 yr. female
189176	189174	inh. burial	EAS	*c* 5% s.u.l.	adult *c* 25–35 yr.
189179/80	189181	inh. burial	EAS	*c* 20%	adult >35 yr. ?female
205114	205112	inh. burial	EAS	shaft + frags. a.l.	infant *c* 0.5–1.5 yr.
205117	205115	inh. burial	EAS	*c* 98%	adult *c* 40–50 yr. female
209244	209243	coffined burial	EAS	*c* 98%	adult *c* 40–50 yr. male
216005	216004	inh. burial	EAS	*c* 10% a.u.l.	adult >18 yr. ??female
217136	217135	inh. burial	EAS	<20 frags. ?l.	subadult/adult >13 yr.
218205	218206	inh. burial (stacked; disturbed)	EAS	*c* 60%	adult *c* 30–35 yr. male
218207	218206	inh. burial (stacked)	EAS	*c* 25%	adult >45 yr. female
220012	220011	inh. burial	EAS	*c* 40%	adult *c* 25–35 yr. ?female
220096-98	220095	inh. burial	EAS	*c* 45%	adult *c* 30–40 yr. female
220110	220109	inh. burial	EAS	*c* 85%	adult *c* 30–40 yr. female
220134	220133	inh. burial	EAS	*c* 50%	adult *c* 35–45 yr. female
228045	228044	inh. burial	EAS	*c* 90%	adult *c* 25–35 yr. female

Pathology
pitting – right knee; enthesophytes – right patella
ante mortem tooth loss; calculus; dental caries; hypoplasia; periodontal disease; fracture – left distal tibia; periosteal new bone – left distal femur & patella; op – left knee; cortical defect – right distal tibia, left tarsals; mv – variant M3
ante mortem tooth loss; calculus; dental caries; hypoplasia; rickets –femora, tibiae; ?periosteal new bone – left tibia
calculus; dental caries; hypoplasia; periodontal disease

calculus; *coxa vara*; Schmorl's – T8-12, L1-2; ddd – 9T; op – T5-6 apj; pitting – T5 & 7 apj; mv – partly lumbarised T11-12 & S1
calculus; periosteal new bone – temporo-mandibular joints; mv – shovelled Is

ante mortem tooth loss; apical void; calculus; dental caries; hypoplasia; hypercementosis; periodontal disease; Schmorl's – L1; ddd – L1-2, L4; osteoarthritis – 4 left & 4 right ribs, right hip; op – 2L & S1 apj, T5-8 & 12 bsm, T1 c-v, T2-3 tp, 2 left ribs, left 1st MtT-P, right tarsal; pitting – L3-4 apj, right shoulder, left hip; enthesophytes – calcanea; mv – wormian bones

calculus; dental caries; hypoplasia; periodontal disease; cortical defect – 1st proximal phalanx (right foot); mv – wormian bones
calculus; hypoplasia; impaction; periodontal disease; cortical defect – left clavicle, humeri; mv – variant I, wormian bones
calculus; dental caries; hypoplasia; hypervascularity – occipital & parietals; mv – wormian bones, metopic suture
calculus; dental caries; hypoplasia; *cribra orbitalia*; mv – variant M2, wormian bones, L6

ante mortem tooth loss; apical void; calculus; dental caries; periodontal disease; *cribra orbitalia*; periosteal new bone – mandible, maxilla; secondary sinusitis; rickets – left ulna; Schmorl's – T6-12, L1-2; ddd – L3; osteoarthritis – L5 & S1, hips; op – C1-2 anterior facets, T11/L4-5/S1 apj, 3T/4L/S1 bsm, T10-12 c-v, T9-10 tp, 2 left ribs, left s-c & shoulder, elbows, right wrist & hip, knees; pitting – 7T apj, temporo-mandibular joints; enthesophytes – innominates, calcanea; ossified cartilage – thyroid; mv – *os acromiale*, metopic suture, occipital sutures, wormian bones
ante mortem tooth loss; dental abscess; calculus; periodontal disease; hyper-eruption; Schmorl's – T6-12, L4; ddd – C6-7, T10-12; osteoarthritis – right 2nd IP (distal), right wrist; op – C1 anterior facet, 1C/1T/2L apj, 1C/6T/5L bsm, T1 & 10-12 c-v; 3T tp, 2 left & 3 right ribs, s-cs, left a-c & wrist, elbows; pitting – C4 & T6 apj, T5-7 c-v, s-cs, a-cs; enthesophytes – innominates, legs, calcanea; ossified cartilage – thyroid, rib; mv – wormian bones, palatine tori
calculus; dental caries; periodontal disease; *cribra orbitalia*; rickets –femora; Schmorl's – T7-10; op – C1 anterior facet, T11 c-v; pitting – C1 anterior facet; enthesophytes – pelvis (?parturition)
calculus; hypercementosis; op – C1 anterior facet
calculus; hypoplasia
calculus; hypoplasia; impaction; mv – variant P1s

calculus; dental caries; hypoplasia; periodontal disease; Schmorl's – T11; osteoarthritis – T9-10, right sacro-iliac; op – C1 anterior facet, C6 & L4-5 apj, T7 c-v, 5T tp, 4 left & 3 right ribs; pitting – C4 & T5 apj; mv –wormian bones, mandibular torus, non-fusion – C2 lamina, lumbarised left S1 & severe asymmetry
hypoplasia; *cribra orbitalia*
calculus
calculus
hypoplasia; mv – enamel pearl
osteoporosis; osteoarthritis – right 1st C-MtC & MtC-P; op – L apj, 3 right distal IPs (hands); mv – variant right capitate

ante mortem tooth loss; calculus; dental caries; hypoplasia; periodontal disease; *cribra orbitalia*; ddd – C6-7; osteoarthritis – T1 c-v, T3-12, L4; op – T6-7 apj, T11 c-v, T8 tp, 5 left & 6 right ribs, right hip; pitting – T12 c-v, temporo-mandibular joints, 5 left & 6 right ribs, right s-c, shoulder & hip; mv – palatine torus
ante mortem tooth loss; apical void; calculus; dental caries; periodontal disease; Schmorl's – T6-12, L1-4; ddd – C4-7, T5-12, L1-4; osteoarthritis – T3 & 11; op – C1-2 anterior facets, 1C/8T/2L apj, 2C/2T/1L bsm, 5T tp, 4 left ribs, left a-c, elbow & 1st MtC-P, hips, knees, right wrist & 1st MtT-P; mv – wormian bones, mandibular torus, atlas bridging

calculus; dental caries; enamel hypoplasia; Schmorl's – 4T; ddd – 4T, 2L; op – T tp, left rib; mv –wormian bones

ante mortem tooth loss; dental caries; hyper-eruption; infection – maxilla; pitting – left temporo-mandibular joint; mv – Vastus notches
calculus; dental caries; hypoplasia; mv – variant Is & canine
calculus; hypoplasia; periodontal disease; Schmorl's – 5T; ddd – C3-5, 8T; op – C1-2 anterior facet; mv – variant canine

ante mortem tooth loss; apical void; calculus; dental caries; hypoplasia; periodontal disease; fracture – left 6th rib
Schmorl's – L2-3; plastic changes– T3-4; pitting – T2-6 apj, right s-c; mv – metopic suture
apical void; calculus; dental caries; hypoplasia; periodontal disease; blunt weapon trauma – skull; infection – maxilla; ddd – S1; op – C3 & S1 apj; mv – wormian bones
calculus; hypoplasia; periodontal disease; Schmorl's – 4T, L1-4; osteoarthritis – T1; op – 1C, T12 apj, 2T tp; pitting – T11 apj, T1 c-v; mv – variant I2s & M3

Table 13.24 (continued)

Context	*Cut*	*Deposit type*	*Phase*	*Quantification*	*Age/sex*
250052a	250050	inh. burial (stacked)	EAS	*c* 15% s.u.l.	adult >45 yr. ?male
250052b = 250054	250050	R	EAS	*c* 10% l.	adult >18 yr.
250054	250050	inh. burial(stacked)	EAS	*c* 25%	adult >50 yr. male
251046	251044	inh. burial	EAS	*c* 99%	adult *c* 18–23 yr. male
251062	251061	inh. burial	EAS	*c* 65%	adult *c* 30-40 yr. male
252075	252076	inh. burial (stacked)	EAS	*c* 30%	adult >55 yr. male
252079	252076	inh. burial (stacked)	EAS	*c* 40%	adult *c* 25–35 yr. female
257020	257021	inh. burial	EAS	teeth + frags. s.	infant *c* 2.5–3.5 yr.
266019	266018	inh. burial (double)	EAS	*c* 60%	subadult *c* 14–16 yr. male
266020	268018	inh. burial (double)	EAS	*c* 70%	adult *c* 30-40 yr. female
267025	267026	inh. burial	EAS	*c* 90%	adult *c* 35-45 yr. female
267033	267034	?R (pit)	EAS	*c* 17 frags.	?
267071	267072	coffined burial	EAS	*c* 15% s.a.l.	adult *c* 25–35 yr. ?female
275004	275002	inh. burial	EAS	*c* 30% s.u.l.	adult >18 yr. ??female
279037	279039	inh. burial	EAS	*c* 85%	adult *c* 45–55 yr. female
280023	280022	coffined burial	EAS	*c* 15%	adult >45 yr. female
282016	282014	?inh. burial	EAS	u/id frags.	?
286011	286016	inh. burial	EAS	*c* 5% s.u.l.	adult *c* 20–30 yr. ?male
286015	286013	?inh. burial	EAS	*c* 5% s.	adult >18 yr. ?male

Key: s.a.u.l. - skull, axial skeleton, upper limb, lower limb (skeletal areas represented where not all are present); op - osteophytes; ddd - degenerative disc disease; o.c. dessicans - osteochondritis dessicans; sbc - solitary bone cyst; mv - morphological variation; bsm - body surface margins; C/T/L/S - cervical/thoracic/lumbar/sacral vertebrae, MtC/MtT - metacarpal/tarsal; MtC/T-P - metacarpal/tarsal - phalangeal joint; IP - interphalangeal joint; apj - articular processes (vertebrae); tp- transverse process (vertebra); c-v - costo-vertebral; a-c - acromio-clavicular; s-c - sterno-clavicular; p-d proximal-distal; u/id – unidentifiable; R – redeposited

Table 13.25 Saxon (unburnt) summary of age and sex, and by sub-phase

			Total
Immature			
infant *c* 6 mth. – 2 yr	3		3
infant *c* 2-4 yr.	1	1	2
juvenile *c* 5-12 yr		1	1
juvenile <10 yr.	3 (1??F)	1	4 (1??F)
juvenile >10 yr.	1	-	1
juvenile/subadult <16 yr	1	-	1
subadult *c* 13-17 yr	3 (1M, 1??M)	1	4 (1M, 1??M)
Total	12 (1F, 2M)	4	16 (1F, 2M)
Adult			
adult *c* 18-25 yr.	4 (2F, 1M, 1?M)	1	5 (2F, 1M, 1?M)
adult *c* 20-30 yr.	1	1 (M)	2 (1M)
adult *c* 25-35 yr.	5 (2F, 2?F)	3 (1?F, 2M)	8 (2F, 3??F, 2M)
adult >30 yr.	1 (?F)	5 (1F, 2M, 1?M, 1??M)	6 (1F, 1?F, 2M, 1?M, 1??M)
adult *c* 30-40 yr.	8 (5F, 3M)		8 (5F, 3M)
adult *c* 35-45 yr.	7 (6F, 1M)		7 (6F, 1M)
adult *c* 40-50 yr.	2 (1F, 1M)	1 (F)	3 (2F, 1M)
adult >45 yr.	8 (3F, 1?F, 2M, 1?M)	4 (3F, 1M)	12 (6F, 1?F, 3M, 1?M)
adult >50 yr.	2 (2M)	1 (F)	3 (1F, 2M)
adult >18 yr.	5 (3??F, 1?M)	4 (2??M)	9 (3??F, 1?M, 2??M)
Total	43 (26F, 13M)	20 (7F, 10M)	63 (33F, 23M)
Overall total	55 (27F, 15M)	24 (7F, 10M)	79 (34F, 25M)

Pathology

ante mortem tooth loss; apical void; osteoarthritis – right glenoid; op – right hip & 1st MtT-P; pitting – left hip

calculus; hypoplasia; *cribra orbitalia*; Schmorl's – T7-12, L4-5; cortical defect – costo-claviculars; mv – shovelled I2, metopic suture, wormian bones

calculus; dislocation – right distal radius/ulna; Schmorl's – T6-12, 5L; ddd – C5-7, T7-12, 4L, S1; op – C1 anterior facet, C2/T12/L4-5 apj, T5-6 bsm, T1 & 12 c-v, T11 tp, left rib & sacro-iliac, right wrist, left tarsal; pitting – left s-c & hip, right shoulder; mv –Vastus notch

osteoporosis; ankylosis/?fracture – right hip; dislocation – right distal radius/ulna; op – right sacro-iliac; pitting – right wrist

calculus; hypoplasia

hypoplasia

calculus; hypoplasia

calculus; hypoplasia; *cribra orbitalia*; Schmorl's – T10; op – C1-2 anterior facet, T9&11 tp; pitting – T1 c-v; mv – variant M3, wormian bones, palatine torus

calculus; dental caries; hypoplasia; periodontal disease; osteoporosis/osetopaenia; ddd – L5-S1; osteoarthritis – C1-2 anterior facet, T1 & 11-12 c-v, 6 left & 4 right ribs; op – C6 bsm, T1 & L1-5 apj, T2-3 tp, left knee; pitting – C5-6 apj, T5 c-v, left temporo-mandibular joint; mv – wormian bones

calculus; hypoplasia

calculus; hypoplasia

ante mortem tooth loss; apical void; calculus; dental caries; hypoplasia; hypercementosis; hyper-eruption; periodontal disease; osteoporosis; *cribra orbitalia*; infection – maxilla; Schmorl's – T5-7 & 11-12; ddd – C6-7, T12, 3L, S1; osteoarthritis – L4, 1 rib; op – C1 anterior facet, 2T & 2L apj, 1T tp, 4 right ribs, shoulders, left wrist, hands, right hip, knees; pitting – C3 & T4 apj, T4 & 11 c-v, temporo-mandibular joints, left s-c, right a-c; mv – atlas bridging, palatine tori

hypoplasia; mv – wormian bones

15), whilst fairly equal proportions were recorded in the assemblages from Finglesham, Kent (Grainger *et al* 2006, 324-5, fig 3.2), and Cuxton (McKinley 2006, 52).

Immature individuals comprise 20.3% of the assemblage, with proportionally fewer recovered from the mid-Saxon compared to the early Saxon phase (16.7% and 21.8% respectively). Neonatal remains were absent, and no infants less than *c* 2 yr. were recovered from the mid-Saxon cemetery. Grainger *et al* (2006, 323-4) reported a similar rate of immature individuals (18.4%) for the 6th–8th-century cemetery at Finglesham, none of which were below the age of *c* 18 months, though several of the 'empty' graves may have once held the remains of immature individuals, something also suggested by McKinley for the early Saxon mixed-rite cemetery at Ringlemere, Kent (2009b). Grainger *et al* (2006) calculated an average rate of 21% immature individuals from their sample of eight Saxon cemetery assemblages from Kent (*ibid*, 325, table 3.3), a figure also reached by Anderson and Andrews (1997, table 18). Slightly higher proportions of immature individuals were recorded in the assemblages from 6th–7th century Saltwood (24%) and 7th-century Cuxton (30%), both in Kent (McKinley 2006, 15).

The rates, as in many archaeological assemblages, are somewhat lower than one would expect for a 'normal' population. The early Saxon phase cemetery was only partially revealed and it may be that a greater proportion of younger individuals lie beyond the excavation area. However, the same cannot be said of the mid-Saxon phase cemetery, which was fully excavated. The demographic proportions may be indicative of genuine cultural factors at work. Mays and Anderson (1995) felt that neonates may have been deliberately excluded from cemeteries of this date in Kent, and the absence of any such young individuals from this part of the EKA2 assemblage is further highlighted by their presence in both the Iron Age and Roman groups. It may be that the immature members of the community were afforded different burial rites, or alternatively the apparent shortage of males resulted in lower fertility rates (McKinley 2009b).

Skeletal indices

A summary of the indices it was possible to calculate for all the Saxon material is given in Table 13.26. Further details are held in the archive. See the Bronze Age section (above) for the definitions of terminology used.

Estimated stature

It was possible to estimate the stature of 27 adults (42.8%; 51.2% early Saxon, 25.0% mid-Saxon) comprising 17 females (51.2%; 57.7% early Saxon, 28.6% mid-Saxon) and 10 males (43.5%; 53.8% early Saxon, 30.0% mid-Saxon). Broad ranges and fairly large standard deviations were calculated for both sexes. This pattern holds true for most phase/sex combinations, except the mid-Saxon males, where the range was notably tight (1.79-1.82m). Like their Roman counterparts, the EKA2 Saxon males were tall, especially within the mid-Saxon group (average 1.80m). The early Saxon phase males, like those from Finglesham and Great

Table 13.26 Summary of the major indices

	Female			Male		
	Number	*Range*	*Mean*	*Number*	*Range*	*Mean*
estimated stature	17	1.52-1.75m (*c* 5'0"- 5'9")	1.61m (SD 0.06m) (*c* 5'3 ½")	10	1.64-1.82m (*c* 5'4 ¾"- 5'11 ¾")	1.76m (SD 0.06m) (*c* 5'9 ¼")
cranial index	7	64.89-79.41 (dolicho-mesocrany)	72.88 (SD 5.18) (dolichocrany)	3	75.00-78.07 (mesocrany)	76.26 (SD 1.61) (mesocrany)
platymeric index	13	70.22-94.35 (platy-eurymeric)	82.15 (SD 7.78) (platymeric)	11	71.56-93.05 (platy-eurymeric)	82.63 (SD 6.70) (platymeric)
platycnemic index	15	61.44-96.68 (meso-eurycnemic)	76.68 (SD 7.44) (eurycnemic)	14	60.27-83.68 (platy-eurycnemic)	68.35 (SD 5.34) (mesocnemic)
robusticity index	10	109.73-137.80	123.21	9	108.76-139.06	128.05 (SD 9.78)
brachial index	3	73.87-75.75	74.87 (SD 0.95)	4	73.19-75.42	74.59 (SD 0.98)
crural index	10	76.58-82.74	79.69 (SD 3.08)	4	77.55-88.68	81.80 (SD 5.10)
intermembral index	3	67.07-73.74	70.41 (SD 3.37)	3	66.78-70.13	69.01 (SD 1.93)

Key: brachial index (radius L x 100/humerus L); crural index (tibia L x 100/femur L); intermembral index (radius + humerus L x 100/tibia + femur L).

Crossroads, Kent, were on average a little shorter (1.74m; Grainger *et al* 2006, 325, table 3.4; Andrews and Anderson 2008, 301); however, these still exceed Roberts and Cox's 1.72m average from their sample (2003, 220). The female average stature matches that given by Roberts and Cox and the female from Great Crossroads (*ibid*; Andrews and Anderson 2008, 302), showing a small increase from the previous period, though two females (267025 (Early) and 176056 (Mid) were close to the male average in stature at 1.75m and 1.72m respectively. At Cuxton the average male stature matches that calculated for EKA2, whilst the females are slightly taller (1.63m; McKinley 2006, 17).

The data imply a continued rise in average stature following the decrease in the Iron Age. Attainment of average or greater stature implies adequate access to meat and nutrition though other factors may include a constitution better adapted to utilising available resources.

Cranial index

It was possible to calculate the cranial index for only 10 adults, all early Saxon (15.9% all; 23.3% early). The indices determined the cranial shape of three males (23.1%) and seven females (26.9%), the latter being on average long-headed and the former of medium proportions. Such a trend towards dolichocrany in the Saxon period was noted by Marlow (1992, 114), though the Cuxton female was mesocranic (McKinley 2006, 17). Compared to the generally mesocranic Roman adults, there is an apparent shift towards long-headedness in the females. However, the sample sizes are too small to allow meaningful comment.

Non-cranial indices

The platymeric index was recorded for 24 (38.1%) individuals, 16 from the early Saxon phase (37.2%) and eight from the Middle (40%). The femora of eleven males (47.8%) include six pairs, and the femora of 13 females (39.4%) include 11 pairs. Both sexes had femora ranging between flattened and broad, the averages falling within the flattened (platymeric) range. The early Saxon indices remain broad in range, and on average platymeric, this being true of both sexes. Though the ranges remain broad, the average mid-Saxon indices are within the eurymeric range. When both femora were present phase differences were distinct. In the early Saxon phase femora differences between the sides of up to *c* 19 points in the males and *c* 21 points in the females were noted, with several over *c* 5 points. In most cases the right femur scored higher (broader) than the left; the pattern was less consistent in the females. In contrast much smaller differences (5 or less) are evident in the mid-Saxon phase pairs. Higher scores were more common in the left male and right female femora. Anderson and Andrews (1997, table 22; 2008, 302) illustrate a tendency towards platymeria in many contemporaneous Kentish assemblages, something repeated in the Cuxton, Saltwood and Cottington Lane material (McKinley 2006, 17; 2009a, 9, table HB4). The general categories of femoral shaft shape compare well with those in the Roman assemblage, but the range of Saxon scores was greater, while the lateral divergence was generally less extensive in the earlier period.

The platycnemic index was calculated for 29 individuals (46.0%), 15 female (45.5%) and 14 (60.9%) male, with eleven pairs observable for each. Most individuals with measurable tibiae are assigned to the early Saxon period, and the remainder to the mid-Saxon phase. The male range is greater, with examples from flattened to broad, whilst the female tibiae range between medium and broad. In both phases the average male score falls into the mesocnemic (medium) category, and the female scores into the broad (eurycnemic). Where both tibiae are present side biases are generally small. The two examples of large divergence (12 points in a male and seven points in a female) occur in the early Saxon assemblage, where the left side tends (inconsistently) to score more frequently in the males and the right in the females. No correspon-ding pattern is apparent in the mid-Saxons. Most comparative examples from the region are eurycnemic (McKinley 2006, 17; Anderson and Andrews 1997, table 22), but the mid-Saxon male from nearby Cottington Lane was mesocnemic in keeping with the

EKA2 males (McKinley 2009a, 9, table HB4). The Roman male tibiae are generally broader than those of the Saxon males.

The robusticity index was calculated for 19 (24.2%) adults, comprising ten females (30.3%) and nine males (39.1%). Overall the ranges were similar for both sexes, with a slightly less robust average female score. In the early Saxon assemblage the ranges remained broad, though most of the males scored towards the more robust end of the scale. In the mid-Saxon phase material the robusticity ranges of the sexes did not overlap, but the femora were only measurable for three individuals in this group, precluding further comment. The tallest male and female (251046 and 267025) were also the least robust of the group, whilst the most robust female (220137) fell towards the shorter end of the stature estimate range. Lateral differences are similar between the phases, though there is no pattern of preference. Average robusticity scores are similar in the Roman and Saxon assemblages, though the later femora show a greater range of scores.

The robusticity data indicate an increase in uneven biomechanical stresses on the legs from the Roman period, demonstrated most clearly in the early Saxon femora, whilst there is a generalised narrowing of the tibiae. These probably reflect some changes in everyday activities, or the way in which they are undertaken. The lengthening of robusticity ranges and the increase in statures may indicate the presence of new 'stock' within the population. That being said, other factors such as access to resources and the ability to make better use of them may also be relevant (see above).

Pathology

Many of the lesions and conditions recorded for the Saxon populations are common to earlier assemblages. To minimise repetition, the reader is referred to previous sections in this report for their background. The basic data relating to the Saxon material are presented, together with rates (TPRs), comparative contemporaneous data, and any applicable discussion related to conditions not observed in the earlier assemblages.

Where possible there will be some comparisons between the two subphases/locations. It is important to note, however, that the mid-Saxon phase sample is rather small, whilst the early Saxon phase material represents only a proportion of the total number of individuals buried in the cemeteries in Zone 19.

Dental disease

All or parts of 60 permanent erupted dentitions were recorded (32 female, 21 male, seven unsexed). Five deciduous dentitions are also present (Tables 13.27–28).

Deposits of calculus, manifest as slight to moderate (occasionally green) 'tidemarks' at the gumline, were observed in 46 permanent dentitions (76.7%), comprising those of 25 females (78.1%), 16 males (76.2%) and five unsexed individuals (71.4%) (Table 13.29). These rates are not dissimilar to those of the preceding period; however, when phase/zone is considered, the rate drops to 65.9% of dentitions in the early Saxon phase and increases to 88.2% of dentitions in the mid-Saxon phase. The early Saxon phase females were more prone to the condition (91.3% as opposed to 71.4%), whereas in the mid-Saxon phase the males were significantly more affected (85.7% as opposed to 44.4%). By contrast with the Roman pattern, deposits were manifest and regularly distributed on most tooth types – the least affected being the maxillary first incisors and third molars. The overall TPR is comparable to that seen in the Wrotham assemblage (46.1%; Egging Dinwiddy forthcoming), and slightly greater than the 39.2% calculated by Roberts and Cox from their contemporaneous sample (2003, 194, table 4.17). A very high rate was seen in the dentitions from Cuxton (63%), whilst the lower rates from Saltwood (20.8%) and Mill Hill (22.4%) may be the result of poor preservation (McKinley 2006, table 3).

Mild-moderate periodontal disease (gingivitis) had affected the alveolar margins of between one and 27 teeth in 26 (43.3%) adult dentitions – 18 female

Table 13.27 Summary of individual dentitions by phase and sex (NB includes all sexing confidence levels)

Phase	*Permanent dentitions*									*Deciduous dentitions*	
	Female			*Male*			*Unsexed*				
	man.	max.	both	man.	max.	both	man.	both	max.	max.	both
		1	22	1	2	11	1	5	1	1	3
	1		8			7		1			1
Total	1	1	30	1	2	18	1	6	1	1	4

Key: Phase divisions as shown in Table 13.25; man. – mandibular; max. – maxillary

Table 13.28 Summary of permanent erupted dentitions by sex (NB includes all sexing confidence levels)

	Max. teeth	*Man. teeth*	*Total no. teeth*	*Max. tooth positions*	*Man. tooth positions*	*Total no. tooth positions*
female	316	316	632	296	315	611
male	175	178	353	148	189	337
unsexed	40	44	84	6	12	18
Total	531	538	1069	450	516	966

Table 13.29 Summary of dental lesions (permanent erupted dentitions) by sex (NB rates shown are true prevalence rates (TPR); includes all sexing confidence levels)

	Calculus	Ante mortem *tooth loss*	*Caries*	*Abscess**	*Hypoplasia*
female	T 356 (149 max.; 207 man.) Rate: 56.3%	T 40 (16 max.; 24 man.) Rate: 6.5%	T 72 (39 max.; 33 man.) Rate: 11.4%	T 21 (16 max.; 10 man.) Rate: 3.4%	T 98 (55 max.; 43 man.) Rate: 15.5%
male	T 168 (72 max.; 95 man.) Rate: 47.6%	T 51 (14 max.; 37 man.) Rate: 15.1%	T 32 (13 max.; 19 man.) Rate: 9.1%	T 11 (8 max.; 3 man.) Rate: 3.3%	T 33 (11 max.; 22 man.) Rate: 9.3%
unsexed	T 17 (6 max.; 11 man.) Rate: 20.2%	-	T 1 (1 man.) Rate: 16.7%	-	T 17 (12 max.; 5 man.) Rate: 20.2%
Total	T 541 (227 max.; 313 man.) Rate: 50.6%	T 91 (31 max.; 63 man.) Rate: 9.4%	T 105 (55 max.; 58 man.) Rate: 9.8%	T 32 (24 max.; 13 man.) Rate: 3.3%	T 148 (78 max.; 70 man.) Rate: 13.8%

(56.3%) and 9 male (42.9%). The Saxon CPR is very similar to that of the preceding period, though in the Roman males the condition was substantially more common (and in the females far less frequent), and the range of severity was greater. The pattern of lower rates in the male dentitions is found in the early Saxon assemblage (60.9% females and 35.7% males), but in the mid-Saxon phase material the distribution is more or less even (55.6% female and 57.1% male), as was also the case in the Iron Age material. The EKA2 TPR (22.3%) is slightly lower than that recorded at Wrotham (29.7%; Egging Dinwiddy forthcoming), whilst the rates from Saltwood, Cuxton and Mill Hill are significantly lower at 2.5%, 2.1% and 4.2% respectively (McKinley 2006, table 3), though these are most likely a relic of poor preservation.

Ante mortem tooth loss was apparent in from one to 11 tooth positions in 20 adult dentitions (33.3%); 11 female (34.4%) and 9 male (42.9%) (Table 13.29). Tooth loss was more common in the mid-Saxon than in the earlier phase. The fairly equal division between males and females in the Roman and early Saxon material gives way to a slight preponderance of tooth loss in males in the mid-Saxon phase. However, the highest frequency occurs in the dentitions of two early Saxon phase older adult males (250054 and 209244). The age-related link to the frequency of the condition is apparent in both sexes and phases. Mandibular teeth were more frequently affected, with the mandibular first molars most and canines least affected. The overall TPR is reduced from that of the Roman, and is marginally above the period average given by Roberts and Cox (8%; 2003, 192, table 4.16). Rates from contemporaneous assemblages from the region include 4.9% (Wrotham; Egging Dinwiddy forthcoming); 5.5% (Mill Hill) and 3.4% (Saltwood) (McKinley 2006, table 3); the Cuxton rate is somewhat higher (13.8%; *ibid*), similar to that from Great Crossroads (12%; Andrews and Anderson 2008, 302).

Dental caries were recorded in from one to eight permanent teeth in 30 (50.0%) dentitions, 20 female (62.5%), nine male (42.9%), and one unsexed (14.3%) (Table 13. 29). A lesion was observed in a single deciduous molar. The lower rates for males are a result of substantially fewer lesions in the early Saxon male dentitions (28.6% of male dentitions, compared to 65.2% female), a large reduction from the previous period. However, the mid-Saxon rates are more consistent with the Roman, with slightly more males affected than females (71.4% and 66.7% respectively). Two adult males *c* 25-35 years (one from each phase) had the highest number of carious lesions within a single male dentition (five), whereas the more usual age-related pattern held true in the females, with both highest frequencies (seven and eight) recorded in individuals over *c* 40 years. Where the origin of the lesion was visible, most occur interdentally, of which most are at the neck. 'Pinhole' caries were frequently observed in the molar fissure, and (particularly in the early Saxon phase females) on the buccal surface at the neck. The maxilla and mandible are fairly equally affected, and proportionally the most commonly affected teeth are the second and third molars, though mandibular first molars were more frequently lost *ante mortem*. There is quite a reduction in the TPR from the Roman period, but the Saxon rate is still more than twice that given by Roberts and Cox (4.2%; 2003, 191, table 4.14), and the Finglesham rate (5.66%; Grainger and Hawkes 2006, 329). The Wrotham rate (7.5%) is more comparable (Egging Dinwiddy forthcoming), while a much higher rate was seen in the teeth of the individuals from Great Crossroads (16.5%; Andrews and Anderson 2008, 302).

Destructive lesions in the supportive structures (apical voids/dental abscesses) were seen in 17 dentitions (28.%), 11 female (34.4%) and six male (28.6%) (Table 13.29). The proportion of affected dentitions remains more or less the same as that calculated for the Roman period. There is a distinct sex-based divergence in the rates in the two phase groups with a reduction from 35.7% to 14.3% of male dentitions and increasing from 26.1% to 55.5% of females dentitions. This may, however, be a reflection of the age ranges of the individuals, the mid-Saxon phase including more older females. The overall TPR is a little less than that for the preceding period, and a little higher than the average presented by Roberts and Cox for the period (2.8%; 2003, 192, table 4.15). There is little difference between the rates in maxillary and mandibular tooth locations, with molars proportionally more prone to lesions. All but one void could be interpreted as true dental abscesses, of which most had buccal openings and/or substantially reduced socket margins. Only one possible granuloma is apparent, though the spherical nature of several lesions implies an initial granuloma. Dental infections had spread onto the maxilla in five older adult females (all early Saxon), one of which has reactive changes manifest in the maxillary sinuses and mandibular body. The absence of dental infection in the mid-Saxon group may be a reflection of the relatively small sample size.

Slight to distinct horizontal lines of dental hypoplasia (see above) were recorded in the permanent tooth crowns of from one to 15 teeth in 35 permanent dentitions (58.3%); 19 female (59.4%), 11 male (52.4%) and one unsexed (14.3%) (Table 13.29). As is often the case, enamel flaws are most frequently seen in the canines and maxillary first incisors. In most cases the teeth had two or more defects (slight and moderate), representing periodic 'stress' episodes of differing intensity. The locations of the most severe lesions indicate poor health and/or nutrition during the third and fifth to sixth years. However, some defects formed around 18 months, whilst two teeth from a single deciduous dentition (early Saxon phase; 153093) had pit defects indicative of health issues from birth to *c* six months, probably related to the mother's health. Subsequent bouts of illness, conceivably owing to a weakened immune system, between this child's third and fifth years (indicated by defects on permanent dentition) may well have contributed to their death at *c* 7-9 years of age. Three individuals (one mid-Saxon phase male and two early Saxon phase females) show enamel production disruption in later childhood (*c* 10 years for the male, *c* 12 years for the females), two of which suffered previous episodes. The early Saxon females appear to have been under more stress than the males during childhood and into adolescence (69.6% and 50% respectively), whilst the opposite is true of the mid-Saxon phase (33.3% females and 57.1% males) and the Roman material. The overall rate is comparable to that calculated for the Wrotham assemblage (12.2%; Egging Dinwiddy forthcoming).

The rates show a reasonable reduction in all dental conditions from the Roman period, though they tend to be slightly greater than the averages for the period. The evidence suggests that in the early Saxon phase male offspring were favoured to some degree, for example provided with better quality, or a greater quantity, of food, whilst in the subsequent phase the provision for both girls and boys appears more balanced, with a decline in male childhood health and improvement in that of the females. There is a similar levelling out of male and female oral health in adulthood, which may also be related to diet. These patterns further exemplify socio-cultural changes between the early and mid-Saxon phases.

Non-masticatory tooth wear

Distinctive tooth wear patterns were noted in 43 dentitions (71.7%; 65.1% early Saxon, 88.2% mid-Saxon). Whilst the types of wear are similar to those seen in the Roman material (see above) some characteristics are more frequent and overt. Nearly all examples have a combination of wear types, the most common being palatal polishing of the anterior teeth (55.8% of all cases). Extreme and/or very irregular wear was noted in 51.2% of examples, whilst notches and buffing were observed in 32.6% and 30.2% respectively. For each wear type the rate was substantially higher in the early Saxon assemblage, with only palatal polishing present in similar proportions in both phases (57.1% early Saxon and 53.3% mid-Saxon). Similar frequencies of each pattern were seen in both sexes in both phases, with a slight-moderate tendency for females to have more notches and chips in the early Saxon phase, whilst in the mid-Saxon phase only one individual, a male had notched teeth. All characteristics except 'extreme wear' were seen in all adult age groups and three juveniles (136115, 136151 and 166036) had notched/worn canines.

Of the individuals with mandibular tori, 75% had probable non-masticatory tooth wear, whereas the link between palatine tori and non-masticatory tooth wear is weaker, with 57.1% having both. There is evidence for a nasopalatine cyst (see below), which may be related to trauma or blockage in the palate of an older male with extremely worn, polished and notched teeth; it is quite possible that the two anomalies are linked.

The overall rate of non-masticatory tooth wear is substantially greater than in the material from the preceding period, but it is not unusual for the Saxon period; for example 71.4% of dentitions in the 6th to 8th century assemblage from Twyford School had such wear (Egging Dinwiddy 2011, 103). However, both rates are almost twice that seen in the 5th to 7th century collection from Collingbourne Ducis, Wiltshire (37.5%; Egging Dinwiddy in prep.). Just over half the dentitions from the Wrotham Saxon cemetery had comparable tooth wear patterns (Egging Dinwiddy forthcoming), whilst preferential wear was observed on the anterior teeth of individuals from Saltwood (McKinley 2006, 22), and Mill Hill (Anderson and Andrews 1997, 236-7). Stuckert (2010, 135) suggests activity-related tooth use as a likely cause of heavy wear and palatal polishing on the anterior teeth in the Saxon assemblage from Blacknall Field, Pewsey, Wiltshire.

The evidence implies a sharp increase or change in the use of the teeth and jaws for non-masticatory tasks in the early Saxon period. Both sexes were involved in such undertakings, though the notching pattern suggests that more females were persistently holding fibres or narrow objects between their anterior teeth. Chipping and other damage was also more prevalent in the female dentitions and may reflect crushing, tearing or clasping harder/tougher materials (see above). In the mid-Saxon phase notching and buffing are evident in only one male dentition each, a decrease implying a marked change in tasks, and/or materials used, and/or the way in which tasks were executed, especially in the female population. Palatal polishing, extreme wear and chipping are present in the dentitions of both sexes in the mid-Saxon phase, indicating a continuation of tasks involving holding/drawing soft material between the front teeth (see above). It appears that in both phases some children began undertaking tasks that modified the teeth, probably working alongside the adults from around the age of six or seven years. As the wear patterns become more extreme with age, individuals probably continued in the activities throughout adulthood and into old age.

Metabolic conditions

Cribra orbitalia

Slight to moderate *cribra orbitalia* (see above) was seen in 19 orbits (34.5%); 11 female (31.4%), six male (37.5%) and two unsexed (50%). Equal proportions of early Saxon males and females are affected (36.4–36.7%), whilst in the later assemblage only males have lesions, though the sample is small. There is a slight rise in overall TPR from the Roman period (31.3%); however, the condition only increases in the males, and a decrease is apparent in the females, again suggesting a shift in the treatment of the different sexes in childhood. The overall rate is a little above that calculated by Roberts and Cox (24.6%; 2003, 186-7, table 4.11). Exceptionally high rates were recorded for Cuxton (50%; McKinley 2006, 23) and Wrotham (69.2%; Egging Dinwiddy forthcoming), though these are likely to be a relic of a small sample sizes. A much lower rate (7.7%) was observed in the assemblage from Mill Hill (Anderson and Andrews 1997, 229).

Vitamin D deficiency (rickets and osteomalacia)

An early Saxon phase adult female and an unsexed adult (mid-Saxon) have noticeably bowed femora shafts (223015 and 153077; Table 13.24), a characteristic of rickets (see above).

Osteoporosis

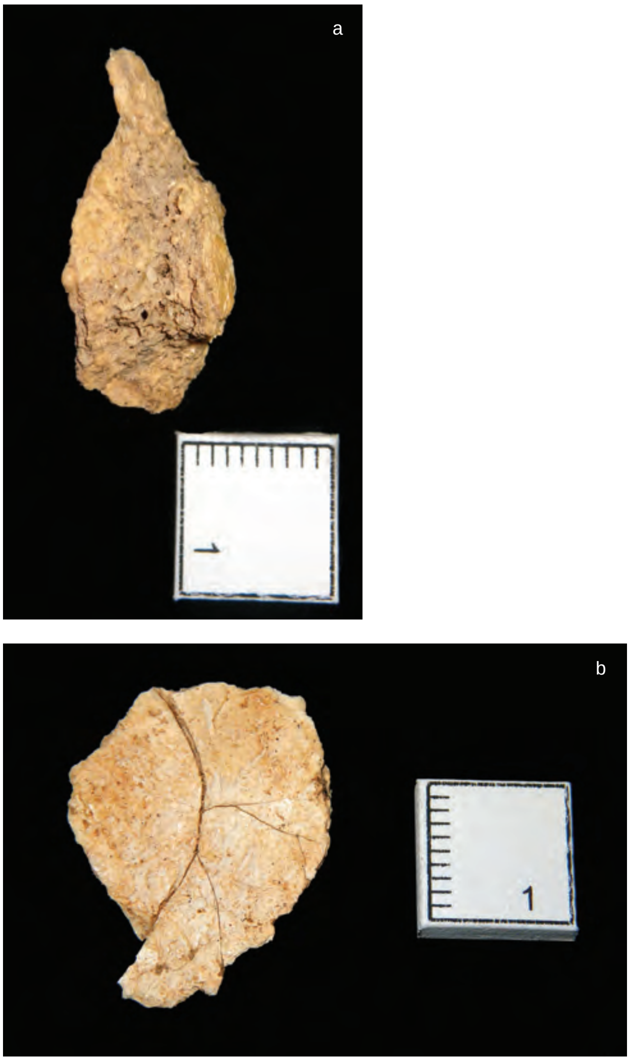
Osteoporosis was noted in the axial skeletons of five early Saxon phase older adults (two male, three female). A further female (267025) may have had osteopenia, a condition characterised by a lack of bone mineral density, widely considered to be a precursor to osteoporosis. Nearly all of the affected individuals had pathological lesions that may have had some association with the condition, including iron deficiency anaemia, childhood stress, infection and diffuse idiopathic skeletal hyperostosis (Table 13.24; see above).

Trauma

Injuries are apparent in the remains of six adults (9.5% CPR), three male and three female (13% and 9.1% respectively). All but one are from the early Saxon assemblage (CPR 11.6% early Saxon; 5% mid-Saxon phase adults) and include stress and traumatic fractures from overuse, accidents and probable interpersonal violence. Dislocations and a penetrating weapon injury were also evident.

Weapon trauma

The evidence for weapon trauma comprises a small



Pl 13.34 Saxon adult female 220134: punched-out fragment of parietal/frontal bone (a) transverse view illustrating internal bevelling; (b) endocranial view showing fracture lines from central point of impact

fragment of bone apparently 'punched-out' of the skull of adult female 220134. The 6mm thick piece is probably from the right parietal, close to the sagittal and coronal sutures. The exocranial surface forms a small oval (*c* 5mm x 6mm), and bevels out towards the endocranial surface where it is rather larger (*c* 24mm x 28mm; Pl 13.34a-b). Several curved fracture lines are present on the endocranial surface. This is most likely represents *peri-mortem* trauma via a high velocity impact such as a projectile or pointed heavy weapon (Aufderheide and Rodríguez-Martín 1998, 20-24).

Fractures and dislocation

Fractures are manifest in the remains of four adult males and one female. A probable stress fracture was observed in a male right talus, comprising slightly healed hairline cracks running latero-posterior to medio-anterior across the posterior calcanean articular surface, and extending onto the posterior tip of the middle calcaneal articular surface. Slight pitting was evident on the corresponding articular surface of the calcaneum. The talus can be susceptible to fracture when the foot is repeatedly over-pronated (rolled inward) whilst in plantar flexion (ie, pointed). Whilst modern clinical examples are most frequently seen in athletes and dancers, walking on uneven and rough ground is perhaps a more plausible explanation.

Spondylolysis was seen in a lumbar vertebra of two adults, one male and one female (see above; Ward *et al* 2010). The male (126205) also sustained a compression fracture of the first lumbar vertebral body, indicative of violent vertical force upon the spine. He also had injuries that may be construed as indicative of interpersonal violence – well-healed, though misaligned fractures of the left first, right fourth and fifth metacarpals, including oblique and comminuted examples. Adams (1987, 188) describes metacarpal fractures as being the frequent result of either a fall onto the hand, or a blow *with* the hand as occurs in a punch. Although the evidence is rather ephemeral, the left mandible may also have been fractured in the region of the third molar. Many of his injuries clearly occurred a substantial time prior to death, as they had been significantly remodelled, with some related osteoarthritis and exostoses.

Young adult male (223012) suffered a comminuted plateau fracture of the left knee (Pl 13.35). The slightly healed injury comprises a series of curving, mainly mediolateral hairline fractures on the anterior three-quarters of both tibial condyles, with a depressed shear fracture of the medial half of the medial condyle that extends inferomedially to the epiphyseal line. The large anterior void is due to post-depositional damage. Such an injury would occur when the femur makes forceful contact with the tibial condyles, as might occur with a direct impact, or fall onto a bent knee.

The established fusion of the right hip of older adult male 252075 has resulted in the fixing of the right femur as if crossed over the left and in a seated position. Thick corded and bony buttressing connect the medial proximal femur to the anterior and lateral pelvis, whilst part of the superior acetabular rim is still evident (Pl 13.36a). X-radiographs (Pl 13.36b) show the partial outline of the femur head considerably medially displaced, whilst much of the femoral neck and acetab-

Pl 13.35 Saxon young adult male 223012: superior view of left proximal tibia showing partially healed plateau fractures

Pl 13.36 Saxon elderly male 252075: (a) superior-lateral view of right innominate and femur showing extensive ankylosis and associated exotoses, probably following trauma; (b) X-radiograph of lesion (inferior medial view)

ulum have been lost to necrosis. The most probable cause of such gross changes is a fracture-dislocation, where the femoral head exited medially through the wall of the acetabulum. This can occur as a result of a heavy blow or fall onto the bent knee (Adams 1987, 203). Complications can include necrosis of the femoral head and post-traumatic ossification (*ibid*, 71, 203). The prominent bony mass on the lateroposterior femur coincides with the midpoint of the vastus intermedius muscle attachment, and is probably associated with the above mentioned trauma.

Rib fractures, often the result of direct force including falling against a hard surface or object, usually unite and heal without intervention (Zuidema 2007; Adams 1987, 107). A relatively rare example of a non-united rib fracture was seen in the medial portion of a left sixth rib (female 220110; Pl 13.37). The flared

Pl 13.37 Saxon adult female 220110: anterior-inferior view of sixth left rib head and neck showing a non-union fracture

broken ends have substantially healed without any fusion having occurred.

Probable dislocation or instability of the right distal radius and ulna joint is evident in the remains of two adult males (251062 and 252075). The sigmoid notches are abnormally enlarged (19mm x 22mm and *c* 15mm diameter), and comprise shallow sub-circular concavities, with surface pitting and marginal osteophytes (osteoarthritis). Radio-ulnar joint dislocation can occur as a result of a fall onto a pronated hand, or less commonly, onto a supinated hand. Fractures (eg, Galeazzi or Colles' fracture) and congenital deformation of either bones of the forearm can lead to similar lesions (Adams 1986, 288-294; 1987, 162-173; Wheeless 2011).

The Saxon trauma CPR is particularly low, and like many rural communities of the time both in Kent and elsewhere, most are probably the result of accidents and falls (Roberts and Cox 2003, 203-8; Egging Dinwiddy 2011, 107). Interpersonal violence has been recorded in a number of Saxon assemblages, such as Cottington Hill, Ramsgate (sharp blade trauma; McKinley 2010, 12), At Finglesham the trauma CPR is equally low (*c* 8.5%), though males were more frequently involved (6:1), suffering weapon and other seemingly violent injuries (Grainger and Hawkes 2006, 333). Other examples include Worthy Park, Kingsworthy, Hampshire and Blacknall Field, Pewsey, Wiltshire (Wells *et al* 2003, 170; Stuckert 2010, 107).

Overall there is a reduced level of traumatic injury compared to the Roman period. Far fewer weapon related injuries were observed, and there are differences in the manifestation of injuries apparently sustained in accidents and falls. Such evidence may serve to illustrate general shifts towards a less violent lifestyle and less hazardous occupations. However, the dearth of adult males in the mid-Saxon phase assemblage may mean that this depiction is skewed.

Enthesophytes, cortical defects and exostoses
(Observations are summarised in Table 13.24.)

Infections

Periosteal new bone

Evidence for infection and/or inflammation in the Saxon material comprises deposits of new bone in the remains of 13 individuals (CPR 16.4%; Table 13.24). Of these, 12 were adults (19.0% adults), seven female (21.2% of females), three male (13.0% of males), and two unsexed. The other was a juvenile (6.3% immature). All the male and unsexed examples (all early Saxon) are manifest in lower limb bones, and comprise two probable tibial ulcers, infection or inflammation associated with a knee fracture, and two cases of non-specific periostitis. In contrast, most of the lesions seen in females (six early Saxon, one mid-Saxon) were the result of dental infection, the exceptions being probable septic osteoarthritis at the base of the right thumb (early Saxon), and endocranial new bone on a fragment of temporal (mid-Saxon). The temporo-mandibular joints of the early Saxon juvenile also have small deposits of new bone.

Joint disease

All or parts of 39 adult spines (22 female, 16 male, one unsexed) were recorded, including 26 early Saxon phase (nine male, 16 female, one unsexed) and 13 mid-Saxon (seven male, six female). Saxon extra-spinal joints numbered 2344 (997 male, 1329 female, 18 unsexed), comprising 756 male and 1155 female joints from the Early phase and 241 male, 177 female and 18 unsexed joints from the middle phase.

Spinal joint disease

Lesions indicative of joint disease were observed in 31 (79.5%) adult spines (ten male (62.5%); 20 female (90.1%)).

Schmorl's nodes

Schmorl's nodes were seen in from one to 12 vertebrae in 19 spines (48.7%; 54.5% female spines, 43.8% male). Eighteen were from the early Saxon assemblage, the remainder being from a single mid-Saxon phase female. Lesions are considerably more prevalent in the early Saxon phase with 21.8% of vertebra affected compared to only 3.7% in the mid-Saxon phase. Most lesions were slight to moderate and few breached the posterior body surface margin. Most commonly involved are the lower thoracic and first four lumbar vertebrae. The male TPR is almost twice that of the females (27.2% and 16.9%). The overall prevalence rate exceeds that from the EKA2 Roman assemblage and the 16.6% period average as stated by Roberts and Cox (2003, 198 table 4.21).

Degenerative disc disease

Degenerative disc disease was evident as slight-moderate and occasionally severe lesions in from one to 17 vertebrae from 18 spines (46.2%; 43.8% male, 50.0% female). The condition was ostensibly more prevalent in the early Saxon phase with 15 spines affected (57.7%), compared to 23.1% of mid-Saxon phase spines (three), with TPRs of the condition in 20.6% and 8.5% of vertebrae respectively. The early Saxon males are proportionally more affected than the females (66.7% as opposed to 56.3%), whilst one male and two female spines are affected in the mid-Saxon phase – again probably a relic of the skewed demographic make-up of this group. In one case the condition is manifest in the spine of a young adult female (126055; 18-23 yr.). Clinical studies also suggest a biochemical factor in the disease, which may help to explain the presence of the condition in younger individuals (Buckwalter 1995; Hogshead 2012; Sobajima *et al* 2004, 390). The condition may be exacerbated by congenital spinal abnormalities, overuse and obesity, the former two being present or inferred in the remains of 126055 (Table 13.24). Two cases of the condition were seen in adults under *c* 35 years in the assemblage from Collingbourne Ducis (Egging Dinwiddy in prep.). There is no change in the rate from the preceding period. Local comparisons are not possible due to the poor state of preservation in most cases, however the rates from Twyford School,

Table 13.30 Summary of number and rates of spinal lesions by sex (NB includes 1st sacral; excludes vertebrae not assigned to specific spinal location)

	No. vertebrae	*Osteoarthritis*	*Schmorl's nodes*	*Degenerative disc disease*	*Lone osteophytes*	*Lone pitting*
female	391	30 (7.7%)	59 (15.1%)	46 (11.8%)	93 (23.8%)	40 (10.2%)
male	217	17 (7.8%)	59 (27.2%)	70 (32.3%)	94 (43.3%)	21 (9.7%)
unsexed	1	-	-	-	1 (100%)	-
Total	609	47 (7.7%)	118 (19.4%)	116 (19.0%)	188 (30.9%)	61 (10%)

Hampshire, and Collingbourne Ducis, Wiltshire are only slightly lower (14.5% and 15.6% respectively; Egging Dinwiddy 2011, 106; in prep.).

Osteoarthritis

Lesions indicative of slight to moderate osteoarthritis were seen in the various articular facets of from one to 12 vertebrae in 14 spines (35.9% spines); nine female (40.9%) and five male (31.3%). A slight increase in prevalence was noted in the mid-Saxon phase material compared to the early Saxon phase. The most frequently affected vertebrae were those at either end of the thoracic range, the least affected being the lower cervical vertebrae. In the early Saxon phase the pattern holds true, though with less lumbar involvement. Here the female spines show a wide range of vertebrae with manifest lesions, whilst in the males lesions are limited to the cervical and ends of the thoracic spine. The range of affected vertebrae is much narrower in the mid-Saxon phase assemblage owing to the small sample number; these comprised lower thoracic and lumbar (females) as well as mid cervical vertebrae (all from males).

Lesions are more prevalent in the mid-Saxon vertebrae with 13.4% affected compared to only 6.8% of the early Saxon phase vertebrae. Overall fairly equal proportions of male and female vertebrae are affected (Table 13.30), though when divided by phase lesions are most frequent in males, with 13.8% (females 6.9%) in the early Saxon phase assemblage and 17.4% (females 11.9%) in the mid-Saxon phase. The latter is particularly noteworthy given the generally older age of the females in this phase, the greater degree of wear and tear in the younger males indicating higher levels of overall physical stresses and/or activity.

The overall rates are similar to that seen in the assemblage from Twyford School (8.8%; Egging Dinwiddy 2011, 106), and a little lower than seen at Collingbourne Ducis (11.2%; Egging Dinwiddy in prep.).

Roberts and Cox record a CPR of 12.1% for 'spinal joint disease' (ie, all of the above), which is substantially lower than the EKA2 CPR (48.4%), though their sample includes rates between 30% and 50% (2003, 196, table 4.19). Spinal joint disease is more prevalent in the early Saxon phase material (85.2%; 53.9% in the mid-Saxon), and whilst females are proportionally more involved in this phase (88.2%, as opposed to 77.8% males), the dimorphism is not as great as that evidenced in the mid-Saxon phase assemblage (83.3% females, 42.9% males), though this may be due to the preponderance of older females in this assemblage (see above).

The patterns suggest that in general females' responsibilities required the use of a larger proportion of their spines than did those of the males, possibly illustrating sex-determined activities, or how the two sexes undertook the same or similar tasks (eg, due to physiological factors). Evidence for greater wear and tear in the lumbar region of the mid-Saxon phase females indicates temporal changes in the ways the women used their bodies, indicating changing tasks or how these were carried out (see below).

Diffuse idiopathic skeletal hyperostosis (DISH)

Classic 'dripped candle wax' bony proliferations are present on the vertebral bodies in much of an older adult spine (male 126224; early Saxon). The right side is predominantly affected in the mid to lower spine, while the superior aspect of both sacroiliac joints is substantially fused. The rate (2.5% all adult spines; 6.3% male spines; 1.6% all adults) is similar to that seen in the EKA2 Roman assemblage, and is in keeping with the CPR calculated by Roberts and Cox (1.8% Saxon individuals; 2003, 202 table 4.26).

Extra-spinal joint disease

Rates of osteoarthritis, and lone osteophytes and pitting in extra-spinal joints are summarised in Table 13.31; the conditions are discussed in previous sections. Lesions indicative of joint disease were observed in one or more extra-spinal joints of 28 adults (44.4%; 12 males (52.2%), 19 females (57.6%), one unsexed).

Eleven adults (17.4%; seven female, four male) had extra-spinal osteoarthritis, seen most commonly in the hips and hands of both sexes. In the early Saxon phase affected male joints comprised wrists, hands and a shoulder, compared to hips, ribs and a hand in the contemporaneous females, whilst the mid-Saxon phase male had hip lesions and the female had lesions in the wrist. The condition was more prevalent in the early Saxon phase (20.9%; 10% mid-Saxon adults), despite the preponderance of older females in the mid-Saxon phase. The overall rate of adults with the condition is somewhat higher than that given by Roberts and Cox (4.6%; 2003, 195). There was a reduction in the prevalence of the condition from the Roman period, something also noted by Roberts and Cox, who suggest that by the Saxon period most land had been cleared and the hard physical labour requirement was reduced (2003, 195), though ploughing would have remained an arduous task.

In general both sexes had degenerative changes (osteoarthritis, lone pitting/osteophytes) in wide range of joints, though in males the range was more extensive. Greater rates were seen in the shoulders, chest, elbows, wrists, the medial knee, ankles and feet of the men, whilst women were more prone to degeneration of the hands, fingers and lateral knee joints. However, the ranges narrow and the rates decrease in the mid-Saxon phase. The most distinct difference is in the distribution of joint disease in the mid-Saxon phase females, where the temporo-mandibular joints, wrists, hands and lateral knees are most commonly affected.

It appears that the heavy labour requirement reduces in the mid-Saxon phase while participation in more specific, less physically demanding activities becomes more evident, suggesting specialisation in crafts. This is most distinct in the females, and indicates that heavy labour or activities were more commonly part of the male lifestyle.

Congenital conditions

Mild *Coxa vara* (shortening and obtuse angulation of the femoral neck) and generalised spinal asymmetry were noted in the femora of young adult female 126055. The condition can be congenital or acquired, the latter for example from fracture, or softening of the bone as occurs in rickets, osteomalacia and also Paget's disease (Adams 1986, 373).

Another female (166117) had *spina bifida occulta* of the second cervical vertebra, alongside some significant vertebral asymmetry including lumbarisation of the left portion of the first sacral vertebra (Pl 13.38). The fifth lumbar vertebral body is taller, effectively compensating for the sacral deformity. Sacral variations were also seen in the remains of adult female 266020. The sacrum in this case was notably flat, with *spina bifida occulta* of the first sacral vertebra.

A hallux valgus deformity (bunion) was observed in the first meta-phalangeal joint in the left foot of 126205, an elderly male. The equivalent joint of the right foot is incomplete, though changes consistent with moderate osteoarthritis are apparent. A second potential example was observed in the right foot of another older adult male (250054), where a large osteophyte (12mm x 5mm x 6mm) is present on the dorsal surface, possibly

Pl 13.38 Saxon adult female 166117: anterior view of sacrum showing asymmetry resulting from lumbarisation of the left side of the first sacral vertebra

Table 13.31 Extra-spinal joints affected by degenerative joint lesions, showing rates (TPR) by sex

Joint	*Female*	*Male*	*Total (inc. unsexed)*
Temporo-mandibular	17R 17L pitting: R 41.2%, L 41.2%	10R 10L pitting: R 20%	27R 27L pitting: R 33.3%, L 25.9%
Costo-vertebral (ribs)	107R 103L oa: R 13.1%, L 14.6% op: R 18.7%, L 20.4% pitting: R 5.6%, L 4.9%	53R 64L op: R 17.0%, L 21.9% pitting: L 4.7%	160R 167L oa: R 8.8%, L 9.0% op: R 18.1%, L 20.3% pitting: R 3.6%, L 4.8%
Acromio-clavicular	5R 5L pitting: R 40.0%	2R 5L op: L 40.0% pitting: R 100%, L 40.0%	7R 10L op: L 20.0% pitting: R 57.1%, L 20.0%
Sterno-clavicular	12R 10L op: L 10.0% pitting: R 16.7%, L 10.0%	6R 5L op: R 33.3%, L 40.0% pitting: R 50.0%, L 60.0%	18R 15L op: R 11.1%, L 20.0% pitting: R 27.8%, L 26.7%
Shoulder – glenoid	15R 12L op: R 13.3%, L 8.3% pitting: R 13.3%	8R 8L oa: R 12.5% op: R 25.0%, L 12.5% pitting: R 12.5%	23R 20L oa: R 4.3% op: R 17.4%, L 10.0% pitting: R 13.0%
Shoulder - humerus	10R 10L op: R 10.0%	5R 9L op: L 11.1%	15R 19L op: R 6.7%, L 5.3%
Elbow - humerus	12R 9L	7R 8L op: R 14.3%, L 12.5%	19R 17L op: R 5.3%, L 5.9%
Elbow – radius	9R 8L	7R 5L op: L 20.0%	16R 13L op: L 7.7%
Elbow – ulna	11R 9L op: R 9.1%, L 22.2%	7R 8L op: R 28.6%, L 50.0%	18R 17L op: R 16.7%, L 35.3%

Table 13.31 (continued)

Joint	*Female*	*Male*	*Total (inc. unsexed)*
Wrist – radius	14R 11L oa: R 7.1% op: R 7.1% pitting: L 9.1%	9R 10L op: R 44.4%, L 30.0% pitting: R 11.1%	23R 21L oa: R 4.3% op: R 21.7%, L 14.2% pitting: R 4.3%, L 4.8%
Wrist – ulna	9R 7L op: 1L %	4R 7L oa: R 50.0%, L 14.2% op: L 14.2%	7R 9L oa: R 28.4%, L 11.1% op: L 11.1%
Hand – carpals	36R, 26L oa: R 5.6%	40R 34L oa: L 2.9% op: R 10.0%	76R 60L oa: R 2.6%, L 1.7% op: R 5.3%
Hand – carpo-meta	21R 20L oa: R 4.8%	30R 31L oa: L 3.0% op: R 16.7%, 1L 3.0%	51R 52L oa: R 2.0%, L 1.9% op: R 9.8%, L 1.9%
Hand – meta-phalangeal	31R 27L oa: 1R % op: 1L %	29R 37L op: 1L %	60R 66L oa: R 1.7% op: L 3.0%
Hand – proximal IP	25R 22L op: R 4.0%, L 4.5%	26R 22L	51R 44L op: R 2.0%, L 2.3%
Hand – distal IP	16R 12L op: R 18.8%, L 16.7%	16R 12L oa: R 6.3%	32R 24L oa: R 3.1% op: R 9.4%, L 8.3%
Sacro-iliac	16R 14L oa: R 6.3% op: R 6.3%, L 7.1% pitting: R 6.3%, L 7.1%	11R 9L op: R 18.2%, L 22.2%	27R 23L oa: R 3.7 op: R 11.1%, L 13.0% pitting: R 3.7%, L 4.3%
Hip – pelvis	18R 20L oa: R 11.1%, L 5.0% op: R 5.6% pitting: R 11.1%, L 20.0%	12R 15L oa: R 16.7%, L 6.7% op: R 33.3%, L 13.3% pitting: R 8.3%, L 13.3%	30R 35L oa: R 13.3%, L 5.7% op: R 16.7%, L 5.7% pitting: R 10.0%, L 17.1%
Hip – femur	19R 18L oa: R 5.3%, op: R 15.8% pitting: R 5.3%	11R 14L oa: L 7.1% op: R 27.3%, L 14.2%	30R 32L oa: R 3.3%, L 3.1% op: R 20.0%, L 6.2% pitting: R 3.3%
Knee – femur/patella	20R 19L op: R 25.0%, L 21.1%	12R 13L op: R 25.0%, L 23.1% pitting: L 7.7%	33R 33L op: R 24.2%, L 21.2% pitting: R 3.0%, L 3.0%
Knee – lateral	15R 16L op: R 13.3%, L 6.3%	12R 12L oa: R 8.3% op: R 8.3%	27R 28L oa: R 3.7% op: R 11.1%, L 3.6%
Knee – medial	14R 18L	11R 10L op: R 18.2%, L 20.0% pitting: R 9.1%, L 10.0%	25R 28L op: R 8.0%, L 7.1% pitting: R 4.0%, L 7.1%
Ankle	20R 20L	12R 13L op: R 8.3%, L 7.7%	32R 33L op: R 3.1%, L 3.0%
Foot – tarsals	94R 78L op: R 1.1%	67R 61L	162R 143L op: R 0.6%
Foot – meta-phalangeal	27R 37L	24R 22L oa: R 4.2%, L 4.6% op: R 8.3%, L 4.6%	52R 62L oa: R 1.9%, L 1.6% op: R 3.8%, L 1.6%

Key: oa – osteoarthritis; op – lone osteophytes; R/L – right/left; IP – interphalangeal; (NB pitting – lone lesions)

delineating the extent of a pseudo-joint associated with the deformity. Alternatively the bony projections may have been the result of trauma, such as occurs when a heavy object is dropped onto/moved over the base of the great toe.

Cysts and neoplasms

A small ivory osteoma is present on the mandible of mid-Saxon phase older female (176056). These are generally asymptomatic bony rounded prominences, commonly found on long or flat bones including the skull (Adams 1986, 65).

A spherical, smooth walled void (*c* 7mm in diameter) located in the nasopalatine duct of adult male 126205 probably reflects plastic changes resulting from a soft tissue expansion such as a cyst, which are commonly found in this location. They may be related to infection, trauma and mucus/debris retention, and a predisposition to the condition has also been debated (Kurnatowski *et al* 2008). It is feasible that the tasks that caused this man to have advanced non-masticatory tooth wear contributed to the formation of this probable cyst.

A small lesion (2.5mm diameter) comparable to that seen on the endocranial temporal bone of a Roman adult (see Pl 33 above), was evident on the anterior left maxilla of female 220134, below and to the lateral side of the facial foramen. The spherical lesion has sclerotic margins surrounded by a collar of woven new bone, whilst a corresponding patch of lamellar new bone is present within the left antrum. The lesion may be the result of a small soft tissue proliferation such as a fibroma or haemangioma, or localised infection. Causes may include developmental abnormalities, viral infections and trauma (Smoker *et al* 2008, 185).

A cortical defect or solitary bone cyst could be responsible for the large sub-spherical cavity occupying approximately 50% of the middle talar articular surface of a left calcaneum (adult female 266020).

Miscellaneous conditions
A summary is given in Table 13.24.

Plastic changes
The left ulna of older adult female 153033 was somewhat bowed, though the radius and other arm were unaffected. The individual also had a morphological variation often associated with activity involving strenuous use of the upper body (*os acromiale*; Stirland 2005, 121), and it is reasonable to suggest a potential link between the two observations.

Coalition defect
A coalition defect was found on the sacrum of adult male 251062, where the anterior-superior margin of the left sacroiliac joint is a little flattened and has the characteristic roughened appearance. The location coincides with the site of the sacral portion of the iliacus and probably reflects repeated flexion and adduction of the hip as occurs during long distance walking, running or marching.

SECTION II

Cremated bone *by Jacqueline I McKinley*

Taphonomy
The surviving depth of the cremation graves was less variable that that of the inhumation graves with a range of 0.07-0.54m, both extremes being amongst the Roman features in Zone 19. Most lay in the 0.15-0.25m range, with very few less than 0.10m in depth. Although the cremation-related fills of some features were evident at the level of the stripped surface, it is unlikely that much if any bone was lost as a result of disturbance in most cases. In this regard it is pertinent to note that the undisturbed remains of an urned burial was recovered from a grave of 0.12m depth in Zone 20 and those of an unurned burial from a feature of 0.14m depth in Zone 19. Despite the acidic burial conditions (brickearth) prevalent in most zones, which often had the commonly observed detrimental effect on bone survival (slightly worn appearance and loss of all/much of the trabecular bone), at least some of the remains (urned and unurned) from most areas were well preserved and inclusive of trabecular bone. Several of the burial contexts from Zone 19, situated on the chalk, include a common trabecular component; however, the link with the nature of the natural was not consistent since the few deposits from Zone 13, also on the chalk, were poorly preserved.

Demography
Minimum number of individuals
A minimum of 57, possibly 59, individuals were identified within the cremated bone assemblage (Table 13.32). The largest proportion (57.9%/55.9%) is of Roman date, with 28.1%/28.8% Bronze Age and 12.3%/13.6% Iron Age (Tables 13.33–35). One Middle Neolithic individual

Table 13.32 Summary of results from analysis of cremated bone

Context	*Cut*	*Deposit type*	*Phase*	*Bone weight*	*Age/sex*	*Pathology*	*Pyre goods/grave goods/inclusions*
Zone 4							
220140	220139	?R	LBA	0.9g	subadult/adult >13 yr.		
220142	220141	?rpd	LBA	18g	adult >18 yr.		burnt flint
252210	252209	rpd	LBA	11.3g	juvenile/subadult *c* 5-18 yr.		
252212	252211	rpd	LBA	11.4g	subadult/adult >13 yr.		
252214	252213	rpd	LBA	3.8g	subadult/adult >13 yr.		
252216	252215	un. burial + rpd	LBA	425.3g	adult *c* 30-45 yr. ?female		0.8g u/b sheep tooth
252218	252217	rpd	LBA	1g	>infant (>5 yr.)		
252220	252219	?rpd	LBA	0.7g	infant *c* 0.5-5 yr.		
252222	242221	crd	LBA	1.2g	1) infant *c* 0.05-5yr. 2) subadult/adult >13 yr.		
252224	252223	?un. burial + rpd/ ?rpd	M/LBA	11.6g	infant *c* 1.5-4 yr. + intrusive fragment (s/a)		
252226	252225	rpd	LBA	<0.1g	>infant (>5 yr.)		
252228	252227	?rpd	LBA	17.8g	adult *c* 25-45 yr.		
Zone 6							
193105$	278177	?cenotaph	LIA/ERo	-			fuel ash
247151$	170073	urned burial + rpd **	MBA	30.5g	neonate 4-5 mth.		

Table 13.32 (continued)

Context	*Cut*	*Deposit type*	*Phase*	*Bone weight*	*Age/sex*	*Pathology*	*Pyre goods/grave goods/inclusions*
Zone 7							
179103	179102	un. burial + rpd	M/LBA	166.1g	adult *c* 20-35 yr. ??female		
179132	-	burial	MRo	106.8g	adult >45 yr. ??female	osteoarthritis – prox. femur; enthesophytes – humerus shaft, finger phalanges shafts, thoracic spinal process	
267090	267091	R (inh. grave)	MRo	1.8g	subadult/adult >13 yr.		
271010	271009	un. burial + rpd*	MRo	783.7g	1) adult *c* 25-35 yr. ?female 2) foetal *c* 7 mth *in utero*		5.8g domestic fowl & medium mammal
Zone 8							
273030	274001	R (ditch)	?EBA	0.1g	>infant (>5 yr.)		
273032	274001	R (ditch)	EBA	0.5g	human		
274005	274001	rpd (ditch)	?EBA	3.3g	subadult/adult >13 yr.		
Zone 10							
42003[$]	42001	urned burial**	MRo	1305.5g	adult *c* 45-55 yr. ?male	osteoarthritis – distal ulnae, right lunate, prox. tibia, hip joints, distal humerus, right proximal radius, 2C, 1T, 1L, right scapula; periosteal new bone – fibula shaft; ddd – 4C; op – C1, S1, scapula, distal femur, both distal humeri, tight distal radius, distal finger phalanx; pitting – left proximal radius, left temporo-mandibular, 1C, 3T, 1 costo-vertebral	
42009	42019	rpd	E/MRo	8.5g	adult >18 yr. ??male		0.1g u/id mammal
123002-3	123001	crd	M. Neo.	4.3g	>infant (>5yr.)		
169009	248221	R ?burial	?Ro	19.8g	subadult/adult >15 yr.		
176312	176311	urned burial + rpd*	MRo	1331.2g	adult *c* 25-35yr. female	periosteal new bone – ventral ilium, humerus shaft, tibia & fibula shafts; pitting – 1T	21.2g small bird & sheep/goat. Fe nail shank
197143	197134	R (ditch)	?EBA	0.2g	human		
247316	247315	?un. burial	ERo	243.1g	adult >30 yr. ??female		Fe nail. Scraps u/b human bone
Zone 11							
147139	147141	un. burial**	LIA/ ERo	365.1g	adult >35 yr. ??male	op – 1T bsm	
153020[$]/ 153018	153017	urned burial + rpd*	MBA	156.7g	juvenile *c* 4-7 yr.		
171024	171023	?un. burial + rpd/?rpd	?LIA	46.7g	subadult/adult >15 yr. ??female		
189052	189050	?rpd	M/LIA	17.8g	subadult/adult >15 yr.		0.2g u/id animal/bid
189054	189053	rpd	M/LIA	2.1g	subadult/adult >13 yr.		
209121/6	147141	grave fill = 147139	LIA/ERo	44.7g	= 147139	op – 1T/L bsm	
209123[$]	147141	accessory deposit**	LIA/ERo	6.8g	= 147139		
Zone 12							
126002	126001	un. burial + rpd	LBA	359g	adult >30 yr. + ?intrusive infant	periosteal new bone – fibula shaft; enthesophytes – femur & fibula shafts	
146013 -15	146016	?un. burial	LBA	81.5g	adult >18 yr.		

Table 13.32 (continued)

Context	*Cut*	*Deposit type*	*Phase*	*Bone weight*	*Age/sex*	*Pathology*	*Pyre goods/grave goods/inclusions*
214043	214042	?un. burial + rpd	LBA	160.7g	adult >18 yr.	enthesophytes – femur shaft	
219032	219031	crd (inc. rpd)	LBA	0.3g	neonate/infant *c* 0-2 yr.		
Zone 13							
125123	125122	R (ditch)	?EIA	1g	>infant (>5 yr.)		
130129	208022	crd (inc. rpd)	?IA	2g	infant *c* 1-2 yr.		glass fragment ?intrusive
159125	159118	?un. burial + rpd	E/MIA	7.2g	infant *c* 1.5-4 yr.		fragments u/b neonate/infant bone
159126-8 /30-31	159118	rpd	E/MIA	7.1g	= 159125		
159133	159132	un. burial + rpd	EBA	328.2g	adult >35 yr. ??male	op - distal finger phalanx; enthesophytes - femur shaft	
186134	186135	un. burial + rpd	?BA	4.4g	foetal *c* 25-35 weeks *in utero*		
200065	200062	R (inh. grave)	E/MIA	0.8g	subadult/adult >13 yr.		
292016	292015	?R	BA	2.9g	subadult/adult >13 yr.		
296001	296004	R	IA	3.7g	subadult/adult >13 yr.		
Zone 14							
166052	166051	un. burial + rpd	MBA	370.2g	adult *c* 18-30 yr.	?calcified lymph node	
220025[s]	220024	urned burial*	LBA	13.9g	infant *c* 3-4 yr.	periosteal new bone – ?humerus shaft	
Zone 19							
126101	126100	R =126107 (inh. grave)	Ro	4.2g	juvenile/subadult *c* 8-14 yr.		Fe staining
126104	126103	= 126108	LIA/ERo	1.4g			
126107	126106	urned burial	Ro	51.5g	juvenile *c* 7-12 yr.		Frag. u/b sheep/goat tooth with copper alloy staining
126108	126103	urned burial	LIA/ERo	35g	infant *c* 2-3 yr.		
126111/12	126110	un. burial *	Ro	464.8g	adult *c* 30-40 yr. ?female		1.3g small bird; 6.5g u/b neonatal sheep/goat & pig; Fe nail shanks (3); Green/blue spot staining humerus shaft; Fe staining femur shaft
126196[s]	126195	urned burial**	LIA/ERo	735.6g	adult *c* 35-45yr. ??female	periosteal new bone – tibia shaft; mv – mandibular tori, wormian bone	u/b sheep/goat (?intrusive)
126215	126214	R (inh. grave)	M/LIA	1g	subadult/adult >13 yr.		
126224-5	126223	R ?urned burial (in AS inh. grave)	ERo	85.1g	adult >45 yr.	osteoarthritis – 1C; enthesophytes – femur shaft	
126337[s]	126334	R = 126342*	ERo	1.4g	>infant (>5 yr.)		11.3g u/b immature sheep/goat & frog
126339[s]	126334	accessory vessel*	ERo	-			dense fill u/b animal
126341[s]	126334	accessory vessel*	ERo	-			
126342	126334	un. burial**	ERo	369g	adult >45yr. ??female	*ante mortem* tooth loss; enthesophytes – femur shaft	20.6g u/b immature pig
150101	150100	rpd + part un. burial	ERo	58.4g	= 150103		3.6g u/b pig; frags. copper-alloy sheet
150103	150100	un. burial	ERo	87.9g	subadult *c* 14-18 yr. ??male		11.4g u/b immature pig, some copper-alloy staining
153061	153060	?un. burial + rpd/?rpd	MRo	94.3g	= 153064		6.9g small bird, pig, sheep/goat & ?dog

Table 13.32 (continued)

Context	*Cut*	*Deposit type*	*Phase*	*Bone weight*	*Age/sex*	*Pathology*	*Pyre goods/grave goods/inclusions*
153064	153060	?urned burial	MRo	56.2g	adult >20 yr.		8.3g small bird, pig, sheep/goat & ?dog
153069	153068	R (modern)	Ro	174g	=153070		1.3g bird
153070	153068	un. burial *	Ro	406.8g	adult >45 yr. ??female	fracture (healed) – rib; osteoarthritis – costo-vertebral; enthesophytes - iliac crest; pitting – 3T; op – 1T ap	0.7g neonatal pig & small dog; blue/ green staining left petrous temporal
166078	166077	?cenotaph*	MRo	26.6g	subadult/adult *c* 15-35 yr.		0.8g bird (?domestic fowl); 3 Fe nails
166083	166082	R	MRo	23.1g	= 166088		1.4g u/b animal
166088$	166082	urned burial**	MRo	1075.7g	adult *c* 40-55 yr.	*ante mortem* tooth loss; periodontal disease; op – C1, 3C bsm, scaphoid; ddd – 1 C/T, 3L; Schmorl's node – 1T; enthesophytes – patella; mv – Vastus notch	5.4g domestic fowl & medium mammal
166090$	166082	accessory vessel/? token **	MRo	5.8g	= 166088		
177482	177480	urned burial rpd **	MRo	162.7g	adult >45 yr. ?female	*ante mortem* tooth loss; exostoses – tibia shaft	0.3g small bird; Fe nail with wood
220055-6	220054	R (inh. grave)	ERo	2.9g	juvenile/subadult *c* 5-18 yr.		?ass. 126107 in adjacent grave
220059/ 220058	220057	un. burial * + rpd	Ro	1237.3g	adult >45yr. ?female	*ante mortem* tooth loss; dental abscess; osteo-arthritis – 1C, 2 right costo-vertebral, 1L, distal ulna; Schmorl's node – 1L; ddd – 1L, S1; pitting -medial clavicle, left scaphoid; op – 3T bsm, 2 L bsm, 2 proximal IP joints (hand); exostoses – humerus shaft; entheso-phytes – femur shaft, patella; mv – wormian bones	5g bird & pig; 12.2g u/b pig (grave fill); copper-alloy sheet
220063	220064	un. burial	Ro	249.2g	adult *c* 21-35yr. ?female		0.2g animal
220069/ 70$	220068	placed deposit /?cenotaph	ERo	0.1g			
220073	220072	crd/?un. burial	Ro	70g	adult *c* 20-40 yr.		1.4g u/b u/id animal (?intrusive)
220075	193051	un. burial	LIA/ERo	43.2g	adult *c* 30-45 yr.		0.4g medium mammal
220104/ 220103	220099	urned burial	MRo	436g	adult *c* 20-35yr. ?male	enthesophytes – femur shaft	13.1g domestic fowl & sheep/goat
220116	220115	?un. burial	MRo	78.7g	adult >20 yr.		0.2g u/b animal bone (?intrusive)
220118	220117	un. burial	Ro	231.7g	adult >30 yr. ?female		1.5g u/id animal
220120	220119	R (grave fill)	LIA/ERo	25.2g	= 220121		0.2g deer antler
220121	220119	?urned burial	LIA/ERo	356.5g	adult *c* 30-45yr. ??female	*ante mortem* tooth loss	1.9g animal
220130	220129	un. burial	Ro	271.9g	adult >35 yr. ??male	periodontal disease; osteoarthritis – 1T; op – C2, 1T bsm	2.9g unburnt pig
239108	239107	?rpd/?un. burial + rpd	Ro	119.8g	adult *c* 30-40 yr.	op - mandibular condyle	2g domestic fowl & immature pig
248263$/ 248261	248260	urned burial	ERo	125.8g	adult *c* 18-40yr.		0.2g small bird & immature pig
267070	267072	R (inh. grave)	?Ro	0.5g	?infant >5 yr.		
279098$	279096	urned burial*	MRo	404.7g	adult >50 yr. ??female	*ante mortem* tooth loss; apical cysts/abscess; ?periosteal new bone; op – C2, 1C bsm	

Table 13.32 (continued)

Context	*Cut*	*Deposit type*	*Phase*	*Bone weight*	*Age/sex*	*Pathology*	*Pyre goods/grave goods/inclusions*
Zone 20							
215191$	215193	urned burial*	MRo	1357.7g	1) adult *c* 20-30 yr. female 2) infant *c* 2 yr.	?osteoma – occipital	
215192$	215195	urned burial*	MRo	766.3g	adult >45 yr. ??male	ddd – 1C; op – distal humerus, C1 anterior facet, 2T bsm	
215194	215193	(spill)	MRo	0.8g	= 215191		from ONs 4029 & 4930
215197	215199	urned burial	MRo	337.1g	infant/juvenile *c* 5 yr. ??male		0.6g domestic fowl
228058$	228055	placed deposit	MRo	-			
252067$	252066	urned burial*	Ro	489.2g	adult >18 yr. ??female		grave goods placed over bone – 3 bracelets + ring (Fe stains to vault & ulna shaft).
252069$	252068 =252066	accessory vessel	Ro	0.7g	= 252067		
Zone 21							
125222	125220	urned burial	EBA	176.3g	juvenile *c* 8-9 yr.		
125223	125220	R/bioturbation	EBA	18.9g	= 125222		
228058/66$	228059	R (SFB)		-			
Zone 23							
128067$	128031	placed deposit	?EBA	-			
141084	141083	?rpd/?un. burial + rpd	EBA	42.2g	subadult *c* 14-15 yr.		
Zone 26							
213002 /?3$	213001 =222001	placed deposit	MBA	-			
222002	222001	placed deposit	MBA	-			
Zone 29							
159010	159009	R	Ro	66.6g	= 159014		
159014	159009	urned burial	ERo	202g	adult *c* 30-50 yr. ?female		3.6g ?roe deer
159023	159009	R in accessory vessel	ERo	0.4g	= 159014		u/b sheep/goat
Weatherlees Pond							
179	197	R (ditch)	LIA/ERo	2.1g	probably human		

Key: $ = lab. excavation by osteoarchaeogist; * = largely undisturbed deposit; ** = undisturbed deposit; un. burial. = unurned burial; rpd = redeposited pyre debris; crd = cremation-related deposit; R. = redeposited; op = osteophytes; ddd = degenerative disc disease; mv = morphological variations; C/T/L/S = cervical/thoracic/lumbar/sacral vertebrae; bsm = body surface margins; ap = articular process; u/b = unburnt

was identified from a feature in Zone 10. The very small quantity of bone from the latter was insufficient to enable any demographic details to be deduced, but the singular presence of this material does demonstrate that the mortuary rite of cremation was being practiced in the vicinity in the Early-Middle Neolithic (bone redeposited in a Middle Neolithic pit, therefore could be from earlier phase; see Section I for comparative data).

The Bronze Age material, which comprised mostly singletons with a few small grave groups, was spread across the temporal range with a concentration towards the latter part of the period (Table 13.33). The 12 Late Bronze Age features in Zone 4 were concentrated within an area 8m x 3m. The two features which have been confirmed as graves sat at the north end of the group (Volume 1, Fig 3.4). The other deposits all comprised charcoal-rich fills (redeposited pyre debris) inclusive of very small quantities of bone (<20g), the distribution of which within the relatively substantial cuts is unknown. There were no duplicate skeletal elements between these eight deposits and those recovered from the remains of the two burials, and all the bone could have derived from the same two cremations. The only exception appears to be the juvenile/subadult bone from cut 252209 which does not match the attributed age of the other two cremated individuals from this zone (an infant and an adult female). Consequently, this individual has been included within the MNI despite the fact that the deposit itself represents redeposited pyre debris rather than the remains of a burial. All the Bronze Age material

Table 13.33 Cremated bone: Bronze Age summary of age and sex by sub-phase

	EBA	*E/MBA*	*MBA*	*M/LBA*	*LBA*	*Total inc. unspec. BA*
Immature						
foetal						1
neonate 4-5 mth.			1			1
neonate/infant 0-2 yr.					1	1
infant 1.5-4 yr.				1	1	2
juvenile *c* 5-9 yr.			2			2
juvenile/subadult *c* 5-18 yr.					1	1
subadult *c* 14-15 yr.		1				1
Total		1	3	1	3	9
subadult/adult >13 yr.	1					1
Adult						
adult *c* 18-30 yr.			1			1
adult *c* 20-35 yr.				1 (??F)		1 (??F)
adult *c* 30-45 yr.					1 (F)	1 (F)
adult >30 yr.	1 (??M)				1	2 (1??M)
adult >18 yr.					1/?2	1/?2
Total	1 (M)		1	1 (F)	3/?4 (1F)	6/?7 (2F, 1M)
Overall total	1 (M)	1	4	2 (1F)	6/?7 (1F)	16/?17 (2F, 1M)

from Zone 8 was redeposited within the north-west segment of the outer ring-ditch 273013. Although the total quantity recovered is very small (*c* 4.9g; MNI 1) its presence is indicative of mortuary activity within an area for which no other such evidence survives. The small group of three features within a 3m x 3m area in Zone 12 includes the remains of a minimum of one adult and one infant. As a result of the excavation procedures adopted (see above) the nature of these charcoal-rich deposits is unclear and inconclusive. The distribution of the archaeological components within cut 146016 indicates that the bone was concentrated in the north-east quadrant, rendering its interpretation as a burial with a subsequent deposit of pyre debris likely. There is no evidence to indicate the formation process of the deposit(s) within cut 214042, and given the lack of element duplication the bone could be from the same cremation as that within 146016, hence the query (?) included within the MNI. The nature of deposit 219032 is also uncertain, but as the other burial and probable burial from this zone represent those of adults, this young individual has been included within the MNI. The two small fragments of infant skull vault found within burial 126002, *c* 28m to the south-east, could be from same individual, and in this context looks to be intrusive or possibly represents a 'token' inclusion. The small amounts of redeposited adult bone from Zone 13 could all be from the one Early Bronze Age adult male (including that found within Iron Age features). Most was recovered from in/around the area of the Bronze Age ring-ditch 134097, the most distant fragments being from the enclosure ditch *c* 42m to the south.

The various cremation-related deposits (burial remains and small deposits of pyre debris; Volume 1, Fig 3.50) made within the Early/Middle Iron Age feature 159118 in Zone 13 are all likely to represent remains from the same cremation, that of a 1-2 year old infant. The MNI from Zone 11 includes one counted from amongst the small quantity of redeposited bone recovered from two of the four Middle/Late Iron Age postholes forming a *c* 1m x 1.40m four post structure in the west of the zone. The features (189050 and 189053) contained abundant fuel ash, together with fired clay and small quantities of bone, and might have been associated with a pyre site. This could possibly have formed the *ustrina* related to the burial made in grave 171023 250m to the east; all belong in the same phase, and the ages match with no duplication of skeletal elements (though the latter point is of uncertain significance given the small quantities of bone involved).

Despite the quantity of bone from the Late Iron Age/early Roman deposit from Weatherlees Pond (adjacent to Zone 4) being so small, the context lay at least 120m to the north-west of the cremation-related deposits in Zone 4 and it is unlikely to represent remains from one of the individuals within that assemblage. Consequently, it has been included within the minimum number count, but there is little further demographic detail regarding this individual.

The Roman vessel from the southern part of Zone 6, lifted and excavated by the writer as a possible urned cremation burial, was found to be devoid of bone. Several contexts inclusive of redeposited unburnt bone of Late Iron Age/early Roman date were excavated in the same area. The vessel itself may represent the remains of a cremation-related cenotaph deposit. Redeposited cremated bone was found in a mid-Roman inhumation grave within the small Late Iron Age-Roman mixed-rite cemetery in Zone 7. The inhumation grave lay *c* 7m to the south of cremation grave 271009 and the bone could have derived from same cremation had the pyre been constructed and the primary rite

Table 13.34 Cremated bone: Iron Age summary of age and sex by sub-phase

	E/MIA	*M/LIA*	*LIA*	*MIA-ERo*	*LIA/ERo*	*Total inc. unspec. IA*
Immature						
infant 1.5-4 yr.	1				1	2
Total	1				1	2
subadult/adult > 15 yr.		?1	1 (??F)			1/?2 (1??F)
Adult						
adult *c* 30-45 yr.					3 (2??F)	3 (2??F)
adult >35 yr.				1 (??M)		1 (??M)
Total				1 (M)	3 (2F)	4 (2F, 1M)
Overall total	1	?1	1 (F)	1 (M)	4 (2F)	7/?8 (3F, 1M)

undertaken within the same locality as the subsequent burial (as would generally be the case). The one other Roman burial from Zone 7 was a singleton *c* 120m to the south. The Roman cremated bone from Zone 10 derived from deposits within the small mixed-rite cemetery. The presence of the remains of one disturbed and redeposited burial (169009, appears to have been made within an amphora) within the fill of an inhumation grave suggests that at least some of the earlier graves were unmarked, or poorly so, within this enclosed group. The redeposited pyre debris 42009 could have been related to the adjacent (*c* 1m) burial deposit 42003, which it matched in terms of age/sex and between which there was no clear duplication of skeletal elements.

Age and sex

A substantial proportion of the Bronze Age assemblage comprises immature individual (52.9-56.2%), almost one third being less than 2 years of age (Table 13.33). The rate is almost twice that seen within the unburnt bone assemblage for the same period (Table 13.6). Although caution should be exercised given the small numbers involved in this part of the assemblage, the dearth of immature individuals observed in the later Bronze Age phases in the unburnt bone assemblage is not mirrored amongst the cremated remains. This probably signals, at least in part, a general shift in emphasis in the mortuary rites being practiced rather than just those affecting this part of the population. Comparative data from the region indicate a similar predominance of the cremation rite emerging in the latter part of the Bronze Age (see Section I). The adult age ranges attributable are generally very broad and it is not possible to make any meaningful comment regarding longevity or lack of it. As is commonly observed with cremated bone assemblages, the sex of only about half the adults could be assessed. The only demographic comment which can be made with confidence is that the rite seems to have been applied to all members of the population, covering both sexes and spanning all age categories.

In contrast with both the Bronze Age cremated remains and the unburnt Iron Age assemblage, the proportion of immature individuals within the cremated Iron Age assemblage is small (12.5/14.3%), and the few young individuals are limited to either end of the phase (Table 13.34). The view of this part of the assemblage may be skewed due to the small numbers of individuals involved overall, and we may not be getting a representative impression of the employment of the mortuary rite in relation to different parts of the population. The potential effects of taphonomic factors, as discussed in Section I, may also have influenced the visibility of immature individuals within this part of the osteoarchaeological record. Balanced against this, however, is the fact that in the Bronze Age such a high proportion of these young individuals were visible. There remains, therefore, the possibility that some cultural influence was being exercised and that immature individuals were preferentially subject to mortuary rites exclusive of the use of fire. The adult age categories are again very broad, but none of less than 30 years of age were identified, and both sexes are represented (comparative data from the region are discussed in Section I).

The proportion of immature individuals within the Roman assemblage is similar to that for the Iron Age (*c* 15.1%) and substantially lower than the *c* 40.3% for the unburnt assemblage of the same date (Tables 13.16 and 13.35: note that this figure is reduced to 34.4% immature for just the early and middle Roman phases). A relatively high proportion of individuals were assigned a sex (60.6% overall), including 73.1% of adults, of which 57.7% were sexed as female (with various levels of confidence) and 15.4% as male. Whilst the discrepancy could represent a genuine reflection of the division between the sexes, it is equally possible that the 26.9% unsexed adults could all be males which would go some way to redressing the imbalance. The latter would, however, remain marginally in favour of females amongst the adults, which is the reverse of the situation amongst the unburnt remains for the period (42.8% female, 52.4% male, 4.8% unsexed). Excluding the late and middle-late Roman individuals from the latter, rendering it of more compatible date with the cremated assemblage, emphasises the discrepancy in favour of the males still further (30% female, 55% male). The median age ranges for both sexes fall in the 'mature'

Table 13.35 Cremated bone: Romano-British summary of age and sex by sub-phase

	ERo	*MRo*	*Total inc. unspec. Ro*
foetal (7 mth. in utero)		1	1
infant *c* 2 yr.		1	1
infant/juvenile *c* 5 yr.		1	1
juvenile *c* 7-12 yr.			1
subadult *c* 14-18 yr.	1 (??M)		1 (??M)
Total	1 (M)	3	5 (1M)
subadult/adult >15 yr.		1	2
adult *c* 20-30 yr.		1 (F)	1 (F)
adult *c* 20-35 yr.		3 (1F, 1?F, 1?M)	4 (1F, 2?F, 1?M)
adult *c* 30-40 yr.			2 (1?F)
adult *c* 30-50 yr.	1 (?F)		1 (?F)
adult *c* 40-55yr.		2 (1?M)	2 (1?M)
adult *c* 18-40 yr.	1		2
adult > 30 yr.	1 (??F)		3 (1?F, 1??F, 1??M)
adult >45 yr.	2 (1??F)	4 (1?F, 2??F, 1??M)	8 (2?F, 4??F, 1??M)
adult >18 yr.		3 (1??F)	3 (1??F)
Total	5 (3F)	13 (7F, 3M)	26 (15F, 4M)
Overall total	6 (3F, 1M)	17 (7F, 3M)	33 (15F, 5M)

adult categories (*c* 30-45 yr.), with more females than males sitting in the >45 year groups.

The youngest individual is most likely to have been *in utero* at the time of cremation, the 25-35 year old mother and her unborn child (Zone 7, grave 271009) being lost together, although it is always possible that the woman suffered a miscarriage and died of related complications. In contrast to the unburnt bone assemblage (all phases; Table 13.35) no neonatal remains were recovered. The assemblage is similar to most of the contemporaneous cremation cemeteries in the region in the general scarcity of immature individuals, particularly neonates, amongst its numbers. Within the smaller groups, Anderson (1998) found none at Ash, only 7.5% of the MNI at Cranmer House were immature (Garrard 1987) and 11.8% from the Thanet Pipeline (Coldswood Road lying adjacent to EKA2 Zone 10 and Cottington Road *c* 2km north of Zone 18; McKinley 2009a), with numbers elsewhere being similarly low (Anderson 1999; Bowden *et al* 1998; Hammond *et al* 2003). Most of the sites from which Roman cremation burials were excavated as part of High Speed 1 Section 1 were devoid of immature individuals with the exception of the major cemetery at Pepper Hill in the north-west of the county (McKinley 2006a; Witkin and Boston 2006). Here, although a full cross-section of the population appears to be represented (cremated MNI 339), a similar proportion to that recorded at EKA2 were immature (16.9%; *ibid*). Likewise, at St. Dunstan's, Canterbury, only 14.1% of the MNI of 71 were immature (McKinley 2008a). The number of immature individuals, particularly neonates and young infants, is likely to be under-representative of the derivative population both at EKA2 and elsewhere due to a combination of taphonomic, cultural and other factors intrinsic to the cremation rite. These include the well-recognised deliberate exclusion of neonates from formal cemeteries (Philpott 1991, 97-102; Mays 1993; Struck 1993; Scott 1999; McKinley 2011), though neonates have been recovered from some cremation cemeteries, for example at St. Stephen's, St. Albans and Skeleton Green, Puckeridge, Herts (McKinley 1992; Wells 1981). A further factor is the probable incidental/accidental non-recovery of infant remains from the pyre site for burial, particularly where dual cremation had occurred, potentially exacerbated where relatively low weights of bone were collected for inclusion in the burial (McKinley 2006a).

The imbalance in favour of females seen at EKA2 amongst the cremated adults was also observed at the Cottington Road cemetery (adjacent to Zone 10), a small mix-rite cemetery where, as here, there was a contrasting imbalance in favour of the males amongst the unburnt remains (McKinley 2009a). The numbers seen elsewhere within the region are often too low to be commented upon with confidence, but at Pepper Hill slightly more males than females were identified amongst the cremated adults (27.6% and 20.3% respectively; Witkin and Boston 2006), but since it was possible to sex only 47.9% of the cremated adults these figures may not be reflective of the population as a whole. There is, therefore, some suggestion of localised variation in the burial rite adopted for immature individuals (inhumation in preference to cremation) and adults on the basis of their sex (females preferentially cremated and males inhumed).

Although there are notable exceptions – Pepper Hill (Biddulph 2006), St. Dunstan's, Canterbury (Diack in prep.; McKinley 2008a), Clubb's Pit, Isle of Grain (Cameron 1985) and Cranmer House, Canterbury (Frere *et al* 1987) – many of the other osteologically recorded Kentish burials of Roman date, as here, comprise singletons or small groups distributed in dispersed clusters, predominantly across the northern half of the county (Booth 2011; Egging Dinwiddy and Schuster 2009; McKinley 2006a fig 5). The majority of the minimum of *c* 800 osteologically identified individuals of this period from Kent derive from the remains of cremation burials (Mays and Anderson 1995, 381; Frere *et al* 1987; Smith 1987; Hicks 1995; 1998; Hutchings 2001; McKinley 2004c; 2006b; 2008a; 2009a; Witkin and Boston 2006; the discrepancy between the number of mortuary features from Pepper Hill (Booth 2011; Biddulph 2006) and the MNI is due to poor bone survival).

Many of the deposits from Pepper Hill are of non-specific Roman date but where further detail could be extracted the majority of cremation burials (70.9%) were early or early-middle, with 27.8% middle or middle-late Roman (Biddulph 2006; Booth 2011 table 5.7). A similar temporal distribution was seen at St. Dunstan's (60% Phase 4 (AD 70-170) and 28% Phase 5 (AD 170-250); Diack in prep.), and elsewhere amongst the CTRL section I assemblage there was also a concentration in the early phase. These, as with the cremation burials from Cottington Road (2nd century AD; Egging Dinwiddy and Schuster 2009), reflect the national trend by which the middle part of the 2nd century saw a change in mortuary practice from cremation to burial by inhumation of an unburnt corpse. It is, therefore, of potential significance that just over half of the cremation burial remains from EKA2 were dated to the middle Roman period (*c* AD 120-250), suggesting a possible localised retention of the mortuary rite beyond that commonly seen elsewhere.

Pathology

Although some pathological lesions were recorded in 23 (CPR 41.1%) of the cremated individuals, the intrinsic nature of cremation and cremation burials (eg, fragmentation, destruction, incomplete recovery of the cremated remains from the pyre site for burial; McKinley 2004a), renders the calculation of true prevalence rates (TPR; ie, number/proportion of a specific skeletal element affected by a condition) difficult and potentially highly misleading. Consequently, only a brief summary is presented here and the reader is directed to Table 13.32 for a summary of the lesions and affected skeletal elements for each individual, and to the pathology sections above for a discussion of most of the conditions/ lesions reflected.

The greatest proportion of individuals with observed pathological lesions were Roman (CPR 45.4%), closely followed by the Iron Age (42.8%), and 31.2% for the Bronze Age. These figures served only to illustrate a distribution however, and cannot be taken as indicate of a shift in health status between the different periods.

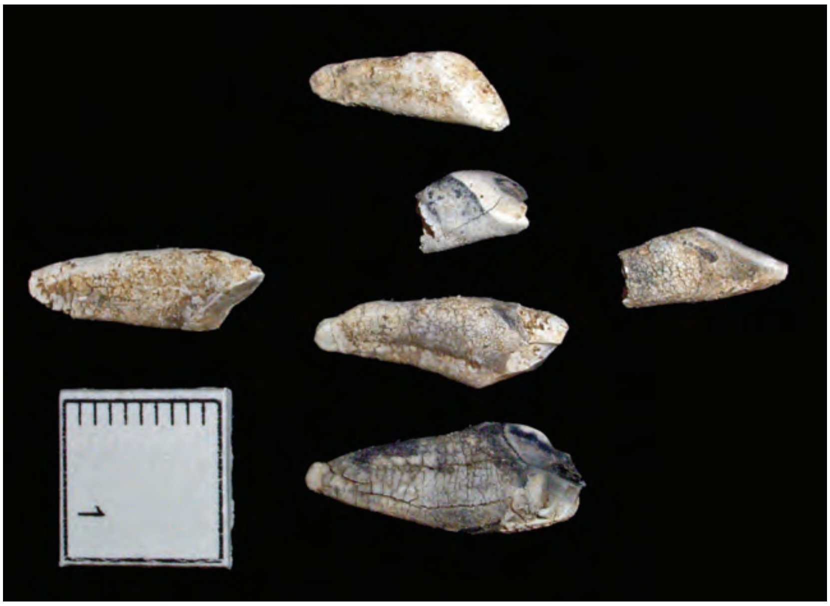
Dental disease

Evidence for dental lesions in cremated material is generally limited to those affecting the supportive structure due to the tendency for the enamel of erupted tooth crowns to shatter as it expands rapidly during the cremation process. Even when recovered, these fragments are generally small and incomplete. Evidence for tooth wear is relatively rare and is most apparent in cases of excessive attrition, where the tooth crown has gone and the occlusal surface of the exposed tooth root is also worn; as, for example, in the case of the Roman older adult male (43003; Zone 10) where several of the anterior teeth had worn through to the roots (Pl 13.39).

Six Roman individuals from Zone 19 (CPR 20%) had *ante mortem* loss of one or more teeth; most were older adults (three females and one male) and two mature (one female, one unsexed). One individual also had slight periodontal disease (one of two with the condition) and one female also had a dental abscess (one of two females with apical lesions).

Trauma

Slight callusing on the ?superior border of a fragment of rib shaft from a Roman older adult female (153070;



Pl 13.39 Roman older adult male (cremated) 43003 showing worn occlusal surfaces of tooth roots

Zone 19) is indicative of a healed crack/fracture. Although rib fractures are amongst the most common seen in archaeological assemblages (see above), evidence for trauma in general within cremated material is relatively rare, again due to factors intrinsic to the cremation process.

Enthesophytes were recorded in the remains of 10 individuals, three Bronze Age (Zones 12 and 13) and seven Roman (most Zone 19, one Zone 7). Lesions were predominantly recorded in the femur shaft, dorsal (mid-shaft and proximal) muscle attachments (seven individuals, both periods). The anterior patella was affected in two Roman individuals. All are probably reflective of age-related repetitive trauma, principally demonstrating stresses to the lower limb.

Exostoses seen in the remains of two Roman females point to more acute traumatic episodes involving the soft tissues, one in the upper limb and one in the lower, the latter suggesting trauma to the ankle joint.

Infections

Periosteal new bone, generally small discrete areas of woven (active) bone, was observed in the remains of five individuals (two Bronze Age, one Late Iron Age/Roman and two Roman). In most cases the lesions are suggestive of localised soft tissue infections affecting the underlying bone. The exception is the Roman mature adult female 176312 (Zone 10) where extensive lamellar new bone was observed in various parts of the skeleton, including the ventral area of the ilium and, particularly, in the shafts of the tibiae and fibulae (Pl 13.40). The involvement of the ilium suggests some form of infection affecting one of the internal organs resting within the pelvic girdle. The intense involvement of the lower limb may suggest a systemic infection related to the latter or possibly ulcerations linked to varicose veins.

A dense oval of osseous material (6.5 x 5.8 x 4.4mm) was recovered together with the bones amongst the Middle Bronze Age burial remains 166052 (Zone 14). The x-radiograph shows a single dense structure with no internal layering, and the feature may represent a calcified lymph node which may form in connection with a number of conditions including tuberculosis.

Joint disease

Schmorl's nodes were observed in two Roman spines from Zone 19; one thoracic and one lumbar lesion (at least one older adult female). Degenerative disc disease was seen in four Roman spines (Zones 10, 19 and 20) affecting from one to four vertebrae; both sexes were affected, all older adults.

Lesions indicative of osteoarthritis were recorded in the remains of six Roman individuals (Zones 7, 10 and 19). All were older adults, including three females and two males. Spinal lesions were seen in three individuals and extra-spinal lesions in five. The wrist and hip joints were each involved in two instances. The older adult male 42003 (Zone 10) has extensive lesions in four extra-spinal joints (Pl 13.41). The same individual also has lone osteophytes in eight spinal and extra-spinal joints and lone pitting in seven. Lone osteophytes were recorded in the remains of nine other individuals (one Bronze Age (Zone 13), one Iron Age/Roman (Zone 11) and seven Roman (Zones 19 and 20)). Spinal lesions were seen in seven cases and extra-spinal in five. The latter affected the joints of the upper limb (elbow and hands) and in one case the mandible. Lone pitting was observed in four other Roman females (Zones 10 and 19); two had spinal lesions and one had lesions in various joints of the upper limb.

Neoplasms

A fragment of what appears to be the central part of the occipital bone, with a portion of the internal occipital protuberance, has a smooth bony growth integral to the outer plate. The growth forms a large 'tongue' of compact bone (almost with appearance of a small mastoid process), *c* 17 x 17mm and 7mm thick, with its origin in the bone but one protuberant end overlapping

Pl 13.40 Roman mature adult female (cremated) 17631: fragments of femur (left) and tibia (right) shaft showing extensive 'plaque'-like deposits of lamellar periosteal new bone

Pl 13.41 Roman older adult male (cremated) 42003: lateral (left) and distal (right) views of distal ulna showing eburnation and pitting in head, with modification of contours and marginal osteophytes

Pl 13.42 Roman young adult female (cremated) 215191: transverse view (side unkown) of occipital bone showing osteoma

the normal exocranial surface of the vault (Pl 13.42). The angle of the protuberant part is almost horizontal (direction unclear). Although osteomas on the skull are relatively common (see *Roman* section above), the form and location of this example is somewhat unusual.

Pyre technology and the mortuary rite

Some parts of this section will focus on the 18 undisturbed, or large undisturbed burial deposits, which comprise the remains of 12 urned (three Bronze Age, one Late Iron Age/Roman and eight Roman) and six unurned burials (one Bronze Age one Middle Iron Age-early Roman and four Roman). Most of the former were subject to detailed excavation by the writer enabling an in-depth analysis of the formation process of the burial. These deposits represent those which have been least compromised and will retain the characteristics of the original deposits most reliably.

Oxidation

The majority of the cremated bone is white in colour, indicative of full oxidation of the bone (Holden *et al* 1995a; 1995b). Deviations from this norm, illustrating varying degrees of oxidation (from the brown and black indicative of charring, through hues of blue and grey to the white of full oxidation), were observed in bone fragments from deposits in most zones and across the temporal range (Table 13.36). Some level of variation was seen in the remains of *c* 53% of the Bronze Age individuals identified (from six of the ten zones). Although most of those affected were adults (five, including one male and one female) immature individuals were also involved (three), and the most extensive variations were observed in the remains of a neonate from Zone 6. Less than half (*c* 43%) of the Iron Age individuals identified (from two of the four zones) were represented by fragments of incompletely oxidised bone. As previously, individuals across the age range were affected (infant and adults), the one sexed individual (an adult female from Zone 19) showing the greatest level of variation. The remains of a similar proportion of Roman individuals were affected (*c* 50%; from all zones). All the remains were those of adults (*c* 65%), involving a slightly higher proportion of females than males amongst the sexed individuals (*c* 60%, compared to 50% males). Extensive variations were seen in the remains of the two males identified (maximum 16 skeletal elements, 43003 Zone 10), but those of two females and one unsexed adult were also substantially affected.

Table 13.36 summarises the frequency and distribution of the less well oxidised remains by phase. In most cases, even where a wide distribution of skeletal elements was involved, only one or two fragments of an individual element were affected and, despite the occasional substantial inclusion of either the femur (Bronze Age 159133 (Zone 13) and 166052 (Zone 14); Late Iron Age/early Roman 126196 (Zone 19); Roman 166088 (Zone 19)) and/or the skull vault (Zone 19 Roman 166088 and 220063), the entire bone was never affected. Variations in the larger long bones were often limited to the interior of shafts (both medullary and centre of the compact bone itself sometimes creating a 'sandwich' effect; McKinley 2008c, fig 2).

Numerous factors, both intrinsic to the process and imposed by external mechanisms, may have an impact on the efficiency of oxidation (McKinley 1994a, 76-78; 2004d, 293-295; 2008c). Some skeletal elements are more susceptible to poorer oxidation than others due to their dense soft tissue coverage (therefore requiring longer to burnt fully, eg, femur) or potential peripheral position on the pyre (eg, head and hands; McKinley 2004d, 293-5). The incomplete oxidation of parts of the skull vault seen in many cases at EKA2 (including one

Table 13.36 Summary of variations in levels of oxidation by phase

	MNI affected	*Number of skeletal areas affected*	*Number of skeletal elements affected*	*Elements most commonly affected*	*Colour variations*
Bronze Age	8	one: 4 cases (s. -1; u. -2; l. -1) two: 2 cases (s.+l. -2) three: 1 case (s.+u.+l.) all four: 1 case	1-7 (most <4)	skull vault, femur (4 individuals each)	black-grey, blue most frequent (31% cases)
Iron Age	3	one: 1 case (l.) two: 1 case (s.+l.) all four: 1 case	1-10 (most <3)	skull vault, femur (2 individuals each)	blue-grey
Roman	17	one: 6 cases (s. -1; a. -1; l. -4) two: 6 cases (s.+l. -2; a.+l. -2; u.+ l. -2) three: 4 cases (s.+u.+l.) all four: 5 cases	1-16 (16 <5; 2 between 5-10; 4 >10)	femur (15), skull vault (12), tibia (11), humerus (8)	brown/black-grey, most frequently blue (50% cases)

Key: s. = skull; a. = axial skeleton; u. = upper limb; l. = lower limb

or both temporals) could also be indicative of the oxygen supply to the head being curtailed via some mechanisms during cremation. This could have been effected by a pillow of some form being placed under the head or by it being encased in a cap/hood of leather/fur/skin.

Most of the distribution patterns (particularly the frequent involvement of the femur) seen in all phases here suggest a general shortfall in the timing of the cremation process. This may reflect either the use of insufficient fuel in pyre construction to sustain heat for an adequate length of time; the use of damp or unseasoned wood leading to a similar inadequacy in time/temperature (though people would have been amply familiar with the requirements for an efficient fire for this to have been a factor only in extremis); or inclement weather, ie, heavy rain quenching the pyre. In the few cases where the hands and feet were adversely affected (Zone 10 Roman 43003 male and 176312 male), the pyre may not have been built large enough to accommodate the deceased comfortably, leaving these extremities too close to the cooler margins. The common involvement of the skull vault may reflect similar marginal placement and/or the muffling effects described above. Two of the Roman individuals from Zone 19 show variations exclusively in several of the lower limb elements. This may indicate either partial muffling of the lower limbs as outlined above (planking/skins/leather below the legs) or a strong wind prevailing down the long axis of the pyre cooling the distal end. The relatively extensive incomplete oxidation of the remains of the Bronze Age neonate from Zone 6, fragments of the limb bones and axial skeleton from which were only charred (black), suggests that the baby may have been placed on the pyre within a wrapping of skins or furs which effectively muffled the body from the effects of the flame during the early part of the process.

Full oxidation of the organic components of the body in cremation is largely a modern Western health and safely requirement. The latter is not followed by some contemporary cultures (Barber 1990, 381-87 Perrin 1998; Downes 1999, 23 and 28), nor would it necessarily have been required by other cremating cultures within Europe's past. Where the requisite was for the 'magic' of transformation from one state (the corpse, recognisable as the individual) to another (burnt, clearly altered and 'purified' remains), with its potential links to soul beliefs (Gräslund 1994; Noy 2004; Toynbee 1971, 43), the degree of oxidation attained may have been of little or no consequence (McKinley 2006d; 2008c). Minor, and occasional major, variations in oxidation of the bone observed in archaeological cremation burials across the temporal range of the rite in Britain (eg, Bell 1988; Boyle 1999; McKinley 1997a; 2004e; 2008c) suggest a complacent or possibly simply pragmatic attitude to the level of oxidation attained.

At EKA2, although similar proportions of the minimum numbers of individuals from each of the three phases include some incompletely oxidised bone amongst their remains, the variations are most extensive in the Roman examples, this phase also being singular in its exclusive involvement of adults (Table 13.36). This suggests some temporal variation either in pyre construction (ie quantities of fuel used or size of the pyre) and/or in tending. It has been observed elsewhere that body mass appears to have been a major factor in the efficiency of Roman cremations, large adult males most consistently demonstrating incomplete oxidation of the bone (as in the most extreme case here – see above), suggesting that there may have been less flexibility employed in the size of pyres to accommodate the needs of individual corpses in this period (McKinley 2008c). No consistent patterns have yet been noted in burials from other phases, but the relatively low proportion of incompletely oxidised remains of Iron Age date has previously been noted (though the potential effects of preferential poor preservation on the less well-calcined bone has been highlighted as a possible factor in this observation; eg, McKinley 1997a, 66). The substantially lower proportion of Roman burials from Pepper Hill, Kent containing poorly oxidised bone (14.9%) stands in contrast to the observations here and from contemporaneous cemeteries elsewhere (average 53.8% of deposits from the towns and 44.8% from rural locations;

McKinley 2008c), and could also, at least in part, be indicative of preferential post-depositional taphonic destruction of such bone (McKinley 2006a; Witkin and Boston 2006, table 12).

Weight of bone for burial

As is frequently the case, the weights of bone presented should be viewed as a minimum of those deposited at the time of burial; albeit in most cases a fair representation of the original. The surviving depths of the remaining graves at EKA2 is such as to render removal of bone as a result of disturbance unlikely, but it is probable that some bone – from all periods – will have suffered due to poor preservation (particularly trabecular bone – see below). Although in general the quantities lost via this mechanism were probably not substantial, there is evidence to suggest that up to 15% of the bone may have been lost in this way in some cases, with rare examples of even greater proportions lost (see *fragmentation*).

The weight of bone recovered from the Bronze Age graves varied widely but both the average and maximum weights are relatively low for the period (Table 13.37). In part this reflects the nature of the assemblage (with a relatively high proportion of immature individuals) and the deposit types, where the only urned burials were those of immature individuals. The latter also represent the only undisturbed burials from this period. The 176.3g of bone from grave 153017 (Zone 11) embodies an unusually large amount of bone for a young juvenile, but the maximum and mean weights recorded for the adults represent only *c* 26.6% and 17.4% respectively of the average expected weight of bone from an adult cremation (McKinley 1993).

Although full recovery of the cremated bone from the pyre site for inclusion within the burial does not appear to have been a general requirement of the rite either in the Bronze Age or at any other period in which it was practiced in the British Isles, the weights recorded here place these remains at the bottom end of the range of weights recovered for the period (McKinley 1997b, 142). The location of the burials may be of some significance in that the remains of only one individual, the subadult from Zone 23, were deposited centrally within a ring-ditch/barrow. Burials made in the latter location most consistently include large amounts of bone (>1000g); in the case of 141084, the inclusion of only 42.2g of bone may be related to the type of deposit, which appears to represent redeposited pyre debris rather than a formal 'burial' (although this is uncertain due to excavation methodology – see above).

The upper range and average weights of bone from the Iron Age (including Late Iron Age/early Roman) burials are notably greater than for the preceding period (Table 13.37). There is the oft-observed difference in the average weights of bone recovered from urned compared with unurned burials, in this instance somewhat exaggerated by the fact that the latter include only one adult. The weights of bone recovered from the undisturbed deposits represent *c* 22.8% (unurned) and *c* 46% (urned) of the average expected weight of bone from an adult cremation (McKinley 1993); the greatest weight being recovered from grave of a probable female. The mean adult weights (overall and undisturbed) are greater than that of 301.1g from the undisturbed unurned burials at the contemporaneous cemetery of Westhampnett, West Sussex, similar to the 405.3g from Denmead, Hampshire, but slightly lower than that recorded at other cemeteries of this date in eastern England, such as King Harry Lane, St Albans, Hertfordshire, with a median range of 500-749g (Stirland 1989; McKinley 1997a, 68-9; 2006e).

The Roman deposits have a considerably broad range of weights than for the earlier periods, with higher

Table 13.37 Range of cremated bone weights and averages for different burial types by phase

	Range	*Mean*
Bronze Age	overall: 4.4g (foetus) – 424.3g (adult)	166.2g
	single adults: 81.5g – 425.3g	279.1g
	urned burials: 30.5g (neonate) – 176.3g (juvenile)	94.3g (all immature, max. 8-9 yr.)
	unurned burials: 4.4g – 425.3g	194.9g
	undisturbed: 13.9g – 156.7g (all urned immature)	67.0g (all immature)
Iron Age	overall: 14.3g (infant) – 735.6g (adult)	228.0g
(inc. Iron Age/Roman	single adults: 46.7g – 735g	309.4g
	urned burials: 35g (infant) – 735.6g	292.6g
	unurned burials: 14.3g – 365.1g	142.0g (only one adult)
	undisturbed: 365.1g (unurned) & 735.6g (urned)	550.3g (both adults)
Roman	overall: 51.5g (juvenile) – 1357.7g (adult + infant)	465.8g
	single adults: 78.7g – 1331.2g	490.2g
	adult female: 106.8g – 1331.2g	458.8g
	adult male: 271.9g – 1305.5g	694.9g
	dual burials: 783.7g & 1357.7g	
	(both adult females with foetus/infant)	
	urned burials: 51.5g – 1357.7g	662.4g
	unurned burials: 249.2g (adult) – 1237.3g (adult)	462.3g
	undisturbed urned: 404.7g (adult) – 1331.2g	895.4g
	undisturbed unurned: 369g (adult) – 1237.3g (adult)	619.5g

averages and considerably greater maximum weights. The larger number of burials from this period (giving more scope for variation) is probably a factor, as – certainly with respect to the Bronze Age figures – is the different demographic profile (proportionally fewer immature individuals). However, the absence of any large deposits of bone (>1000g) from the earlier assemblages does appear in stark contrast to the Roman examples. As observed in the previous phase and from contemporaneous deposits elsewhere, the average weight for the urned burials is greater than that for the unurned, though both types comprise several with >1000g of bone. The substantially higher averages for the undisturbed burials of both forms demonstrate the potential for post-depositional bone loss via a variety of mechanisms (see above and *taphonomy*). Although the average weight from the female burials is much lower than that from the male (by about a third), the minimum and maximum bone weights from both burial forms comprise the remains of females. This again suggests the probability that the larger numbers of the latter identified within the assemblage may have given greater scope for variation (Table 13.35). The average weights of bone recovered from the undisturbed deposits represent *c* 38.5% (unurned) and *c* 56% (urned) of the average expected weight of bone from an adult cremation (McKinley 1993); the largest of the adult burial deposits representing *c* 83%. Although the greatest weight of bone from a single burial represented the remains of two individuals, an adult female and an infant, such burials commonly include less bone than do those of single individuals (Table 13.37).

The overall average for the period is greater than that from contemporaneous graves at both Saltwood (214.7g) and Pepper Hill (397.5g); the undisturbed adult burials from the latter giving a broader range than here (70-1526g; probably at least partly due to the substantially higher MNI) but a similar average (775.6g; McKinley 2006a and b; Witkin and Boston 2006). As here (and as is commonly observed), no consistent link between the sex of the individual and the weight of bone included in the burial was recorded at Pepper Hill. Similar or lower average weights have been recorded from some contemporaneous Kentish cemeteries, for example St. Dunstan's, Canterbury (408.3g overall, 521.7g undisturbed urned burials; McKinley 2008a) and Cottington Road (653.3g overall; McKinley 2009a), whilst elsewhere the means are considerably higher, as at Cranmer House, Canterbury (708g overall; Garrard 1987) and Each End, Ash (947g; Anderson 1998). Similar variability is observed on the broader scale including within some of the larger cemeteries of eastern England (McKinley 2006b, table 6.6). Other than the variations related to age, burial form and levels of post-depositional disturbance discussed above, no consistent pattern can be detected exerting an influence on the quantities of bone collected for burial. The greater numbers of burials in the larger, predominantly urban cemeteries, is likely to have some effect on the range of weights observed given the potential for more variation within these assemblages.

Fragmentation

Cremated bone is by nature fragmentary and brittle. Dehydration during cremation leads to shrinkage, and the formation of cracks and fissures in the bone (McKinley 1994a; 2000a). Subsequent burial, with infiltration of soil into the fissures and the effects of wet/dry, freeze/thaw result in further fragmentation along these pre-existing lines of weakness. The effects are exacerbated if the burial environment is acidic (eg, clays and siliceous sands) and the bone is afforded no barrier between it and the aggressive soil matrix; trabecular bone in particular being prone to total disintegration during removal of the bone from its burial environment and post-excavation processing. Disturbance to the deposit may cause additional stress either directly (physical damage) or indirectly (by altering the burial environment: McKinley 1994b).

This post-depositional degradation of the bone, particularly that occurring during excavation, results in the bone crumbling to 'dust'-sized particles less than the 2mm fraction included in the total weights shown in Table 13.32 (see *Methods*). Frequently, much of the latter fraction also remains mixed with other extraneous material from the burial environment and cannot be weighed in its entirety. In the majority of cases the quantities of bone observed in these fractions is low, but occasionally it may be more substantial. An impression of the potential 'loss' of bone via these mechanisms is gained from the examples where it proved feasible to measure the approximate amounts of bone within this smallest fraction. Most of the visual observations (*c* 69% Bronze Age, *c* 67% Iron Age and *c* 71% Roman) match the relatively small quantities recorded from both urned and unurned Roman burials where between 5% and 10% additional bone by weight was recovered from the normally unsorted residues. These included the remains of young (5%) and elderly adults (8%), and an infant/juvenile (9%). More substantial amounts, within the range of 10-25% additional bone, were observed in a few cases (*c* 23% Bronze Age, *c* 17% Iron Age and *c* 8% Roman), again encompassing most age categories, and including a mature Bronze Age adult (unurned, *c* 14% additional bone) and the exceptional case of the Bronze Age urned burial of a juvenile (Zone 11, grave 153017) which contained *c* 50% more bone than is shown in the Table 13.32 quantifications. Conversely, other deposits (*c* 8% Bronze Age, *c* 17% Iron Age and *c* 21% Roman) contained little or no bone within this small fraction; examples within the upper range of this group include the elderly Roman male whose undisturbed urned burial remains (43003) had suffered little/no soil infiltration (3% additional bone in this fraction).

The majority of the bone from the Bronze Age burials was recovered from the 5mm sieve fraction (Table 13.38) with two exceptions; the unurned infant burial from Zone 13 where the majority (55%) was held in the 2mm fraction, and the unurned burial of an adult male from the same zone where most (55%) was collected in the 10mm fraction. In the former case, the exceptionally young age of the individual (25-35 weeks

Table 13.38 Bone fragmentation within different burial types by period

	Deposit type	*Mean fragmentation level (sieve fraction containing majority of fragments by weight)*	*Maximum fragments*
Bronze Age	overall	5mm: 45-64%, mean 56%; 83.3% of burials	range: 19-60mm; mean 34mm
	urned	5mm: 45-61%, mean 55%; 100% burials (all immature)	range: 19-60mm; mean 33mm
	* urned	5mm: 55-61%, mean 59%; 100% burials (all immature)	range: 19-29mm; mean 24mm
	unurned	5mm: 47-64%, mean 56%; 75% of burials	range: 21-47mm; mean 34mm
Iron Age (inc. Iron Age/ Roman)	overall	10mm: 61-81%, mean 70%; 71% burials	range: 22-82mm; mean 41mm
	urned	10mm: 70-81%, mean 76%; 75% burials	range: 35-82mm; mean 47mm
	* urned	10mm: 81% (one burial)	82mm
	unurned	10mm: 60-61%; 33.3% burials	range: 22-50mm; mean 31mm
	*unurned	10mm: 61% (one burial)	50mm
Roman	overall	10mm: 56-97%, mean 70%; 81% of burials	range: 35-215mm; mean 64mm
	urned	10mm: 58-97%; mean 72%; 92% burials	range: 42-215mm; mean 76mm
	* urned	10mm: 58-97%; mean 73%; 86% burials	range: 50-215mm; mean 88mm
	unurned	10mm: 56-80%; mean 68%; 80% burials	range: 35-82mm; mean 52mm
	*unurned	10mm: 57-80%; mean 65%; 100% burials	range: 44-82mm; mean 61mm

(Key: * = undisturbed)

foetal), and the consequently small size and extreme delicacy of the bone (only 4.4g recovered, mostly skull vault) is the main factor influencing the unusually small median fragment size. The above average (for this part of the assemblage) preservation of bone fragments in the adult male burial is probably related to the larger size and robusticity of this individual's bones – this representing the only male identified within the Bronze Age assemblage. Although in general the maximum fragment size from the adult remains was understandably larger than that from the immature individuals (38mm compared with 33mm), both the smallest and largest fragments were recovered from the latter (a 3-4 year old and a 8-9 year old respectively; both from relatively undisturbed urned burials).

This pattern of relatively high fragmentation has also been observed within contemporaneous burial remains from Kent, the majority of the bone from most of the CTRL examples also being recovered from the 5mm sieve fraction (McKinley 2006a) with maximum fragment sizes from undisturbed burials at White Horse Stone and Tutt Hill ranging from 11-73mm. Environmental factors, particularly soil type, are likely to have been a major influence in the county. At Amesbury Down, Wiltshire (on chalk geology), for example, the average maximum fragment size was 44 mm, but this was largely affected by those at the lower end of the range which derived from the infants (28-34mm, mean 32mm), whilst those from the adult graves were notably larger (59-68mm). The frequently reported preferential preservation of fragment size in remains from urned compared with unurned burials is not demonstrated in this assemblage since all the urned burials are those of immature individuals

The Iron Age bone (predominantly Late Iron Age/early Roman) generally appears less fragmented than the Bronze Age material; the majority of the bone was recovered from the 10mm sieve fraction, the mean maximum fragment sizes are greater and the upper range is higher for all burial categories (Table 13.38). To some extent this reflects the lower proportion of immature individuals in this part of the assemblage; the 5mm residue held the majority of the bone (55-68%) from the two infant burials and the maximum fragment sizes are in the lowest part of the range (22-35mm). There is also a higher proportion of urned burials within this phase, and the figures demonstrate both the commonly observed benefits of burial in an urn and the detrimental effects of disturbance irrespective of the burial form.

The data for the Roman burials show the bone from this period to be the least fragmentary. Once again, this in part reflects the influence of a higher proportion of urned burials than seen in the Bronze Age and a lower proportion of immature individuals than seen in either of the earlier phases. There were also substantially more undisturbed (or at least relatively so) burials than seen in the previous periods; *c* 50% compared with *c* 25% Bronze Age and *c* 29% Iron Age (see Table 13.32). The 19% of burials where the majority of the bone was not recovered from the 10mm fraction comprised, with one (subadult) exception, the remains of adults (male and female, some elderly); their remains fell predominantly in the 5mm fraction (45-67%), and included the burial with the smallest maximum fragment size. Most derived from Zone 19 where the heaviest truncation damage to graves was recorded (see above).

The protective influence of the urn is further highlighted in the Roman figures, as are the benefits of limited disturbance to the burial remains. Two of the urned burials from this period were particularly well preserved, and the lack of disturbance is strongly reflected in the condition of the bone. The 250mm high vessel (ON 1258) used for burial 166088 in grave 166082 was one of only two to survive totally intact (Pl 13.43). In this instance the only threat to the survival of the bone was the soil matrix which had infiltrated the fill after the loss of the seal/lid (which in this instance may have comprised textile, leather/skin or a stone). Most (74%) of the 1075.7g of bone was recovered from the

Pl 13.43 Urned Roman burial 166088 (ON 1258): complete vessel lifted for laboratory excavation

10mm fraction, and the largest recorded fragment in the whole assemblage (215mm) lay almost vertical against one side of the vessel (Pl 13.44 and 45). In the case of burial 43003 from Zone 10, the condition of the bone at excavation is unlikely to have changed from that at deposition. In this instance very little soil had infiltrated the narrow neck of the intact vessel and on removal the bone appeared almost pristine (Pl 13.1, 2, 39 and 41). The majority (79%) was held in the 10mm fraction, with a maximum fragment length of 111mm. The excellent condition of both these burial remains and those from grave 166082 is demonstrated by the large proportions

Pl 13.44 Urned Roman burial 166088 during excavation; top of spit 8 showing long bone fragments lying vertically against side of vessel

identifiable to skeletal element (70% and 67% by weight respectively). The size of these remains is commensurate with that from modern British crematoria where fragments of up to 195mm have been recorded (prior to deliberate mechanical pulverisation – *cremulation* – of the bone within a *cremulator*), and where it is known that no deliberate fragmentation had occurred, only that due to cremation and raking-down of the bone (McKinley 1993).

Further evidence of the damage which may be sustained as a result of excavation – despite extreme care – is provided by comparing the pre-excavation maximum fragment size with that recorded in osteological analysis. In two of the vessels excavated by the writer – 252067 and 215192 (Zone 20) – fragments recorded as 110 and 90mm *in situ* were reduced to 52mm and 33mm respectively by the time they returned for osteological analysis.

The same general temporal increase in recorded fragment size was observed in the remains from CTRL High Speed 1 and, as at EKA2, the changes was largely

Pl 13.45 Urned Roman burial 166088: long bone fragments

attributed to an increase in the proportion of urned compared with unurned burials (McKinley 2006a; Witkin and Boston 2006). Overall, there is no conclusive indication that deliberate fragmentation of bone occurred prior to burial. The apparent regional tendency for comparatively greater levels of fragmentation in the Bronze Age, which at EKA2 is largely explained by demographic and taphonomic factors, may also mask an incidental increased fragmentation due to minor variations in the post-cremation recovery and storage procedures. Trampling across the pyre site during recovery of the bone rather than raking or hand collection from the margins, for example, or recurrent transference of the remains from one receptacle to another, would both have increased fragmentation of this very brittle material along dehydration fissures formed in cremation.

Skeletal elements

In common with earlier observations on bone weights and fragment size, there was a general temporal increase in the proportion of the bone from the burials identifiable to skeletal element, from a mean of 39% (by weight) in the Bronze Age, to 56% in the Roman, via 43% in the Iron Age. The pertinent factors include those affecting the two previous categories of data – taphonomy, deposit type and, to a lesser extent, demography. The two earlier assemblages fall within the commonly observed range of *c* 30-50% identifiable elements (personal observation), the Roman mean being slightly above the average.

The figures for the Bronze Age have a range of 24-47% identifiable elements (with one outlier at 61%, the foetal remains totalling only 4.4g). With the exception of one of the infant burials, from which only 11.6g of bone was recovered and where all of the 28% of identifiable elements were skull fragments (see below), some bones from all four areas of the skeleton (skull, axial skeleton, upper and lower limb) were identified from each of the graves. Generally, elements of skull were over-represented at the expense of axial skeletal elements together, in some instances, with the upper limb. Such a bias in favour of skull elements is a regular occurrence across the temporal range, reflecting – in the majority of cases – the comparative ease with which even small fragments of this part of the skeleton can be identified rather than deliberate selection of skull fragments for burial (McKinley 1994a, 5-6). The paucity of axial skeletal elements is also a recurrent feature, this area of the skeleton comprising mostly trabecular bone which is preferentially prone to taphonomic destruction (see above). One adult male (unurned burial 159133, Zone 13) is represented by unusually low proportions of skull elements (7.5%; see below) amongst the identifiable bone (43% of total weight); given the ease of identification of fragments of even small size (2-5mm and sometimes less), such an occurrence is suggestive of deliberate selection/exclusion. In this case the grave had survived to a relatively substantial depth (*c* 0.13m), rendering bone loss due to disturbance unlikely. That *c* 78% of the bone identifiable to element comprised fragments of lower limb suggests either deliberate selection of the latter for burial or, potentially, preferential removal of the skull fragments for disposal/use elsewhere (see below).

The Iron Age figures show a much broader range than seen in the preceding period (13-70% identifiable to element), the highest proportion being recorded in two urned burials, both those of adult females from Zone 19 (126195 and 220121). As previously, most cases show a bias towards the identification of skull elements at the expense of the axial skeleton. The figures from burial 220121 show the nearest to a 'normal' distribution of elements (see below) with the exception of a paucity of fragments from the axial area (owing to taphonomic factors). The lower limb is strongly represented in two burials; in one case the proportion of skull elements is close to normal (classified as *c* 18% by weight – see below) but in the other accounted for only 8% of the identifiable elements. In this case (171024, Zone 11) the nature of the deposit is not conclusive and only 46.7g of subadult/adult bone was recovered from the 0.29m deep 'grave'; here it is likely that most of the bone from the cremation – including the skull – was disposed of elsewhere. The urned burial of an adult from Zone 19 (220075) has a similarly low bone weight (43.2g), and, as the grave had survived to 0.20m in depth, it is unlikely that bone will have been lost to disturbance. Here again, *c* 70% of the 52% of bone identified to skeletal element comprises lower limb fragments, with less than 1% representing skull fragments. The absence of the latter appears deliberate, and given the overall small quantity of material from this deposit, most of the bone – including the skull – was obviously disposed of elsewhere, and this deposit may have been more accurately interpreted as a 'cenotaph' (see below; McKinley 2004d; 2013).

The proportion of identifiable skeletal elements from the individual Roman burials shows an extensive range (11-93% of total weight of bone from burial), the lowest percentage deriving from the unurned burial of a mature adult female (220118 Zone 19) and the largest from the relatively undisturbed urned remains of an elderly female (177482, Zone 19). Although the urned burials fall in the upper part of the range (37-93%) and the unurned burials in the lower part (11-64%), potentially demonstrating the effects of taphonomic factors (see *fragmentation*), there is little difference between the means (62-63%). The remains from two burials show a near-normal distribution of skeletal elements: 67% of the bone from the intact urned burial 166088 (Zone 19; mature adult, unsexed) was identifiable to element of which 22% was skull, 19% axial skeleton, 18% upper and 42% lower limb (normal proportions (by weight) would be *c* 18%, 20%, 23% and 38% respectively); a very similar distribution was recorded from the undisturbed unurned burial 220059 (Zone 19, elderly female) at 22%, 16%, 18% and 43% respectively (55% identifiable to element). The remains of a male and a female from two other burials also show a fairly close to normal distribution of elements (young and older adults). In most cases, however, there is the commonly observed imbalance in favour of skull elements, markedly so in some instances; a maximum 60% of the identifiable elements from one unurned burial (adult; 220116 Zone 19) comprises skull, and since *c* 62% of the bone was identifiable to element this suggests a level of deliberate selection in this instance.

In the rare cases of an imbalance in favour of other skeletal areas (upper (two) or lower limb (four), all adults across the age range and inclusive of both sexes), skull elements are not generally significantly under-represented (12-17%). In one case, however, skull fragments accounted for only 7% of the 55% identified elements (248263, Zone 19, unsexed adult). The damaged vessel (ON 3642) had survived to a maximum depth of only 60mm, and the paucity of skull (especially vault fragments) and comparative preponderance of lower limb elements (61% identified elements) may reflect the formation process of the burial deposit, with the latter being placed in the vessel first and the skull elements towards the end, and thereby preferentially removed during truncation of the deposit (also see *formation processes*).

Elsewhere in the county individual cases of deliberate exclusion of skull fragments from Roman burials have been recorded at Pepper Hill and Saltwood (Witkin and Boston 2006; McKinley 2006b), with two cases from St. Dunstan's (McKinley 2008a). Similarly rare exclusion of skull elements has also been observed on a wider scale (McKinley 1997a, 252; 2004d, 301). The absence of such easily identifiable elements – both for the osteologist and for those who collected the bone from the pyre site for burial – implies deliberate action. The recognisable features and symbolic significance of the skull may have rendered these fragments most suitable for some other ritual purpose in some instances; particularly in a mortuary rite where burial was secondary and characterised by the inclusion of only some, albeit variable quantities, of the cremated remains (McKinley 2006d). The Roman assemblage from Saltwood included three truncated urned burials similar to 248263 from EKA2 (see above), again implying that the bone was put in the urn as it was collected from the pyre for burial with recovery commencing at the foot end and working towards the head (McKinley 2006a). A similarly ordered deposition of remains was recorded in five (9.3%) of the urned burials from Pepper Hill (Witkin and Boston 2006).

The overall figures, for all phases, fail to indicate any consistent pattern in the quantities of different skeletal elements included amongst those collected for burial. In general, most individuals, irrespective of the age, sex or mode of burial, appear to have been represented by a relatively random assortment of bone fragments assembled from across the pyre. Where there are clear cases or strong indications of selection, there is little to indicate why those particular individuals should have been subject to different treatment from their contemporaries.

The small bones of the hands and feet, together with tooth roots no longer *in situ* (and generally in the absence of the supportive structures/tooth sockets), are commonly recovered from the remains of cremation burials of all periods. It has been suggested that the frequency of occurrence of these small elements may provide some indication of the mode of recovery of bone from the pyre site for burial (McKinley 2000; 2004d, 299-301).

From one to 15 hand/foot bones and one to 16 tooth crowns/roots were each found in 67% of the Bronze Age burials (53% had some of each; maximum combined total 20 from juvenile 153020, Zone 11). A higher proportion of adult (83%) than immature remains (55%) included such elements, but the latter generally featured the greatest number of tooth crowns/roots (the maximum of 16 from the neonate 247151, Zone 6). Half these deposits contained less than 10 such elements, but two (adult and subadult/adult) included 13-15 hand/foot bones (each also had four tooth roots) and four included 11-16 tooth crowns/roots (three immature, one adult; each with one-five hand/foot bones). The writer has previously observed that Middle Bronze Age burials, by way of example for the wider period, generally include in the region of five to 20 such elements, placing those reported here within average for the period.

Some of these small elements were recovered from all the Iron Age burials, most of which included less than 10; between two and eight tooth roots in six burials, and one and 14 hand/foot bones in seven, five deposits containing some of each (maximum combined total 17, adult female 252216, Zone 4).

Most (*c* 70%) of the Roman burials contained some of these small bones; a slightly higher proportion of the adult (*c* 73%) compared with the immature (*c* 60%) remains, and less female (*c* 87%) compared with male (100%) burials. Although, as previously, the majority (*c* 56%) included less than 10 such elements, and one (*c* 4%) contained 10-20, a substantial proportion (*c* 35%) held >20. The latter include two female burials (mature adult 271010 (Zone 7) and young adult 176312 (Zone 10)) with 55 (44 hand/foot and 11 tooth roots) and 57 (46 hand/foot and 11 tooth roots) elements respectively. The largest numbers were recovered from the two totally undisturbed urned burials 43003 (Zone 10; elderly male) and 166088 (unsexed mature adult, Zone 19); the former with 91 elements (84 hand/foot, ie, all or parts of most bones from these areas, and 11 tooth roots) and the latter with 72 (68 hand/foot bones and 4 tooth roots). Both these burials contained large quantities of bone (>1000g) demonstrating that an effort had been made to include a substantial proportion of the remains from the pyre in the burial. Thirty-five of these small elements (19 hand/foot and 16 tooth crowns/roots) were included amongst the remains of one infant/juvenile (215197, Zone 19). A paucity of these small bones has been observed and discussed by the writer with respect to some Roman cemeteries such as Brougham, Cumbria (McKinley 2004d), and Anderson observed that very few were found in the burials from Ash (1998, 125). Their frequency is available for only three sites in the CTRL High Speed 1 scheme (Boys Balancing Pond, Little Stock Farm and Saltwood; Márquez-Grant 2006; McKinley 2006b and c), where, although higher numbers were recorded than at Brougham and Ash, the numbers were still in the low to medial range (<20). A maximum of 17 was recorded at St. Dunstan's (McKinley 2008a).

Whilst taphonomy may have had an influence on the survival of some of these bones (ie the largely trabecular carpals and tarsals) it is unlikely to have represented a major factor. Similarly, the effect of the age of the individual will have had some impact, though the various parts of the teeth and the phalanges are relatively robust and often survive as well as the long bone shafts. Such remains are, however, very small, and would be very difficult to distinguish in hand-recovery of individual bones from the pyre site. The frequent inclusion of such small bones (as opposed to the presence of small fragments of bone, which may be a taphonomic artefact) may suggest that rather than hand collection of individual bone fragments, the material in the upper levels of the burnt-out pyre (including most of the bone) was raked-off and subsequently winnowed (by wind or water) which would enhance their ease of recovery. An alternative possibility may be that the remains were left on the pyre for a day or so, allowing natural winnowing by the wind to remove the fine fuel ash, leaving the cremated bone more exposed and easily accessible. The data from most of the remains suggest that hand-recovery was employed – an observation supported by the evidence for ordered deposition in some burial remains. There are, however, some cases, particularly from the Roman period, where the alternative mode of recovery is suggested. The pattern of involvement is not such as to indicate a specific range of individuals who were treated in this manner, and it may simply have been dependent on the varying inclination of the pyre attendants.

Dual cremation and burial

Conclusive evidence for dual cremation was limited to the Roman period for which two middle phase burials contained the remains of an adult and an immature individual (*c* 6% burials). Rates of 2.4-5.7% have been recorded from contemporaneous cemeteries across the county, both Crammer House and Pepper Hill falling at the lower end of the range recorded nationwide (2%-8%), with St. Dunstan's showing a similar rate to that recorded at EKA2 (Garrard 1987; McKinley 2000d, 272; 2004d; 2008a; Wells 1981; Witkin and Boston 2006). The presence of such burials is not ubiquitous, and there are numerous cemeteries devoid of any examples including Lankhills, Hampshire (Clarke 1979), Walls Field and Walls Common, Baldock (Stead and Rigby 1986), Puckeridge (Wells 1981), and the smaller burial groups within the CTRL Kentish High Speed 1 project (McKinley 2006a).

As here, the most commonly recorded combination is that of an adult or subadult/adult (predominantly but not exclusively female) with a young immature individual (McKinley 1994a, 100-102; 2000d). The circumstantial evidence for a familial link between individuals apparently cremated and buried together is fairly compelling, particularly in the two cases recorded here (from Zones 7 and 20), but it cannot be assumed to have always been the case; close neighbours and friends who were unfortunate enough to die within a short time of each other may also have been cremated together (Toynbee 1971, 55; Morris 1992, 42; Noy 2005; McKinley 2006d).

One Late Bronze Age deposit from Zone 12 included two small fragments of what appeared to be infant bone (0.2% of total bone weight) but the evidence for dual cremation is inconclusive. The fragments may have been accidentally included with contaminated pyre debris (where a pyre site was reused and ineffectively cleared between cremations), or they may represent a 'token' deposit of fragments from an earlier cremation (see below). Similarly, although the 1.2g of bone from a Late Bronze Age deposit in Zone 4 clearly comprised parts of two individuals, the nature of the deposit is unclear. It clearly did not represent a burial, but consisted of redeposited pyre debris potentially from more than one cremation.

Pyre goods

Pyre goods, in the form of small quantities of cremated animal bone, were recovered with the remains of three Iron Age (42%) and 17 Roman (51%) individuals (Table 13.32). The quantities of bone from the earlier phase are very small (0.2-2.1g) and the species unclear, but both bird and medium-sized mammals appear to have been present and a fragment of deer antler was recorded from one burial.

The quantities of cremated animal bone recovered from the Roman deposits were also generally very small, with a maximum of 21.2g from an urned burial in Zone 10, representing 1.6% of the total weight of bone recovered. Six deposits included fragments of a single species; unidentifiable in three cases, two with chicken and one small bird (*turdus* sp./*passerine* sp.). Two species were identified within a further six; each including either chicken or small bird with pig (three cases) or sheep/goat (two cases). One contained three species and another four, each featuring small bird, pig and dog with, in the one case, sheep/goat as well. Cremated animal bone was found with individuals across the age range and with both sexes, but a much larger proportion of the adults than immature individuals were accompanied by such remains (57% compared with 20%). The remains of all the male adults with pyre goods were accompanied by some cremated animal bone, as were 67% of the adult females. Both the frequency of occurrence, number of species and quantity of animal bone recovered, as with evidence for other pyre goods, should be viewed as a minimum. It may not have been considered necessary to include all the animal bone, or possibly in some cases any of it, in the burial. Where only a relatively small proportion of the human remains were subject to archaeologically recoverable/recognisable burial, the remains of any of the pyre goods may have been subject to similar treatment. There is evidence from some contemporaneous cemeteries for deliberate selection of certain types of pyre good for burial, others being left with the pyre debris (Cool 2004, 437-60; Polfer 2000).

Table 13.39 shows the frequency and distribution of the various species. Domestic fowl (including 'bird' of commensurate size) is the most regularly occurring species, the elements recovered suggesting that the entire bird was being placed on the pyre. Pig, particularly neonatal/immature, is also common; the elements identified are predominantly from the head and feet. The elements of sheep/goat are indicative of joints of meat being placed on the pyre with the deceased. Small birds were mostly found with females and were probably kept as pets; Pliny tells of a boy whose numerous pets were slaughtered to be cremated with him, including nightingales, parrots and blackbirds (Toynbee 1971, 291). Similarly, with the two dogs for which there is evidence, the one found with the elderly female was clearly a small animal and probably a 'lap' dog. Some animal bone fragments were too small and morphologically non-descript to allow species identification. A greater range of species were found with the females compared to the males, though the individual with four species was an unsexed adult; 15.2g of animal bone was recovered from the latter representing 10% of the total weight of bone from the deposit. There is little obvious link between age and the species found, but it was observed that 40% of the chicken was recovered from amongst the remains of older adults (>45 years) when only *c* 30% of the assemblage fell into this age range.

Three of the Roman burials with cremated animal bone also included fragments of unburnt bone – the remains of grave goods. A further five deposits contained unburnt bone only (excluding those where the bone was obviously intrusive); ie, *c* 21% of individuals were accompanied by grave goods comprising unburnt animal remains. The species were limited to neonatal or immature pig and sheep/goat (including neonatal/immature; Tables 13.32 and 13.39).

The presence of cremated animal bone amongst the burial remains is a characteristic of the mortuary rite across the temporal range (McKinley 2006d, table 5.1), with a wide variation in the numbers involved from different Roman cemeteries, for example from *c* 3.5% at Westhampnett, West Sussex (McKinley and Smith 1997) to *c* 80% at Ryknield Street, Wall, Staffordshire (McKinley 2008d; 2004d). Its inclusion in contemporaneous Kentish burials appears relatively frequent, the various burial groups within the recently excavated High Speed 1 project ranging from 23.9% (Pepper Hill; Witkin and Boston 2006) to 40% (Saltwood Tunnel; McKinley 2006a; 2006b). At Each End, Ash 25% of the burials contained the remains of animal pyre goods (Anderson 1998). No examples were recorded from any of the Cranmer House burials (Garrard 1987); however, it is possible, given the often very small quantities in which this material occurs in the neighbouring site of St. Dunstan's (where 36-38% of the burials from different phases contained cremated bone; McKinley 2008a), that it was overlooked in analysis. As at EKA2, the quantities of bone included are generally relatively low and the variety of species limited, pig and domestic fowl being the most popular (eg, Harman 1985; Rielly 2000, table 26, 76). The species observed are reflected elsewhere in the Roman world; for example at sites in northern France (Meniel 1993) and at the Mid Roman military cemetery of Kesteren in the Netherlands (Hessing 1993) pig predominated, with lesser amounts of cattle and sheep/goat, dog and chicken.

The popularity of pig is likely to reflect the ritual status of the animal, which included a legal requirement for their sacrifice at the graveside prior to burial, the graves not …'really becoming graves until the proper rites are performed and a pig is slain' (Cicero *De Legibus* II 22, from Toynbee 1971, 50; Witkin and Boston 2006). The inclusion of chicken, whilst probably representing a food offering, could also reflect the symbolic significance of the cock's associa-

Table 13.39 Distribution of animal remains from Roman cremation burials/deposits by species (species identifications by Lorrain Higbee)

Species	*Number burial/deposits*	*With adult*	*With adult*	*With immature individual*
Pig	9	4	1	2 (1 subadult)
cremated	5 (3 neonatal/immature)	2 (neonates)		
unburnt	5 (neonate/immature)	2 (neonates)	1	2 (1 subadult)
Chicken				
(all cremated)	8 (inc. 2 'birds')	3	1	1
Sheep/goat	7	5	1	
cremated	3	1	1	
unburnt	4 (2 neonatal/immature)	4 (2 neonatal/immature)		
Small bird				
(all cremated)	5	3		
Dog				
(cremated)	2	1		
?roe deer				
(cremated)	1	1		
medium mammal				
(cremated)	3	1	1	
unidentified				
(cremated)	2	2		

tion with the dawn and the god Mercury, messenger to the underworld and escort to the dead (Black 1986; Wheeler 1985). Dogs may also be linked with one of a number of Celtic and Roman deities including Nodons (equated with Mars), Aesculapius (healer) and Epona (the Celtic horse-goddess; Green 1994). There are a number of instances of unburnt dog remains being recovered with both inhumation and cremation burials from Britain, the suggested symbolism being that of guardian and/or guide (Smith 2006, 36-45); though the continued companionship of an affectionately regarded pet in the otherworld is also likely to have been a factor (eg, Toynbee 1971, 291 note 172; McKinley 2006d).

Five of the Roman burials from Zone 19 had either blue/green spot staining (from copper-alloy) or iron staining to one or more bones (Table 13.32). In some cases, particularly that involving iron, the staining will have occurred within the burial environment and can be linked to an adjacent iron artefact. Such is not always the case with the copper-alloy staining, which in some cases may be seen on bone from deposits from which no copper-alloy items have been recovered. Such staining is likely to have occurred on the pyre and may be indicative of the location of items of personal adornment on the body laid-out for cremation; eg, the staining to the left temporal of the elderly woman from 153070 and the upper arm bone of the mature adult female from 126111

Pyre debris

Pyre debris is the material remaining at the pyre site after the bone and pyre goods intended for burial, and potentially other forms of disposal, have been removed. The major component usually comprises charred wood (remains of fuel) of varying particle size (from minute dust-sized particles to lumps of charred log), with varying quantities of cremated bone, sometimes pyre goods, and potentially (dependent on the underlying soil type) burnt flint, burnt clay and fuel ash slag (general hearth slag formed on highly siliceous soils). It is frequently recovered redeposited within cremation graves (particularly with unurned burial remains), where it usually comprises a more or less homogeneous mix of archaeological components, but it may also be found in both pre-existing and apparently specifically excavated features (McKinley 1997b; 2000e). Lone or 'formal' deposits of pyre debris have, for example, been recorded within several Roman cemeteries both in Kent (eg, Pepper Hill and Saltwood) and elsewhere (Jessup 1959, 6-7; McKinley 2004d; 2006a; 2006b; Witkin and Boston 2006). Whether the inclusion of this material in the grave represented a purely practical 'cleaning-up' process or part of the 'closure' of burial is uncertain, but its presence does suggest the relative proximity of the pyre site to the place of burial. Cremated remains are intrinsically portable, whether urned or carried in some other form of container (bag/basket), but it is less likely that a separate container of pyre debris would also be carried any significant distance or that such material would have been subject to 'curation'.

Redeposited pyre debris was recovered, often in copious amounts and generally as small 'dust'-fraction particles, from all the Bronze Age graves containing the remains of unurned burials, and from two of the three urned burials. In the case of 247151 (Zone 7), the pyre debris was clearly inside the urn since the fill was 'sealed' below the collapsed base of the vessel which was then overlain by the pushed-in sides; the matrix above this, derived from the grave fill, was devoid of pyre debris. The latter was concentrated 'above' the bone within the inverted vessel; a *c* 70mm depth of charcoal-rich material largely devoid of cremated bone (spit 2) lay below the collapsed base, the bone being concentrated in spits 3-5 (of six). The formation process had involved pyre debris being placed in the base of the vessel, then the bone, the subsequent inversion for burial resulting in a slight infiltration of the former amongst the latter. A variation on this theme was observed in burial 152320 (Zone 11). In this case the fuel ash was concentrated to one side, particularly in the upper levels of the inverted vessel, spreading across to the other side in the lower levels in decreasing quantities before petering out. The bone was predominantly mixed with the fuel ash in the upper layers, but a substantial proportion (34-45% by weight) lay outside the charcoal-rich quadrants. The evidence suggests, again, that the pyre debris was added to the vessel first, the bone, apparently in a bag in this case, was then added before the vessel was inverted for burial. A level of infiltration amongst the bone by the fuel ash would eventually have followed. The reasoning behind the interpretation of most of the deposits in Zone 4 as lone/'formal' deposits of pyre debris has been discussed above (see *demography*).

None of the graves containing the remains of Iron Age or Iron Age/early Roman urned burials incorporated pyre debris, but all those containing the unurned burials did. In grave 147141, the excavator observed that the bone appeared to have been buried in a bag fastened with a brooch (0.29m diameter, 0.10m deep concentration of bone forming a cone) and placed above a set of ceramic grave goods (Fig 4.42). The fill of the vessel within the potential cenotaph deposit from Zone 6 (Table 13.32) was charcoal-rich, and several lone deposits of pyre debris were found in Zone 11 (see below).

The majority of the Roman graves, irrespective of burial type, did not contain redeposited pyre debris. The few deposits interpreted as potential cenotaphs were also devoid of fuel ash. In the few cases where pyre debris was found in association with the remains of an urned burial the location of the fuel ash is uncertain due to disturbance and/or a lack of clarity in the site records. The formation process is similarly unrecoverable in one of the two unurned burials inclusive of pyre debris. In the case of 150101 from Zone 19, however, although the records suggest that the fuel ash was spread throughout the grave fill, the bone (recovered separately from each half of the grave) was concentrated in the south-east half (74%) of the grave suggesting this is where the burial was made with the pyre debris subsequently deposited above it.

The temporal variation in the frequency with which pyre debris was redeposited in grave fills may be indicative of a change in the location of the pyre site in respect to the place of burial. As observed above, cremated remains are easily transportable and it is possible that in the Late Iron Age through into the Roman period, there was a shift away from the cemetery also functioning as a crematorium and that cremations were undertaken closer to the deceased's place of residence. This would, however, be at odds with what is commonly observed for the period, and an alternative may be that, particularly in Zone 19, we are on the margins of a larger cemetery, the *ustrina* (cremation areas) for which lay some distance from the excavated graves. It has been observed in at least one large cemetery of this date that the distance from the known *ustrina* appeared to affect the frequency with which redeposited pyre debris was incorporated in the grave fills (those further away being less likely to contain much/any; McKinley 1991).

Cenotaphs and 'token' deposits

Cenotaphs are features which have the characteristic appearance of graves, potentially including pyre goods and pyre debris, and even grave goods, but which are either devoid of or contain very little cremated bone (often less than 10g). Toynbee (1971, 54) noted the Romans' use of cenotaphs 'if a person's body was not available for burial' or 'for some person whose remains were buried elsewhere'. One Late Iron Age/early Roman deposit (Zone 6) and two Roman deposits from Zone 19 have been interpreted as probable cenotaphs; the earlier example contained a large quantity of fuel ash (see above) but the later vessels were empty. One other deposit from Zone 19, identified as an urned burial in Table 13.32, may also more accurately be interpreted as a cenotaph (see *skeletal elements*). Although the 'placed deposits' of Bronze Age vessels from Zone 23 and 26 ostensibly have no connection with the mortuary rite, it is possible that these also represent cenotaph deposits.

Several potential examples of Middle/Late Bronze Age cenotaph deposits were recorded at four sites in the CTRL High Speed 1 scheme. Some contained very small quantities of bone (<10g) or 'substantial' quantities of charcoal, whilst others appeared to be empty (McKinley 2006a). Similar examples have been recovered from various sites across the south of the country, the inclusion of burnt material suggesting that at least some of the deposits could be associated with the cremation rite, functioning in a similar way to the cenotaphs seen in later phases. In one case from Kent, the archaeobotanist interpreted the charcoal found in one of these vessels as pyre debris – despite the absence of cremated bone – on the basis of the lack of diversity and species identified compared with those from domestic assemblages (Challinor forthcoming). Numerous examples have been recorded from Roman sites, for example, a potential 26 such features were identified at Pepper Hill and a possible 14 at St. Dunstan's (McKinley 2000e; 2004d, 284, 306-307; 2008a; Wenham 1968, 25; Wheeler 1985; Witkin and Boston 2006).

The word 'token' is variously defined as 'symbolic', 'nominal' or a 'memento'. Its use in respect to the mortuary rite of cremation is slightly problematic, the term 'token burial' being used to cover a multitude of undoubtedly different types of deposit containing only small quantities of bone (see above; McKinley 2013; forthcoming c). Its use in this report has been specifically limited to cases which appear to represent small (possibly one or two fragments only but generally <10g), symbolic amounts of bone, *memento mori* deposits potentially retained by the deceased's friends or relatives as, for example, those distributed in 18th century Aboriginal Australia (Hiatt 1969, 105). Some such deposits may eventually have been buried, perhaps at a much later date, together with the remains of another individual (eg, McKinley 2004c; 2006f). It has also been use to describe similar small quantities of bone from the same cremation as represented within the rest of a grave which appear to have been deliberately placed within an accessory vessel.

Formation processes

For much of the assemblage, the available evidence for formation process has already been applied to the broad interpretation of the deposit type. In many cases, further details of the burial formation process could not be deduced due either to post-depositional disturbance of the deposit or the excavation methodology employed (see *methods*). In a number of instances, however, particularly where urned burial remains were lifted *en masse* for excavation by the writer, particulars of the formation process could be defined more closely. Some examples have already been discussed above (see *pyre debris),* and a few other specific points and cases will be outlined here.

The Roman urned burial 420003 from Zone 10 provides an almost unique view of a burial formation process. Although similarly narrow-necked vessels have been found elsewhere in the British Isles functioning as urns (eg, Barber and Bowsher 2000, figs 74-5) their upper levels are frequently damaged/missing, as is often the case with burial urns. In this intact example, it can be seen that those undertaking the burial had recognised that the internal diameter of the neck (30mm) was too narrow to allow the bone to be inserted (see Pl 13.1b-c above). Consequently, after removing the handles, they had knocked off the neck, creating a 61 x 49mm opening through which the large bone fragments could be fed (see Pl 13.1a). The maximum fragment size was 111mm, and in the case of one fragment of pelvis careful manoeuvring would have been required to fit it through the opening. After adding the 1305.5g of bone (skeletal elements in no particular order), and apparently shaking the vessel at intervals to ensure that it lay flat within the vessel (otherwise it would have formed a cone in the centre and/or lain at an angle within the vessel; see Pl 13.2), the broken neck was replaced and the vessel buried. The vessel was not filled to capacity; the upper 100mm was void, and very little soil had infiltrated (part of the neck was damaged in machine stripping of the site, most of the recently broken fragments being recovered from inside the vessel on top of the bone). In addition to demonstrating the lengths to which the mortuary attendants would go to use the chosen vessel for burial, this also illustrates that bone was not deliberately broken after cremation to enable it to fit through the narrow neck of the vessel, as has often being postulated in the past; rather, the vessel was adapted to accommodate the bone (also see *fragmentation*).

The horizontal organisation of the bone in three other Roman urned burials from Zone 20 also suggests that the vessels were periodically shaken during the deposition of the bone (215191, 215192 and 252067). Other examples indicate that the vessel was tipped slightly to one side during addition of the bone and subsequently not levelled, or that the vessel was tipped during transportation, shifting the contents. Such appears to be the case in the Late Bronze Age burial 220025 from Zone 14, where the bone was confined to one side only in the upper half of the vessel. In the Roman burial 166088 from Zone 19, there was very little bone in the upper 80mm of the intact vessel (230mm depth) and that was concentrated on one side. In the lower levels the bone was steeply angled, some resting almost vertically against the sides of the vessel, with frequent interleaving between the fragments; fragments of tibia and fibula shaft within one quadrant extended through a 170mm depth of the vessel (Pl 13.44 and 45; Fig 13.1).

Although few skull elements and a preponderance of lower limb fragments were found in the final spit within burial 166088, there was no supporting evidence for an ordered deposition of skeletal elements. Joins were found between fragment of ulna shaft from spits 3b and 5c, and fragments of mandible from spits 5c and 7c, with a 20-40mm depth between the spits. Fragments of the animal bone from this burial were also distributed throughout the fill (spits 3-7 of 8). Joins between dispersed bone fragments were also observed in burial 215192 (Zone 20), comprising fragments of left temporal from spits 3a and 5d. In burial 252067 from the same zone, most skull elements were found in spits 1 and 2 (of 4), but the other skeletal elements were distributed throughout the fill. A similar observation was made with respect to burial 279098 from Zone 19, and in the earlier burial 126196 from the same area lower limb was seen to predominate in the lower levels of the vessel. In these cases there is a suggestion that certain elements may have been held back as a final inclusion in the burial, but it is not suggestive of an overall order deposition such as that discussed above.

Burial 252067 from Zone 20 presented an unusual

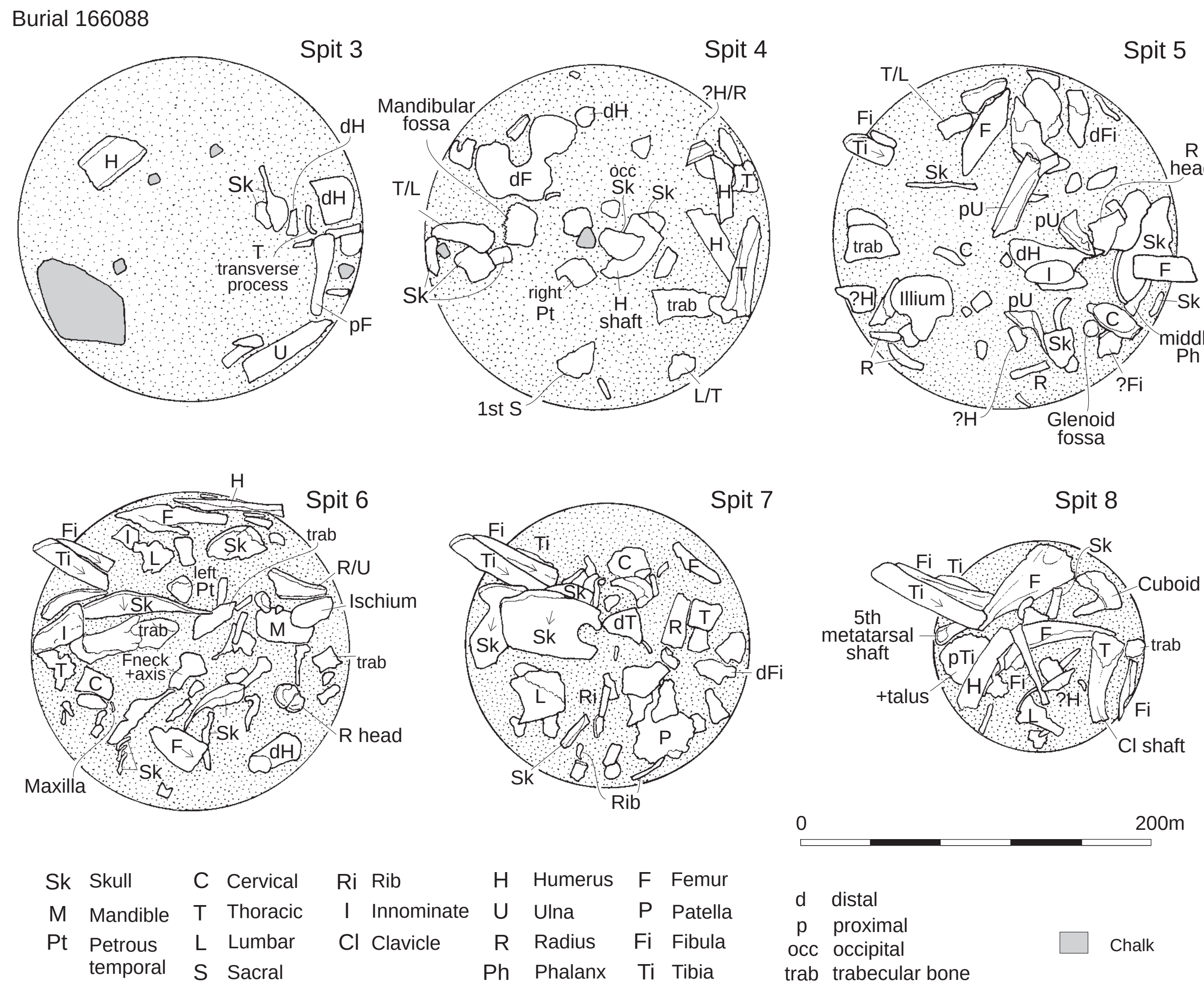


Fig 13.1 Roman urned burial 166088 (Zone 19); annotated scale drawings showing distribution of skeletal elements in spits 3-8

case of unburnt items, ie, grave goods, being placed on top of the bone within the vessel prior to burial. Moreover, these are items of personal adornment which would more usually be worn by the deceased for cremation (Pl 13.46). The inclusion of grave goods of this type and in this way is not a characteristic of the rite in the Roman period, and has similarities with some of the examples from the earliest stage of the Saxon period (McKinley 2006d).

Fragments of yellow clay, unlike the rest of the soil matrix infiltrated from the grave fill, were found in the lower spits of the urned burial 215191 from Zone 20. These may represent the remains of a clay seal or plug placed within the mouth of the vessel such as that found in a contemporaneous cremation burial from Poundbury Farm, Dorset (Dinwiddy and Bradley 2011; McKinley forthcoming c, fig 8). Most urned burials were probably originally sealed; the types of lid which have been found include stones, ceramic vessels, textiles and skins, though subsequent disturbance often destroys the evidence. The intact example of the clay plug from Poundbury had survived because it was also covered by a stone. Had it not been the clay would have fallen out (pressure, water-flow) as is believed to have occurred in the present case.

Pl 13.46 Roman urned burial 252067 showing unburnt grave goods overlying cremated bone

Chapter 13 – Appendix

Isotopic Investigation of Residential Mobility of Individuals from the Zone 12 Middle Iron Age Cemetery

by Andrew Millard with Geoff Nowell

[NB: Delays in commissioning and production of the following analysis and report mean the data was not available until some time after the human bone reports had been submitted, hence the lack of reference to the results and their potential significance within the target population.]

Introduction

The target population for the isotopic analysis comprised the small Middle Iron Age cemetery in Zone 12 (see McKinley this volume). The cemetery lay *c* 600m north of a small cemetery of commensurate date at Cliffs End Farm (Fig 1.1), most individuals from which had been subject to isotope analysis with intriguing results indicative of migration (Millard in press). The Zone 12 cemetery offered a source of comparative material which would enable the potential frequency, or lack of it, of such mobility in East Kent at this time to be further investigated.

Principles

People who are born and grow up in a particular geographical region have a specific combination of stable isotopes preserved in the enamel of their teeth (Budd *et al* 2004). Unlike minerals in bone, these values do not change during the lifetime of the individual. Isotope ratios of oxygen and strontium are particularly useful in this kind of geographic study. Oxygen isotopes in teeth are derived from drinking water which is usually mostly derived from local rain water, whose composition varies systematically with climate, so that drinking water maps have been devised for Britain and Europe. Dietary strontium isotopes vary with geology, so that a combination of geological maps, past measurements on soils and rocks, and measurements local to the site, are used to interpret movement of people.

Some teeth form during the period when a child is likely to still be suckling at the breast which is known to elevate $\delta^{18}O$ values (Wright and Schwarcz 1998) from what they would be if the child shared the mother's diet. This can complicate the interpretation of the isotope values, and so where possible such teeth are avoided for sampling.

Materials

The 2nd premolar and 3rd molar teeth from four adult humans were sampled. The two males (153027 and 153054) and two females (136034 and 166004a) derived from the Zone 12 Middle Iron Age cemetery. The latter two were found in adjacent graves (136033 and 166005) towards the north end of the linear cemetery (Volume 1, Fig 3.46); one male grave (153055) was located at the south end of the line, the other (153028) formed one of two outliers *c* 12m to the south.

Methods

Sample preparation

Each tooth was sectioned using a flexible diamond impregnated cutting disc, and enamel and dentine separated for separate chemical processing. Where there was sufficient material, only half of the tooth was used. The crown and cut surfaces of the enamel were abraded from the surface to a depth of ~100mm using a tungsten carbide dental burr and the removed material discarded. Any adhering dentine was then removed using the burr and the resulting core enamel isolated for oxygen and strontium isotope analysis.

Oxygen isotope analysis

Sub-samples of enamel were taken and prepared for isotope analysis using a slightly modified version of the method of Dettmann *et al* (2001). The sample was dissolved in 2M HNO_3, HF was added to precipitate calcium as CaF_2 and the solution centrifuged. The decanted solution was diluted, and KOH and NH_3OH were added to bring it near to neutral pH. Then 2M $AgNO_3$ was added and fine-grained silver phosphate (Ag_3PO_4) was precipitated. The sample was centrifuged, decanted, then rinsed, centrifuged and decanted twice before drying.

Measurements on the resulting yellow-brown precipitate were conducted in the Laboratoire de Géologie de Lyon, CNRS–UMR 5276 Université Claude Bernard, Lyon following the methods of Fourel *et al* (2011). Replicate measurements on NBS 120C prepared with the samples yielded a $\delta^{18}O$ value of 21.60±0.49 ‰ (1σ, n=5), and on NBS120C prepared in the Lyon laboratory by the method of Lécuyer *et al* (1993) gave a value of 21.70±0.11 ‰ (1σ, n=8); both preparations are within the error range of the accepted value of 21.7 ‰ (summarised in Chenery *et al* (2010)). Drinking water values ($\delta^{18}O_{DW}$) were derived from phosphate ($\delta^{18}O_P$) values using the calibration of equation 6 of Daux *et al* (2008).

Strontium isotope analysis

Tooth enamel samples of ~20-175mg were cleaned in deionised water and dissolved in 16M HNO_3 (Romil UpA) for analysis. Sr was extracted as a fraction eluted from a column of Sr-Spec (a crown-ether based exchange chromatography medium, Eichrom). $^{87}Sr/^{86}Sr$ ratios were measured using a ThermoFinnigan Multi-collector ICP Mass Spectrometer (MC-ICP-MS) in the Northern Centre for Isotopic and Elemental Tracing at Durham University. Reproducibility of the standard NBS987 during analysis was 0.710268 ± 22ppm (2σ, n=9). All values have been normalised to the accepted value of 0.710240 for NBS987.

Results and discussion

Results are shown in Table 13.1.1 and Fig 13.1.1.

Strontium isotopes

The strontium isotopes range from 0.7087 to 0.7100,

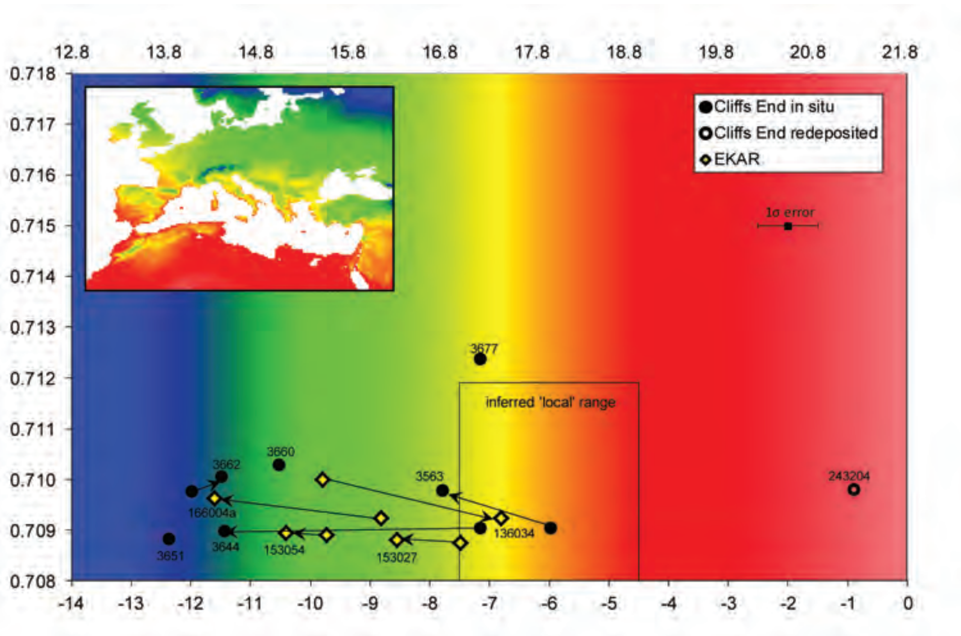


Fig 13.1.1 Isotope measurements for EKA2 individuals compared with Middle Iron Age individuals from Cliffs End Farm (Millard in press). Inset map: oxygen isotopes in precipitation across Europe and the Mediterranean using the same colour scale, re-plotted from the data of Bowen and Revenaugh (2003), as updated and made available at http://wateriso.eas.purdue.edu/waterisotopes/pages/data_access/ArcGrids.html. As the values in this map are interpolated it should be taken as a rough guide to variation and not as indicating exact values.

Table 13.1.1 Samples and isotope measurements

Sample reference	*Tooth*	*$^{86}Sr/^{87}Sr$ ratio ±2se[a]*		*Ag_3PO_4 yield/%*	*$\delta^{18}O$ enamel phosphate (‰ VSMOW)* □	*$\delta^{18}O$ drinking water (‰ VSMOW)[b]*
EKA2 153027	UR P2	0.708749	(17)	78.2	17.0	-7.5
EKA2 153027	LL M3	0.708795	(14)	79.5	16.3	-8.6
EKA2 166004a	UR P2	0.709228	(13)	66.9	16.2	-8.8
EKA2 166004a	UL M3	0.709631	(14)	71.8	14.4	-11.6
EKA2 136034	LR P2	0.710001	(10)	77.8	15.5	-9.8
EKA2 136034	LR M3	0.709236	(12)	94.5	17.5	-6.8
EKA2 153054	LR P2	0.708902	(12)	83.3	15.6	-9.7
EKA2 153054	LR M3	0.708945	(12)	62.6	15.1	-10.4

Key:
a. Uncertainties in strontium isotope ratios are shown in parenthesis as the uncertainty in the last two digits.
b. Calibrated using equation 6 of Daux *et al* 2008.

Table 13.1.2 Isotope values for the local environment

Sample reference	*Description*	*$^{86}Sr/^{87}Sr$ ratio ±2se[a]*		*$\delta^{18}O$ enamel phosphate (‰ VSMOW)* □	*$\delta^{18}O$ drinking water (‰ VSMOW)[b]*	*Reference[b]*
Cliffs End 163803	sheep/goat	0.710056	(04)	18.45	-6.53	1
Cliffs End 202204	sheep/goat	0.709409	(04)	19.14	-5.77	1
Cliffs End 264406	sheep/goat	0.709672	(05)	19.22	-5.68	1
Local brickearth		0.708174	(05)			1
Chalk		0.7074				2
Clay-with-flints		0.7119				2
Local precipitation					-4.5 to -7.5	1

Key:
a. Uncertainties in strontium isotope ratios are shown in parenthesis as the uncertainty in the last two digits.
b. References: 1. Millard in press; 2: Hughes and Millard unpubl

which falls entirely within the range of 0.7082 to 0.7101 for the local environment derived from sheep/goat and brickearth at the nearby site of Cliffs End Farm (Table 13.1.2), and well within the wider regional range of 0.7074 to 0.7119 inferred from a variety of environmental samples (Millard in press). There is, therefore, no evidence for migration of any of these people from far away on the basis of strontium isotopes alone. When considering the variation between teeth of the same individual, the difference between the P2 and M3 might reveal possible migration between the ages of 3–6 years and 9–12 years. For the two males, 153027 and 153054, the P2 and M3 give remarkably similar values, thus giving no indication of movement during childhood. The two females, 166004a and 136034, show more variation so there is a possibility that they moved around in childhood, but we know very little about the causes of these small variations in $^{86}Sr/^{87}Sr$. Given that the brickearth in the Wealden District is a very variable material (Gallois 1965) such variations could conceivably be caused by slight variations in food source, such as rotation of crops across different fields in different years.

The strontium isotopes give no evidence for migration. This is similar to the results from Cliffs End where the seven Middle Iron Age individuals had strontium isotope ratios ranging 0.7088 to 0.7124; only one Cliffs End individual had a value outside the regional environmental range and for the three individuals where two teeth were analysed, intra-individual variation was low.

Oxygen isotopes

The oxygen isotope values have a wide range, 14.4 to 17.5 ‰, which when calibrated to drinking water values gives a range of -11.6 to -6.8 ‰, which is mostly below the expected local range of -7.5 to -4.5 ‰ (Millard in press). The variation between the P2 (representing ages 3-6 years approximately) and M3 (9-12 years approximately) in the two females (136034 and 166004a) is more than the 1‰ range of variation expected in a population using a single drinking water source (Longinelli 1984). This is strong evidence that these two women migrated during childhood. Individual 136034 may have arrived in Thanet before the age of 9 years as her M3 is consistent with local precipitation and strontium. The two males (153027 and 153054) show smaller differences, but are both in the same direction and predominantly outside the expected range for Thanet and the UK. These men may or may not have moved during childhood but certainly moved after the age of 12 years to Thanet, probably across the North Sea from the east, although 153027 has values that could be from northern Britain. When the data is compared with those from the Middle Iron Age individuals from Cliffs End Farm, there appears to be a pattern of most individuals moving from higher ^{18}O values to lower ones during childhood with EKA2 136034 having the largest move in the opposite direction and Cliffs End 3662 a significant shift. This suggests that the EKA2 and Cliffs End populations both moved between a variety of places of differing drinking water ^{18}O during childhood before most of them migrated to Thanet.

Conclusions

Oxygen isotopes indicate extensive migration of the individuals analysed from EKA2 with all four of them spending part of their childhood in regions of lower $\delta^{18}O$. The strontium isotopes are not diagnostic as to the location of this other place, though they do rule out Norway and parts of Sweden. The most likely place would seem to be the southern margins of the North Sea, the Baltic region or southern Sweden.

Chapter 14

Animal Bone

by Lena Strid

Introduction

The EKA2 excavations recovered 43,662 hand-collected fragments of animal bone from phased features from a total of 24 zones. The assemblage was divided into three landscapes (Landscapes 1–3) with different geology, topography and environment: the Chalk Ridge (Zones 17–25, and also 10–12 in this study), Pegwell Bay/Cliffs End spur (Zones 13–16, 26) and Ebbsfleet Peninsula (Zones 1-9) respectively. Material of most phases was represented in that analysed from every Landscape, the exceptions being the lack of Iron Age faunal remains in Landscape 1, mid- to late Roman material in Landscape 2 and Saxon material in Landscape 3.

Previous archaeological work in the area includes the Monkton excavations (Bennett *et al* 2008), which continue from the west end of the EKA2, the Weatherlees – Margate – Broadstairs waste water pipeline (Egging Dinwiddy and Schuster 2009), which bisects Zones 11–12, the Tothill excavations north of Minster and adjacent to Zones 23–24 (Morris 2011), the Manston Road excavations in Ramsgate (Andrews *et al* 2009), and the Thanet Earth excavations (Jones forthcoming) further to the north-west. While the multi-period Thanet Earth assemblage mainly derives from the Iron Age and the Manston Road assemblage is mainly Saxon, the other assemblages are dominated by Roman material, although a small amount of faunal remains from the Bronze Age and Saxon periods are also present.

Methodology

The bones were identified at Oxford Archaeology by the author using a comparative skeletal reference collection, in addition to osteological identification manuals, such as Cohen and Serjeantson (1996), Hillson (1992) and Schmid (1972). While most taxa present little difficulty for identification, barring fragmentation and/or poor bone preservation, some taxa, such as sheep and goat, are skeletally very similar. For birds in particular, identification is sometimes limited to genera or family, or, in case of the small passerines, to order. Sheep and goat were identified to species where possible, using Boessneck *et al* (1964) and Zeder and Lapham (2010). They were otherwise classified as 'sheep/goat'. An attempt to distinguish donkey/mules from horse and pheasant from domestic fowl was carried out using Erbersdobler (1968), Johnstone (2004) and Reichstein (1995). However, no pheasants or mules could be identified. One donkey was identified on metric criteria (Johnstone 2004). The identification of fallow deer was confirmed by Naomi Sykes at Nottingham University and the identification of gannet was confirmed by Joanne Cooper at the Natural History Museum, Tring. Mammal ribs and vertebrae, with the exception of atlas and axis, were classified by size: 'large mammal' representing cattle, horse and deer; 'medium mammal' representing sheep/goat, pig and large dog; and 'small mammal' representing small dog, cat and hare.

The condition of the bone was graded on a 6-point system (0-5). Grade 0 equating to very well preserved bone, and grade 5 indicating that the bone had suffered such structural and attritional damage as to make it unrecognisable (Table 14.1).

For the calculation of the number of identified fragments per species (NISP) all identifiable fragments were counted, although bones with modern breaks were refitted. The minimum number of individuals (MNI) was calculated on the most frequently occurring bone for each species, using Serjeantson's zoning guide for the post-cranial skeleton (1996) and Worley's mandible

Table 14.1 Animal bone preservation grading methodology

Grade 0	Excellent preservation. Entire bone surface complete
Grade 1	Good preservation. Almost all bone surface complete
Grade 2	Fair preservation
Grade 3	Poor preservation. Most bone surface destroyed
Grade 4	Very poor preservation. No original bone surface remaining
Grade 5	Extremely poor preservation. Unlikely to be able to identify element

Table 14.2 Fay Worley's definitions for mammalian mandibular zones used in bone recording

Zone	*Mandible*
1	Coronoid process
2	Condyle
3	Ascending ramus
4	Goneal angle
5	Molar region of the body
6	Premolar region of the body
7	Diastema with mental foramen
8	Incisor region and mandibular symphysis

zoning guide (Table 14.2), and taking into account left and right sides. The weight of the bone fragments has been recorded in order to give an idea of their size and to facilitate an alternative means of quantification.

For ageing, Habermehl's (1975) data on epiphyseal fusion for cattle, sheep, pig, horse, dog and cat were used. Three fusion stages were recorded: 'unfused', 'in fusion', and 'fused'. 'In fusion' indicates that the epiphyseal line is still visible. Avian remains were considered 'unfused' if the ends of the long bones had the porous surface typical of juvenile birds. Tooth wear for cattle, sheep/goat and pig was recorded using Grant's tooth wear stages (Grant 1982), and correlated with tooth eruption (Habermehl 1975). In order to estimate an age for the animals, the methods of Halstead (1985), Payne (1973) and O'Connor (1988) were used for cattle, sheep/goat and pig respectively.

Sex estimation was carried out on morphological traits on cattle metapodials and pelves, sheep/goat pelves, sheep and goat horn cores, and pig mandibular canine teeth, using data from Boessneck *et al* (1964), Hatting (1983), Prummel and Frisch (1986), Schmid (1972) and Vretemark (1997). Metrical sex estimation was carried out on cattle metacarpals, using data from Mennerich (1968). Equid canines and spurs on fowl tarsometatarsi were used to indicate the presence of male individuals in these taxa (Sadler 1991). Observation of medullary bone in birds was used to indicate the presence of egg-laying hens.

Measurements were taken according to von den Driesch (1976), using digital callipers with an accuracy of 0.01mm. Large bones were measured using an osteometric board, with an accuracy of 1mm. Withers' height of cattle, horse and dog were calculated using Foch (1966), Matolcsi (1970) and May (1985), and Harcourt (1974) respectively.

As noted during the assessment, many of the bones from the sieved soil samples were unidentifiable, and due to time constraints, it was decided not to include them in the analysis. While bones and teeth from micromammals and amphibians were present, the sieved remains only included a small number of bird bones, most of these from domestic fowl.

Given the large size of the assemblage, it was decided to prioritise the more substantial assemblages from Zones 6, 13, 14 and 20, thereby including bones from a variety of time periods and from all three landscape zones. Only bones from securely dated features which were of analytical value (see assessment) were recorded. However, because of the comparative scarcity of bones from the early prehistoric period, all reasonably securely stratified faunal remains from Neolithic and Bronze Age features were analysed regardless of analytical value or location. Due to the intensity of settlement in Zone 6, with relatively large amounts of residual remains in most features in Zone 6, the analysis of this zone concentrated on larger, more stratigraphically secure assemblages, causing an under-representation of features with generally few remains, such as postholes and shallow pits.

This methodology yielded a total number of 20,234 recorded bones (Table 14.3), ranging from the Neolithic to the mid-Saxon period. The largest assemblages derived from the Early to Middle Iron Age phase from Zone 13 (n: 5549) and the mid-Roman phase from Zone 6 (n: 2423).

Table 14.3 Total number of recorded faunal remains by zone and chronological period in the EKA2 assemblage

	Landscape 1 zones						*Landscape 2 zones*			*Landscape 3 zones*			
Period	*10*	*12*	*19*	*20*	*21*	*24*	*13*	*14*	*26*	*4*	*6*	*7*	*8*
NEO			2										
EBA	48						39						10
EBA/MBA	2										5		
MBA	4	92							1				
MBA/LBA		9	3			17							
LBA		11		17				8	2	2	37	102	
LBA/EIA	193	6						15		29	145	251	
Unspecified Bronze Age					2		62						
EIA							2140	9					
EIA/MIA							2205	11			439		
MIA							1751				511		
MIA/LIA											38		
LIA							237	22			27		
Unspecified Iron Age							39	15			24		
LIA/ERo				42			306	120			521		
ERo							998	1			685		
MRo				578							2423		
MRo/LRo				364									
LRo				795							619		
Unspecified Roman				254			65	1664			5		
MS								2083					
Unspecified Saxon				30			99						
Total	247	118	5	2080	2	17	7941	3948	3	31	5479	353	10

Table 14.4 Number of animal bone fragments by feature type from all zones and phases in the EKA2 assemblage

Zone	Phase	N	Ditch	Gully	Pit	Quarry pit	Post hole	Well	SFB	Hearth	Grave	Tree throw	Layer	Trackway/ hollow way	Cobbled surface
Landscape 1															
10	EBA	48	3		45										
10	EBA/MBA	2	2												
10	MBA	4			4										
10	LBA/EIA	193			129			64							
12	MBA	92	92												
12	MBA/LBA	9			6							3			
12	LBA	11	10								1				
12	LBA/EIA	6	5		1										
19	NEO	2			2										
19	MBA/LBA	3	3												
20	LBA	17	17												
20	LIA/ERo	42	38		4										
20	MRo	578	118		356				63				41		
20	MRo/LRo	364							364						
20	LRo	795	100		129				566						
20	Unspecified Roman	254	37	4	213										
20	Unspecified Saxon	30												30	
21	Unspecified Bronze Age	2									2				
24	MBA/LBA	17				17									
Landscape 2															
13	EBA	39	39												
13	LBA/EIA	8	8												
13	Unspecified Bronze Age	62	62												
13	EIA	2140	2140												
13	EIA/MIA	2205	491		1694	12							8		
13	MIA	1751	173		958	29			591						
13	Unspecified Iron Age	39			39										
13	LIA	237			1	236									
13	LIA/ERo	306	117			189									
13	ERo	998	1		603	5			389						
13	Unspecified Roman	65	24		41										
13	Unspecified Saxon	99			99										
14	LBA	8	8												
14	LBA/EIA	15	3		12										
14	EIA	9										9			
14	EIA/MIA	11	9		2										
14	Unspecified Iron Age	15			15										
14	LIA	22				22									
14	LIA/ERo	120	120												
14	ERo	1	1												
14	Unspecified Roman	1664	1327	8	328		1								
14	MS	2083			2043		3			4	33				
26	MBA	1									1				
26	LBA	2			2										
Landscape 3															
4	LBA	2	2												
4	LBA/EIA	29	23		6										
6	EBA/MBA	5	5												
6	LBA	37	37												
6	LBA/EIA	145	145												
6	EIA/MIA	439	27		334		1				77				
6	MIA	511			511										
6	MIA/LIA	38	2		14		20	2							
6	UnspecifiedIron Age	24					24								
6	LIA	27					27								
6	LIA/ERo	521	405		107									9	
6	ERo	685	423		110		152								
6	MRo	2423	689		38	31		69							1596
6	LRo	619	6			67			546						
6	Unspecified Roman	5			5										
7	LBA	102	90		4		8								
7	LBA/EIA	251	1		250										
8	EBA	10	10												

The assemblage

Feature types

Most of the bone, regardless of period, was recovered from ditches and pits (Table 14.4). A relatively large quantity of bones was recovered from a small number of Iron Age and Roman sunken-featured buildings (SFBs), which were found in Zones 6, 13 and 20. Other features producing animal remains include wells, hearths, graves, tree-throw holes, trackways and layers. The largest bone assemblage dated to the mid-Roman period came from the upper surface of the large Iron Age to Roman trackway which traversed Zone 6.

Intra-site variation between the number of cattle and sheep bones deposited in ditches and in pits has been observed on several Iron Age and Roman sites in central Southern England (Maltby 1994, 88). Cattle bones generally dominate in ditch fills, whereas sheep bones tend to be dominant in pits, possibly a result of differential disposal patterns rather than taphonomical variation. To see whether this pattern was also found in the assemblage from EKA2, the Early Iron Age, Early Iron Age/Middle Iron Age and Middle Iron Age assemblages from Zone 13 were chosen for analysis, since these formed a relatively large and well dated group. The earliest Iron Age assemblage came exclusively from a trapezoidal enclosure ditch (134099), whereas the Early/Middle and Middle Iron Age assemblages were dominated by bones from pits. Given this difference in distribution, the bones were considered as a single Early-Middle Iron Age unit.

Table 14.5 Number of fragments from large mammals (Cattle, horse and unidentified large mammal) and medium mammals (Sheep/goat, pig, unidentified medium mammal) from ditches and pits in the Early-Middle Iron Age assemblage from Zone 13

	Ditches	*%*	*Pits*	*%*
Cattle	451		201	
Horse	64		22	
Large mammal	437		129	
Total large mammals	952	64.9%	352	47.2%
Sheep/goat	253		182	
Pig 85	25			
Medium mammal	176		163	
Total medium mammals	514	35.1%	370	52.8%
Total	1466		745	

When the combined number of bone fragments from large mammals (cattle, horse, unidentified large mammals) and their frequency are compared with that of bone fragments from medium mammals (sheep/goat, pig, unidentified medium mammal), the large mammals were over-represented in ditches, whereas large and medium mammals formed two similar-sized assemblages in the pits (Tables 14.5-14.6). The skeletal elements from both medium and large mammals come from all body parts, which would negate, in this case, the argument that large mammal predominance in the ditches related directly to butchery waste, smaller mammals having been butchered closer to the settlement (Maltby 1987). Instead the difference may reflect chronological differences in disposal practices, degrees of fragmentation and/or heavy taphonomic destruction of medium mammal bones in ditches.

Bone condition

Bone preservation is influenced by time and taphonomy, both relating to post-depositional diagenesis and pre-depositional treatment of waste. Bones from Bronze Age assemblages were not necessarily in poorer condition than bones from Roman assemblages, indicating that local diagenesis and waste disposal methods are likely to be more critical factors predicating bone condition than the longer time frame on its own. Bone preservation along the route of the EKA2 was very varied. Generally bones from Landscapes 1 and 2 were in poorer condition than those from Landscape 3, the Ebbsfleet Peninsula, indicating that observed gnaw marks, butchery marks and pathologies are underrepresented for the first two landscapes. This probably relates to soil type and/or to levels of acidity in the soil. Indeed, viewing the assemblage by landscape area (Table 14.7) the Early Iron Age-Middle Iron Age and Late Iron Age-Roman phases from Landscape 3 contain a higher frequency of gnawed bones than contemporary assemblages from the other landscapes. There is little difference in the frequency of gnawed bones from the Bronze Age from all landscapes, suggesting that bones in Landscape 3 would have been less accessible for scavengers. However, there are few Bronze Age bones with traces of gnawing and the frequency of gnawed bones may, therefore, not be representative for this phase.

Burnt or charred bones were generally rare and were mainly found in assemblages from the Iron Age, Roman and Saxon periods (Table 14.7). Since burnt bone is far less affected by soil conditions than unburnt bone (Gilchrist and Mytum 1986), the scarcity of burnt bone

Table 14.6 Bone preservation in ditches and pits for large mammals (cattle, horse, unidentified large mammal) and medium mammals (sheep/goat, pig, unidentified medium mammal) in the Early-Middle Iron Age assemblage from Zone 13

	Ditches						*Pits*					
	N	*0*	*1*	*2*	*3*	*4*	*N*	*0*	*1*	*2*	*3*	*4*
LM	852		5.2	29.0	42.0	35.6	352		10.2	31.5	33.2	25.0
MM	514	0.2	10.1	26.8	28.4	34.4	370		7.3	40.3	31.1	21.4

Table 14.7 Preservation level for bones and number of bones with traces of animal gnawing and burning from all phases of the EKR2 assemblage, by landscape and zone

Zone	*Phase*	*N*	*0*	*1*	*2*	*3*	*4*	*5*	*Gnawed bones*	*Burnt bones*
Landscape 1										
10	EBA	48			16.7	72.9	14.3			
10	EBA/MBA	2		100.0						
10	MBA	4					100.0			
10	LBA/EIA	193	10.9	60.1	19.2	2.1	7.8		2	1
12	MBA	92					100.0			
12	MBA/LBA	9			88.9		11.1			
12	LBA	11			27.3	63.6	9.1			
12	LBA/EIA	6			66.7	33.3				
19	NEO	2					100.0			
19	MBA/LBA	3					100.0			
20	LBA	17			41.2	41.2	17.6		2	
20	LIA/ERo	42				11.9	88.1			
20	MRo	578		0.3	22.0	32.0	45.7		24	2
20	MR/LRo	364	0.3	3.0	21.2	59.6	15.9		15	3
20	LRo	795	1.0	7.9	36.6	19.9	34.6		39	5
20	Unspecified Roman	254			5.1	9.8	85.0		1	2
20	Unspecified Saxon	30			6.7	3.3	90.0			
21	Unspecified BA	2					100.0			
24	MBA/LBA	17				5.9	94.1		1	
Landscape 2										
13	EBA	39					100.0			1
13	LBA/EIA	8			12.5	87.5			1	
13	Unspecified BA	62				19.4	80.6			
13	EIA	2140	<0.1	4.5	28.3	48.1	19		69	4
13	EIA/MIA	2205	16.6	3.3	34.2	15.3	30.7		31	32
13	MIA	1751	0.2	12.9	44.6	27.7	14.6		51	5
13	Unspecified IA	39			2.6	10.3	87.2		1	
13	LIA	237	0.8	4.6	11.8	65.0	17.7		1	
13	LIA/ER	306	0.3	4.9	19.3	34.6	40.8		8	1
13	ER	998	0.4	12.3	23.9	29.2	34.2		30	65
13	Unspecified Roman	65	10.8	38.5	16.9	26.2	7.7		6	
13	Unspecified Saxon	99	1	4	47.5	33.3	14.1		9	
14	LBA	8		12.5	25.0	62.5			2	
14	LBA/EIA	15		13.3	13.3		73.3		2	
14	EIA	9					100.0			
14	EIA/MIA	11				18.2	81.8			
14	Unspecified IA	15			26.7	6.7	66.7			
14	LIA	22				9.1	90.9			
14	LIA/ERo	120		4.2	62.5	25.8	7.5		1	
14	ERo	1					100.0			
14	Unspecified Roman	1664	2.3	21.5	30.8	30.3	15.1	0.7	23	13
14	MS	2083	3.3	22.9	33.5	16.5	24.1	0.2	108	14
26	MBA	1			100.0					
26	LBA	2					100.0			
Landscape 3										
4	LBA	2			100.0					
4	LBA/EIA	29		41.4	55.2	3.4			3	
6	EBA/MBA	5					100.0			
6	LBA	37		35.1	29.7	5.4	29.7		2	
6	LBA/EIA	145	0.7	34.5	57.2	5.5	2.1		12	
6	EIA/MIA	439	2.0	54.2	40.8	2.0	0.9		29	36
6	MIA	511	2.2	81.8	15.1	0.2	0.8		42	3
6	MIA/LIA	38	5.3	78.9	15.8				2	1
6	Unspecified IA	24		75.0	25.0				1	1
6	LIA	27		3.7	96.3				1	
6	LIA/ERo	521	4.6	65.3	28.2	1.5	0.4		26	2
6	ERo	685	3.6	55.6	39.6	1.0	0.1		35	2
6	MRo	2423	2.1	42.5	52.7	2.3	0.4		166	5
6	LRo	619	2.4	45.9	48.9	2.1	0.6		48	1
6	Unspecified Roman	5		80.0	20.0					
7	LBA	102	12.7	30.4	51.0	5.9				
7	LBA/EIA	251	0.4	12.7	86.5	0.4			1	
8	EBA	10		100.0						

cannot be explained by diagenesis. Instead, the low frequency of burnt bone could imply that burning was not the preferred waste disposal method for bone.

Several bones from a variety of assemblages displayed traces of carnivore gnawing, indicating that dogs or foxes had access to the bones prior to deposition. One bone in the early Roman assemblage from Zone 6 had been gnawed by a rodent and one bone in the late Roman assemblage from Zone 20 had gnaw marks suggesting cat gnawing.

Neolithic

Two poorly preserved and unidentifiable bone fragments from pit 228052 (Zone 19) comprise the only remains from the Neolithic period.

Bronze Age

The Bronze Age remains comprise a total of 1120 fragments, deriving mainly from contexts phased as Late Bronze Age/Early Iron Age. While all three Bronze Age periods are relatively well represented in Landscape 1, the largest assemblage came from Late Bronze Age/Early Iron Age features in Landscape 3 (Table 14.8). The Middle Bronze Age was poorly represented along the EKA2, being only found in Landscape 1.

The species identified in the Bronze Age assemblages are cattle, sheep, goat, pig, horse, dog, red deer, water vole, domestic fowl and mallard-sized duck (Tables 14.9-14.11). Cattle are the most common species in the Bronze Age assemblage as a whole, followed by sheep/goat in most phases and zones. The earliest secure finds of domestic fowl in Britain come from the Early Iron Age sites of Houghton Down and Blackhorse Road (Hamilton 2000; Legge *et al* 1989, both cited in Poole 2010), and its presence in what may be Late Bronze Age/Early Iron Age features at EKA2 merits further discussion. The fowl remains include one scapula, one radius and one ulna from pit 157012 in Zone 10, and one femur from ditch 190514 in Zone 6. Pit 157012 is undated, but was cut into the top of a probable Late Bronze Age/Early Iron Age well (157006). No features other than a single mid-Saxon pit were found nearby were found nearby and therefore the risk of intrusion from later periods is low, but the suggested date for 157012 is based on a very small quantity of pottery from well 157006 and so may not be secure; a Saxon date is possible for pit 157012 (P Andrews pers. comm.). Metric comparison with other prehistoric finds was not possible, as the wing bones were fragmented. The femur from ditch recut 190514 in Zone 6 is even more problematic with regard to phasing. Not only does it come from the upper fill of this feature, suggesting the possibility of it being a later intrusion, but the ditch where the femur was found is cut by two other ditches: Late Iron Age/early Roman ditch 190517 and early Roman ditch 190510. Comparisons with measurements from Iron Age and Roman fowl femora from EKA2 (n: 3), as well as from other Iron Age and Roman sites in Britain (n: 10) (University of Southampton 2003), show that the

Table 14.8 Number of animal bones from Bronze Age assemblages. Number of identifiable bones in parentheses

	Landscape 1	*Landscape 2*	*Landscape 3*	*Total*
EBA	48 (11)	39 (8)	10 (10)	97 (29)
EBA/MBA	2		5 (4)	7 (4)
MBA	96 (6)	1		97 (6)
MBA/LBA	29 (15)			29 (15)
LBA	28 (14)	10 (9)	141 (56)	179 (79)
LBA/EIA	199 (63)	23 (8)	425 (95)	647 (166)
BA	2 (1)	62 (20)		64 (21)
Total	404	135	581	1120

Table 14.9 Number of animal bones from Bronze Age assemblages in Landscape 1
(Minimum Number of Individuals (MNI) in parentheses)

				Landscape 1			
	EBA	*EBA/MBA*	*MBA*	*MBA/LBA*	*LBA*	*LBA/EIA*	*BA*
Cattle	10 (1)		4 (1)	12 (1)	8 (1)	28 (3)	
Sheep/goat			2 (1)	3 (1)	3 (1)	9 (3)	1 (1)
Sheep						3	
Goat						1	
Pig					1 (1)	12 (2)	
Horse	1 (1)				2 (1)	1 (1)	
Dog						3 (1)	
Domestic fowl						3 (1)	
Duck						1 (1)	
Indet. Bird						6	
Watervole						1 (1)	
Amphibian						4	
Medium mammal				4	1	89	
Large mammal	11	2	15	4	8	27	1
Indeterminate	26		75	6	5	10	
Total	48	2	96	29	28	199	2
Weight (g)	278	3	153	309	321	3693	16

femur from ditch 190514 is within the same size range as Iron Age and Roman specimens (Table 14.12).

With the exception of the Late Bronze Age assemblage from Landscape 3 and the Late Bronze Age/Early Iron Age assemblages from Landscape 1 and Landscape 3, most assemblages are too small to yield useful information and they will not, therefore, be discussed further. Bronze Age assemblages are often small, which has affected the possibility for comparisons or animal husbandry strategies. There are no large contemporary assemblages from this period in eastern Kent, and instead the substantial assemblages from Middle Bronze Age Grimes Graves (Norfolk), Middle-Late Bronze Age Chelmsford (Essex) and Late Bronze Age/Early Iron Age Runnymede (Surrey) (Legge 1992; Serjeantson 1996; Wade 1999) have been used for comparisons. The skeletal element distribution pattern from the small Late Neolithic/Early Bronze Age assemblage from Thanet Earth suggests deliberate selection of right-sided elements, possibly for ritual purposes (Jones forthcoming), and that assemblage may therefore be less suitable for comparison.

Table 14.10 Number of animal bones from Bronze Age assemblages in Landscape 2)
(Minimum Number of Individuals (MNI) in parentheses)

	Landscape 2				
	EBA	*MBA*	*LBA*	*LBA/EIA*	*BA*
Cattle	6 (2)		6 (2)	5 (2)	15 (1)
Sheep/goat	1 (1)		3 (1)	2 (1)	3 (1)
Pig				1 (1)	2 (1)
Horse	1 (1)				
Medium mammal	15		1	6	4
Large mammal	5	1		2	5
Indeterminate	11			7	33
Total	39	1	10	23	62
Weight (g)	340	2	878	467	724

Table 14.11 Number of animal bones from Bronze Age assemblages in Landscape 3
(Minimum Number of Individuals (MNI) in parentheses)

	Landscape 3			
	EBA	*EBA/MBA*	*LBA*	*LBA/EIA*
Cattle	10 (1)	2 (1)	49 (2)	62 (3)
Sheep/goat		2 (1)	1 (1)	10 (2)
Pig			1 (1)	3 (1)
Horse			1 (1)	14 (1)
Dog			3 (1)	3 (1)
Red deer			1 (1)	1 (1)
Domestic fowl				1 (1)
Medium mammal				8
Large mammal			8	26
Indeterminate		1	77	296
Total	10	5	141	425
Weight (g)	1	201	1551	5647

Table 14.12 Greatest length of domestic fowl femora from EKA2 and a selection of comparative sites. ABMAP = Animal bone metrical archive database (University of Southampton 2003)

Site	*Phase*	*N*	*Mean*	*Min*	*Max*
EKA2	LBA/EIA	1	80.6		
	EIA/MIA	1	80.7		
	LIA/ERo	1	74.0		
	Roman	1	80.6		
ABMAP	ERo-LRo	10	77.4	69.8	87.2

Phased to the Late Bronze Age/Early Iron Age indirectly, on the basis of a very small quantity of pottery (see above), the assemblage from Landscape 1 comes from Zone 10, largely from a single pit 157012 cut into well (157006). The presence of skull fragments from both goat and sheep is interesting, since remains from goat are rarely found in early prehistoric settlements (Noddle 1994; Serjeantson 2011). The earliest find of goat in Britain comes from a skeleton deposited at an Early Neolithic causewayed enclosure at Windmill Hill, Wiltshire, radiocarbon dated to 4530±150 BP (Noddle 1994, 118; Clutton-Brock 1989, 32). Not until Early Iron Age Danebury, where 2% of the ovicaprid horn cores were goat, do goats appear in any larger numbers (Grant 1984, 287). However, though pit 157012 may be Late Bronze Age/Early Iron Age, it could be Saxon.

Duck is not assumed to have been domesticated until the Roman or Saxon period (Albarella 2005), suggesting that farming was supplemented by wildfowling.

The dental data are scant, but give an age at death for two cattle (18-30 months, 30-36 months), two sheep/goat (1-2 years, 3-4 years) and three pigs (immature, sub-adult, adult) (Tables 14.13-15). The epiphyseal fusion for all three taxa corresponds with the dental data, but also shows the presence of one mature cattle of at least 3.5 years at the time of its death (Appendix 14.2.1; Table 14.16).

In contrast, the contemporary assemblage from Landscape 3 comes from several pits (177284, 178177 and 215107) and ditches (190262, 190270 and 190514) from Zones 4, 6 and 7. The presence of a shed antler suggests the use of antler as raw material, but no cut marks, saw marks or chop marks were observed on the antler. The ageing data for livestock are scant, with one ageable cattle mandible (Halstead stage: adult) and two sheep/goat mandibles (both from 3-4 years old animals) (Tables 14.13-14.15). Data on epiphyseal fusion were only available for cattle, where they indicated that most cattle were slaughtered as sub-adults or adults (Appendix 14.2.17; Table 14.16).

The Late Bronze Age assemblage from Landscape 3 is similar to the Late Bronze Age/Early Iron Age assemblage from the same landscape: it derives from several features and from several zones. A skull fragment from red deer provides the only evidence for hunting. Ageing data are only available for cattle (Tables 14.13 and 14.17), which comprise one mandible from a 30-36 month old animal, one radius from a juvenile and three fused bones from animals older than 7-10 months, 12-15 months and 2-2.5 years respectively.

In all three assemblages, cattle are by far the most common animals by fragment count. A similar predom-

Table 14.13 EKA2 (all zones): dental analysis of cattle, using Halstead (1985)

	N	*0-1 months*	*1-8 months*	*8-18 months*	*18-30 months*	*30-36 months*	*Young adult*	*Adult*	*Old adult*	*Senile*
EBA	1								1	
BA	2							1	1	
LBA	4					1		2	1	
LBA/EIA	3				1	1		1		
EIA	2							1		1
EIA/MIA	15		2	2	2	1		6	1	1
MIA	8			3	1	2				2
LIA	1					1				
Unspecified IA	2						1		1	
Total EIA-MIA	28		2	5	3	3	1	7	2	4
LIA	1					1				
LIA/ERo	5				3			1		1
ERo	15			2	2	1	1	7	1	1
MRo	19				1	3	2	7	3	3
MR/LRo	1									1
LRo	4							4		3
Unspec. Roman	6			2				2		2
Total LIA-Roman	53			4	6	5	3	21	4	11
MS	10			3		1		3	1	2

Table 14.14 EKA2 (all zones): dental analysis of sheep/goat, using Payne (1973)

	N	*0-2 months*	*2-6 months*	*6-12 months*	*1-2 years*	*2-3 years*	*3-4 years*	*4-6 years*	*6-8 years*	*8-10 years*
LBA/EIA	3						2	1		
EIA/MIA	6			2	1		2	1		
MIA	1								1	
MIA/LIA	1				1					
Total EIA-MIA	8			2	2		2	1	1	
LIA	1			1						
LIA/ERo	9			3		1	5			
ERo	15		1	3	1	3	4	2	1	
MRo	18		1	4	1	4	3	2	2	1
MR/LRo	2							1		1
LRo	16		2	1		2	8	1	1	1
Total LIA-Roman	38		2	9	1	9	6	7	3	1
MS	32	1	1	9	2	5	4	8	1	1

Table 14.15 EKA2 (all zones): dental analysis of pig, using O'Connor (1988)

	N	*Juvenile*	*Immature*	*Sub-adult*	*Adult*	*Elderly*
LBA/EIA	3		1	1	1	
EIA	6			6		
EIA/MIA	1				1	
MIA	2				2	
MIA/LIA	1	1				
Total EIA-MIA	10	1		6	3	
LIA/ERo	1			1		
ERo	6	1	3	2		
MRo	16		2	9	5	
LRo	4			3	1	
Total LIA-Roman	27	1	5	15	6	
MS	4	2		2		

inance of cattle to sheep/goat and pig is also found in Middle-Late Bronze Age Chelmsford (Wade 1999). Cattle is also the most common animal at Late Bronze Age Grimes Graves, although the proportion of sheep/goat is much higher there than at EKA2 or Chelmsford (Legge 1992). In contrast, cattle are the least common livestock in Late Bronze Age Runnymede, where the abundance of pig suggests that the assemblage included remains of feasting (Serjeantson 1996) (Table 14.18). However, the data from EKA2 and Chelmsford must be considered with caution, as the combined NISP for cattle, sheep/goat and pig falls under 300 fragments, which are considered too few to produce a reliable sample size for inter-species comparison (Hambleton 1999, 39-40).

Size

The cattle and sheep/goat from EKA2 are generally within the same size range as contemporary animals from elsewhere in Britain (Table 14.19). One male cattle metacarpal from well 157006 was much larger both in length and width and it is unclear whether it represents a large ox or whether the bone is an intrusive specimen. While aurochs was present in Britain during the Bronze Age, the metacarpal is much too small for aurochs (Degerbøl 1970, 92-97). Considering that such large cattle bones are only found in the mid- and- and late Roman assemblages from EKA2 (see below, Table 14.50), it is possible that the bone is Roman or later.

Table 14.16 EKA2 (Late Bronze Age/Early Iron Age, all landscapes): epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	8	0.0%	2	0.0%	1	0.0%	1	0.0%
Mid fusion	9	22.2%			2	0.0%		
Late fusion	6	0.0%	1	0.0%				

Table 14.17 EKA2 (Late Bronze Age, all landscapes): epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	3	33.3%						
Mid fusion	1	0.0%			1	0.0%		
Late fusion								

Table 14.18 Comparison of relative proportion of cattle, sheep/goat and pig from the Late Bronze Age to Early Iron Age assemblages from EKA2 and from a selection of Bronze Age sites in south-eastern England

Site	*Phase*	*N*	*Cattle*	*Sheep/goat*	*Pig*
EKA2 (landscape 1)	LBA/EIA	53	52.8%	24.5%	22.6%
EKA2 (landscape 3)	LBA	51	96.1%	2.0%	2.0%
EKA2 (landscape 3)	LBA/EIA	75	82.7%	13.3%	4.0%
EKA2 total		179	77.7%	13.4%	8.9%
Chelmsford	MBA/LBA	271	89.7%	7.0%	3.3%
Grimes Graves	MBA	5094	52.5%	42.4%	5.1%
Runnymede	LBA	1534	28.4%	41.6%	30.1%

Table 14.19 Greatest length and greatest distal width of cattle and sheep/goat bones in the Late Bronze Age to Early Iron Age assemblages from EKA2 and contemporary sites in Britain

Site	*Phase*	*Species*	*Bone*	*Measurement*	*N*	*Mean*	*Min*	*Max*
EKA2 Zone 10	LBA/EIA	Cattle	Metacarpal	GL	1	204.0		
Grimes Graves	MBA				27	177.4	165.0	185.6
ABMAP	EBA				2	176.0	172.0	180.0
ABMAP	MBA				1	180.0		
ABMAP	LBA-EIA				4	176.5	170.0	184.0
ABMAP	EBA-EIA				7	176.9	170.0	184.0
EKA2 Zone 10	LBA/EIA	Cattle	Metacarpal	Bd	1	65.4		
Grimes Graves	MBA				32	53.5	47.5	65.3
Potterne	LBA/EIA				17	57.3	49.8	65.7
ABMAP	EBA				2	50.4	48.0	52.7
ABMAP	MBA				1	61.1		
ABMAP	LBA-EIA				7	52.9	49.8	59.1
ABMAP	EBA-EIA				10	53.2	48.0	61.1
EKA2 Zone 13	BA	Cattle	Tibia	Bd	1	58.0		
EKA2 Zone 10	LBA/EIA				2	53.7	52.3	55.1
Grimes Graves	MBA				22	58.5	50.6	63.0
ABMAP	LBA-EIA				5	53.6	51.3	59.4
EKA2 Zone 10	LBA/EIA	Sheep/goat	Tibia	GL	1	200.5		
Potterne	LBA/EIA				12	199.3	190.0	212.0
ABMAP	EBA				2	198.0	188.0	208.0

Table 14.20 Calculated withers' height of cattle, using Foch (1966) and Matolsci (1970), from the Bronze Age/Early Iron Age assemblages from EKA2, Grimes Graves and Potterne

Site	*Phase*	*Element*	*N*	*Mean*	*Min*	*Max*	*Range of withers' height (cm)*
EKA2	LBA/EIA	Metacarpal	1	204.0			124.8
		Metatarsal	1	214.0			116.6
Grimes Graves	MBA	Metacarpal	27	177.4	165.0	185.6	108.0 (0.99–116.0)
		Metatarsal	23	207.3	192.5	290.5	124.7 (106.0–158.0)
Potterne	LBA/EIA	Radius	3	246.7	230.0	260.0	106.1 (98.9–111.8)
		Tibia	4	312.0	290.0	354.0	107.6 (100.1–122.1)

Table 14.21 Calculated withers' height of sheep/goat, using Teichert (1975), from the Late Bronze Age/Early Iron Age assemblages from EKA2 and Potterne and from Middle Bronze Age Grimes Graves

Site	*Phase*	*Element*	*N*	*Mean*	*Min*	*Max*	*Range of withers' height (cm)*
EKA2	LBA/EIA	Tibia	1	200.5			60.4
Grimes Graves	MBA	Metacarpal	6	128.5	123.5	132.5	62.2 (59.8–64.1)
		Metatarsal	8	139.2	135	143.2	62.8 (60.9–64.6)
Potterne	LBA/EIA	Humerus	2	131.5	127.0	136.0	55.5 (53.6–57.4)
		Radius	9	149.6	132.5	168.0	59.8 (53.0–67.2)
		Femur	3	161.3	152.0	168.0	56.7 (53.4–59.0)
		Tibia	12	199.3	190.0	212.0	60.0 (57.2–63.8)

Table 14.22 Calculated withers' heights on horse metatarsals, from EKA2 and a selection of Middle Bronze Age to Middle Saxon sites from Britain

Site	*Phase*	*N*	*Mean*	*Min*	*Max*
EKA2	LBA/EIA	1	141.5		
Grimes Graves	MBA	2	129.3	128.0	130.6
Potterne	LBA/EIA	2	137.8	137.5	138.0
EKA2	EIA	4	125.2	116.8	132.5
EKA2	MIA	1	144.6		
ABMAP	EIA-LIA	17	124.2	112.6	133.1
EKA2	MRo-LRo	2	133.8	128.1	139.4
ABMAP	ERo-LRo	23	136.0	118.4	155.6
EKA2	MS	1	141.7		
Hamwic (Six Dials)	MS	7	134.3	129.4	142.5

However, comparative material is limited for the Bronze Age, and what appear to be severe outliers could in reality represent animals within the norm for the period. The calculated withers' heights from a cattle metatarsal (116.6cm) and a sheep/goat tibia (60.4cm) are within the range of cattle withers' heights from Grimes Graves and Potterne (Legge 1992, 72-73; Locker 2000, 111) (Tables 14.20-14.21).

A withers' height of 141.5cm was calculated for the horse metatarsal from well 157006. This is larger than the horse withers' heights from Grimes Graves and Potterne (Legge 1992, 74; Locker 2000, 105), Early Iron Age horses from EKA2 and contemporary sites in Britain (Table 14.22), but within the same size range of horse withers' heights from Middle Iron Age EKA2 as well as from Roman and Saxon sites in Britain (University of Southampton 2003). While the sample size for Bronze Age and Early Iron Age horses is relatively small, and thus may not be representative of the size ranges of these periods, it remains possible that the horse metatarsal from the Late Bronze Age/Early Iron Age well 157006 is intrusive. Perhaps this and the cattle metacarpal (see above) came from a late, otherwise undifferentiated and undated deposit within the well.

Butchery

Butchery marks were only noted on four bones from Late Bronze Age/Early Iron Age deposits. A cattle humerus from Zone 6 had cut marks distally from disarticulation of the elbow joint. Chop marks at the base of horn cores indicating horn core removal occurred on two sheep skulls from Zone 10. A large mammal rib from the same zone had been chopped off mid-rib.

Pathology

Pathologies were also scarce, only occurring on four bones from Zone 10. Thin layers of bone growth on a cattle mandible ramus and on a cattle metacarpal shaft suggest infection, possibly of the periosteum, the membrane that surrounds the bone. A sheep horn core had depressions on the medial side. The aetiology is unclear, but has been linked to malnutrition and/or milking stress (Albarella 1995). One cattle metatarsal had a slightly splayed distal condyle, a pathology that has been linked to the use of cattle for traction (Albarella and Davis 1996, 42; Bartosiewicz *et al* 1997, 32-33, 43).

Table 14.23 Number of animal bones from Early to Middle Iron Age assemblages from EKA2

	Landscape 1 Zone 20	Landscape 2 Zone 13	Zone 14	Zone 13+14	Landscape 3 Zone 6	Total
EIA		2140	9	2149		2149
EIA/MIA		2205	11	2216	439	2655
MIA		1751		1751	511	2262
MIA/LIA					38	38
IA		39	15	54	24	78
Total		6135	35	6170	1012	7182

Animal bone groups (ABGs)

The assemblage contained two associated animal bone groups that could indicate deliberate deposits of a ritual nature: one sheep skull in pit 157012 in Zone 10 and one articulating left and right cattle mandible in pit 278071 in Zone 7. However, the sheep skull was found in the top fill of the pit, together with 128 other bones from a wide selection of taxa, most of which were butchery or kitchen waste. It is therefore less probable that the sheep skull could signify a ritual deposit. The cattle mandibles, by contrast, were placed in the single fill of a shallow pit, which also contained six small fragmented bones from cattle, sheep/goat and medium mammal and three small pottery sherds. It would not be inconceivable that the other finds in the fill were accidental inclusions from the backfilling of the feature.

Animal husbandry at Bronze Age EKA2 and other sites in southern England

There are few substantial faunal assemblages from the Bronze Age in south-east England, and all are varied both in species abundance and in the local environment type, which makes it hard to discuss generalities of animal husbandry (Legge 1992, 40-42; Serjeantson 2007, 88-92). However, cattle were probably used for a multitude of products: beef, dairy and traction. Due to the small assemblage size, it is difficult to establish any focus for animal husbandry at the EKA2. A high proportion of calves, which in Grimes Graves has been interpreted as deliberate specialisation in dairy products (Legge 1992), was not observed, although it must be remembered that poor bone preservation severely affects juvenile bone, and consequently juvenile bones may originally have comprised a higher proportion of the total assemblage.

Dale Serjeantson argues that in the Middle to Late Bronze Age sheep husbandry became more intensified and focussed on milk production. Sheep were probably kept close to the settlement for regular milking and supervision of lambing (Serjeantson 2007, 88-89). Unfortunately it is not possible to discuss the validity of this hypothesis in regards to the faunal remains from the EKA2 as the Bronze Age assemblage is too small to form any meaningful comparison. However, the presence of older adult sheep, as seen in the dental data, suggests that these animals were kept for either dairy and/or wool production.

Early-Middle Iron Age

The largest part of the Early to Middle Iron Age assemblage comes from Zone 13 in Landscape 2, where a total of 6111 bone fragments were recovered. The remains from neighbouring Zone 14 are few in number and the two zones have therefore been analysed together. Iron Age bones were absent from Zone 20 (Table 14.23). There is a high degree of fragmentation for all species, which could imply that all taxa were utilised for meat and marrow, but also that the bones could in most cases have been redeposited at least once. The generally poor bone condition in Landscape 2 may also be associated with redeposition of bones (Reitz and Wing 2008, 134-143).

Cattle bones dominate all but the smallest period-based assemblages in Landscape 2 by number of identified fragments (NISP) (Table 14.24). Using the Minimum Number of Individuals (MNI) as a means of quantification, sheep/goat becomes the predominant taxon. There is sometimes a discrepancy of the predominant species when using MNI and using NISP. This discrepancy can be influenced by many factors. For example, fragments of sheep/goat bones are often easier to identify than a bone fragment of similar size from a large mammal, since the smaller sheep/goat bones contain more species characteristic diagnostics per fragment. Furthermore, pig has more teeth and foot bones than cattle and sheep/goat. On the other hand, in hand-collected assemblages there is a retrieval bias against the small phalanges and teeth of medium-sized mammals. Regardless of quantification method, cattle would have been the main meat provider due to their larger size.

A similar difference in the frequency of NISP and MNI for cattle and sheep/goat was noted in the Iron Age assemblage from Claydon Pike, Gloucestershire, where it was suggested that the difference was chronological, cattle being better represented on gravel island 1 than on islands 2 and 3. This would be in line with a national shift from a sheep/goat dominated economy to a cattle dominated economy (Sykes 2007a, 54). Such a shift could not be observed at EKA2, where instead the frequency of sheep/goat and pig increased in the Middle Iron Age.

The assemblage from Landscape 3 is much smaller than the assemblage from Landscape 2, and a secure inter-species comparison between periods is not possible (cf Hambleton 1999, 39-40). However, if

Table 14.24 Number of animal bones from Early to Middle Iron Age assemblages (Landscape 2) from EKA2. Sheep bones are not included in the sheep/goat fragment count. Minimum Number of Individuals (MNI) in parentheses

	EIA	*EIA/MIA*	*MIA*	*IA*	*Total*
Cattle	349 (8)	244 (8)	178 (7)	10 (1)	777
Sheep/goat	199 (10)	140 (10)	151 (10)	10 (2)	499
Sheep	6	8	6		20
Pig	73 (4)	19 (1)	71 (5)	3 (1)	164
Equid	48 (3)	21 (3)	19* (2)	2 (1)	90
Horse	6 (2)		533* (1)		6
Donkey	1 (1)				1
Dog	7	13 (2)	5 (1)		25
Red deer		1 (1)			1
Cetacean			1 (1)		1
Domestic fowl	2 (1)	25 (1)	3 (1)		30
Raven	5 (1)				5
Crow			1 (1)		1
Indet. Bird				1	1
Rodent		6			6
Mole		4 (1)			4
Frog		3 (1)			3
Toad		69 (8)			69
Amphibian		182			182
Microfauna		101			101
Medium mammal	119	170	155	5	449
Large mammal	339	182	184	4	707
Indeterminate	995	1028	444	18	2480
Total	2149	2216	1751	54	5623
Weight (g)	30309	20411	29707	577	67882

*: 521 bones from an articulated horse skeleton

viewing the Early Iron Age/Middle Iron Age and Middle Iron Age assemblages together, the combined fragment count of 297 is just below the recommended minimum of 300 fragments, facilitating tentative conclusions regarding the inter-species frequency. Cattle comprise approximately two thirds of the livestock (Table 14.25), slightly more than in Landscape 2. The frequency of sheep is similar, suggesting that the rise in the abundance of cattle in Landscape 3 may be related to the low frequency of pig in this landscape. Perhaps the inhabitants of the settlement represented in Zone 6 increased the area of arable land at the cost of woodland suitable for pannage during this period.

Disarticulated bones from equids, most likely predominantly horse, formed between 3.6% and 18% of the identifiable assemblage in the Early to Middle Iron Age phases from the Landscapes 2 and 3. While their primary function was as riding animals and/or pack animals, the fragmentation pattern of the equid bones is similar to the cattle bones and suggests that equids were eaten. Butchery marks were not common, but include cut marks from skinning, disarticulation and filleting, as well as long bones split open for marrow extraction. Two finds of articulated horse remains, one hind leg and one entire carcass, will be discussed further below.

The equid remains from Landscape 2 included three small and slender bones that were thought on initial inspection to be possibly from donkeys. One probably Early Iron Age first phalanx from ditch 134099 was metrically compared to bones from modern and medieval donkeys and horses, but was found to be within the size range of horses, albeit on the lowest range (Reichstein 1995, 184). Metrical comparisons of Iron Age and Roman donkeys, mules and horses show that a possibly Early Iron Age metatarsal, also from ditch 134099, was metrically within the range of donkeys (Johnstone 2004, 399). This is an early date for donkey in Britain, and while the possibility that this was an intrusive specimen cannot be fully excluded, the pottery from ditch 134099 was mainly Iron Age, any Roman pottery being only found in the upper fills. The third suspected donkey bone is an unfused Late Iron Age metatarsal from quarry pit 292001. While unfused, the measurements of the greatest proximal breadth (Bp) and the smallest breadth of the diaphysis (SD) are much smaller than those from the metatarsal in ditch 134099 (above), and may therefore be from donkey.

Donkeys and mules were commonly used as pack animals by the Romans, but they have rarely been found archaeologically in Roman Britain. Finds of donkey include an articulated leg in mid-Roman Southwark (Bendrey 2002) and a possible identification to donkey from the fort at Newstead in southern Scotland (Baxter 1998, 5; Bendrey 2002). A mule mandible was found in a deposit dated to AD 125-160 in Billingsgate, London (Armitage and Chapman 1979). There is also a small number of donkey bones from Iron Age sites in Britain, among others, the later deposits from Danebury (Johnstone 2004, 407).

Dog is found in small numbers throughout all Iron Age phases. All remains were adult or sub-adult. Dogs were used for herding, guarding and to some extent for hunting (see below). A cut mark on a shoulder blade in

Table 14.25 Number of animal bones from Early to Middle Iron Age assemblages (Landscape 3).
Sheep bones are not included in the sheep/goat fragment count. Minimum Number of Individuals (MNI) in parentheses

	EIA	*EIA/MIA*	*MIA*	*IA*	*Total*
Cattle	68 (4)	135 (5)	3 (1)	2 (1)	208
Sheep/goat	42 (3)	33 (5)	7 (1)	6 (1)	88
Sheep	1	5		2	8
Pig	7 (1)	6 (2)	3 (1)		26
Equid	12 (2)	14 (2)	1 (1)		27
Horse	15* (1)				15
Dog	3 (1)	3 (1)		1 (1)	7
Red deer	1 (1)				1
Black-throated diver/ red-throated diver	1 (1)				1
Indet. bird			1		1
Amphibian	1				1
Medium mammal	49	22	9	5	85
Large mammal	85	101	3	2	191
Indeterminate	154	192	11	6	363
Total	439	511	38	24	1012
Weight (g)	11257	17024	602	238	29121

*: 15 bones from an articulated horse leg

the Early Iron Age period suggests the use of dog flesh, whether for food or for ritual/medicinal purposes.

Domestic fowl only occurred in Zone 13, the majority of these bones coming from a single male individual in Early Iron Age/Middle Iron Age pit 156135. This bird has been radiocarbon dated to the Middle Iron Age, at 370-100 cal BC (SUERC-40732). With the exception of a single juvenile femur from Middle Iron Age pit 168115, radiocarbon dated to 380-170 cal. BC (SUERC-40733), all fowl remains derived from adult birds, indicating the importance of eggs and feathers/down. Male birds were also used in cock fighting.

Bones from domestic animals dominate the assemblages from Landscape 2 and Landscape 3, a common feature in Iron Age assemblages. The non-commensal wild fauna comprises single bones of red deer and dolphin-sized cetacean, crow and a black or red-throated diver as well as five bones from a raven skeleton. Hunting and wildfowling, as evidenced by red deer, diver and cetacean remains, would have provided a very small part of the consumed meat. Crows and other corvids would have scavenged the middens of the settlements and the single crow wing bone is likely to be an accidental inclusion at the site. The partial raven skeleton may be a deliberate deposit and is discussed together with other associated bone groups below.

Element representation

The skeletal element representation of cattle, sheep/goat, pig and horse shows a significant taphonomic loss of skeletal remains. However, bones from all body parts were present, indicating that the animals had been slaughtered, butchered and consumed at the settlements in Zones 6 and 13. With the exception of sheep metacarpals in the Middle Iron Age assemblage, no element appears to be under- or over-represented in the assemblages, bearing in mind the taphonomic loss which affects skeletal elements disproportionally.

The Middle Iron Age assemblage in Zone 13 shows a curious under-representation of sheep/goat metacarpals (n: 3), compared to metatarsals (n: 21). There were few phalanges in the assemblage, suggesting that metacarpals and adhering phalanges may have been removed from the carcass and disposed of elsewhere. However, the scarcity of phalanges could also be connected to recovery bias against smaller bones.

Age

Due to the limited numbers of dental and epiphyseal data when viewing the assemblages by phase, the landscapes are viewed as a unit. The cattle dental data (Table 14.13) show a small but consistent slaughter of surplus animals between 1-8 months and 30-36 months of age, probably mostly males. The Early Iron Age/Middle Iron Age assemblage includes a total of seven cattle mandibles from the age categories 'adult' and 'old adult'. These age categories are missing in the Middle Iron Age assemblage. It is not certain whether this discrepancy is caused by representation bias or whether an increased focus on secondary products in the Middle Iron Age meant that mature cattle were less likely to be slaughtered. Both assemblages include small numbers of very old cattle, indicating animals that were past their prime as draught oxen, milking cows and breeding cows.

Most bones in the late-fusing category were fused, indicating cattle that were over 3.5 years old when they died. The epiphyseal fusion data also indicate that only one animal below ten months of age was slaughtered on site (Tables 14.26-14.30). However, 12 bones from neonatal/juvenile cattle have been found, which could indicate (disturbed) deposits of natural mortalities or the deliberate slaughter of young calves.

The dental data from sheep/goat are scant, but include both young animals of 0.5-2 years of age and adult sheep/goat of 3-6 years of age (Table 14.14). The Middle Iron Age assemblage also included one 6-8 year old animal. The epiphyseal fusion data suggest that a majority of the sheep died skeletally immature, before 3.5 years of age (Tables 14.26-30). Sheep/goat at EKA2 were kept for a multitude of products. An ewe killed at three years of age would still have produced four lambs, assuming twin births, and at least three clips of wool. Dairy and manure for field fertilising need also be taken into account. A total of nine bones from neonatal/juvenile sheep/goat were recovered. They may indicate natural mortalities, although it cannot be excluded that they represent disturbed butchery or kitchen waste.

Pigs were usually slaughtered as sub-adults, ie, between the eruption of the second and the third mandibular molar, the latter of which occurs when the pigs are *c* 18-20 months old. A small number of older pigs, probably breeding animals, were also present (Tables 14.15, 26-30). This is a typical slaughter age pattern for pig keeping, as there is no need to keep non-breeding pigs after they have reached their full size. The assemblage also included five neonatal/juvenile pig bones.

The majority of the horse bones were fused, indicating that they were sub-adult or, more likely, adult at the time of death. The presence of one pelvis in Early Iron Age ditch 134099 with a fusing hip socket indicates an age of death at 10-12 months. This ditch also contained an unfused femur which would have come from an animal less than 3.5 years of age. Other unfused horse bones include two distally unfused radii from Early/Middle Iron Age pit 301188 and Middle/Late Iron Age pit 178279. Since horses mature slowly and require large pastures, they would probably not have been raised deliberately for meat in Iron Age Britain. The sub-adult horses could have been slaughtered to preserve fodder availability during a

Table 14.26 Early Iron Age, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	36	2.8%	21	4.8%	7	0.0%	16	0.0%
Mid fusion	44	15.9%	9	22.2%	7	28.6%		
Late fusion	17	41.2%	7	57.1%	2	100.0%	5	20.0%

Table 14.27 Early Iron Age/Middle Iron Age, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse. Articulated remains are only counted once

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	32	0.0%	26	11.5%	3	0.0%	7	0.0%
Mid fusion	27	14,8%	13	30.8%	3	100.0%	2	0.0%
Late fusion	23	39.1%	13	69.2%			6	0.0%

Table 14.28 Middle Iron Age, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse. Articulated remains are only counted once

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	42	2.4%	15	13.3%	15	6.7%	2	0.0%
Mid fusion	32	21.9%	14	28.6%	6	66.7%	1	0.0%
Late fusion	41	46.3%	7	71.4%	4	75.0%	1	0.0%

Table 14.29 Middle Iron Age/Late Iron Age, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	1	0.0%	2	0.0%				
Mid fusion								
Late fusion			1	0.0%	1	100.0%	1	100.0%

Table 14.30 Early Iron Age-Middle Iron Age, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	93	0.0%	62	9.7%	25	4.0%	26	0.0%
Mid fusion	119	16.0%	37	29.7%	16	56.3%	4	25.0%
Late fusion	76	40.8%	30	66.7%	6	83.3%	12	8.3%

hard winter, or may have been unsuitable as work animals due to a bad disposition or illness.

The bones from the other taxa present in the assemblage all come from adult or sub-adult animals, with the exception of one juvenile fowl femur from Middle Iron Age pit (168115).

Sex

Female cattle dominate the assemblage from Landscape 2 (Table 14.31), suggesting that in the Early Iron Age in particular cattle husbandry was focussed on dairy products rather than the use of cattle as draught animals for agriculture. Females, males and castrates are represented in similar numbers among the ovi-caprine remains, suggesting that sheep/goat husbandry was not focussed on a particular product. The dominance of male pig mandibular canines could indicate that a majority of the female pigs were slaughtered before the permanent canines erupted at 7-10 months of age. However, the male predominance could be caused by biased recovery, as the male pig canines are much larger than the female canines. Two maxillary female canines were recovered from an Early Iron Age ditch. Other sexed animals include two male horses and four male fowl (Table 14.31).

The assemblage from Landscape 3 contained few sexable bones and consequently no conclusions could be drawn regarding animal husbandry (Table 14.32).

Size

There were relatively few elements in each phase that could be measured, resulting in a small sample size on which to base a biometrical study. Tentatively, there is no secure evidence for size changes from the Early Iron Age to the Middle Iron Age for any taxa (Tables 14.33-35). The increase in metacarpal width observed for Middle Iron Age cattle is absent for distal tibia, probably reflecting the bias caused by a small sample size. While the sample sizes are small, comparative data suggest that cattle and sheep/goat from EKA2 and from Thanet Earth are rather small for the Iron Age compared to sites such as Yarnton and Pennyland (Tables 14.33-34). This may reflect pressure on the available pasture on the Isle of Thanet. If wealth was measured in the number of livestock, as has been indicated from Early Christian Ireland (McCormick 1991, 41-42), pastures may have been utilised to the maximum, resulting in animals not being able to grow to their optimal size. Alternatively, the size difference could reflect different sex ratios of the herds. However, female cattle are most common at both EKA2 and Yarnton (Appendix 3.2-3.4; Mulville *et al* 2011, 503). The cattle from Pennyland were not sexed.

In general the horse withers' heights fall within the range of horses from Iron Age sites in Britain (Table 14.36). The single larger horse from the Middle Iron

Table 14. 31 Iron Age, Landscape 2: Sex estimation of cattle, sheep/goat, pig, horse and domestic fowl

			Female	*Male*	*Intact male*	*Castrate*
EIA	Cattle	Metacarpal	3			
		Pelvis	12	3		
	Sheep	Horn core		1	1	1
	Pig	Mandibular canine		9		
	Horse	Mandibular canine		1		
	Domestic fowl	Tarsometatarsus		1		
EIA/MIA	Cattle	Metacarpal	4			
		Pelvis	4	1		
	Sheep/goat	Pelvis	4			
		Horn core		1		
	Sheep	Horn core			1	1
	Pig	Mandibular canine	1	1		
	Domestic fowl	Tarsometatarsus		2		
MIA	Cattle	Pelvis	3	2		
		Metacarpal	1			
	Sheep	Horn core		1		
	Pig	Mandibular canine	3	3		
	Horse	Mandibular canine		1		

Table 14.32 Iron Age, Landscape 3: Sex estimation of cattle, sheep/goat, pig and horse

			Female	*Male*	*Intact male*	*Castrate*
EIA/MIA	Cattle	Pelvis	1	1		
	Pig	Mandibular canine	1	1		
	Horse	Mandibular canine	1			
MIA	Cattle	Metacarpal		1		
		Pelvis	1		1	1
	Sheep	Horn core		2		3

Table 14.33 Greatest length and greatest distal width of cattle bones in the Early to Middle Iron Age assemblages from EKA2 and contemporary sites in Britain

Site	*Phase*	*Bone*	*Measurement*	*N*	*Mean*	*Min*	*Max*
EKA2	EIA	Metacarpal	GL	4	175.4	167.7	181.5
EKA2	EIA/MIA			4	173.9	164.5	183.0
EKA2	MIA			2	179.5	177.0	182.0
Thanet Earth	IA			4	172.0	160.0	189.0
Wetherlees pipeline	EIA			1	184.0		
Wetherlees pipeline	MIA/LIA			1	182.0		
West Stow	MIA-LIA			5	177.7	166.7	189.8
Yarnton	EIA-MIA			12	180.5	164.0	203.0
Pennyland	IA			4	182.5	176.0	189.0
ABMAP	EIA-MIA			12	174.1	158.2	184.0
EKA2	EIA	Metacarpal	Bd	3	50.5	49.2	51.5
EKA2	EIA/MIA			5	50.9	47.5	54.1
EKA2	MIA			2	58.2	55.7	60.2
Wetherlees pipeline	EIA			1	52.7		
Wetherlees pipeline	MIA/LIA			3	56.0	51.8	59.6
ABMAP	EIA-MIA			19	54.6	47.5	61.8
EKA2	EIA	Tibia	Bd	10	55.6	50.8	61.1
EKA2	EIA/MIA			7	60.0	56.2	67.8
EKA2	MIA			8	54.9	50.1	65.4
Thanet Earth	IA			2	58.3	55.1	61.4
ABMAP	EIA-MIA			41	54.4	47.2	60.6

Table 14.34 Greatest length and greatest distal width of sheep/goat bones in the Early to Middle Iron Age assemblages from EKA2 and contemporary sites in Britain

Site	*Phase*	*Bone*	*Measurement*	*N*	*Mean*	*Min*	*Max*
EKA2	EIA/MIA	Metacarpal	GL	1	114.8		
Thanet Earth	IA			6	124.4	117.3	133.6
West Stow	MIA-LIA			2	127.6	125.0	130.2
Yarnton	EIA-MIA			3	122.4	116.0	127.0
ABMAP	EIA-MIA			17	114.5	101.1	126.5
EKA2	EIA/MIA	Metacarpal	Bd	1	23.9		
ABMAP	EIA-MIA			15	21.8	19.7	26.0
EKA2	EIA/MIA	Tibia	GL	1	203.5		
ABMAP	EIA-MIA			4	193.4	175.0	208.3
EKA2	EIA	Tibia	Bd	5	23.5	21.8	25.5
EKA2	EIA/MIA			4	23.5	22.1	25.2
EKA2	MIA			7	22.8	21.7	24.0
Thanet Earth	IA			1	23.2		
ABMAP	EIA-MIA			31	22.5	20.8	23.8

Age represents an outlier. As the articulated horse has been radiocarbon dated to 390-200 cal BC (SUERC 40738) the fact it appears to be an outlier may only be a consequence of the inherent bias resulting from the small sample size in the ABMAP database. There is also a possibility, however, that this was a 'special' animal (see below), given the nature and location of the burial, in a pit (177193, possibly dug as a grave) adjacent to the trapezoidal enclosure.

Butchery

Butchery marks were found on similar locations on the species in the two assemblages, indicating that they were used in a similar manner throughout the period.

Cattle long bones exhibited cut marks from disarticulation of the joints and from filleting of meat. Cut marks from disarticulation were primarily found on the shoulder joint, elbow joint, the hip joint and the hock joint, whereas cut marks from filleting occurred on skull, pelvis, femur and tibia. Two scapulae had been disarticulated by chops through the glenoid, separating the glenoid process from the rest of the bone. One pelvis and a small number of large mammal vertebrae showed evidence of axial splitting of the carcass. Indications of marrow extraction occurred on one femur and tibia as well as two humeri and one tibia; the first two were split axially and the latter three chopped open transversely.

Sheep/goat follow the same pattern of cut marks at shoulder joint, elbow joint and hock joint. One femur from the Early/Middle Iron Age assemblage was chopped in two, probably to facilitate marrow extrac-

Table 14.35 Greatest distal width of pig bones in the Early Iron Age to Saxon assemblages from EKA2 and contemporary sites in Britain (ABMAP)

Site	Phase	Bone	Measurement	N	Mean	Min	Max
EKA2	EIA	Tibia	Bd	1	27.2		
EKA2	MIA			1	28.9		
EKA2	MIA/LIA			1	28.7		
EKA2	LIA/ERo			1	31.3		
EKA2	MRo			2	28.5	26.9	30.1
EKA2	MS			1	27.7		
ABMAP	MIA			4	25.1	22.0	27.0
ABMAP	LIA			1	26.4		
ABMAP	LIA/ERo			1	28.8		
ABMAP	ERo			3	29.8	28.0	31.3
ABMAP	LRo			13	29.6	27.5	31.9
West Stow	ES, phase 1			8	29.7	27.6	31.7
West Stow	ES, phase 2			4	28.6	27.2	30.7
Hamwic (Melbourne Street)	MS			52	29.4	26.4	33.2
ABMAP	Late Saxon			2	28.7	28.6	28.8

Table 14.36 Calculated withers' height of equid (horse) from EKA2 and comparative sites

Site	Phase	N	Mean	Min	Max
EKA2	LBA/EIA	1	141.5		
EKA2	EIA	4	125.2	116.8	132.5
EKA2	MIA	1	144.6		
EKA2	LIA/ERo	2	131.8	122.9	140.7
EKA2	ERo	1	136.4		
EKA2	MRo	6	126.8	117.2	139.4
EKA2	LRo	3	127.3	120.5	133.2
EKA2	MS	1	141.7		
Grimes Graves	MBA	5	129.3	123.3	138.6
Potterne	LBA/EIA	5	139.0	135.8	142.3
Thanet Earth	IA	4	125.3	115.8	132.7
Claydon Pike	MIA	8	123.0	117.0	131.0
Yarnton	IA	3	135.0	129.0	140.0
Yarnton	Ro	4	133.0	113.0	149.0
Springhead Roadside settlement	Ro	12	130.0	121.0	136.0
Northfleet Villa	Ro	13	138.0	121.0	150.0
Hamwic (Melbourne St, Six Dials)	MS	18	132.6	102.0	142.5
ABMAP	LBA/EIA	3	129.5	123.9	132.8
ABMAP	EIA	3	126.6	123.4	129.8
ABMAP	EIA/MIA	3	125.1	112.7	130.5
ABMAP	MIA	18	120.0	109.4	136.5
ABMAP	LIA	23	119.6	79.9	133.1
ABMAP	LIA/ERo	11	125.0	107.4	144.6
ABMAP	ERo	7	127.3	114.1	139.3
ABMAP	LRo	35	136.2	120.8	180.5
ABMAP	ES	1	128.3		
ABMAP	LS	5	132.6	128.9	140.4

tion. One sheep horn core had been sawn in two, suggesting that the horn sheath was utilised as a raw material for hornworking.

There was scant evidence of pig butchery, consisting only of a cut mark from disarticulation on a Middle Iron Age proximal femur and an atlas had had both wings chopped off during portioning of the carcass.

Butchery marks on horse were noted on five bones. The bone from Zone 6 shows cut marks from filleting, whereas the bones from Zone 13 include evidence of skinning, disarticulation, filleting and marrow extraction.

Butchery marks on other taxa include cut marks from disarticulation of the shoulder joint on dog (ditch 134099) and chop marks on the antler pedicle on a deer skull (pit 173275) to remove the antler.

Pathology

Pathological conditions occurred on bones from cattle, sheep/goat, pig, horse and frog/toad. The pathological assemblage is proportionate to the total number of bones per zone and period suggesting that the animal husbandry conditions were similar on the settlements.

Extended medial distal condyles on three cattle metatarsals, osteophytes on a proximal metatarsal and on a first phalanx, eburnation on a proximal femur as well as lipping around a hip socket indicate the use of cattle for traction (Bartosiewicz *et al* 1997, 32-43). The mandibular/temporal joint was affected by pitting on one skull and on two mandibles. Bone absorption and eburnation were also present on one of the mandibles. These three elements were found in different contexts and zones and are not likely to derive from the same animal. Other pathological conditions on cattle bones include a strip of smooth new bone formation on a femoral shaft, probably healed osteomyelitis, and a small bone growth on a metacarpal shaft, which may be a haematoma or an enthesophyte. Haematomas occur from traumatic impact and subsequent infection of the periosteum, a membrane which covers bone. These are common on metapodials since these elements are not covered in protective muscle tissue.

The articulated horse in pit 177193 (see below) displayed areas of fine pitting, minor bone absorption and bone remodelling on the joint surfaces of left and right tarsals and metatarsals, as well as minor exostoses on the anterior side of these bones. This could be a beginning of spavin or similar joint disease, although a bacterial infection cannot be excluded (cf Baker and Brothwell 1980, 125).

The distal cusp of the mandibular third molar was congenitally missing on five cattle mandibles. Indirect evidence for this was observed on a cattle maxilla, where the corresponding tooth was worn unevenly.

Oral pathologies were common in the sheep/goat assemblage. Four of eight pathological sheep bones displayed signs of infection of the mandible, such as bone absorption at the gum line, swelling of the horizontal ramus, widening of the alveoles and porous bone growth. An enthesophyte on a sheep/goat first phalanx suggest muscle strain of the foot, possibly associated to walking on very soft or hard ground. One sheep/goat metacarpal and one metatarsal had a narrow bone ridge on the posterior side of the proximal half of the shaft. This condition has been observed in several assemblages (Brothwell *et al* 2005; Dobney *et al* 1995, 43; Strid 2011), but the aetiology is still unclear. It may be linked to infection and minor trauma.

Healed fractures were observed on two amphibian long bones and on one medium mammal vertebra. One juvenile sheep/goat displayed a semi-healed fracture of the metatarsal. The lamb/kid probably succumbed from a subsequent infection or was slaughtered before it could die of the infection.

Associated bone groups

Associated bone groups (ABGs) are often found in Iron Age assemblages. This category, usually defined as either an articulated animal skeleton, articulated limb or skulls (Grant 1984), are deliberate deposits, possibly of a ritual nature. The ABGs in the EKA2 assemblage comprise one horse burial in pit 177193, one horse hind limb in ditch 302122, one horse skull in pit 279145, one partial cockerel skeleton in pit 156135, one partial raven skeleton in ditch 134099, as well as three deposits of articulated mandibles of cattle (pits 166009 and 173013) and sheep/goat (pit 168115) in Landscape 2 which may be of a ritual nature. There is also a cattle skull with articulated mandibles and a pair of pig mandibles associated with inhumations (297080 and 263052).

Pit 177193 contained a complete skeleton of an adult male horse, laid out on its right side, with fore limb flexed and hind legs stretched out below the body. Cut marks and/or chop marks were absent, suggesting that neither skin nor meat had been removed from the carcass. The lack of gnaw marks suggest that scavengers were not able to access the carcass after its deposition. The small number of animal bone and pottery sherds that were found in the fill may have originated from deliberate infill. Complete horses are rare finds in Iron Age assemblages (Morris 2008, 117-118, 137) and it is therefore difficult to distinguish any pattern in their deposition. However, considering that horse meat was regularly eaten in the Iron Age, as evidenced by the fragmentation pattern, the sacrifice of such large amount of meat suggests that this burial had some very special significance. A tarsal from this animal has been radiocarbon dated to 390-200 cal. BC (SUERC-40738).

The articulated horse leg was deposited in one of the lower fills (301145) in Early Iron Age/Middle Iron Age ditch 302122 in Zone 6, and comprises femur, tibia, metatarsal, lateral metatarsals and the first phalanx. Deposits related to opening/closing rituals tend to be placed either at the base or at the top of a feature, but there are several Roman examples of deposits in the middle of features (Grimm 2011; Morris 2008, 174-175). The placement of the horse limb can, therefore, not be used as an argument against ritual deposition. Gnaw marks from carnivores were found on the femur and on the calcaneus, indicating that the limb was accessible to scavengers pre- and/or post-deposition. Again, this in itself need not indicate that the deposition could not have been ritual, since dogs or foxes may have accessed the limb afterwards. The horse limb's status as a possible ritual deposit is therefore ambiguous. The top fill of Middle Iron Age pit (279145) in Zone 6 contained the fragmented remains of a horse skull with associated mandibles, which may be considered to be a deposit for a closing ritual.

Remains from a male fowl were found in the upper fill from Early Iron Age/Middle Iron Age pit 156135 in Zone 13. The spur on the right tarsometatarsus had been sawn off, possibly for adding a metal spur for cockfighting, or the amputation may have been necessitated by an injury (Pl 14.1). The cockerel has been radiocarbon dated to 370-100 cal. BC. As a recent introduction to the domestic fauna and a relatively rare animal, fowl may have had particular importance in the Iron Age community. This suggests that the deposition of the cockerel may have had ritual significance.

The partial raven skeleton (right humerus, left and right femur, right tibiotarsus and right tarsometatarsus) was found in the base of Early Iron Age ditch 134099 in Zone 13, indicating that it may be a ritual deposit. Deliberately deposited skeletons of ravens and other large corvids have been found on several Iron Age and Roman sites, and it has been argued that the large corvids may have been associated with death and the afterlife, as message carriers and bringers or prophecies. They may also have been used in the Iron Age for excarnation of bodies before burial (Serjeantson and Morris 2011).

Pl 14.1 Early/Middle Iron Age pit 156135 in Zone 13: (left) cockerel tarsometatarsus with sawn-off spur(lateral, posterior, medial and anterior view; (right) cockerel tarsometatarsus with complete spur (anterior, lateral, posterior and medial view)

Other possible ritual deposits include one dog baculum (penis bone) in the top fill of Early/Middle Iron Age pit 302077 in Zone 6. This fill included a small number of other animal bones, but none of them from dog.

Articulated mandibles have been classified as ABGs in James Morris' work on associated bone groups in Yorkshire and in southern England (Morris 2008, 33-35), but were less common than other ABG types (Morris pers. comm.). Mandibles in the EKA2 assemblage are generally not found as pairs, which suggests a special treatment of the cattle and sheep/goat mandibles, as mentioned above. They are, however, partial, lacking the vertical ramus and so may have more in common with butchery waste than with ritual deposition, since complete elements are more common as ABGs. Indeed, one articulated cattle mandible in ditch 134099 included only the foremost part and had cut marks on the diastema from filleting or skinning. The articulated cattle and sheep/goat mandibles mentioned above lack traces of butchery, although that in itself may not be significant, as most of the disarticulated mandibles also lack them. The cattle mandible in Middle Iron Age pit 166009 was found in the base fill, although it is not known whether it was found at the base of the pit or within the fill. The cattle mandible in Early/Middle Iron Age pit 173013 and the sheep/goat mandible in Middle Iron Age pit 168115 were both found at the base of fills (173024 and 168117 respectively) of a possible re-cut of the pits, presenting the possibility of an opening ritual deposit. However, these fills also contained several bones from a variety of species. The nature of their deposition is therefore rather uncertain.

Two ABGs, the head of an adult cattle and an articulated neonatal pig mandible, were associated with inhumation burials. The cattle head was placed with an inhumation (297080) of a 7-9 year old child, whereas the pig mandible was found near the re-deposited or *in situ* slumped remains of an adult ?female in a well (263052). Similar burials with cattle heads have been found at the nearby Late Bronze Age/Middle Iron Age site Cliffs End Farm (Jacqueline McKinley pers. comm.).

Intra-site variation of disposal in pits

The Early and Middle Iron Age assemblage from Zone 6 contained several pits that had been filled in rapidly, as evidenced by pot sherds from upper fills fitting with sherds from the lower fills. Regardless of phasing, no spatial concentration of animal bone within pits could be observed. Most pits contained between 6 and 71 bones; a single pit (279145) contained 442 bones. Even excluding pits with very few bones, no over-arching pattern of bone distribution is apparent. Some pits are dominated by bones from large mammals, others dominated by bones from medium mammals. Pit 302077 contains an almost equal number of bones from large and medium mammals. None of the pit assemblages showed a predominance of certain skeletal elements or elements from the left or right side, as was observed at Thanet Earth (Jones forthcoming).

Animal husbandry at Iron Age EKA2 and other sites in southern England

Eastern Kent is underrepresented among Iron Age animal bone assemblages (Hambleton 1999, 15) and only Thanet Earth had a suitable sized Iron Age assemblage for comparative purposes. Suitable sites elsewhere in Britain may vary in environment and underlying geology, which can direct the focus of animal husbandry on a settlement (cf Davis 1995, 81; Hamiliakis 2000, 279). The sites chosen for comparison have, however, similar species abundance to EKA2 (Table 14.37). The frequency of cattle and sheep/goat is consistent with other Iron Age sites in Eastern England,

Table 14.37 Comparison of relative proportion of cattle, sheep/goat and pig from a selection of Iron Age sites in southern England

Site (Phase)	*County*	*N*	*Cattle*	*Sheep/goat*	*Pig*
EKA2 (EIA-MIA)	Kent	1790	55.0	34.4	10.6
Thanet Earth (IA)	Kent	3404	58.0	37.2	7.9
West Stow (MIA-LIA)	Suffolk	2550	54.5	34.9	10.6
Claydon Pike (MIA)	Gloucestershire	643	51.3	43.4	5.3
Yarnton (EIA-MIA)	Oxfordshire	4663	58.3	36.3	5.4
Pennyland (IA)	Bedfordshire	1145	62.0	29.8	8.2

and the Upper Thames Valley, indicative of an animal economy focussed on cattle (Hambleton 1999, 46, 88-89). The higher frequency of pig in EKA2 and West Stow suggests the availability of nearby woodland for pannage.

The slaughter patterns for the EKA2 also follow those from comparative sites. Cattle and sheep/goat display broad slaughter age ranges, signifying young surplus animals slaughtered for meat and older animals past their prime as dairy producers, wool producers, breeders or draught oxen, suggesting a mixed product economy. Pigs are slaughtered young, with the exception of a few breeding animals (Holmes 1993; Mulville *et al* 2011; Sykes 2007a).

Late Iron Age-Roman

The Late Iron Age and early Roman period would have brought great changes to the Isle of Thanet. The Romans invaded in AD 43 and military forts were established at Richborough and (later) Reculver. However, there are few changes in the material culture as observed archaeologically. Trade and cultural exchange across the English Channel may have meant that the coastal areas of south-east England were to a large extent Romanised long before the conquest (Egging Dinwiddy and Schuster 2009, 147-148).

The settlement on the chalk ridge in Landscape 1 predominantly dates to the mid- to late Roman period, whereas the settlements on the Cliffsend spur in Landscape 2 were inhabited in the Late Iron Age to early Roman period, with the *caveat* that Zone 14 contained a number of features that could only be dated broadly as 'Roman'. In contrast, the settlement on the Ebbsfleet Peninsula in Landscape 3 was occupied throughout the Late Iron Age and Roman periods. The assemblage from Zone 6 is dominated by bones from the mid-Roman upper layer of a trackway, in use from the Early Iron Age to the mid-Roman period. These deposits significantly increased the size of the mid-Roman assemblage (Table 14.38).

The three landscapes are similar in species disposition (Tables 14.39-14.41), although for many periods this must be viewed with caution as the fragment count

Table 14.38 Number of animal bones from Late Iron Age to late Roman assemblages

	Landscape 1 Zone 20	*Zone 13*	*Landscape 2 Zone 14*	*Zone 13+14*	*Landscape 3 Zone 6*	*Total*
LIA		237	22	259	27	286
LIA/ERo	42	306	120	426	521	989
ERo		998	1	999	685	1684
MRo	578				2423	3001
MRo/LRo	364					364
LRo	795				619	1414
Unspecified Roman	254	65	1664	1729	5	1988
Total	2033	1606	1807	3413	4280	9726

Table 14.39 Number of animal bones from Late Iron Age to late Roman assemblages (Landscape 1).
Sheep bones are not included in the sheep/goat fragment count. Minimum Number of Individuals (MNI) in parentheses

	LIA/ERo	*MRo*	*MRo/LRo*	*LRo*	*Roman*	*Total*
Cattle	6 (1)	66 (6)	40 (2)	105 (5)	18 (2)	235
Sheep/goat	5 (2)	68 (3)	33 (3)	81 (5)	16 (3)	203
Sheep		2	1	3		6
Pig	1 (1)	11 (1)	9 (1)	36 (3)	2 (1)	59
Equid	1 (1)	21 (2)	8 (1)	28 (2)	7 (1)	67
Horse					2 (1)	
Dog		4 (1)		11 (1)		15
Canid		1		2	1	4
Red deer			2 (1)	3 (1)		5
Fallow deer		1 (1)		1 (1)	1 (1)	3
Roe deer			1 (1)	3 (2)		4
Deer sp.	3	2		7		12
Domestic fowl				2 (1)		2
Wader sp.			1			1
Indet. bird			2	1		3
Toad				1 (1)		1
Small mammal				2	1	3
Medium mammal	6	82	60	123	10	281
Large mammal	6	63	63	116	12	260
Indeterminate	14	257	144	270	184	869
Total	42	578	364	795	254	2033
Weight (g)	387	11710	3812	11860	2227	29996

per period is relatively low. This suggests that while the local environments may be somewhat different, there were no places in the settlements that were considered directly unsuitable for certain taxa. No settlement showed indications of animal husbandry specialisation, such as cattle rearing or wool production. However, a strong increase in pig abundance was noted for the late Roman phase in Landscape 1 and in the mid- and late Roman phases in Landscape 3. This will be discussed further below. As the number of identified bone per species was low in many phases, the landscapes will be analysed as chronological units.

Table 14.40 Number of animal bones from Late Iron Age to late Roman assemblages (Landscape 2).
Sheep bones are not included in the sheep/goat fragment count. Minimum Number of Individuals (MNI) in parentheses

	LIA	*LIA/ERo*	*ERo*	*Unspecified Roman*	*Total*
Cattle	35 (4)	42 (3)	79 (6)	110 (5)	266
Sheep/goat	13 (1)	59 (4)	169 (12)	355 (18)	597
Sheep		1	7	7	15
Goat				5	5
Pig	2 (1)	11 (2)	26 (3)	8 (1)	47
Equid	11 (1)	9 (1)	35 (3)	7 (2)	62
Dog	9 (1)		5 (1)	96 (3)	110
Cat				43 (2)	43
Cetacean			1 (1)		1
Domestic fowl		2 (1)	1 (1)	36 (4)	38
Goose				24 (2)	24
Duck			3 (1)	2 (2)	5
Wader sp.		1			1
Kite				2 (1)	2
Crow/rook				6 (1)	6
Indet. bird		7	1	43	51
Rodent		1			1
Mole	1 (1)				1
Frog		2 (1)			2
Toad		3 (1)			3
Amphibian	1	2		1	4
Small mammal	1		1	7	9
Medium mammal	11	92	189	338	630
Large mammal	46	39	76	103	264
Indeterminate	129	153	406	536	1224
Total	259	426	999	1729	3413
Weight (g)	3789	4356	13676	17499	39320

Table 14.41 Number of animal bones from Late Iron Age to late Roman assemblages (Landscape 3).
Sheep bones are not included in the sheep/goat fragment count. Minimum Number of Individuals (MNI) in parentheses

	LIA	*LIA/ERo*	*ERo*	*MRo*	*LRo*	*Unspecified Roman*	*Total*
Cattle	5 (1)	102 (4)	126 (2)	387 (15)	102 (4)		722
Sheep/goat		74 (6)	134 (10)	325 (16)	82 (7)	2 (1)	617
Sheep		6	2	18	2		28
Goat				2			2
Pig		12 (2)	20 (2)	144 (8)	29 (2)		205
Equid		17 (1)	29 (2)	94 (3)	28 (2)		168
Dog		4 (1)	4 (1)	98 (4)	17 (1)		123
Canid				1			1
Cat					1 (1)		1
Red deer				1 (1)	10 (1)		11
Deer sp					1		1
Cetacean				1 (1)			1
Domestic fowl					1 (1)		1
Gannet					1 (1)		1
Raven			1 (1)				1
Indet. bird		2	3	2			7
Small mammal		1		5			6
Medium mammal	1	45	80	214	77	2	419
Large mammal	1	61	68	388	94	1	613
Indeterminate	20	197	218	744	174		1353
Total	27	521	685	2423	619	5	4280
Weight (g)	240	7376	14476	43265	13019	62	78438

Domestic mammals dominate all assemblages from this broad period (Tables 14.39-14.41). Chronologically there is little significant difference in species proportion between livestock, bearing in mind the different sizes of the assemblages. However, only the mid-Roman assemblage from Landscape 3 is of sufficient size for a reliable inter-species comparison (cf Hambleton 1999, 39-40), and the relationship between cattle, sheep/goat and pig in the other time periods must be viewed with caution. The minimum number of individuals (MNI) is also only of a useable size for the mid-Roman period, where it shows equal numbers of cattle and sheep/goat.

When the assemblages from the three landscapes are considered together, sheep/goat fragments have increased in relative abundance compared to the Iron Age, mainly at the expense of cattle (Table 14.42). Sheep/goat are particularly common in the early Roman period, but in the following periods appears to decline somewhat, although they are still relatively more common than in the Iron Age. It is possible that the decrease in cattle in the early Roman period is not caused by an increase of sheep/goat, but by the sale of cattle on the hoof to the nearby Roman military forts. Studies on the fort at Alchester (AD 44-65) suggest that their food supply almost exclusively consisted of local animals, rather than depending on long-distance trade networks (Thomas 2008). The later increase in the frequency of cattle would probably reflect an adaption to the higher demand for livestock to send to the urban and military markets. Specialisation in the form of agriculture, dairy or wool production could also have influenced the species/age/sex distribution among the herds. Unfortunately, the published Roman bone assemblages from Canterbury are rather small (Bendrey 2009; Jones and Cooper 2010) and only the worked animal bone from the excavations of the Roman forts at Dover, Reculver and Richborough were included in the analysis (Philp 2012; Philp 2005; Cunliffe 1968).

The assemblage from Landscape 2 contained five fragments from goat: three horn cores from male goats, one unsexed horn core and one skull where the horn cores had been chopped off. Goats are rare animals in Britain throughout the Roman period, the only exception being the shrine to Mercury at Uley, where 80% of the sheep/goat remains came from goat (Levitan 1993). On the Isle of Thanet, goat is present at Cottington Hill and at Monkton, by one and two horn cores respectively (Bendrey 2008, 254; Grimm 2009). Since horn cores are one of the most distinguishable ovi-caprid element, it is difficult to tell whether the absence of post-cranial elements from goat indicates trade in horn or hides for raw material or whether any post-cranial elements from goat were too indistinct morphologically to be securely identified to species.

The frequency of pig increases significantly in the mid-Roman period (Table 14.42). While material from the trackway in Zone 6 dominate this phase, the high frequency of pig continues in the late Roman period, suggesting that the increase is not a feature of biased disposal practices. It is unclear from the animal bones alone whether it could be related to an increase in woodland for pannage, or whether the perceived increase is merely a reflection of increased trade in cattle and sheep/goat to urban markets.

Only two first phalanges could be specifically identified as horse, whereas no bones could be identified as either donkey or mule. It is therefore assumed that most, if not all, equid bones are from horse. The equid remains were found throughout the settlement. The assemblage is dominated by disarticulated bones which came from a variety of time periods and feature types. The high rate of disarticulation suggests redeposition of bones, either by human activity such as re-cutting of features, or by scavengers. Taphonomic activity can also separate a carcass into disarticulate remains. The presence of cut marks suggests that human activity was to some extent responsible for the disarticulation of the equid remains.

Other domestic animals include dog, cat and domestic fowl. Dog is found in all landscapes and in most time periods. Their presence is further indirectly evidenced by gnaw marks on bone. The dog bones mainly derive from adult animals, although a total of four fusing limb bones from sub-adult dog/s were recovered from Late Iron Age quarry pit 292001 and mid-Roman ditch 107140, and six unfused bones from juvenile dog/s were recovered from late Roman sunken-featured building 170132. While all body parts are represented in the dog assemblage, only 145 bones from a total of four dogs were found articulated. This suggests that the bones have been greatly re-deposited, by humans and/or by scavengers. The articulated remains include two articulated skeletons from mid-Roman ditch 170140 and Roman ditch 159244, as well as one articulated head from mid-Roman pit 126101 and an articulating radius and ulna from late Roman ditch 217122.

Cat is almost exclusively found in the Roman phase of Zone 14, only a single pelvis was found in a late Roman sunken-featured building in Zone 6. The cat remains from Zone 14 are dominated by 35 bones from one semi-articulated sub-adult cat from Roman ditch 159244. The disarticulated cat bones come from a variety of features, suggesting that cat was a continuous albeit minor presence at the settlement. Epiphyseal fusion data indicate that many cats died as sub-adults.

The remains of domestic fowl are primarily found in Roman ditch 159224 in Zone 14. They come from a variety of component cuts of this feature and represent at least four individuals. A small number of fowl were recovered from Late Iron Age to early Roman features in

Table 14.42 Comparison of relative proportion of cattle, sheep/goat and pig from Late Iron Age to late Roman assemblages (all landscapes)

Phase	*N*	*Cattle*	*Sheep/goat*	*Pig*
LIA	55	72.7	23.6	4.4
LIA/ERo	319	47.0	45.5	7.5
ERo	563	36.4	55.4	8.2
LIA-ERo	938	42.1	50.2	7.7
MRo	963	40.8	43.1	16.1
LRo	440	47.0	38.2	14.8

Zone 13 and from late Roman features in Zones 6 and 20. Juvenile remains form a minority of the domestic fowl assemblage, suggesting that fowl were kept primarily for eggs and down/feather. One male fowl from Roman ditch 259208 showed evidence of spur removal, suggesting that cock fighting was a popular pastime.

Wild non-commensal animals present include red deer, fallow deer, roe deer, whale-sized and dolphin-sized cetacean, goose, kite, raven, crow/rook, gannet as well as unspecified duck and wader. While it is difficult to distinguish the domestic variations of goose and duck from greylag goose and mallard, studies suggest that these birds were generally not domesticated in Britain until the post-Roman period (Albarella 2005). The presence of two fallow deer metatarsals from mid-Roman pit 227018 and late Roman sunken-featured building 249083, as well as one fallow deer antler (radiocarbon dated to cal AD 1–220 (SUERC-40739)) incorporated in the unspecified Roman assemblage from ditch 249071, all in Zone 20, suggests the presence of a high-status villa in the vicinity (cf Bendrey 2008, 261-262), most likely that excavated approximately 1km to the south at Minster. Fallow deer were imported from the continent during the Roman period and are assumed to have been held in enclosures near villas (Sykes *et al* 2006). Other fallow deer remains on the Isle of Thanet include seven bones and two shed antlers from Monkton. The Monkton assemblage includes both meat-poor metapodials and bones from the shoulder and forelimb (Bendrey 2008, 254), suggesting that its inhabitants may have been associated with the villa.

Hunting, evidenced by bones from red deer, roe deer, goose, duck, wader and possibly also fallow deer, would again have provided a very small part of the diet. Gannets are documented as having been eaten in coastal Scotland, but it is unclear whether this was the case in Roman Kent. Whale bones are occasionally found on Roman sites (Bendrey 2008, 254; Jones *et al* 1985, 172; Marvell and Owen-John 1997; Palmer and Powell 2010, 311) and it has been suggested that these probably represent utilisation of stranded individuals rather than off shore hunting (Jones *et al* 1985, 172). By contrast, dolphins and porpoises can swim close to the coast and the dolphin-sized vertebra may therefore indicate hunting.

Kite, raven and crow/rook were probably scavengers around the settlement, but two articulated wing bones from kite and six semi-articulated bones from crow/rook may be deliberate deposits and are discussed further below. The single fragmentary raven ulna from ditch 170142 is less likely to represent a deliberate deposit, unless it came from redeposited infill.

The deer remains also included antler fragments, both shed antler and antlers removed from the skull, indicating that antler were used as raw material for crafts.

Element representation

The skeletal element representation of cattle, sheep/goat, pig and horse for the Late Iron Age and Roman periods shows that while there had been a significant taphonomic loss of skeletal remains, bones from all body parts were present. This would imply that there was no major trade in cured meat, insofar as can be observed from the faunal remains alone. Any trade in deboned cured meat is difficult to ascertain and evidence of long-distance trade in livestock often requires isotopic analyses (cf Viner *et al* 2010) .

There is an under-representation of horn cores of cattle and sheep/goat in all phases. While sheep can be naturally hornless, many skulls had had the horn cores broken off close to the base. Perhaps the horn cores were removed for horn working and processed elsewhere. In the medieval period horn cores and bones from the lower legs were often included in the hide (cf Serjeantson 1989). This seems not to be the case here, as cattle and sheep/goat metapodials are commonly found. However, phalanges are relatively scarce and again, this could be caused by removing the phalanges for rendering of glue, or including them in the hides. The smaller sheep/goat phalanges could, on the other hand, have been missed during excavation.

Age

The epiphyseal fusion data suggest that cattle were mostly slaughtered as adults (Tables 14.43-49). This is consistent with the dental data, which show a steady slaughter of young cattle, with two later peaks in the age categories 'Adult' and 'Senile' (Table 14.13). Evidence of the slaughter of very young cattle occurs in the Late Iron Age and Late Iron Age/early Roman phases, and a total of thirteen bones from juvenile cattle were found in the Early, mid- and late Roman phases.

The dental data for sheep/goat show a wide range of slaughter ages from 2-6 months to 8-10 years (Table 14.14). The age at death for the younger animals peaks at 6-12 months, suggesting a cull in their first winter. For the older animals there is a small peak at 2-3 years, but a large part of the herd lived several more years. The epiphyseal fusion data indicate a marked increase in slaughter of sheep/goat in their first year of life in the early Roman period, which is absent again in the mid-Roman period (Tables 14.43-49). This could be a response to increased demand of sheep/goat dairy products, where lambs/kids were killed to free milk for human use. As there is no such evidence for culls of calves in the early Roman period, while there is a rise in slaughtered young sheep/goats, cattle milk and sheep/goat milk may have been used for different purposes. Alternatively the cull of lambs/kids may have been a response to dietary preferences of the Roman military, perhaps to decrease the size of the sheep/goat flocks to free pasture for other taxa or for crop production.

While the sample size per phase for pig epiphyseal fusion is small, and must be viewed with caution, it shows that a small number of skeletally mature pigs, ie, over 3.5 years of age, were found in the early Roman and late Roman periods (Tables 14.43-49). The presence of skeletally mature pigs indicates that breeding animals could have several litters before they were slaughtered.

Table 14.43 Late Iron Age, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		Sheep/goat		Pig		Horse	
	N	% unfused	N	% unfused	N	% unfused	N	% unfused
Early fusion	7	28.6%	1	0.0%			3	33.3%
Mid fusion	5	60.0%	1	0.0%			2	100.0%
Late fusion	4	25.0%						

Table 14.44 Late Iron Age/early Roman, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		Sheep/goat		Pig		Horse	
	N	% unfused	N	% unfused	N	% unfused	N	% unfused
Early fusion	10	20.0%	19	0.0%	3	0.0%	2	0.0%
Mid fusion	17	23.5%	11	9.1%	1	100.0%	1	0.0%
Late fusion	5	20.0%	2	50.0%			2	50.0%

Table 14.45 Early Roman, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		Sheep/goat		Pig		Horse	
	N	% unfused	N	% unfused	N	% unfused	N	% unfused
Early fusion	24	0.0%	37	21.6%	4	25.0%	7	14.3%
Mid fusion	16	18.8%	20	30.0%			3	0.0%
Late fusion	9	33.3%	14	50.0%	1	100.0%	11	0.0%

Table 14.46 Middle Roman, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		Sheep/goat		Pig		Horse	
	N	% unfused	N	% unfused	N	% unfused	N	% unfused
Early fusion	45	2.2%	24	4.2%			21	0.0%
Mid fusion	37	8.1%	36	30.6%	1	100.0%	5	40.0%
Late fusion	27	25.9%	10	40.0%			9	0.0%

Table 14.47 Middle/Late Roman, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		Sheep/goat		Pig		Horse	
	N	% unfused	N	% unfused	N	% unfused	N	% unfused
Early fusion	6	0.0%	1	0.0%				
Mid fusion	3	33.3%	3	33.3%			1	0.0%
Late fusion	3	66.7%						

Table 14.48 Late Roman, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		Sheep/goat		Pig		Horse	
	N	% unfused	N	% unfused	N	% unfused	N	% unfused
Early fusion	16	0.0%	9	0.0%	5	0.0%	10	10.0%
Mid fusion	18	11.1%	10	30.0%	3	100.0%	3	0.0%
Late fusion	19	42.1%	2	50.0%	1	100.0%	7	14.3%

Table 14.49 Unspecified Roman, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		Sheep/goat		Pig		Horse	
	N	% unfused	N	% unfused	N	% unfused	N	% unfused
Early fusion	8	12.5%	40	17.5%	2	0.0%	7	0.0%
Mid fusion	6	16.7%	21	42.9%				
Late fusion	3	33.3%	14	42.9%	1	0.0%		

This is also shown in the dental data, where only two pigs showed extensive wear on the third mandibular molar (Table 14.15), which erupts at 18-20 months (Sisson and Grossman 1953).

The ratio of skeletally mature and immature animals shows that neither horses nor dogs were primarily used as a food source. For the Late Iron Age to Roman period as a whole, seven (8%) equid bones and eleven (14.3%) dog bones were unfused. Juvenile and sub-adult equids and dogs were found in most phases. The presence of juvenile equid remains indicates that breeding took place at the site. The deaths of younger horses and dogs may be attributed to illness, scarcity of fodder, or a bad temper making them unsuitable for their purpose.

Sex

There were few bones in the assemblage that could be sexed. There was a slight predominance of female cattle and male pigs in the early and mid-Roman assemblage. The overrepresentation of male pigs may be caused by biased bone retrieval, as male canines are much larger than female ones. However, if most female pigs were slaughtered prior to the eruption of the permanent canines at the age of 7-10 months, they would have been excluded from the sex estimation. (To facilitate future research the sexed bones have been included in Appendix 14.3).

Size

With the exception of distal tibiae of cattle and sheep/goat, the measured elements of cattle, sheep/goat, pig and horse comprise small sample sizes for each phase (Tables 14.35-14.36, 14.50-14.51). The tibia measurements show that there was little difference in distal tibia width for cattle in the Iron Age and the Roman period, whereas the sheep/goat tibiae show an increase in width in the late Roman period. It is widely established that the Romans introduced larger breeding animals in Britain for stock improvement, although to what extent and when this increase in animal size occurred varies (cf Johnstone and Albarella 2002, 23-25). While the ABMAP database shows an increase in height and width for most elements and taxa between the early Roman and late Roman period (Tables 14.35-14.36, 14.50-14.51), the database does not separate the mid-Roman period, and since most settlements contain

Table 14.50 Greatest length and greatest distal width of cattle bones in the Late Iron Age-Roman assemblage from EKA2 and contemporary sites in Britain (ABMAP)

Site	*Phase*	*Bone*	*Measurement*	*N*	*Mean*	*Min*	*Max*
EKA2	LIA/ERo	Metacarpal	GL	1	175.5		
EKA2	ERo			1	185.5		
EKA2	MRo			4	177.8	160.0	202.0
EKA2	Unspec. Roman			1	185.5		
Wetherlees pipeline	LIA			1	180.0		
Wetherlees pipeline	LIA/ERo			2	180.0	179.0	181.0
Wetherlees pipeline	ERo			1	178.0		
Monkton	Roman			7	191.7	180.0	204.2
Ickham	LRo			6	187.7	180.0	200.0
ABMAP	LIA/ER			5	174.4	158.5	182.6
ABMAP	ER			25	178.7	163.4	192.0
ABMAP	LR			61	192.0	175.2	228.0
EKA2	LIA/ERo	Metacarpal	Bd	2	53.9	48.4	59.3
EKA2	MRo			5	54.5	50.1	57.6
EKA2	Unspec. Roman			1	54.1		
Wetherlees pipeline	LIA			1	52.7		
Wetherlees pipeline	LIA/ERo			1	49.6		
Wetherlees pipeline	ERo			1	50.4		
Monkton	Roman			12	60.2	51.9	71.1
Ickham	LRo			9	54.8	50.1	61.8
ABMAP	LIA/ERo			6	50.1	47.0	52.3
ABMAP	ERo			60	55.1	47.5	67.0
ABMAP	LRo			108	56.5	46.0	70.3
EKA2	LIA/ERo	Tibia	Bd	3	58.0		
EKA2	ERo			2	59.5	56.2	62.7
EKA2	MRo			11	55.4	51.6	66.5
EKA2	LRo			3	57.5		
EKA2	Unspec. Roman			1	50.2		
Wetherlees pipeline	LIA/ERo			2	56.0	54.1	57.8
Wetherlees pipeline	ERo			2	56.2	52.4	59.9
Monkton	Roman			5	64.6	57.0	76.9
Ickham	LRo			1	60.2		
ABMAP	LIA/ERo			19	54.6	45.6	59.6
ABMAP	ERo			61	56.3	48.1	76.0
ABMAP	LRo			91	58.5	43.3	71.8

too few measureable bones to observe intra-site size changes, it is therefore difficult to ascertain how and where the introduction of larger animals occurred throughout Roman Britain.

Likewise, the increased variety of the size of dogs which is known from Roman Britain (Harcourt 1974) could not be verified at EKA2 due to lack of comparative intra-site data. All calculated withers' heights at EKA2 derive from the broadly dated Roman assemblage in Zone 14 (Table 14.52). These fall mainly within the size range common for both Iron Age and Roman dogs, with one dog with a withers' height of 67.3cm representing large Roman dogs not found in Iron Age Britain (Harcourt 1974).

Butchery

Roman butchery is associated with an intense use of cleavers for disarticulation and filleting, as opposed to the Iron Age use of knives. However, this is mainly a feature of urban and military sites, where a high demand for meat required fast butchery techniques. On many rural sites, traditional Iron Age butchery techniques were still in use. Some of the urban butchery techniques have been found on rural sites, but it is unclear whether this signifies a dissemination of these techniques, mobility patterns of retired or itinerant butchers, or sale of meat cuts from urban centres (Maltby 2007).

Viewing the assemblage as a whole, there is a small increase in the use of cleavers for cattle butchery and to

Table 14.51 Greatest length and greatest distal width of sheep/goat bones in the Late Iron Age-Roman assemblage from EKA2 and contemporary sites in Britain (ABMAP)

Site	*Phase*	*Bone*	*Measurement*	*N*	*Mean*	*Min*	*Max*
EKA2	ERo	Metacarpal	GL	1	114.6		
EKA2	MRo			1	118.5		
Wetherlees pipeline	LIA/ERo			1	116.5		
Monkton	Roman			2	122.8	122.0	123.6
Ickham	LRo			2	125.3	123.4	127.1
ABMAP	LIA/ERo			4	119.2	115.8	126.1
ABMAP	ERo			8	114.2	104.9	123.9
ABMAP	LRo			17	122.0	108.3	136.5
EKA2	ERo	Metacarpal	Bd	1	21.8		
EKA2	MRo			2	22.2	21.7	22.6
Wetherlees pipeline	LIA/ERo			1	23.2		
Monkton	Roman			2	25.7	25.0	26.3
Ickham	LRo			4	23.5	23.0	24.2
ABMAP	LIA/ERo			4	22.3	21.9	23.2
ABMAP	ERo			15	22.2	20.6	24.9
ABMAP	LRo			28	24.1	21.6	28.0
EKA2	LIA/ERo	Tibia	Bd	6	23.2	21.9	25.0
EKA2	ERo			9	23.1	19.7	28.0
EKA2	MRo			13	23.0	20.2	27.4
EKA2	MRo/LRo			2	28.1	27.0	29.1
EKA2	LRo			6	27.1	25.0	31.3
Wetherlees pipeline	LIA/ERo			7	23.1	21.8	24.3
Wetherlees pipeline	ERo			2	23.2	22.7	23.6
Monkton	Roman			14	25.9	23.0	30.4
Ickham	LRo			3	23.4	21.4	24.9
ABMAP	LIA/ERo			17	21.7	20.2	25.2
ABMAP	ERo			67	23.1	20.0	29.8
ABMAP	LRo			102	25.2	20.1	29.8

Table 14.52 Calculated withers' height of dogs from EKA2 and from a selection of sites from Iron Age, Roman and Saxon Britain (Harcourt 1974)

Site	*Phase*	*Element*	*GL*	*Withers' height (cm)*
EKA2	Roman	Humerus*	127.7	41.1
EKA2	Roman	Humerus*	128.0	41.3
EKA2	Roman	Humerus**	131.9	42.6
EKA2	Roman	Humerus	204.0	67.3
EKA2	Roman	Radius	119.5	40.0
EKA2	Roman	Radius**	121.1	40.5
EKA2	Roman	Tibia**	145.5	43.3
Sites from Harcourt (1974)	Iron Age			29.0–58.0 (n:272)
Sites from Harcourt (1974)	Roman			23.0–72-0 (n:751)
Sites from Harcourt (1974)	Saxon			23.0–71.0 (n:117)

*: Articulated skeleton **: Probably from articulated skeleton

some extent sheep/goat and pig butchery. However, knife cuts suggesting disarticulation and filleting are still very common throughout the Roman period, most often occurring on the elbow joint, the shoulder joint and the hock joint of cattle and sheep/goat. The butchery marks on the hock joint could derive from disarticulation of the lower leg, but also from skinning. Three cattle first phalanges display cut marks from skinning. Since phalanges were not identified to front or hind limb, it is not clear whether the hind leg was regularly skinned to the hock joint or the front leg skinned to the phalanges. Blade marks from filleting with a heavy cleaver occurred mostly on cattle long bones in the mid-Roman assemblage, but two cattle bones in the early Roman assemblage were also affected. Otherwise filleting was mainly carried out with knives throughout the period. Perforation of scapulae from smoking or curing the shoulder was noted on one early Roman and one late Roman cattle scapula, as well as on one mid-Roman pig scapula. This is also a meat processing technique associated with urban and military sites, although it is the one most commonly found in rural assemblages (Maltby 2007).

Evidence of axial splitting of the carcass was found on a small number of large mammal vertebrae, medium mammal sternum and vertebrae, a pig mandible, sheep skulls and a single sheep/goat pelvis. One goat skull had several axial chopmarks between the horn cores and this may represent a failed attempt to split the skull open. Chop marks and cut marks on skulls and mandibles of cattle, sheep/goat and pig indicate the use of head meat. Axial splitting of long bones to facilitate marrow extraction was noted on one cattle metatarsal and one sheep/goat metacarpal. A total of four sheep/goat tibiae, two in the early Roman assemblage and two in the unspecified Roman assemblage, had irregular perforations through the distal metaphysis. This is known from several assemblages in Britain as well as in other European countries (Vretemark 1997, 170), although its function is not fully understood. It may have been a way to extract molten marrow, or merely the remains of gnaw marks from dog carnassial teeth.

Two cattle and four sheep horn cores had been chopped off at the base, indicating the use of horn for horn working. Another cattle horn core had a saw mark at the base, further evidence of use of horn sheaths as a raw material. Other evidence for the use of animal remains as raw material for crafts include a worked horse radius, polished all along the shaft, with cut marks on the upper and lower thirds of the shaft, possibly from removal of the periosteum, a membrane that covers the bone.

The assemblage also included evidence of some more unusual butchery. In the Late Iron Age/early Roman assemblage, a dog humerus displayed cut marks on the upper third of the shaft, a location associated with filleting. Utilisation of dog meat occasionally occurred in the Iron Age (Maltby 1996, 23-24), but there is little evidence for this in the Roman period.

Several horse bones displayed butchery marks, both from disarticulation and from filleting. Horse was generally not eaten in Roman Britain, but the use of horse meat for dog food or for medicinal or ritual purposes cannot be excluded. Cut marks indicating filleting were noted on two radii from the mid-Roman period and on one pelvis from an unspecified Roman date.

Pathology

Pathologies, mostly related to infections, fractures and muscle stress, were found in all of the Roman assemblages. They affect bones and teeth from cattle, sheep/goat, pig, horse, dog, cat, red deer, domestic fowl and frog/toad.

Several pathologies suggest the use of cattle for traction. These include extended medial joint surface on the distal condyles of a metatarsal, fusion of the tarsal bones to a metatarsal and osteophytes proximally on a first phalanx. Another first phalanx displayed large exostoses, bone absorption and remodelling near the joints, as well as grooved wear and eburnation on the proximal joint surface. Eburnation, indicative of osteoarthritis, also occurred on the hip joint of two cattle pelves. Similar pathologies were noted on horse bones, namely osteophytes around the proximal joint surface of a metatarsal and bone absorption and pitting on the distal joint surface of a tarsal bone.

Two sheep/goat humeri and one radius displayed exostoses at the lateral side of the elbow joint, so called 'penning elbow'. This condition can arise due to repeated impact trauma on the joint, such as when sheep are kept in enclosures which are too small.

Pathologies which were probably caused by muscle stress were noted on a dog distal femur with lipping at one condyle, on a cattle distal humerus with lipping laterally at the trochlea, on a horse metatarsal with a slightly raised area anteriorly on the upper third of the shaft, and on two large mammal thoracic vertebrae with fusion of the neural arches.

Porous bone growth, suggesting infection, occurred on the shafts of a cattle metatarsal, a sheep/goat radius, a horse metacarpal, a horse femur, a fowl metatarsal, as well as at the base of the horn core on a sheep/goat skull and at the hip socket on a cattle pelvis; the latter also displayed bone absorption. Indications of inactive infections were noted on two cattle metacarpal shafts and near the hip socket on a dog pelvis. Traces of what may have been a more serious infection were found on a cattle femur, where a small piece of the outer layer of the cortical bone had become detached near an area of smooth bone growth. This could be a sign of healed osteomyelitis where newly-formed bone sits above a layer of pus and necrotic bone (Baker and Brothwell 1980, 64-67). The fowl metatarsal merits further notice. Not only did the upper quarter of the shaft display pathological bone growth, but the spur had been removed close to the base. The removal of the spur may have caused infection of the leg, which moved into the periosteum and the bone. Removal of spurs for castration or to facilitate the use of metal spurs for cock fighting are known from the Roman empire and from post-medieval Europe (West 1982).

Bone absorption, which may also signify infection, were noted on the medial edge of the proximal joint surface on a red deer radius and on the ilium of a dog pelvis. Other bones with pathologies include a medium mammal vertebra with an irregular depression in the caudal endplate, possibly osteochondrosis, and a large mammal scapula with eburnation along the posterior edge of the glenoid surface, suggesting a dislocated shoulder. Bony lumps and swollen areas interpreted as ossified haematomas occurred on one horse radius and one sheep/goat radius. As haematomas are a reaction to impact trauma, they are more commonly observed on metapodials which are not protected by muscle tissue to the same degree as the other long bones. The pathology on the sheep/goat radius was located on the distal third of the shaft, which is less covered by muscle tissue. The pathology on the horse radius was located on the proximal third of the shaft, and if it was a haematoma would signify a very heavy impact.

Healed fractures occurred on one pig tibia, one dog radius, one dog tibia/fibula, one cat rib and one frog/toad long bone. Two fractured medium mammal ribs were in the process of healing when the animal/s died. The fracture on the dog hind limb had not only fused the tibia and fibula, but the break had misaligned, forming a marked lateral bend, which probably caused the dog to walk with a limp. A dog radius had a healed fracture on the upper third of the shaft. The break had caused misalignment and a new joint formed on the posterior side near the proximal end. The state of the original proximal joint is unknown as it had been destroyed by dog gnawing. Four horse metacarpals displayed fusion of the lateral metapodials to the main metapodial. This condition is age-related, but may also be connected to weight-bearing and muscle strain (Bendrey 2006).

Oral pathologies were mainly noted on sheep/goat, where a total of nine mandibles displayed signs of infection, including swelling and porous pathological bone growth on the horizontal ramus, bone absorption at the gums of the premolars and molars, widened alveoles and premortem tooth loss. Other oral pathologies include a dog mandible with premortem loss of the second premolar and four cattle incisors with wedges in the cemento-enamel junction. This latter pathology may be connected to the use of long abrasive grass in the diet, but the aetiology is uncertain (Miles and Grigson 1990, 494-495).

Congenital absence of teeth or premortem tooth loss was indirectly observed on two cattle mandibular molars with uneven wear of the cusps and on one sheep/goat mandible with deep wear on the aboral cusp of P4 and the oral cusp of M1. Congenital loss of the last cusp of the third mandibular molar was noted on three cattle teeth.

The trackway

Almost two thirds of the mid-Roman bone assemblage in Zone 6 came from a cobbled surface which bisected the excavation area and extended into Zone 7. The trackway was first laid out in the Early Iron Age and was still in use in the mid-Roman period. The bone assemblage is believed to derive from this later period. The representation of taxa in the faunal remains from the trackway is proportionate to that in the mid-Roman assemblage from Zone 6 as a whole, with the exception of dog, which is under-represented on the trackway (Table 14.53). Even if counting the 67 bones from the articulated dog in ditch 170140 as a single fragment, the percentage of dog bones in the trackway only rises to 34.4% of the total dog assemblage in this period and zone. It is uncertain whether this bias represents intentional deposit preferences or whether it is caused by a genuine relative scarcity of dog bones when excluding the articulated remains.

Table 14.53 Number of animal bones from the middle Roman trackway and from other middle Roman features from Zone 6

	Trackway	*Other features*	*Total*	*% trackway*
Cattle	283	104	387	73.1%
Sheep/goat	217	109	326	66.6%
Sheep	13	5	18	72.2%
Goat		2	2	0%
Total ovi-caprine	230	116	346	66.5%
Pig	118	26	144	81.9%
Horse	66	28	94	70.2%
Dog	11	87*	98*	11.2%
Canid	1		1	100.0%
Red deer	1		1	100.0%
Cetacean	1		1	100.0%
Indet. bird	1	1	2	50.0%
Small mammal	2	1	3	66.7%
Medium mammal	125	89	214	58.4%
Large mammal	266	122	388	68.6%
Indeterminate	492	252	744	66.1%
Total	1596	827	2423	65.9%
Weight (g)	29383	13882	43265	67.9%

*: includes 67 bones from an articulated dog

The bone proportion from the EKA2 trackway greatly differs from the bone assemblage from an Iron Age causeway at Yarnton, Oxfordshire, where cattle, horse and deer are over-represented. While this could be explained by the preference for depositing larger mammals on the outskirts of settlements, the bias towards bones from the right limbs at Yarnton suggests a deliberate choice of body parts for deposition (Mulville *et al* 2011, 514-516). A similar bias could not be observed at EKA2.

Associated bone groups

The Roman assemblage also contained four associated bone groups (ABGs). The single fill of a Late Iron Age/early Roman pit (315038) contained an articulated hind leg of an adult horse. It is not clear where in the fill the leg was found, but the only other bone in the pit was a small rib fragment, suggesting that the pit did not function as a rubbish pit for butchery and kitchen waste. The deposition of the horse leg might therefore have had a ritual significance.

The skeleton of an adult dog was found in the upper fill of mid-Roman ditch 170140. Bones from all body parts, with the exception of the feet, which were entirely absent, were retrieved from the feature. Its right tibia and fibula had been broken and the bone had misaligned when it healed. If the dog was found in the upper part of the fill, plough damage could have disarticulated the skeleton and destroyed large parts of the bones. If, on the other hand, the dog was found below the plough depth, the missing skeletal elements could be explained by re-deposition of a semi-decomposed carcass. There is unfortunately not enough information to interpret this ABG deposit as ritual or profane.

Roman ditch 159244 contained the skeletons of one cat and one dog, both found in a basal fill (174192). Again, while bones from most body parts are present, a substantial proportion of the skeletal elements are not included, suggesting that the carcasses had been disturbed since their deposition. While a retrieval bias against the smaller bones of the feet and tail suggests that these elements may originally have been present, this cannot explain the absence of both dog scapulae and pelves, as well as three of the 10 main limb bones. The lack of gnaw marks indicates that scavengers could not access the carcass. The context also contains one atlas and one fragmented humerus from a different dog. It is not clear whether the remaining dog bones belong to a single individual, although the measurable long bones (humerus, radius, tibia) yield a similar withers' height (Table 14.52).

Animal husbandry at Late Iron Age-Roman EKA2 and other sites in southern England

Late Iron Age/Roman sites in eastern Kent show a great variety in species abundance (Table 14.54). Cattle and sheep/goat are present in almost equal frequency in Late Iron Age to mid-Roman phases on EKA2, with an increase in cattle in the late Roman period. The roadside settlement at Springhead in West Kent shows a similar pattern, but here the increase in cattle abundance occurs in the mid-Roman period (Worley 2011a, 32). Cattle is the most common taxon in all phases from the villa at Northfleet and in the late Roman assemblage from Ickham (Worley 2011b, 43; Palmer and Powell 2010, 311), whereas the chronologically wider-ranging Roman sites of Monkton and Thanet Earth show a marked predominance of sheep/goat and cattle respectively (although the emphasis of the former is mainly on the mid-Roman period). An increase in cattle abundance is known from several other settlements in Roman Britain and has been associated with a population increase, requiring an increase in arable land and oxen for ploughing, as well as increased trade in livestock to urban markets (Grant 1989, 138). As the published contemporary urban assemblages from eastern Kent are small, the latter argument cannot be verified for this region.

In contrast, the settlements at Heybridge (Essex), Yarnton (Oxfordshire) and Wavendon Gate (Buckinghamshire) show a consistent predominance of cattle throughout the Late Iron Age and Roman periods (Table 14.54) (Johnstone and Albarella 2002; Mulville *et al* 2011; Dobney and Jaques 1996). For Heybridge, this has been interpreted as a rapid response to the Roman invasion and the associated demand for meat from the fort in nearby Colchester (Johnstone and Albarella 2002, 44-46). The abundance of cattle at Yarnton and at Wavendon Gate demonstrates continuity from the Iron Age, suggesting that this reflects the presence of good breeding environments for cattle rather than societal

Table 14.54 Comparison of relative proportion (%) of cattle, sheep/goat and pig from EKA2 and a selection of Roman sites in southern England

Site (County)	*Phase*	*N*	*Cattle*	*Sheep/goat*	*Pig*
EKA2 (Kent)	LIA-LRo	2341	42.5	45.0	12.5
	LIA-ERo	938	42.1	50.2	7.7
	MRo	963	40.8	43.1	16.1
	LRo	440	47.0	38.2	14.8
Thanet Earth (Kent)	LIA-LRo	228	65.8	22.4	11.8
Monkton (Kent)	Roman	1987	25.7	67.6	6.7
Ickham (Kent)	LRo	229	58.1	35.8	6.1
Northfleet Villa (Kent)	ERo-LRo	577	61.4	27.0	11.6
	MRo	188	61.7	26.6	11.7
	LRo	334	60.2	27.5	12.3
Springhead (Kent)	ERo-LRo	2812	38.3	50.7	10.9
	ERo	2146	33.7	56.0	10.3
	MRo	415	52.8	35.9	11.3
	LRo	251	53.8	30.7	15.5
Heybridge (Essex)	LIA-LRo	6012	71.8	18.7	9.5
	LIA/ERo	1267	62.8	20.4	16.8
	ERo	2078	62.6	26.9	10.6
	MRo	2074	82.4	11.9	5.6
	LRo	593	86.5	10.1	3.4
Yarnton, Cresswell Field (Oxfordshire)	LIA-LRo	2518	50.5	38.9	10.6
	LIA/ERo	652	58.3	35.6	6.1
	ERo	1057	47.4	36.2	16.4
	LRo	809	48.2	45.0	6.8
Wavendon Gate (Bedfordshire)	ERo-LRo	1774	77.7	19.1	3.2
	ERo	817	74.8	20.9	4.3
	MRo	401	82.3	16.0	1.7
	LRo	556	78.6	18.7	2.7

changes caused by the Roman invasion (Mulville *et al* 2004, 489-491; Dobney and Jaques 1996, 226).

The slaughter age patterns at EKA2 and at the comparative sites are similar for cattle and sheep: culling of surplus young animals for prime meat, probably in autumn after they had been fattened, and slaughter of adult and elderly animals that were past their prime as breeding animals, draught oxen, milk and/or wool producers. The broad age categories for cattle over 36 months makes it difficult to spot any patterns of age preferences among these animals. It could suggest that breeding cattle were slaughtered at a different rate from cattle primarily used for dairying, although the slaughter age could also be based on the individual animal rather than its main function in the settlement. However, the cattle at Northfleet Roman villa were mostly elderly, indicating a focus on arable crop production and/or dairy production (Worley 2011b, 45, 51). An exception to the above mentioned slaughter age pattern is the early Roman assemblage from Springhead roadside settlement, where only a minority of the cattle were slaughtered as adults or elderly. This may suggest that crop production was not a main concern for the inhabitants, cereals there perhaps being primarily purchased rather than grown. This pattern changes in the mid- and late Roman period, however, to the common slaughter age pattern of young surplus cattle and adult/elderly cattle (Worley 2011a, 33).

Sheep were generally slaughtered between two and six years of age. Some sites focussed on particular age groups, whereas others show a wide range of slaughter ages. The on average younger age-at-death for sheep/goat compared to cattle is probably connected to the higher fecundity of sheep/goat. Ewes from primitive sheep breeds often give birth to twin lambs, whereas cattle usually only bear one calf which takes much longer to reach its full growth.

Fecundity and maturation rate also influence pig husbandry. In all sites, most pigs were slaughtered prior to skeletal maturity, a common pattern in pig-keeping since meat is their main value as livestock. Due to their high fecundity and rapid maturation there is little need to wait until they have reached their full growth, instead pigs were slaughtered at a variety of ages, probably to conserve fodder for the remaining herd over winter.

Saxon

A substantial mid-Saxon animal bone assemblage was found in Zone 14. Other Saxon deposits included those from a trackway in Zone 19 and two pits in Zone 13 (Table 14.55). Apart from cemeteries, Saxon remains on the Isle of Thanet are scarce (Welch 2007, 196-197), and the Saxon settlements at Thanet Earth, south-west of Birchington, and at Manston Road, Ramsgate, provide the only other larger Saxon animal bone assemblages in the area (Jones forthcoming; Hamilton-Dyer 2009). The Saxon settlement excavated at Cliffs End Farm produced too little animal bone to be used for comparison (Grimm 2009).

Species representation

Viewed as a whole, the Saxon assemblage from EKA2 is dominated by bones from sheep/goat, closely followed by bones from cattle (Table 14.55). Using minimum number of individuals (MNI) as quantification gives a much greater dominance of sheep/goat, but this may be caused by the smaller sheep/goat bones being less fragmented than those of cattle and thus retaining species-specific characteristics to a greater extent. Nevertheless, cattle would again have contributed the majority of the diet due to their larger size. Other animals that formed part of the diet include pig, hare, domestic fowl, goose and unidentified passerine. Game was of very minor importance, being only represented by a small number of hare bones. As discussed above, it is difficult to distinguish domestic goose from its wild counterpart, the greylag goose, particularly since they can interbreed. However, based on the general scarcity of wild fauna at the site, it is likely that the majority of the geese, if not all, are domestic. Other taxa present in the assemblage include equid, dog, cat, rabbit, crow/rook and buzzard. The rabbit bones are probably intrusive, since the Roman population was not large enough to sustain itself in the wild and rabbit appears to have been re-introduced to Britain in the later 12th century (Sykes 2007b, 80-84). While no equid bones could be identified on morphological grounds specifically as either horse or donkey, the absence of small and slender bones suggests that the majority of or all equid bones are horse.

Element representation

The substantial taphonomic loss of skeletal elements from cattle, sheep/goat, pig and horse that was observed

Table 14.55 Number of fragments from the middle Saxon assemblage. Minimum Number of Individuals (MNI) in parentheses. Sheep bones are not included in the sheep/goat fragment count

	Zone 13	*Zone 14*	*Zone 20*	*Total*
Cattle	31 (1)	313 (9)	1 (1)	345 (10)
Sheep/goat	8 (1)	367 (18)	5 (1)	380 (18)
Sheep		26		26
Pig	4 (1)	44 (5)	2 (1)	50 (5)
Equid	1 (1)	7 (1)		8 (1)
Dog		3 (2)		3 (2)
Cat		24 (4)		24 (4)
Rabbit		2 (1)		2 (1)
Hare		3 (1)		3 (1)
Domestic fowl	1 (1)	30 (5)		31 (5)
Goose		13 (2)		13 (2)
Buzzard		10 (1)		10 (1)
Crow/rook		1 (1)		1 (1)
Passerine		2		2
Indet. bird		43		43
Frog		2 (1)		2 (1)
Toad		3 (1)		3 (1)
Amphibian		3		3
Small mammal		4		4
Medium mammal	6	353	1	360
Large mammal	15	263	1	279
Indeterminate	33	567	20	620
Total	99	2083	30	2212
Weight (g)	2667	24107	138	26912

Table 14.56 Middle Saxon, all landscapes: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	46	41.3%	52	25.0%	2	0.0%	1	100.0%
Mid fusion	55	61.8%	41	36.6%	7	57.1%	1	100.0%
Late fusion	27	40.7	15	66.7%	4	100.0%	2	100.0%

in the assemblages from the earlier periods was also noticed in the Saxon assemblage. Bones from all body parts were present, suggesting local slaughter, butchery and consumption. The assemblage displayed an over-representation of sheep/goat mandibles, which cannot entirely be rationalised in terms of the ease of identification of this element. They were recovered from a large number of pits, a small number of mandible fragments being in each. Only one mandible was complete, and the extensive fragmentation suggests that the mandibles are butchery waste. This may suggest a disposal strategy where mandibles were more likely to be immediately deposited in pits rather than lying accessible for scavengers. The pig remains exhibited a scarcity of bones from the feet: only three phalanges were recovered and no metapodials. The lack of metapodials, despite the relatively small size of the pig assemblage, is unusual. A similar pattern was observed in the Iron Age assemblage from Thanet Earth, where it was argued that the pig feet may have been processed elsewhere (Jones forthcoming). There are too few horse bones to consider the representativity of the skeletal element distribution, although bones from all body parts were present.

Ageing

The cattle slaughter pattern, as suggested by the dental data and epiphyseal fusion data, shows two peaks: young cattle in their first or second year and mature cattle (Tables 14.13, 14.56). The young animals would have been surplus animals slaughtered for meat, whereas the mature cattle would have been past their prime as milk producers, breeding animals or draught animals. The sheep/goat data show a much wider spread of age-at-death, but with peaks at 6-12 months and 2-6 years, probably representing the same kind of animal husbandry as for cattle (Tables 14.14, 14.56). The pig remains are few, but most or all were slaughtered prior to full skeletal maturity at the age of 2.5 years (Tables 14.15, 14.56). This is a common pattern in pig husbandry due to their high fecundity, fast growth and lack of secondary products. Juvenile fowl comprised 16.1% of the fowl remains, indicating that breeding took place at the site and that some fowl were killed young for meat. Most, however, were kept for eggs and feather/down.

Sexing

The sexable remains were few and for the most part yield little information pertaining to the animal husbandry of the settlement. However, to facilitate future research they have been included in Appendix 14.2. While the predominance of male cattle indicates the importance of draught oxen for agriculture, the scarcity of female cattle is curious. As they were necessary for dairy production and breeding, their scarcity is less likely to reflect the sex ratios of the living herd. Perhaps this is a reflection of biases in a small dataset. Despite that factor, the scarcity of female sheep horn cores suggests that the majority of the ewes may have been hornless, a natural trait that may have been deliberately bred for, since horned sheep can damage their fleeces while scratching themselves or fighting. The scarcity of female pig canines could be explained by poor retrieval of these smaller teeth, although it is not impossible that female pigs were killed at a younger age than males. The permanent canines erupt at 9-10 months of age (Sisson and Grossman 1953), so any pigs younger than that cannot be sexed. A majority of the fowl tarsometatarsi belonged to females, indicating the importance of eggs in fowl husbandry.

Size

The measured bones from the Saxon assemblage are mostly within the same size range as the late Roman ones (Tables 14.34–14.35, 14.57–14.58). Sheep/goat metacarpals are much longer in the Saxon period, although this must be viewed with caution as the sample size is small. Few of the comparative sites with substantial biometric data sets showed continuation between the Roman and the Saxon periods, but generally speaking it seems as if the import of larger breeding animals ceased during the mid- or late Roman period, although the time when this occurred varied between settlements and regions. Nevertheless, no apparent reduction of livestock size in the Saxon period has been noted in south-eastern England (Crabtree 1991, 36-37; Johnstone and Albarella 2002, 44; Mulville *et al* 2004, 334-335; 2011, 517-518), suggesting that the end of the Roman presence in Britain did not negatively affect the rural producer sites significantly with regard to breed improvement. The rural Romano-British population may have been resilient in the face of the collapse of the Roman market system.

Butchery

Butchery marks were mainly found on cattle and sheep/goat. Axial division of carcasses was noted on several vertebrae from large and medium mammals, on cattle and sheep/goat skulls and cattle pelves, as well as on one pig mandible. Cut marks on a proximal metatarsal from sheep/goat and on a tarsal bone from cattle could indicate skinning or disarticulation of the hock joint. With the exception of the sheep elbow joint, where cut marks were noted on several bones, most disarticulation and portioning were done with heavy cleavers. Axial splitting of long bones, probably to extract bone marrow, was noted on cattle metapodials, humeri and femora, as well as on one sheep/goat tibia and metatarsal. One pig scapula, a fowl coracoid and

Table 14.57 Greatest length and greatest distal width of cattle bones in the Saxon assemblage from EKA2 and contemporary sites in Britain

Site	*Phase*	*Bone*	*Measurement*	*N*	*Mean*	*Min*	*Max*
EKA2	MS	Metacarpal	GL	1	188.0		
Yarnton/Cresswell Field	S			5	186.1	179.0	189.0
Pennyland	ES/MS			4	182.5	176.0	189.0
Hamwic (Melbourne Street)	MS			42	189.7	171.9	224.8
EKA2	MS	Metacarpal	Bd	2	51.0	48.6	53.4
West Stow	ES, phase 1			14	53.9	48.4	62.6
	ES, phase 2			16	56.4	49.4	68.6
	ES, phase 3			2	51.8	50.5	53.1
Hamwic (Melbourne Street)	MS			49	55.9	48.6	67.1
EKA2	MS	Tibia	Bd	4	57.2	55.9	58.4
Yarnton/Cresswell Field	S			3	60.1	51.4	61.4
West Stow	ES, phase 1			18	56.3	50.8	67.4
	ES, phase 2			25	56.2	50.5	65.5
	ES, phase 3			6	57.3	52.0	68.5
Pennyland	ES/MS			12	50.8	48.0	56.0
Hamwic (Melbourne Street)	MS			111	56.8	49.1	67.9

Table 14.58 Greatest length and greatest distal width of sheep/goat bones in the Saxon assemblage from EKA2 and contemporary sites in Britain

Site	*Phase*	*Bone*	*Measurement*	*N*	*Mean*	*Min*	*Max*
EKA2	MS	Metacarpal	GL	4	120.9	118.7	126.1
Pennyland	ES/MS			4	114.3	109.0	120.0
Hamwic (Melbourne Street)	MS			65	126.3	110.0	144.9
EKA2	MS	Metacarpal	Bd	5	23.8	23.2	24.4
West Stow	ES, phase 1			16	24.8	22.7	27.0
	ES, phase 2			19	24.9	22.3	27.1
	ES, phase 3			1	26.2		
Hamwic (Melbourne Street)	MS			61	25.5	20.9	28.6
EKA2	MS	Tibia	Bd	12	25.2	24.1	27.0
Yarnton/Cresswell Field	S			1	24.6		
West Stow	ES, phase 1			35	26.2	22.4	29.4
	ES, phase 2			56	26.4	23.8	29.5
	ES, phase 3			9	26.3	23.6	29.0
Pennyland	ES/MS			28	25.9	24.0	29.0
Hamwic (Melbourne Street)	MS			267	25.9	21.8	30.0

tibiotarsus displayed cut marks and chop marks from disarticulation of the joints. Cut marks on a pig mandible indicate utilisation of cheek meat. Seven sheep horn cores were chopped off at the base, possibly connected to the use of horn sheaths for horn working.

Pathologies

Pathologies occurred on bones from cattle, sheep/goat, pig, dog, cat, domestic fowl and frog/toad. Indications of muscle stress were found on one cattle metatarsal, which displayed large exostoses at the distal metaphysis, a location which has been associated with the utilisation of animals for traction purposes (Bartosiewicz *et al* 1997). One female cattle pelvis had eburnation on the acetabulum, a sign of degenerative joint disease. Degenerative joint disease can be increased by stress to the joint, suggesting the possibility that the cow was used for traction.

Oral infections were relatively common among the ovicaprines. Four mandibles showed signs of infection such as porous bone, widened alveoles and bone absorption at the cheek tooth row, mostly at P4-M2. One of these mandibles also had swelling buccally and one abscess. Other indications of infections include a sheep/goat metatarsal with porous bone growth midshaft and a dog skull with porous bone growth above the right orbit. The latter could be a sign of sinus infection (Pl 14.2).

Exostoses laterally on a sheep/goat distal humerus could be so called 'penning elbow', a skeletal reaction to repeated impact trauma at the elbow joint, believed to be caused by running sheep in pens or keeping the animals in small enclosures (Baker and Brothwell 1980, 127). Thumb print sized depressions on a horn core from a wether could indicate malnutrition (Albarella 1995). Exostoses at the joint of a fowl scapula could indicate muscle stress or infection, although there was no other pathological bone growth on this bone.

Healed fractures were noted on two articulated cat metatarsals, one cat tibia and fibula, one pig fibula and

Pl 14.2 Dog skull from Saxon pit 133064 in Zone 14: porous bone growth above the right orbit, possibly a sign of infection (oblique anterior/dorsal view)

Pl 14.3 Cat tibia and fibula from Saxon pit 203024 in Zone 14: healed fracture at the upper third of the shaft (lateral, posterior, anterior and medial view)

one amphibian tibiofibula. The cat tibia and fibula had been fractured at the upper third of the shaft, where there was extensive bone remodelling (Pl 14.3). The fibula had fused to the tibia at the fracture point and the proximal part of the fibula had turned 180 degrees. The presence of an abscess indicates that an infection developed at the injury.

Associated bone groups

Christianity was established in Kent in the 7th century and the inhabitants of the 8th – 9th century Saxon settlement in Zone 14 at EKA2 were probably Christian, at least officially, though they might be prone to resisting change in their practices, for example burial. While associated bone groups are mainly associated with pre-Christian belief systems, ritual deposits occurred throughout the medieval period and up until the late 19th century. These deposits are mainly associated with buildings, such as houses, churches and barns (Falk 2008; Merrifield 1987).

Three associated bone groups were retrieved from the assemblage: semi-articulated bones from at least two calves in pit 279003, one cat in pit 173114 and one partial buzzard in pit 166068. The calf remains include all body parts, although not all bones are present. The bones come from several fills, suggesting that the pit was filled-in rapidly, or that this pit was used over a longer time period for disposal primarily of remains of calf carcasses. Two frontal bones were split open, probably to gain access to the brain. The butchery marks and widespread distribution of elements in the pit suggest that the calf remains are food and butchery waste.

The cat was found in the middle fill of pit 173114, and may therefore be considered to be a carcass deposit without ritual significance. However, cats are not very common in Saxon assemblages, whether as animal bone groups or disarticulated bones, and though they were not regarded as high-status animals, it is possible that their role in pest control may have been enough to warrant their presence as ritual deposits.

The buzzard in pit 166068 was found in the main fill (166071) and could, if the other fills represent natural events, be either a foundation deposit or a closing deposit. Bones from buzzard have been found on a number of Saxon sites, where they have usually been interpreted as remains of scavengers. While buzzards can be used for hawking, they are not included among the birds of prey either in *De Arte Venandi cum Avibus* or *The Book of Saint Albans*, two medieval treatises on falconry from the 1240s and 1486 respectively, and this absence may have influenced interpretations (Serjeantson 2009, 316-318; Yalden and Albarella 2009, 130-139). However, since buzzards prey on, among other things, rodents, the deposit of the buzzard at EKA2 may have been considered as a vermin deterrent.

Animal husbandry at Saxon EKA2 and other sites in southern England

Saxon assemblages in southern England show a wide variety of livestock abundance (Table 14.59), probably reflecting environmental constraints and/or specialisation. Cattle is often the most numerous taxon in rural assemblages, with the exception of the Saxon assemblages from EKA2, Brandon and West Stow (both in Suffolk), where sheep/goat dominate, and Springhead and Wicken Bonhunt which are dominated by pig. However, due to their larger size cattle would still have contributed the greatest amount of meat to the diet.

While the ageing data from EKA2 and many of the comparative sites must be viewed with caution due to small sample sizes, some similarities are apparent.

Table 14.59 Comparison of relative proportion of cattle, sheep/goat and pig from some Saxon sites in southern England

Site (County)	*Phase*	*N*	*Cattle*	*Sheep/goat*	*Pig*
EKA2 (Kent)	MS	801	43.1	50.7	6.2
Thanet Earth (Kent)	S	347	64.0	25.0	11.0
Ramsgate (Kent)	S	316	31.6	54.4	13.9
Northfleet (Kent)	ES	771	53.2	18.5	28.3
Springhead (Kent)	ES	332	35.8	23.5	40.7
Mucking* (Essex)	ES/MS	818	62.6	15.9	21.5
Brandon (Suffolk)	MS	47,214	28.5	52.2	19.3
West Stow (Suffolk)	ES	63,603	40.9	44.7	14.5
Wicken Bonhunt (Suffolk)	MS	29,950	17.2	12.9	70.0
Yarnton (Oxfordshire)	MS	539	57.1	28.9	13.9
Cresswell Field (Oxfordshire)	S	353	56.4	30.0	13.6
Pennyland (Bedfordshire)	ES/MS	2394	48.9	37.3	13.8
Ipswich** (Suffolk)	MS	9618	44.5	22.9	32.5
Hamwic (Melbourne Street, Six Dials)** (Hampshire)	MS	45,455	52.6	32.1	15.3

*: Combined proportion fragments from SFB assemblages with at least 100 bone fragments **: Urban settlement

Generally, the slaughter patterns do not indicate any specialisation in the form of dairy or wool production. The urban assemblage from *Hamwic* also shows a wide selection of age groups for cattle and sheep/goat, suggesting that no particular age group was the focus for the raising of livestock for the market there (Bourdillon and Coy 1980, 87). Wicken Bonhunt is an exception, where the slaughter pattern for livestock indicates a consumer site rather than a producer site (Crabtree 1994).

On the producer sites, surplus young cattle and sheep/goat were culled in their first and second year. This would free resources for the remaining herds and provide the inhabitants with prime meat. The surviving female cattle were kept for dairy and breeding and could live for many years before being well past their prime and ready for slaughter. With the exception of bulls chosen for breeding, male cattle were castrated and trained as draught oxen, vital animals in the Saxon agricultural society, or kept as beef cattle for a few years prior to slaughter. The proportion of adult males to females is difficult to ascertain as sample sizes usually are small. The Saxon assemblage from EKA2 (n: 9) showed a marked predominance of male cattle (Appendix 14.3.12), whereas Yarnton (n: 8) showed a more equal ratio of males and females (Mulville *et al* 2004, 333). Sheep/goat were slaughtered at a younger age than cattle, probably reflecting the greater fecundity and rapid maturity of sheep/goat. They were kept for dairy and wool, meat probably being a by-product of the older animals. Pigs were culled at all ages and only a small number survived to adulthood. How many years adult breeding pigs were kept is difficult to ascertain. The age category adult is categorised by wear of the third mandibular molar, which erupts at 18-20 months (Sisson and Grossman 1953), which is over a year before full skeletal maturation. Pigs classified as adults may, therefore, have been slaughtered just at the end of their second year, possibly having been used for breeding only once.

Chapter 14 – Appendices

Appendix 14.1

Table 14.1.1 EKA2 (Landscape 1): Dental analysis of cattle, using Halstead (1985)

	N	*0-1 months*	*1-8 months*	*8-18 months*	*18-30 months*	*30-36 months*	*Young adult*	*Adult*	*Old adult*	*Senile*
EBA	1								1	
MRo	8					2	1	4		1
MRo/LRo	1									1
LRo	2							2		

Table 14.1.2 EKA2 (Landscape 1): Dental analysis of sheep/goat, using Payne (1973)

	N	*0-1 months*	*1-8 months*	*8-18 months*	*18-30 months*	*30-36 months*	*Young adult*	*Adult*	*Old adult*	*Senile*
MRo	4					2		1		1
MRo/LRo	2							1		1
LRo	9		2				6			1
Unspecified Roman	3					1	1	1		

Table 14.1.3 EKA2 (Landscape 1): Dental analysis of pig, using O'Connor (1988)

	N	*Juvenile*	*Immature*	*Sub-adult*	*Adult*	*Elderly*
LIA/ERo	1			1		
MRo	2		2			
LRo	2			2		

Table 14.1.6 EKA2 (Landscape 2): Dental analysis of pig, using O'Connor (1988)

	N	*Juvenile*	*Immature*	*Sub-adult*	*Adult*	*Elderly*
EIA	6			6		
ERo	3	1	1	1		
MS	4	2		2		

Table 14.1.4 EKA2 (Landscape 2): Dental analysis of cattle, using Halstead (1985)

	N	*0-1 months*	*1-8 months*	*8-18 months*	*18-30 months*	*30-36 months*	*Young adult*	*Adult*	*Old adult*	*Senile*
Senile										
LBA	2							1	1	
BA?	2							1	1	
EIA	2							1		1
EIA-MIA	10		1	2	2	1		3		1
MIA	7			3	1	1				2
Total IA	2						1		1	
LIA	1					1				
LIA-ERo	3				1			1		1
ERo	7			2				4	1	
Unspecified Roman	6			2				2		2
MS	10			3		1		3	1	2

Table 14.1.5. EKA2 (Landscape 2): Dental analysis of sheep/goat, using Payne (1973).

	N	*0-1 months*	*1-8 months*	*8-18 months*	*18-30 months*	*30-36 months*	*Young adult*	*Adult*	*Old adult*	*Senile*
LBA/EIA	1							1		
LIA	1			1						
LIA/ERo	6			3			3			
ERo	11		1	3	2	1	2	1	1	
Unspecified Roman	34		2	7	2	8	5	6	3	1
MS	32	1	1	9	2	5	4	8	1	1

Table 14.1.7 EKA2 (Landscape 3): Dental analysis of cattle, using Halstead (1985)

	N	*0-1 months*	*1-8 months*	*8-18 months*	*18-30 months*	*30-36 months*	*Young adult*	*Adult*	*Old adult*	*Senile*
Senile										
LBA/EIA	1							1		
EIA/MIA	5		1					3	1	
MIA	1					1				
LIA/ERo	2				2					
ERo	8				2	1	1	3		1
MRo	11				1	1	1	3	3	2
LRo	2							2		

Table 14.1.8 EKA2 (Landscape 3): Dental analysis of sheep/goat, using Payne (1973)

	N	*0-2 months*	*2-6 months*	*6-12 months*	*1-2 years*	*2-3 years*	*3-4 years*	*4-6 years*	*6-8 years*	*8-10 years*
LBA/EIA	2						2			
EIA/MIA	6			2	1		2	1		
MIA	1								1	
MIA/LIA	1				1					
LIA/ERo	3					1	2			
ERo	4					2	1	1		
MRo	14		1	4	1	2	3	1	2	
LRo	7			1		2	2	1	1	
Unspecified Roman	1			1						

Table 14.1.9 EKA2 (Landscape 3): Dental analysis of pig, using O'Connor (1988)

	N	*Juvenile*	*Immature*	*Sub-adult*	*Adult*	*Elderly*
EIA/MIA	1				1	
MIA	2				2	
MIA/LIA	1	1				
ERo	3		2	1		
MRo	14			9	5	
LR	2			1	1	

Appendix 14.2

Table 14.2.1 EKA2 (Late Bronze Age/Early Iron Age, landscape 1: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	1	0.0%	2	0.0%	1	0.0%		
Mid fusion	7	28.6%			2	0.0%		
Late fusion	1	0.0%	1	0.0%				

Table 14.2.2. EKA2 (Late Iron Age/Early Roman, landscape 1): Epiphyseal closure of cattle, sheep/goat, pig and horse.

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion								
Mid fusion	3	0.0%	2	0.0%				
Late fusion								

Table 14.2.3 EKA2 (Middle Roman, landscape 1): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	7	0.0%					4	0.0%
Mid fusion	3	0.0%	2	0.0%	1	100.0%	2	50.0%
Late fusion	3	33.3%						

Table 14.2.4 EKA2 (Middle/Late Roman, landscape 1): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	6	0.0%	1	0.0%				
Mid fusion	3	33.3%	3	33.3%				
Late fusion	3	66.7%					1	0.0%

Table 14.2.5 EKA2 (Late Roman, landscape 1): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	9	0.0%	1	0.0%	5	0.0%	5	0.0%
Mid fusion	9	0.0%	4	0.0%	3	100.0%		
Late fusion	8	37.5%			1	100.0%	6	16.7%

Table 14.2.6 East Kent Access Road (Unspecified Roman, landscape 1): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion							2	
Mid fusion			1					
Late fusion					1			

Table 14.2.7 EKA2 (Middle Saxon, landscape 1): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion								
Mid fusion	1	100.0%						
Late fusion								

Table 14.2.8 EKA2 (Early Iron Age, landscape 2): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	35	0.0%	21	4.8%	7	0.0%	16	0.0%
Mid fusion	44	15.9%	9	22.2%	7	28.6%		
Late fusion	17	41.2%	7	57.1%	2	100.0%	5	20.0%

Table 14.2.9 EKA2 (Early Iron Age/Middle Iron Age, landscape 2): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	24	0.0%	21	14.3%	3	0.0%	4	0.0%
Mid fusion	24	16.7%	11	36.4%	2	100.0%		
Late fusion	15	40.0%	10	70.0%			3	0.0%

Table 14.2.10 EKA2 (Middle Iron Age, landscape 2): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	20	0.0%	13	7.7%	15	6.7%	2	0.0%
Mid fusion	21	19.0%	11	36.4%	6	66.7%	1	0.0%
Late fusion	6	0.0%	6	83.3%	4	75.0%		

Table 14.2.11 EKA2 (Late Iron Age, landscape 2): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	7	28.6%	1	0.0%			3	33.3%
Mid fusion	5	60.0%	1	0.0%			2	100.0%
Late fusion	4	50.0%						

Table 14.2.12 EKA2 (Late Iron Age/Early Roman, landscape 2): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	6	0.0%	6	0.0%	3	0.0%		
Mid fusion	4	0.0%	2	0.0%	1	100.0%		
Late fusion	3	33.3%					1	100.0%

Table 14.2.13 EKA2 (Early Roman, landscape 2): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	11	0.0%	23	26.1%	4	25.0%	3	0.0%
Mid fusion	6	0.0%	12	25.0%			3	0.0%
Late fusion	4	25.0%	7	28.6%	1	100.0%	6	0.0%

Table 14.2.14 EKA2 (Unspecified Roman, landscape 2): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	8	12.5%	39	17.9%	2	0.0%	5	0.0%
Mid fusion	6	16.7%	20	45.0%				
Late fusion	3	33.3%	14	42.9%				

Table 14.2.15 EKA2 (Middle Saxon, landscape 2): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	52	36.5%	42	33.3%	2	0.0%	1	0.0%
Mid fusion	54	61.1%	41	36.6%	7	57.1%	1	0.0%
Late fusion	15	66.7%	14	64.3%	4	100.0%	2	0.0%

Table 14.2.16 EKA2 (Late Bronze Age, Landscape 3): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	3	33.3%						
Mid fusion	1	0.0%			1	0.0%		
Late fusion								

Table 14.2.17 EKA2 (Late Bronze Age/Early Iron Age, Landscape 3: Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	7	0.0%					1	0.0%
Mid fusion	2	0.0%						
Late fusion	5	0.0%						

Table 14.2.18 EKA2 (Early Iron Age/Middle Iron Age, landscape 3): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	8	0.0%	5	0.0%			3	0.0%
Mid fusion	3	0.0%	2	0.0%	1	100.0%	2	50.0%
Late fusion	7	42.9%	3	66.7%			3	0.0%

Table 14.2.19 EKA2 (Middle Iron Age, landscape 3): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	21	4.8%	2	50.0%				
Mid fusion	10	30.0%	3	0.0%				
Late fusion	35	54.3%	1	0.0%				

Table 14.2.20 EKA2 (Middle Iron Age/Late Iron Age, landscape 3): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	1	0.0%	2	0.0%				
Mid fusion								
Late fusion			1	0.0%	1	100.0%	1	100.0%

Table 14.2.21 EKA2 (unspecified Iron Age, landscape 3): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion			2	50.0%				
Mid fusion			1	100.0%				
Late fusion			1	0.0%				

Table 14.2.22 EKA2 (Late Iron Age/Early Roman, landscape 3): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	4	50.0%	13	0.0%	1	0.0%	2	0.0%
Mid fusion	10	40.0%	7	14.3%	2	50.0%	1	0.0%
Late fusion	2	0.0%	2	50.0%			1	0.0%

Table 14.2.23 EKA2 (Early Roman, landscape 3): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	13	0.0%	14	14.3%	2	0.0%	4	25.0%
Mid fusion	10	30.0%	8	37.5%	1	0.0%		
Late fusion	5	40.0%	7	71.4%	1	0.0%	5	0.0%

Table 14.2.24 EKA2 (Middle Roman, landscape 3): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	38	2.6%	24	4.2%	28	3.6%	17	0.0%
Mid fusion	34	8.8%	34	32.4%	13	46.2%	3	33.3%
Late fusion	24	25.0%	10	40.0%	6	100.0%	9	0.0%

Table 14.2.25 EKA2 (Late Roman, landscape 3): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion	7	0.0%	8	0.0%	5	40.0%	5	20.0%
Mid fusion	9	22.2%	6	50.0%	1	100.0%	3	0.0%
Late fusion	11	45.5%	2	50.0%	1	100.0%	1	0.0%

Table 14.2.26 EKA2 (Unspecified Roman, landscape 3): Epiphyseal closure of cattle, sheep/goat, pig and horse

	Cattle		*Sheep/goat*		*Pig*		*Horse*	
	N	*% unfused*	*N*	*% unfused*	*N*	*% unfused*	*N*	*% unfused*
Early fusion			1	0.0%				
Mid fusion								
Late fusion								

Appendix 14.3

Table 14.3.1 EKA2 (Late Bronze Age/Early Iron Age, all zones): Sex estimation of cattle, sheep/goat and pig

		Female	*Male*	*Intact male*	*Castrate*
Cattle	Pelvis	1	1		
Sheep/goat	Pelvis		1		
Sheep	Horn core		1		
Goat	Horn core		1		

Table 14.3.2 EKA2 (Early Iron Age, all zones): Sex estimation of cattle, sheep, pig and domestic fowl

		Female	*Male*	*Intact male*	*Castrate*
Cattle	Metacarpal	3			
	Pelvis	12	3		
Sheep	Horn core		1	1	1
Pig	Mandibular canine		9		
Horse	Mandibular canine		1		
Domestic fowl	Tarsometatarsus		1		

Table 14.3.3 EKA2 (Early Iron Age/Middle Iron Age, all zones): Sex estimation of cattle, pig, horse and domestic fowl

		Female	*Male*	*Intact male*	*Castrate*
Castrate					
Cattle	Pelvis	1	1		
Pig	Mandibular canine	1	1		
Horse	Mandibular canine	1			
Domestic fowl	Tarsometatarsus		2		

Table 14.3.4 EKA2 (Middle Iron Age, all zones): Sex estimation of cattle, sheep/goat, pig and horse

		Female	*Male*	*Intact male*	*Castrate*
Cattle	Metacarpal		1		
	Pelvis	1		1	1
Sheep/goat	Pelvis				
	Horn core				
Sheep	Horn core		2		3
Goat	Horn core				
Pig	Mandibular canine				
Horse	Mandibular canine		1		

Table 14.3.5 EKA2 (Late Iron Age, all zones): Sex estimation of, sheep/goat

		Female	*Male*	*Intact male*	*Castrate* astrate
Sheep/goat	Pelvis	1			

Table 14.3.6 EKA2 (Late Iron Age/Early Roman, all zones): Sex estimation of cattle, sheep/goat and pig

		Female	*Male*	*Intact male*	*Castrate*
Cattle	Metacarpal		1		
	Pelvis	1	1		
Sheep/goat	Horn core		1		
Sheep	Horn core				1
Pig	Maxillary canine	1	1		

Table 14.3.7 EKA2 (Early Roman, all zones): Sex estimation of cattle, sheep/goat, pig amd horse

		Female	*Male*	*Intact male*	*Castrate*
Cattle	Metacarpal	1			
	Pelvis	4			
Sheep/goat	Horn core		1		
Pig	Mandibular canine	1	4		
	Maxillary canine	1	1		
Horse	Maxillary canine	1	1		

Table 14.3.8 EKA2 (Middle Roman, all zones): Sex estimation of cattle, sheep/goat and pig

		Female	*Male*	*Intact male*	*Castrate*
Cattle	Metacarpal	3	1		
	Pelvis	5	3		1
Sheep/goat	Pelvis		1		
Sheep	Horn core		1	2	
Goat	Horn core	1			
Pig	Mandibular canine	2	8		
Pig	Maxillary canine		2		

Table 14.3.9 EKA2 (Middle/late Roman, all zones): Sex estimation of sheep/goat and pig

		Female	*Male*	*Intact male*	*Castrate*
Sheep/goat	Pelvis	1			
Sheep	Horn core			1	
Pig	Maxillary canine	1			

Table 14.3.10 EKA2 (Late Roman, all zones): Sex estimation of cattle, sheep/goat and pig

		Female	*Male*	*Intact male*	*Castrate*
Cattle	Pelvis	2	2		
Sheep/goat	Pelvis	1			
Sheep	Horn core			1	
Pig	Mandibular canine	3	2		

Table 14.3.11 EKA2 (Unspecified Roman, all zones): Sex estimation of cattle, sheep/goat, pig, horse and domestic fowl

		Female	*Male*	*Intact male*	*Castrate*
Cattle	Metacarpal	1			
	Pelvis	4	2		
Sheep/goat	Pelvis	3			
	Horn core		1		
Sheep	Horn core			1	1
Goat	Horn core		3		
Pig	Mandibular canine	1			
Horse	Maxillary canine	1			
Domestic fowl	Tarsometatarsus		1		
	Long bone	2			

Table 14.3.12 EKA2 (Saxon, all zones): Sex estimation of cattle, sheep/goat, pig and domestic fowl

		Female	*Male*	*Intact male*	*Castrate*
Cattle	Metacarpal	1			
	Pelvis	1		3	4
Sheep/goat	Pelvis	1	1		
Sheep	Horn core	1	2	1	5
Pig	Mandibular canine	1	4		
Domestic fowl	Tarsometatarsus	7	1		

Appendix 14.4

Table 14.4.1 Measurements of animal bones from the Late Bronze Age/Early Iron Age assemblage from EKA2

Zone	*Species*	*Element*	*GL*	*Bp*	*SD*	*Bd*	*40*	*41*	*42*
10	Cattle	Metacarpal	204.0	64.0	34.3	65.4			
10	Cattle	Metatarsal	214.0	44.2	23.2				
10	Cattle	Tibia				52.3			
10	Cattle	Tibia				55.1			
6	Domestic fowl	Femur	80.6						
6	Dog	Humerus			7.8	20.0			
6	Dog	Radius		11.9					
10	Goat	Skull					143.0	53.9	37.6
10	Horse	Metatarsal	270.0	48.4	28.8	51.2			
10	Sheep	Skull					72.0	27.0	16.8
10	Sheep/goat	Tibia	200.5			27.3			

Table 14.4.2 Measurements of animal bones from the Early Iron Age assemblage from EKA2

Zone	*Species*	*Element*	*GL*	*Bp*	*SD*	*Bd*	*40*	*41*	*42*	*43*	*44*	*45*	*46*	*47*
13	Cattle	Horncore									122.0	47.0	29.7	
13	Cattle	Horncore									147.0	54.0	33.0	109.0
13	Cattle	Horncore									147.0	52.5	37.1	139.0
13	Cattle	Metacarpal		51.3	28.3									
13	Cattle	Metacarpal	167.0	46.5	25.5	49.2								
13	Cattle	Metacarpal	177.7	51.2	27.8	50.9								
13	Cattle	Metacarpal	181.5	48.7	28.3	51.5								
13	Cattle	Metatarsal		51.3	28.3									
13	Cattle	Skull									136.0	54.5	30.8	
13	Cattle	Tibia				51.5								
13	Cattle	Tibia				60.5								
13	Cattle	Tibia				55.9								
13	Cattle	Tibia				52.0								
13	Cattle	Tibia				59.7								
13	Cattle	Tibia				53.9								
13	Cattle	Tibia				61.1								
13	Cattle	Tibia				50.8								
13	Cattle	Tibia				59.7								
13	Cattle	Tibia				50.8								
13	Domestic fowl	Ulna	74.5											
13	Horse	Calcaneus	109.2											
13	Horse	Metatarsal	223.0	38.0	23.2	25.9								
13	Horse	Metatarsal	239.0	41.9	25.5	40.2								
13	Horse	Metatarsal	240.9	41.8	27.0	42.5								

Table 14.4.2 (continued)

Zone	*Species*	*Element*	*GL*	*Bp*	*SD*	*Bd*	*40*	*41*	*42*	*43*	*44*	*45*	*46*	*47*
13	Horse	Metatarsal	253.0	43.3	28.5	43.1								
13	Horse	Phalanx 1		43.9	26.6									
13	Horse	Phalanx 1			27.1									
13	Horse	Phalanx 1	72.5		28.3	40.8								
13	Horse	Phalanx 1	77.1	51.5	31.2	45.2								
13	Horse	Phalanx 1	82.0	52.6	31.5	43.8								
13	Horse	Phalanx 1	87.0	55.5	34.1	45.5								
13	Pig	Tibia				27.2								
13	Raven	Femur	67.2											
13	Sheep	Skull					85.0	30.4	18.5	87.0				
13	Sheep	Skull						35.5	19.6					
13	Sheep/goat	Tibia				25.5								
13	Sheep/goat	Tibia				23.5								
13	Sheep/goat	Tibia				22.3								
13	Sheep/goat	Tibia				24.2								
13	Sheep/goat	Tibia				21.8								

Table 14.4.3 Measurements of animal bones from the Early Iron Age/Middle Iron Age assemblage from EKA2

Zone	*Species*	*Element*	*GL*	*Bp*	*SD*	*Bd*	*8*	*10*	*40*	*41*	*42*
13	Cattle	Metacarpal				52.8					
13	Cattle	Metacarpal	164.5	46.5	25.4	49.0					
13	Cattle	Metacarpal	172.0	46.7	26.6	47.5					
13	Cattle	Metacarpal	176.0	52.4	28.0	54.1					
13	Cattle	Metacarpal	183.0	49.4	27.6	51.0					
13	Cattle	Metatarsal		52.2							
13	Cattle	Metatarsal	229.5	48.4	29.7						
13	Cattle	Tibia				56.0					
13	Cattle	Tibia				56.2					
6	Cattle	Tibia				56.5					
6	Cattle	Tibia				59.4					
13	Cattle	Tibia				60.5					
13	Cattle	Tibia				63.6					
13	Cattle	Tibia				67.8					
13	Dog	Mandible					73.5	35.5			
13	Domestic fowl	Femur	80.7	16.4	7.0	16.2					
13	Domestic fowl	Tarsometatarsus	75.0								
6	Horse	Metatarsal		43.5	28.6						
13	Horse	Phalanx 1				42.5					
6	Horse	Tibia				62.1					
6	Horse	Tibia				64.2					
13	Red deer	Metacarpal				41.0					
13	Sheep	Horncore							165.0	57.1	44.0
6	Sheep	Metacarpal	114.8	20.8	11.8	23.9					
13	Sheep	Metatarsal	134.0	18.1	10.4	21.1					
13	Sheep/goat	Humerus	133.8								
13	Sheep/goat	Tibia				22.1					
13	Sheep/goat	Tibia				25.2					
13	Sheep/goat	Tibia				22.5					
6	Sheep/goat	Tibia	203.5	39.4	12.5	24.1					

Table 14.4.4 Measurements of animal bones from the Middle Iron Age assemblage from EKA2. Estimated measurements within parenthesis

Zone	*Species*	*Element*	*GL*	*Bp*	*SD*	*Bd*	*Did*	*10*	*13*	*15*	*40*	*41*	*42*	*43*
13	Cattle	Calcaneus	117.5											
6	Cattle	Femur				80.0								
6	Cattle	Femur				84.0								
13	Cattle	Metacarpal				55.7								
13	Cattle	Metacarpal	177.7	47.0	28.2	(51.5)								
6	Cattle	Metacarpal	182.0	57.4	32.5	60.6								
13	Cattle	Metatarsal	200.0	46.1	25.9	56.8								
6	Cattle	Radius				60.1								
6	Cattle	Tibia	289.0			50.1								
13	Cattle	Tibia				51.6								
13	Cattle	Tibia				53.7								
6	Cattle	Tibia				53.7								
13	Cattle	Tibia				54.5								
6	Cattle	Tibia				54.7								
13	Cattle	Tibia				55.7								
13	Cattle	Tibia				65.4								
13	Dog	Mandible						35.6						
13	Dog	Mandible							20.5					
6	Dog	Skull								72.0				
13	Domestic fowl	Carpometacarpus	36.0											
13	Domestic fowl	Ulna					10.0							
13	Horse	Calcaneus (L)*	108.3											
13	Horse	Calcaneus (R)*	109.0											
13	Horse	Femur (L)*	398.0		38.1	91.0								
13	Horse	Femur (R)*	398.5	113.5	37.8	93.5								
13	Horse	Humerus (L)*	297.0	87.0	34.6	81.0								
13	Horse	Humerus (R)*	294.5		35.3	78.5								
13	Horse	Metacarpal (L)*	233.0	49.1	34.1	49.6								
13	Horse	Metacarpal (R)*	232.0	49.3	34.4	49.2								
13	Horse	Metatarsal (L)*	276.0	50.4	31.5	49.6								
13	Horse	Metatarsal (R)*	276.0	51.1	32.4									
13	Horse	Phalanx 1 (L)*	83.2	56.4	33.3	46.1								
13	Horse	Phalanx 1 (L)*	84.4	56.4	34.0	48.4								
13	Horse	Phalanx 1 (R) *	85.6	55.8	33.7	48.5								
13	Horse	Radius (L)*	348.0	80.3	38.9	76.2								
13	Horse	Radius (R)*	346.5	81.0	38.1	77.4								
13	Horse	Tibia (L)*	360.5	91.8	37.4	72.6								
13	Horse	Tibia (R)*	359.0	93.2	38.3	71.4								
13	Horse	Tibia				163.2								
13	Pig	Tibia				28.9								
6	Sheep/goat	Femur				33.5								
13	Sheep	Metatarsal	131.7	17.9	10.3	21.0								
13	Sheep	Metatarsal	154.8	18.7	12.7	23.2								
13	Sheep	Skull									52.0	22.4	17.8	49.0
6	Sheep	Skull									92.0	35.3	22.7	
6	Sheep	Skull									97.0	37.3	22.6	120.0
6	Sheep/goat	Tibia				21.7								
13	Sheep/goat	Tibia				22.0								
6	Sheep/goat	Tibia				22.0								
6	Sheep/goat	Tibia				22.4								
13	Sheep/goat	Tibia				23.7								
13	Sheep/goat	Tibia				23.8								
13	Sheep/goat	Tibia				24.0								

* = from articulated horse skeleton

Table 14.4.5 Measurements of animal bones from the Middle Iron Age/Late Iron Age assemblage from EKA2

Zone	*Species*	*Element*	*Bd*
6	Pig	Tibia	28.7

Table 14.4.6 Measurements of animal bones from the Late Iron Age assemblage from EKA2

Zone	*Species*	*Element*	*Bp*	*SD*	*Bd*
13	Horse	Metatarsal	33.8	18.3	
14	Horse	Phalanx 1			48.2
14	Horse	Phalanx 2	52.6		

Table 14.4.7 Measurements of animal bones from the Late Iron Age/early Roman assemblage from EKA2

Zone	*Species*	*Element*	*GL*	*Bp*	*SD*	*Bd*	*44*	*45*	*46*
13	Cattle	Metacarpal	175.5	55.5	31.5	59.3			
20	Cattle	Metacarpal				48.4			
6	Cattle	Metatarsal	204.0	43.3	25.9				
6	Cattle	Radius				65.3			
6	Cattle	Skull					145.0	56.4	34.9
13	Cattle	Tibia				59.5			
6	Cattle	Tibia				53.5			
6	Cattle	Tibia				61.0			
6	Dog	Tibia		31.6					
13	Domestic fowl	Femur	74.0						
14	Domestic fowl	Tibiotarsus	102.7						
14	Horse	Metacarpal	230.5	49.1	33.9	51.3			
6	Horse	Metatarsal	234.5	43.9	24.6	43.2			
14	Horse	Phalanx 1	84.3	57.9	38.8	51.2			
6	Horse	Tibia				61.8			
6	Pig	Tibia				31.3			
6	Sheep/goat	Femur				34.5			
13	Sheep/goat	Radius				28.7			
13	Sheep/goat	Tibia				25.0			
20	Sheep/goat	Tibia				23.5			
6	Sheep/goat	Tibia				21.9			
6	Sheep/goat	Tibia				22.0			
6	Sheep/goat	Tibia				23.2			
6	Sheep/goat	Tibia				23.5			

Table 14.4.8 Measurements of animal bones from the early Roman assemblage from EKA2

Zone	*Species*	*Element*	*GL*	*Bp*	*SD*	*Bd*	*11*	*12*	*13*	*40*	*41*	*42*	*43*	*44*	*45*	*46*
13	Cattle	Metacarpal	185.5	50.5	27.4											
13	Cattle	Metatarsal				46.2										
6	Cattle	Metatarsal			24.7	50.6										
6	Cattle	Metatarsal				46.3										
6	Cattle	Radius	254.0			63.5										
6	Cattle	Radius				64.3										
6	Cattle	Radius				64.3										
6	Cattle	Skull												113.0	40.5	30.0
6	Cattle	Skull												145.0	54.1	38.0
13	Cattle	Tibia				56.2										
6	Cattle	Tibia				62.7										
6	Dog	Mandible					28.6	19.3	17.5							
6	Horse	Metacarpal	223.5	54.6	34.1	52.1										
6	Horse	Metacarpal		45.6												
13	Horse	Phalanx 1	82.0	42.5	31.7	43.1										
13	Horse	Radius				63.7										
6	Horse	Radius				61.0										
6	Horse	Radius				80.2										
13	Horse	Tibia	310.3		31.4	61.4										
13	Horse	Tibia				63.0										
13	Horse	Tibia				66.7										
6	Sheep/goat	Femur				31.3										
13	Sheep/goat	Humerus	128.8			26.9										
13	Sheep	Metacarpal	114.6	19.9		21.8										
6	Sheep	Skull								91.0	34.5	22.1	91.0			
6	Sheep	Skull									27.4					
13	Sheep/goat	Tibia				19.7										
13	Sheep/goat	Tibia				22.0										
6	Sheep/goat	Tibia				22.7										
13	Sheep/goat	Tibia				23.0										
13	Sheep/goat	Tibia				23.0										
6	Sheep/goat	Tibia				23.0										
13	Sheep/goat	Tibia				23.1										
6	Sheep/goat	Tibia				23.3										
13	Sheep/goat	Tibia				28.0										

Table 14.4.9 Measurements of animal bones from the middle Roman assemblage from EKA2

Zone	*Species*	*Element*	*GL*	*Bp*	*SD*	*Bd*	*40*	*41*	*42*	*44*	*45*	*46*
6	Cattle	Horn core								119.0	44.0	29.0
6	Cattle	Metacarpal				56.9						
6	Cattle	Metacarpal	202.0	56.4	32.5	55.8						
6	Cattle	Metacarpal	160.0	54.0	30.0	57.6						
6	Cattle	Metacarpal	176.0	49.2	30.0	50.1						
6	Cattle	Metacarpal	173.0	49.0	28.1	52.2						
20	Cattle	Metatarsal		45.8		50.5						
20	Cattle	Radius				66.9						
6	Cattle	Radius	259.5			64.6						
6	Cattle	Tibia				51.6						
6	Cattle	Tibia				52.3						
6	Cattle	Tibia				53.1						
6	Cattle	Tibia				53.1						
6	Cattle	Tibia				53.7						
6	Cattle	Tibia				54.3						
6	Cattle	Tibia				54.5						
6	Cattle	Tibia				55.2						
6	Cattle	Tibia				55.4						
6	Cattle	Tibia				59.4						
6	Cattle	Tibia				66.5						
6	Dog	Femur				25.3						
6	Dog	Radius		15.1	10.4							
20	Dog	Tibia				17.2						
6	Dog	Tibia				23.3						
6	Goat	Skull					85.0	31.3	22.4			
6	Goat	Skull					92.0	33.8	22.5			
6	Horse	Metacarpal	208.0	48.4	30.3	46.0						
6	Horse	Metacarpal	192.0	42.6	29.7	44.0						
6	Horse	Metacarpal	194.0	45.3	29.5	43.2						
6	Horse	Metacarpal				46.5						
20	Horse	Metatarsal	25.5	45.7	30.4	44.4						
20	Horse	Metatarsal		41.4	24.2							
6	Horse	Metatarsal	266.0	49.2	31.2	49.4						
6	Horse	Phalanx 1	74.0	49.8	30.7	42.5						
6	Horse	Phalanx 1	74.8	52.2	33.3	43.5						
6	Horse	Radius	299.5			68,1						
6	Horse	Radius				65.1						
6	Horse	Tibia				64.2						
20	Horse	Tibia	344.0	92.9								
6	Horse	Tibia		76.9								
6	Horse	Tibia				61.1						
6	Pig	Calcaneus	74.3									
6	Pig	Metacarpal III	67.1									
6	Pig	Tibia				30.1						
6	Pig	Tibia				26.9						
6	Sheep/goat	Metacarpal	118.5	19.3	11.5	21.7						
6	Sheep/goat	Metacarpal				22.6						
6	Sheep	Metatarsal				22.3						
6	Sheep	Metatarsal				22.8						
6	Sheep/goat	Radius				23.8						
6	Sheep/goat	Radius				25.1						
6	Sheep	Skull						29.7				
6	Sheep	Tibia				21.3						
6	Sheep	Tibia				22.6						
6	Sheep	Tibia				22.8						
20	Sheep/goat	Tibia				27.4						
6	Sheep/goat	Tibia	181.5			21.8						
6	Sheep/goat	Tibia				23.7						
6	Sheep/goat	Tibia				22.5						
6	Sheep/goat	Tibia				21.6						
6	Sheep/goat	Tibia				22.4						
6	Sheep/goat	Tibia				20.2						
6	Sheep/goat	Tibia				23.8						
6	Sheep/goat	Tibia				21.9						
6	Sheep/goat	Tibia				26.8						

Table 14.4.10 Measurements of cranial dog bones from the middle Roman assemblage from EKA2

Zone	*Element*	*1*	*2*	*3*	*5*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*23*	*29*	*36*
20	Mandible						71.5	67.3	37.0	37.0	31.8		22.0						
20	Mandible								37.1				22.7						
6	Mandible (L)*				100.0				34.2				20.7						
6	Mandible (R)*								34.6			20.7	21.0						
6	Mandible					69.9	65.4	60.3	33.7	32.8	28.6		19.2						
6	Mandible								39.2				22.3						
6	Mandible						82.6	76.9	38.2	45.0	39.0		22.4						
6	Mandible (L)**		152.0	144.5	124.3	84.5	77.2	71.3	37.3	41.4	35.4		22.4						
6	Skull**													72.2	18.9	56.2			39.3
6	Skull	179.0	175.0			84.7	89.4	103.5									64.9		
6	Skull																50.6	53.8	

*: Articulates with one another **: Articulates with one another

Table 14.4.11 Measurements of animal bones from the middle Roman/late Roman assemblage from EKA2

Zone	*Species*	*Element*	*SD*	*Bd*
20	Red deer	Metatarsal	23.4	
20	Sheep/goat	Tibia		27.0
20	Sheep/goat	Tibia		29.1

Table 14.4.12 Measurements of animal bones from the late Roman assemblage from EKA2

Zone	*Species*	*Element*	*GL*	*Bp*	*SD*	*Bd*	*40*	*41*	*42*
20	Cattle	Calcaneus	153.0						
20	Cattle	Metatarsal	238.0	49.5	30.4	60.9			
6	Cattle	Radius	268.0						
6	Cattle	Radius	262.0			62.1			
20	Cattle	Tibia				62.4			
6	Cattle	Tibia	329.5	88.1	37.5	56.0			
6	Cattle	Tibia				54.2			
20	Fallow deer	Metatarsal			15.3				
6	Domestic fowl	Humerus	68.2						
20	Horse	Metacarpal	197.5	44.1	31.2	45.1			
6	Horse	Metacarpal				47.2			
20	Horse	Metatarsal				42.9			
20	Horse	Metatarsal	244.5	43.9	26.5	43.4			
6	Horse	Phalanx 1	68.7	47.0					
20	Horse	Radius	324.0			71.5			
6	Horse	Tibia				60.0			
20	Roe deer	Metacarpal				22.0			
20	Sheep	Horncore					57.0	21.8	14.8
6	Sheep	Skull					142.0	48.7	37.7
6	Sheep/goat	Tibia				25.0			
20	Sheep/goat	Tibia				25.0			
20	Sheep/goat	Tibia				25.2			
20	Sheep/goat	Tibia				27.7			
6	Sheep/goat	Tibia				28.3			
20	Sheep/goat	Tibia				31.3			

Table 14.4.13 Measurements of cranial dog bones from the late Roman assemblage from EKA2

Zone	*Species*	*Element*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
20	Dog	Mandible						21.0	20.5
20	Dog	Mandible	64.1	59.9	32.8	32.2	28.2		19.7
6	Dog	Mandible			31.5				18.1
6	Dog	Mandible			35.4				21.4
6	Dog	Mandible	63.0	59.0	27.5	35.9	32.2		16.6

Table 14.4.14 Measurements of animal bones from unspecified Roman assemblage from EKA2

Zone	*Species*	*Element*	*GL*	*Bp*	*SD*	*Bd*	*40*	*41*	*42*	*44*	*45*	*46*	*47*
14	Cat	Humerus				15.0							
14	Cattle	Horncore								133.0	46.8	36.5	129.0
14	Cattle	Metacarpal	185.5	53.3	27.3	54.1							
14	Cattle	Metatarsal	212.0	42.7	24.3								
20	Cattle	Skull								132.0	47.8	35.4	117.0
14	Cattle	Tibia				50.2							
14	Dog	Calcaneus	44.6										
13	Dog	Humerus	204.0		14.7	39.7							
14	Dog	Humerus	127.7		8.9	22.3							
14	Dog	Humerus	128.0										
14	Dog	Humerus	131.9			22.4							
14	Dog	Humerus				21.1							
14	Dog	Metacarpal II	43.3										
14	Dog	Metacarpal III	49.7										
14	Dog	Metacarpal V	41.9										
14	Dog	Metatarsal III	52.3										
14	Dog	Metatarsal IV	48.1										
14	Dog	Radius	121.1			15.8							
14	Dog	Radius	119.5			15.7							
14	Dog	Radius				16.1							
14	Dog	Radius				15.7							
14	Dog	Radius				15.7							
14	Dog	Tibia	145.5	23.4	10.3	15.9							
14	Dog	Tibia				26.9							
14	Domestic fowl	Femur	80.6										
14	Domestic fowl	Ulna	72.1										
14	Domestic fowl	Ulna	72.8										
14	Goat	Horn core					149.0	57.5	36.6				
14	Goat	Horn core					159.0	61.9	42.4				
14	Goat	Horn core					155.0	59.5	38.6				
14	Horse	Phalanx 1	80.5	53.3	34.0	44.3							
20	Horse	Phalanx 1	75.5	51.9	32.2	42.9							
20	Horse	Phalanx 1			34.7	43.9							
14	Sheep	Skull					90.0	33.3	19.3				
14	Sheep	Skull					81.0	30.6	19.9				
14	Sheep/goat	Metatarsal				21.7							
14	Sheep/goat	Tadius	145.0			27.3							
14	Sheep/goat	Tadius				27.2							
14	Sheep/goat	Tibia				25.3							
14	Sheep/goat	Tibia				26.2							
14	Sheep/goat	Tibia				26.1							
14	Sheep/goat	Tibia				24.3							
20	Sheep/goat	Tibia				28.7							

Table 14.4.15 Measurements of animal bones from the mid-Saxon assemblage from EKA2

Zone	*Species*	*Element*	*GL*	*Bp*	*SD*	*Bd*	*1*	*2*	*7*	*8*	*9*	*23*	*25*	*26*
14	Cat	Humerus	88.9			15.8								
14	Cattle	Metacarpal				48.6								
14	Cattle	Metacarpal	188.0	51.7		53.4								
14	Cattle	Radius	272.5			68.1								
14	Cattle	Radius				70.0								
14	Cattle	Tibia				55.9								
14	Cattle	Tibia				56.1								
14	Cattle	Tibia				58.2								
14	Cattle	Tibia				58.4								
14	Domestic fowl	Femur	72.7											
14	Domestic fowl	Radius	56.8											
14	Domestic fowl	Tarsometatarsus	66.9											
14	Domestic fowl	Tarsometatarsus	67.0											
14	Domestic fowl	Tarsometatarsus	68.1											
14	Domestic fowl	Tarsometatarsus	68.3											
14	Domestic fowl	Tarsometatarsus	67.5											
14	Domestic fowl	Tibiotarsus	100.4											
14	Domestic fowl	Tibiotarsus	100.7											
14	Domestic fowl	Ulna	61.2											
14	Domestic fowl	Ulna	62.1											
14	Dog	Skull					213.0	200.0	99.2		124.0	70.7	40.5	
14	Dog	Skull									103.6	60.8	37.7	
14	Dog	Skull								90.5	105.2		37.8	60.8
14	Horse	Metatarsal	270.5	49.1	30.7	45.9								
14	Pig	Calcaneus	75.6											
14	Pig	Tibia				27.7								
14	Sheep	Metacarpal	126.1	21.2	11.8	23.2								
14	Sheep	Metacarpal	118.8	21.7	13.1	23.7								
14	Sheep	Metacarpal	120.0	21.5	13.3	23.7								
14	Sheep	Metacarpal				23.8								
14	Sheep	Metacarpal	118.7		13.8	24.4								
14	Sheep	Metatarsal	130.0	19.3	11.6	22.0								
14	Sheep	Metatarsal				22.2								
14	Sheep	Metatarsal	129.3	19.3	11.7	22.4								
14	Sheep	Metatarsal	128.8	19.5	11.8	22.8								
14	Sheep/goat	Radius				26.9								
14	Sheep/goat	Tibia				24.1								
14	Sheep/goat	Tibia				24.1								
14	Sheep/goat	Tibia				24.1								
14	Sheep/goat	Tibia				24.2								
14	Sheep/goat	Tibia				25.0								
14	Sheep/goat	Tibia				25.2								
14	Sheep/goat	Tibia				25.2								
14	Sheep/goat	Tibia				25.3								
14	Sheep/goat	Tibia				25.6								
14	Sheep/goat	Tibia				25.9								
14	Sheep/goat	Tibia				26.0								
14	Sheep/goat	Tibia				27.0								

Chapter 15

Fish Remains

by Rebecca Nicholson

Introduction

The fish remains from the EKA2 comprise almost 1400 identifiable skeletal and dermal structures, which is a surprisingly small assemblage considering the size of the excavated area, the large quantities of soil sieved to 1mm, and the proximity of the site to the coast. The majority of fish remains were recovered from soil sample residues, although many of these contained very small numbers of bones. Around 12% of the assemblage was collected by hand on site and unsurprisingly these bones came from larger fish. The great majority (87%) of the identifiable bones came from Saxon deposits infilling Roman ditches and pits in Zone 14 on Foads Hill, behind Pegwell Bay. This is likely to be due at least in part to the advantageous conditions for bone preservation afforded by the large dumps of sea shells in these features.

Identification

Bones were identified to taxon and anatomical element using the author's personal reference collection and published guides (Watt *et al* 1997; Gravendeel *et al* 2002). Where species identifications are uncertain the bones have been recorded either to family only or have been classified as unidentified. Few bones could be measured, even using digital callipers to 0.1mm, either because of their small size or poor condition. The remains have been quantified by number of identifiable fragments (NISP). Although in no case was a bone counted more than once, scales and dermal structures are included in the counts presented in Table 15.1, since they were present in very low numbers. The raw counts also take no account of the different numbers of identifiable bones present in different fish, and so should be viewed only as an indication of the species of fish represented in the assemblage.

The assemblage

In general, the fish remains are in fair or good condition, but this finding must be qualified in that those assemblages from deposits containing abundant marine shell or faecal-like material are generally well preserved while those from other context types are in poorer condition. It is therefore likely that fish remains have been lost in many areas through post-depositional decay. Even where bones are apparently well preserved, the remains may be biased in favour of rapidly buried bones and more robust bones, often from larger taxa.

Prehistoric

With the exception of a fossil shark tooth, no fish remains were recovered from early prehistoric deposits and while this may be in part due to the nature of the soils in certain parts of the scheme, fish remains are rare from prehistoric deposits in southern England. A few fish bones were present in Iron Age pit fills. These are of note since they are likely to reflect a degree of fish capture and consumption in a period when the majority of bone assemblages from the south of England are devoid of any evidence for fish exploitation (eg, Grant 1984; Hill 1995; Dobney and Ervynck 2007).

Early-Middle Iron Age pit fill 173190, from pit 173188 in Zone 13 located on Foads Hill, included a few vertebrae from eel (*Anguilla anguilla*), herring (*Clupea harengus*) and a small gadid, probably whiting (*Merlangius merlangus*). One herring vertebra is crushed in a manner consistent with chewing which may indicate a faecal origin for at least this bone. An elasmobranch vertebra, probably from a small ray, came from 173281, an Early-Middle Iron Age rubbish deposit infilling storage pit 173275 in Zone 6 on the Ebbsfleet Peninsula. Several small flatfish vertebrae, from right-eyed flatfish (Pleuronectidae) and sole (*Solea solea*), come from Early-Middle Iron Age contexts 256043 and 256038, again rubbish deposits within what was probably a former storage pit (256029) in Zone 6. A small number of unidentifiable fishbone fragments within the fills may have been chewed. Samples phased only as Iron Age (but possibly Saxon) from pit 178070 (Zone 14) included a clupeid (herring family) vertebra and scale, a thornback ray (*Raja clavata*) dermal denticle and a subopercular fragment probably from European sea bass (cf *Dicentrarchus labrax*).

Roman

As in the Iron Age, relatively few fish remains (around 120 identifiable bones) come from fills that could be securely dated to the Roman period of occupation. Typically, outside towns and villas it appears that the

Table 15.1 Number of identified fish fragments, by broad phase across all Zones

	Late Bronze Age/ Iron Age	*Iron Age*	*Late Iron Age/ Early Roman*	*Roman*	*Saxon*	*Medieval*	*Grand total*
Elasmobranch		1		65	5		71
Ray					20		20
Thornback ray		1		1	4		6
cf. Spotted ray					1		1
Eel		4		2	161	1	168
Conger eel					9	1	10
Clupeid (herring fam.)		2		4	228 (+ 3 scales)		234
Herring		1			32	2	35
Herring/Sprat				2	7	2	11
cf. Shad						1	1
Anchovy					32		32
cf. Pike					1		1
Garfish					25		25
Gadid (cod fam.)		1		8	124	7	140
Cod				3	233	2	238
Cod/Saithe					11		11
Cod/Saithe/Pollack					3	1	4
Cod/Whiting					7	2	9
Saithe/Pollack							1
Whiting					30	1	31
Bib/Pout				1			1
Haddock					8		8
Rockling					1		1
Sandeel					2		2
Sea bass				8	2		10
Scad				1	5		6
Sea bream					2 (+ 2 scales)		2
cf. Grey mullet					1		1
Mackerel				1	110		111
Gurnard					4		4
Tub gurnard					2		2
Cottid					3		3
Flatfishes		1		4	18		23
Turbot/Brill					1		1
Right-eyed flatfish		5		8	9		22
Plaice					1		1
cf. Flounder		1					1
Dover sole		1			4		5
Unidentified		4	1	12	112	1	130
Grand total	1	22	1	120	1223	19	1382

Roman population ate little fish, so again even these few bones are of some significance.

Of the identified bones from contexts phased as Roman, some come from deposits infilling features in Zone 14, Foads Hill, which potentially may in fact be of later (mid-Saxon) date, since Saxon material has evidently infilled some open features of earlier date across this Zone. However, every attempt has been made to ensure that only bones from securely phased deposits are included in this report.

Notable in this small collection are several bones from the skull of at least one cod (*Gadus morhua*) from early Roman context 258190, a fill within ditch 249167 (Zone 6) on the Ebbsfleet Peninsula. Only prehistoric and Roman pottery was found in the fills within this feature. Using the regression formulae of Barrett 1995 (based on Jones 1991, 164) measurements on the dentary indicated a very large fish of around 1.3m which would have represented a very significant catch for a fisherman. Cod of this size are rare today but were much more common in the past. It is likely to have been caught in the open waters of the North Sea. Articulated head bones from a large sea bass were collected on site from Roman ditch fill 222049, part of an enclosure system in Zone 14. Sea bass are usually found in small shoals close to rocky shores or in estuaries (Muus and Dahlstrøm 1974, 123). Individual herring (*Clupea harengus*) vertebrae came from fill deposits within ditch 205059 and late Roman sunken-featured building 249083 (both in Zone 20 on the chalk ridge). The fill of inhumation grave 207049 (Zone 6) dated to the late Roman period included a thornback ray dermal denticle and a bone (vomer) from the head of an eel (*Anguilla anguilla*), although these cannot be considered deliberately placed grave goods since residual pottery was noted in the fill.

Unusually, since these fish have cartilagenous skeletons which tend not to survive well, a collection of 65 elasmobranch vertebrae from the fill of Roman pit 125019 (Zone 14) came from a single dogfish or other small shark (Scyliorhinidae/Carcharhinidae). Other fish remains from the same fill (125021) include bones from small gadids including bib or pout (*Trisopterus* sp.). Several deposits described in the field as 'cessy' were excavated, including mid-late Roman well fill 172304 from Zone 6, which is likely to have contained faecal waste judging by the presence of amorphous mineralised concretions, seeds and a few mineralised fly pupae and puparia. This deposit included several small bones from a minimum of one right-eyed flatfish (Pleuronectidae), several of which appear distorted in a manner consistent with chewing. A single scad (*Trachurus trachurus*) vertebra came from ditch 190449.

Saxon

The great majority of fish remains, around 1200 identifiable bones, came from feature fills phased to the Saxon, and mostly from the mid-Saxon (AD 720-850) period. All came from Zone 14 on Foads Hill. A diverse range of fish is represented, with clupeids (mainly herring), cod and eel particularly common. Mackerel bones (*Scomber scombrus*) are relatively frequent, particularly in pit fills; being pelagic fish the mackerel were probably caught using gillnets from small boats, together with the seasonally available herring.

The large gadid remains include bones from cod but also very large haddock (*Melangrammus aeglefinus*). A 20 litre sample (5835) from fill 202022 (pit 202021) contained articulated bones from a cod of estimated size 1.0-1.1m (based on dentary measurements, as above). Also present in this sample were the partial remains (some burnt) of at least three other, smaller cod and isolated bones from small flatfish (probably flounder, *Platichthys flesus*), herring and sea bream (Sparidae). This sample also included fragments of crab (*Cancer* sp.) and from 200g of finest fraction, tiny vertebrae from clupeids (Clupeidae), tiny flatfish, sandeel (Ammodytidae) and, unusually, anchovy (*Engraulis* cf *encrasicolus*). A very large cod, estimated size based on dentary measurements of about 1.1m, was also found in pit 277004, with several bones probably from a single individual. Other fish in this feature included large haddock and smaller cod or whiting (*Merlangius merlangus*).

Fill 182120 was a charcoal-rich layer beneath a large dump of marine shells within Roman enclosure ditch 159219; given the shell dump it is likely that this fill may in fact be Saxon in date. A 40 litre sample (6914) from this deposit contained bones from a diverse range of fish including: herring, eel, whiting, garfish (*Belone belone*), mackerel, gurnard (Triglidae), rockling (*Ciliata/Gaidropsarus*), small rays including thornback and probably spotted ray (*Raja montagui*), small flatfish (plaice, flounder or dab), anchovy and sea bream. Some of these bones come from fish of less than 100mm long and a few had probably been chewed. Other fills within this ditch also contained bones from small conger eel (*Conger conger*), large haddock and sea bass. A small fragment, probably of pike (*Esox lucius*) palatine is the only identification, albeit tentative, of an exclusively freshwater fish.

Samples from the mid-Saxon fills within Roman enclosure ditch 159224 produced bones from a range of fish, some small and even tiny (individuals of less than 150mm in length) including herring, eel, conger eel, small gadids, garfish, sea bass, scad, flatfish and sea bream. Given the shell-rich nature of these fills it is possible that some of the tiny fish, or bones from them, were inadvertently collected together with the molluscs or, alternatively, were present in the guts of larger fish. However, small and tiny fish such as these are edible and are commonly sold in fish markets outside Britain today, so there is no good reason to assume that they were not an intended catch. The finest residue from sample 6908 (context 133085) within this cut also, unusually, included a charred mandible fragment, possibly from a bat, as well as several field vole (*Microtus agrestis*) teeth and frequent avian eggshell, the latter also found in the sample from adjacent context 133084.

Sample 5572, from pit 139061, is unphased but given its location (Zone 14) and the marine shell within its fill, it seems likely to be of Saxon date. The sample contained many components typical of cesspit fills including a range of amorphous coprolitic concretions, mineralised woodlice and fly pupae/puparia together with white and amber coloured nodules of unidentified origin. The fish remains include almost 200 identified bones, many of which show clear signs of chewing and/or digestion (see Wheeler and Jones 1989 69-75), which is entirely consistent with deposition in faeces. The co-occurrence of herring and eel in this fill is reminiscent of many assemblages from mid-late Saxon urban cess pits recorded by the author, but soil sample 5572 also contained a few bones from small garfish, gadids and mackerel. A slow worm (*Anguis fragilis*) scale and bones from field mouse (*Apodemus sylvaticus*), shrew (*Sorex araneus*) and frog or toad (*Rana/Bufo* sp.) suggests that the feature was sufficiently open for long enough to act as a pit fall trap for small animals.

Fish remains from sample 5587, from Saxon pit fill 163018 (pit 163017), include a scad (*Trachurus trachurus*) dermal scute in addition to bones from mackerel, herring, eel (some chewed), whiting, small flatfish and anchovy. Scad was also identified in pit 126040. A very large tub gurnard (*Trigla lucerna*) parasphenoid came from hearth 28008.

The identification of anchovy in seven Saxon samples is noteworthy. There are no records of a fishery for anchovies in British waters, but Dutch anchovy fisheries are documented and anchovies have been caught in British waters, usually in nets along with herring, pilchards and sprats (Cunningham 1890). The fish is here at the northern edge of its range, but has also been recorded in medieval samples from sites in New Romney (A Locker, pers. comm.).

Medieval

Only a few fish came from medieval contexts, most of which were from medieval ditch fills on the Ebbsfleet Peninsula (Zone 3). Taxa include eel, small gadids including cod and whiting, herring or sprat, conger eel and shad (*Alosa* sp.).

Unphased

Notable among the finds is a cuttlebone (in fact cuttlefish are not fish but cephalopods) from context 125106, a backfill deposit in unphased but potentially Iron Age pit 159258 in Zone 13. Like squid, cuttlefish can be eaten and also produces black ink; the cuttlebone can also be used to create fine moulds for casting metal (Bell 1977, 85). Their remains are infrequently reported from archaeological excavations (Smart 1995) but Roman and later examples are known from London (K Reilly pers. comm.) and the remains of two cuttlefish were also represented at Bishopstone, both from Early Iron Age contexts (Bell 1977, 85). Like crabs, lobsters and whelks, cuttlefish are usually caught using baited traps (pots) on the seabed.

Discussion

The fish assemblage reported here is small in comparison to published assemblages from English towns and monastic sites of Saxon and later date (eg, Nicholson 2006; 2009), but significant because fish remains from rural sites are scarce, and those from contexts pre-dating the Saxon period particularly so. The paucity of Iron Age fish remains from English sites led Dobney and Ervynck to suggest that fish were deliberately avoided – a fish taboo possibly associated with religious belief (Dobney and Ervynck 2007). However, fish remains are common from coastal midden and settlement sites in Northern and Western Scotland and it is presently unclear whether the lack of fish remains from Iron Age coastal sites in England is due at least in part to differences in conditions for bone preservation.

Where fish bones have been recovered from Iron Age sites in England, most assemblages comprise fewer than 10 bones and most are from inland sites. While the herring and eel from Early-Middle Iron Age pit fill 173190 would fit well in a Saxon context, and so may potentially be intrusive, the small flatfish and elasmobranchs from Early-Middle Iron Age features in Zone 6 are likely to reflect some use of fixed nets to capture fish as the tide receded.

Outside towns and other 'Romanised' settlements the pattern of fish eating, or rather the lack of evidence for it, appears to continue through the period of Roman occupation, although again the types of deposits available for sampling from English rural sites may play a part in this apparent picture. Fish remains from EKA2 are indeed much rarer in deposits dating to the Roman centuries that to those phased as Saxon. The Roman assemblage includes species which would probably have been caught in surface nets (herring, scad), fixed shoreline nets (small flatfish), by inshore fishing using a hooked line (large cod and smaller gadids, bass, rays) and by netting or trapping at river mouths (eel). Elsewhere in the Roman world, documentary and pictorial evidence demonstrates that the Romans used a range of different types of fishing equipment, adapted to different categories of fish (pelagic, benthic, migratory) in different environments (coastal, shallow water, deep water etc). These included stationary nets and traps, baskets and pots, casting nets, dragnets, seine nets, spears/harpoons and hook and line from the shore and from boats (Bekker Nielsen 2007). While it is unlikely that all these methods were used to capture the small number of fish represented on the EKA2, it is certainly likely that fishermen utilised different methods to catch fish in a range of waters, depending on the season. It seems unlikely, however, that despite the proximity of the sea that fishing was ever more than a minor occupation for the Roman occupants of the Isle of Thanet; fish were probably not eaten commonly.

Fish appear to become more popular during the mid-Saxon period, as has also been documented at the nearby site of Thanet Earth (Locker 2010). However, fish are perhaps less common than might be expected given the proximity to the southern North Sea coast and the clear focus on other marine resources, especially considering the nature of the shell-rich fills and rubbish deposits in Zone 14. The evidence indicates that a range of fishing methods was used, probably varying seasonally to target migratory taxa such as eels and herring, but there is no good evidence for fishing beyond coastal waters and it is possible that eels may also have been trapped in local streams. Large herring shoals are found in the southern North Sea around Thanet in the autumn and winter while a second group of herring spawn in the Thames Estuary in spring (Cushing 1982, 60; Wood 1981). Although the remains of large cod and haddock were recovered, they were not particularly numerous and could probably have been caught from small boats operating in the North Sea. Mature cod and haddock are found inshore more commonly in winter (Wheeler 1978), but small gadids such as whiting, rays and flatfish, including plaice and flounder, would have been available in coastal waters for much of the year and could have been captured using fixed nets, traps or baited hooks. Anchovy, gurnards, sea bass, sea breams, sole, scad, mackerel and gurnards come inshore seasonally to spawn and were probably caught in late spring-autumn. The use of fine nets positioned in shallow water is likely to explain the presence of tiny fish.

Recent investigation into early Saxon diet using stable isotope analysis has demonstrated a greater consumption of marine foods at coastal than at inland sites (Mays *et al* 2012), but typically fish remains are relatively infrequent on Saxon sites predating the late 9th and 10th centuries (Barrett *et al* 2004). In Kent, however, a large assemblage of mid-Saxon fish remains has been reported from Sandtun, West Hythe, a settlement interpreted as a trading centre and fishing port, and another sizeable assemblage was recovered from mid-Saxon Lyminge, probably connected to the nearby monastery (Hamilton Dyer 2001; Reynolds 2011). Other large fish assemblages have been reported from a mid-late Saxon settlement at Bishopstone, East Sussex and Flixborough, Lincolnshire, both of which appear to be linked to élite settlements. While the assemblages from Sandtun and Lyminge are larger than that from the EKA2, the range of taxa represented is similar, although cod and sea bream feature more prominently at Lyminge, largely from the hand-collected assemblage, while anchovy is absent. Whiting and flatfish were common at Sandtun. All three assemblages from Kent were almost entirely dominated by marine and migratory taxa, with very small numbers of bones from freshwater species present at Lyminge and a single possible pike bone was all that was present from the EKA2. Together with herring, eels were also common in the Lyminge samples, and it is likely that they were caught as the females travelled downstream, probably by trapping in weirs using baskets or nets. Fish weirs are documented in Saxon land charters and the word comes from the Anglo-Saxon 'wer', one meaning of which is a device to trap fish (English Heritage 2011).

Although it is clear that entire fish were transported to the Cliffsend Spur at Foads Hill above the Ebbsfleet Peninsula, there is no patterning either in skeletal element distribution or butchery marks to suggest that any further processing of fish took place. It is therefore likely that fresh fish were cooked and eaten, possibly by those responsible for processing the very large quantities of shellfish.

Chapter 16

Marine Shell

by Rebecca Nicholson

Introduction

A large assemblage of marine shell (317.7kg) was recovered from 1102 deposits, 41% from the sieving of 194 bulk soil samples. The great majority of shells (about 50%) came from ditch and pit fills from Zone 14 on Foads Hill, mostly dated to the mid-Saxon period on the basis of the associated ceramic assemblages and fill stratigraphy. Only a very small proportion of shells are prehistoric (Bronze Age and Iron Age) or medieval. Estimated counts and very preliminary identifications were made during finds and sample processing and these records were added to the site database. Subsequently, the assemblage was rapidly assessed by Campbell (2011) and the decision taken to fully identify and quantify material from all Bronze Age, Iron Age and medieval deposits with over 10 shells, all Roman deposits with over 50 shells and all Saxon deposits with over 100 shells.

Methods

Whole shells and quantifiable elements of broken shells (umbones of bivalve shells, apices and apertures, or the bases of apertures, of gastropod shells) were extracted and quantified from all the sieved material over 4mm. Hand-collected shell that appeared to conform to the selection criteria above was also recorded, although in some cases preliminary counts used to select material for full recording proved incorrect.

The resulting assemblage was identified to genus, and to species where preservation allowed, by reference to digital and standard works such as Oliver *et al* (2010), Beedham (1972) and Tebble (1966) and to comparative material in the author's own collections. The smallest gastropods and bivalves were identified using low-power binocular magnification (x10 – x20). The number of shells of each variety recovered in each deposit was counted. Oysters were initially separated into left (lower) and right (upper) valves and these were counted separately. A small number of valves could not be determined to side and these were also scored separately. All shells were inspected for infesting and encrusting organisms and details noted. For other bivalves, left and right valves were always present in roughly equal numbers for any variety in any deposit but were not distinguished during recording. For calculations of abundance the minimum number of bivalves has been calculated by phase, based on the numbers of left and right valves for oysters or by half of the total number counted for other bivalves.

In order to reconstruct the nature of the shell sources being exploited, oyster, whelk and red whelk (buckie) shells from all prehistoric and a selection of richer Roman, Saxon and medieval contexts were measured for use in statistical comparisons of size and shape. Additionally, mussels were measured from two Bronze Age, three Roman and two Saxon contexts. Evidence for epibiont infestation was noted following Winder (1993; 2011) and was recorded in detail for measured oysters; other shells were largely devoid of infestations and encrustations. For bivalves (mussels and oysters) maximum valve length and width were measured following Winder (1993; 2011). Oyster hinge and shell shape reflects the kind of substrate the animal grew upon and can be used to differentiate shellfish growing in sheltered bays, deeper waters and reefs. Analysis may also identify populations likely to have been cultivated. Common whelk and red whelk measurements followed Reid (1996). Gastropods also show allometric differences, some of which can probably be explained by differences between habitats, with individuals becoming adapted locally as a result of limited mixing between adjacent populations (Magnúsdóttir 2010). In modern collections differences in shell size and shape are evident between different sampled populations, while red whelk shell size and shape also differs to a certain extent between males and females, particularly in the relationship between shell length and aperture length (Power and Keegan 2001). To allow comparison of shell size and shape, measurements were taken to allow the calculation of relative aperture size (the Hs/Ha of Crothers (1992, 92) used by Cummins *et al* (2002)), the width-height ratio (Ws/Hs) and, for red whelks, the shell length and aperture length (SL/AL) of Power and Keegan (2001). Unfortunately, however, while measuring the gastropods it became clear that damage to the aperture edges, probably inflicted while extracting the animal, greatly reduced the number of measureable specimens. Consequently, for the discussions below only width and height measurements are considered. All measurements will be available in the archive.

It was evident that in many deposits the left valves of oysters were less well preserved than the much flatter right valves, although the former are preferred for biometrical analysis because the right valves are usually smaller and inset within the cupped left valves. Measurements (± 2mm, since some erosion of the margins was commonplace) were taken from the hinge to the margin immediately opposite (shell width) and across the shell for maximum length for the oysters. Occasionally measurements were estimated following Winder (2011) where margins were broken, a frequent occurrence for the left valves. A significant proportion of left valves were too broken for measurement, however. It should be noted that a recent study has shown that dimensions of the oyster nacreous lining are less variable within a given sample of modern native oysters than dimensions of the entire shell, since some of the variability between shells in a sample is due to variation in the size and shape of the hinge (Campbell 2010). However, in this assemblage for speed and consistency of recording and given the poor condition of much of the oyster shell, the entire shell dimensions were measured

The assemblage

Even with the selection methodology described above, over 25,000 individual shells representing a minimum of over 18,500 shellfish were identified and recorded (Tables 16.1 and 16.2), the majority of which were of Roman or (especially) Saxon date. Some of the Bronze Age and Iron Age shell may be intrusive material from later deposits, but that recovered from the fills of ring-ditches appears to be genuinely prehistoric. A variety of marine molluscs are represented, with periwinkles (*Littorina littorea* (L.)) dominating the sieved assemblage at 37%, limpets (*Patella* spp.) the next highest at 24% and mussels (*Mytilus edulis* L.) at 15%. By minimum number of individuals, Oysters (*Ostrea edulis* L.) account for 14% of the recorded sieved assemblage but 49% of the recorded hand collected material, illustrating the bias introduced when only hand collected assemblages are considered. Since each oyster possesses two valves, which are relatively large in comparison to other shells, it is easy to see why shell assemblages consistently seem to be dominated by oysters. Whelk (*Buccinum undatum* L.) and red whelk (*Neptunea antiqua* (L.)) form 4% and 5% of the sieved assemblage respectively. Very small numbers of other marine mollusca are also present (see below). Crustacea include several small fragments of crab and arthropods include small numbers of barnacles.

Oysters

These were present in all periods, but were particularly abundant within feature fills dating to the mid-Saxon period within Zone 14 and were also common in features associated with the Roman settlement on Thorne Hill on the chalk ridge (Zone 20). They were relatively infrequent in other periods. Although very visible owing to their relatively large size, oysters in fact make up only 14% of the assemblage from sieved soil samples in the recorded assemblage and only 11% of the Saxon shell; however, the greater meat weight from these molluscs when compared to the smaller mussels and limpets should be borne in mind. Shell condition is variable, but frequently poor, making measurement

Table 16.1 Numbers of shellfish (excluding minor taxa) represented in the recorded sieved assemblage

	Oyster MNI	*Mussel MNI*	*Whelk*	*Red Whelk*	*Periwinkle*	*Limpet*
Bronze Age	5	103	0	0	2	2
Late Bronze Age/early Iron Age	0	0	0	0	0	0
Iron Age	3	0	0	0	0	0
Late Iron Age/Roman	1	0	0	0	0	0
Roman	427	782	26	1	9	0
Saxon	1524	1289	619	795	5644	3692
Medieval	194	102	10	2	1	0
Total	2154	2276	655	798	5656	3694

Table 16.2 Numbers of shellfish (excluding minor taxa) represented in the recorded hand collected assemblage

	Oyster MNI	*Mussel (MNI)*	*Whelk*	*Red Whelk*	*Common Periwinkle*	*Limpet*
Bronze Age	29	79	1	0	0	0
Late Bronze Age/early Iron Age	0	1	0	0	0	0
Iron Age	42	3	3	6	1	0
Late Iron Age/Roman	69	165	1	2	0	198
Roman	930	69	8	8	9	6
Late Roman	17	0	0	0	0	0
Saxon	604	57	108	336	191	202
Medieval	70	176	0	0	0	0
Total	1761	550	121	352	201	406

Table 16.3 Measured oyster valves

Period	*Context*	*Sample*	*Cut/Feature*	*No. of measured left valves*	*Mean width (st dev) of left valve*	*Mean length (st dev) of left valve*	*No. of measured right valves*	*Unmeasureable valves*
Middle Bronze Age	148042	5069	148044	2	80, 67 (n/a)	64, 64 (n/a)	0	6
Middle Bronze Age	148041	n/a	148044	1	64, 74 (n/a)	64, 60 (n/a)	2	8
Early Iron Age	170042	n/a		1	80 (n/a)	77 (n/a)	2	0
Middle Iron Age	208019	n/a	208017	0	0	0	1	0
Middle Iron Age	246006	n/a	246048	1	84 (n/a)	72 (n/a)	0	0
Middle Iron Age	130057	n/a	130048	1	74 (n/a)	69 (n/a)	0	0
Early/Mid Iron Age	211071	n/a	211067	1	70 (n/a)	55 (n/a)	0	0
Early/Mid Iron Age	248028	n/a	248027	0	n/a	n/a	1	0
Early/Mid Iron Age	174054	n/a	174060	0	n/a	n/a	1	0
Iron Age	226010	n/a	226001	1	82 (n/a)	75 (n/a)	3	0
Iron Age	226009	n/a	226001	0	n/a	n/a	2	0
Mid Roman	127036	5403	127034	102	66 (9.0)	56 (12.0)	127	62
Mid Roman	157016	5204	136006	27	78 (10.9)	68 (8.1)	72	89
Mid Roman	205057	6846	205059	66	75 (11.6)	65 (12.0)	129	19
Late Roman	249073	n/a	217122	48	78 (8.5)	70 (8.9)	29	94
Roman	205056	6845	205059	16	74 (6.6)	61 (9.9)	14	87
Roman	250098	n/a	250094	18	71 (13.3)	65 (13.9)	25	28
Saxon	173068	5586	173061	39	70 (14.2)	62 (14.6)	33	37
Saxon	133081	6903	159219	88	59 (11.2)	53 (11.4)	142	358
Saxon	133084	6907	159224	85	69 (14.0)	61 (14.8)	164	105
Saxon	182116	6909	159224	88	72 (14.4)	64 (14.4)	122	147
Saxon	182117	6910	159224	97	71 (15.4)	63 (16.2)	162	198
Saxon	173086	n/a	173080	72	79 (10.7)	72 (13.0	52	7
Medieval	175165	7504	175161	61	54 (16.0)	49 (15.3)	138	114

n/a - not applicable

impossible in many cases. Where valves could be identified to species, virtually all are those of the native, common or flat oyster *Ostrea edulis* L. There are also a very small number of saddle-oysters *Anomia ephippium* L., a shellfish that colonises hard substrates and which is found regularly with oysters.

Native oysters can be found in shallow coastal and estuarine waters on stable bottoms of mud, rocks, muddy sand and gravel and can form extensive beds and reefs. Where exploited, suitable habitats can be constructed using discarded shells and other hard substrates 'cultch' to encourage spat to attach.

Oyster shells from 26 contexts were measured and their condition recorded in detail. These comprised all measurable prehistoric shells, six shell-rich Roman, six shell-rich Saxon and one shell-rich medieval context; sieved samples were used where possible (Table 16.3). In Table 16.3 and the discussion below only the measurements taken from the left valves are considered, but all measurements and details of shell condition is available in the archive.

Mussels

These were also common, forming around 15% of the sieved assemblage (Table 16.2). Several Bronze Age deposits included collections of mussels and the shellfish were also frequent in some Roman, Saxon and medieval samples. Unusually for archaeologically excavated shells, preservation is generally very good and many valves are intact and so potentially measureable. All shells appear to be of the common mussel *Mytilus edulis* (L.), with no convincing examples of the warm-water French mussel *Mytilus galloprovincialis* (Lamarck) recorded. Mussels are common on moderately to strongly wave-beaten inter-tidal shores (where they tend to remain relatively small) and on solid and stable soft sub-tidal beds to 40m depth (where they become relatively large), but can attach to most bare stable surfaces. They often form dense mats which can expand into large beds and reefs when not disrupted by harvesting.

Limpets

Limpets are usually a grazer of inter-tidal bare rock areas, but can be found in small numbers on solid sections of, or objects on, otherwise muddy shores. Preservation of these small gastropods is generally good and all appear to be the common limpet *Patella vulgata* L., although distinctions between species can be difficult. Over 4000 shells were recovered, almost all from mid-Saxon fills in Zone 14, usually from deposits which also contained abundant mussels, whelks, red whelks and/or periwinkles, and occasionally from deposits also rich in oysters. The remaining limpets were largely from later Iron Age/Roman contexts in Zone 22 on Laundry Hill. Two limpets came from Bronze Age gully fill 148042 in Zone 12. Overall, limpets comprised 24% of the recorded sieved assemblage by minimum number of individuals, although the dietary contribution of their meat (if eaten) is likely to have been fairly minimal. While limpets are not commonly eaten in Britain today, they are edible and are eaten elsewhere in Europe.

Periwinkles

The common or edible periwinkle *Littorina littorea* (L.) was very frequent in the mid-Saxon shell-rich fills of Zone 14, but rare in other deposits and phases across the excavated zones. In total 5849 shells were identified, making up 37% of the identified shells from sieved samples across all excavated zones. Periwinkles are the most frequent shell in 19 contexts, almost all of them Saxon. Preservation of these robust shells is good and a large proportion is intact and could potentially be measured. Habitat, size range and distribution for this gastropod have been reviewed by Reid (1996, 111-113). Common periwinkles are widely distributed and often common grazers of sheltered or moderately wave-beaten shores from high-tide line to about 10m depth, most commonly on inter-tidal solid shores amongst sea-weed, especially wracks (*Fucus* sp.). They are also found on muddy beds in harbours and estuaries, congregating on stable sections of shore, objects or under patches of inter-tidal wracks (Reid 1996, 111-113). The periwinkle can also be common amongst mussels, where small young winkles colonise inter-tidal beds but large older winkles dominate the shallow beds (Saier 2000).

A smaller number of flat periwinkles (*Littorina obtusata* L.) and rough periwinkles (*Littorina saxatilis* (Olivi)) were recorded, but these never comprised more than a few individuals in any sample. Since some forms of small periwinkle are very similar, there is a small chance that some of the small winkles should have been assigned to a different species, notably that some of the rough winkles were very young edible periwinkle or *vice versa*.

Common Whelks

Whelks were present in all periods, but as with other shells the great majority (93%) came from mid-Saxon fills in Zone 14. In total, 779 shells of common whelk *Buccinum undatum* L. have been identified, a significant proportion of which were intact enough to measure. Whelks are carnivore-scavengers of muddy sands and stony beds from extreme low tide to 1200m and are today fished by dredging or potting. Shell preservation is good or fairly good, so identification is clear, although the similarity of young whelks and dog-whelks means that there is a small chance that a few small whelks might have been identified as poorly preserved dog-whelks, or large dog-whelks identified as young common whelks. Of the 266 measured whelks from Saxon contexts, all of which came from sieved deposits, the average shell length was 51mm (range 27-80mm, standard deviation 10.7).

Red Whelks (Buckies)

Red whelks or buckies were even more frequently recovered than common whelks. In total 1157 have been identified, again largely (98%) from mid-Saxon deposits in Zone 14. Six red whelks were recovered from Iron Age features in the same area, although the possibility that these are intrusive has to be considered given the abundance of mid-Saxon shell in the vicinity. Shells from securely dated Roman deposits were, however, scarce; one came from sieved sample 5204, context 157016, a fill within ditch 136006 in Zone 6, while the few others were recovered by hand collection from a range of feature fills in Zones 10 and 20, some in Zone 10 possibly early or mid-Saxon. Two shells came from medieval pit fill 175165 in Zone 1, on the Ebbsfleet Peninsula. Of the recovered shells, several (particularly those from Zone 20) have some evidence of sooting on the surface, probably as a result of resting on charcoal. The majority of the red whelk shells are sufficiently intact to be measurable, although a significant proportion has slight erosion at the apex and/or damage to the edge of the aperture. If this damage was minimal, measurements were estimated. In some cases damage to the aperture appeared to have resulted from extracting the animal from its shell: cuts could be seen on a few Saxon examples.

Red whelks are a cold water mollusc, common locally off the coasts of northern Britain but are at the southern edge of their present range in Thanet. Similar in appearance to the common whelk, they are found from 15-1200m, mainly on soft substrates and are not now considered edible (see below).

Other shells

Various other species of gastropod were found in low numbers but these are unlikely to have been consumed. Several netted dog-whelks (*Nassarius* cf. *reticulatus* (L.)) were recovered; these scavenge on inter-tidal or shallow sub-tidal mud or muddy sand. A small number of common dog-whelks (*Nucella lapillus*) were also recorded. A few sting-winkles (*Ocenebra erinaceus* (L.)) were probably harvested accidentally with the oysters; it is a carnivore of sedentary molluscs from mid-tide to 150m depth and is found regularly on oyster beds. A few small winkles could only be identified as from one of three common British species, the flat periwinkles *Littorina obtusata* (L.) and *L. mariae* Saachi & Rastelli, or the rough periwinkle *L. saxatilis* (Olivi). Topshells, though never frequent, include the flat topshell *Gibbula umbilicalis* (da Costa) as well as the grey topshell *Gibbula cineraria* (L.) and *Osilinus lineata* (da Costa), all of which can be found on stable inter-tidal shores.

Interestingly, the small periwinkle species did not tend to occur in contents rich in common periwinkles, even though the gastropods are commonly found together on seaweed dominated shores. This suggests that the small winkle species were not principally being brought to the site as a by-catch with the common, edible, periwinkles, and that the latter were sorted before being transported to the site.

The common periwinkles tend to occur together with other edible shellfish, although there were single dumps of periwinkles, for example in context 133100 in ditch 159219 in Zone 14. The small winkle species were not present in significant enough quantities to indicate their source, although it is likely that since they are common in inter-tidal seaweed, especially wracks, most were accidentally included in seaweed used to pack the larger, edible shells.

Very few small species of bivalve were recovered; the most commonly occurring is the Baltic tellin *Macoma balthica* (L.), found in mud-rich inter-tidal or shallow sub-tidal beds. Other shells included the common cockle (*Cerastoderma edule* L.), a shellfish which is commonly eaten but here is present in very low numbers and sometimes in very juvenile form, suggesting accidental inclusion. Bivalves occurring very occasionally include the trough-shell (*Spisula eliptica* (Brown)), which is usually found in sand-rich inter-tidal or more commonly sub-tidal beds. Also the variegated scallop (*Clamys varia* L.) which is usually found in shallow, rocky coastal areas, as well as small tellins (*Tellina* sp.) and a single carpet shell (*Tapes corrugata* (Gmelin)), this last widely distributed on British coasts, burrowing in a variety of substrates.

Roman context 205056, from ditch 205059 in Zone 20 on the chalk ridge, included around 20 acorn barnacles (*Semibalanus balanoides* (L.)). Since these arthropods attach permanently to a hard substrate, it is likely that they originated attached to oysters or other shells.

Prehistoric shellfish

Shells were rare in secure prehistoric contexts, and when present very few were complete. A layer of shell filled the base of cut 148040 at the terminus of Bronze Age gully 148044 in Zone 12. Recovered shells included a minimum of 13 oysters and two limpets, however only two oyster valves were measureable (Table 16.3). Several fills within Bronze Age ring-ditch 134096 (Zone 13) contained significant caches of mussel valves, with occasional examples of rough periwinkle, small cockles and a topshell probably representing incidental inclusions with the mussels. Mussels from sample 7147 (200095) have a mean length of 45mm (n=27, range 35-54mm, standard deviation 5.5) and those from the hand collected assemblage from context 290538 have a mean length of 44mm (n=107, range 35-56mm, standard deviation 3.5). It is unclear whether these shells have any special significance, but the layer of shell at the base of gully 148040 may represent a placed deposit, possibly related to food consumed at the time of burial.

Late Bronze Age/Early Iron Age pit 157012, possibly a well, in Zone 10, contained a minimum of 25 oysters and two mussels, though at least the uppermost fill of this feature may have been Saxon. Six hand collected Iron Age whelks were on average 68mm long (range 57-76mm) and 41mm wide (range 36-48mm).

Shells securely dated to the Iron Age are similarly scarce, since many features assigned to the Iron Age and containing shell included some Roman or later pottery in the fills. Again, when present, oyster shells are in poor condition and of variable shape and size. Only ten Iron Age left valves were sufficiently intact to measure, and were on average 82mm wide (range 70-100mm) and 72mm long (range 70-84mm). Three intact whelks from pit fill 178071 (Zone 14) are 57, 64 and 76mm long while five hand collected red whelks phased as Iron Age, also from context 178071 and from ditch fill 157015 (Zone 10), similarly range in length from 57–72mm (mean 64mm, standard deviation 6.2). Considering the ubiquity of Saxon shell in pits and ditches across Zone 14, and the scarcity of shell in Iron Age features across the entire EKA2, it is possible that the shell from 178071 is intrusive.

Roman shellfish

Oysters

Oysters were common in some pit and ditch fills in Zone 20, on the chalk ridge, but were in relatively poor condition, limiting the number of measureable shells, particularly affecting left valves. In many cases shell size estimates had to be made (after Winder 2011), but even so a significant proportion of valves were unmeasureable.

Mid-Roman pit 250094 included several shell-rich fills. Fill 250098 included over 100 shells, weighing 1.8kg, the majority of which are oyster valves of a wide range of sizes, although relatively few are intact enough to measure. The majority are of the round-hinged form, but occasional long, oval-hinged forms are also present and in a few cases the growth appears to have been irregular, with several shells exhibiting a change of growth and shape mid-way through their life (as documented by Campbell 2010). Around 38% of the measured valves have chalky, chambered and/or blistered patches internally, while patches of bryozoa (sea mats) are also relatively frequent, recorded on about 21% of the measured valves. These patches were seen on the inside as well as the outside of valves, suggesting that the shells were open when collected and may represent cultch or shells rejected during sorting rather than food waste. Several oysters have other shells adhering, usually oysters but occasionally cockles or mussels.

Fill 205057 in mid-Roman ditch 205059 (Zone 20) includes 213 valves from a minimum of 109 oysters (from 38 litres of soil). The shells are in variable condition, but the majority of margins on the left valves are broken, making measurement impossible. This is true even for shells otherwise in good condition, and may be in part a product of opening the shells for extraction of the meat. Shells again vary in shape, with a number of elongated valves present, many with clear evidence of growth disturbance and in some cases with a raised layer of nacre forming a 'blister', usually immediately below the hinge. A few 'rottenbacks' are present; shells perforated by borings from the sponge *Cliona celata*, but otherwise these valves are fairly free from infestation, although some shells have evidence of internal blistering and chambering, probably enhanced by post-depositional modification. Some valves have flattened areas or irregular shell shapes suggestive of crowded growing conditions.

Late Roman fill 249073, from ditch 217122 also in Zone 20, included a large collection of shells, most of which were oyster. Shell condition is generally poor, which has compromised the recording of size and infestation to a degree. In some cases it was difficult to separate pre-depositional from post-depositional modifications and root etching was evident on many shells. Nevertheless, it is clear that again the oysters comprise a range of shell sizes and shapes. Both the classic round and oval shapes as described by Campbell (2010) were present. Others had lobate or more irregular forms and/or distorted hinges, possibly a result of a change of habitat during the life of the mollusc (see Campbell 2010 for illustrations and discussion) and/or crowding. A significant proportion of valves have some form of infestation, both externally and internally and several have other molluscs attached (oyster, mussel and cockle), evidence that the oysters grew on a substrate peppered with other shells.

Considered together, while the majority of the oysters from these Roman contexts are of a rounded rather than oval shape, a considerable range of sizes is present and this is even without considering smaller specimens which may be under-represented due to the collection method used for some of these deposits. Around 13% of shells have evidence of internal chambering, possibly caused by the Polychete worm *Polydora hoplura*, although actual evidence of the distinctive U-shaped burrows is rare. There is little evidence for other infesting organisms. Where shellfish have been farmed a greater uniformity of shape and size could be expected, and a rather lower level of parasitic modification to the shells. It is more likely that these oysters have been collected from wild populations, with minimal levels of pre-selection being made during collection. Bryozoa (sea mats) on the inside of a few valves, particularly seen on valves from contexts 250098, 157016 and 249073, show that these animals were not eaten, but whether the beds were deliberately seeded with discarded shells to encourage oysters to attach is uncertain. The presence of shells from dead animals again suggests that unsorted oysters were brought to the site, and these may have been collected en-mass by raking in shallow or deeper water.

Notches were present on at least 14% of the measured oysters and the extent of damage to valve edges means that this number is likely to be under-estimated, indicating that these animals were alive and uncooked when opened for their meat.

Mussels

Intact mussels are surprisingly common and shells from three samples were measured (samples 6845, 7602 and 7603). Sample 6845 (ditch fill 205056) from ditch 205059 in Zone 20 contained almost 450 valves in 40 litres of soil, of which 227 are measureable, giving a mean length of 41mm (range 28-52mm, standard deviation 4.2). Mussels are the dominant shell type in Roman samples 7602, 7603 and 7604, from fills within early Roman sunken-featured building 193140 (Zone 13). The measured shells from sample 7603 (173231) are relatively small, with lengths from 26-43mm (n=49, mean 34mm), slightly smaller than those from sample 7602 (173200) which have a mean length of 38mm (n= 50, range 26-52mm). Mussels were a common component of Late Iron Age/early Roman pit fill 290538 (pit 290181) in Zone 22 and mussels were also frequent in ditch fill 157016 (ditch 136006; sample 5204) from Zone 10, with oysters and whelks also present.

Saxon shellfish

The uppermost fills of the relatively large, outer ditches on the north and east sides of the Roman enclosure in

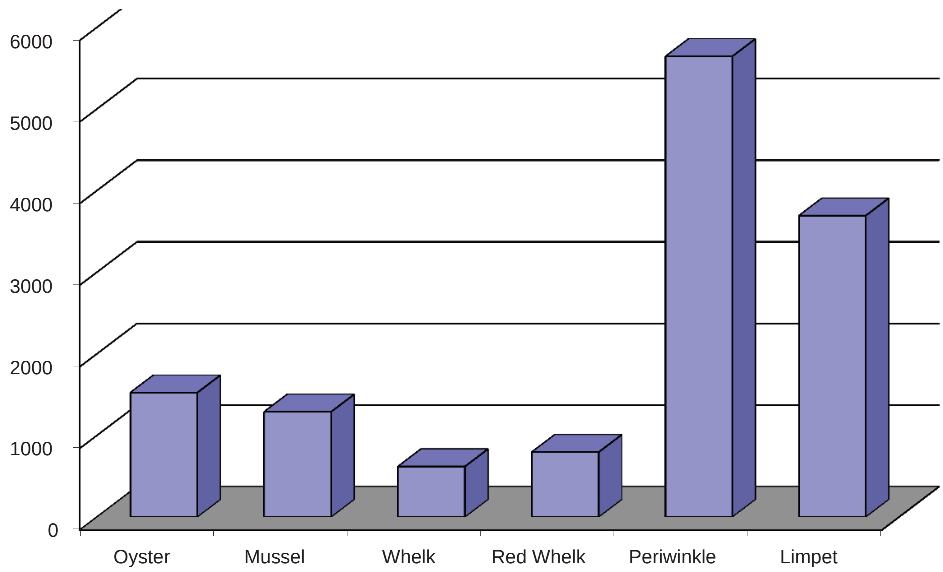


Fig 16.1 Numbers of individual shellfish in Saxon sieved samples (common taxa only)

Zone 14 on the Cliffsend Spur contained very large quantities of marine shell of various species, as discussed above (Fig 16.1). These were largely recovered by targeted sampling rather than hand collection. These shellfish-rich deposits were also encountered in many of the pits surrounding a pair of slab-lined hearths 173051 and 191119. The amount of shell appears too great for normal domestic consumption, even given the relatively low meat:shell ratio, and the spread is likely to represent the remnants of what was formerly a more extensive spread of Saxon shellfish processing debris (see Volume 1 Chap 4).

Oysters

Oyster shells were particularly visible in these deposits, although representing only about 12% of the individual shellfish in the sieved assemblage (40% in the hand collected assemblage). Shell condition is fair to poor, with right valves significantly better preserved and more intact than the 'frilly' left valves, the majority of which have broken edges, greatly limiting the sample sizes for measurement. Again in many cases estimates had to be made of shell size (after Winder 2011), although many shells were too badly broken even for this. It is clear that again a range of shell sizes and shapes are present, including classic round and oval shapes as well as many others with lobate or more irregular forms and/or distorted hinges. Many valves had clearly been growing on a hard, irregular surface and irregular shell shape also indicates crowded conditions in many cases. Overcrowding is typically found in naturally occurring and unmanaged native oyster beds (Winder 2011). Some 8% of valves were scored as having irregular growth. In most of these cases the shell is elongated or crescent-shaped and the axis of growth seems to have changed during life. The reason for this change in growth is unclear but could be due to a change in environment, as discussed by Winder and Gerber Parfitt (2003). The oyster may have been moved either by natural or man-made causes, or forced to grow in a new direction by an obstruction such as another oyster, or subjected to a new influence like a change in direction of strong current. Where shell preservation is reasonably good, opening notches can be seen (18% of the measured assemblage), again suggesting that the valves were probably opened while the animal was alive, since they should have opened naturally once heated. Even some of the smallest shells have opening cuts, an indication that these too were prepared as food.

About 12% of the measured shells exhibit internal chambering or blistering, but only 2% have actual tunnelling indicative of *Polydora hoplura* and a similar proportion of shells have surface modification attributable to *Polydora ciliata*. There are only very occasional examples of shells penetrated by gastropod boreholes or modified by the sponge *Cliona celeta*. A small number of shells have Bryozoa encrustations internally or externally, the former an indication that the shells had been open on the sea bed for some time and so not part of living organisms when collected. Generally, however, the shells were clear of encrusting organisms, suggesting that the molluscs were sorted and only living ones brought to the site. Sample 5586 (layer 173068) in pit 173061, however, includes a greater proportion of infested shells than others from this period. Most of the lower (left) valves in this sample were incomplete and the majority have some evidence of parasitic infection generally, exhibiting internal chambering and blistering. A small number of valves had the pock-marked appearance indicative of colonisation by *Cliona celeta*. Quite a few valves were faintly orange in colour, possibly as a consequence of heating or proximity to fired clay. A small number of valves exhibited patches of sooting, probably because they were laid on charcoal pre- or post-burial. A significant proportion of left and right valves had a rusty appearance, usually internally, due to a very thin layer of what appeared to be cemented silt or sand, possibly formed post-burial.

Mussels

Mussels were abundant in some of the mid-Saxon feature fills in Zone 14. Almost 800 valves were recovered from 40 litres of sample 6997 (context 277008), a fill of pit 277004, of which 75 complete shells were measureable, giving a mean length of 40mm (range 38–49mm, standard deviation 2.9). Mussels from early-mid-Saxon pit fill 189021 (sample 5460), from pit 189018 in Zone 11, are significantly larger, with a mean length of 51mm (range 45–58mm, standard deviation 2.8, n=69). A few of these valves have small notches at the side, possibly from opening the animals. Opening would imply that the mussels were uncooked or not fully cooked, since once heated sufficiently to cook the animal, the valves open automatically.

Red Whelks (Buckies) (Fig 16.2)

Overall, the mean height of the 339 measured Saxon red whelks retrieved by sieving is 65mm (range 34-88mm, standard deviation 11.8) while for the 30 measured hand collected shells the mean height is 63mm (range 46-89mm, standard deviation 11.6). Red whelks reach sexual maturity at heights of 95-100mm (6-9 years) in females and 75-90mm (4-5 years) in males (Power and Keegan 2001), indicating that a significant proportion of the animals were immature when harvested.

Whelks (Fig 16.3)

Whelks generally came from the same shell-rich fills as the red whelks and were numerous in some; for example, there were 72 whelks in sample 6997 (context 277008) from pit 277004 and 58 in sample 5835 (context 202022) from pit 202021. Of the 266 measured whelks from Saxon contexts, all of which come from sieved deposits, the average shell height is 51mm (range 27–80mm, standard deviation 10.7).

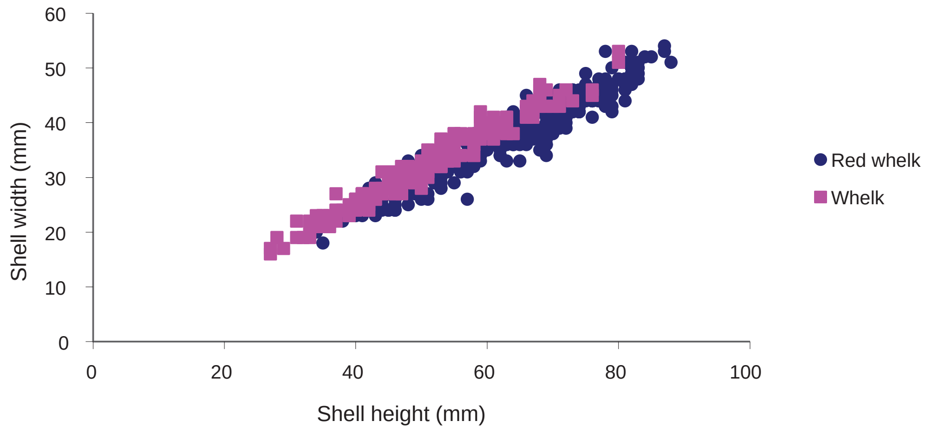


Fig 16.2 Red whelk measurements from Saxon sieved samples

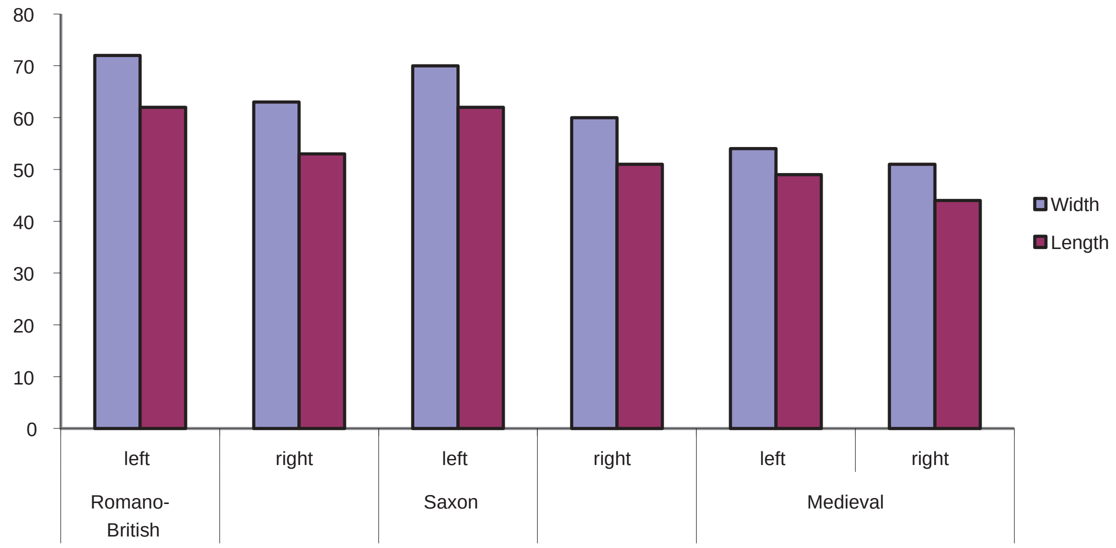


Fig 16.3 Whelk measurements from Saxon sieved samples

Medieval shellfish

Only 554 individual shells were recorded from medieval deposits, all of them from sieved soil samples. The majority of sieved shells were oyster valves (MNI 194), with mussels also common. The few whelks, red whelks, cockles and periwinkles may also represent consumed shellfish. Sample 7504 from fill 175165 in medieval pit 175161 in Zone 1 contained over 300 oyster valves, together with mussels and a few whelks, red whelks, cockles, topshells and a variegated scallop in 36 litres of soil. The composition of the shell assemblage is thus rather similar to that from the Saxon deposits described above, although limpets are entirely absent and periwinkles rare. Sample 5406 (context 189017) from ditch 189015 in Zone 11 by contrast contains only oysters and mussels, some of the former rather small sized, though it is possible that this assemblage derives from a Saxon pit (189018) which is cut by the ditch.

Oysters

The oysters are generally of the flat and round type typical of oysters found in sheltered bays and inlets, with a mean width for the left valve of 54mm (range 20-90mm, standard deviation 16.0) and mean length of 49mm (range 16-80mm, standard deviation 15.5). Several of the smaller *O. edulis* left valves are concave and smooth which may be indicative of growth on a pole or possibly on a large rock, while a few are ovoid or of the irregular faceted shape similar to the type commonly found in more exposed reefs. A few examples have clearly grown on top of a pebble or similar protruberance, but there was little evidence for attached cultch. Epibont infestations and encrustations are few and largely confined to internal blistering possibly caused by the marine polychaete *Polydora hoplura* Claparède. A couple of valves have slight chalky deposits internally, possibly formed during a period of changing salinity. Opening notches, both V and W-shaped, are relatively common, particularly on the margin opposite the hinge.

Although only one medieval sample of oysters has been measured, the valves were clearly somewhat smaller in width and length than assemblages from the preceding periods (Figs 16.4 and 16.5).

Mussels

Mussels are frequent in the medieval samples, and while

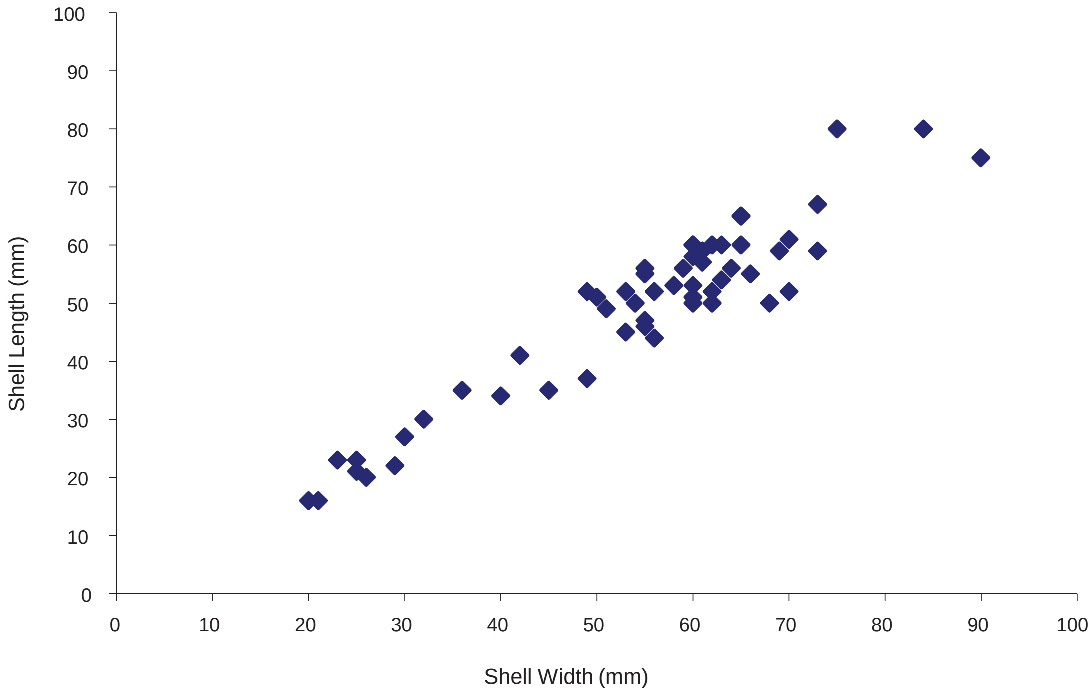


Fig 16.4 Comparison of mean oyster vavle width and length

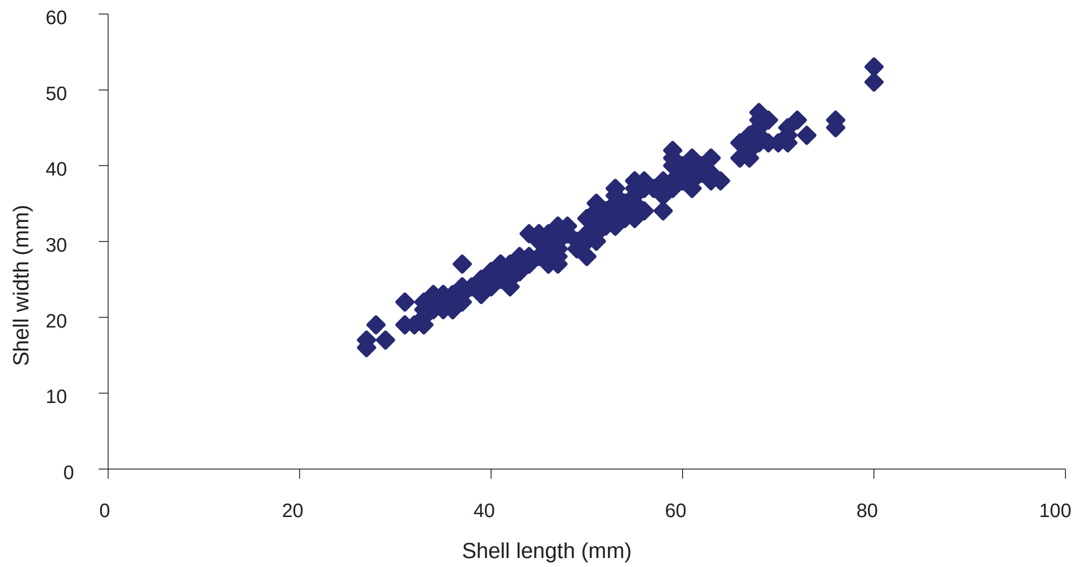


Fig 16.5 Plot of length and width for left oyster valves in sample 7504 (medieval pit fill 175165)

some were measurable the largest group, from sample 7504 from pit 175161 in Zone 1, were largely broken. Over 350 valves were also recovered, many by hand collection, from context 189017 in ditch 189015 in Zone 11. While not measured, it is clear from visual inspection that the valves are all relatively large, of similar size to those measured from fill 189021 of Saxon pit 189018 (above), cut by ditch 189015, and it is possible, therefore, that these shells represent redeposited material from the earlier feature.

Other shells

Whelks and red whelks were present only in sample 7504 (context 175165) from pit 175161 in Zone 1, while only two periwinkles and no limpets were recorded. Thirteen cockles, several small bivalves including the Baltic tellin and varigated scallop and a single top shell were also identified.

Discussion

Shellfish exploitation through time

The relative scarcity of shell in prehistoric contexts is fairly typical for English sites, although to some extent the paucity of published assemblages may be due to early excavation and reporting methodologies (Hill and Willis 2010). While to some degree it may here be related to the kinds of deposits excavated, the proximity of Pegwell Bay, evidently a rich source of shellfish in later periods, would make it unlikely that shellfish were not eaten, unless consumption was constrained by religious or other belief.

By the Roman period shellfish, particularly oysters and mussels, had evidently become an important foodstuff, but there are no deposits which would be out of place in a domestic context. Oysters from nearby Richborough were evidently of such quality that they were imported into Italy in the 1st century AD (Déry 1998, 104). How the oysters were kept fresh for the entire period of transport is not known, but there is no evidence from the documentary records that they were preserved in any way. Since oysters traded in the shell would leave no trace at the collection point, this kind of activity is likely to be archaeologically invisible. Oysters can remain alive for well over a week, as long as they are kept intact, moist and cool, for example by packing in seaweed.

Conversely, the extensive mid-Saxon shell spreads filling features on the Cliffsend Spur in Zone 14 suggest a much larger enterprise, possibly related to a trade in preserved shellfish meat. As discussed above, the great majority of Saxon shellfish came from the uppermost fills of the large outer ditches on the north and east sides of the Roman enclosure and from the fills of many of the pits surrounding a pair of slab-lined hearths, features 173051 and 191119. Lenses composed of single shell types within these fills suggest successive dumping events. The presence of Ipswich ware within the fills dates several of them to the mid-Saxon period and it is thought that where no other dating evidence is present, these shell-rich deposits are all of similar date, representing what was a much more extensive spread of Saxon shellfish debris (see Volume 1, chapter X). These shell-rich deposits are similar in composition to 7th – 8th-century pit fills found at Cliffs End Farm approximately 500m to the south-west of the current site, which also contained concentrations of marine shell, particularly periwinkles but also mussels, oysters, whelks and limpets (S Wyles in McKinley *et al* forthcoming), although oysters were relatively more common in the Zone 14 deposits than at Cliffs End Farm.

Considering the very large quantities of shells, and the likelihood that a much more extensive spread was formerly present, it seems likely that specialised shellfish harvesting took place on a 'cottage-industry' scale, followed by some form of processing on the site resulting in the discard of shells en-masse. While notches on the oyster shell edges indicate that many were opened while still alive (ie, uncooked), given the proximity of the slab-lined hearths, the occasionally slightly reddened shells suggestive of heating, and the possible remnants of fired clay with wattle drying floors found in nearby Saxon pits 167081, 202128 and 202100 (C Poole, this volume) a plausible hypothesis is that some of the extracted shellfish were smoked and/or dried in order to preserve them. This procedure is documented ethnographically from other parts of the world (Claason 1998, 187, 224). Where shells proved hard to open, heating them would have facilitated the process. If not smoked and dried, then shellfish may have been salted or pickled in brine, as is known from the 17th century (Philpots 1890).

There are relatively few examples of large published Saxon shell assemblages from rural sites in England, but this is beginning to change, with (for example) the recent analysis of the marine shells from 8th-early 11th century deposits at Bishopstone, Sussex, a site with an ecclesiastical component (Somerville 2011), and the ongoing analysis of over 10,000 marine shells associated with a mid-Saxon monastic site at Lyminge, Kent (Campbell 2011). Mussels were numerically dominant at Lyminge, an inland site located to the south-east of Canterbury, with cockles, limpets, oysters and periwinkles also common and whelks (*Buccinium*) present but less frequent than the other shell types (*ibid*). At Bishopstone around 2,500 shells were identified, with limpets numerically the most common shellfish and mussels, oysters and periwinkles also relatively frequent, but as at East Kent, cockles were rare.

Shellfish from mid-Saxon towns include large quantities of oysters recovered by sieving from late 7th – mid 9th-century craftsmen's tenements at *Lundenwic* (Winder and Gerber-Parfitt 2003) and similar large assemblages of hand collected oysters from the coastal settlement at *Hamwic* (Southampton; Winder 1980), also occupied from the late 7th to the mid 9th century. At *Hamwic*, however, anecdotal evidence suggests mussels were under-collected (*ibid*) and some periwinkles and smaller quantities of cockles and whelks were also present. By contrast, cockles were the dominant shellfish type at Sandtun, west of Hythe, a trading, fishing and salt-working settlement occupied from around AD 700 to AD 850-875 (Gardiner *et al* 2001), with oysters, periwinkles and whelks also present together with occasional mussels.

Shellfish habitat and collection

In terms of size and shape, the oyster assemblages from the Bronze Age to at least the Saxon period appear very similar, with valves ranging from around 30mm to over 100mm in length (Fig 16.3). The majority of shells were broadly of the traditional round shape, but elongated and irregular shaped shells were common and a significant number of valves appeared to have had their growth impaired by the proximity of obstacles, probably other shells. The growth pattern of some shells had changed during the life of the animal, possibly related to movement or a change in the local environment, perhaps caused by harvesting. The variability suggests that oysters were collected by hand or by raking from a natural rather than a cultivated bed, although a degree of management cannot be ruled out. Following what may be a very small decrease in average shell size in the Saxon period, by the medieval period the average size of oysters appears to have decreased significantly (Fig 16.3), a finding typical for this period (Winder 2010).

The periwinkles, limpets and mussels would have been collected at low tide, from rocks or intertidal beds, while the whelks and red whelks are likely to have been recovered by potting, although some whelks could have been collected at extreme low tide. It is almost certain that the red whelks came from a local population known to exist off Thanet, in Pegwell and Sandwich Bays (Light 2009), since otherwise these molluscs are common only in the North Sea, Ireland and north to Arctic waters (Hayward and Ryland 1990, 685). It is extremely likely that the other shellfish in the assemblage were also collected locally, probably in Pegwell Bay where periwinkles, limpets, mussels and whelks, in particular, are now common in the intertidal zone. Native oyster beds are also likely to have been present locally, but as elsewhere in Britain these have largely disappeared due to environmental change (eg, the changing topography of the Thanet coastline), disease and over-exploitation.

Native oysters from the north Kent coast spawn in April-August, the exact timing dependant on water temperatures. During these months the oysters are unpalatable, so collection would not have taken place during the summer. Mussels too spawn in April-September and are better collected in the colder months, and all shellfish are more likely to spoil quickly in summer, so it is very likely that the shellfish at the site were collected in autumn-early spring, although some shellfish collection at other times of year cannot be ruled out.

If shellfish were being processed in large batches, then the obvious question is whether this was for local consumption or for trade. While shellfish are particularly visible archaeologically, the ratio of edible meat: shell is generally low, so large quantities of shell can represent only a few meals in calorific terms. Nevertheless, it is clear that the extensive dumps of shell in Zone 14 are likely to represent more than just local domestic consumption, since the low calorific value in relation to costs of harvesting, transport and processing makes shellfish an unlikely regular meal for farming or fishing communities. It is much more likely that then, as now, shellfish were largely reserved for the wealthier classes, and it is plausible that the demand for shellfish, as well as other seafood, expanded with the founding of minsters (including Minster-in-Thanet), and the later *wics* established as long-distance trading centres.

There are edible types of molluscs which could be expected to have lived in the waters around the Isle of Thanet, but which are absent or uncommon in the assemblage. In particular, shells of shallow-water muds and sands are rare, which is surprising since these are easily gathered by rake or spade while the tide is low, and these sediments should have been very extensive in Pegwell Bay, in the Wantsum Channel as it silted, and at the mouth of the Stour in the drifting shingle which closed off the Wantsum over time. Shells such as Baltic tellins, furrow shells (*Scrobicularia plana*), carpet-shells (venerids) and razor-shells (*Solen*/*Ensis*) should be much more common. Particularly notable is the low numbers of cockles (*Cerastoderma* sp.), which form extensive dense easily-harvested beds, and extensive dense deposits in coastal British archaeological sites (eg, Campbell 2009, 9-11; Murray 2001). While it is possible that the muddy and sandy beds around Thanet were much more restricted in size and duration than previously thought, it is perhaps more likely that these shellfish were not sought.

Conclusions

Oysters, in particular, are now an expensive luxury, with the finest in Britain considered to be the native oyster, *Ostrea edulis*, now found in only a few places including the coast of north-east Kent, near the town of Whitstable. Kentish oysters were similarly valued in Roman times (Déry 1998), but while the importance of shellfish as traded goods may have had its origin in the Roman period, there is no compelling evidence of this from the EKA2, since only a relatively small number of clearly Roman deposits were rich in shellfish and none were indicative of anything beyond domestic consumption. If shellfish were traded as fresh items, however, the shells would be exported and so little archaeological trace would remain, possibly apart from shells rejected at the sorting stage, but it is likely that this would take place close to where the oysters were collected. There is certainly no evidence from this assemblage for oyster cultivation in either the Roman or Saxon periods; the range of shell sizes and shapes in both periods suggests a wild population. Although only a relatively small sample, the medieval oysters do appear slightly more likely to have been cultivated since the measured valves are significantly smaller and generally more regular in shape, though this could be a possible consequence of over-harvesting in the earlier periods, of more careful selection, or the increased management of established oyster beds. Elsewhere, structures thought to relate to early medieval oyster cultivation are known (eg, Gale 2000).

Apart from oysters, mussels were also abundant in Roman contexts, but whelks and red whelks are almost exclusively found in Saxon deposits, suggesting that deliberate potting for whelks began at this time. The similarity in size between the common and red whelks is an indication that both were captured in the same way, and it is possible that the red whelks were a by-product of potting for whelks; the two are very similar and can be found together in coastal waters of 15-100m deep. The occurrence of red whelks is notable and rare in British archaeology, and the species is here at the southern limit of its natural range. The salivary gland of the red whelk is poisonous both when fresh and when cooked, with symptoms including visual disturbance, nausea, vomiting, diarrhoea and even paralysis, though symptoms only last 24 hours (Fleming 1971; Reid *et al* 1988). Unless collected accidentally and mistaken for the very similar common whelk, the Saxons would have probably removed the poisonous gland, as the Victorians must have done, since red whelks were a popular food for the lower working classes in the latter half of the 19th century (Fleming 1971).

Considering the amount of shell both here and at some other mid-Saxon sites, it seems highly likely that shellfish were an important and traded foodstuff in the Saxon period along the eastern and southern coast of England. Huge oyster middens excavated at Poole in Dorset, probably dating to the later Saxon and early post-Conquest period, attest to the continuing importance of this resource (Winder 1992). It is plausible that trade in shellfish, either fresh or preserved, followed the rise of Christianity and laws forbidding the eating of red meat on certain days. Shellfish may also have provided variety in the diet of the better off and those associated with the Conversion-era minsters. Conceivably the shellfish at EKA2 may have been collected and processed either for consumption at the monasteries or for trading through the mid-Saxon *wics*. Certainly, the shellfish spreads appear too large to attribute solely to domestic consumption at one or several farmsteads.

Chapter 17

Plant Macrofossils

by Kath Hunter

Introduction

Following an extensive programme of environmental sampling 1794 samples were processed and assessed for plant macrofossils. The evaluation and assessment procedures are outlined in an earlier assessment report (Hunter 2011), as a result of which 68 samples were selected for full analysis. These samples were selected from various excavation sites along the 6.5km length of the route of the new road to provide a representative range of material from the different landscape types. Assemblages from features and activity areas dating from the Early Neolithic through the Bronze Age, Iron Age, Roman, Saxon and medieval periods have been analysed in an attempt to identify temporal and spatial changes within the landscape by looking for changes in crop utilisation and agricultural practice indicated by the plant assemblages. The nature of the project has made it possible to compare and contrast the assemblages from the same phases across the excavation area as well from other sites in Kent and beyond.

Method

The processing of samples was initially carried out on-site and later at OA South and OA East using a modified Siraf-type flotation machine. The flots were washed over into a 250μm mesh sieve and the residues were retained on a 500μm flexible nylon mesh. Samples taken primarily for the recovery of charred plant remains (CPR) had their flots and residues dried in a heated room at *c* 25°C. Samples taken for the recovery of waterlogged plant remains (WPR) were processed by bucket flotation using the same mesh sizes as above. Processing 1 litre samples where possible, the resulting flots and residues were stored wet in the OAS cold store at between 4°C-8°C. All the waterlogged samples were rapidly assessed and the results are recorded in the assessment report. All the heavy residues were sorted for CPR (including charcoal above 2mm) by environmental assistants, or if abundant were retained for more detailed assessment. Residues thought to contain mineralised plant remains (MPR) were also retained. Due to the large number of samples taken a process of preliminary assessment was carried out by Laura Strafford (supervisor OAS), followed by a second stage assessment of 357 samples by the author to rationalise the selection of samples for further work. Sixty-eight samples were finally selected and the results of the analysis are reported here. The flots from each sample were examined either using a Leica EZ4D, a Zoom Master 40 Prior or a MTL10 stereo microscope and any identifiable plant remains were extracted and recorded. The identification of the plant remains was carried out in comparison with modern reference material and standard reference texts (Jacomet 2010; Beijerinck 1947; Schoch *et al* 1988; Berggren 1981; Cappers *et al* 2006; Ross-Craig 1969). The nomenclature for the identification of the plant remains follows Stace (2010). The term seed in this text may refer to achene, nutlet etc.

Notes on preservation and identification

The majority of the plant remains recovered from the site was preserved by charring with smaller but significant amounts being preserved by silicification and mineralisation. Unfortunately most of the mineralised seeds consisted only of the internal structure, which is often not identifiable even to family. The lack of well-preserved waterlogged plant remains appears to be the result of a lack of suitable preservation environments within the areas of excavation; even the features interpreted as wells failed to produce waterlogged remains. The potential for the presence of silicified remains was not recognised prior to excavation and processing and therefore some silicified material may have been lost because of the fragile nature of the remains. The presence of silicified cereal chaff where the charred equivalent is absent may serve to indicate material that has been lost due to the preservation processes, and is particularly useful when associated with charred grain (see Robinson and Straker 1991). Some mineralised plant remains have been recovered but these are sparse and on the whole identification to species has been limited.

The identification of cereal grains, in particular wheats, to genus purely on their morphological characteristics can be problematic. Jones (1978) and Jacomet (2006) both highlight the variations and similarities of characteristics of cereal grains from different genera. Jones in particular highlights the similarity in shape of charred free-threshing and some glume wheats. Therefore identification of wheat grains to genus is only tentative for all but the most distinctly rounded free threshing type grains and some well-preserved long narrow, humped backed grains that appear to be of emmer type (*Triticum* cf. *dicoccum*). Where the more diagnostic elements of cereal chaff occur it has been

Table 17.1 Charred plant remains: Early Neolithic

Zone
Period
Sample no.
Context no.
Feature type/no.
Processed soil volume (litres)

Taxa	**Common name**	**Component**	**Habitat**
Triticum cf. *dicoccum* Schulb	possible emmer	grain	C
Triticum sp.	wheat	grain (sprouted) [double grains]	C
cf. *Triticum* sp.	possible wheat	grain (sprouted)	C
Avena sp.	oat	grain (sprouted)	C
cf.Avena sp.	possible oat	grain(fragments)	C, G
Cereal NFI	unidentified cereal	grain fragments	C
Triticum cf. *dicoccum*	possible emmer	glume base	C
Triticum cf *.spelta*	possible spelt	glume base	C
Triticum spelta/dicoccum	spelt/emmer	spikelet fork	C
Triticum spelta/dicoccum	spelt/emmer	glume base	C
cf. *Hordeum* sp.	barley	rachis fragment	C
Cereal NFI	unidentified cereal	detached embryo	C
Fabaceae	legume	seed fragments	
Urtica urens L.	small nettle	achene	cultivated and waste places
Corylus avellana L.	hazelnut	shell frags	H, W
Linum sp.	flax type	seed(fragments)	C
Linum sp.	flax type	stem fragment	C
Poaceae	grass	caryopsis	
Unident		seed(mineralised)	
Unident		organic fragment(with plant impressions)	

Habitat key for all tables

Habitat
C – Cultivated; G – Grassland; D – Disturbed; Da – Disturbed arable; W – Waste ground; S – Scrub; B – Bankside; M – Marsh; n – nitrogen rich; H – Hedgerow, A – Arable

Frequency
* Rare 1-5, ** Occasional 6-20, *** Frequent 21-100; **** Abundant 100

possible to infer the presence of particular crops. However, unless the chaff is still physically attached to the grain it is unwise to use the presence of one to confirm the identity of the other; it is the shape of the attachment end of the floret base, a sucker-like end for the wild type and a fold for the cultivated type, that is used to distinguish them. The continued problem of distinguishing cultivated and wild oat grains in charred assemblages, unless the diagnostic floret bases are present and ideally still attached to the grain, almost certainly prevents us from usefully identifying the patterns of cultivation and usage through time of oat on many British sites. Rye grains can often be difficult to identify definitively due to poor preservation, with the result that the grains are attributed to a wheat/rye type.

Although present in most phases, peas (*Pisum sativum*) and broad beans (*Vicia faba*) are rarely represented by more than a few seeds in each case, which is probably due to the fact that these seeds do not need to come into contact with fire during processing. It is likely, therefore, that peas and beans are greatly under-represented. The varying quantities of charred, waterlogged and mineralised pea remains from deposits in Saxon Southampton show clearly the effect of this preservation bias (Hunter 2005). Identification of pea is more problematic than that of the distinctly shaped broad bean, as it is dependent on the hilum scar surviving, which is unfortunately rarely the case in charred examples. Occasionally this scar survives without the rest of the seed and this was seen in a few cases from this site. With these factors in mind it is likely that there will be more secure identifications of broad beans than peas, creating a bias in the evidence for the representation of these two pulses.

Many samples contained seeds of goosefoot/orache type (*Chenopodium/Atriplex* spp.) which look very similar in both charred and uncharred form, since they are black. Consequently only seeds of this type that were clearly charred were included in the count. The nutlets of corn gromwell, present in a number of samples, had a characteristically 'modern' appearance; however these seeds contain a high proportion of silica in their outer coat and so are easily preserved by silicification (Prustovoytov *et al* 2004) and the breaking of a few examples proved that this was the case here. Other silica rich remains that were preserved included the awns of wheat or barley and other less diagnostic cereal chaff fragments. These persisted in some deposits where other remains have probably been destroyed by combustion (Boardman and Jones 1990). In addition, there were a few examples of mineralised seeds and amorphous concretions from some of the samples, but in low quantities suggestive of redeposition, possibly in the act of manuring from midden/cess type deposits from elsewhere on the site.

6 Early Neolithic 8384 312048 Pit 312047	*6 Early Neolithic 8385 312050 Pit 312049*	*14 Early Neolithic 5510 191085 Pit 191086*	*14 Early Neolithic 5521 191092 Pit 191092*	*14 Early Neolithic 5800 191178 Pit 191179*
		2		
	1	4	2	
1				
	1			
		1		
3	13	39	43	**
	1			
		1		
		1		
2				
	1			
	1			
	3			
			1	
125	17	74	40	**
		(17)16		
		1		
	2			
7		1	1	
	27			

A significant number of grass caryopses, apparently of several types, were present in most of the samples, but the charring process had destroyed the characteristics needed to identify them beyond family level, with the exception of possible rye grass type (cf *Lolium* sp.)

Results

Early Neolithic (Table 17.1)

The numbers of identifiable plant remains in the assemblages from the five pits were characteristically low. Hazelnut shell fragments were present in all five samples and flax seeds and stems were present in pit fill 191085 (Pl 17.1; stem identified by C Stevens).

Cereal grains and chaff found in samples of this date are often interpreted as intrusive, however Early Neolithic radiocarbon dates (see Chapter 21 below) for the flax seed, emmer type grains and hazelnut shell fragments from pit 191086 (two emmer grains, 3650-3380 cal BC (SUERC-40743); nine flax seeds, 3640-3380 cal BC (SUERC-40742); and a single hazelnut fragment, 3650-3380 cal BC (SUERC-40744. 4730)) provide evidence of two agricultural crops and a wild-gathered food resource being cultivated/exploited during this period. In view of this dating evidence, it is likely that the similar plant remains from the other Neolithic pits are also from that period.

Pl 17.1 Charred flax seeds from Early Neolithic pit 191085 in Zone 14 (photograph by Chris Stevens)

Middle-Late Bronze Age (Table 17.2)

A single sample from Zone 26 (ditch 201163, sample 6400, ctx 121038) produced cereal remains, with wheat and hulled barley present. Where the chaff was well enough preserved it suggested the presence of emmer (*Triticum dicoccum*) but no barley chaff was present. Hazelnut shell with elder (*Sambucus nigra*) seed and sloe (*Prunus spinosa*) stone suggest potential wild food resources. Very few other seeds were present though blinks (*Montia fortana* ssp. *chrondrosperma*), common marsh bedstraw (*Galium* cf. *palustra*) and possible wood club-rush (cf *Scirpus sylvaticus*), indicative of damp habitats, were identified.

Late Bronze Age (Table 17.2)

The charred assemblages from these Late Bronze Age features are richer than those from the Early Neolithic samples, but they are still relatively small compared with

Table 17.2 Charred plant remains: Middle–Late Bronze Age

			Zone
			Period
			Sample no.
			Context no.
			Feature type/no.
			Processed soil volume (litres)
Taxa	**Common name**	**Component**	**Habitat**
Triticum sp.	free threshing wheat type	grain	C
Triticum sp.	glume wheat type	grain	C
Triticum sp.	wheat	grain	C
cf. *Triticum* sp.	possible wheat	grain	C
Hordeum sp.	barley, hulled	grain	C
Hordeum vulgare/distichon Var *nudum* L	barley,six row/two row,naked	grain	C
cf. *Hordeum* sp	possible barley	grain	C
Avena sativa L.	oat	grain	C
Avena sp.	oat	grain	C
cf. *Avena* sp.	possible oat	grain	C, G
Avena/Bromus sp.	oat/brome	grain	C, G
Cereal nfi	unidentified cereal	grain fragments	C
Triticum dicoccum Schubl	emmer	spikelet fork	C
Triticum dicoccum Schubl	emmer	glume base	C
Triticum cf. *dicoccum*	possible emmer	spikelet fork	C
Triticum cf. *dicoccum*	possible emmer	glume base	C
Triticum spelta	spelt	glume base	C
Triticum spelta	spelt	spikelet fork	C
Triticum cf.spelta	possible spelt	glume base	C
Triticum cf.spelta	possible spelt	spikelet fork	C
Triticum spelta/dicoccum	spelt/emmer	spikelet fork	C
Triticum spelta/dicoccum	spelt/emmer	glume base	C
Hordeum sp.	barley	rachis fragment	C
Avena sp.	oat	awn fragments	C, A, D, W
Cereal nfi	unidentified cereal	detached embryo	C
Cereal nfi	unidentified cereal	straw culm node	C
Cereal nfi	unidentified cereal	palea/lemna fragments	C
Papaver rhoeas (L.)	common poppy	seed [mineralised]	A, W, D
Vicia/Lathyrus sp. (4mm)	vetch/pea	seed	Da, C
Vicia/Lathyrus sp. (2mm)	vetch/pea	seed	Da, C
Vicia faba L.	broad bean	seed	C
Vicia faba/Pisum sativum	broad bean/pea	seed fragments	C
Trifolium/Lotus sp. L.	clover/birdsfoot trefoil	seed	
Trifolium/melilotus sp. L.	clover/medick	seed	
Fabaceae	legume	seed fragments	
Prunus spinosa L.	blackthorn	stone (fragments)	W, S
Prunus sp.		stone (fragments)	
Corylus avellana L.	hazelnut	shell frags	S, W
Raphanus raphanistrum L.	wild radish	mericarp (fragments)	A, W
cf .*Potentilla* sp.	cinquefoil type	achene	
Viola sp.	violet type	seed	
Brassicaceae type	crucifer type	seed (mineralised)	
Thlaspi arvense L.	field penny-cress	seed (mineralised)	W, A
Persicaria maculosa/persicaria	redshank/pale persicaria	achene (frags)	Da
Polygonum aviculare L.	knotgrass	achene	all sorts of open ground
Fallopia convolvulus (L.) Love.	black bindweed.	achene	Da
Rumex sp.	dock type	achene	Da, G, M, S, W
cf. *Rumex* sp.	possible dock type	achene (mineralised)	
Ameranthaceae	goosefoot family	seed (mineralised)	
Chenopodium album L.	fat hen	seed	
Atriplex sp.	orache	seed	n
Chenopodium sp.	goosefoots	seed	n
Caryophyllaceae	pink family	seed	
Stellaria sp.	chickweed/stitchwort	seed	
Cerastium sp. L.	possible mouse-ear type	seed	
Silene latifolia Poir	white campion	seed	W, cultivated ground. Mostly on light soils in the open
Montia fontana ssp *chrondrosperma* (Fenzl)Walters	blinks	seed	Damp places
cf. *Plantago* sp.	plantain type	seed	

4	4	4	4	7	7	7	7	7	7	12	26
LBA	LBA	LBA	LBA	LBA	LBA	LBA	LBA	LBA	LBA or EIA	LBA?	M-LBA
8239	8253	8219	8152	7311	7313	7324	7360	7365	7349	6618	6400
254148	254125	127169	126290	179105	182153	287032	178164	303048	179131	214043	121038
Pit	Pit	Pit	Enclosure ditch	Pit	Ditch	Ditch	Pit	Pit	Posthole	Pit	Ditch
254146	254124	127167	126230	179104	201093	201127	159256	303049	179130	214042	201163
5									5		
6							5		1		
4	3	82	2	1	10	7		25			7
	2	2	2		4	1		1			
		9		2			8	23			9
1							183	23			
		8	1			1	15	4	2		1
								1			
		31			18			1	3		
6	1				22	2			9		(3)
20		7		1	4						
100+	50	280	100	47	27	35	191	190	49	3	47
14	6	3				4	9				
18	7	11				15	19	9			
						5					1
	6				1	6			2		1
5		5	2	3	14				8		
1			3	1	3						
			11			1					
	1		11								
100+	51	25		6	15	6	65	1	3	1	36
100+	83	47		11	16	5	130	22	2		2
							1				
*	*	**					*				
21	6	2	3		11	5		1	8		3
							1				
							2				
		[*]									
1		1					4				
4		10		3	1	4	8		2		3
		3			1	1		1			
	3	34		4	11	4		18			
4	1			2			2				1
						1					
						3	1		3	1	5
											(1)
			1								
											1
						(1)					
		4									
1											
1											
1		1									
1		16		1		4	3		1	1	
		17							1	3	
1		1				3		1	4		
8	1	40			3	1	2	2	5	1	
14		1			3				1		
						2					
						4	200+		10		
		6									
211		19			1						
1	1					1					
	1	1					1				
		19									
			1								
		1			1						1
		6		1							

Table 17.2 (continued)

			Zone *Period* *Sample no.* *Context no.* *Feature type/no.* *Processed soil volume (litres)*
Verbascum sp.	mullein	seed	
Hyoscyamus niger L.	henbane	seed	W
Galium cf. *palustre* L	common marsh-bedstraw	nutlet	
Galium aparine L.	cleavers	nutlet	Da, H
Asteraceae	daisy family	achene	
Tripleurospermum inodorum (L.) Scultz-Bip	scentless mayweed	achene	Da
Sambucus nigra L.	elder	seed	H, S, W
Apiaceae	carrot family	fruit	
cf. *Conium maculatum* L.	possible hemlock	fruit	
Juncus sp.	rush	(capsule)/seeds	
cf. *Juncus* sp.	possible rush	(capsule)/seeds	
cf. *Scirpus sylvaticus*	wood club-rush	nut	B, M, damp spots in wood and shade
Poaceae	grass family	caryopsis	
cf. *Lolium* sp	possible rye grass type	caryopsis	
Arrhenatherum elatius (L.) P.Beaux.ex J.&C.Presl.	false oat-grass	basal internodes	
Unident		seed (mineralised)	
Unident		monocotyledonous stem fragments	

Table 17.3 Charred plant remains: Early–Middle Iron Age

			Zone *Period* *Sample no.* *Context no.* *Feature type/no.* *Processed soil volume (litres)*
Taxa	**Common name**	**Component**	**Habitat**
Triticum sp.	wheat	grain (sprouted) [double grains]	C
Triticum sp.	possible wheat	grain (sprouted)	C
Hordeum sp.	barley hulled	grain (sprouted)	C
Hordeum vulgare L	barley, six row, hulled	side grain(twisted) [sprouted]	C
cf. *Hordeum* sp	possible barley	grain	C
Avena sativa L.	oat	grain	C
Avena sp.	oat	grain (sprouted)	C
cf. *Avena* sp.	possible oat	grain (fragments)	C, G
Cereal NFI	unidentified cereal	grain fragments	C
Triticum dicoccum Schubl	emmer	spikelet fork	C
Triticum dicoccum Schubl	emmer	glume base	C
Triticum cf. *dicoccum*	possible emmer	spikelet fork	C
Triticum cf. *dicoccum*	possible emmer	glume base	C
Triticum spelta	spelt	glume base	C
Triticum spelta	spelt	spikelet fork (attached rachis)	C
Triticum cf. *spelta*	possible spelt	spikelet fork	C
Triticum spelta/dicoccum	spelt/emmer	spikelet fork	C
Triticum spelta/dicoccum	spelt/emmer	glume base	C
Triticum sp	free threshing wheat	rachis fragment	C
Triticum sp.	wheat	awn fragments	C
Hordeum sp.	barley	rachis fragment (6-row hulled)	C
Hordeum sp.	barley	rachis fragment	C
Hordeum sp.	barley	lemma base (horseshoe)	C
Avena sp.	oat	awn fragments	C, A, W
Avena sp.	oat	lemma/palea fragments	C, A, W
Avena fatua L.	wild oat	floret base	A, W

4	*4*	*4*	*4*	*7*	*7*	*7*	*7*	*7*	*7*	*12*	*26*
LBA	*LBA*	*LBA*	*LBA*	*LBA*	*LBA*	*LBA*	*LBA*	*LBA*	*LBA or EIA*	*LBA?*	*M-LBA*
8239	*8253*	*8219*	*8152*	*7311*	*7313*	*7324*	*7360*	*7365*	*7349*	*6618*	*6400*
254148	*254125*	*127169*	*126290*	*179105*	*182153*	*287032*	*178164*	*303048*	*179131*	*214043*	*121038*
Pit	*Pit*	*Pit*	*Enclosure ditch*	*Pit*	*Ditch*	*Ditch*	*Pit*	*Pit*	*Posthole*	*Pit*	*Ditch*
254146	*254124*	*127167*	*126230*	*179104*	*201093*	*201127*	*159256*	*303049*	*179130*	*214042*	*201163*
		1									
										1	
											14
		3	1					2		1	
1		3								1	
3		47		3	4	1			2		
					1			3			3
										1	
		6	1		3						
		150+									
						1			2		
											1
4		100+	1	1	4	11			2		
	4										
										3	
15	1	44		18	4	4	3	4	9	10	6
		12									

4	*6*	*6*	*6*	*13*	*13*	*13*	*13*	*13*	*13*	*13*	*19*
		Early to Middle Iron Age						*Early Middle Iron Age*			
8204	*5385*	*7904*	*8335*	*5501*	*5502*	*5505*	*5506*	*5509*	*5860*	*7607*	*7499*
312012	*256043*	*173282*	*331004*	*191052*	*186012*	*187010*	*191064*	*139047*	*200067*	*248091*	*205107*
Pit	*Pit*	*Pit*	*Round house*	*Pit*	*Pit*	*Pit*	*Pit*	*Pit*	*Pit*	*Grave*	*Pit*
312011	*256029*	*173275*	*190471*	*191054*	*186013*	*187007*	*191066*	*139049*	*200062*	*248090*	*205106*
18	16	68	2	52	25	44	30	75	25	77(1)	13
1		3	1	12	5	1	10	38	7	17	6
28	6	24	1	26	12	2	12	41	7	38	5
			(1)	9	4			4		-2	
4		10		6	5	1	7	31	7	5	6
			1								
9	16	100	8	50	2		38	41	15	24	10
13	-28	8		7	2		2(74)	24	13	5	21
107	60	500+	4		100+	81	140	390	500+	1000+	200+
2										5	
1		3								9	
		4						1		8	
2					1	1					1
5	12	12		7	5	171	44	47	35	52	11
	1	4		1	1	5		2	2	4	2
1						5					
50+	22	6		11	1	59	150+	56	2	19	50+
50+	12	26		4	1	192	150+	110	42	200+	50+
								2			
		⋆									
		1								1	
	3						2	6	2	3	
		1									
				⋆						⋆	
	⋆										
		1									

Table 17.3 (continued)

			Zone *Period* *Sample no.* *Context no.* *Feature type/no.* *Processed soil volume (litres)*
Avena sp.	oat	floret base	
Cereal NFI	unidentified cereal	detached embryo	C
Cereal NFI	unidentified cereal	detached coleoptile	C
Cereal NFI	unidentified cereal	straw culm node	C
Cereal NFI		palea/lemma fragments	C
Papaver sp.	poppy	seed [mineralised]	
cf. *Papaver* sp.	possible poppy	seed [mineralised]	
Papaver rhoeas (L.)	common poppy	seed (silicified) [mineralised]	A, W
Papaver cf. *rhoeas* (L.)	possible common poppy	seed	
Papaver dubium L.	long-headed poppy	seed	A, W
Fulmaria officinalis L.	common fumitory	achene	C, W
Ranunculaceae		achene	
Ranunculus acris/repens/bulbosus L.	meadow/creeping/bulbous buttercup	achene	
cf. *Ranunculus* sp.	possible buttercup	achene	
Vicia/Lathyrus sp. (4mm)	vetch/pea	seed	Da, C
Vicia/Lathyrus sp. (2mm)	vetch/pea	seed	Da, C
Vicia faba L.	broad bean	seed	C
cf. *Vicia faba* L.	possible broad bean	seed fragments	C
Pisum sativum L.	garden pea	seed (absision scar)	C
cf. *Pisum sativum* L.	possible pea	seed	C
Vicia faba/Pisum sativum	broad bean/pea	seed fragments	C
Trifolium/Lotus sp. L	clover/birdsfoot trefoil	seed	
Trifolium/melilotus sp. L	clover/medick	seed	
Fabaceae	legume	seed fragments	
Prunus cf. *spinosa* L.	possible blackthorn	drupe	W, S
Prunus cf. *spinosa* L.	possible blackthorn	stone (fragments)	W, S
Crataegus monogyna Jacq.	hawthorn	stone (fragments)	W, S
cf. *Crataegus monogyna* Jacq.	possible hawthorn	stone (fragments)	
Rubus sp.	blackberry type	seed	
cf. *Potentilla* sp.	cinquefoil type	achene	
cf. *Rosa* sp.	possible rose type	achene	
Urtica dioica L.	Common nettle	achene	D, W
Urtica urens L.	small nettle	achene	W
Corylus avellana L.	hazelnut	shell frags	S, W
Viola sp.	violet type	seed	
Linum sp.	flax type	seed (fragments)	
Malva sp.	mallow	nutlet	D, G
cf. *Malva* sp.	possible mallow	nutlet	
Brassicaceae	cabbage family	seed (mineralised	
Brassicaceae	cabbage family	mericarp (fragments)	
cf. *Lepidium ruderale* L.	possible narrow-leaved pepperwort	seed (mineralised)	W, D
Brassica rapa ssp. *campestris* (L.) A.R.Clapham	wild turnip	seed	B
Thlaspi arvense L.	field penny-cress	seed (mineralised)	W, A
cf. *Thlaspi arvense* L.	field penny-cress	seed (mineralised)	
Raphanus raphanistrum L.	wild radish	mericarp (fragments)	Da, W
cf. *Raphanus raphanistrum* L.	wild radish	seed	Da, W
Polygonaceae	knotweed family	achene	
Polygonaceae	knotweed family	tepal	
Persicaria maculosa/persicaria	redshank/pale persicaria	achene (frags)	Da
Polygonum aviculare L	knotgrass	achene	all sorts of open ground
cf. *Polygonum aviculare* L	possible knotgrass	achene	
Fallopia convolvulus (L.) Love	black bindweed.	achene	Da
cf .*Fallopia convolvulus* (L.) Love	possible black bindweed	achene	
cf. *Rumex acetosella* L.	possible sheep's sorrel	achene (tepal)	
Rumex cf. *palustris* Smith	marsh dock	achene	B ditches marshy fields
Rumex sp.	dock type	achene	Da, G, M, S, W
cf. *Rumex* sp.	possible dock type	achene (mineralised)	
cf. *Rumex* sp.	dock type	tepal/perianth fragment	
Amaranthaceae	goosefoot family	seed (mineralised)	
Chenopodium album L.	fat hen	seed	Da, n

4	6	6	6	13	13	13	13	13	13	13	19
	Early to Middle Iron Age							Early Middle Iron Age			
8204	5385	7904	8335	5501	5502	5505	5506	5509	5860	7607	7499
312012	256043	173282	331004	191052	186012	187010	191064	139047	200067	248091	205107
Pit	Pit	Pit	Round house	Pit	Pit	Pit	Pit	Pit	Pit	Grave	Pit
312011	256029	173275	190471	191054	186013	187007	191066	139049	200062	248090	205106
				1							
23		1		2	2	2	2			3	20
2											
		5					1	6			
	1	4(1)									
		1(1)									
		1				1					
								4			2
		1						1			
		1									
								1	1		
2		13		2	3		6	7	1	21	4
3	2		1	12	4	3	13	9		7	9
		2				1					
										1	
		5				1				1	1
			3	5	1	4	3	4		2	1
		15	3	13	17	9	12	26		5	
1											7
				3		15	11			36	
25	3						2	1	4		24
		1									
		1									
										1	
										1	
	1	3		1							21
										1	
		1									
	1										1
			1								
	1										
		3					2				
						1				1	
				5							3
	3	423		2			1	3			
					(1)						
		268(1)					1	64			
		20(1)					5	1			
				1							
	2	5					2	2	-5	2	
		1						3			
		2									
		1									
									4		
	3	12		2	1	3	3	13			
1											
		26		9		6	9	59	5	8	2
				2							
								3			1
	5	9		12	1	30	26	26	22	14	5
						4				12	
											18
		187				35			19		
	1			1							

Table 17.3 (continued)

			Zone *Period* *Sample no.* *Context no.* *Feature type/no.* *Processed soil volume (litres)*
Atriplex sp.	orache	seed	n
Chenopodium sp.	goosefoots	seed	n
Caryopyllaceae	pink family	seed	
Stellaria sp.	Chickweed /stitchwort	seed	
Stellaria media (L.) Vill	common chickweed	seed	C and open ground
Stellaria cf. *media* (L.) Vill	possible common chickweed	seed	
Stellaria cf. *neglecta* L.	possible greater stitchwort	seed	
Stellaria cf. *palustris*	marsh stitchwort	seed	M, Fen
Stellaria graminea L.	lesser stitchwort	seed	G, W
Cerastium cf. *arvense* L.	possible field mouse-ear	seed	dry grassland
cf. *Silene* sp.	campion type	seed	
Silene cf. *vulgaris* (Moench) Garcke	possible bladder campion	seed	
Silene cf. *latifolia* Poir	possible white campion	seed	
Silene dioica (L.) Clairv.	red campion	seed	woods and hedgerows
cf. *Silene dioica* (L.) Clairv.	possible red campion	seed	
Lithospermum arvense L.	corn gromwell	nutlet [mineralised]	A,W,G
Hyoscyamus niger L.	henbane	seed	Maritime sand and shingle, inland rough and waste ground
Veronica hederifolia L.	ivy-leaved speedwell	seed	C, W
Plantago lanceolata L.	ribwort plantain	seed	G short or grazed. Da
cf. *Plantago* sp.	plantain type	seed	
Mentha sp.	mint	seed	
Euphrasia/Odontites L.	eyebright/ bartsia	seed	Da G
cf. *Euphrasia/Odontites* L.	possible eyebright/ bartsia	seed	
Galium cf. *uliginosum* L	fen bedstraw	nutlet	fens and base rich marshy places
Galium aparine L.	cleavers	nutlet	Da ,H
cf. *Galium* sp.	bedstraw	nutlet	
Asteraceae	daisy family	achene	
Cirsium cf. *palustra* (L.) Scop.	possible marsh thistle	achene	M, damp grassland and open wood
Anthemis cotula	stinking chamomile	achene	A, heavy soils
cf. *Anthemis cotula*	possiblestinking chamomile	achene	
Tripleurospermum inodorum (L.) Scultz-Bip	scentless mayweed	achene	Da
cf. *Tripleurospermum inodorum*		achene	
Sambucus nigra L.	elder	seed	H, W, woods, shrubberies, rough ground
cf. *Valerianella rimosa* Bastard	broad-fruited cornsalad	fruit (mineralised)	Cornfields and rough ground
Valerianella dentata (L.) Pollich	narrow-fruited cornsalad	fruit	Cornfields and rough ground
Apiaceae	carrot family	fruit	
Pimpinella saxifraga	burnet-saxifrage	fruit	G and open rocky places
cf. *Conium maculatum* L.	possible hemlock	fruit	
Cyperaceae			
cf. *Scirpus sylvaticus*	wood club-rush	nut	M, damp spots in wood and shade
Eleocharis cf. *uniglumis* (Link) Shult	slender spike-rush	nut	M and dune slacks
Carex sp. (Trigonus)	sedge	nut	M, B, W, G esp. damp/wet soils
Poaceae	grass	caryopsis	
Chara sp.	stone wort	oogonia	aquatic, often stagnant
cf. *Pteridium aquilinum*	bracken	frond tip	
Unident		seed (mineralised)	
Unident		rhizome/tuber fragments	
Unident		organic fragment (with plant impressions)	
Unident		mineralised cists	
Unident		insect [mineralised]	
Unident		catkin	

4	*6*	*6*	*6*	*13*	*13*	*13*	*13*	*13*	*13*	*13*	*19*
	Early to Middle Iron Age							*Early Middle Iron Age*			
8204	*5385*	*7904*	*8335*	*5501*	*5502*	*5505*	*5506*	*5509*	*5860*	*7607*	*7499*
312012	*256043*	*173282*	*331004*	*191052*	*186012*	*187010*	*191064*	*139047*	*200067*	*248091*	*205107*
Pit	*Pit*	*Pit*	*Round house*	*Pit*	*Pit*	*Pit*	*Pit*	*Pit*	*Pit*	*Grave*	*Pit*
312011	*256029*	*173275*	*190471*	*191054*	*186013*	*187007*	*191066*	*139049*	*200062*	*248090*	*205106*
						8					
						2		16		8	5
		6		1	1		4				2
1	1				1	4	6			3	2
		2									
		6									
						2		16		3	
		1									
		1		1							1
											1
				1						1	
								2			
		2				2					
							1				
	2	152		1000+	64	55	128	80	64[1]	35	
	7	1		1	1		3	1			
		1									
	1	4				4			5	3	1
							1	4			
											1
	1							3		1	
						3					4
	1										
				9	1	1	4	2	2	22	2
		9		1			1	14		2	
		1					1				
				1				10			
1	2	20				3	9	16	1	1	1
							1				
			(1)								
			2		1						
				1		2	1			1	
	1										
						2	9			2	
		2									
		1									
	1										
		1									
7	12	69		9	4	35	41	236	25	30	21
	1										
29	33	6		112	11	11	14	17			1
		12					1			5	3
		1		1							
		1									
		1									
											1

Pl 17.2 Charred grains of (from left to right) naked barley (Late Bronze Age pit 159256, Zone 7), hulled barley, wheat, possibly emmer, from sample (photograph by Kath Hunter)

those from the Iron Age and Roman phases and again this is characteristic of samples from this period. Both emmer and spelt wheat are represented by chaff fragments, with emmer dominating where identification is possible. A few wheat grains are of a narrow humped-back type which suggests an emmer type, although distortion from the charring process must be taken in to account. A relatively rich and exceptionally well preserved deposit of naked barley grains was recovered from pit 159256 (Pl 17.2). Four grains were radiocarbon dated to the Late Bronze Age, at 910-790 cal BC (SUERC-40740) and 1010-830 cal BC (SUERC-40741) respectively. Hulled barley and emmer type grains were also present in the assemblage, but in much smaller quantities. The lack of barley chaff may be an indication of the deposition of a processed grain, although the chaff could have been lost during the charring process. A single naked barley grain was also present in sample 8219, again without associated chaff. Emmer wheat chaff dominates the assemblage in samples 7324, 7360 and 7365, whilst spelt chaff is more common in samples 7311, 7313 and 8152 where identification is possible. Evidence of another crop is indicated by broad bean seeds (*Vicia faba*) from the ditch samples from Zone 7 (7313and 7324). The weed seeds associated with the cereal remains are mainly seeds of disturbed ground with some commonly associated with cereal crops, including wild radish (*Raphanus raphanistrum)*, scentless mayweed (*Tripleurospermum inodorum*) and fat hen (*Chenopodium album*), the last present in a large amount from sample 7360. By contrast, the sample from Zone 19 (sample 8152) produced very poorly preserved cereal grains and a sloe type (cf *Prunus spinosa*) stone fragment, together with spelt chaff.

Late Bronze Age-Early Iron Age (Table 17.2)

A single undated naked barley grain was present in pit 254146, which might suggest that this deposit is of Bronze Age date, although residuality cannot be discounted. The earliest example of free threshing type wheat grains from the excavations appear in the sample from pit 179130 along with glume type wheat grains and oat. Spelt is the most readily identifiable chaff though some others may be of emmer type.

Early-Middle Iron Age (Table 17.3)

With the exception of sample 8204 from Zone 4, wheat was the major cereal represented in all the samples from this phase. The majority of chaff is identified as spelt, while emmer and a few free threshing wheat rachis fragments occur in feature fills from Zone 13. All of the identifiable barley grain is of a hulled type, with some rachis fragments and lemma bases suggestive of the presence of a six row type in samples 7904 and 7606. Pea and broad bean are again represented, along with flax seeds from 7904 and 5506. A single charred *Sitona lineatus* (sitona weevil) was also recovered from sample 7904 (identified by H Kenward). This is an insect commonly found associated with vetches and peas, although it can be found outside this habitat type.

A relatively large deposit of what appears to be narrow leaved pepperwort (cf *Lepidium ruderale*) from sample 7904 might be evidence of a crop weed, although it is possible that the seeds were collected for oil extraction. A single seed of this type, along with one from penny cress (*Thlapsi arvense*) and broad fruited corn salad (*Valerianella* cf *rimosa*), were mineralised, and a few mineralised cists were also present. These cists are commonly found with assemblages that contain mineralised concretions and seeds. It is currently not understood exactly what exactly they are or how they form (Carruthers 2003; Carruthers pers. comm. 2012), but their presence in a deposit is often an indicator of the presence of other mineralised material. This assemblage was probably of mixed origin, possibly a secondary or tertiary deposit in pit 173275, rather than resulting from the process of mineralisation occurring in the pit. The latter might be expected to have produced a richer range of mineralised objects. Henbane (*Hyoscyanus nigra*), a toxic plant often associated with nitrogen-rich deposits such as middens, is also present in sample 7904 as charred seeds. A large number of similar seeds were also recovered from sample 7602 (see below). The assemblage from a grave fill (7607) was found to contain a relatively large amount of charred plant remains. This probably represents the use of a mixed deposit like the pit fills from Zone 13 (with soil containing mixed cereal grains, chaff and weed seeds) to backfill the grave, rather than it being a deliberate deposition of charred material within the grave.

Another possibly significant weed is *Lithospermum arvense* (corn gromwell) which produces seed of a similar size to cereal grains which might be retained through the cereal processing stages. The achenes are toxic and contain a very high silica content. If they were not removed by hand before milling they might have proved a potential health risk (and could also have resulted in a very gritty flour). A number of samples from Zone 13, in particular sample 5501(pit 191054), contained relatively large numbers of these seeds, suggesting that there was a significant infestation of the local crops. Corn gromwell is today a typical weed of spring sown cereals, found growing in light, chalk rich soils, suggesting that crops were grown locally, on the chalk ridge itself.

Table 17.4 Charred plant remains: Middle Iron Age

			Zone	*4*
			Period	*Middle Iron Age*
			Sample no.	*8249*
			Context no.	*182248*
			Feature type/no	*Pit 182246*
			Processed soil volume (litres)	
Taxa	**Common name**	**Component**	**Habitat**	
Triticum sp.	glume wheat type	grain (sprouted)	C	3
Triticum sp.	wheat	grain (sprouted) [double grains]	C	14
cf. *Triticum* sp.	possible wheat	grain (sprouted)	C	11
Hordeum sp.	barley hulled	grain(sprouted)	C	8
cf. *Hordeum* sp	possible barley	grain	C	8
Avena sp.	oat	grain (sprouted)	C	10
cf. *Avena* sp.	possible oat	grain(fragments)	C, G	70
Cereal NFI	unidentified cereal	grain fragments	C	500+
Triticum cf. *dicoccum*	possible emmer	spikelet fork	C	2
Triticum cf. *dicoccum*	possible emmer	glume base	C	1
Triticum spelta	spelt	glume base	C	10
Triticum spelta	spelt	spikelet fork (attached rachis)	C	1
Triticum spelta/dicoccum	spelt/emmer	spikelet fork	C	19
Triticum spelta/dicoccum	spelt/emmer	glume base	C	58
Hordeum sp.	barley	rachis fragment	C	2
Avena sp.	oat	awn fragments	C, A, W	**
cf. *Secale cereale*	rye type	rachis	C	1
Cereal NFI	unidentified cereal	detached embryo	C	18
cf. *Papaver* sp.	possible poppy	seed [mineralised]		1
Vicia/Lathyrus sp. (4mm)	vetch/pea	seed	Da, C	1
Vicia/Lathyrus sp. (2mm)	vetch/pea	seed	Da, C	75
Vicia faba L.	broad bean	seed	C	1
Vicia faba/Pisum sativum	broad bean/pea	seed fragments	C	35
Fabaceae	legume	pod fragments		3
Fabaceae	legume	seed fragments		27
Brassicaceae	cabbage family	seed (mineralised		1
Brassicaceae	cabbage family	mericarp (fragments)		(1)
Raphanus raphanistrum L.	wild radish	mericarp (fragments)	C, W	3
cf. *Polygonum aviculare* L.	possible knotgrass	achene		1
Fallopia convolvulus (L.) Love.	black bindweed.	achene	Da	1
Rumex sp.	dock type	achene	Da, G, M, S, W	9
cf. *Rumex* sp.	possible dock type	achene (mineralised)		7
Chenopodium album L.	fat hen	seed	Da, n	1
Caryophyllaceae	pink family	seed		11
Stellaria sp.	chickweed/stitchwort	seed		4
Stellaria cf. *media* (L.) Vill	possible common chickweed	seed		18
Stellaria graminea L.	lesser stitchwort	seed	G, W	3
Galium aparine L.	cleavers	nutlet	Da ,H	1
Asteraceae	daisy family	achene		1
Tripleurospermum inodorum (L.) Scultz-Bip	scentless mayweed	achene	Da	9
Torilis sp.	hedge-parsley	fruit		1
Poaceae	grass family	caryopsis		15
Unident		seed (mineralised)		7

Middle Iron Age (Table 17.4)

The wheat from sample 8249, from Zone 4 pit 182246, was relatively well preserved and some of the grains appear to be of glume wheat type. Where the wheat chaff is identifiable it is dominated by spelt wheat with some emmer and a possible rye rachis fragment. The rye could be intrusive as it is more commonly associated with medieval and later deposits, although it has been found in Roman deposits elsewhere. Hulled barley is also present, as were a single identifiable broad bean seed and a number of large legume type seed and pod fragments, but these are not sufficiently well preserved to allow further identification. Weed seeds include a number of Caryophyllaceae, with wild radish and scentless mayweed, the latter possibly suggesting the cultivation of light sandy soils.

Middle-Late Iron Age (Table 17.5)

Judging by the identifiable glume wheat chaff, spelt is the dominant cereal cultivated during this period, although emmer is still represented and occasional free threshing wheat rachises are also present in low numbers. Six row hulled barley is also present, as is oat.

Table 17.5 Charred plant remains: Middle-Late Iron Age

			Zone
			Period
			Sample no.
			Context no.
			Feature type/no.
			Processed soil volume (litres)
Taxa	**Common name**	**Component**	**Habitat**
Triticum sp.	free threshing wheat type (tail grain)	grain	C
Triticum sp.	glume wheat type	grain (sprouted)	C
Triticum sp.	wheat	grain (sprouted) [double grains]	C
cf. *Triticum* sp.	possible wheat	grain (sprouted)	C
Hordeum sp.	barley hulled	grain (sprouted)	C
Hordeum vulgare L	barley, six row, hulled	side grain (twisted) [sprouted]	C
cf. *Hordeum* sp	possible barley	grain	C
Avena sp.	oat	grain (sprouted)	C
Avena sp.	possible oat	grain (fragments)	C, G
Avena/Bromus sp.	oat/brome	grain	C, G
cf. *Secale cereale*	rye type	grain	C
Cereal NFI	unidentified cereal	grain fragments	C
Triticum dicoccum Schubl	emmer	spikelet fork	C
Triticum dicoccum Schubl	emmer	glume base	C
Triticum cf. *dicoccum*	possible emmer	spikelet fork	C
Triticum cf. *dicoccum*	possible emmer	glume base	C
Triticum spelta	spelt	glume base	C
Triticum spelta	spelt	spikelet fork (attached rachis)	C
Triticum cf .spelta	possible spelt	spikelet fork	C
Triticum cf .spelta	possible spelt	glume base	C
Triticum spelta/dicoccum	spelt/emmer	spikelet fork	C
Triticum spelta/dicoccum	spelt/emmer	glume base	C
Triticum cf. *aestivum*	bread wheat	rachis fragment	C
Triticum sp	free threshing wheat	rachis fragment	C
Triticum/Hordeum sp.	wheat /barley	awn fragments [silicified]	
Hordeum sp.	barley	rachis fragment	C
Avena sativa L.	oat	floret base	C
Avena fatua L.	wild oat	pedicle	
Avena sp.	oat	awn fragments	C, A, W
Avena fatua L.	wild oat	floret base	A, W
Avena sp.	oat	floret base	
cf. *Secale cereale*	rye type	rachis	C
Cereal NFI	unidentified cereal	detached embryo	C
Cereal NFI	unidentified cereal	detached coleoptile	C
Cereal NFI		palea/lemma fragments	C
Papaver sp.	poppy	seed [mineralised]	
cf. *Papaver* sp.	possible poppy	seed capsule (fragments)	
Papaver dubium L.	long-headed poppy	seed	A,W
cf. *Glaucium flavum* Crantz	possible yellow horned-poppy	seed	on maratime shingle less often other substrata
Ranunculus acris/repens/ bulbosus L.	meadow/creeping/bulbous buttercup	achene	G
cf. *Ranunculus* sp.	possible buttercup	achene	
Vicia/Lathyrus sp. (4mm)	vetch/pea	seed	Da, C
Vicia/Lathyrus sp. (2mm)	vetch/pea	seed	Da, C
Vicia cf. *sativa*	common vetch	seed	
Vicia faba L.	broad bean	seed	C
Pisum sativum L.	garden pea	seed (absision scar)	C
cf. *Pisum sativum* L.	possible pea	seed	C
Vicia faba/Pisum sativum	broad bean/pea	seed fragments	C
Trifolium/Lotus sp. L	clover/birdsfoot trefoil	seed	
Trifolium/melilotus sp. L	clover/medick	seed	
Fabaceae	legume	seed fragments	
Urtica dioica L.	common nettle	achene	D, W
Urtica urens L.	small nettle	achene	cultivated, W
Corylus avellana L.	hazelnut	shell frags	S, W
Viola sp.	violet type	seed	
Linum sp.	flax type	seed (fragments)	
Brassicaceae	cabbage family	seed (mineralised	

4	4	4	4	4	4	5	5	10a	7	12
				Middle–Late Iron Age					Middle–Late Iron Age	Middle-Late Iron Age
8218	8201	8244	8245	8246	8247	8301	8302	8437	7328	6620
252231	280121	144146	252238	252240	252242	123190	123189	242134	303016	154030
Pit	Oven	Post hole	Structure	Structure	Structure	Pit	Pit	Pit	Pit	Posthole
252230	280119	144147	252245	252245	252245	254114	254114	242133	303017	154029
			1							
					10	6		2	16	
	1000+ [3]	30		10		9	9	114	34	9
	13	8	1		1	11	5	1	11	2
	16	7	1		2	4	12	7	37	9
	-5								22	
1		4	4	3		6		4	30	6
	506	16	3	4	5	19	16	25		3
		52		22	6	42	-71	23		
			1			2			5	
							1			
3		236	167	139	100+	150+	100+	347	390	150+
1		4						8		
1					4			5		
										1
									1	1
	68	33	14	19	16	14	7	13		
	27(1)	14	1			14	2			
	18	6		1				2		
			7	7					2	
2	18	26	68	61	11	50+	50+	50+	3	3
3	72	100+	84	54	100+	50+	50+	50+	11	5
		1							1	
	****									
	1	4	1	6	1	5	9			
					2					
						1				
*					***		**			
	1									
						2				
*	57	68	6	9	9	44	11	44	14	1
		1		1	1	2		3		
	****									
	3						1			
								2		
	1				1			3		
										1
	1					1		1		
								1		
	4	4	1	7		21				
	138	16		14	14	52	29	60	35	12
	1									
					4	2		2		
	1									
1	3	1			3	5		7		
4		2	73	100+	10	22		36	2	
	2			2	1					1
		1								
			8	16	50		2			
									1	
								2		
			9					7		
									1	
							1			
1							1		3	

Table 17.5 (continued)

			Zone *Period* *Sample no.* *Context no.* *Feature type/no.* *Processed soil volume (litre)*
Thlaspi arvense L.	field penny-cress	seed (mineralised)	A, W
cf. *Thlaspi arvense* L.	field penny-cress	seed (mineralised)	
Raphanus raphanistrum L.	wild radish	mericarp (fragments)	cultivated and rough ground, waste places and tips
Persicaria maculosa/persicaria	redshank/pale persicaria	achene (frags)	Da
Polygonum aviculare L	knotgrass	achene	all sorts of open ground
cf. *Polygonum aviculare* L	possibleknotgrass	achene	
Fallopia convolvulus (L.) Love.	black bindweed.	achene	Da
cf. *Fallopia convolvulus* (L.) Love.	possible black bindweed.	achene	
cf. *Rumex acetosella* L.	possiblesheep's sorrel	achene/(tepal)	
Rumex sp.	dock type	achene	Da, G, M, S, W
cf. *Rumex* sp.	possible dock type	achene (mineralised)	
Amaranthaceae		seed (mineralised)	
Atriplex sp.	orache	seed	n
Chenopodium sp.	goosefoots	seed	n
Caryophyllaceae	pink family	seed	
Stellaria sp.		seed	
Stellaria cf. *media* (L.)Vill	possible common chickweed	seed	
Stellaria graminea L.	lesser stitchwort	seed	G, W
cf. *Stellaria graminea* L.	possible lesser stitchwort	seed	
Cerastium cf. *arvense* L.	possible field mouse-ear	seed	dry grassland
Cerastium sp. L.	possible mouse-ear type	seed	
Spergula arvensis L.	corn spurry	seed	calcifuge on usually sandy cultivated land or rarely in short maratime turf
Montia fontana ssp *chrondrosperma* (Fenzl)Walters	blinks	seed	damp places
Primulaceae		seed	
Lithospermum arvense L.	corn gromwell	nutlet [mineralised]	A, W, G
Hyoscyamus niger L.	henbane	seed	W
Veronica sp.	speedwell	seed	
Plantago major L.	greater plantain	seed	G
Plantago lanceolata L.	ribwort plantain	seed	G short or grazed. Da
Plantago lanceolata L.	ribwort plantain	seed capsule and seeds	G short or grazed. Da
cf. *Plantago* sp.	plantain type	seed	
Verbascum sp.	mullein	seed	
cf. *Teucrium* sp.	germander	nutlet	
Prunella vulgaris L.	self heal	seed	G, woodland clearings
Euphrasia/Odontites L.	eyebright/ bartsia	seed	Da, G
cf.Euphrasia/Odontites L.	possible eyebright/ bartsia	seed	
Galium cf. *Uliginosum* L.	fen bedstraw	nutlet	fens and base richmarshy places
Galium cf. *palustre* L	common marsh-bedstraw	nutlet	
Galium aparine L.	cleavers	nutlet	Da, H
cf. *Galium* sp.	bedstraw	nutlet	
Asteraceae	daisy family	achene	
Crepis cf. *capillaris* (L.) Wallr	possible smooth hawk's-beard	achene	G, W
Anthemis cotula	stinking chamomile	achene	A heavy soils
Tripleurospermum inodorum (L.) Scultz-Bip	scentless mayweed	achene	Da
cf. *Tripleurospermum inodorum*		achene	
Valerianella dentata (L.) Pollich	narrow-fruited cornsalad	fruit	A, W
cf. *Conium maculatum* L.	possible hemlock	fruit	
cf. *Apium repens*	possible creeping marshwort	fruit	open wet places
Torilis nodosa (L.) Gaertn	knotted hedge-parsley	fruit	
cf. *Juncus* sp.	possible rush	(capsule)/seeds	
Cyperaceae	sedge family	nut	
Poaceae	grass family	caryopsis	
Unident		seed (mineralised)	
Unident		organic fragment (with plant impressions)	

4	*4*	*4*	*4*	*4*	*4*	*5*	*5*	*10a*	*7*	*12*
				Middle–Late Iron Age					*Middle–Late Iron Age*	*Middle-Late Iron Age*
8218	*8201*	*8244*	*8245*	*8246*	*8247*	*8301*	*8302*	*8437*	*7328*	*6620*
252231	*280121*	*144146*	*252238*	*252240*	*252242*	*123190*	*123189*	*242134*	*303016*	*154030*
Pit	*Oven*	*Post hole*	*Structure*	*Structure*	*Structure*	*Pit*	*Pit*	*Pit*	*Pit*	*Posthole*
252230	*280119*	*144147*	*252245*	*252245*	*252245*	*254114*	*254114*	*242133*	*303017*	*154029*
	2(1)								4	
						1				
		4 (4)		1			-1		3(1)	
					1				8	
	3	2		2	1	2			15	
									2	
	1	1			1	1		3	7	
								2		
						1				
	4		1	2		8	2	5	17	
	1(1)		3	9	1	1	1			
	(1)									
1										
			7			4				
1	2	3		3			4		5	
1				3	3	19			7	
	11						8			
						3	4			
			1							
								46		
					1					
						1				
									1	
							1			
										1
	4					2		2	2	
									1	
	7							6	2	
								2	13	
	2							1		
										1
									1	
		1								
		3		1						
2					1					
									1	
									18	
	1							10	7	
								1		
		2		2			4	15	81	1
								1		
						1				1
	24	1		6	3	10	10	9	48	2
	8		2							
								3		
	3	5						4	5	
									1	
	1									
			2							
		1								
1	5	42	5	5	5	23	19	88	59	16
10	1 (1)	54		15	22	30	24	69	5	10
1					5			1		

Table 17.6 Charred plant remains: Late Iron Age

			Zone	*6*
			Period	*Late Iron Age*
			Sample no.	*8355*
			Context no.	*178239*
			Feature type/no.	*Post built structure 154190*
			Processed soil volume (litre)	
Taxa	**Common name**	**Component**	**Habitat**	
Triticum sp.	wheat	grain (sprouted) [double grains]	C	9
cf. *Triticum* sp.	possible wheat	grain (sprouted)	C	6
Hordeum sp.	barley hulled	grain (sprouted)	C	2
cf. *Hordeum* sp	possible barley	grain	C	5
Avena sp.	oat	grain (sprouted)	C	4
cf. *Avena* sp.	possible oat	grain (fragments)	C, G	5
Cereal NFI	unidentified cereal	grain fragments	C	50+
Triticum dicoccum Schubl	emmer	spikelet fork	C	4
Triticum dicoccum Schubl	emmer	glume base	C	1
Triticum spelta/dicoccum	spelt/emmer	spikelet fork	C	16
Triticum spelta/dicoccum	spelt/emmer	glume base	C	70
Avena sativa L.	oat	floret base	C	4
Avena sp.	oat	awn fragments	C, A, G	*
Cereal NFI	unidentified cereal	detached embryo	C	2
Vicia/Lathyrus sp. (4mm)	vetch/pea	seed	Da, C	4
Vicia/Lathyrus sp. (2mm)	vetch/pea	seed	Da, C	8
	legume	seed fragments		3
Linum sp.	flax type	seed (fragments)		1
Raphanum raphanistrum L.	wild radish	mericarp (fragments)	A, W	2
Polygonum aviculare L.	knotgrass	achene	all sorts of open ground	3
Fallopia convolvulus (L.) Love	black bindweed	achene	Da	1
Rumex sp.	dock type	achene	Da, G, M, S, W	4
Stellaria sp.		seed		8
Stellaria graminea L.	lesser stitchwort	seed	G, W	2
Euphrasia/Odontites L.	eyebright/bartsia	seed	Da, G	2
Galium cf. *palustre* L.	common marsh-bedstraw	nutlet		1
Asteraceae	daisy family	achene		1
Tripleurospermum inodorum (L.) Scultz-Bip	scentless mayweed	achene	Da	
Valerianella dentata (L.) Pollich	narrow-fruited cornsalad	fruit	A, W	1
Poaceae	grass family	caryopsis		11
Unident		seed		1

Peas and beans again occur in small quantities, but as argued above, the importance of these cultivars is likely to be under-represented by their charred remains. The continued presence of scentless mayweed in the assemblages suggests that light soils are being cultivated and seeds of corn spurry (*Spergula arvensis*) and sheep's sorrel (*Rumex acetosella*) from the upper fill of pit 254114 in Zone 5 (sample 8301) might also suggest the utilisation of sandy acidic soil. However, the cultivation of heavier soils may also be hinted at by the single stinking chamomile seed from the same sample.

An upper fill of oven 280119 (sample 8201) from Zone 4 produced a rich deposit of charred cereal remains. It appears that wheat grains were still in part encased within their spikelets when they were burnt, which is suggested by the presence of double wheat grains adhering together. Unfortunately all the diagnostic chaff had been burnt away. Most of the surviving chaff in the sample is the silica rich lemma, palea and glume beak fragments. None of the grains show any evidence of the insect damage, sprouting or collapse which might suggest the destruction of a spoilt batch of wheat, so it is possible that the sample represents a crop of wheat still encased, in-part, within its glumes. This may have been burnt accidentally whilst it was being dried prior to storage or while it was being parched prior to pounding to release the naked grain. The sample's position in the oven may suggest that it may not have been deposited during the period of use of the oven. The charred peas and hulled barley could also have resulted from the accidental burning of crops while being dried, or they all could have been part of a deposit of waste material that was deliberately burnt. The weed seeds are similar to the others from this period, with plants from cultivated and disturbed habitats including long headed poppy (*Papaver rhoeas*), scentless mayweed, wild radish, dock and cleavers.

Late Iron Age (Table 17.6)

Sample 8355, from Zone 6 Structure 154190, produced roughly equal quantities of wheat, hulled barley, oat and some flax seeds. Where the wheat chaff is identifiable it appears to be dominated by emmer,

Table 17.7 Charred plant remains: Late Iron Age/early Roman

			Zone	*6*	*6*
			Period	*LIA or Early Roman*	
			Sample no.	*5382*	*5387*
			Context no.	*258031*	*219077*
			Feature type/no.	*Post built structure 169005*	*Post built structure 169006*
			Processed soil volume (litre)		
Taxa	**Common name**	**Component**	**Habitat**		
Triticum sp.	glume wheat type	grain (sprouted)	C		6
Triticum sp.	wheat	grain (sprouted) [double grains]	C	253	11
cf. *Triticum* sp.	possible wheat	grain (sprouted)	C	16	17
Hordeum sp.	barley hulled	grain (sprouted)	C	308	44
Hordeum vulgare L.	barley, six row, hulled	side grain (twisted) [sprouted]	C	29	4
cf. *Hordeum* sp	possible barley	grain	C	9	30
Avena sp.	oat	grain(sprouted)	C	10	
Cereal nfi	unidentified cereal	grain fragments	C	505	500+
Triticum dicoccum Schubl	emmer	spikelet fork	C	10	1
Triticum dicoccum Schubl	emmer	glume base	C	1	
Triticum cf. *dicoccum*	possible emmer	spikelet fork	C	4	3
Triticum cf. *dicoccum*	possible emmer	glume base	C	9	2
Triticum cf. *spelta*	possible spelt	spikelet fork	C	1	
Triticum spelta/dicoccum	spelt/emmer	spikelet fork	C	21	
Triticum spelta/dicoccum	spelt/emmer	glume base	C	28	
Triticum sp.	free threshing wheat	rachis fragment	C	1	2
Hordeum sp.	barley	rachis fragment	C	2	1
Hordeum sp.	barley	lemna base (fold)	C	1	
Avena sativa L.	oat	floret base	C	1	1
Avena sp.	oat	awn fragments	C, A, G		**
Cereal nfi	unidentified cereal	detached embryo	C	29	17
cf. *Papaver* sp.	possible poppy	seed [mineralised]	1		
Vicia/Lathyrus sp. (2mm)	vetch/pea	seed	Da, C	3	
Vicia faba/Pisum sativum	broad bean/pea	seed fragments	C	1	1
cf. *Cannabis sativa* L	possible hemp	achene (mineralised)	C		1
Brassicaceae	cabbage family	seed (mineralised)	1	(1)	
Raphanus raphanistrum L.	wild radish	mericarp (fragments)	C and rough ground, waste places and tips	1	1
Rumex sp.	dock type	achene	Da, G, M, S, W		1
Chenopodium sp.	goosefoots	seed	n	3	
Galium aparine L.	cleavers	nutlet	Da, H	1	
Tripleurospermum inodorum (L.) Scultz-Bip	scentless mayweed	achene	Da		1
Carex sp. *(Trigonus)*	sedge	nut	M, B, W, G esp. damp/wet soils	1	
Poaceae	grass family	caryopsis		2	
Unident		seed (mineralised)		(1)2	
Unident		rhizome/tuber fragments			(1)
Unident		mineralised concretions		*	1

which appears to be at variance with most of the samples from the Middle Iron Age onwards. As with all the samples producing glume wheat chaff there are a number of examples from this sample that were so poorly preserved that identification to genus was not possible, and some may be from spelt. Also present are floret bases of cultivated oat (*Avena sativa*) which at least suggests that some of the oat grains represent an actual crop rather than an uncultivated, wild, species.

Late Iron Age/early Roman (Table 17.7)

The two samples from Zone 6 Structures 169005 and 169006 are relatively grain rich and are dominated by hulled barley. Where the wheat grains are well enough preserved they appear to be of possible glume wheat type. The identifiable chaff is of an emmer type similar to that found in Late Iron Age sample 8355, also from Zone 6, but there are relatively few weed seeds compared with other Iron Age samples. The presence of mineralised concretions, a possible *Cannabis sativa* (hemp) seed fragment and a single mineralised brassica type seed from sample 5387 suggest that there has been a mixing of waste material in the deposit. The hemp seed may suggest the presence of a cultivated crop, either for textile production or medicinal use.

Table 17.8 Charred plant remains: early Roman

			Zone	
			Period	
			Sample no.	
			Context no.	
			Feature type/no.	
			Processed soil volume (litre)	
Taxa	**Common name**	**Component**	**Habitat**	
Triticum sp.	glume wheat type	grain (sprouted)	Cult	
Triticum sp.	wheat	grain (sprouted) [double grains]	C	
cf. *Triticum* sp.	possible wheat	grain (sprouted)	C	
Hordeum sp.	barley hulled	grain (sprouted)	C	
Hordeum vulgare L	barley, six row, hulled	side grain (twisted) [sprouted]	C	
cf. *Hordeum* sp	possible barley	grain	C	
Avena sativa L.	oat	grain	C	
Avena sp.	oat	grain (sprouted)	C	
cf. *Avena* sp.	possible oat	grain (fragments)	C/G	
cf. *Secale cereale*	rye type	grain	C	
Cereal NFI	unidentified cereal	grain fragments	C	
Triticum dicoccum Schubl	emmer	spikelet fork	Cult	
Triticum dicoccum Schubl	emmer	glume base	Cult	
Triticum cf. *dicoccum*	possible emmer	spikelet fork	Cult	
Triticum cf. *dicoccum*	possible emmer	glume base	Cult	
Triticum spelta	spelt	glume base	Cult	
Triticum spelta	spelt	spikelet fork (attached rachis)	Cult	
Triticum cf. *spelta*	possible spelt	spikelet fork	Cult	
Triticum spelta/dicoccum	spelt/emmer	spikelet fork	C	
Triticum spelta/dicoccum	spelt/emmer	glume base	C	
Triticum sp	free threshing wheat	rachis fragment	C	
Hordeum sp.	barley	rachis fragment (6-row hulled)	C	
Hordeum sp.	barley	rachis fragment	C	
Hordeum sp.	barley	lemma base (fold)	C	
cf. *Hordeum* sp.	barley	rachis fragment		
Avena sativa L.	oat	floret base	C	
Avena sp.	oat	awn fragments	C, arable, rough and waste ground	*
cf. *Secale cereale*	rye type	rachis		
Cereal NFI	unidentified cereal	detached embryo	C	
Cereal NFI	unidentified cereal	detached coleoptile	C	
Cereal NFI	unidentified cereal	straw internode		
Cereal NFI	unidentified cereal	straw culm node		
Cereal NFI		palea/lemma fragments		
cf. *Papaver* sp.	possible poppy	seed capsule (fragments)		
Fumaria officinalis L.	common fumitory	achene	cultivated and waste ground	
Ranunculus acris/repens/ bulbosus L.	meadow/creeping/bulbous buttercup	achene	grassland (see Stace for individual habitats)	
Vicia/Lathyrus sp. (4mm)	vetch/pea	seed	Da,Cult	
Vicia/Lathyrus sp. (2mm)	vetch/pea	seed	Da,Cult	
cf. *Vicia cracca* L.	possible tufted vetch	seed	grassy and bushy places and hedgerows	
Vicia faba L.	broad bean	seed	Cult	
cf. *Vicia faba* L.	possible broad bean	seed fragments	Cult	
Pisum sativum L.	garden pea	seed (absision scar)	Cult	
Vicia faba/Pisum sativum	broad bean/pea	seed fragments	Cult	
Trifolium/Lotus sp. L	clover/birdsfoot trefoil	seed		
Trifolium/Melilotus sp. L	clover/medick	seed		
Cf. *Medicago* sp.		seed		
Linum sp.	flax type	seed (fragments)		
		seed (mineralised		
Raphanus raphanistrum L.	wild radish	mericarp (fragments)	cultivated and rough ground, waste places and tips	1
Persicaria maculosa/persicaria	redshank/pale persicaria	achene (frags)	Da	
Polygonum aviculare L	knotgrass	achene	all sorts of open ground	
cf. *Polygonum aviculare* L	possibleknotgrass	achene		
cf. *Rumex acetosella* L.	possiblesheep's sorrel	achene/(tepal)		
Rumex cf. *palustris* Smith	marsh dock	achene	B ditches marshy fields	

6 Early Roman 8326 132152 Well 132144	*10 Early Roman 5202 127027 Pit 127030*	*10a Early Roman 8436 130268 Sunken Feature Building 249199*	*11 Early Roman 5486 215042 Ditch 215037*	*13 Early Roman 7602 173200 Sunken Feature Building 193140*
		64		
6	9		17	22
3	1			20
2	1	24	4	13
		6[2]		
1	2			13
3		23(64)		14
5			5	35
				4
101	50	217	37	316
		7		
		1		
		4		1
	2			
13	18	57	60	93
4	2	9	6	
		2		3
	10	82	10	
87	14	60	17	
				1
		3	4	3
1		9	8	6
		1		
		1		
		10		
*				
				1
	2	280	8	10
		11	11	48
2				1
			1	
		-1		
	1			
	2		1	
		4		9
1	4	28		24
1				
		1		
	1			
1				
2	5	7	3	
1	2	9	2	2
		1		11
		1		2
		2		
2				
	(3)		2	
		2		
	31	3	3	
	4			
		37	1	

Table 17.8 (continued)

			Zone Period Sample no. Context no. Feature type/no. Processed soil volume (litre)
Rumex sp.	dock type	achene	DaGMSW
cf. *Rumex* sp.	possible dock type	achene (mineralised)	
Amaranthaceae	goosefoot family	seed (mineralised)	
Atriplex sp.	orache	seed	n
Chenopodium sp.	goosefoots	seed	n
Caryophyllaceae	pink family	seed	
Stellaria sp.		seed	
Stellaria cf. *media* (L.)Vill	possible common chickweed	seed	
Stellaria cf. *Pallida* (dumort.) Crep.	possible lesser chickweed	seed	
Stellaria graminea L.	lesser stitchwort	seed	GW
Myosoton cf. *aquaticum* (L.) Moench	water chickweed	seed	marshes, ditches and banks of water courses
Silene dioica (L.) Clairv.	red campion	seed	woods and hedgerows
cf. *Silene dioica* (L.) Clairv.	possible red campion	seed	
Montia fontana ssp *chrondrosperma* (Fenzl) Walters	blinks	seed	Damp places
Lithospermum arvense L.	corn gromwell	nutlet [mineralised]	Arable fields, rough ground, and open grassy places
Hyoscyamus niger L.	henbane	seed	Maritime sand and shingle, inland rough and waste ground
cf *Lythrum* sp.	purple loosestrife type	nutlet	
Euphrasia/*Odontites* L.	eyebright/bartsia	seed	Da G
Galium aparine L.	cleavers	nutlet	Da,H
cf. *Galium* sp.	bedstraw	nutlet	
		achene	
Anthemis cotula	stinking chamomile	achene	A heavy soils
Tripleurospermum inodorum (L.) Scultz-Bip	scentless mayweed	achene	Da
Sambucus nigra L.	elder	seed	hedges, woods, shrubberies, waste and rough ground
		fruit	
cf. *Conium maculatum* L.	possible hemlock	fruit	
	grass	caryopsis	
cf. *Pteridium aquilinum*	bracken	frond tip	
Unident.		seed (mineralised)	
Unident.		rhizome/tuber fragments	
Unident.		organic fragment (with plant impressions)	
Unident.		spine thistle type	

Early Roman (Table 17.8)

Spelt still dominates the wheat chaff with a single free threshing wheat rachis fragment identified in the fill of the sunken-featured building (SFB) (sample 7602). Six row hulled barley is also present in this sample and also in sample 8436. A number of sprouted oat and barley grains were found in sample 8436. Approximately a third of the oat grains show evidence of sprouting and there are a large number of detached embryos that might be associated with these grains. There are also a relatively larger number of weed seeds from disturbed and arable fields than occur in other zones and phases, including knotweed (*Polygonum aviculare*) and docks (*Rumex* spp.). Broad bean, pea and flax are again represented by a few examples from samples recovered from feature fills in Zones 6, 10 and 10a. A significantly large assemblage of henbane seeds from a deliberate backfill of SFB 193140 (sample 7602) may indicate that the plant was growing close by. A native of coastal shingle environments, it has adapted to grow on the nitrogen-rich midden deposits associated with human occupation. This is an extremely toxic plant that might have had some medicinal use and so may have been tolerated close to sites of occupation. The plant may have been charred during ritual or medicinal use, but the charred remains could equally indicate the control/clearance of a potentially dangerous plant from the local area.

Mid-Roman (Table 17.9)

Glume wheat dominates most of the assemblages from this phase, with the chaff of spelt being more numerous

6 Early Roman 8326 132152 Well 132144	*10 Early Roman 5202 127027 Pit 127030*	*10a Early Roman 8436 130268 Sunken Feature Building 249199*	*11 Early Roman 5486 215042 Ditch 215037*	*13 Early Roman 7602 173200 Sunken Feature Building 193140*
2	3	28	2	13
				3
		5		
		1		
		1		
		14	2	
	1	7		8
				2
	1			
		1		
	3			
	1			
		1		
		7		
			1	
		299		
		1		
	1			
	2		1	
	1			
	1	28		2
	1			
4	1	27	2	14
		1		
			2	
		4	1	1
2	13	158	10	35
	4	38	3	
	2			1
1		2		
			1	

than that of emmer in the features in Zone 6. Ditch sample 6806 from Zone 20 is, however, dominated by oat grains, but unfortunately there is no diagnostic chaff to confirm the identification of cultivated oat (*Avena sativa*). Six row barley, flax and pea are also present in samples from this period.

Mid-late Roman (Tables 17.9 and 17.10)

The three mid-late Roman SFBs from Zone 20 all produced similar deposits with spelt, some emmer and a free threshing type of wheat chaff. The hulled barley grains include a possible six row-type side grain. Cultivated oat is indicated by a single floret from sample 7722. Broad bean and possible pea were only noted from building 228059. Corn gromwell was recovered from all three buildings, together with scentless mayweed, while henbane only appeared in building 249081.

The uniformity of the deposits may suggest that they represent the result of accumulation of local waste rather than a series of individual structured deposits. The sunken nature of the features will have provided a place where waste could accumulate during the use and on abandonment of the building. Unfortunately there does not appear to be anything from these deposits that might suggest specific activities in or around the buildings.

The assemblage from sample 8393, from Zone 6 well 170184, comprises a mixture of wheat, barley and oat, all of which have examples of sprouted grains in small numbers. Some of the barley chaff suggests a six row type. Legume remains include a possible pea. While there was evidence of mineralised remains from this context they were not well enough preserved to suggest

Table 17.9 Charred plant remains: mid-Roman

			Zone
			Period
			Sample no.
			Context no.
			Feature type/no.
			Processed soil volume (litre)
Taxa	**Common name**	**Component**	**Habitat**
Triticum sp.	glume wheat type	grain(sprouted)	C
Triticum sp.	wheat	grain (sprouted) [double grains]	C
cf. *Triticum* sp.	possible wheat	grain (sprouted)	C
Hordeum sp.	barley hulled	grain (sprouted)	C
Hordeum vulgare L.	barley, six row, hulled	side grain (twisted) [sprouted]	C
cf. *Hordeum* sp	possible barley	grain	C
Avena sp.	oat	grain (sprouted)	C
cf. *Avena* sp.	possible oat	grain (fragments)	C, G
Avena/Bromus sp.	oat/brome	grain	C, G
Cereal nfi	unidentified cereal	grain fragments	C
Triticum dicoccum Schubl	emmer	spikelet fork	C
Triticum dicoccum Schubl	emmer	glume base	C
Triticum cf. *dicoccum*	possible emmer	spikelet fork	C
Triticum spelta	spelt	glume base	C
Triticum spelta	spelt	spikelet fork (attached rachis)	C
Triticum cf. *spelta*	possible spelt	spikelet fork	C
Triticum cf. *spelta*	possible spelt	glume base	C
Triticum spelta/dicoccum	spelt/emmer	spikelet fork	C
Triticum spelta/dicoccum	spelt/emmer	glume base	C
Triticum sp.	free threshing wheat	rachis fragment	C
Hordeum sp.	barley	rachis fragment (6-row hulled)	C
Hordeum sp.	barley	rachis fragment	C
Avena sativa L.	oat	floret base	C
Cereal nfi	unidentified cereal	detached embryo	C
Cereal nfi	unidentified cereal	detached coleoptile	C
Cereal nfi	unidentified cereal	straw internode	
Cereal nfi	unidentified cereal	straw internode	
cf. *Papaver* sp.	possible poppy	seed [mineralised]	
Fulmaria officinalis L.	common fumitory	achene	cultivated ground, W
Vicia/Lathyrus sp. (4mm)	vetch/pea	seed	Da, C
Vicia/Lathyrus sp. (2mm)	vetch/pea	seed	Da, C
Vicia cf. *sativa*	common vetch	seed	
Vicia faba L.	broad bean	seed	C
Pisum sativum L.	garden pea	seed (absision scar)	C
cf. *Pisum sativum* L.	possible pea	seed	C
Vicia faba/Pisum sativum	broad bean/pea	seed fragments	C
Trifolium/Lotus sp. L	clover/birdsfoot trefoil	seed	
Fabaceae	legume	seed fragments	
Prunus spinosa L.	blackthorn	stone (fragments)	WS
Rubus sp.	blackberry type	seed	
cf. *Potentilla* sp.	cinquefoil type	achene	
Corylus avellana L.	hazelnut	shell frags	SW
Linum usitatissium L.	flax	seed (fragments)	C
Linum sp.	flax type	seed (fragments)	
cf. *Linum* sp.	possible flax	seed (fragments)	
Malva sp.	mallow	nutlet	D, G
cf. *Malva* sp.	possible mallow	nutlet	
Brassicaceae	cabbage family	mericarp (fragments)	
Raphanus raphanistrum L.	wild radish	mericarp (fragments)	cultivated ground, W
Polygonum aviculare L.	knotgrass	achene	all sorts of open ground
Fallopia convolvulus (L.) Love.	black bindweed	achene	Da
cf. *Rumex acetosella* L.	possiblesheep's sorrel	achene/(tepal)	
Rumex sp.	dock type	achene	Da, G, M, S, W
cf. *Rumex* sp.	possible dock type	achene (mineralised)	
Chenopodium sp.	goosefoots	seed	n
Caryophyllaceae	pink family	seed	
Caryophyllaceae	pink family	capsule fragment	
Stellaria sp.		seed	
cf. *Stellaria* sp.	stichworts	seed	
Stellaria cf. *media* (L.)Vill	possible common chickweed	seed	
cf. *Stellaria graminea* L.	possible lesser stitchwort	seed	

6	6	7	20	20	20	20	20	20
Middle Roman		Middle Roman		Middle–Late Roman			Middle–Late Roman	
5326	8396	7320	6806	7719	7720	7722	7746	7756
128024	248208	303002	205056	228063	228078	228062	271060	271053
Posthole	Well	Pit	Ditch	Sunken Feature Building				
128025	248206	303003	205059	228059	228059	228059	249081	249081
			18(1)					
7	4	1		6	4	4	25	8
	12	3	23			1	4	
7	1	3	10		1		11	2
			8					
	6	1	13	1		2	5	
2		2	49(1)				4	
1		6	53	1			3	
	12		1					
20	45	100+	217	28	9	71		54
1	1							
	4							
								1
11	2	5	155	1			37	23
14	11		3(1)					
		1	2				4	11
28							11	
	12	4	36				52	
	41	34	191	10	10		25	158
				1				
1								
	1							
	1					1		
3		4	15		1		5	
	2		121				1	
			2					
							1	
							1	
	4	1	7		9		4	
4	9	10	6		2	1	3	
			3					
					1	1		
(1)								
19	1		4	2				
37		60+	16	12				
1	2	1	13	1	1		4	
	4	3			11	3		
			1					
			6					
			1					
			1		2	1		
			3					
1		1						
1								
								5
							1	
1								
	1				(1)	3		
		1		2				
			1				1	
	3			3	6			
1	1	7	12	2		7	12	
1		10			7	7	2	
2	2							1
3				1				
			1					
		1						
						1		
	1							
							2	

Table 17.9 (continued

			Zone *Period* *Sample no.* *Context no.* *Feature type/no.* *Processed soil volume (litre)*
Cerastium sp. L.	possible mouse-ear type	seed	
Silene dioica (L.) Clairv.	red campion	seed	woods, H
Primulaceae	primrose family	seed	
Anagalis arvense L.	scarlet pimpernel	seed	Da
cf. *Anagalis arvense* L.	possible scarlet pimpernel	seed	
Lithospermum arvense L.	corn gromwell	nutlet [mineralised]	A, W, G
Hyoscyamus niger L.	henbane	seed	W
Plantago lanceolata L.	ribwort plantain	seed	G short or grazed. Da
cf. *Plantago* sp.	plantain type	seed	
Euphrasia/Odontites L.	eyebright/bartsia	seed	Da G
cf. *Euphrasia/Odontites* L.	possible eyebright/bartsia	seed	
Galium aparine L.	cleavers	nutlet	Da, H
cf. *Galium* sp.	bedstraw	nutlet	
		achene	
Anthemis cotula	stinking chamomile	achene	A heavy soils
Tripleurospermum inodorum (L.) Scultz-Bip	scentless mayweed	achene	Da
Sambucus nigra L.	elder	seed	H, S, W
Juncus sp.	rush	(capsule)/seeds	
Poaceae	grass family	caryopsis	
cf. *Lolium* sp	possible rye grass type	caryopsis	
Unident		seed (mineralised)	
Unident		rhizome/tuber fragments	
Unident		organic fragment (with plant impressions)	
Unident		mineralised cists	

the significance of the plant remains represented, although a faecal origin can be surmised.

Late Roman (Table 17.10)

Samples 5395 and 5398 were a primary fill and *in-situ* layer of burning within collapsed, probably beehive-shaped oven 176181. The only identifiable wheat chaff from these samples is from spelt. There appears to be a ratio of 1:1 of grain to chaff. Possible pea seeds and a single detached pea abscission scar were recovered from sample 5398, while a single blackberry type seed suggests a wild food resource. Sample 5398 also contained a single stinking chamomile achene, evidence for an arable weed that prefers heavier soils. The samples also contain scentless mayweed which, by contrast, is usually found on lighter soil.

Other Roman (Table 17.10)

Oven/kiln sample (7295), from early Roman SFB 126117 in Zone 19, contained an abundance of silicified and charred wheat/barley awn with cereal lemma and palea fragments. The fact that there were relatively few wheat, oat and barley grains may suggest that this is the remains of a fuel deposit associated with the use of the kiln. The deposit also contained a single flax seed. Corn gromwell and scentless mayweed were also present

Early–mid-Saxon (Table 17.11)

SFB sample 5208, from Zone 10 produced very few charred plant remains. Together with the evidence of other finds this suggests that the sampled deposit was a dump or a general build-up of waste in the hollow of the building. The identifiable cereal remains consist of three wheat grains with single grains of barley and oat, but no chaff. The weed remains include a few dock and elder seeds. The sample from Zone 11 pit 189018 also produced no identifiable cereal chaff, but some of the wheat grains appear to be of a free threshing type. Six row barley, oat and possible rye grains are also present, as are a few broad bean and possible pea seeds. The number of flax seeds in sample 5407 suggests that the crop was being utilised during this period and may have been grown locally, though there is no evidence of other parts of the plant. Hazelnut shell and hawthorn stones may be evidence of potential food resources but could equally have been gathered with wood for fuel. The extensive sampling of Saxon SFBs at West Heslerton produced uniformly poor assemblages of plant remains, which it is suggested reflects the deposition of tertiary waste, with some indication of possible fuel and hearth material (Carruthers and Hunter in prep. a).

Mid-Saxon (Table 17.11)

Grain rich samples 6938 and 6980 are dominated by barley, including some side grains that suggest the

6	6	7	20	20	20	20	20	20
Middle Roman		*Middle Roman*		*Middle–Late Roman*			*Middle–Late Roman*	
5326	*8396*	*7320*	*6806*	*7719*	*7720*	*7722*	*7746*	*7756*
128024	*248208*	*303002*	*205056*	*228063*	*228078*	*228062*	*271060*	*271053*
Posthole	*Well*	*Pit*	*Ditch*	*Sunken Feature Building*				
128025	*248206*	*303003*	*205059*	*228059*	*228059*	*228059*	*249081*	*249081*
1								
1							1	
1								
		1						
							4	
			3	9		2	10	
								1
1			1			1		
				2				
				1			64	
						1	1	
1	1					1	1	
1		2					1	
1								
1	2		8				1	2
	1							
		8						
11	3	33	67	7	1	10	13	1
1			12	3	2			1
1		11	5	5	1		30	1
							1	
						4	6	3
					*			

presence of a six row type. This differs from the grain rich mixed assemblage from Springhead, also in Kent, which was dominated by thousands of grains of free threshing wheat together with barley and rye, suggesting the processing waste from a mixture of crops (Stevens 2011a). Free threshing wheat type grains are present in sample 6980 and a similar rachis fragment was found with a single spelt glume from sample 6554. Both of the pits from Zone 14 contained fired clay fragments with wattle impressions which are similar to those found with the grain-rich Saxon deposit from Springhead. At Springhead these have been interpreted as the remains of a crop drying surface, temporarily constructed at the time of harvest to prepare grain for storage in order to reduce the risk of spoiling through unwanted germination and/or rotting of stored grain. Similar deposits have also been found in Iron Age contexts on other sites, but not from EKA2 (C Poole pers. comm.). Both free threshing wheat type grain and chaff were noted from the ditch sample 6922 which also produced broad bean and pea seeds.

All the samples from this phase include seeds of stinking chamomile, with samples 6938 and 6980 being particularly rich. This might suggest that heavier soils were now more commonly being used to grow crops.

Saxon/medieval (Table 17.11)

Unusually for a sample of this date, some of the wheat grain from sample 6808 (Zone 20 trackway 126227) appears to be of a narrow shape that might suggest a glume type (though this could be residual here), but free threshing wheat rachis fragments are also present. Other cereal remains include rye grain and chaff, barley and oat. Arable weeds include stinking mayweed.

Medieval (Table 17.11)

As with the Saxon samples there is a paucity of identifiable remains in the medieval samples; the few cereal grains include free threshing wheat and possible rye. Flax seeds and some possible pea seeds provide the only other evidence of cultivated crops. Stinking chamomile seeds are also present.

Discussion

Wheat

The assemblages from the EKA2 have shown a pattern of crop utilisation which is generally reflected elsewhere across Kent. At sites such as at White Horse Stone, emmer and spelt dominate the Iron Age assemblage, with spelt taking over from emmer as time progresses (Giorgi 2006a). In the EKA2 much of the material appears to consist of a mixture of cereal grain and chaff, but there are no obvious locations of large-scale crop processing.

The rise in the quantity of glume wheat chaff and grain from the later Iron Age into the late Roman period

Table 17.10 Charred plant remains: mid–late Roman

			Zone
			Period
			Sample no.
			Context no.
			Feature type/no.
			Processed soil volume (litre)
Taxa	**Common name**	**Component**	**Habitat**
Triticum sp.	free threshing wheat type (tail grain)	grain	C
Triticum sp.	glume wheat type	grain (sprouted)	C
Triticum sp.	wheat	grain (sprouted) [double grains]	C
cf. *Triticum* sp.	possible wheat	grain (sprouted)	C
Hordeum sp.	barley hulled	grain (sprouted)	C
Hordeum vulgare L.	barley, six row, hulled	side grain (twisted) [sprouted]	C
cf. *Hordeum* sp	possible barley	grain	C
Avena sp.	oat	grain (sprouted)	C
cf. *Avena* sp.	possible oat	grain (fragments)	C, A, G
Avena/Bromus sp.	oat/brome	grain	C, G
Cereal nfi	unidentified cereal	grain fragments	C
Triticum dicoccum Schubl	emmer	glume base	C
Triticum spelta	spelt	glume base	C
Triticum spelta	spelt	spikelet fork (attached rachis)	C
Triticum spelta/dicoccum	spelt/emmer	spikelet fork	C
Triticum spelta/dicoccum	spelt/emmer	glume base	C
Triticum/Hordeum sp.	wheat /barley	awn fragments [silicified]	C
Hordeum sp.	barley	rachis fragment (6-row hulled)	C
Hordeum sp.	barley	rachis fragment	C
Hordeum sp.	barley	lemna base (horseshoe)	C
Avena sp.	oat	awn fragments	C, A, G
Cereal nfi	unidentified cereal	detached embryo	C
Cereal nfi	unidentified cereal	straw culm node	C
Cereal nfi	unidentified cereal	partially mineralised concretion silica rich ash with charred grain	C
Cereal nfi		palea/lemna fragments	C
Papaver sp.	poppy	seed [mineralised]	
cf. *Papaver* sp.	possible poppy	seed [mineralised]	
Fulmaria officinalis L.	common fumitory	achene	C, W
Ranunculus acris/repens/bulbosus L.	meadow/creeping/bulbous buttercup	achene	G
cf. *Ranunculus* sp.	possible buttercup	achene	
Vicia/Lathyrus sp. (4mm)	vetch/pea	seed	Da, C
Vicia/Lathyrus sp. (2mm)	vetch/pea	seed	Da, C
Vicia cf. *sepium*	bush vetch	seed	G, H, S
Pisum sativum L.	garden Pea	seed (absision scar)	C
cf. *Pisum sativum* L.	possible pea	seed	C
Vicia faba/Pisum sativum	broad bean/pea	seed fragments	C
Trifolium/Lotus sp. L.	clover/birdsfoot trefoil	seed	
Trifolium/melilotus sp. L.	clover/medick	seed	
Fabaceae	legume	seed fragments	
Prunus spinosa L.	blackthorn	stone (fragments)	W, S
Rubus sp.	blackberry type	seed	
Linum sp.	flax type	seed (fragments)	
cf. *Malva* sp.	possible mallow	nutlet	
Brassicaceae	cabbage family	seed (mineralised	
Raphanum raphanistrum L.	wild radish	mericarp (fragments)	cultivated ground, W
Polygonum aviculare L.	knotgrass	achene	all sorts of open ground
cf. *Polygonum aviculare* L.	possibleknotgrass	achene	
Fallopia convolvulus (L.) Love.	black bindweed.	achene	Da
Rumex sp.	dock type	achene	Da, G, M, S, W
cf. *Rumex* sp.	possible dock type	achene (mineralised)	
Chenopodium album L.	fat hen	seed	Da, n
Chenopodium sp.	goosefoots	seed	n
Stellaria sp.	chickweed/stitchwort	seed	
cf. *Stellaria* sp.	stichworts	seed	
Stellaria cf. *media* (L.)Vill	possible common chickweed	seed	
Stellaria cf. *Pallida* (dumort.) Crep.	possible lesser chickweed	seed	
Stellaria neglecta L.	greater stitchwort	seed	damp shady places
Stellaria graminea L.	lesser stitchwort	seed	G, W
Cerastium cf. *Arvense* L.	possible field mouse-ear	seed	dry grassland

6 *Middle-Late Roman* *8393* *172304* *Well 170184*	*6* *Late Roman* *5395* *289055* *Oven 176181*	*6* *Late Roman* *5398* *289054* *Oven 176181*	*19* *Roman* *7295* *126176* *Kiln 126175*	*20* *Roman* *7761* *171240* *Sunken-Feature-Building 249083*
				14
				4
96(1)	22	48	8	
30	5	1	7	17
15(3)	8	11	3	4
				1
22	1	2	1	2
56(2)	3	5	5	
5	4	4	4	1
	3	4		
500+	151	100+	82	52
2				
50	11	42	9	8
9		2		2
35	11	45	50+	1
73	7	60	50+	3
			****	
9				
11	1	10	2	2
1				
	*	*		
	4	1		
66				
***				
			***	
			2	
			1	
1				
			1	
	1	1		
10	3			2
32	2	17	9	
1		6		
		-1		
1	4	29		1
	10	54		
31				
	6		1	
	21	16	1	
			1	
	1			
			1	
	1			
		1		
1				
	22		4	1 3
24				
1				
15	2	4		22
				5
	1			
3				
1		1		
			7	
	4		1	
2				
		1		
			3	

Table 17.10 (continued)

			Zone *Period* *Sample no.* *Context no.* *Feature type/no.* *Processed soil volume (litre)*
Silene latifolia Poir	white campion	seed	B, W, C. Mostly on light soils in the open
Montia fontana ssp *chrondrosperma* (Fenzl)Walters	blinks	seed	Damp places
Primulaceae	primrose family	seed	
cf. Primulaceae		seed	
Anagalis arvense L.	scarlet pimpernel	seed	Da
Lithospermum arvense L.	corn gromwell	nutlet [mineralised]	A, W, G
Plantago major L.	greater plantain	seed	
Plantago lanceolata L.	ribwort plantain	seed	G short or grazed. Da
Plantago lanceolata L.	ribwort plantain	seed capsule and seeds	
cf. *Lythrum salicaria* L.	possible purple loosestrife	nutlet	
Euphrasia/Odontites L.	eyebright/bartsia	seed	Da G
Galium aperine L.	cleavers	nutlet	Da, H
Asteraceae	daisy family	achene	
Cirsium cf. *Palustra* (L.) Scop.	possible marsh thistle	achene	M, damp grassland and open wood
cf. *Cirsium*	possible thistle		
Anthemis cotula	stinking chamomile	achene	A heavy soils
Tripleurospermum inodorum (L.) Scultz-Bip	scentless mayweed	achene	Da
Sambucus nigra L.	elder	seed	H, S, W
Valerianella dentata (L.) Pollich	narrow-fruited cornsalad	fruit	A, W
Apiaceae	carrot family	fruit	
Pimpinella saxifraga	burnet-saxifrage	fruit	G, open rocky places
cf. *Conium maculatum* L.	possible hemlock	fruit	
cf. *Daucus carota* L.	possible wild carrot	fruit	
cf. *Scirpus sylvaticus*	wood club-rush	nut	damp spots in wood and shade, B, M
Poaceae	grass family	caryopsis	
Unident		seed (mineralised)	
Unident		organic fragment (with plant impressions)	
Unident		silica rich ash	
Unident		spine thistle type	
Unident		dicotyledonous leaf fragment	
Unident		insect [mineralised]	
Unident		catkin	

reflects an increase seen at other sites in the area and across the south of England and the Midlands (Campbell and Pelling in prep; Carruthers and Hunter in prep. b). This may be due to the increase in production of surplus grain for trade, the increase in size of settlement and consequent centralisation of local crop processing, and also the use of the resulting chaff as a fuel. In Kent the survival of emmer wheat as a crop into the Roman period, alongside spelt, appears to be a regional phenomenon. Elsewhere in southern Britain emmer appears to have been largely replaced by spelt as the crop of choice by this time (Stevens 2009). Along the EKA2 the presence of emmer has been recorded from Roman contexts in Zones 6 and 10, although some of this might be residual from earlier deposits. Spelt chaff is also present in Zone19 from the Bronze Age and is present in features dating to the Roman period in the zones along the chalk ridge (Landscape 1). Bronze Age spelt has been dated from Prince's Road in north-west Kent (Pelling 2003) and is associated with dated barley grains from the A2/A282 excavations (Smith 2011a). The use of wheat chaff as fuel and as a source of temper for ceramics would mean that uncharred chaff could be transported away from the point of processing before it became charred and incorporated into the archaeological assemblage. This could skew the proportion of chaff to grain in a charred assemblage and might present a particular problem in interpreting Late Iron Age, Roman and Saxon cereal deposits.

The apparent (at least small-scale) cultivation of glume wheats into the Saxon period is attested by the radiocarbon dated grains from Northfleet villa (Smith 2011b) and from the Thames Valley (Pelling and Robinson 2000). The increased incidence of free threshing wheats and rye alongside the continued and constant presence of hulled barley is also a pattern reflected beyond the local area, seen for example in deposits from the A2 road widening scheme near Gravesend (Smith 2009; 2012). However, when evidence comes from one or a small number of plant remains the possibility of intrusion or residuality

6	*6*	*6*	*19*	*20*
Mid-late Roman	*Late Roman*	*Late Roman*	*Roman*	*Roman*
8393	*5395*	*5398*	*7295*	*7761*
172304	*289055*	*289054*	*126176*	*171240*
Well 170184	*Oven 176181*	*Oven 176181*	*Kiln 126175*	*Sunken-Feature-Building 249083*
		1		
5			3	
			1	
			5	2
	1			
		1		
1				
	1			
	1			2
1		1		
	7	1		
	3			
1				
		1		
4	8	5	1	
	2			
1				
	1			
	1			
			2	
1				
	1	1		
53	56	13	11	24
55	29	24	2	
				** 2
****				
1		1		
1				
1				

becomes an issue, particularly as charred remains, though prone to physical damage, are resistant to decay. It is because of this that the provenance of some remains should be treated with caution.

Barley

The extremely well preserved naked barley grains from pit 159256 (Pl 17.2) produced a Late Bronze Age radiocarbon date. This crop has been commonly associated with Neolithic and Bronze Age deposits in Britain, and the radiocarbon date reinforces this. The naked barley is so well preserved that it suggests a deliberate deposit, possibly of a votive nature. Several other Bronze Age samples produced a few naked barley grains along with hulled grains. Unlike the naked variety, hulled barley has been identified in deposits from all phases of the site from the Bronze Age onwards. The preservation of grain and chaff has, in some cases, allowed the identification of a six row type of barley, a type less suited to malting due to the differing size of the central and side grains which could lead to uneven germination. This type of barley might have been grown for fodder or human consumption. The relatively small amount of identifiable chaff compared to the grain means that the presence of a two row type cannot be discounted.

Legumes

The presence of broad bean seeds from the Bronze Age provides earlier examples than those from the adjacent excavation at Thanet Earth, where this plant first appears in samples from the Middle Iron Age (Carruthers 2012). Legumes such as broad bean and pea have clearly been a constantly important food resource since early prehistory. The smaller legumes commonly found in many of the assemblages may also have represented potential fodder crop or crop weeds. It is possible that legumes could have been grown amongst the cereals, either as a weedy relic of a previous crop or deliberately sown together to maximise crop productivity and mitigate against a poor harvest of either crop.

Table 17.11 Charred plant remains: Saxon and medieval

			Zone
			Period
			Sample no.
			Context no.
			Feature type/no.
			Processed soil volume (litre)
Taxa	**Common name**	**Component**	**Habitat**
Triticum sp.	free threshing wheat type (tail grain)	grain	C
Triticum sp.	glume wheat type	grain (sprouted)	C
Triticum sp.	wheat	grain (sprouted) [double grains]	C
cf. *Triticum* sp.	possible wheat	grain (sprouted)	C
Hordeum sp.	barley hulled	grain (sprouted)	C
Hordeum vulgare L	barley, six row, hulled	side grain (twisted) [sprouted]	C
cf. *Hordeum* sp	possible barley	grain	C
Avena sp.	oat	grain (sprouted)	C
cf. *Avena* sp.	possible oat	grain (fragments)	C, G
Avena/Bromus sp.	oat/brome	grain	C, G
Secale cereale	rye	grain	C
cf. *Secale cereale*	rye type	grain	C
Cereal nfi	unidentified cereal	grain fragments	C
Triticum spelta	spelt	glume base	C
Triticum sp	free threshing wheat	rachis fragment	C
Hordeum sp.	barley	rachis fragment	C
Hordeum sp.	barley	lemna base (horseshoe)	C
cf. *Hordeum* sp.	barley	rachis fragment	C
Avena sativa L.	oat	floret base	C
Avena sp.	oat	awn fragments	C, A, G
Avena sp.	oat	floret base	
cf. *Secale cereale*	rye type	rachis	
Cereal nfi	unidentified cereal	detached embryo	C
Cereal nfi	unidentified cereal	detached coleoptile	C
Cereal nfi	unidentified cereal	straw culm node	
Cereal nfi		palea/lemna fragments	
cf. *Papaver* sp.	possible poppy	seed capsule (fragments)	
Papaver rhoeas (L.)	common poppy	seed (silicified) [mineralised]	A, W
Papaver dubium L.	long-headed poppy	seed	A, W
Ranunculus acris/repens/ bulbosus L.	meadow/creeping/bulbous buttercup	achene	G
Vicia/Lathyrus sp. (4mm)	vetch/pea	seed	Da, C
Vicia/Lathyrus sp. (2mm)	vetch/pea	seed	Da, C
Vicia faba L.	broad bean	seed	C
cf. *Vicia faba* L.	possible broad bean	seed fragments	C
Pisum sativum L.	garden pea	seed (absision scar)	C
cf. *Pisum sativum* L.	possible pea	seed	C
Vicia faba/Pisum sativum	broad bean/pea	seed fragments	C
Trifolium/Lotus sp. L	clover/birdsfoot trefoil	seed	
Fabaceae	legume	seed fragments	
Crataegus monogyna Jacq.	hawthorn	stone (fragments)	S, H
Urtica urens L.	small nettle	achene	C, W
Corylus avellana L.	hazelnut	shell fragments	S, W
Viola sp.	violet type	seed	
cf. *Viola* sp.	possible violet type	seed	
Linum usitatissium L.	flax	seed (fragments)	C
Linum sp.	flax type	seed fragments)	
Malva sp.	mallow	nutlet	D, G
cf. *Malva* sp.	possible mallow	nutlet	
Brassicaceae	cabbage family	seed (mineralised	
Brassicaceae	cabbage family	mericarp (fragments)	
Brassica rapa ssp *campestris* (L.) A.R.Clapham	wild turnip	seed	B
cf. *Thlaspi arvense* L.	field penny-cress	seed (mineralised)	
Raphanus raphanistrum L.	wild radish	mericarp (fragments)	C, W
Persicaria maculosa/persicaria	redshank/pale persicaria	achene (fragments)	Da
Polygonum aviculare L	knotgrass	achene	all sorts of open ground
Fallopia convolvulus (L.) Love	black bindweed.	achene	Da
Rumex sp.	dock type	achene	Da, G, M, S, W

10 Early or mid-Saxon 5208 197085 Sunken Feature Building 194086	*11 Early or mid-Saxon 5407 189019 Ditch 189018*	*14 Mid- Saxon 6554 139075 Pit 139075*	*14 Mid- Saxon 6922 133098 Enclosure Ditch 159219*	*14 Mid- Saxon 6938 202102 Pit 202100*	*14 Mid- Saxon 6980 202130 Pit 202128*	*20 Saxon- early Medieval 6808 217060 Trackway 126227*	*11 Medieval 5406 189017 Ditch 189015*
	39		320(1)		66		2
						6	
3		3		10			
		1	3		11	22	
1	63	1		227	175	7	3
	(28[1])		(23)86	19	28		
			77	10	20	7	1
1	7		2	30	78	6	2
	5	1	8	14	26	20	
				1	12	3	
						2	
	3					5	3
17	356	60	1000+	246	18	297	22
		1					
		1	20	7		8	
				1	5		
					3		
						1	
				1			
					*		
					2	1	
						1	
			2	9		2	
	3	1					
	2						
		[1]					
					(1)		
		[4]					
				1			
					4		
3	9				2		
2	120		13		81	30	3
	8		5				
			5				
	21		3				4
	37		2			7	
	2						
				9			
	6				1		
				1			
	98					4	
	1						
						3	
	59(6)						
							1
			3		2		
			1	1			
	3			1		1	
					17		
				31			
					1		
					1(2)		
	4						
	10			8			
	22			2	2	1	
2	23		9	1	26		

Table 17.11 (continued)

			Zone
			Period
			Sample no.
			Context no.
			Feature type/no.
			Processed soil volume (litre)
cf. *Rumex* sp.	possible dock type	achene(mineralised)	
Amaranthaceae	goosefoot family	seed (mineralised)	
Chenopodium album L.	fat hen	seed	Da, n
Atriplex sp.	orache	seed	n
Chenopodium sp.	goosefoots	seed	n
Caryophyllaceae	pink family	seed	
Stellaria sp.		seed	
Stellaria graminea L.	lesser stitchwort	seed	G, W
Cerastium cf. *Arvense* L.	possible field mouse-ear	seed	dry grassland
Silene dioica (L.) Clairv.	red campion	seed	woods, H
cf. *Silene dioica* (L.) Clairv.	possible red campion	seed	
Primulaceae	primrose family	seed	
possible Primulaceae		seed	
Lithospermum arvense L.	corn gromwell	nutlet [mineralised]	A, W, G
Plantago lanceolata L.	ribwort plantain	seed	G short or grazed. Da
Verbascum sp.	mullein	seed	
cf. *Lythrum salicaria* L.	possible purple loosestrife	nutlet	
Euphrasia/*Odontite*s L.	eyebright/bartsia	seed	Da, G
Galium aparine L.	cleavers	nutlet	Da, H
cf. *Galium* sp.	bedstraw	nutlet	
Asteraceae		achene	
cf. *Crepis* sp.	hawks beard	achene	
Anthemis cotula	stinking chamomile	achene	A heavy soils
cf. *Anthemis cotula*	possiblestinking chamomile	achene	
Tripleurospermum inodorum (L.) SCz-Bip	scentless mayweed	achene	Da
Sambucus nigra L.	elder	seed	woods, H, S, W
Valerianella dentata (L.) Pollich	narrow-fruited cornsalad	fruit	A, W
Apiaceae	carrot family	fruit	
cf. *Foeniculum vulgare* Mill.	possible fennel	fruit	C, W
cf. *Conium maculatum* L.	possible hemlock	fruit	B
Alliaceae	onion family	seed (mineralised)	
Juncus sp.	rush	(capsule)/seeds	
cf.*Scirpus sylvaticus*	wood club-rush	nut	B, M, damp spots in wood and shade
Carex sp. (Trigonus)	sedge	nut	M, B, W, G esp. damp/ wet soils
Poaceae	grass family	Caryopsis	
cf. *Lolium* sp	possible rye grass type	caryopsis	
Unident		seed (mineralised)	
Unident		rhizome/tuber fragments	
Unident		tiny pitted seed	
Unident		organic fragment(with plant impressions)	
Unident		organic fragments with grain/ seed inclusion	
Unident		mineralised cists	
Unident		mineralised concretions	
Unident		insect [mineralised]	

Flax

Like the large legume seeds, flax is mainly represented by small numbers of seeds in samples from the Early Neolithic through to the medieval period. Two samples from the Early Neolithic and early to mid-Saxon periods (5510 and 5407) contained more seeds. The flax plant could potentially have provided textile from the retted stems and oil from the seeds as well as providing seed for subsequent crops. None of these processes involves contact/proximity to fire and so the charred remains would either be the result of accidental charring, deliberate waste disposal or charring and deposition for ritual purpose. The flax from the Neolithic pit may have been an example of the latter (Pl 17.1).

10 Early or mid-Saxon 5208 197085 Sunken Feature Building 194086	*11 Early or mid-Saxon 5407 189019 Ditch 189018*	*14 Mid-Saxon 6554 139075 Pit 139075*	*14 Mid-Saxon 6922 133098 Enclosure Ditch 159219*	*14 Mid-Saxon 6938 202102 Pit 202100*	*14 Mid-Saxon 6980 202130 Pit 202128*	*20 Saxon-early Medieval 6808 217060 Trackway 126227*	*11 Medieval 5406 189017 Ditch 189015*
	1				24	1	
				37			
	3					2	1
				4		2	
	10			3	54		
				2		2	1
	7			2	2		
					5		
				6			
						1	
					4		
	1						
	2						
					1		
	5			2	4		
	1						
			1	1			
	2					1	3
				5	1	2	1
				13		2	3
					1		
	1000+	1	9	99	514	48	19
			2	1			
				1			
2		1		15			
					9		
	2			2			
					1		
			1		38		
					(1)		
							2
					1		
					1		
	72		2		51	31	7
				2			
	12	1	7	22		14	3
					1		
	128						
1					***		
							1
		****					
*							
		1			2		

Rye
The presence of rye prior to the Saxon period from EKA2 is based only on tentative identifications and the seeds could be intrusive. However, the remains from Zones 11 and 20, though low in number, reflect a general adoption of this Northern European crop in the area from the post-Roman period. Securely identified rye does not appear in samples from the EKA2 until the later Saxon period, as is also the case at Saltwood Tunnel (Stevens 2006).

Oat
The few diagnostic chaff fragments recovered from the site at least indicate that a cultivated crop was present.

Unfortunately, as discussed above, the paucity of identifiable remains precludes their interpretation beyond indication of simple presence or absence of the crop.

Hemp

A single fragment of a mineralised seed may suggest evidence for another textile, oil or medicinal crop, but the identification is tentative.

Weed seeds

Wendy Carruthers has highlighted the possible link between the occurrence of scentless mayweed and the cultivation of lighter soils at the nearby Thanet Earth excavations (Carruthers 2012). Scentless mayweed is present along the EKA2 scheme route in contexts dating from the prehistoric to the early-mid Roman period, suggesting the cultivation of lighter soils. The presence of possible sheep's sorrel (*Rumex* cf. *acetocella*) in all three landscape zones but particularly in the Ebbsfleet Peninsula (Landscape 3) may also be evidence of cultivation of lighter acidic soils.

With the increase in cultivation of cereals in the Late Iron Age into the Roman period it is suggested that heavier soils were brought into cultivation, possibly because the lighter soils were suffering from reduced fertility and also because the Roman period saw the introduction of ploughs better suited to working the heavier soils. The corresponding increase in the occurrence of seeds of stinking chamomile, which prefers a heavier clay soil, can be seen from this period, though scentless mayweed continues to appear in the assemblage suggesting the continued use of different soil types. Both scentless mayweed and stinking chamomile occur from the Iron Age to the Saxon periods, suggesting that lighter soils continued in cultivation alongside the heavier soils throughout the Roman period. The greatest occurrence of stinking chamomile is in the post-Roman period, although it should be borne in mind that with a few exceptions the seeds of these plants were only found in small numbers and large-scale crop processing waste is not evident from any period. In fact only the two primary deposits of Saxon crop processing waste produced stinking chamomile in any great numbers. Bearing this caveat in mind, however, the change from the dominance of scentless mayweed to stinking chamomile is most noticeable in the samples from the chalk soils in Landscape 1 and corresponds with findings from the nearby Thanet Earth excavations (Carruthers 2012). The pattern is not clear for the Cliffsend Spur zones (Landscape 2) until the Saxon period, when scentless mayweed disappears. In the Ebbsfleet Peninsula zones (Landscape 3) scentless mayweed is present from the Bronze Age until the late Roman period, while stinking chamomile appears in the record in the Middle-Late Iron Age and disappears in the late Roman period.

A common arable weed, corncockle (*Agrostemma githago*) is notable for its scarcity in all zones; only a few examples have been identified and they are much degraded. This is in contrast to the crop dryer sample from Thanet Earth that contained more than one thousand seeds. Corncockle produces seeds large enough to be retained throughout the processing stages of cereal crops, requiring the toxic seeds to be removed by hand before the grain can be used. Its scarcity in the EKA2 assemblages might suggest either that most of the cereal had been processed and cleaned to this stage by the time it became charred, or that corncockle was not a common weed in the immediate area, although several examples were recovered from Plateau 1 and 4 at Thanet Earth (Carruthers 2012).

Differences between landscape types

One of the research questions posed for the EKA2 project was whether the differences in landscape types present in the vicinity affected patterns of crop utilisation and associated weed flora. The extent to which this question can be answered has been limited by the relatively small number of samples analysed from the chalk escarpment (Landscape 1) and from the area of mixed chalk and brickearth soils from the Cliffsend Spur (Landscape 2). This was because only a fairly small number of samples produced sufficient identifiable plant remains to allow meaningful interpretation. A larger number of productive samples has been analysed from the zones to the south, on the Ebbsfleet Peninsula, with its sandier soils and head deposits (Landscape 3). The productivity of the samples from the different areas may be a product of a number of factors. It is possible that there was more cultivation of the Ebbsfleet Peninsula, associated with a higher density of occupation, or that the features sampled were located closer to areas of occupation. However, differences in soil types and depths should also be taken into consideration: the often shallower chalk soils can leave charred plant remains and finds more susceptible to physical damage through human activities such as ploughing, as well as providing less of a buffer against the effects of the cycles of the seasons through the freezing and the drying out of the characteristically well-drained soils. The occurrence of the principal crop plants in relation to the three Landscape areas is summarised in Figs. 17.1–17.3.

With the publication of several road and water pipe line excavations in recent years there are now a significant number of published reports detailing charred archaeobotanical assemblages from Kent, dating from the Early Neolithic through to the medieval period (Pelling 2008; Robinson 2008; Giorgi and Stafford 2006; Stevens 2009; 2011a; Stevens and Smith 2011; Smith 2009; 2012). The assemblages from the EKA2 excavations can be added to this dataset and compared and contrasted with the other assemblages from this geographical area as well as providing new information about a part of Kent which has not been the focus of detailed published work to date. In particular, radiocarbon dating of prehistoric plant remains has provided evidence of early agricultural crops where previously the later intrusion of material might have been suggested. Early Neolithic pit (191086) from Zone

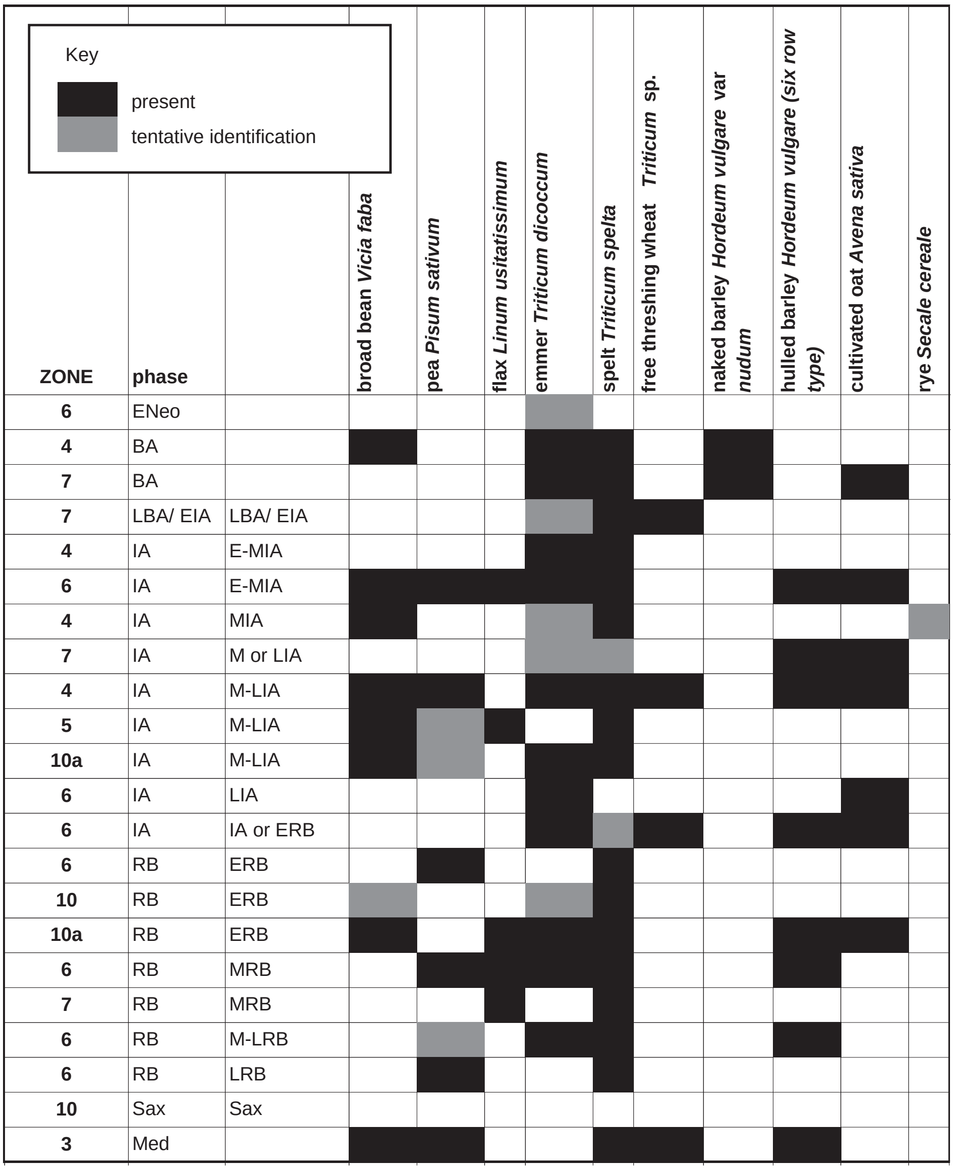


Fig. 17.1 Presence and absence of crop plants from Ebbsfleet Peninsula

14 on the Cliffsend Spur has provided dating evidence for two crops, one a glume wheat (possibly emmer) and the other flax, and while it not possible to demonstrate conclusively that these crops were grown in the vicinity of the site, these dates do provide evidence for early agricultural practice in the wider area. These remains are similar to those from assemblages in other Early Neolithic features in Kent, where a votive element to the deposition has been suggested. Earlier Neolithic cereal remains come from White Horse Stone (Giorgi 2006), from a causewayed enclosure at Ramsgate (UBA 13517: 3765–3722 cal BC; UBA-15518: 3695–3651 cal BC; Carruthers 2011) and from a pit at Westwood Cross (NZA-2651: 3800–3650 cal BC, 4951±35BP; UBA-13386: 3790–3650 cal BC, 4948±30BP; and UBA-13385: 3940–3670 cal BC, 4986±30BP; Stevens 2011b). All were found together with hazelnut shell. Flax seeds and seed capsule fragments were also recovered from one of the Neolithic pits at Ramsgate, but were not radiocarbon dated. Therefore, at present, the flax from Zone 14 (Pl 17.1) is the earliest dated example from the area. Neolithic samples from nearby Thanet Earth have also produced a compact type of free threshing wheat, naked barley and flax, as yet undated (Carruthers 2012). The compact form of wheat (*Triticum compactum*) was dated from Ramsgate (see above). Carruthers (2011) suggests that it is a form of wheat which might be better suited to coastal areas with poor soils. This form of wheat was also noted in the Neolithic period at Thanet Earth, but by contrast none of the wheat grains from the EKA2 exhibited the short rounded grain shape that characterises this type of wheat. This might be because this type of wheat was not well enough preserved for identification. Where grains are here attributed to a free threshing type they are all longer grains, possibly of bread wheat type (*Triticum* cf *aestivum*).

Since early prehistoric plant remains tend only to be found in low numbers, well preserved datable material is invaluable for establishing the agricultural practices associated with particular periods of occupation in the area. Sampling of Bronze Age features has provided

Key
■ present
▒ tentative identification

ZONE	phase		broad bean *Vicia faba*	pea *Pisum sativum*	flax *Linum usitatissimum*	emmer *Triticum dicoccum*	spelt *Triticum spelta*	free threshing wheat *Triticum* sp.	naked barley *Hordeum vulgare* var *nudum*	hulled barley *Hordeum vulgare* (six row type)	cultivated oat *Avena sativa*	rye *Secale cereale*
14	ENeo				■		▒					
12	BA											
26	BA					■						
13	IA	E-MIA	■	■	■	■	■	■		■		
12	IA	M-LIA				▒						
11	RB	ERB					■			■		
13	RB	ERB				▒	■	■				▒
11	Sax		■	▒	■			■		■		■
14	Sax		■	■			■	■		■	■	
11	Med				▒			■				■

Fig. 17.2 Presence and absence of crop plants from the Pegwell Bay spur

Key
■ present
▒ tentative identification

ZONE	phase		broad bean *Vicia faba*	pea *Pisum sativum*	flax *Linum usitatissimum*	emmer *Triticum dicoccum*	spelt *Triticum spelta*	free threshing wheat *Triticum* sp.	naked barley *Hordeum vulgare* var *nudum*	hulled barley *Hordeum vulgare* (six row type)	cultivated oat *Avena sativa*	rye *Secale cereale*
19	BA						■					
19	IA	E-MIA		■		▒	■					
20	RB	MRB	■	▒	■	▒	■	■		■	■	
19	RB	RB			■		■					
20	RB	RB		▒			■			■		
20	Sax-Med							■				■

Fig. 17.3 Presence and absence of crop plants from the Chalk Ridge

further evidence of crop husbandry from a period that has been underrepresented in crop research for much of southern Britain and for Kent in particular (Campbell and Pelling in prep.).

Conclusions

The assemblages analysed in this report have on the whole produced evidence compatible with all the recent archaeobotanical research from the area. Such is the amount of data that has been produced from the area, particularly for the Iron Age and Roman periods that now might be the time for a review of the results and establishment of new research agendas. The targeting and radiocarbon dating of early prehistoric assemblages has produced some very useful information about the crops being utilised well as suggesting potential social and/or ritual activities. Further sampling and dating of material from the Neolithic and Bronze Age will hopefully serve to increase our knowledge of this often underrepresented period, of the utilisation and significance of plants to the human population as well as investigating their interaction with the local environment. The targeting of Saxon and medieval deposits would also increase the data available for periods again underrepresented by charred plant remains in this part of Kent. This should be done taking into account that changes in crop type and agricultural practice result in distinctly different assemblages compared to those of the Late Iron Age and Roman periods. Given the characteristically large amounts of plant remains recovered from those periods, there is great potential for developing new research projects into the character of the remains, the nature of their production, use, deposition and preservation through time. For example, is it always possible to distinguish between crop processing waste assemblages and the remains of the use of wheat chaff as a commodity in its own right, such as a fuel? The burnt chaff left over from other processes, such as the tempering of ceramics, might also superficially appear to be a crop processing assemblage. The review of plant macrofossils for the south of England will hopefully go a long way to pulling together all the recent work from the area and helping to set revised research agendas (Campbell and Pelling in prep.).

Chapter 18

Charcoal

by Denise Druce

Introduction

Following the palaeoenvironmental assessment of bulk samples, recommendations were made for the analysis of a small number of charcoal-rich deposits from a range of different feature types and time periods, the number partly constrained by the frequency of charcoal fragments >4mm in each sample. Surprisingly, perhaps, many cremation deposits included very little identifiable charcoal. Samples selected for analysis were from two Early Neolithic pits, Late Bronze Age cremation deposits, two Iron Age pits, features associated with two Roman sunken-featured buildings (SFBs), Saxon pits, and a medieval ditch. These lay in areas of varying geology and topography, from the Ebbsfleet Peninsula (Landscape 3) to the Cliffsend Spur (Landscape 2) and the chalk ridge (Landscape 3) above. The aim of the charcoal study was to investigate the types of wood fuel being used, to identify any evidence for species selection and function, and to ascertain any possible differences in the nature of the woody environment over landscape types and periods.

Methodology

The samples were processed using a modified Siraf flotation machine, the flots being collected onto a 250µm mesh, air-dried, and sub-sampled where necessary. Analysis followed standard procedure where at least 100 fragments >4mm in size were extracted and grouped together based on the characteristics observed in transverse section at up to x40 magnification. If there were an insufficient number of fragments over 4mm, then a proportion of >2mm fragments were selected to make up the minimum amount. Representative fragments of each group were then fractured to reveal both radial and tangential sections, which were examined under a Meiji incident-light microscope at up to x400 magnification. Identifications were made with reference to Schweingruber (1990), Hather (2000), and modern reference material. Nomenclature follows Stace (2010).

Results

The results of the analyses are given in Tables 18.1-4, where fragment counts are given unless stated otherwise. Fifteen taxa were positively identified, including 11 to species level. The taxonomic level of identification varied according to the observed genera/family and/or the state of preservation. In many cases the fragments could only be taken to an approximate level of identification due to the similarities of species within a genus or sub-group, eg, *Quercus* sp (oak) which could be *Q. robur* (pedunculate oak) or *Q. petraea* (sessile oak) in Britain, or *Salix* (willow) and *Populus* (poplar), which are anatomically similar. Maloideae, referred to as hawthorn-type in the text, could be hawthorn, whitebeam, apple or pear. The similarity of many of the *Prunus* species (blackthorn-type in text), including *Prunus avium* (wild cherry), *P. padus* (bird cherry), and *P. spinosa* (blackthorn/sloe) often makes this genus difficult to tell apart. Similarly, distinguishing between *Alnus glutinosa* (alder) and *Corylus avellana* (hazel) is often difficult if their properties in tangential section are not clear.

Neolithic (Table 18.1)

One of the Early Neolithic pits, 191179 (Zone 14), was dominated by oak, with hawthorn-type, wild cherry and rare hazel. The other, pit 312049 (Zone 6), contained a relatively diverse assemblage of ash and hawthorn-type, rare oak, elm, hazel and blackthorn-type. Ash and blackthorn/hawthorn-type are typical of open woodland and scrub. None of the ash fragments exhibited tyloses, which restrict the movement of moisture in vessels of hardwood trees over 50 years in age. It is possible, therefore, that the charcoal represents the remains of wood fuel collected from the woodland floor.

Late Bronze Age cremation deposits (Table 18.2)

All of the Late Bronze Age assemblages from EKA2 were from cremation deposits from cremation cemetery 252229 in Zone 4. Ten of the twelve cremation deposits included identifiable charcoal (Table 18.2); most were collected as single whole-earth samples, but 252214 and 220142 comprised two samples each. Only two of the excavated features have been confirmed as graves (252215 contains the remains of an adult, possibly female, while 252223 contains the remains of an infant, 1-4 years old); the other deposits all comprised charcoal-rich fills but very

Table 18.1 Charcoal analyses: Early Neolithic and Iron Age pits

Landscape		*3*	*2*	*3*	*2*
Zone		*6*	*13-15*	*6*	*13*
Context No		*312050*	*191178*	*173281*	*211046*
Sample No		*8385*	*5800*	*7903*	*5548*
Feature No		*312049*	*191179*	*173275*	*211043*
Feature type		*Pit*	*Pit*	*Pit*	*Pit*
Fill description		*Secondary fill*	*Secondary fill*	*Backfill*	*Backfill*
Phase		*ENEO*	*ENEO*	*EMIA*	*MIA*
Sample Size L					
% >4mm analysed		*100%*	*100%*	*50%*	
% >2mm analysed		*25%*			*100 %*
Notes			*Few tyloses observed*	*Abundant CPR: charred stems/ straw/ rhizomes and charred 'lumps' – burnt stable waste?*	*No tyloses observed. Contained peas.*
Alnus glutinosa/Corylus avellana	alder/hazel	8		2	
Corylus avellana	hazel	2	3	49r	cf 1
Fraxinus excelsior	ash	40			9
Maloideae	hawthorn-type	37	16		
Prunus cf *avium*	cf wild cherry		6		
Prunus sp	sloe/blackthorn or wild/bird cherry	2			cf 2
Quercus sp	oak	4	103	7r	34
Ulmus sp	elm	1			
Indeterminate/bark		6	16	7	2
Total		100	144	65	48

Figures are actual counts. r = roundwood

small quantities of cremated bone and, therefore, are likely to represent redeposited pyre debris (McKinley, this volume). Since there were no duplicate skeletal elements between these eight deposits and those recovered from the remains of the two burials, all the bone could have derived from the same two cremations (*ibid*). A comparison of the charcoal data suggests that the largest assemblages (>100 fragments) (from 252214/sample 8214, 252218, 252220) appeared to also contain larger sized charcoal fragments, which, notwithstanding post-depositional processes, may suggest that a higher proportion of the pyre debris was collected and re-deposited in these contexts. Of hese, 252218 and 252220 contained infant/child bone and 252214 bone from a subadult/adult >13 years old (*ibid*).

The cremation assemblages were all dominated by oak charcoal, with rare *cf* elm, blackthorn-type and buckthorn, and rare/frequent ash. The common occurrence of oak fragments with tyloses in 252218 and 252214 suggests that part of the pyres for these two cremations were constructed out of mature oak trees. The non-oak taxa are likely to represent brushwood/kindling and/or pyre goods.

Table 18.2 Charcoal analyses: deposits from the Late Bronze Age Cremation Cemetery 252229 (Zone 4, Landscape 3)

Context No.	*Sample No.*	*Flot size ml*	*Size of fragments*	Quercus *sp* *oak*	*cf* Ulmus *sp* *elm*	Prunus *sp* *blackthorn-type*	Acer campestre *field maple*	Rhamnus cathartica *buckthorn*	*Indet.*
252210	8205	10	>2mm	22			7		
252212	8206	23	>2mm	32					1
252214	8207	27	>2mm	42					2
252214	8214	200	>4mm	121 (22 with tyloses)					
252216	8208	25	>2mm	85		2		1	1
252218	8209	105	>4mm	112 (7 with tyloses)		2			18
252220	8210	40	>4mm	149					4
252222	8211	5	>2mm	60					
220140	8212	<5	comminuted						
220142	8213	50	>2mm	119	2	1			1
220142	8217	<5	comminuted						
252226	8215	<5	comminuted						
252228	8216	50	>2mm	59		1	4		1

Figures are actual counts

Middle Iron Age

The two Early/Middle Iron Age assemblages were from pit fills (Table 18.1). One, 211046, a charred deposit in the base of pit 211043 (Zone 13) was dominated by oak, and the other, 173281, a fill within pit 173275 (Zone 6), was dominated by hazel. The limited evidence suggests that oak was still available locally and utilised as wood fuel during this period. However, the presence of ash, a light demanding tree, hawthorn-type, and blackthorn-type, indicates open/scrubby areas and/or hedgerows.

The abundant charred remains of stems/straw and rhizomes accompanying the hazel charcoal in pit fill 173281 are potentially interesting, and may represent burnt household/stable waste. Indeed the inclusion of charred amorphous 'lumps' in the deposit may very likely be the remains of livestock dung. Both prehistoric and historic evidence for leaf and twig foddering through the winter months, when livestock tends to be housed, is well attested. The process involves either the cutting/storing of leaf bearing twigs during the summer or the cutting of fresh twigs (with or without new growth) in late winter or early spring (Hass *et al* 1998). Although documented use of hazel as fodder appears limited (Edlin 1949), as is unequivocal evidence for foddering from British prehistoric sites (though this appears to be being addressed), there is no reason to suggest that hazel was not used even, perhaps, as a by-product of coppicing or pollarding.

Roman (Table 18.3)

Even though the two sunken-featured buildings included in the study came from slightly different time periods and different landscape types (mid-late Roman SFB 249081/5 from Zone 20, and late Roman SFB 170132 from Zone 6), all four of the assemblages from these features were dominated by blackthorn-type roundwood, including probable wild cherry. A couple of the fills also contained small roundwood from a number of other scrubby/hedgerow taxa, such as hawthorn-type, field maple, buckthorn and elder. Significantly, very few oak fragments were recorded from these features.

The fact that the three deposits from SFB 170132 were associated with an oven suggests that the charcoal probably represents fuel wood rather than burnt structural remains. The dominance of blackthorn-type, including wild cherry in the SFBs may either indicate its deliberate selection, or that there was a very limited supply of other available woody taxa during this period. Although wild cherry is not regarded as a typical wood for fuel, its pleasant aroma when burnt is noteworthy (Edlin 1949). The presence of charred plant remains and bone in the SFB fills may represent the waste from activities taking place in the building, such as food processing/cooking. Although the oven fill itself, 289055, was also dominated by blackthorn-type,

Table 18.3 Charcoal analyses: Roman features

Landscape		*1*	*1*	*3*	*3*	*3*
Zone		*20*	*20*	*6*	*6*	*6*
Context No		*205141*	*215239*	*289044*	*289054*	*289055*
Sample No		*7704*	*7767*	*5397*	*5398*	*5395*
Feature No		*249081*	*249085*	*170132*	*170132*	*176181*
Feature type		*Basal layer of sfb*	*Fill of sfb*	*Spread overlying fire pit/oven in sfb*	*Spread overlying fire pit/oven in sfb*	*Fill of oven in sfb 170132*
Fill description			*backfill*			*Primary fill*
Phase		*MRB*	*MLRB*	*LRB*	*LRB*	*LRB*
Sample Size L						
% >4mm analysed		*100%*	*100%*	*75%*	*50%*	
% >2mm analysed						*100%*
Notes			*Abundant CPR.*	*Flot contains bone and daub, plus frequent CPR. Lots of small roundwood.*		
Acer campestre	field maple		cf 2		1	
Alnus glutinosa	alder				1	
Corylus avellana	hazel	1	7r			
Coniferous wood	indet conifer					1
Fraxinus excelsior	ash	1				6
Maloideae	hawthorn-type	cf 1	11			3
Prunus spinosa	sloe/blackthorn	3				4
Prunus cf *avium*	cf wild cherry	6r	20r	44r		7
Prunus sp	sloe/blackthorn or wild/bird cherry	51r	16r	62r	105r	15
Quercus sp	oak	3	4	3		10
Rhamnus cathartica	buckthorn	1r				
Sambucus nigra	elder		2			
Indeterminate/bark		8	11	18	16	20
Total		75	73	127	123	66

Figures are actual counts. r = roundwood

Table 18.4 Charcoal analyses: Saxon and Medieval features

Landscape		*2*	*2*	*2*	*3*
Zone		*14*	*14*	*14*	*3*
Context No		*133079*	*176068*	*182133*	*204027*
Sample No		*6904*	*6563*	*6943*	*5122*
Feature No		*159219*	*176064*	*182127*	*172057*
Feature type		*Depost (associated with shellfish processing?)*	*Pit*	*Pit*	
Ditch					
Fill description		*Backfill*	*Backfill*	*Sscondary fill*	*Backfill*
Phase		*SAXON*	*SAXON*	*SAXON*	*MEDIEVAL*
Sample Size L					
% >4mm analysed		*50%*	*100%*	*25%*	
% >2mm analysed			*50%*		*100%*
Notes		*Frequent calcined bone*	*Contains daub, abundant CPR, and bone*	*Abundant CPR and bone fragments*	*Abundant CPR*
Acer campestre	field maple	4	12		
Alnus glutinosa/Corylus avellana	alder/hazel	1	2		
Corylus avellana	hazel	1		64r	
Cornus sanguinea	dogwood	2	2		
Fagus sylvatica	beech		4		
Ligustrum vulgare	wild privet	5			
Maloideae	hawthorn-type			35r	
Prunus spinosa	sloe/blackthorn	16r		2r	5
Prunus cf *avium*	cf wild cherry	1	28r		37r
Prunus sp	sloe/blackthorn or wild/bird cherry	55r	17r	11r	11
Quercus sp	oak		11		3
Viburnam lantana	wayfaring-tree			10	
Indeterminate/bark		14	18	28	3
Total		99	94	150	59

Figures are actual counts. r = roundwood

including positively identified blackthorn and probable wild cherry, it also contained a common oak and ash. Rare hawthorn-type charcoal and a fragment of indeterminate coniferous wood were also recorded in this feature.

Saxon and medieval (Table 18.4)

Blackthorn-type roundwood continues to dominate in the Saxon deposits 133079 (ditch 159219) and 176068 (pit 176064), both in Zone 14, and the medieval ditch fill 204027 in Zone 3. The third Saxon pit fill, 182133 (pit 182127), in Zone 14, also contained blackthorn-type charcoal, but this feature was dominated by hazel roundwood, with a smaller component of hawthorn-type. Rare to frequent numbers of other, previously recorded, taxa include field maple and oak. However, species recorded exclusively in the Saxon features include dogwood (*Cornus sanguinea*), beech (*Fagus sylvatica*), wild privet (*Ligustrum vulgare*) and wayfaring-tree (*Viburnam lantana*). All of these taxa would have thrived on the chalk soils, possibly forming open scrubby woodland or hedges. All of the deposits, including 133079, which is interpreted as being possibly associated with shellfish processing, contained other material such as calcined bone and/or charred plant remains characteristic of 'domestic' rubbish.

Discussion

The charcoal evidence from the Early Neolithic pits on EKA2 is broadly similar to assemblages from two Early Neolithic pits discovered during excavations on the A2/A282 improvement scheme near Dartford, west Kent (Druce 2011, 171). Although oak appears to have been used as a major wood, like the east Kent pits the A2/A282 pits also provided direct evidence for the Early Neolithic utilisation of woodland edge/ scrubby taxa.

Early Neolithic pollen records from both the A13 in east London, and the lower Ebbsfleet valley in west Kent indicate a regional woodland of oak, lime (*Tilia cordata*), elm, ash and hazel (Stafford *et al* 2012; Peglar forthcoming). Although significant woodland clearance is not evident in the region until the Late Neolithic/Early Bronze Age period, records from both sites indicate small temporary clearance activity prior to this. This activity is characterised by a decline in arboreal pollen (specifically lime in the lower Ebbsfleet valley), coincident with a rise in yew and open woodland/scrubby taxa such as buckthorn (*Rhamnus cathartica*) and wayfaring-tree (Stafford *et al* 2012). Given that lime was likely to have been a major constituent of the Early Neolithic woodland on the sandy soils of the Thanet Beds, its absence from the charcoal records is intriguing.

There is a growing body of evidence to suggest the deliberate selection of a single taxon, predominantly oak, for pyre construction during the Bronze Age in southern Britain. Oak charcoal appeared to be the dominant wood fuel in deposits associated with Bronze Age cremation burials on the A2/A282 near Dartford (Druce 2011, 172), A2 Pepper Hill, Gravesend (Challinor 2012), and two Oxfordshire sites, Barrow Hills (Thompson 1999) and Gravelly Guy (Gale 2004). Thompson (1999) suggests that a single tree or shrub may have been selected for the bulk of the pyre construction. The selection itself was possibly determined by the status, sex or age of the individual (Campbell 2007). Although oak-dominated Bronze Age cremations appear to be the most common to date, other species, such as ash and, more recently, hawthorn-type, have also been recorded (Challinor 2009).

Many of the regional pollen sequences broadly agree, and show the onset of a significant reduction in woodland cover from the Late Neolithic/Early Bronze Age period onwards. Evidence from both the A13 and the lower Ebbsfleet valley shows a reduction in arboreal pollen, in particular lime, coincident with an increase in scrubby/hedgrow taxa, open grassland, and cultivation signals. Oak and hazel certainly persist during the Late Bronze Age period, but may have become increasingly localised. Unfortunately, there were no Late Bronze Age domestic contexts from EKA2 with which to compare the cremation data. Therefore, it is unclear whether oak was specifically selected for ritual activities, or was also utilised in day to day activities.

The diversity of taxa and dominance of blackthorn-type wood in the Roman SFBs and oven fill may, tentatively, suggest differences in wood collection for domestic purposes in this period. This trend was very much apparent at Cottington Hill in Thanet, where there appeared to be a distinction between 'domestic' and 'ritual' wood fuel which Challinor (2009) suggests may indicate pressure on local woodland resources.

Many Roman sites in Kent, such as Cottington Hill, Northumberland Bottom (Challinor 2006b), Saltwood Tunnel (Alldritt 2006) and Northfleet Roman Villa (Barnett 2011, 118), show a general reduction in the use of oak in domestic contexts, coupled with a reliance on local scrub/hedgerow flora. However, this trend is by no means universal. Other Roman domestic sites, such as those at Thurnham, Kent, (Challinor 2006c) and Dartford (Druce 2011), show the continued use of oak in domestic contexts. It would appear, therefore, that areas of oak woodland were highly localised by this time.

The evidence from EKA2 suggests that blackthorn/wild cherry and hazel continued to be a major source of wood fuel during the Saxon and medieval periods. The appearance of beech for the first time in Saxon deposits is of interest, and is consistent with other records in the region, such as those from Dartford (Druce 2011) and A2 Pepper Hill (Challinor 2012), which show beech only occurring in Saxon or medieval features. Although beech pollen has been recorded in south-east England in deposits dated to the Middle Neolithic period (Birks 1989; Rackham 2003) its poor pollen production means that its exact pattern of colonisation and expansion is unclear.

Pollen evidence from sites such as Northfleet, near Gravesend, suggests that relatively little woodland was extant in the area by the Saxon period (Scaife 2011), and woodland place-names in Thanet are rarely mentioned in the Domesday Book (Rackham 2003). It is unclear whether the late occurrence of beech and the other calcicolous (chalk-loving) shrubs at EKA2 is due to pressure on established woodland resources, and hence their appropriation (be it locally or from further afield), or whether they only really became established in the region once the removal of the original woodland was more or less complete. Beech, after all, is a good wood fuel (Edlin 1949) and, therefore, its absence from earlier features is intriguing.

Conclusion

The charcoal from EKA2 has provided extremely useful data on wood selection and the nature of the woody environment in north-east Kent over a significant time period. There are no obvious patterns in the nature of the woodland exploited between landscape types. Rather, chronological trends are apparent, which support existing evidence.

These trends include:

1) The Early Neolithic utilisation of oak, coupled with direct evidence for Early Neolithic woodland disturbance, previously highlighted in many of the mid-Holocene pollen records from East London. This is characterised by the utilisation of woodland edge/scrubby taxa, such as hawthorn-type and ash. The absence of lime on EKA2 and other sites in the region is intriguing, as lime is likely to have formed a large constituent of the woodland prior to its decline around the Late Neolithic/Early Bronze Age period (Stafford *et al* 2012).
2) Consistent evidence for oak-dominated cremation burial assemblages during the Late Bronze Age period
3) Significant reduction in the utilisation of oak in later periods, coupled with a greater reliance on woodland edge/scrubby taxa such as blackthorn-type, hawthorn-type, field maple, elder, and buckthorn. This shift, however, is not evident at all sites. Localised pockets of oak and hazel woodland probably still existed in the region during the Roman period.
4) The later occurrence of beech, coupled with an increase in chalk-loving shrubby taxa such as dogwood, wild privet and wayfaring-tree in the Saxon deposits. This possibly reflects changes in resource use/collection due to loss of other woodland and/or changes in the local woody environment. It is unclear whether this trend is widespread, or very localised.

Chapter 19

Land Snails

by Elizabeth Stafford

Introduction

One hundred and fifty-one incremental samples from 14 feature profiles from Zones 11, 14, 17, 19, 21 and 23 were collected specifically for the retrieval of land snail assemblages. The samples derived from a series of Bronze Age ring-ditches, a Late Bronze Age gully, a series of Roman ditches, a mid-Saxon possible well or waterhole and a late Saxon pit. A representative selection from each sample profile, totalling 100 samples, was processed and scanned in detail in 2011 as part of the initial assessment phase. This included a sample from at least every context, and more if these were greater than *c* 0.10-0.20m in thickness. On the broadest level the assessment aimed to determine the presence/absence of identifiable shell; provide data on taxonomic content; and to outline requirements for further work. The assessment report revealed that shell was well preserved in countable numbers in a number of the Bronze Age sequences. Subsequently in 2012, 19 samples from three feature profiles from Zones 13 and 23 were analysed further. The following report includes the results of both the assessment and detailed analysis.

Methods

Processing and assessment

The weight of sediment processed for the snail samples was 2kg. The samples were floated onto 0.5mm mesh and the fine residues were also retained to 0.5mm. Both flots and residues were air-dried. For the assessment stage the flots were scanned under a binocular microscope at up to x40 magnification and an indication of the abundance of identifiable shell along with key taxa were noted on a sliding scale (+ = 1-3, ++ = 4-12, +++ = 13-25, ++++ = 26-50, +++++ = 51-100, ++++++ = >100). The results are presented in Tables 19.1, 3, 4, 6-12.

Analysis

The assessment report recommended that samples from three features of Bronze Age to Iron Age date be analysed in detail. Spatial variation was noted in the assemblages between the sequences from Zones 21 and 23 on the one hand, and Zone 13 on the other. These sequences offered potential to provide data on the processes of feature infilling, the nature of the local environment and episodes of woodland/scrub regeneration, and possibly to clarify the nature of the implied boundary between woodland and open land in Zone 13. In order to address this and provide a definitive species list, one sequence from Zone 23 (ring-ditch 290062; barrow 195070) and one from Zone 13 (ring-ditch 246049; barrow 134096) were analysed in detail, along with the lower shell-bearing fills from gully 168056 in Zone 13. It was thought unlikely that further detailed work on the remaining samples would provide significant data additional to those presented in the assessment report due to the similarity of the open country assemblages and variable shell preservation.

For the analysis stage whole shells and apical fragments were carefully extracted from 19 flots and residues. Shells were identified with the aid of a modern reference collection and counted. The results are presented in Tables 19.2, 19.5 and 19.7 and Fig 19.1.

Species identification and ecology

Nomenclature follows Kerney (1999). No attempt has been made to identify juveniles and apical fragments of *Cochlicopa* spp. It is often difficult to distinguish between juveniles of *Vallonia* spp. in very worn or encrusted examples. Where several species were present in the analysed samples juveniles have been divided in the proportions noted for adult specimens. *Cecilioides acicula* was excluded from the totals since it burrows deeply and provides no useful information on conditions as a sediment or soil formed. This snail was extremely numerous in some samples and its inclusion in the total tends to obscure the results from the other species. Of the other species listed, *Pomatias elegans* burrows just below the surface of loose soil or leaf litter, so does give useful palaeoecological information. Note was also made of the size and preservation of some species with robust shells, such as Clausiliidae and *P. elegans*, since they tend to reside in soils for longer periods. The presence of well-preserved and whole shells along with the more fragile shelled species such as the Zonitidae could be seen as a good indicator of the degree to which the assemblages are formed *in situ* (autochthonous), as opposed to those which have been transported (allochthonous).

Ecological groups broadly follow the scheme of Evans (1972; 1984) whereby species are broadly divided into those with open-country, catholic and shade-demanding preferences.

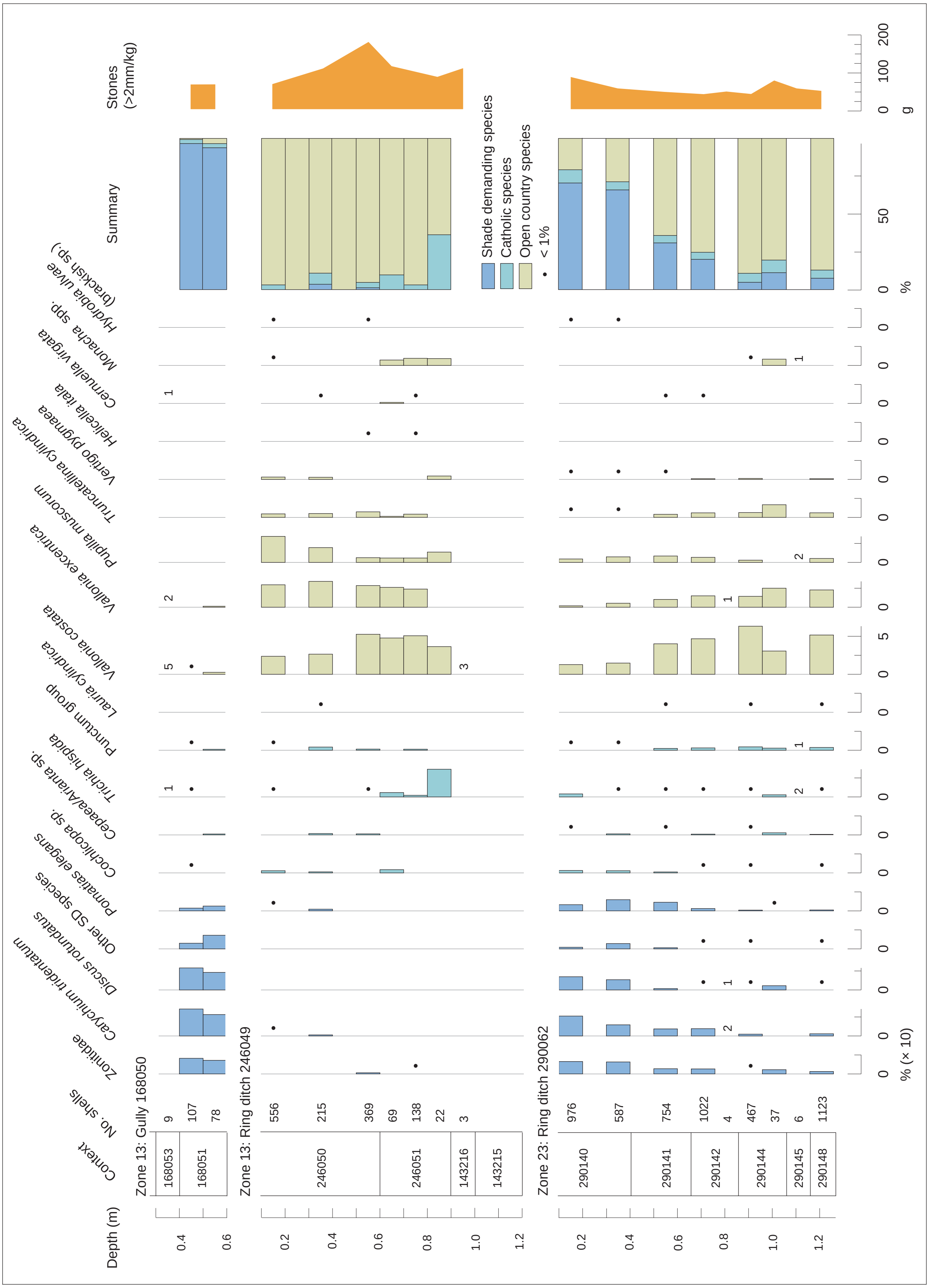


Fig. 19.1 Molluscs from Bronze Age ring-ditch 246049 (Zone 13), gully 168050 (Zone 13), and ring-ditch 290062 (Zone 23)

Table 19.1 Summary of route-wide mollusc samples

Phase	*Zone*	*Intervention*	*Feature*	*No. increments*	*No. assessed*	*Shell abundance*	*No. analysed*
Late Saxon	17	143037	Pit	8	8	x	
Mid-Saxon	11	189017	Well/ waterhole	8	6	x	
Roman	11	141061	Ditch	13	5	good	
	14	173001	Ditch	10	8	x	
		174191	Ditch	12	8	x	
		222039	Ditch	10	6	x	
	19	217098	Ditch	9	7	good	
LBA-EIA	13	168050	Gully	6	3	moderate	3
BA	13	246049	Ring ditch	12	8	good	7
	21	216075	Ring ditch	11	6	good	
		289057	Ring ditch	12	0	good	
	23	170011	Ring ditch	12	12	x	
		182044	Ring ditch	15	15	moderate	
		290062	Ring ditch	13	8	good	9
Total				151	100		19

x = shell poorly preserved

Table 19.2 Zone 13, molluscs from Bronze Age ring-ditch 246049 (Barrow 134096)

Phase				*Early Bronze Age*			
Feature				*Ring ditch*			
Intervention:	*246049*						
Context		*246050*			*246051*	*143216*	
Sample	*7151*	*7153*	*7159*	*7156*	*7157*	*7158*	*7159*
Depth	*0.1-0.2*	*0.3-0.4*	*0.9-1.0*	*0.6-0.7*	*0.7-0.8*	*0.8-0.9*	*0.9-1.0*
Brackish water							
Hydrobia ulvae	2		1				
Open Country							
Truncatellina cylindrica	26	11	27	1	6		
Vertigo pygmaea	17	6				1	
Pupilla muscorum	190	42	23	4	8	3	
Vallonia costata	132	57	194	33	70	8	3
Vallonia excentrica	164	73	105	18	33		
Helicella itala			1		1		
Cernuella virgata		1		1	1		
Catholic							
Cochlicopa spp.	16	3		3			
Punctum pygmaea		8	6				
Vitrina pellucida					1		
Nesovitrea hammonis	2	1			1		
Monacha spp.	2				13	2	
Trichia hispida	1		1	5	9	8	
Cepaea/Arianta sp.		4	5	4			
Lauria cylindrica		1					
Shade-demanding							
Pomatias elegans	1	5					
Acicula fusca							
Carychium tridentatum	3	3					
Acanthinula aculeata							
Spermodea lamellata							
Vertigo pusilla							
Discus rotundatus							
Vitrea spp.							
Aegopinella pura							
Aegopinella nitidula			6				
Oxychilus cellarius					1		
Clausilia bidentata							
Total	556	215	369	69	138	22	3

Table 19.3 Zone 13, molluscs from Bronze Age ring ditch 216075 (Barrow 216090)

Phase	*Early Bronze Age*					
Feature	*Ring-ditch*					
Intervention:	*216075*					
Context	*216083*	*216082*	*216081*	*216078*	*216077*	
Sample	*8005*	*8007*	*8009*	*8011*	*8013*	*8014*
Depth	*0.10-0.20*	*0.30-0.40*	*0.45-0.55*	*0.65-0.75*	*0.80-0.90*	*0.90-1.00*
Brackish water						
Hydrobia ulvae		+				
Open Country						
Truncatellina cylindrica		+	++	+++	+	
Vertigo pygmaea	+	+	+	++	+	
Pupilla muscorum	++	+++	++	+++++	+	+
Vallonia costata	++++++	++++++	+++++++	+++++++	++	+
Vallonia excentrica	+++++	+++++	+++++	++++	+	+
Catholic						
Cochlicopa sp.	+++	+++++	+	+	+	
Punctum pygmaea	+++++	+++++	+	+++	+	
Vitrina pellucida				+		
Nesovitrea hammonis	+			+++		
Monacha spp.				+		
Trichia hispida	+++	++	+			
Cepaea/Arianta sp.			+			
Shade-demanding						
Pomatias elegans	++	+++++	+++++	++++++		+
Carychium tridentatum	+++++++	+++++++	+++++++	+++++++	++	+
Acanthinula aculeata	+	+++++	+	++	+	
Ena obscura	+	++	+			
Discus rotundatus	++++++	+++++	+++	+		
Vitrea spp.	++	++++++	++	++	+	+
Aegopinella pura	+	++++	++	++	+	
Aegopinella nitidula	+++	++++	++	+		
Oxychilus cellarius	++	++++	+	++		
Clausiliidae		+++	+	+		
Estimated total	500	900	500	600	37	10

+ = 1-3, ++ = 4-12, +++ = 13-25, ++++ = 26-50, +++++ = 51-100, ++++++ = >100

Table 19.4 Zone 23, molluscs from Bronze Age ring-ditch 170011 (Barrow 195054)

Phase	*Early Bronze Age*							
Feature	*Ring-ditch*							
Intervention:	*170011*							
Context	*170014*	*170012*	*170013*					
Sample	*6112*	*6113*	*6114*	*6115*	*6116*	*6117*	*6119*	*6120*
Depth	*0.00-0.10*	*0.10-0.20*	*0.20-0.30*	*0.30-0.40*	*0.40-0.50*	*0.50-0.60*	*0.30-0.40*	*0.40-0.50*
Open Country								
Truncatellina cylindrica					+		+	
Vertigo pygmaea								
Pupilla muscorum		+	+	+			+	
Vallonia spp.		+	+	+	+	+	++	++
Catholic								
Punctum pygmaea				+				
Cepaea/Arianta sp.					+	++		
Shade-demanding								
Discus rotundatus								
Vitrea spp.								
Total	0	3	2	6	6	8	16	8

+ = 1-3, ++ = 4-12, +++ = 13-25, ++++ = 26-50, +++++ = 51-100, ++++++ = >100

Table 19.5 Zone 23, molluscs from ring ditch 290062 (Barrow 195070)

Phase	*Early Bronze Age*								
Feature	*Ring-ditch*								
Intervention:	*290062*								
Context	*290140*	*290141*	*290142*	*290144*	*290145*	*290148*			
Sample	*6174*	*6176*	*6178*	*6180*	*6181*	*6182*	*6183*	*6184*	*6185*
Depth	*0.10-0.20*	*0.30-0.40*	*0.50-0.60*	*0.65-0.75*	*0.75-0.85*	*0.85-0.95*	*0.95-1.07*	*1.05-1.15*	*1.15-1.25*
Brackish water									
Hydrobia ulvae	1	2							
Open Country									
Truncatellina cylindrica	9	5	31	61		30	6		68
Vertigo pygmaea	3	1	7	10		6			11
Pupilla muscorum	44	43	63	68		14		2	58
Vallonia costata	125	87	302	477		295	11		581
Vallonia excentrica	19	31	78	153	1	67	9		255
Cernuella virgata			1	2					
Catholic									
Cochlicopa spp.	31	17	10	1		1			1
Punctum pygmaea	6	2	10	22		19			37
Vitrina pellucida						2	1	1	1
Nesovitrea hammonis	3	1	9	10					3
Monacha spp.						4	3	1	
Trichia hispida	39	4	1	2		2	1	2	2
Cepaea/Arianta sp.	9	8	5	8			1		6
Cepaea hortensis			1	2					3
Cepaea nemoralis				1		2			2
Lauria cylindrica			2			2			7
Shade-demanding									
Pomatias elegans	80	87	86	32		5	+		15
Acicula fusca									
Carychium tridentatum	256	86	70	98	2	11			33
Acanthinula aculeata	7		8	5					1
Ena obscura	1	4							
Discus rotundatus	170	79	14	2	1	3	2		2
Vitrea spp.	45	23	26	38		2	2		27
Aegopinella pura	36	11	8	4					1
Aegopinella nitidula	69	47	10	5					
Oxychilus cellarius	10	12	8	21		1			9
Clausilia bidentata	13	36	4			1			
cf. *Balea perversa*		1							
Total	976	587	754	1022	4	467	36	6	1123

6121	*6123*	*6124*	*6125*
0.50-0.60	*0.30-0.40*	*0.40-0.50*	*0.50-0.60*
			+
			+
+	+	++	++
	+		
		+	+
	+		
			+
3	3	12	17

Results

The results are presented in tabular format in Tables 19.1-12. Table 19.1 is a summary of the sampled sequences; number of samples assessed and analysed, and includes comment on the general level of shell abundance (ie, identifiable whole shells and apical fragments). In six of the feature profiles examined shell was either absent or poorly preserved. In the remaining eight sequences shell preservation was moderate to very good.

Bronze Age

Zone 13: Bronze Age ring-ditch 246049; barrow 134096 (Table 19.2, Fig 19.1)
Of the ten samples examined from ring-ditch 246049, the three lowermost (ctx 143216 and 143215) contained no shell apart from three shells of the grass snail *Vallonia costata*. Shell numbers increased up-profile from context

246051 reaching up to 556 individuals at the top of the sequence. Overall the assemblages were dominated by open country species (88-96%) indicative of open grassland relatively free of shade. There is no indication of denser vegetation such as long grass or scrub growing within the feature as it infilled. The two species of *Vallonia* were present in numbers. Other significant species included *Pupilla muscorum*, *Truncatellina cylindrica* and *Vertigo pygmaea*. The xerophile species *T. cylindrica* is noteworthy, a species of very dry exposed places; it is very rare today but was probably more widespread in the Neolithic and Bronze Age, particularly on chalk downland (Kerney 1999, 89). There was no indication of significant change within the profile apart from increasing shell numbers towards the top suggesting a reduction in the rate of sediment accumulation and increased stability of the feature edges. The micro-environment of the ditch is likely to have had less of an influence as the ditch became shallower and the changes in the proportion of the two *Vallonia* sp. and *Pupilla muscorum* could be reflecting this. *V. costata* was most abundant in fill 246051 at *c* 50%, with *V. excentrica* at *c* 25%. Within the overlying fill 246050 *V. excentrica* increases and slightly outnumbers *V. costata* at up to 34%. *Pupilla muscorum* also increases from 6% to 34%. The assemblages from fill 246050 indicate well-established short-turfed (grazed) grassland in the vicinity, possibly a little impoverished with patches of bare earth. Occasional worn specimens of the brackish water snail *Hydrobia ulvae* were probably transported to the site perhaps attached to vegetation.

Zone 21: Bronze Age ring-ditch 216075; barrow 216090 (Table 19.3)

Six samples were examined at the assessment stage from ring-ditch 216075. Shell was extremely well-preserved, with up to *c* 900 individuals recorded at 0.3-0.4m, although shells in the lowest two samples were less abundant. The assemblages were dominated by open country species (*Vallonia, Pupilla muscorum, Truncatellina cylindrica*) together with *Pomatias elegans* and *Carychium tridentatum*. This suggests an open grassland environment but with areas of long grass probably around and within the feature. From 0.30-0.40m the large numbers of shells from a diverse range of species suggest increased surface stability and perhaps the growth of scrub with some tree cover. This latter development is similar to the analysed sequence from ring-ditch 290062 in Zone 23 (see below).

Zone 23: Bronze Age ring-ditch 170011; barrow 195054 (Table 19.4)

Twelve samples were assessed from inner ring-ditch 170011. Shell was very poorly preserved with up to 17 individuals recorded at 0.50-0.60m in ctx 170013. Of the

Table 19.6 Zone 23, molluscs from Bronze Age ring-ditch 182044 (Barrow 195004)

Phase				*Early Bronze Age*			
Feature				*Ring-ditch*			
Intervention:	*182044*						
Context	*182060*	*182058*	*182057*	*182056*			
Sample	*6127*	*6128*	*6129*	*6130*	*6131*	*6132*	*6133*
Depth	*0.00-0.10*	*0.10-0.20*	*0.20-0.29*	*0.29-0.39*	*0.39-0.49*	*0.49-0.59*	*0.59-0.69*
Open Country							
Truncatellina cylindrica							
Vertigo pygmaea			+			+	
Pupilla muscorum	++++	++++	+++	++	++	++	+
Vallonia costata	++	++		++	+++	+++++	++
Vallonia excentrica	+	+++	++	++	++	++	+
Helicella itala		++		+	+		
Catholic							
Cochlicopa spp.						+	
Punctum pygmaea							
Nesovitrea hammonis							+
Trichia hispida						+	
Cepaea/Arianta sp.							+
Shade-demanding							
Pomatias elegans	+	+	+	+	+	+++	++
Carychium tridentatum	+		+		+	+	+
Acanthinula aculeata							
Discus rotundatus	+	+	+		+	+	
Vitrea spp.						++	
Aegopinella pura							
Aegopinella nitidula						+	
Oxychilus cellarius							
Clausiliidae				+	+		
Estimated total	50	80	30	30	30	150	20

+ = 1-3, ++ = 4-12, +++ = 13-25, ++++ = 26-50, +++++ = 51-100, ++++++ = >100

shells that were identified open country species were most prevalent with little indication of change within the profile.

Zone 23: Bronze Age ring-ditch 290062; barrow 195070 (Table 19.5, Fig 19.1)

Nine samples were analysed from ring-ditch 290062. In contrast to many of the sequences examined along the scheme, shell was abundant in the lowest sample at 1.15–1.25m (ctx 290148), with 1123 individuals. Being the lowest fill of the feature this could imply that the sediment incorporated contemporary topsoil. The assemblage was dominated by open country species (87%) indicative of well-established short-turfed grassland. The presence of shade-demanding species to 8% (mainly Zonitidae and *Carychium tridentatum*) and catholic species to 6% may indicate that areas of longer more diverse grassland also existed in the immediate vicinity, although *Oxychilus, Vitrea* and *Discus* may also have been attracted to the rubbly surfaces within the base of the feature (ie, a troglophile fauna, see Evans and Jones 1973). The much smaller number of shells in some of the samples immediately overlying indicate episodes of rapid sedimentation and erosion of feature edges, conditions not conducive to preservation. This is reflected in a peak in the proportion of stones in the fills at 0.95–1.05m.

Above 0.75m in fill 290142, shell abundance increases dramatically indicating increased stability. The open-country species accounted for 75% of the assemblage with the shade-demanding component rising to 20%, perhaps indicating that the feature was becoming vegetated with long grass. *C. tridentatum* was again most abundant, along with the Zonitidae. Within fills 290141 and 290140 the shade-demanding component continues to rise reaching 70% at the top of the sequence, with the open country component reduced to 21%. *C. tridentatum* remains dominant at 26%, with the Zonitidae at 16% and *D. rotundatus* increasing substantially to 17%. Other notable species that become more abundant are *Clausilia bidentata*, *Ena obscura* and *Acanthinula aculeata*. Overall this suggests the presence of scrub and/or open woodland that may have been growing around or within the feature. The soil micromorphology from 290140 indicated that this soil was a bioworked and homogenised humic fine soil, probably representing a local calcareous brown earth over a relatively more minerogenic fill, and the snails are consistent with this. The consistent presence of *Pomatias elegans*, particularly in the upper fills, indicates some disturbance and loose surfaces.

Zone 23: Bronze Age ring-ditch 182044; barrow 195004 (Table 19.6)

Fifteen samples were assessed from ring-ditch 182044. Shell was less well-preserved in this profile compared to

Early Bronze Age Ring-ditch							
6134 0.69-0.79	*6135 0.80-0.90*	*6136 0.90-1.00*	*6137 1.00-1.16*	*6138 1.10-1.16*	*6139 1.16-1.26*	*6140 1.26-1.36*	*6141*
+	++	+	+	+			
	++		+				
++	++	++					
++++	+++++	++++	++++	++		+	
++	++	+	+				
+							
	+						
+				+	+	++	
	+	+	+				
+	+		+			+	+
+++++	+++	+	+				
++	++	+					
	+	+	+	+			
+	+	+	+				
		+	++	++			
			+				
150	100	50	70	22	3	6	1

some of the others examined. The lowermost contexts produced few shells but numbers did increase up-profile to a maximum of *c* 150 individuals per sample. Once again open-country species dominated. Increases of *P. elegans* in fill 182057 may indicate some surface disturbance here. A small component of shade-demanding elements was present throughout the profile but not in significant numbers.

Late Bronze Age to Early Iron Age

Zone 13: Late Bronze Age–Early Iron Age gully 168056 (Table 19.7, Fig 19.1)
Six samples were examined from gully 168056 (intervention 168050). Shell was absent between 0.0-0.3m. Only the two lowermost two samples, at 0.4-0.6m (ctx 168051), produced useful quantities of shell. Although numbers were still quite low at 107 and 78 individuals, the shells were quite well preserved. These samples are significant in that the assemblages comprised almost entirely shade-demanding species (94-96%) with only occasional catholic and open country species. The composition of the assemblage suggests that the sediment formed in relatively enclosed conditions with tree cover and leaf litter. The most abundant species were *Carychium tridentatum*, *Discus rotundatus*, and Zonitidae. Other species included *Acicula fusca*, *Acanthinula aculeata*, *Spermodea lamellata*, *Vertigo pusilla* and *Clausilia bidentata*. Two species present here are of significance; *A. fusca* (point snail) and *S. lamellata* (plaited snail) are associated with ground litter in old deciduous woodland and are characteristic of late Boreal/Atlantic closed woodland environments, becoming quite rare after the Neolithic (Davies 2008, 173-4).

Table 19.7 Zone 11, molluscs from Late Bronze Age–Early Iron Age gully 168050

Phase	*Late Bronze Age–Early Iron Age*		
Feature	*Gully*		
Intervention:	*168050*		
Context	*168053*	*168051*	
Sample	*7173*	*7174*	*7176*
Depth	*0.3-0.4*	*0.4-0.5*	*0.5-0.6*
Open Country			
Vallonia costata	5	1	2
Vallonia excentrica	2		1
Cernuella virgata	1		
Catholic			
Cochlicopa spp.		1	
Punctum pygmaea		1	1
Trichia hispida	1	1	
Cepaea/Arianta sp.			1
Shade-demanding			
Pomatias elegans		4	5
Acicula fusca		2	6
Carychium tridentatum		38	22
Acanthinula aculeata			4
Spermodea lamellata		2	
Vertigo pusilla		1	
Discus rotundatus		31	18
Vitrea spp.		4	1
Aegopinella pura		9	4
Aegopinella nitidula		1	1
Oxychilus cellarius		8	7
Clausilia bidentata		3	4
Total	9	107	77

+ = 1-3

Roman

Zone 11: Roman ditch 190417 (intervention 141061) (Table 19.8)
Five samples were assessed from ditch 190417. Shell was moderately to well-preserved with up to *c* 400 individuals at 0.70–0.80m (ctx 141061). No change was detected in this sequence. The assemblages appeared to be very mixed, comprising a range of both open country, catholic and shade-demanding species and no clear environmental signal could be detected. It is possible that some of the shell in these assemblages represents reworked components deriving from the complex series of ditches cut by ditch 141061.

Zone 14: Roman ditches 159244 (intervention 174191), 159230 (intervention 222039) and 159219 (intervention 173001) (Table 19.9)
Fourteen samples were assessed from ditches 174191 and 222039. Shell was entirely absent from all samples apart from very occasional worn specimens of the brackish water snail *Hydrobia ulvae* in the basal two samples of ditch 174191 (ctx 174193, 0.80–1.10m). These shells were probably transported to the site perhaps attached to vegetation.

Eight samples were assessed from ditch 173001. Although preservation was a little better here, numbers were still very low, the most abundant sample at 0.00–0.10m containing only 37 individuals, with the remaining samples containing 5–17 individuals. The assemblages here were mixed comprising both open-country, catholic and shade-demanding species with no clear environmental signal.

Zone 19: Roman ditch 249029 (intervention 217093) (Table 19.10)
Seven samples were assessed from this feature. Shell was moderately to well-preserved, with up to *c* 450 individuals in context 217093 (0.30–0.40m). Initially the assemblages are dominated entirely by open country species indicative of a short-turfed grassland environment, perhaps with some areas of bare earth (eg, *Pupilla muscorum, Helicella itala, Truncatellina cylindrica* and the *Vallonias*). However from 0.70m upwards shell numbers increase dramatically, indicating increased stability. The open-country species are joined by a more diverse range of catholic and shade-demanding species suggesting that the feature became overgrown with rank grass and possibly a little scrub. The most numerous of these was *Carychium tridentatum*. Various zonitids and Clausiliidae were also noted.

Table 19.8 Zone 11, molluscs from Roman ditch 190147

Phase			*Roman*		
Feature			*Ditch*		
Intervention	*141061*				
Context	*141062*				
Sample	*5705*	*5706*	*5708*	*5710*	*5712*
Depth (m)	*0.40-0.50*	*0.50-0.60*	*0.70-0.80*	*0.90-1.0*	*1.10-1.20*
Brackish water					
Hydrobia ulvae			+		
Open Country					
Vertigo pygmaea	++	+	++	++	+
Pupilla muscorum	+			+	
Vallonia spp.	+++				
Vallonia costata	++	++++	+++++	++++	+++
Vallonia excentrica	+	++	++	++	+
Catholic					
Cochlicopa spp.		+	+++	++	+
Punctum pygmaea		+	+	+	+
Vitrina pellucida		+			
Nesovitrea hammonis		++			
Monacha spp.			++	+	
Trichia hispida	++	++++	+++++	+++	+++
Cepaea/Arianta sp.			+		
Helix aspersa			+		+
Shade-demanding					
Carychium tridentatum	++	++++	++++	++++	+++
Vertigo pusilla				+	
Acanthinula aculeata			+		+
Ena obscura			+		+
Discus rotundatus	++	++++	+++++	++++	++++
Zonitidae					
Vitrea spp.	+	++	++	++	+
Aegopinella nitidula	++	++	++++	+++	
Oxychilus cellarius	+	++	+++	++	
Clausiliidae		++	++	+	+
Estimated total	70	170	400	200	100

+ = 1-3, ++ = 4-12, +++ = 13-25, ++++ = 26-50, +++++ = 51-100, ++++++ = >100

Saxon

Zone 11: Mid-Saxon well/waterhole 189018 (Table 19.11)
Shell was largely absent from feature 189018 apart from occasional specimens of the open country species *Vallonia costata* and catholic species *Trichia hispida* and *Cepaea/Arianta* sp.

Zone 17: Late Saxon pit 143037 (Table 19.12)
Eight samples were assessed from pit 143037 dated to the late Saxon period. Shell was very poorly preserved in these samples. The shell that was present comprised open-country grassland species such as the *Vallonia* and *Pupilla muscorum*, along with occasional catholic species.

Discussion

The samples from EKA2 provide local environmental data for a number of the periods represented by the archaeological remains. However, since features from different phases with good preservation (largely confined to the chalk bedrock zones) are not distributed uniformly along the route it is impossible to provide a comprehensive characterisation of the development of the whole area for all periods. In addition, it is important to note that molluscan evidence from archaeological features may to some extent reflect very local conditions associated with features as opposed to soil and sediment sequences that may receive deposits from a wider catchment. There are obvious taphonomic problems related to the function of features, processes of infilling, sedimentation, erosion, reworking of older sediments, and post-depositional disturbance. It is important to demonstrate as far as possible if a feature has been deliberately backfilled, leading to the mixing of assemblages, and/or if the feature has been left open for any period, allowing sufficient time for *in situ* soil formation to occur. These issues, however, are inherent in molluscan analysis and are considered in the interpretation of the assemblages.

Although human activity is recorded during the Neolithic along the route, the earliest snail bearing deposits that were sampled date to the Bronze Age. The snail assemblages from EKA2 cannot, therefore, provide

Table 19.9 Zone 14, molluscs from Roman ditch 159219

Phase				*Roman*				
Feature				*Ditch*				
Intervention:	*173001*							
Context	*173002*	*173003*	*173004*					
Sample	*6950*	*6951*	*6952*	*6954*	*6956*	*6957*	*6958*	*6959*
Depth	*0.00-0.10*	*0.10-0.20*	*0.25-0.35*	*0.45-0.55*	*0.65-0.75*	*0.75-0.85*	*0.85-0.95*	*0.95-1.05*
Open Country								
Vallonia spp.						+		+
Vallonia costata	+++	+	+				+	
Vallonia excentrica	+							
Catholic								
Cochlicopa spp.		+			+	+	+	+
Trichia hispida	++	+	+	+	+	+	++	+
Cepaea/Arianta sp.	+							
Helix aspersa	+			+	+	+	+	
Shade-demanding								
Ena obscura							+	
Zonitidae		+						
Aegopinella nitidula	+			+	+		+	+
Oxychilus cellarius	+		+	+		+	+	+
Total	37	10	5	5	9	6	17	10

+ = 1-3, ++ = 4-12, +++ = 13-25, ++++ = 26-50, +++++ = 51-100, ++++++ = >100

Table 19.10 Zone 19, molluscs from Roman ditch 249029

Phase				*Roman*			
Feature				*Ditch*			
Intervention:	*217098*						
Context	*217093*	*217099*					
Sample	*6853*	*6856*	*6857*	*6858*	*6859*	*6860*	*6861*
Depth	*0.00-0.10*	*0.30-0.40*	*0.40-0.50*	*0.50-0.60*	*0.60-0.70*	*0.70-0.80*	*0.80-0.90*
Brackish water							
Hydrobia ulvae				+			
Open Country							
Truncatellina cylindrica	++	++	+		+	+	+
Vertigo pygmaea	+		+	+			
Pupilla muscorum	++++	++++	++++	++++	+++++	+++++	++++
Vallonia spp.	++	++++	+++	+++	+++	++	++
Vallonia costata	+++	++++++	++++++	+++++	++++	++	+
Vallonia excentrica	++	++	++	+++	+++		++
Helicella itala	+	+		+++	++++	++	++
Catholic							
Punctum pygmaea	+	++					
Nesovitrea hammonis		+			+		
Monacha spp.	+	+		+			
Trichia hispida				++			
Cepaea/Arianta sp.		+	+	+			
Lauria cylindrica							
Shade-demanding							
Carychium tridentatum	++	+++++	++++	+	++		
Vertigo pusilla	+	++++	+++	++	+		
Acanthinula aculeata	+	++	+				
Ena obscura				+	++		
Vitrea spp.	+	++		+			
Aegopinella pura	+	++					
Aegopinella nitidula		++	+				
Clausiliidae		+	+	+			
Total	100	450	200	200	200	80	60

+ = 1-3, ++ = 4-12, +++ = 13-25, ++++ = 26-50, +++++ = 51-100, ++++++ = >100

environmental data for the earliest periods of activity in the locality. There is, however, a corpus of regional environmental data available from previous investigations which can provide a general landscape context. Although pollen data for the early to mid Holocene in Kent are rather limited, evidence from Holywell Coombe (Preece and Bridgland 1998; Kerney *et al* 1980) and Wateringbury (Kerney *et al* 1980) suggests locally forested conditions during the pre-boreal and boreal (*c* 9000-5500 BC), initially birch and pine, followed by hazel and then hazel and elm woodland. It has been assumed that most of south-east England was densely wooded prior to *c* 4000 BC. However, there is some recent debate concerning the natural ecological state of the assumed climax woodland of the Atlantic period. With reference to the chalklands, sites such as Willow Garth in the Yorkshire Wolds (Bush and Fenley 1987; Bush 1993), Cranbourne Chase, Dorset (French *et al* 2003) and Caburn, East Sussex (Waller and Hamilton 2000) provide evidence to suggest that in some areas the woodland development in the earlier Holocene may have been patchier than the traditional model suggests. Overall the extent and duration of woodland clearance in Kent is not clear. Current research suggests that clearance on the chalklands of the south and south-east was predominantly a Late Bronze Age phenomenon (Wilkinson 2003:730), somewhat later than the evidence for other areas such as the downlands of Hampshire and Wiltshire. Locally, however, there may have been much variation with some areas subject to extensive and permanent clearance, and other areas where cycles of clearance and woodland/ scrub regeneration occurred (Kerney *et al* 1964; Thomas 1982; Preece and Bridgland 1998; Wilkinson 2003).

For the EKA2, the samples recovered from the Bronze Age ring-ditches located along the chalk ridge were dominated by open country species (eg, *Vallonia, Pupilla muscorum, Vertigo pygmaea, Truncatellina cylindrica*) indicative of very dry open environments, probably short-turfed grassland, and are consistent with the molluscan assemblage zones e-f at Holywell Coombe (Preece and Bridgland 1998). This implies that if forested conditions did indeed prevail during the early

Table 19.11 Zone 11, molluscs from mid-Saxon well/waterhole 189018

Phase	*Mid-Saxon*					
Feature	*Well/waterhole*					
Intervention:	*189018*					
Context	*189017*	*189017*	*189020*	*189020*	*189021*	*189022*
Sample	*5454*	*5455*	*5458*	*5459*	*5460*	*5461*
Depth	*0.0-0.1*	*0.1-0.2*	*0.4-0.5*	*0.5-0.6*	*0.6-0.7*	*0.7-0.8*
Open Country						
Vallonia costata	+				+	
Catholic						
Trichia hispida		+			+	
Cepaea/Arianta sp.		+				
Shade-demanding						
Zonitidae					+	
Total	2	2	0	0	5	0

+ = 1-3

Table 19.12 Zone 17, molluscs from late Saxon pit 143037

Phase	*Late Saxon*							
Feature	*Pit*							
Intervention:	*143037*							
Context	*143040*	*143039*	*143038*					
Sample	*5442*	*5443*	*5444*	*5445*	*5446*	*5447*	*5448*	*5449*
Depth	*0.0-0.04*	*0.04-0.14*	*0.14-0.24*	*0.24-0.34*	*0.34-0.44*	*0.44-0.54*	*0.54-0.64*	*0.64-0.68*
Open Country								
Pupilla muscorum	+						+	
Vallonia costata	++	+		+				
Vallonia excentrica	+							
Catholic								
Trichia hispida		++		+			+	
Cepaea/Arianta sp.		+						
Total	8	9	0	2	0	0	2	0

+ = 1-3, ++ = 4-12, +++ = 13-25, ++++ = 26-50, +++++ = 51-100, ++++++ = >100

to mid Holocene, substantial clearance had occurred prior to the construction of the barrows.

In the profiles from Zones 21 and 23 there are, however, notable increases in shade-demanding elements in the secondary and tertiary fills that indicate the growth of vegetation within and around the features, rank grass and possibly some scrub. In contrast, the ring-ditch in Zone 13 [246049/134096] shows no real evidence for this, which may suggest that the feature was being maintained, and perhaps also grazed. Of note here is the assemblage from nearby gully 168056 dated to the Late Bronze Age to Early Iron Age which contained a shade demanding assemblage indicative of tree cover. The molluscs included *Acicula fusca* and *Spermodea lamellata*, indicators of 'old' undisturbed woodland. This may indicate that gully 168056 was located on a boundary between open and wooded environments if the upper fills of the ring-ditch accumulated during this period. It is also conceivable, given the established nature of the woodland indicated by the assemblages, that this boundary existed earlier perhaps during the period the barrow was in use.

Only two features dated to the Roman period contained useful quantities of shell. Although a little mixed, as expected for this period, they provide evidence of largely open environments but with some areas of long grass and scrub.

Chapter 20

Soil Micromorphology and Chemistry

by Richard I Macphail and J Crowther

Introduction

Six 0.50m long monoliths were selected for analysis in order to help understand different sedimentary processes on site, the nature of palaeosols and possible surfaces, and the influence of anthropogenic activities within the sequences. These monoliths were from the inner ring-ditch of the Early Bronze Age penannular monument on Thanet Sands in Zone 3 (monolith sample 5108), Bronze Age barrow ditch fills (monolith sample 6919) and a Bronze Age buried soil on chalk (monolith sample 6157) in Zone 23, and a rural Roman dark earth formed in Thanet Sands (monolith sample 5325) in Zone 6. A soil micromorphology and chemistry study was undertaken (Goldberg and Macphail 2006).

Methods

Evaluation and subsampling. The following samples were selected for analysis (Table 20.1):

Two thin sections and two bulk samples from monolith 6157;

Two thin sections and three bulk samples from monolith 5325;

One thin section and one bulk sample from monolith 6919;

One thin section from monolith 5108

Chemistry. Analysis was undertaken on the fine earth (ie, < 2mm) fraction of the samples. Phosphate-P_i was determined by colorimetry using 1N HCl as the extractant; and LOI (loss-on-ignition) by ignition at 375ºC for 16 hours (Ball 1964) – previous studies having shown that there is no significant breakdown of carbonate at this temperature.

Soil micromorphology. Subsampled monolith samples (Tables 20.2 and 20.4) were impregnated with a clear polyester resin-acetone mixture (Pl 20.18); samples were then topped up with resin, ahead of curing and slabbing for 75x50mm-size thin section manufacture by Spectrum Petrographics, Vancouver, Washington, USA (Goldberg and Macphail 2006; Murphy 1986) (Pl 20.1, 6–7). Thin sections were further polished with 1,000 grit papers and analysed using a petrological microscope under plane polarised light (PPL), crossed polarised light (XPL), oblique incident light (OIL) and using fluorescent microscopy (blue light – BL), at magnifications ranging from x1 to x200/400. SEM/EDS (Energy Dispersive X-ray Spectrometry; (Weiner 2010)) was carried out on M5325A (Table 20.3; Pl 20.25–26). Thin sections were described, ascribed soil microfabric types (MFTs) and microfacies types (MFTs) (see Tables 20.1 and 20.4), and counted according to established methods (Bullock *et al* 1985; Courty 2001; Courty *et al* 1989; Macphail and Cruise 2001; Stoops 2003; Stoops *et al* 2010).

Results

Chemistry

The analytical data are presented in Table 20.1, with key features relating to individual samples highlighted. Here a broad overview of the two soil properties is presented.

Table 20.1 Sample details and analytical data

Sample	*Context*	*Notes*	*LOI[a] (%)*	*Phosphate-P_i[b] (mg g^{-1})*
x6157[a]	141094	Bronze Age buried calcareous brown earth/rendzina: A/B horizon	2.38*	0.838
x6157[b]	198083	As above: B/C horizon	1.47	0.483
x5325[a]	133028	Late Roman etc. rural dark earth on loamy Thanet beds, brickearth-like: humic topsoil	2.39*	2.05**
x5325[b]	133028	As above: moderately humic lower topsoil	1.61	1.36*
x5325[c]	133034	As above: subsoil	1.29	1.12*
x6169		Bronze Age barrow ditch fills, calcareous	3.23**	0.273

[a] Loss-on-ignition: Figures highlighted have notably higher values: * = 2.00–2.99%; **? 3.00%

[b] Phosphate-P_i: Figures highlighted show signs of phosphate -P_i enrichment: * = slightly enriched (1.00–1.99mg g^{-1}), ** = enriched (2.00–2.99mg g^{-1})

Table 20.2 EKA2; soil micromorphology samples and counts

Monolith	*Thin section*	*Rel depth*	*Bulk sample*	*Rel depth*	*Context*	*MFT*	*SMT*	*Voids*	*Gravel*	*Wet-land*	*Biog. root sed frag?*	*Org Root trace*	*Fe-root traces*
6157	M6157A	0–15cm	x6157a	0–10.5cm	141094	B1	2a,2b,3b	35%				a*	
6157	M6157B		x6157b	18–23 cm	198083	B2	2a, 3a	25%	f		a		
5325	M5325A	0–15 cm	x5325a	0–11 cm	133028	A1	1a	35%		a-1			
	M5325B		x5325b	11–25 cm	133028	A1/A2	1a/1b	35%					
			x5325c	40–50 cm	133034								
6169	M6169A	0–18cm	x6169	3.5–10.5 cm	290140	B3	3c,3d	25%	f				
5108	M5108A	21.5–31.5 cm		21.5–31.5 cm	206007	D1	4a,4b	35%					aaa

Thin section	*Context*	*Earthworm granule*	*Cop. bone cop'.*	*Isotropic clasts*	*Fe-Silt nodules*	*Burned flint*	*Pot*	*Charcoal*	*Artic. phytoliths*	*Dusty clay coatings*	*Matrix intercal*	*Clayey inwash*	*Fe-Mn nodules*
M6157A	141094	a*				a-1		a(aa)					aaa
M6157B	198083	a	a*			a-1		a			a*		aa
M5325A	133028		a	aa	a*			a	a-1	a			a
M5325B	133028		a*	a	a*	a-1	a-1(aaa)	a		a*	a		aa
M6169A	290140	aa				a-1	a-1	a*					
M5108A	206007							a*		a		aaa	aaaa

Thin section	*Context*	*2ndary Fe*	*Broad burrows*	*Thin burrows*	*Broad O-M Excr*	*Thin O-M Excr*	*V.Thin O-M Excr.*
M6157A	141094		aaaa	aaaa	aa(total)	aa	aaaa/aaa
M6157B	198083		aaaa	aaaa	(total)	aa	aa
M5325A	133028		aaaa		aa		
M5325B	133028		aaa		aa		a
M6169A	290140		aaaa	aaa	aaa(total)	aaa	a
M5108A	206007	aaa		aa			

* = very few 0-5%, f = few 5–15%, ff = frequent 15–30%, fff = common 30-50%, ffff = dominant 50–70%, fffff = very dominant >70%
a = rare <2% (a*1%; a-1, single occurrence), aa = occasional 2-5%, aaa = many 5–10%, aaaa = abundant 10–20%, aaaaa = very abundant >20%

Table 20.3 EKA2, SEM/EDS analysis of features and inclusions in M532 5A

Feature	*F*	*Na*	*Mg*	*Al*	*Si*	*P*	*P2O5*	*K*	*Ca*	*CaO*	*Ti*	*Mn*	*Fe*	*Fe0*
Isotropic mineral inclusion 1		0.80	0.36	4.64	38.8			1.66	1.02				2.39	3.08
Ditto 2		0.86		5.21	36.6	0.70	1.60	2.34	1.59				3.18	4.09
Ditto 2 coating		0.42		8.66	28.6			11.9				5.19	0.64	0.83
Local soil matrix		0.39	0.46	4.08	39.1	0.33		1.13	0.76		0.32		2.86	3.68
Coprolitic bone – outer part	1.71	0.45		1.57	1.91	17.6	40.4		34.5	48.2			0.47	1.43
Ditto	1.54	0.57		0.80	0.40	18.7	42.8		35.6	49.8			2.10	2.70
Coprolitic bone – inner part				1.22	1.90	18.1	41.5		36.1	50.5			1.23	1.58
Dusty clay void coating			1.03	8.76	30.8	0.38		2.17	1.38	0.44			7.60	9.78
Ditto			1.72	10.3	28.3	0.51		2.09	1.56		0.32		8.33	10.7

Loss-on-ignition (LOI). Although none of the samples is particularly organic rich, there is quite marked variability in the LOI data, with three of the samples having notably higher values (Table 20.1). Two of these are from the uppermost (topsoil) horizons from the Bronze Age buried brown earth/rendzina [sample 6157a: 2.38%] and Roman dark earth [5325a: 2.39%]. In both cases, as would be anticipated, there is a clear reduction in organic matter content in the underlying horizon(s). However, the highest LOI (3.23%) was recorded in the sample [6169] from the Bronze Age barrow ditch fill, which may indicate somewhat lower rates of organic decomposition within the ditch, perhaps as a result of more poorly drained conditions.

Table 20.4 EKA2, SEM/EDS analysis of features and inclusions in M3235A

Microfacies type (MFT)/Soil micro-fabric type (SMT)	*Sample no.*	*Depth (relative depth)* *Soil micromorphology (SM)*	*Preliminary interpretation and comments*
MFT A1/SMT 1a	M5325A	0-75mm SM: heterogeneous; *Microstructure*: massive, prismatic(?), 35% voids, moderately accommodated curved planar voids, fissures, with fine open vughs and channels and chambers; *Coarse Mineral*: C:F Coarse:Fine limit at 10μm), 80:20, well sorted coarse silt-very fine sand-size quartz – subangular to subrounded, with flint, feldspar, mica and glauconite; egs of Fe-stained brickearth-like/Sands fragment; *Coarse Organic and Anthropogenic*: trace/eg of articulated phytoliths; <2mm size eg of wetland sediment (laminated silty clay with phytoliths and diatoms); rare fine (max 5mm) and very fine coprolitic bone fragments (larger ones with Fe-staining, colourless to very pale yellow, with weak fibrous birefringence, colourless under OIL, with some whitish areas, BL autofluorscent; possible dog coprolite remains); occasional dusty, colourless aggregates (fine to medium sand size) with melted silt? (?); rare rounded wood charcoal or flecks (max 1mm); rare trace of brown or colourless nodules embedding silt (?); *Fine Fabric*: SMT 1a: dotted and dusty darkish brown (PPL), very low interference colours to isotropic (close porphyric, speckled b-fabric, XPL), pale yellowish brown (OIL), moderately humic stained with very abundant very fine charred OM and charcoal – rare phytoliths and fine red burned inclusions; *Pedofeatures*: *Textural*: rare very thin very dusty clay void coatings (10-15μm) in some fine channels; *Amorphous*: rare fine Fe-Mn nodules; *Fabric*: abundant broad to very broad burrows (2-4mm) with burrow intercalations; *Excrements*: partial total excremental fabric, with occasional broad, sometimes mammilated organo-mineral excrements. BD: 2.39% LOI, 2.05 mg g^{-1} P EDS: Coprolitic bone (34.5-36.1% Ca, 17.6-18.7% P; outer parts contain 1.54-1.71% F); enigmatic isotropic clasts (siliceous with 28.6-38.8% Si; one with iron staining 3.18% Fe and 0.70% P); soil matrix (0.33% P) and dusty clay void coatings (0.38-0.51% P) are also phosphate enriched.	133028 Massive well sorted coarse silt-very fine sand, with relict coarse prismatic structures, characterised by moderately humic fine fabric. This contains much very fine charcoal and rare phytoliths. Soil displays abundant broad to very broad burrows, with a partial total excremental microfabric. An example of articulated phytoliths is present alongside a <2mm size eg of wetland sediment and rare fine size (max 5mm) coprolites and very fine coprolitic bone/amorphous fragments. These are isotropic and autofluorescent under blue light (BL). Larger ones have Fe-staining and colourless to very pale yellow, with weak fibrous birefringence, colourless under OIL, with some whitish areas, suggesting likely dog coprolite remains). Occasional dusty, colourless and isotropic aggregates (fine to medium sand size) with melted silt (?), rare rounded wood charcoal or flecks (max 1mm) and rare trace of brown or colourless nodules embedding silt, occur. Rare very thin very dusty clay void coatings (10-15μm) in some fine channels, and rare fine Fe-Mn nodules were recorded. (Relatively humic and phosphate-enriched - 2.39% LOI, 2.05 mg g^{-1} P). EDS data: coprolitic bone (34.5-36.1% Ca, 17.6-18.7% P; outer parts contain 1.54-1.71% F); enigmatic isotropic clasts (siliceous with 28.6-38.8% Si; one with iron staining 3.18% Fe and 0.70% P); soil matrix (0.33% P) and dusty clay void coatings (0.38-0.51% P) are also phosphate enriched. *This soil has a history of: 1) manured cultivation using probable midden waste, 2) abandonment/fallowing and biological homogenisation (grassland?), and 3) unknown burial conditions which produced small amounts iron-manganese staining and inwash of dusty clay.*
		0-75mm SM: heterogeneous; *Microstructure*: *Coarse Mineral*: C:F; *Coarse Organic and Anthropogenic*: *Fine Fabric*: *Pedofeatures*:	
MFT A1/SMT 1a over MFT A2/SMT 1b	M5325B	75-150 mm SM: homogeneous SMT 1a, becoming SMT 1b with increasing depth; *Microstructure*: massive prismatic, 35% voids, fissures, channels and some closed fine vughs; *Coarse Mineral*: as above; *Coarse Organic and Anthropogenic*: many – one coarse size, fine sand tempered pot fragment (40+mm); trace of very fine coprolitic material, rare isotropic siliceous clasts; rare – 10mm size burned flint; rare charcoal (max 2mm); trace amounts of Fe-clay embedded silts; *Fine Fabric*: as 1a, SMT 1b: dusty speckled pale brown (PPL), low interference colours to isotropic (close porphyric,	133028 Massive well sorted coarse silt-very fine sand, with relict coarse prismatic structure, characterised by moderately humic fine fabric, which becomes less humic down-profile. It is partially bioworked by many fine channels and broad burrows. Occasional examples of broad organo-mineral excrements also occur. Anthropogenic inclusions include very fine charcoal and trace amounts of phytoliths, with coarse example (40+mm) of fine sand tempered pot

Table 20.4 (continued)

Microfacies type (MFT)/Soil micro-fabric type (SMT)	*Sample no.*	*Depth (relative depth) Soil micromorphology (SM)*	*Preliminary interpretation and comments*
		speckled b-fabric, XPL), pale yellowish brown (OIL), weakly humic with many fine amorphous OM, charred OM, with trace of phytoliths; *Pedofeatures*: *Textural*: rare amounts of very thin dusty to limpid clay void coatings in upper slide; rare very dusty clayey/impure intercalations/pans in lower half of slide; Amorphous: many fine to medium Fe-Mn nodules, usually sharp-edged; trace of channel hypocoatings; Fabric: many broad to very broad burrows (2–4mm) with burrow intercalations; *Excrements*: partial total excremental fabric, with rare broad, sometimes mammilated organo-mineral excrements; rare thin organo-mineral excrements in relict channels. BD: 1.61% LOI, 1.36 mg g^{-1} P (BD: 1.29% LOI, 1.12 mg g^{-1} P)	fragment, a 10mm size burned flint, and trace amounts of very fine coprolitic material, rare isotropic siliceous clasts, rare charcoal (max 2mm) and trace amounts of Fe-clay embedded silts. Trace amounts of finely dusty clay void coatings give way down-profile to occasional very dusty/matrix intercalations. Many fine to medium Fe-Mn nodules, and trace amounts of channel iron hypocoatings, were also noted. (1.61% LOI phosphate-enriched 1.36 mg g^{-1} P) *This slide records the junction between the humic topsoil formed by cultivation and abandonment/fallowing and the remains of the Ap horizon, characterised by the remains of textural pedofeature evidence of having been ploughed.*
		0-75mm SM: heterogeneous; *Microstructure*: *Coarse Mineral*: C:F; *Coarse Organic and Anthropogenic*: *Fine Fabric*: *Pedofeatures*:	
MFT B1/SMT 2a, 2b, 3b	M6157A	0-75mm SM: mainly SMT 1a, with few SMT 2b and 3b; Microstructure: massive, channel, 35% voids, fine and medium channels, vughs and chambers, with complex packing voids; Coarse Mineral: well sorted with coarse silt and very fine sand as below, with an example of relict clay (4mm) and very few chalk sand/coarse sand, flint; Coarse Organic and Anthropogenic: trace amounts of earthworm granules (biogenic calcite), example of strongly burned flint (1mm), rare to occasional concentrations of charcoal (max 1250mm); rare trace of humic fine root remains; Fine Fabric: SMT 2b: blackish brown (PPL), isotropic (close porphyric, undifferentiated b-fabric, XPL), dark brown (OIL), very humic; SMT 3b: speckled blackish brown (PPL), moderately low interference colours (close porphyric, crystallitic b-fabric, XPL), pale brownish (OIL), moderately humic with charred OM and fine charcoal; Pedofeatures: Amorphous: abundant fine Fe-Mn staining and nodules (some humic soil SMT 2b); Fabric: abundant thin and broad burrows; Excrements: occasional thin and many to abundant (upwards) very thin organo-mineral excrements; occasional broad and mammilated excrements, with otherwise total excremental fabric. BD: 2.38% LOI, 0.838 mg g^{-1} P.	141094 Massive, stone-free, fine sandy silt loam, characterised by channels. Upwards, humic soil occurs as small burrow fills and aggregates, likely associated with the relatively higher LOI (2.38%) here. An example of strongly burned flint (1mm) and rare to occasional fine charcoal (max 1.2mm) concentrations occur. Abundant thin and broad burrows, occasional thin and many to abundant (upwards) very thin organo-mineral excrements, and occasional broad and mammilated excrements, occur within the otherwise total excremental fabric. Abundant iron manganese nodule formations are associated with relict humic soil present, which increases upwards. An example of calcareous soil in a burrow includes fine charcoal concentrations. *Earthworm worked humic topsoil Ah horizon of rendzina, with the burrowed-in remains of the Ah1 surface humus soil, also being present. There is the possibility that this is pasture, with earthworm working 'burying' earlier occupation debris, albeit sparse. The presence of calcareous soil in burrows here and below, which includes charcoal and coprolites, may indicate occupation 'spreads' at the site during barrow construction. This anthropogenic soil was worked down-profile before burial and sealing by the barrow.*

Table 20.4 (continued)

Microfacies type (MFT)/Soil micro-fabric type (SMT)	*Sample no.*	*Depth (relative depth) Soil micromorphology (SM)*	*Preliminary interpretation and comments*
MFT B2/SMT 2a and 3a	M6157B	75-150 mm SM: essentially homogeneous decalcified SMT 2a, with few areas of calcareous SMT 3a; *Microstructure*: massive, with relict fine prisms, 25% voids, fine fissures, fine and medium channels; *Coarse Mineral*: C:F; 80:20, poorly sorted with chalk stones (max 20mm) and gravel below ~115mm, with coarse silt- fine sand- size quartz, quartzite, feldspar, mica and very few opaques and glauconite; very few flint flakes(?) ~0.5mm in size; *Coarse Organic and Anthropogenic*: example of burned flint (6 mm); rare fine charcoal (max 1mm); trace amounts of biogenic calcite, as earthworm granules and root pseudomorphs in calcareous SMT 2a; rare trace of sand-size coprolitic fragments (x2), autofluorescent under BL with embedded phytoliths – possibly human, in calcitic soil burrows (sometimes with charcoal); *Fine Fabric*: SMT 2a: very dusty brown (PPL), low interference colours (close porphyric, stipple speckled b-fabric, XPL), pale orange (OIL), thin humic staining; SMT 2a: very dusty greyish brown (PPL), moderately high interference colours (close porphyric, crystallitic b-fabric, XPL), pale orange (OIL), very thin humic staining, with calcite microfossils; *Pedofeatures*: *Textural*: trace of clayey intercalations associated with chalk clasts; *Crystalline*: rare secondary $CaCO_3$ formations, impregnations and hypocoatings *Amorphous*: many fine Fe-Mn staining and nodules; *Fabric*: abundant thin and broad burrows (max 2.5mm); *Excrements*: occasional thin and very thin organo-mineral excrements, otherwise total excremental fabric. BD: 1.47% LOI, 0.483 mg g^{-1} P.	141094 Massive, poorly humic, generally decalcified fine sandy silt loam with underlying (relict) prismatic structure. Coarse chalk stones (max 40mm) occur alongside broad burrow-mixed calcareous fine soil. Here rare biogenic calcite root traces and earthworm granules are present. Rare charcoal, an example of burned flint and two sand-size coprolitic fragments (autofluorescent under BL), occur. Examples of 0.5mm-size flint 'flakes' may also be of anthropic origin. Much of the soil has a total excremental homogenised microfabric, along with abundant thin and broad burrows (max 2.5mm), and occasional thin and very thin organo-mineral excrements. There are many fine iron-manganese nodular formations. *This sample represents the lower decalcified Ah horizon of a barrow-buried rendzina, in which only small amounts of chalk and chalky subsoil occur. Some post-depositional burrowing may also be responsible for the mixing of chalky soil. Anthropogenic materials – charcoal, burned flint and coprolites, and possibly small flint flakes – may have been concentrated at this depth by surface casting earthworms.*
MFT B3/SMT 3c and 3d	M6919	35-105mm SM: weakly heterogeneous with SMT 3c and more humic 3d; *Microstructure*: massive, channel, 25% voids, channels and vughs, with chambers; *Coarse Mineral*: C:F; 3c=80:20, 3d=70:30; moderately sorted coarse silt to fine sand-size quartz, with flint, mica, and few chalk gravel (12mm max); *Coarse Organic and Anthropogenic*: example of rounded flint tempered pot, burned flint (8mm), trace of fungal spores and fine charcoal; many landsnail shell (max 7mm), with occasional biogenic calcite – earthworm granules; *Fine Fabric*: SMT 3c: as 3a, with strongly crystallitic b-fabric; SMT 3d: dusty yellowish to dark brown (PPL), moderately low interference colours (close porphyric, crystallitic b-fabric, XPL), yellow and whitish yellow (OIL), humic staining with many very fine amorphous OM and rare charred OM; *Pedofeatures*: *Crystalline*: rare secondary $CaCO_3$ formations, impregnations and hypocoatings; *Fabric*: very abundant broad burrows and many thin burrows; *Excrements*: total excremental fabric, with rare very thin, many thin and broad organo-mineral excrements, some mammilated. BD: 3.23% LOI, 0.273 mg g^{-1} P.	290140 Massive channelled calcareous fine sandy silt loam, which becomes much more humic upwards (3.23% LOI). Fill is also characterised by many landsnail shell (max 7mm), with occasional biogenic calcite – earthworm granules. Example of rounded flint-tempered pot, burned flint (8mm), a trace of fungal spores and fine charcoal, were encountered. The soil has a partial total excremental fabric, with very abundant thin to broad burrows, and very thin to broad organo-mineral excrements, some mammilated. *The thin section sampled across a likely 'turf' stabilisation horizon, where a bioworked and homogenised humic fine soil occurs over a relatively more minerogenic fill. Background anthropogenic inclusions occur, alongside evidence of earthworms*

Table 20.4 (continued)

Microfacies type (MFT)/Soil micro-fabric type (SMT)	*Sample no.*	*Depth (relative depth) Soil micromorphology (SM)*	*Preliminary interpretation and comments*
MFT D1/SMT 4a and 4b	M5108	0-75mm SM: layered sands (SMT 4a) and clayey sands (4b); *Microstructure*: massive, layered and laminated (1-5mm thick), 35% voids, fine channels with often closed vughs; *Coarse Mineral*: C:F, 80:20 (4a) and 65:35 (4b), with well sorted fine sand-size quartz, quartzite, feldspar, glauconite, flint; *Coarse Organic and Anthropogenic*: rare trace of wood charcoal, with 2.5mm max example; rare ferruginised root traces; *Fine Fabric*: SMT 4a: dusty brown (PPL), moderate interference colours (porphyric and coated grain, stipple speckled and grano-striate(?) b-fabric, XPL), very pale yellowish brown; SMT 4b: dusty darkish brown (PPL), moderate interference colours (porphyric and coated grain, stipple speckled and grano-striate(?) b-fabric, XPL), pale yellowish brown, very weak humic staining and trace of charcoal; *Pedofeatures*: *Textural*: rare finely dusty clay void coatings and grain coatings, with many impure clay infills of channels (from clayey SMT 4b); *Amorphous*: abundant iron and manganese impregnation along biochannels/burrows channels, with many ferruginous channel hypocoatings and semi-pseudomorphs of roots; *Fabric*: occasional thin (<1mm) burrows – Fe-Mn stained fills often.	206007 Layered and laminated well sorted fine sandy and clayey-sandy fills, with numerous fine channels. The latter often include ferruginised traces of roots. The many burrows are often impregnated with iron and manganese (once humic?). Trace amounts of wood charcoal occur (max 2.5mm). Rare finely dusty clay void coatings and grain coatings occur alongside many impure clay infills of channels (of clayey sand layer origin), which is weakly humic. *This example of the enclosure ditch fill records (ephemerally waterlain) silting of the exposed Thanet Sand substrate/geology, and alternating weakly humic clayey sands. The latter may originate from the erosion of more clay rich subsoils developed in the Thanet Sands. This appears to have been a semi-continuous process with both rooting and burrowing occurring. Iron was precipitated in channels within ephemerally water-saturated fills.*

Inorganic phosphate (phosphate-P_i). Of the six samples, the three associated with the Roman dark earth stand out as having notably higher concentrations. The humic topsoil [5325a] from this sequence is categorised in Table 20.1 as being 'enriched' in phosphate (phosphate-Pi: 2.05 mg g^{-1}), and the two underlying horizons as being 'slightly enriched'. This enrichment is likely to be anthropogenic in origin, possibly resulting from inputs of manure, cess, midden materials, etc. In contrast, neither the Bronze Age buried soil nor the barrow ditch fill show any clear signs of phosphate enrichment.

Conclusions from the chemistry

The various contexts sampled display quite marked variability in both properties analysed. The sequences may be interpreted as follows:

Bronze Age buried calcareous brown earth/rendzina: quite organic rich, particularly in A/B horizon, but no evidence of phosphate enrichment through anthropogenic activity;

Roman dark earth: quite organic rich, especially in the humic topsoil, and good evidence of phosphate enrichment which is likely associated with anthropogenic activity; and

Bronze Age barrow ditch fills: the single context analysed has a relatively high LOI, perhaps implying accumulation under poorly drained conditions, but has a low phosphate content.

Soil micromorphology

Results are presented in Tables 20.2–20.4, illustrated in Pl 20.1–20.25 and Fig 20.1, and supported by material on an accompanying CD-Rom (data in project archive). Twenty-two characteristics were identified and counted from the six thin sections analysed.

Early Bronze Age monument 193165 on Thanet Beds, Zone 3 (M5108)

Ctx 206007: This is a layered and laminated series of well sorted fine sandy and clayey-sandy fills, with numerous fine channels (Pl 20.1). The latter often include ferruginised traces of roots (Pl 20.2–20.3). The many burrows are often impregnated with iron and manganese (once weakly humic soil?). Trace amounts of wood charcoal occur (max 2.5mm) (Pl 20.4–20.5). Rare finely dusty clay void coatings and grain coatings are present alongside many impure clay infills of channels (of clayey sand layer origin), and these are weakly humic.

This example of the inner ring-ditch fill records waterlain silting of the exposed Thanet Sand substrate/geology, and alternating weakly humic clayey sands. The latter may originate from the erosion of more clay rich subsoils developed in the Thanet Sands (Argillic brown earths; Frilsham soil series(?) within Hamble soil association (Jarvis *et al* 1983). Ditch infilling appears to

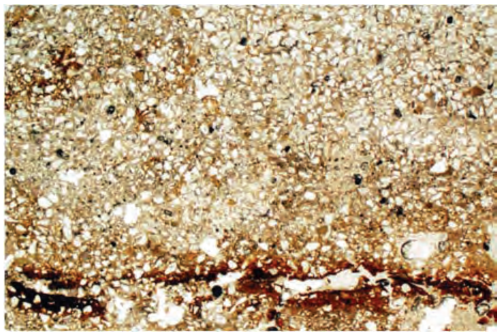
Pl 20.1 Scan of M5108 (ctx 206007): layered and laminated well-sorted fine sands and clayey fine sands. The latter are slightly more iron-stained and the focus of fine rooting (root traces are also often ferruginised). Frame width ~50mm

have been a rapid semi-continuous process with both fine rooting and burrowing occurring. Iron was precipitated in these bio-channels within the ephemerally water-saturated fills. There is no evidence of coarse woody roots rooting in fill as it developed, possibly implying open conditions. The very small amounts of charcoal present are probable relict of clearance.

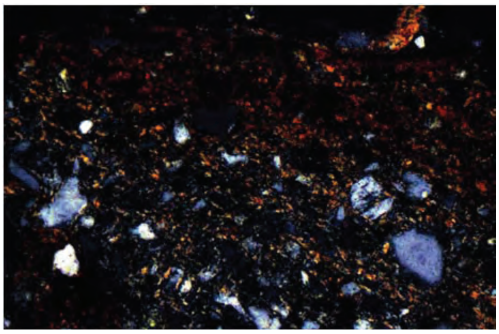
Early Bronze Age barrow and buried soil on chalk, Zone 23(M6157)

Ctx 141094 (M6157B) from beneath barrow 195004: This lower thin section of buried soil shows a massive, poorly humic, generally decalcified fine sandy silt loam with underlying (relict) prismatic structure to be present (Pl 20. 7). Coarse chalk stones (max 40mm) occur alongside broad burrow-mixed calcareous fine soil. Here, rare biogenic calcite root traces and earthworm granules are present. Rare charcoal, an example of burned flint and two sand-size coprolitic fragments (autofluorescent under BL) occur (Pl 20.8–20.11). Examples of 0.5mm-size flint 'flakes' may also be of anthropogenic origin (Pl 20.8). Much of the soil has a total excremental homogenised microfabric, along with abundant thin and broad burrows (max 2.5mm), and occasional thin and very thin organo-mineral excrements. There are many fine iron-manganese nodular formations.

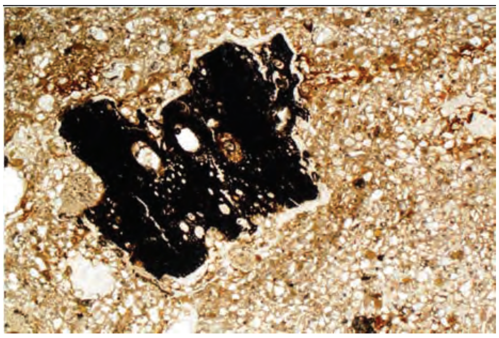
This sample represents the lower decalcified An horizon of a barrow-buried rendzina, in which only small amounts of chalk and chalky subsoil occur (typical brown calcareous earth, Coombe I soil association; Jarvis *et al* 1983). Some post-depositional burrowing may also be responsible for the mixing of chalky soil. Anthropogenic materials – charcoal, burned flint and coprolites (dog/human?; Macphail and Goldberg 2010), and possibly small flint flakes – may have been concentrated at this depth by surface casting earthworms (see M6157A).



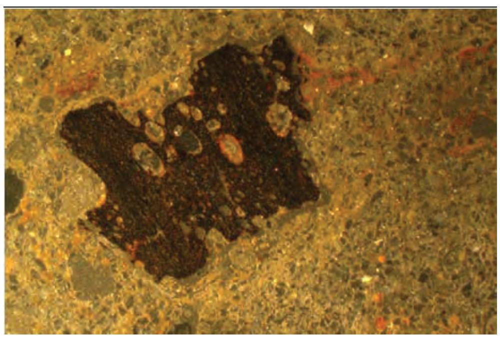
Pl 20.2 Photomicrograph of M5108 (ctx 206007): ferruginised root channel in clayey sands layer, below a sandy layer. Plane is polarised light (PPL). Frame width ~4.62mm



Pl 20.3 Detail of Pl 20.2 under crossed polarised light (XPL). Note iron staining of root channel (iron hypocoating). Frame width ~0.90mm

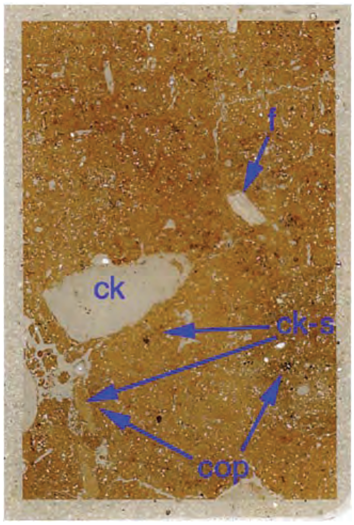


Pl 20.4 Photomicrograph of M5108 (ctx 206007) showing wood charcoal fragment in fine sands. PPL. Frame width ~4.62mm

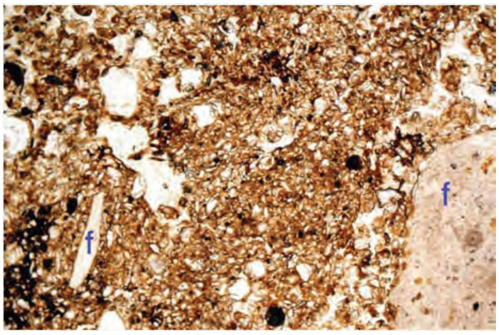


Pl 20.5 As Pl 20.4 under oblique incident light (OIL). Note pale iron-depleted sands in general (leached sands in sometimes water-saturated ditch?), with minor iron staining

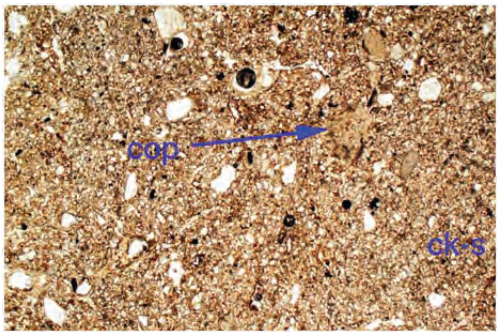
Pl 20.6 Scan of M6157A (ctx 141094) showing increasingly humic decalcified and stone-free soil, upwards (arrow); fine iron-manganese nodules associated with relict humic materialare in evidence. Frame width ~50mm



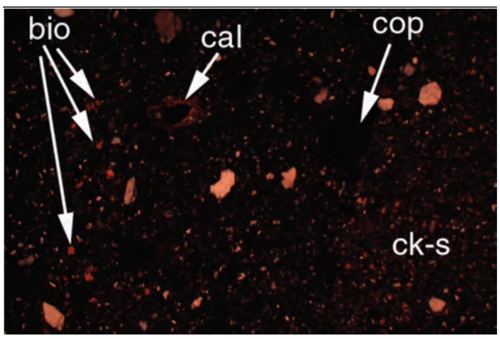
Pl 20.7 Scan of M6157B (context 141094): chalk (ck); flint (f) and two examples of sand-size coprolites (cop) present below a stone-free decalcified soil. Note pale burrow mixed chalky soil (ck-s). Frame width ~50mm



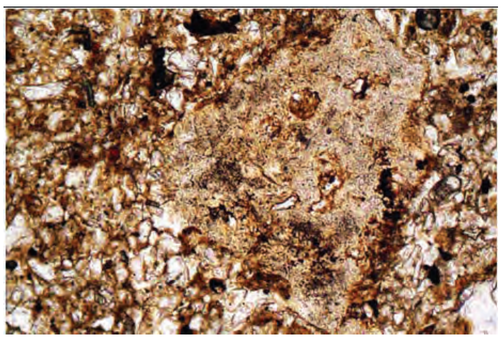
Pl 20.8 Photomicrograph of M6157B (ctx 141094): flint includes large calcined (burned ?) fragments (f) and scatter of fine 'flakes' (left). Note post-burial blackish Fe-Mn staining. PPL. Frame width ~4.62mm



Pl 20.9 Photomicrograph of M6157 (ctx 141094): moderately humic decalcified soil and burrow-mixed chalk soil (ck-s) (see Pl 20.7). A coprolite fragment is also present (cop – see Pl 20.11). PPl. Frame width ~4.62mm*

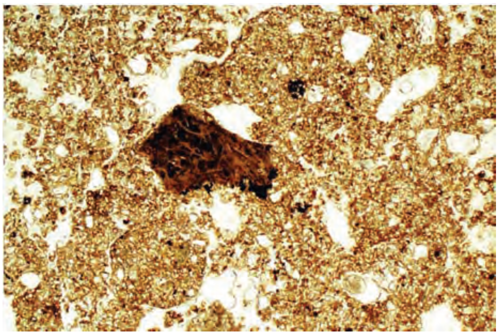


Pl 20.10 As Pl 20.9, under XPL. Note secondary calcite void hypocoating (cal) and biogenic calcite crystals (bio) mixed into generally decalcified soil



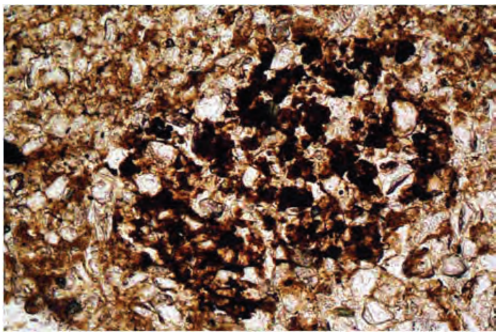
Pl 20.11 Detail undifferentiated (dog/human) in Pl 20.9. This is isotropic but autofluorescent under blue light, implying a calcium phosphate apatite mineralogy. PPL. Frame width ~0.90mm

Ctx 141094 (M6157A): The upper buried soil is a massive, stone-free, fine sandy silt loam, characterised by channels (Pl 20.6). Upwards, humic soil occurs as small burrow fills and aggregates, likely associated with the relatively higher LOI (2.38%) here (Table 20.1). An example of strongly burned flint (1mm) (Pl 20.12–20.13) and rare to occasional fine charcoal (max 1.2mm) concentrations occur. Abundant thin and broad burrows, occasional thin and many to abundant (upwards) very thin organo-mineral excrements, and occasional broad and mammilated excrements, occur within the otherwise total excremental

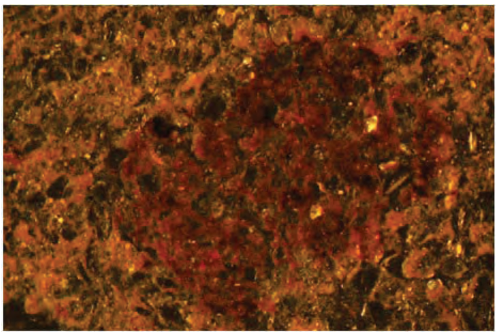


Pl 20.12 Photomicrograph of M6157A (ctx 141094) (see Pl 20.6). Strongly burned flint in bioworked humic topsoil. PPL. Frame width ~4.62mm

Pl 20.13 As Pl 20.12, under OIL



Pl 20.14 Photomicrograph of M6157A (ctx 141094) (see Pl 20.6). detail of humic soil burrow fill composed of humified pellets of amorphous organic matter. PPL. Frame width ~0.90mm



Pl 20.15 As Pl 20.14, under OIL showing iron stained nature of humified organic matter, possibly a dung residue

fabric. Abundant iron manganese nodule formations are associated with the relict humic soil present, which increases upwards (Pl 20.6, 20.14–20.15). An example of calcareous soil in a burrow includes fine charcoal concentrations.

This is the earthworm worked, humic, decalcified topsoil Ah horizon of a calcareous brown earth, with the burrowed-in remains of the Ah1 surface humus soil also being present. There is the possibility that this is a soil formed under pasture (dung traces?), with earthworm working 'burying' earlier occupation debris, albeit sparse. The presence of calcareous soil in burrows here and below, which includes charcoal and coprolites, may possibly also indicate occupation 'spreads' at the site during barrow construction. This anthropogenic soil was worked down-profile before burial and sealing by the barrow.

Thus, and although the picture is obscure, it appears that:

1. A first occupation could be recorded, possibly associated with flint working (possible fine flint debris);

2. Later use of the area for pasture, which led earthworms to form a stone-free soil;

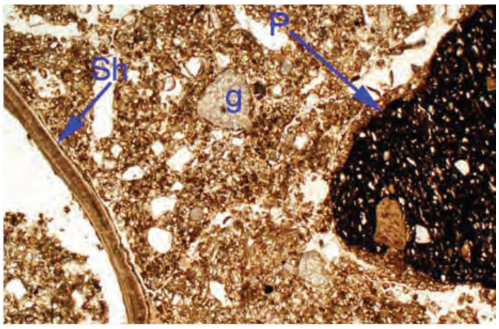
3. A second occupation related to ritual use of the site and barrow(s) construction;

4. Post-burial formation of iron manganese nodules and earthworm burrowing through chalky soil associated with the barrow mound (Crowther *et al* 1996; Macphail, 1991).

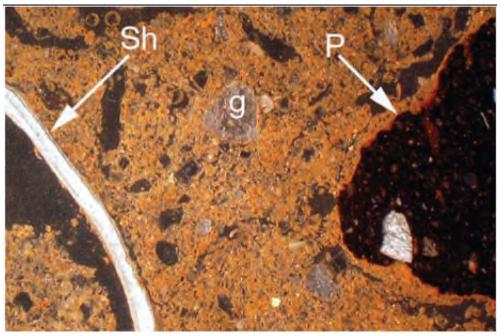
Bronze Age barrow ditch fill on chalk. Ditch 195070 associated with barrow 19312,3 Zone 23 (M6919)

290140 (M6919): This fill is a massive, channelled, calcareous fine sandy silt loam, which becomes much more humic upwards (3.23% LOI) (Table 20.1). Fill is also characterised by many landsnail shells (max 7mm), with occasional biogenic calcite – earthworm granules (Pl 20.16–20.17). Examples of rounded flint-tempered pot, burned flint (8mm), a trace of fungal spores and fine charcoal were encountered. The soil has a partial total excremental fabric, with very abundant thin to broad burrows, and very thin to broad organo-mineral excrements, some mammillated.

The thin section sampled across a likely 'turf' stabilisation horizon, where a bioworked and homogenised humic fine soil occurs over a relatively more minerogenic fill. Background anthropogenic inclusions occur, alongside evidence of earthworms and snail fauna. This humic soil probably reflects a local calcareous brown earth soil cover (Coombe I soil association; Jarvis *et al*, 1983), and is similar to findings from previous studies of turf barrows from the Monkton-Mount Pleasant areas of Thanet (Macphail unpublished reports to Canterbury Archaeological Trust).



Pl 20.16 Photomicrograph of M6169 (ctx 290140): bioworked humic ditchfill soil containing landsnail shells (S), earthworm granules (g), and an example of flint-tempered pottery (P). PPL. Frame width 4.62mm



Pl 20.17 As Pl 20.16, under OIL. Note burned flint in pot

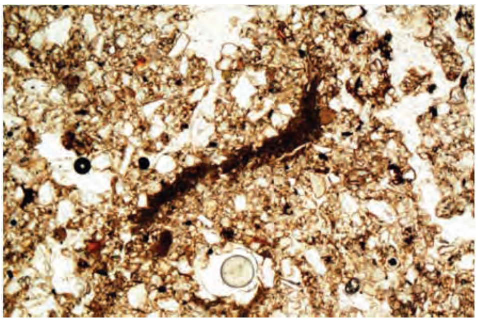
Roman dark earth on Thanet Beds. Part of dark earth deposit 170028, Zone 6 (M5325)

Ctx 133028 (M5325B): This lower sample records a massive, well sorted coarse silt-very fine sand, with a relict coarse prismatic structure. It is characterised by a moderately humic fine fabric, which becomes less humic down-profile (1.61% becoming 1.29% LOI, downwards; Table 20.1; Pl 20.19-20.20). The soil is partially bioworked by many fine channels and broad burrows. Occasional examples of broad organo-mineral excrements also occur. Anthropogenic inclusions include very fine charcoal and trace amounts of phytoliths, with a coarse example (40+mm) of fine sand-tempered pot fragment, a 10mm size burned flint, trace amounts of very fine coprolitic material (see M5325A), rare isotropic siliceous clasts, rare charcoal (max 2mm) and trace amounts of Fe-clay embedded silts. Trace amounts of finely dusty clay void coatings give way down-profile to occasional very dusty/matrix intercalations (Pl 20.19–20.20). Many fine to medium Fe-Mn nodules, and trace amounts of channel iron hypocoatings, were also noted. It is phosphate-enriched with 1.36 mg g^{-1} P (Table 20.1).

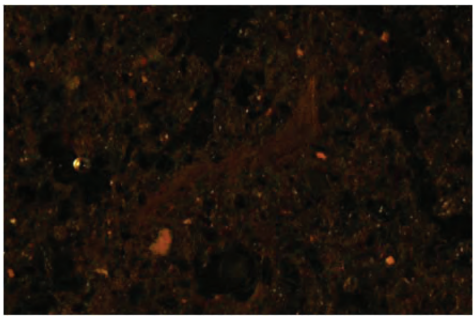
This slide samples the junction between the humic topsoil formed by cultivation and abandonment/fallowing and the remains of the less altered lower Ap horizon. The latter retains relict textural pedofeature evidence of having been ploughed.

Ctx 133028 (M5325A): In the upper thin section sample the soil is a massive, well sorted coarse silt-very fine sand, with relict coarse prismatic structures, characterised by a moderately humic fine fabric (2.39% LOI, Table 20.1; Pl 20.18) This contains much very fine charcoal and rare phytoliths. The soil displays abundant broad to very broad burrows, with a partial total excremental microfabric. An example of articulated phytoliths is present (Pl 20.21) alongside a <2mm size example of wetland sediment and rare fine size (max 5mm) coprolites and very fine coprolitic bone /amorphous coprolitic fragments (Pl 20.23–24). These are isotropic and autofluorescent under blue light (BL).

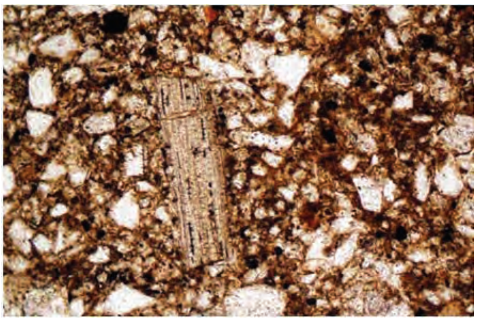
Pl 20.18 Scan of resin embedded block M5325A & B showing humic Roman dark earth topsoil formed in brown earth with anomalous irregular boundary between upper more humic (2.39% LOI) topsoil and less humic subsoils (1.61% and 1.29% LOI respectively). Note large pot fragment, also present in thin section M5325B. Height 18cm



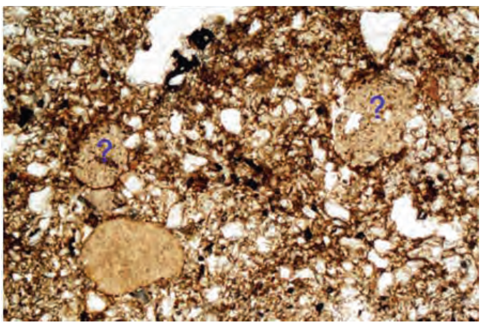
Pl 20.19 Photomicrograph of M5325B (ctx 133028): weakly humic dark earth subsoil with marked dark silty clay intercalatory pan, probably relict of a plough soil history on the site. PPL. Frame width ~2.38mm



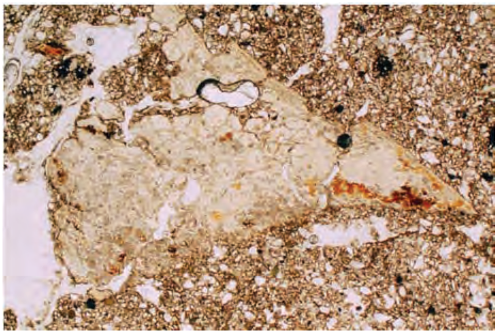
Pl 20.20 As Pl 20.19, under OIL



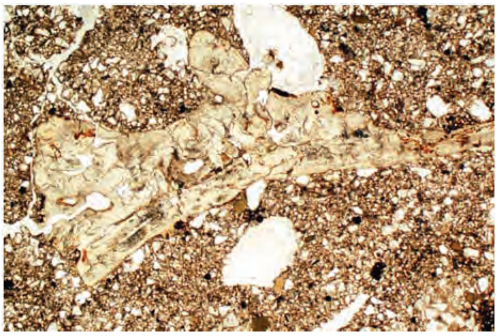
Pl 20.21 Photomicrograph of M5325A (ctx 133028): upper humic dark earth contains fine amorphous and charred organic matter and phytoliths, including this example of articulated phytoliths or possible cereal origin. PPL. Frame width ~0.90mm



Pl 20.22 As Pl 20.21: enigmatic isotropic clasts (?). EDS found these to be siliceous, sometimes with P (Table 20.3); strongly burned sandstone rock fragments? PPL. Frame width ~2.380mm



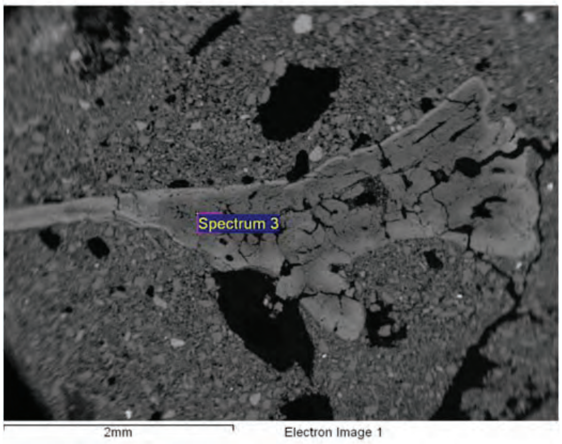
Pl 20.23 As Pl 20.21. Coprolitic bone fragment as evidence of middening/manuring. PPL. Frame width ~4.62mm



Pl 20.24 As Pl 20.23, another example of coprolitic bone. This one was studied employing EDS (see Pl 20.25-26). PPL. Frame width ~4.62mm

Larger ones have Fe-staining and colourless to very pale yellow, with weak fibrous birefringence, colourless under OIL, with some whitish areas, suggesting that these are possibly dog coprolite remains) (Lawson 2000; Macphail and Goldberg 2010). This is consistent with overall phosphate enrichment (2.05 mg g^{-1} P). Occasional dusty, colourless and isotropic aggregates (fine to medium sand size) with melted silt (burned sandstone?) (Pl 20.22), rare rounded wood charcoal or flecks (max 1mm) and a rare trace of brown or colourless nodules embedding silt also occur. Rare, very thin, very dusty clay void coatings (10-15μm) in some fine channels and rare fine Fe-Mn nodules were recorded. EDS analyses found: coprolitic bone (34.5-36.1% Ca, 17.6-18.7% P; outer parts contain 1.54-1.71% F) (Pl 20.25 and Fig 20.1); enigmatic isotropic clasts (siliceous with 28.6-38.8% Si; one with iron staining 3.18% Fe and 0.70% P);and the soil matrix (0.33% P) and dusty clay void coatings (0.38-0.51% P) are also phosphate enriched (Table 20.3).

The soil has a darkish colour because humus is mixed with fine charred and amorphous organic matter. It is relatively rich in anthropogenic inclusions, including coprolitic material, charcoal, burned mineral material, phytoliths and pot. This appears to be settlement middening waste, rather than *in situ* occupation material. The concentration of inclusions and chemistry is thus more comparable to 'infield' manuring as recorded (by J Crowther) in soils buried



Pl.20.25 As Pl 20.24, EDS BSE image of coprolitic bone; Ca-P chemistry with pale outer parts including 1.54-1.71% F. Scale=2mm

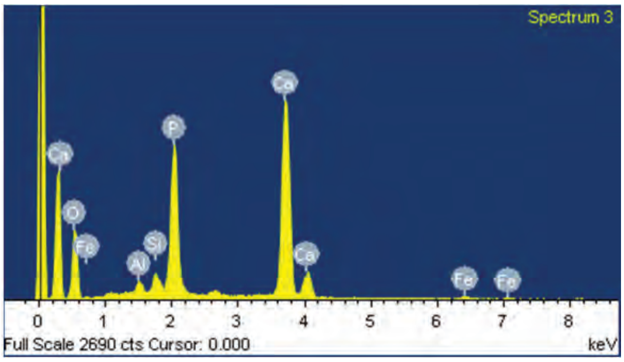


Fig 20.1 As Pl 20.25, EDS Spectrum. Coprolitic bone is dominated by Ca (34.5-36. 1%; 48.2-50.5% CaO) and P (17.6-18.7%; 40.2-42.8% P_2O_5) (Table 20. 3)

below the late 3rd century town walls at Canterbury (on brickearth) and at the early medieval (8th century) site of Büraburg, Nordhessen, Germany (Goldberg and Macphail 2006, tables 9.1a-9.1b; Greig 2004; Henning and Macphail 2004). Similarly, at the Roman towns of Scole (Norfolk) and Southwark, London edge of town 'dark earth' was a lightly manured sandy soil (Ashwin and Tester forthcoming). At Zone 6 on the EKA2, this manuring seems to be related to cultivation and the development of an Ap horizon (see Canterbury buried soil, above), and the subsoil (133028) is characterised by textural pedofeatures relict of ploughing (Goldberg and Macphail 2006, 202-210; Lewis 1998; Macphail *et al* 1990). The ensuing biological homogenisation of this ploughsoil probably occurred when the ground was left to fallow or pasture; cf the dark earth soil development of pasture soils at Deansway on the edge of Worcester, by late Saxon (burgh) times (Greig 2004; Macphail 2004)).

This dark earth soil, therefore, seems to have had a history of:

1. Manured cultivation using probable midden waste derived from nearby Roman rural settlement;
2. Abandonment/fallowing and biological homogenisation (grassland?);
3. Unknown subsequent (burial by colluviation?) conditions which produced small amounts iron-manganese staining and inwash of dusty clay.

Conclusions

A small soil micromorphology, loss-on-ignition (LOI) and phosphate (P) study of six thin sections and bulk samples from four sites within the EKA2 was carried out. EDS microchemistry was also employed on one thin section.

Monolith 5108: it can be tentatively suggested that the Early Bronze Age inner ring-ditch records rapid, layered, sandy and clayey sand infilling in probably open conditions, with the studied thin section being representative of the monolith sample as a whole; rare charcoal, probably relict of clearance, was noted.

Monolith 6157: study of the Bronze Age or earlier buried soil on chalk suggests a history of:

1. A first occupation perhaps associated with flint working;
2. Later use of the area for pasture;
3. A second, immediately pre-barrow occupation related to use of the site and barrow(s) construction;
4. Post-burial formation of iron manganese nodules and earthworm burrowing.

Monolith 6919: a likely 'turf' stabilisation horizon was found in the Bronze Age barrow ditch fill on chalk, and this was corroborated by LOI data.

Monolith 5325: study of the Roman dark earth on Thanet Beds suggests a sequence beginning with manured cultivation using probable midden waste, followed by abandonment/fallowing (grassland?) and subsequent burial by colluvium.

Chapter 21

Radiocarbon Dating

by Alistair J Barclay and Chris J Stevens

Introduction

Fifty-six samples were submitted to the Scottish Universities Environmental Research Centre (SUERC) from selected prehistoric, Roman and Saxon features to try and address a number of research aims regarding the site. Seven dates are on samples of animal bone, mostly articulated, and 42 are on samples of human bone mostly from inhumation and cremation burials, five are on charred plant remains and two are on pottery charred food residue.

Project aims

The radiocarbon dating strategy had two main aims:

- to confirm the date of otherwise unphased deposits (eg, human and animal bone), to confirm the date of material thought to be contemporaneous with the associated feature (eg, not intrusive or redeposited), and to provide direct dates for pottery by targeting internal charred food residues;
- to provide more precise dates (ie, within a century) for selected features including a Neolithic pit (191086) with an associated pottery group and a complex of intercutting ditched boundaries (1384 and 3131) of later Iron Age date, and to compare these age estimates with those from similar sites elsewhere.

Methods, pretreatment, measurement and calibration

In the case of the first aim where the requirement was to provide a radiocarbon date for the selected sample, these are quoted in the tables (see also Volume 1, Chaps 2–5) in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986); they are conventional radiocarbon ages (Stuiver and Polach 1977) and have been calculated using the calibration curve of Reimer *et al* (2009) and the computer program OxCal (v4.1) (Bronk Ramsey 1995; 1998; 2001; 2009). The calibrated date ranges cited in the text are those for 95% confidence, quoted in the form recommended by Mook (1986), with the end points rounded outwards to 10 years. The ranges in plain type in the radiocarbon tables have been calculated according to the maximum intercept method (Stuiver and Reimer 1986). All other ranges are derived from the probability method (Stuiver and Reimer 1993).

In the case of the second aim the methods adopted follow the standard Bayesian approach to chronological modelling as outlined by Bayliss and Ramsey (2004), a heuristic procedure that starts by defining a problem and involves the building of simulation models to inform sample selection. Sample results will determine whether the initial model fits expectation, needs modification or further results.

In two cases (pit 191086 and ditches 1384 and 3131) a Bayesian approach has been adopted for the interpretation of the chronology (Buck *et al* 1996; Bayliss *et al* 2007). Although the simple calibrated dates are accurate estimates of the dates of the samples, it is the dates of the archaeological events, which are represented by those samples, which are of interest. In the case of the features under discussion, it is the chronology of the selected features and their associated activity that is under consideration, not the dates of individual samples. The dates of this activity can be estimated not only using the absolute dating information from the radiocarbon measurements, but also by using the stratigraphic relationships between samples. The OxCal programme provides the methodology to combine these different types of information explicitly, to produce realistic estimates of the dates of interest. However, the *posterior density estimates* produced by this modelling are not absolute. They are interpretative *estimates*, which can and will change as further data become available and as other researchers choose to model the existing data from different perspectives. They are quoted in *italics*.

Details of the algorithms employed by this program are available from the on-line manual or in Bronk Ramsey (1995; 1998; 2001; 2009). The algorithms used in the models described below can be derived from the structures shown in Figs 21.1–21.12.

Results

Neolithic

Two features, a grave of uncertain date and an early Neolithic pit, were radiocarbon dated (Table 21.1). A single radiocarbon measurement (SUERC-40296) was obtained on a sample taken from the left femur from inhumation burial 177085. This returned a date of 3350-3090 cal BC (at 95% confidence) indicating that

Table 21.1 Radiocarbon measurements obtained for Neolithic features. Posterior density estimates derive from the model presented in Fig. 21.1

Laboratory Code	*Feature and Context*	*Material Identification*	*Radiocarbon Age (BP)*
SUERC-40296	Grave 177085 (177086)	Human bone, left femur	4490±30
SUERC-40742	Pit 191086 (191085)	Charred flax seeds	4750±35
SUERC-40743	Pit 191086 (191085)	Charred cereal grain, Emmer grain	4775±35
SUERC-40744	Pit 191086 (191085)	Charred hazelnut shell fragment	4730±35

the burial is of Middle Neolithic date and contemporaneous with the use of Mortlake and Fengate style pottery that is generally accepted to be in use from 3350 BC until about 2850 BC (Barclay 2007, 344 and table 15.1; and see Leivers above).

To precisely date pit 191086 samples were taken on three different types of short-lived charred plant remains (charred flax seeds, cereal grain and hazelnut shell: SUERC-40742-44; Table 21.1). Decorated Bowl is known to have been current during the 37th century BC until perhaps the 34th century BC. The project provided the opportunity to try and obtain a more precise date within the 37th and/or the 36th century BC. Using the OxCal program a simulation model was built to determine the minimum number of radiocarbon dates required to achieve this level of precision. A single radiocarbon date may only return a date range within 250 years or more (eg, SUERC-40742 4750±35 BP at 95% confidence 3640-3380 cal BC), which would simply confirm what is already broadly known about this style of pottery. However, by obtaining at least three dates it would be possible to place the digging of the pit and the use of this pottery within about a 100 years (eg, either the 37th, 36th or 35th century BC). This would then allow the pit deposit and the type of pottery to be placed in sequence with other estimated events modelled with a similar level of precision.

The model (Fig 21.1) has good agreement (A110.1). Given that the pit filling was likely to be a short event (probably within a single day or so) the age of the pottery is likely to be close to that of the digging of the pit. The digging of the pit has been modelled as *3640-3520 cal BC (95% probability) probably 3640-3570 cal BC (68% probability)*. As the pottery mostly consisted of large freshly broken refitting fragments the age estimate for the digging of the pit is highly likely to be close to that of the pottery assemblage. This result provides a more precise date for a single group of decorated pottery that has stylistic affinities with Whitehawk pottery from the southern coastal regions of England.

The pit site is located only 1.5km from the Chalk Hill, Ramsgate causewayed enclosure that is associated with what is described as 'Carinated Bowl' and globular-shaped pottery (identified by Alex Gibson and summarised in Bayliss *et al* 2011, 372-6). The dating of the Chalk Hill enclosure has been presented by Bayliss *et al* (2011, fig 7.21), although this may be refined with the final publication of the site report. The site chronology based on their work is represented in Fig 21.2 using the OxCal 4.1v program, which gives near identical results. This indicates that the Chalk Hill enclosure was probably built at some point during *3780*

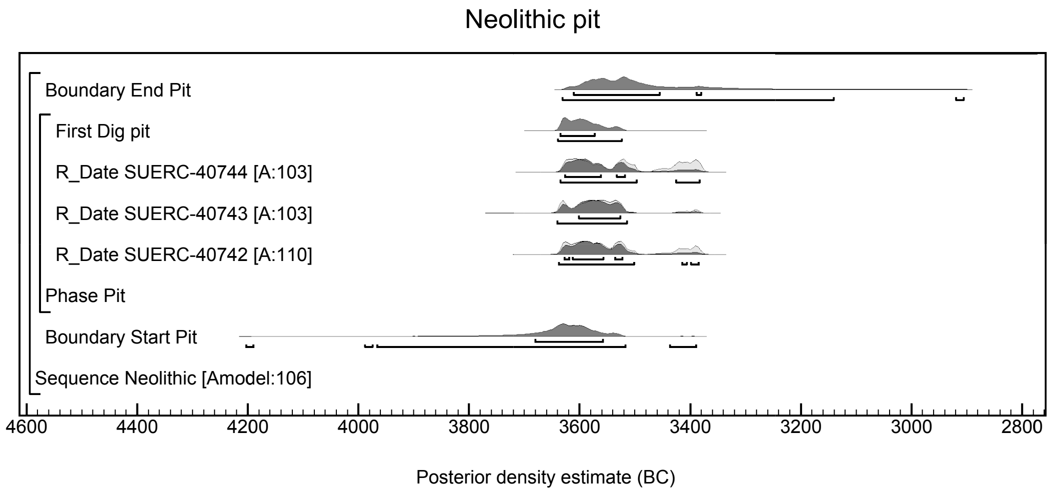


Fig 21.1 Probability distributions for the dates from pit 191086. Each distribution represents the relative probability that an event occurred at a particular time. For each of the dates two distributions have been plotted, one in outline, which is the result produced by the independent calibration of the radiocarbon measurement and a solid one, which is based on the chronological information provided by the model. For example, the distribution 'First Dig pit' is the estimated date for the digging of the feature. The large square brackets down the left-hand side of the diagram, along with the OxCal keywords, define the overall model exactly.

δ13C (‰)	*δ15N (‰)*	*C:N Ratio*	*Calibrated Date Range (95.4% confidence*	*Posterior density estimate (95% probability)*
-21.9	11.2	3.2	3350–3090 cal BC	3640–3500 cal BC (93.2%) 3410–3400 cal BC (0.5%)
-26.7			3640–3380 cal BC	3400–3380 cal BC (1.7%)
-23.1			3650–3380 cal BC	3640–3510 cal BC
-24.5			3640–3370 cal BC	3640–3490 cal BC (89.1%) 3430–3380 cal BC (6.3%)

to 3670 cal BC (95% probability) and more probably 3750 to 3690 cal BC (at 68%) (see Fig 21.2; modelled as *Build_Chalk_Hill*), whilst the enclosure was abandoned at some point during *3640 to 3600 (95% probability) or more likely 3640 to 3600 cal BC (68% probability)*. The latter is similar to the dates obtained for the digging of the pit (see above and Fig 21.3). However, using the OxCal Order function there is a 70% probability that the enclosure was abandoned before the pit was dug. It is very likely that the enclosure went out of use within a generation or two (*up to 50 years at 68% probability or 105 years at 95% probability*) before the pit was dug.

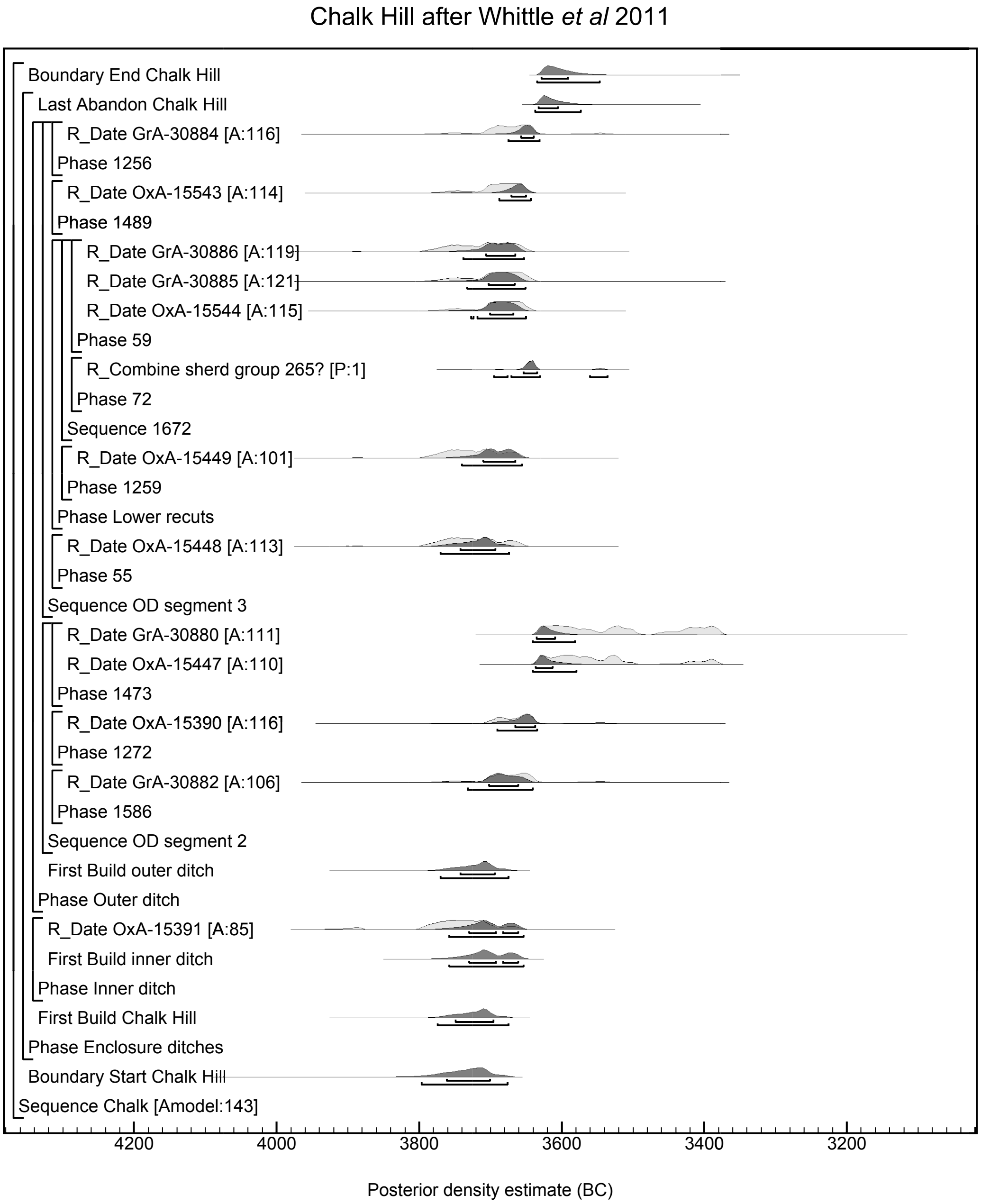


Fig 21.2 Probability distributions for the dates for Chalk Hill (after Whittle et al *2011). The large square brackets down the left-hand side of the diagram, along with the OxCal keywords, define the overall model exactly.*

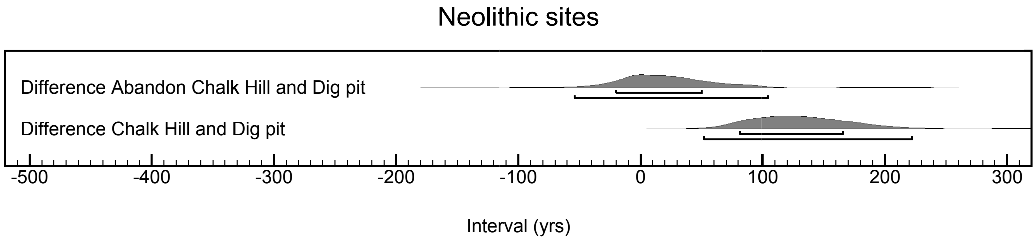


Fig 21.3 Posterior density estimates for the difference between the abandonment of Chalk Hill and the digging of Neolithic pit 191086 (upper), and the construction of Chalk Hill and the digging of the pit (lower). Modelled using the OxCal difference function

Early Bronze Age

Eleven radiocarbon dates were obtained, mostly on human bone samples from burial deposits. Three (SUERC-40278, 40280-81) are on cremated bone from individual grave deposits and eight (SUERC-40290-92, 40713, 40718, 40720-21) are on inhumed bone from burials. The main purpose was to confirm the date of each individual burial. Details of each sample, its context and its calibrated date range can be found in Table 21.2 with the results shown in chronological order in Fig 21.4 (red for cremated bone and black for inhumed bone samples) and in the probability order Table 21.3.

Ten of these burials span the Early Bronze Age period with the earliest one, inhumation 220051, likely to be of 21st or 20th century BC date (SUERC-40718: 2130-1890 cal BC at 95% confidence). Slightly later in date is cremation burial 159133 (SUERC-40278: 2030-1770 cal BC at 95% confidence). The latest burials are the two cremation deposits, 125220 and 141083 that are dated by SUERC-40280 and 40281 respectively and were made during the 17th or 16th century cal BC (see Table 21.2). Overall all of the EBA burials span a period that could have lasted between *250 and 470 years* with the suggestion that one or more burials were made, possibly at intervals, every one or two generations. One such group are the three dated burials from Barrow 1.

Table 21.2 Radiocarbon measurements obtained for Early Bronze Age features

Laboratory Code	*Feature and Context*	*Material Identification*	*Radiocarbon Age (BP)*
SUERC-40278	Grave 159133 (159132)	Cremated bone indet.	3565±30
SUERC-40280	Grave 125220 (125223)	Cremated bone indet.	3280±30
SUERC-40281	Grave 141083 (141084)	Cremated bone indet.	3340±30
SUERC-40290	Grave 136129 (136128)	Human bone, left femur	3490±30
SUERC-40291	Grave 136132 (136131)	Human bone, left femur	3435±30
SUERC-40292	Grave 174060 (174057)	Human bone, skull	3445±30
SUERC-40713	Grave 126004 (126005)	Human bone, left femur	3535±35
SUERC-40718	Grave 220051 (220053)	Human bone, right femur	3625±35
SUERC-40720	Grave 216091 (216092)	Human bone, right femur	3510±35
SUERC-40721	Grave 246134 (246136)	Human bone, left femur	3505±35
SUERC-40722	Grave 132095 (132096)	Human bone, right humerus	3435±35

Table 21.3 Early Bronze Age radiocarbon dates. Probability (%) order of radiocarbon dates for selected EBA burials. The table should be read from the left hand column across each row. The stated probability is that the date in the left hand column is older that the corresponding date in the top row (eg SUERC-40278 is older than SUERC-40718 is 21% = 0.21 probability

	SUERC-40718	*SUERC-40278*	*SUERC-40713*	*SUERC-40720*	*SUERC-40721*	*SUERC-40290*	*SUERC-40292*
SUERC-40718	0	79	92	97	97	99	99
SUERC-40278	21	0	74	85	86	90	95
SUERC-40713	8	26	0	63	65	70	85
SUERC-40720	3	15	37	0	52	57	79
SUERC-40721	3	14	35	48	0	55	77
SUERC-40290	1	10	30	43	45	0	74
SUERC-40292	0	5	15	21	23	26	0
SUERC-40291	0	4	10	15	16	19	41
SUERC-40722	0	4	12	17	18	21	42
SUERC-40281	0	0	0	0	0	0	2
SUERC-40280	0	0	0	0	0	0	0

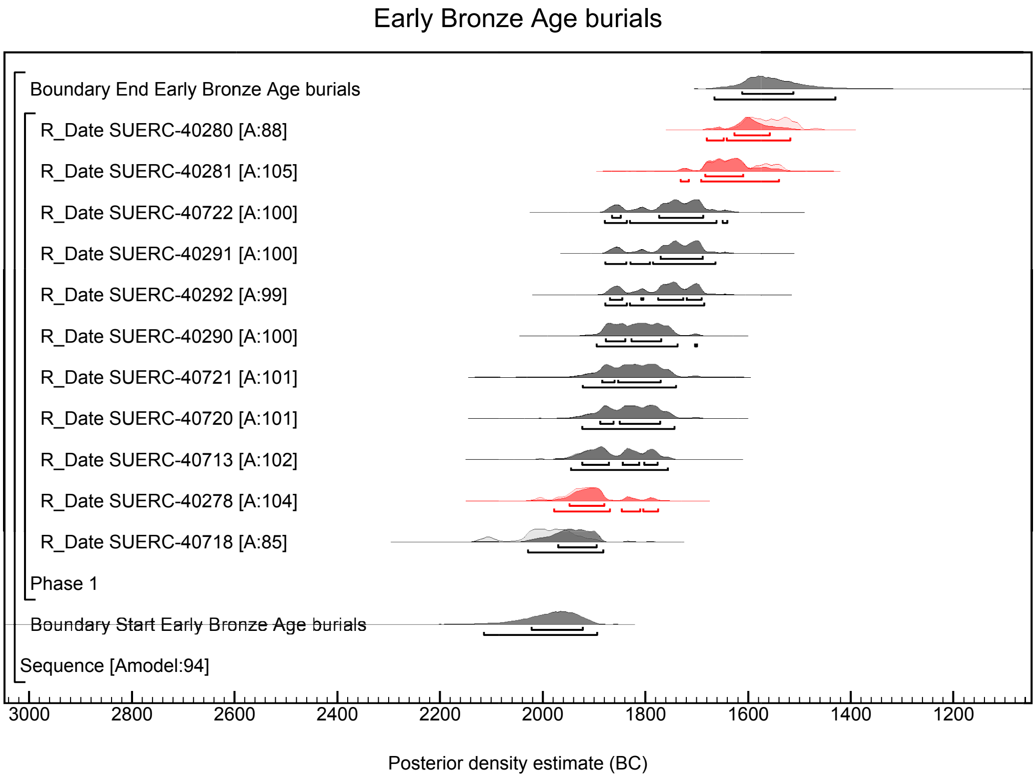


Fig 21.4 Radiocarbon modelled dates for Early Bronze Age burials

δ13C (‰)	*δ15N (‰)*	*C:N Ratio*	*Calibrated Date Range (95.4% confidence)*
-25.9			2030–1770 cal BC
-22.0			1640–1460 cal BC
-24.8			1730–1520 cal BC
-20.5	10.6	3.3	1900–1700 cal BC
-21.2	10.4	3.2	1880–1660 cal BC
-21.4	10.5	3.2	1880–1680 cal BC
-21.1	10.50	3.2	1960–1750 cal BC
-21.5	10.1	3.2	2130–1890 cal BC
-21.6	10.0	3.2	1930–1740 cal BC
-21.6	9.8	3.2	1930–1740 cal BC
-20.7	10.6	3.2	1880–1640 cal BC

SUERC-40291	*SUERC-40722*	*SUERC-40281*	*SUERC-40280*
100	100	100	100
97	97	100	100
90	88	100	100
85	83	100	100
84	82	100	100
81	79	100	100
59	57	98	100
0	49	96	100
5	0	96	99
4	4	0	81
0	1	19	0

Bone samples from all three burials produced date ranges that are statistically consistent and therefore are likely to be of a similar age (T'=0.4, T'(5%)=6.0; υ=2). Using the OxCal Order function the result SUERC-40713 for 126004 is probably the earliest of the three (*by 63% and 65% probability respectively*), whilst the probability that the date for 216091 (SUERC-40720) is earlier than 246134 (SUERC-40721) is slight (*only 52% probability*) (Table 21.3).

Overall only the earliest of these burials (SUERC-40718 Grave 220051) is likely to overlap with the Beaker burial tradition, the majority are arguably later than the main episode of Beaker associated activity during the final centuries of the 3rd millennium cal BC.

Middle-Late Bronze Age

Fifteen radiocarbon measurements were obtained for selected samples of human bone and charred plant remains (Table 21.4). Thirteen human burials were selected for radiocarbon dating and were found to fall within the Middle and Late Bronze Age periods (*c* 1500-800 cal BC). Details of these burials and their radiocarbon dates are given in Table 21.4 with the results placed in chronological order in Fig 21.5. As with the burials of Early Bronze Age date this group includes both cremated and inhumed remains. The earliest (cremation) burial 203001, dated by SUERC-40298, is one of three burials that were probably made in the 15th century BC. The other two are both inhumation burials (dated by SUERC-40300 and 40723).

Three further burials (166051, 200090 and 126180) are slightly later and were made during the 14th or possibly the early 13th century BC (SUERC-). Two cremation burials (SUERC-40268-69: graves 252223 and 179102) date to the 12th century BC or later and belong to a time when Deverel-Rimbury style pottery was going out of use. A further five burials belong to the centuries spanning the 11th to the early part of the 9th century BC. As with the human remains of Early Bronze Age date, these later burials also include both cremation and inhumation burials with no clear chronological pattern.

Two further measurements (SUERC-40740-41)

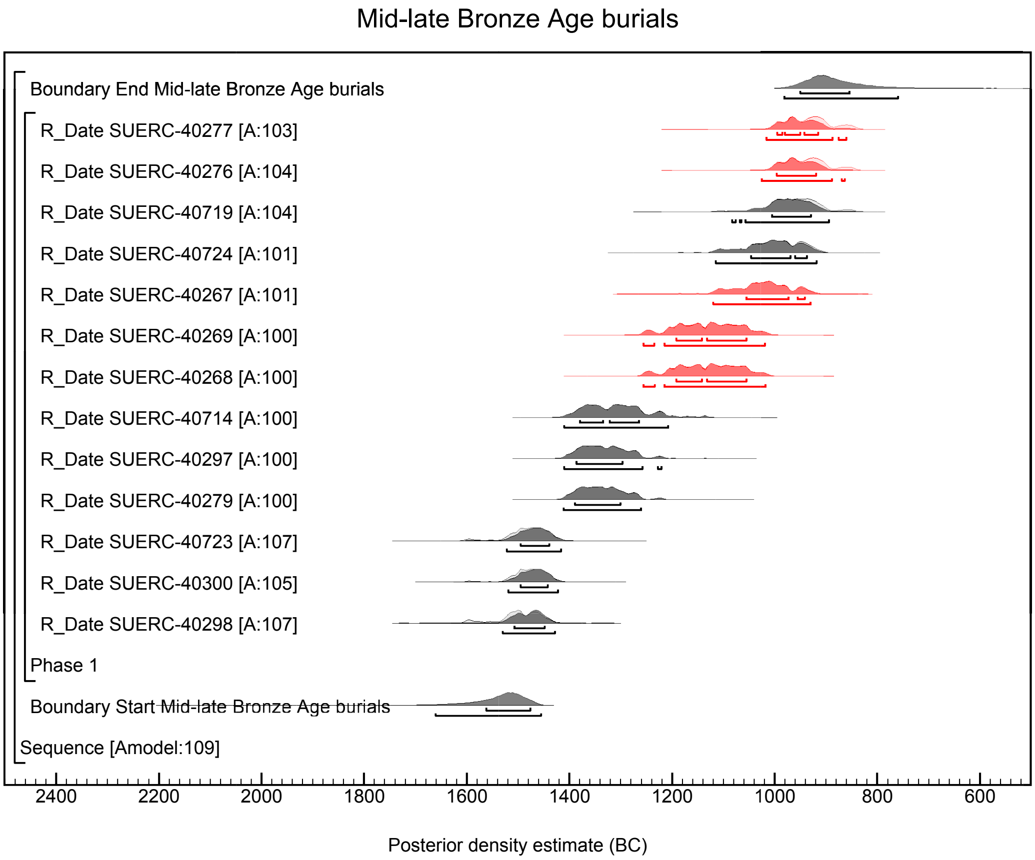


Fig 21.5 Radiocarbon modelled dates for Middle–Late Bronze Age burials

Table 21.4 Radiocarbon measurements obtained for Mid to Late Bronze Age features

Laboratory Code	*Feature and Context*	*Material Identification*	*Radiocarbon Age (BP)*
SUERC-40267	Grave 252215 (252216)	Cremated bone indet.	2855±30
SUERC-40268	Grave 252223 (252224)	Cremated bone indet.	2925±30
SUERC-40269	Grave 179102 (179103)	Cremated bone indet.	2925±30
SUERC-40276	Grave 126001 (126002)	Cremated bone indet.	2790±30
SUERC-40277	Grave 146016 (146013)	Cremated bone indet.	2785±30
SUERC-40279	Grave 166051 (166052)	Cremated bone indet.	3060±30
SUERC-40297	Grave 200090 (200089)	Human bone, left tibia	3055±30
SUERC-40298	Grave 203001 (203002)	Human bone, femur	3230±30
SUERC-40300	Grave 221014 (221016)	Human bone, right femur	3210±30
SUERC-40714	Grave 126180 (126181)	Human bone, left tibia	3040±35
SUERC-40719	Grave 275007 (275009)	Human bone, left femur	2810±35
SUERC-40723	Grave 290481 (290482)	Human bone, left tibia	3210±35
SUERC-40724	Grave 198245 (198244)	Human bone, left femur	2840±35

Table 21.5 Radiocarbon dates for cereal from pit 159256

Laboratory Code (95.4% confidence	*Feature and Context Posterior density estimate (95% probability)*	*Material Identification*	*Radiocarbon Age (BP)*
SUERC-40740	Pit 159256 (178164)	Charred cereal grain, naked barley grain	2680±35
SUERC-40741	Pit 159256 (178164)	Charred cereal grain, naked barley grain	2770±35

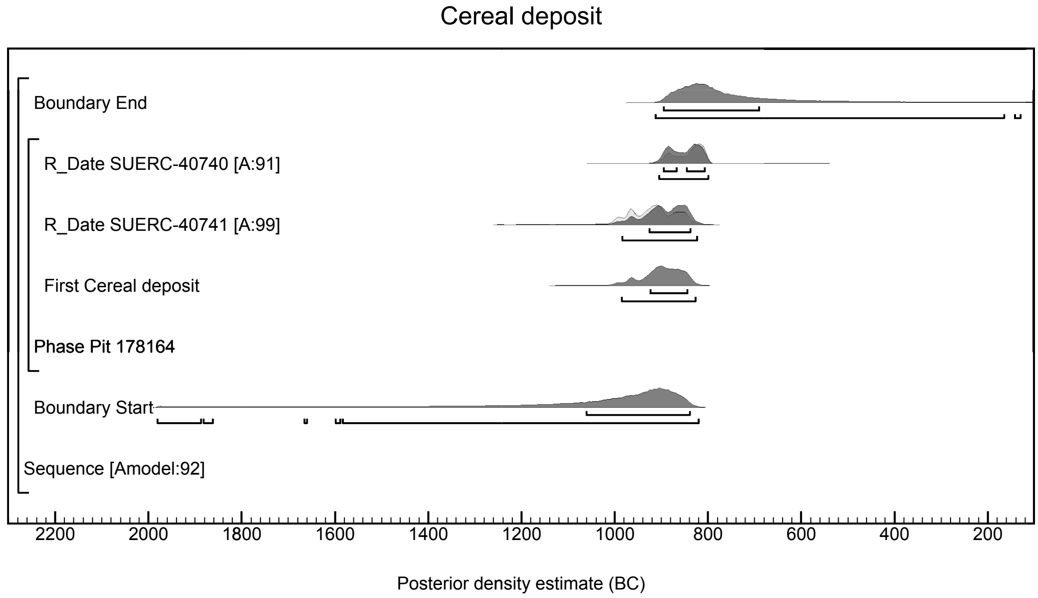


Fig 21.6 Radiocarbon modelled dates for Late Bronze Age cereal deposit in pit 178164

were obtained on charred barley grain recovered from pit 178164 (Table 21.5). This deposit is likely to have been placed at some point during *990-820 cal BC (at 95% probability. See Fig 21.6: modelled as First Cereal Deposit)*.

Iron Age

Twenty radiocarbon dates were obtained on features of Iron Age date (Table 21.6). Twelve are on human bone, six on animal bone and two are on pottery charred food residue. Ten of the measurements on human bone were to confirm the dates of burial and bone deposits. Three dates (SUERC-40732-34) on fowl bones were to confirm their Iron Age date and another was to confirm the date of a horse burial (SUERC-40738). In addition, four dates were obtained on material from earthwork ditches 3131 and 1384 to determine likely dates of construction. Details of the samples and their dates can be found in Table 21.6 and are plotted in Fig 21.7. All of the samples selected for dating produced results that fall within the later Iron Age period (4th to 1st centuries BC).

Seven of the eight inhumation burials selected for radiocarbon dating returned dates within the 4th to 3rd centuries BC. The exception is 147255 (SUERC-40286), which dates to some point within the 2nd or 1st century BC. Cremated bone from a grave (147141) and a post-hole/pit (189050) are both much later. The cremation burial 147141 (SUERC-40271) is likely to belong to the pre-conquest Iron Age of the later 1st century BC or early 1st century AD. The cremated bone from posthole/pit 189050 (SUERC-40272) is slightly earlier and is likely to derive from a burial that was made either in the later 2nd century BC or the earlier half of the 1st century BC.

Three fowl bones were dated, from pits 156135 (SUERC-40732) and 168115 (SUERC-40733), and SFB 174060 (SUERC-40734). In all three cases the animals were found to be of Middle Iron Age date (later 4th century to earlier 1st century BC). A horse burial made in pit 177193 (SUERC-40738) was deposited at some point during the 4th or 3rd century BC.

Two pottery samples of internal charred food residue were dated (SUERC-40748-49) both of which returned measurements that fall within the 4th and 3rd centuries BC.

In addition to the above an attempt was made to date the construction of two linear earthworks represented by ditch cuts 1384 and 3131 to identify whether they were constructed during the 2nd or 1st century BC. In order to date these events an assessment of all possible sample material was undertaken and a simulation model based on the available samples and stratigraphy was constructed using the OxCal program.

δ13C (‰)	*δ15N (‰)*	*C:N Ratio*	*Calibrated Date Range (95.4% confidence)*
-21.0			1130–920 cal BC
-23.5			1260–1010 cal BC
-23.2			1260–1010 cal BC
-22.3			1020–840 cal BC
-23.2			1010–840 cal BC
-20.7			1420–1260 cal BC
-20.6	11.0	3.2	1420–1220 cal BC
-20.8	10.7	3.2	1610–1430 cal BC
-21.0	10.4	3.2	1530–1410 cal BC
-20.7	11.3	3.2	1410–1200 cal BC
-20.0	9.0	3.2	1060–840 cal BC
-21.0	10.2	3.3	1610–1410 cal BC
-21.0	12.7	3.3	1120–910 cal BC

δ13C (‰)	*Calibrated Date Range*
-22.9	910–790 cal. BC
-24.6	1010–830 cal. BC

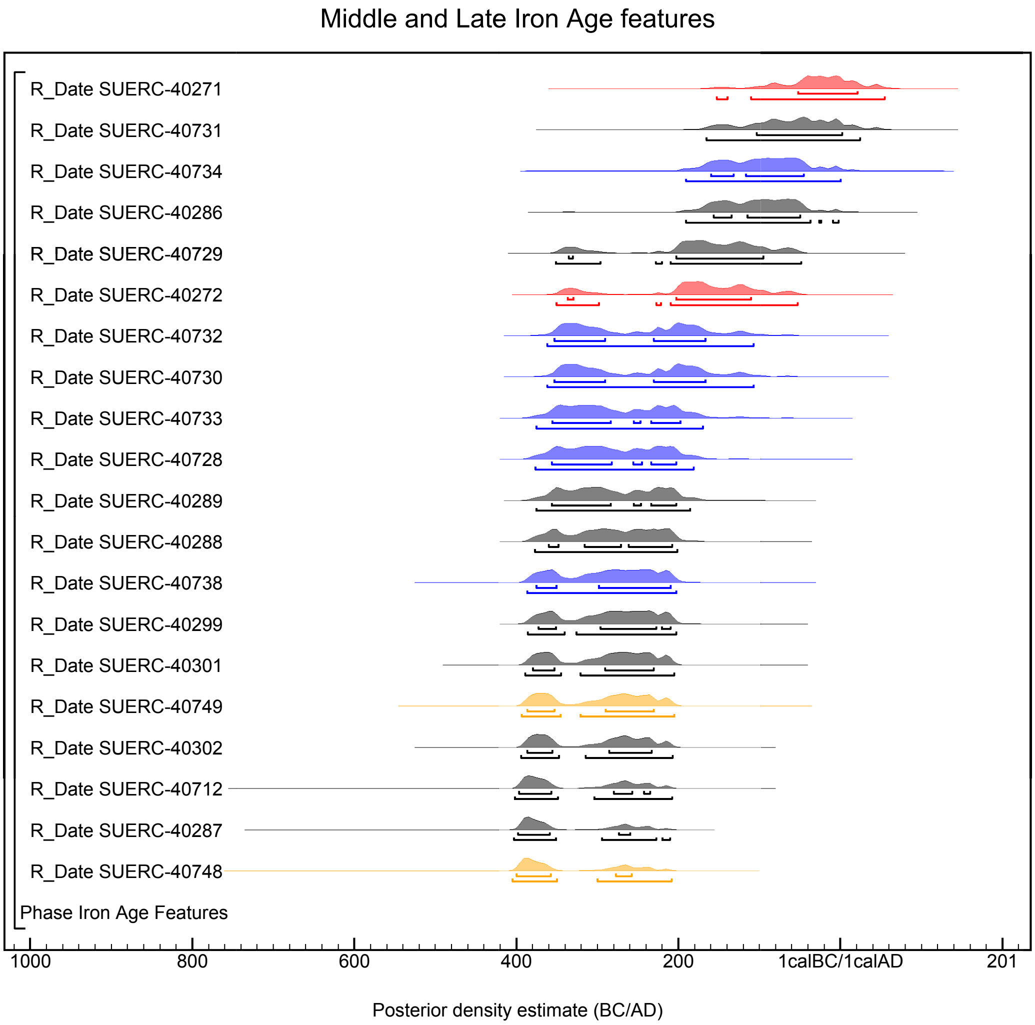


Fig 21.7 Radiocarbon modelled dates for Middle and Late Iron Age features

Table 21.6 Radiocarbon dates obtained for Iron Age features

Laboratory Code	*Feature and Context*	*Material Identification*	*Radiocarbon Age (BP)*
SUERC-40271	Grave 147141 (147139)	Cremated bone indet.	2025±30
SUERC-40272	Post-hole/pit 189050 (189052)	Cremated bone indet.	2135±30
SUERC-40286	Grave 147255 (147256)	Human bone, left femur	2080±30
SUERC-40287	Grave 136033 (136034)	Human bone, left femur	2285±30
SUERC-40288	Grave 153028 (153027)	Human bone, left femur	2215±30
SUERC-40289	Grave 126127 (126128)	Human bone, left fibula	2200±30
SUERC-40299	Grave 220092 (220093)	Human bone, left femur	2230±30
SUERC-40301	Grave 246011 (246012)	Human bone, right femur	2240±30
SUERC-40302	Grave 248090 (248092)	Human bone, left tibia	2255±30
SUERC-40712	Grave 205111 (205108)	Human bone, left femur	2280±35
SUERC-40728	Ditch 3131 (3146)	Animal bone, cattle left metacarpal	2200±35
SUERC-40729	Ditch 1384 (1088)	Human bone, frontal vault	2130±35
SUERC-40730	Ditch 1384 (1184)	Animal bone, sheep right mandible	2165±35
SUERC-40731	Ditch 1384 (1184)	Human bone, temporal vault	2045±35
SUERC-40732	Pit 156135 (156136)	Animal bone, femur, fowl	2165±35
SUERC-40733	Pit 168115 (168117)	Animal bone, juvenile femur, fowl	2190±35
SUERC-40734	SFB 174060 (174073)	Animal bone, ulna, fowl	2075±35
SUERC-40738	Pit 177193 (177091)	Animal bone, tarsal, horse	2230±35
SUERC-40748	Pit 173188 (173189)	Pottery charred residue	2290±35
SUERC-40749	SFB 174060 (174068)	Pottery charred residue	2250±35

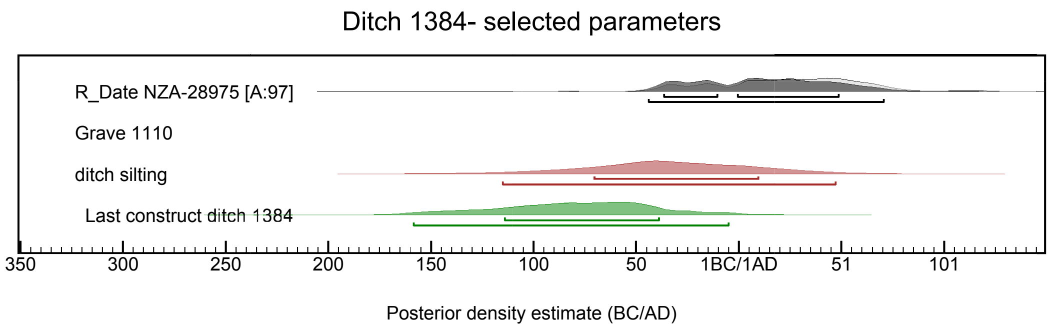


Fig 21.8 Radiocarbon modelled dates for Iron Age ditch 1384 (see Fig 21.9)

Three samples of disarticulated bone (human skull fragments and a sheep mandible) from the primary ditch fill of 1384 were dated by SUERC-40729-31. As the bone was disarticulated the assumption was made that it was all residual but possibly not much older than the digging of the ditch. On this basis the youngest of the samples is likely to be closest in date to the construction of the ditch. This was modelled as *Last_Construct_ ditch 1384* (see Fig 21.8) and gives a date for construction of *160 cal BC to 1 cal AD (at 95% probability) or more likely 120-30 cal BC (at 68% probability)*. Burial 1110 was made in a grave that cut the uppermost ditch fill. Given the size of the ditch cut the time between its digging and the placing of the burial involves a lapse of time that is likely to equate to at least several years and possibly decades. Ditch silting has been estimated using the OxCal Date function (Fig 21.8) and this returns a date estimate of *120 BC to 50 AD (at 95% probability) or more likely 80 BC and 10 AD (at 68% probability)*. The difference between the date for the burial and the construction of the ditch has been modelled (Fig 21.8) (with the assumption that there was little or no hiatus between the final siting and the placing of the burial). The result suggests that ditch silting could have taken somewhere between *40 to 130 years (at 68% probability) or 10 to 180 years (at 95% probability)*.

Estimating a more precise date for the construction of ditch 3131 was restricted by a lack of sample material. Only a single sample of disarticulated bone was available from the primary fill, which in the model presented here was treated as a *terminus post quem* (Fig 21.9 modelled as *After_SUERC-40728*). The upper fills of the ditch cut were sealed by burial 3121 that had been previously dated by NZA-28976 (Barclay 2009, 170). As the two dates were in sequence a construction date for the ditch and earthwork was estimated using the OxCal *Date* function. This gave a likely estimate for construction at some point between *190 to 20 cal BC (at 68% probability or 350-20 cal BC at 95% probability)*. Whilst this result lacks the precision of the age estimate for ditch 1384, it is not incompatible. A date estimate was also calculated for the secondary recut ditch using the OxCal Date function. This gives a result for the cutting of the ditch as happening at some point between *20 cal BC to 100 cal AD (68%) or 50 cal BC to 240 cal AD (at 95% probability)*.

δ13C (‰)	*δ15N (‰)*	*C:N Ratio*	*Calibrated Date Range (95.4% confidence*	*Posterior density estimate (95% probability)*
-20.6			160 cal BC–cal AD 60	
-23.7			360–50 cal BC	
-19.6	11.4	3.2	200–1 cal BC	
-20.4	9.3	3.2	410–210 cal BC	
-20.9	10.2	3.2	380–200 cal BC	
-21.5	9.0	3.2	380–180 cal BC	
-21.0	9.9	3.2	390–200 cal BC	
-20.4	11.2	3.2	390–200 cal BC	
-21.2	10.8	3.2	400–200 cal BC	
-20.0	9.7	3.2	410–200 cal BC	
-22.1	7.5	3.2	380–180 cal BC	380–180 cal BC
-20.9	10.3	3.3	360–40 cal BC	340–320 cal BC 1.1% 220–40 cal BC 94.3%
-21.2	4.4	3.3	370–100 cal BC	350–390 cal BC 7.8% 260–50 cak BC 87.6%
-20.8	9.7	3.3	170 cal BC–cal AD 30	170 cal BC–10 cal AD
-20.9	7.9	3.4	370–100 cal BC	
-20.9	10.3	3.3	380–170 cal BC	
-20.4	9.3	3.3	200 cal BC–cal AD 10	
-22.4	6.9	3.3	390–200 cal BC	
-26.2			410–200 cal BC	
-27.0			400–200 cal BC	

Table 21.7 Radiocarbon dates obtained from ditches 1384 and 3131, Bigbury and Hermeskeil (Germany)

Feature	*Feature Type*	*Context*	*Material Type*	*Material Identification*	*Laboratory Code*
EKAR					
3131	Ditch	3131 (3146)	Animal Bone	Left metacarpal (5.0g) – Cattle	SUERC-40728
1384	Ditch	1384 (1088)	Human Bone	Frontal vault (1.2g)	SUERC-40729
1384	Ditch	1384 (1184)	Animal Bone	Right mandible (5g) – Sheep	SUERC-40730
1384	Ditch	1384 (1184)	Human Bone	Temporal vault (1.2g)	SUERC-40731
Bigbury					
Waterhole	Dump layer in waterhole	5	Charcoal	Not known	BM-1530
Waterhole	Dump layer in waterhole	5	Charcoal	Not known	BM-1768
					BM-1768 (revised)
Hermeskeil					
	Ditch fill	10	Charcoal	Twig/branch, 3-5 years old	ERL-16189
	Ditch fill	10	Charcoal	Twig/branch More than 10 years old	ERL-16187

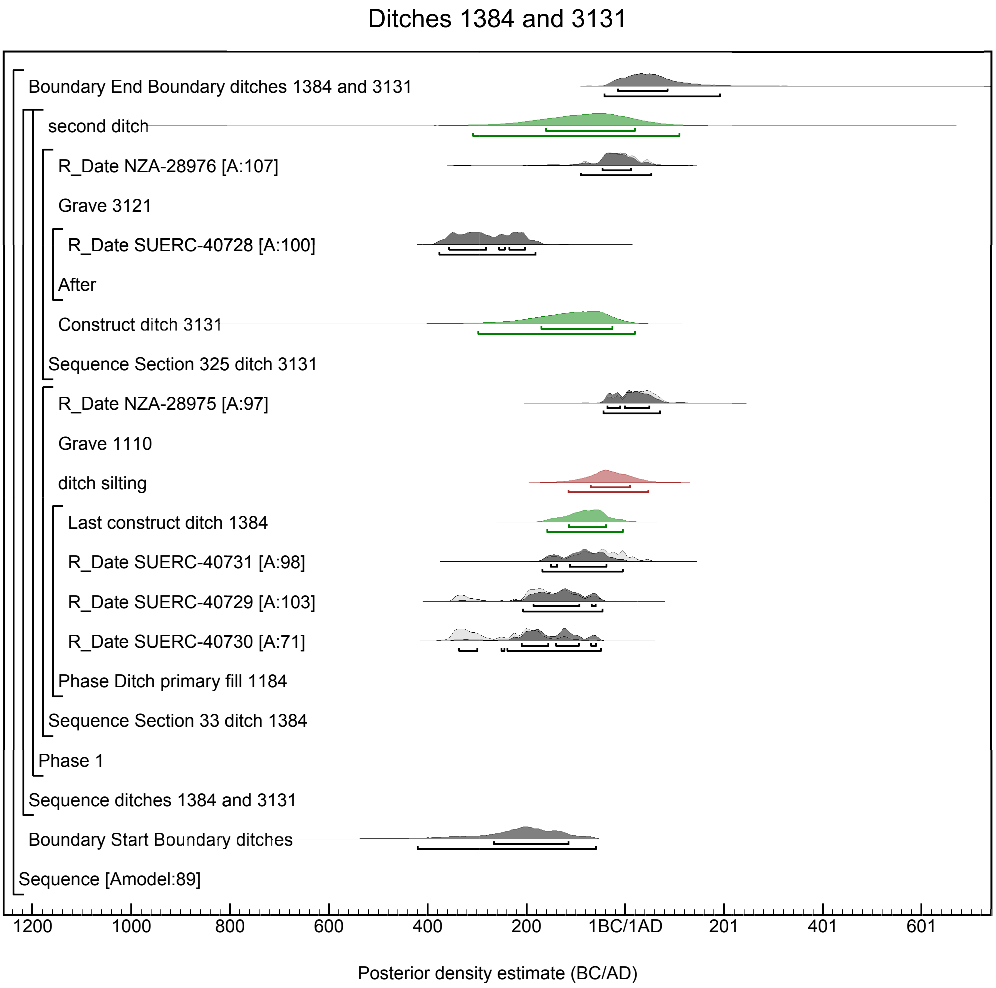


Fig 21.9 Probability distributions for the dates from Iron Age ditches 1384 and 3131. Each distribution represents the relative probability that an event occurred at a particular time. For each of the dates two distributions have been plotted, one in outline, which is the result produced by the independent calibration of the radiocarbon measurement, and a solid one, which is based on the chronological information provided by the model. For example, the distribution 'Last construct ditch 1384' is the estimated date for the digging of the feature. The large square brackets down the left-hand side of the diagram, along with the OxCal keywords, define the model exactly.

Radiocarbon Age (BP)	*$\delta^{13}C$ (‰)*	*$\delta^{15}N$ (‰)*	*C:N Ratio*	*Calibrated Date Range (95.4% confidence)*	*Archaeological Phase*
2200±35	-22.1	7.50	3.2	380–180 cal BC	
2130±35	-20.9	10.30	3.3	360–40 cal BC	
2165±35	-21.2	4.40	3.3	370–100 cal BC	
2045±35	-20.8	9.70	3.3	170 cal BC–cal. AD 30	
2080±45	-24.4				Argued to be associated with abandonment of hillfort.
1920±35	-25.6				Argued to be associated with abandonment of hillfort.
2060±50					Bowman *et al.* 1990
2078±35					Primary fill of defensive ditch. Charcoals suggested to be from a wickerwork superstructure.
2107±35					Primary fill of defensive ditch. Charcoals suggested to be from a wickerwork superstructure.

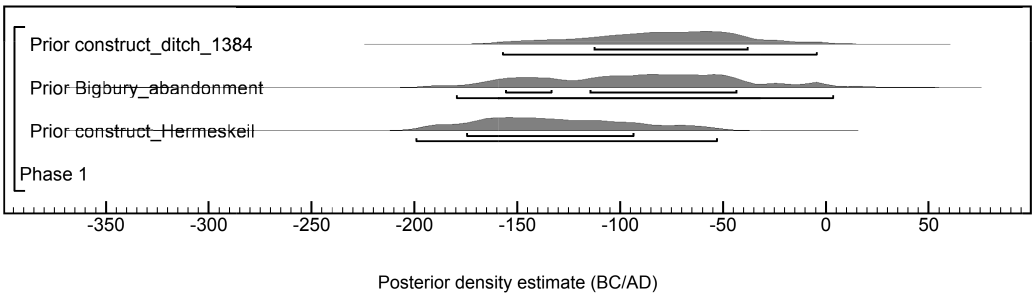


Fig 21.10 Posterior density estimates for the construction of ditch 1384, Hermeskeil earthwork and abandonment of Bigbury

The two burials made in the silted up primary ditch (1384 and 3131) both date to the pre-conquest period. Burial 3121 NZA-28976 is likely to have been placed at some point between *50 cal BC to 20 cal AD (at 68% probability) or 90 cal BC to 40 cal AD (at 95% probability)*. Burial 1110 NZA-28975 is likely to have been placed at some point during *40 to 10 cal BC (30.6%) and 10 cal BC to 40 cal AD (37.6%) (at 68% probability) or 50 cal BC to 70 cal AD (at 95% probability)*.

The construction date for ditch 1384 can also be compared with two other sites that are discussed in Volume 1, Chap 3. Fig 21.10 presents the construction date for 'Hermeskeil site' and for the abandonment of Bigbury based on the radiocarbon dates presented in Table 21.7). The Hermeskeil site was constructed at some point between *200-50 cal BC (at 95% probability)* and Bigbury could have been abandoned at some point during *180 to 1 cal BC (at 95% probability) or more likely 160 to 40 cal BC (at 85% probability)*. Fig 21.10 presents these results with the construction date for ditch 1384 in date order.

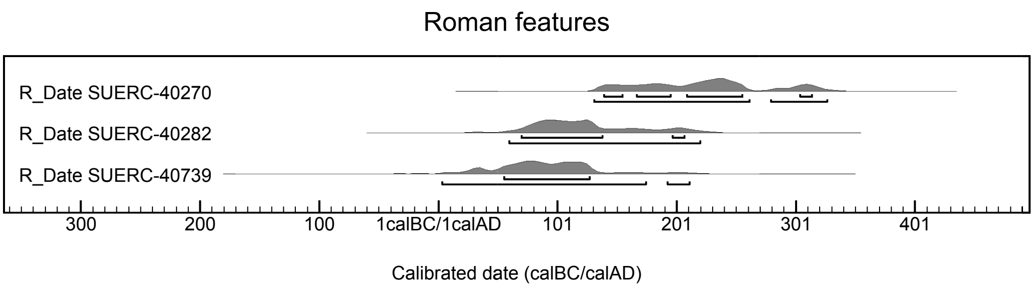


Fig 21.11 Radiocarbon modelled dates for Roman features

Table 21.8 Radiocarbon dates obtained for Roman features

Laboratory Code	*Feature and Context*	*Material Identification*	*Radiocarbon Age (BP)*
SUERC-40270	Grave 42001 (42003)	Cremated bone indet. (2.2g)	1795±30
SUERC-40282	Grave 159009 (159014)	Cremated bone indet. (1.9g)	1885±30
SUERC-40739	Ditch 249071 (249077)	Antler (2.9g) - Fallow Deer	1915±35

Table 21.9 Radiocarbon dates obtained for Saxon features

Laboratory Code	*Feature and Context*	*Material Identification*	*Radiocarbon Age (BP)*
confidence)			
SUERC-40306	Grave 176043 (176044)	Human bone, right femur	1315±30
SUERC-40307	Grave 176055 (176056)	Human bone, left clavicle	1300±30
SUERC-40308	Grave 223031 (223033)	Human bone, right femur	1285±30

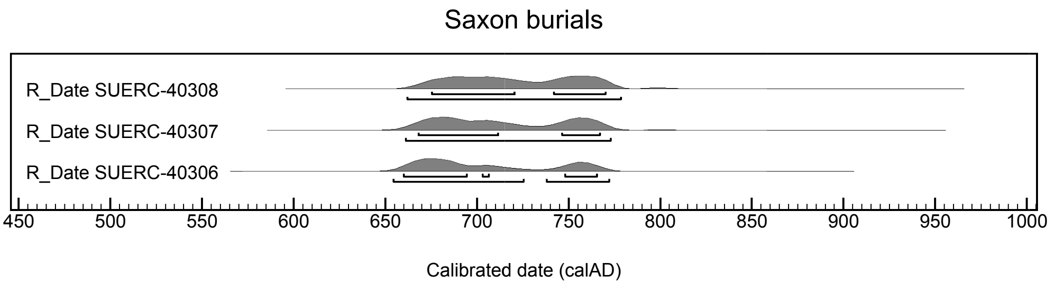


Fig 21.12 Radiocarbon modelled dates for Saxon burials

δ13C (‰)	δ15N (‰)	C:N Ratio	Calibrated date (95.4% confidence)
-24.1			cal AD 130–330
-20.0			cal AD 60–220
-21.4	5.3	3.2	cal AD 1–220

δ13C (‰)	δ15N (‰)	C:N Ratio	Calibrated date (95.4%
-20.1	9.5	3.2	cal AD 650–780
-18.9	9.6	3.2	cal AD 660–780
-19.7	9.9	3.1	cal AD 660–780

Roman

Three radiocarbon measurements were obtained on material thought to be of Roman date, two on cremated human bone from selected burials and a third on antler (see Table 21.8 and Fig 21.11). The radiocarbon dating suggests that grave 159009 (SUERC-40282) and the antler from ditch 249071 (SUERC-40739) are likely to belong within the late 1st and 2nd centuries AD, whilst the burial within grave 42001 (SUERC-40270) is likely to have been made in the 2nd or 3rd century AD.

Saxon

Three radiocarbon measurements (SUERC-40306-8) were obtained on human bone from selected burials. All three returned similar calibrated date ranges that fall within the mid-Saxon period (see Table 21.9 and Fig 21.12).

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