RADIOCARBON DATES

from samples funded by English Heritage between 1998 and 2003

Alex Bayliss, Christopher Bronk Ramsey, Gordon Cook, Peter Marshall, Gerry McCormac, and Johannes van der Plicht

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Radiocarbon Dates funded by English Heritage between 1998 and 2003

Introduction

This volume presents a detailed catalogue of the radiocarbon dates funded by English Heritage between April 1998 and March 2003. In total, details of 1195 determinations are provided.

Only samples from sites in which English Heritage had a formal interest were eligible for dating through the Scientific Dating Team of the Centre for Archaeology (this was formed by the merger of the Central Archaeology Service and the Ancient Monuments Laboratory in 1999). Often, samples came from archaeological excavations funded, wholly or in part, by English Heritage. Some samples were from sites excavated by the in-house archaeological team or on sites in guardianship (eg St Peter's Church, Barton-upon-Humber, Lincolnshire; Rodwell with Atkins 2011), but many were from projects undertaken by others with funding from the English Heritage Archaeology Commissions Programme.

Some excavations, such as the large-scale work at Yarnton, Oxfordshire (Hey 2004; Hey *et al* 2011; Hey *et al* forthcoming), were undertaken in advance of development or mineral extraction where permission had been granted before funding from developers became widely available, following the adoption of new planning guidance in the early 1990s (PPG16 1990).

Work also continued on the post-excavation analysis of sites that had been excavated with funding from English Heritage and its predecessors before the implementation of PPG16, such as the Neolithic complex on Hambledon Hill, Dorset (Fig. 1; Mercer and Healy 2008) or the Iron Age hillfort at Conderton Camp, Worcestershire (Thomas 2005). The programme to bring such sites to publication over the preceding few years had been successful, however, and so the proportion of resources spent on the analysis of such sites had begun to decline by this period. Similarly, samples were also submitted from the archaeological survey of the lowland wetlands of England (eg in the Humber Wetlands; Van der Noort and Ellis 1999; 2000; Van der Noort 2004), although this major initiative was also coming to a conclusion.

Resources could thus be refocused on sites that fell outside the planning process. In some cases, this was because assistance was needed for sites that had been encountered in development, despite the best efforts of the planning system (eg at Padstow, Althea Library, Cornwall; Manning and Stead 2006). In other cases, sites were recovered accidently during the course of agricultural works (eg the Waterden Hoard, Norfolk), or were threatened by natural processes such as riverine erosion (eg at Chamber's Wharf, London; Fig.2; Bayliss *et al* 2004a).

Fig 1. *The early Neolithic monument complex on Hambledon Hill, Dorset (© Historic England)*

Fig 2. *Excavating the body on the foreshore at Chamber's Wharf, London (© Historic England, photography by Robert Whytehead)*

Fig 3. *The West Kennet long barrow, Wiltshire (© Historic England)*

At this time, the first projects funded by English Heritage specifically aimed at exploiting the new potential for precise dating provided by the routine use of Bayesian chronological modelling were initiated. The pioneering phase of site-based applications, enabled by the development of the method and the availability of appropriate software (Buck *et al* 1991, 1992; Bronk Ramsey 1995), had clearly demonstrated the potential of the approach (eg Cleal *et al* 1995). The interpretation of these new chronologies was, however, limited by the fact that they tended to stand as isolated pin-pricks of precision within a sea of fuzzy prehistory.

We began to address this issue in two ways. First, a project to date a series of Neolithic long barrows in southern England was initiated, with the aim of producing a critical mass of data that would allow each site to be discussed within the context of its neighbours (Fig. 3; Bayliss and Whittle 2007; Whittle *et al* 2007a). Second, we began a project to date early Anglo-Saxon burials of the period *c* AD 580–720, using a combination of high-precision radiocarbon dating of the skeletons and the relative sequence provide by correspondence analysis of the associated grave-assemblages (Bayliss *et al* 2013).

Between 1998 and 2003, English Heritage maintained collaborative research arrangements with four radiocarbon dating facilities (Fig 4). Conventional radiocarbon dating was provided by the laboratory at the Scottish Universities Research and Reactor Centre (SURRC) using liquid scintillation spectrometry (LSS), with high-precision measurements, also undertaken using liquid scintillation spectrometry, provided by the laboratory of the Queen's University, Belfast. A single conventional measurement was kindly made on a sample from the Eton Rowing Course by the British Museum laboratory, since they had undertaken all the other conventional radiocarbon dates from this site as part of works funded before English Heritage became involved in this project.

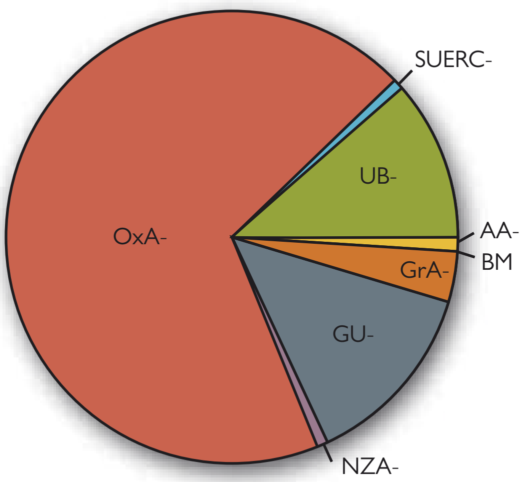


Fig 4. *Proportion of radiocarbon measurements included in this volume processed by each collaborating facility (AA-, Arizona Accelerator Mass Spectrometer Laboratory; BM-, British Museum, GrA-, Rijksuniversiteit Groningen, GU-/SUERC-, Scottish Universities Research and Reactor Centre/Scottish Universities Environmental Research Centre; NZA- Rafter Radiocarbon Laboratory; OxA-, Oxford Radiocarbon Accelerator Unit; UB-, The Queen's University, Belfast Radiocarbon Dating Laboratory).*

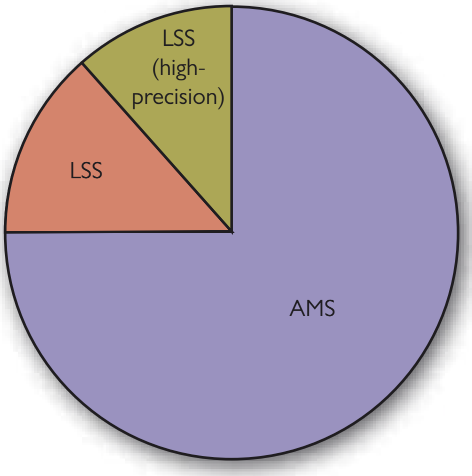


Fig 5. *Techniques of radiocarbon dating used for the measurements reported in this volume (LSS, liquid scintillation spectrometry; LSS (high-precision), high-precision liquid scintillation spectrometry; AMS, accelerator mass spectrometry).*

The Oxford Radiocarbon Accelerator Unit continued to provide measurements by accelerator mass spectrometry (AMS). Occasionally a replicate measurement might be required on an AMS sample, in which case a second sample was sent to the Rafter Radiocarbon laboratory. From April 2002, when the radiocarbon dating programme funded by English Heritage was significantly extended by the advent of research funded by the Aggregates Levy Sustainability Fund (Bayliss *et al* 2007a), AMS dating was also provided by the Rijksuniversiteit Groningen. Occasionally, a sample submitted for conventional dating provided insufficient carbon for measurement by liquid scintillation spectrometry, and so the combusted carbon dioxide would be graphitised and dated by AMS (at the Arizona Accelerator Mass Spectrometer Laboratory and, from 2003, at the Scottish Universities Environmental Research Centre).

Between 1998 and 2003, three-quarters of all the radiocarbon dates obtained were measured by AMS (Fig 5). The precision provided by this technique was now comparable to that achieved by routine conventional dating. The large samples required by radiometric dating, however, were in some cases advantageous. This was particularly the case where it was necessary to date bulk sediment fractions (*see* below) and, as a consequence, more than 80% of the samples dated by liquid scintillation spectrometry at SURRC were bulk sediments. Measurements made by high-precision liquid scintillation spectrometry at Belfast, however, were still much more precise than those made by AMS (error terms on average being less than half those quoted on AMS results). Conventional high-precision dating was therefore still sometimes essential for applications where high-precision was required to provide chronologies that were sufficiently precise to be useful for archaeological interpretation.

A general introduction to methods of measuring the radiocarbon content of archaeological samples is provided by Bayliss *et al* (2004b).

By the time the samples covered in this volume were submitted for dating, the programme to publish the radiocarbon dates that English Heritage had funded as a series of monographs had been initiated (Jordan *et al* 1994). Consequently, almost all the information published in this volume was gathered at the time of sample submission, and during subsequent post-excavation analysis. Some additional technical information has been supplied by the dating laboratories concerned. Submitters were asked to check the draft publication entries for their sites, and to provide interpretative comments on the overall utility of the suite of radiocarbon dates and on each individual measurement.

The date when final comments were made is stated in the catalogue. This is important because this determines the basis on which the comments were made. Over 80% of the dates reported in this volume were interpreted using Bayesian statistical models, although for most archaeological collaborators this was still a new and unfamiliar methodology.

Both calibration and statistical models are updated over time. Since the original chronological modelling at Stonehenge, for example, there have been a series of revisions of the chronological model proposed (Allen and Bayliss 1995; Bayliss *et al* 1997; Bronk Ramsey and Bayliss 2000; Parker Pearson *et al* 2007), including updates incorporating important new suites of data (Darvill and Wainwright 2009; Parker Pearson *et al* 2009; Parker Pearson and Cox Willis 2010; Darvill *et al* 2012; Marshall *et al* 2012a). For this reason, where date estimates have been cited from chronological models in datelist entries, the name of the relevant parameter along with a reference to the model from which it derives is provided.

Sometimes, scientific and archaeological understanding has simply moved on in the period since the comments were originally drafted. Ultimately, this does not matter, since the key objective in the publication of this catalogue is to ensure that the basic data are available in sufficient detail to allow existing interpretations and chronological models to be evaluated and new ones to be constructed.

The majority of the radiocarbon dates included in this volume have not been published previously in datelist form, although most appear in archaeological publications on specific sites. Summary datelists in the journal Archaeometry are available for some of the measurements made at the Oxford Radiocarbon Accelerator Unit (Bronk Ramsey *et al* 1999, 2000a, 2002; Higham *et al* 2007).

Sampling strategies

As the precision of AMS dating improved, the constraints on sample selection imposed by the quantity of material required for conventional dating diminished (Table 1). This remained an issue in cases where high-precision radiocarbon dating was essential, but generally the question was not whether sufficient datable material could be found, but rather which samples should be dated from the many thousands of organic items recovered on a particular site.

Over this period, a rigorous procedure to enable the construction of Bayesian chronological models on a routine basis was forged from practice (Fig 6). This was by no means a purely mathematical process (such approaches tended to flounder in the face of the realities of sample taphonomy and radiocarbon measurement), but rather a pragmatic mix of statistical, scientific, and archaeological criteria (Bayliss and Bronk Ramsey 2004).

Table 1. Typical quantities of material required for different radiocarbon measurement techniques in 1998–2003.

Material	LSC	AMS
Charcoal	10g	1 fragment
Wood (wet)	100g	1g
Peat (wet)	200g	2g
Bone and antler	200g	2g

Statistical simulation played a role in determining the minimum number of samples that should be submitted to resolve a particular archaeological question and, crucially, in determining which archaeological problems could not be successfully addressed given the limitations of the available techniques and samples. Simulation also demonstrated how powerful vertical stratigraphy could be in obtaining precise chronologies through Bayesian modelling.

In practice, however, simulation models acted as a guide in selecting an archaeologically representative set of samples which related as directly as possible to the problem or deposits in question. More samples might be needed in cases where the available material was of doubtful taphonomy. For example, six measurements were made on different fragments of short-lived charcoal from the lowest primary silt of the 'Great Ditch' at Tintagel Castle, Cornwall in the hope that the latest of these would provide a reliable *terminus post quem* for the final maintenance of the ditch (*see* below, p252; Barrowman *et al* 2007).

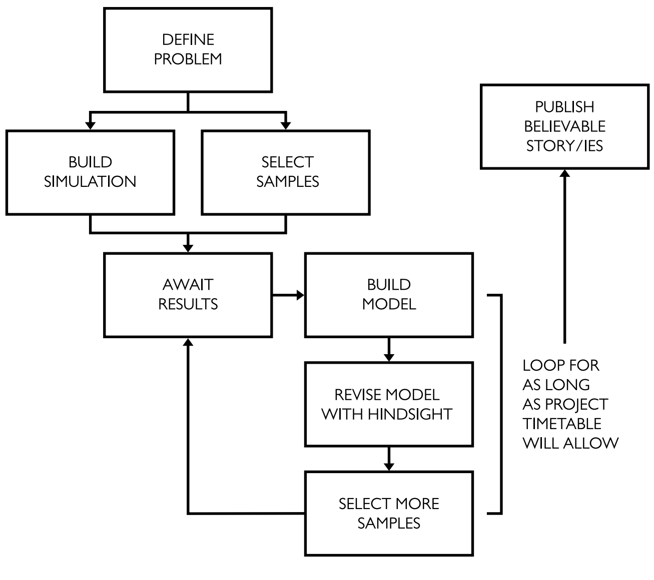


Fig 6. *Flow diagram showing the stages in routine chronology building in 1998–2003*

Further samples might be submitted to address the scientific risk inherent in dating particular sample types. Replicate measurements were made largely on a judgemental basis, for example when dating both the humic acid and the humin fractions of sediment samples.

Sequential sampling strategies emerged as the most effective. The minimum number of samples needed to resolve the question at hand (as determined by simulation) was submitted as the first series of samples. When these results were returned, preliminary models with further simulated dates were constructed and a second suite of samples selected. These would address particular scientific or archaeological issues identified by the first round of radiocarbon dates and provide the additional dates needed if, for example, the site fell on a less favourable part of the calibration curve than originally anticipated. This approach maximised the cost-effectiveness of the dating programme, but could present severe challenges for project management as the turn-around time between sample submission and the reporting of results was typically six months or more.

Sample selection and characterisation

Once the overall sampling strategy had been designed, particular samples were identified for dating. Whilst a wide range of organic materials could be dated (Fig 7), bone and antler (40%), charcoal and other charred plant remains (32%), and waterlogged plant remains (including waterlogged wood) (15%) constituted the majority of samples. Peat and other sediments (6%) and charred residues on pottery sherds (5%) provided most other samples, although small numbers of calcined bones and two samples of groundwater were also dated.

As sample size was rarely now a constraint on sample selection, the vast majority of samples (90%) consisted of material which originally derived from a single organism. This avoids the risk, highlighted by Ashmore (1999), that a bulk sample will include fragments of various ages, giving a radiocarbon measurement that is the mean of all and the age of none.

In some circumstances, however, bulk material may provide the best (or only) means of dating particular deposits (Fig 8). This is particularly true in dating peat, sediment, and soil samples. Often, chemical fractions of the whole sediment are dated, these being bulk materials by definition. The dissolved carbon fractions dated from the groundwater at Drigg, Cumbria (*see* below, p90; Brown 2014) is similarly a bulk material by definition. Such samples comprise almost two-thirds (65%) of all bulk samples included in this volume. Another substantial category of bulk samples (18%) is waterlogged plant remains that were sieved from bulk sediment but were too small individually for AMS dating. These could be bulked together to make a viable sample. Such samples were submitted in preference to dating a bulk chemical fraction of the sediment. In some other cases (15%), charred material also had to be bulked in order to provide sufficient material for even AMS dating (for example, the charred asparagus seeds from Barking Abbey, Essex, *see* below, p29).

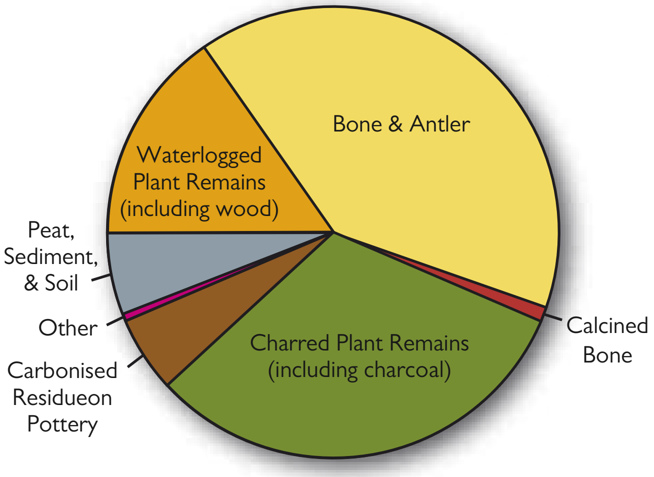


Fig 7. *Types of material dated*

In other cases, the risk inherent in submitting bulk materials for dating was judged to be outweighed by the need for high-precision measurements or by the need for results to be returned quickly. Most of these samples derived from contexts which contained large amounts of short-lived, datable material that was interpreted as functionally associated with a discrete archaeological episode, such the firing of a hearth or the construction of a structure. For

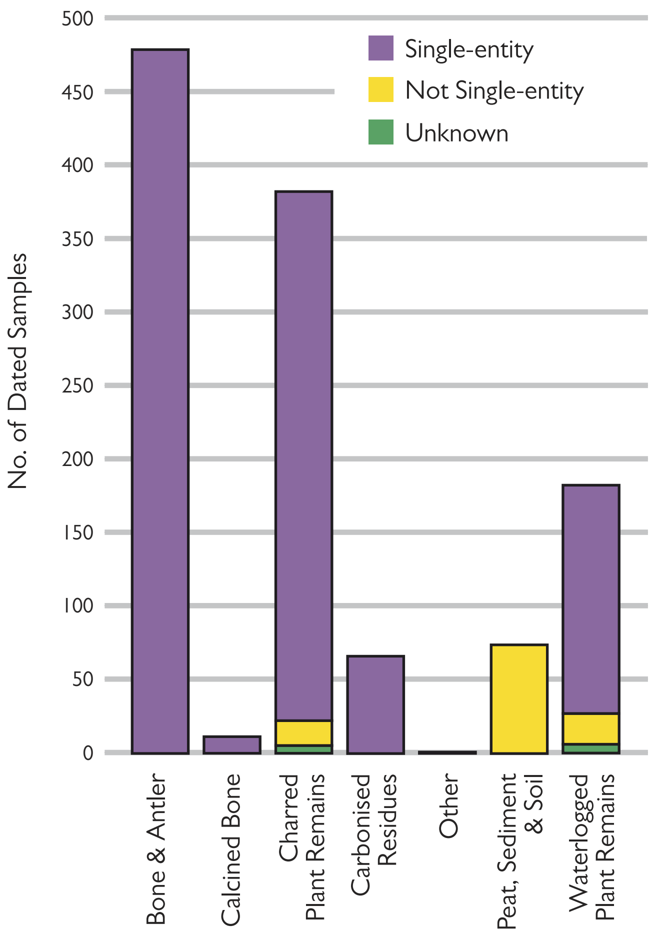


Fig 8. *Single-entity and bulk samples by material type*

example, bulked samples of short-lived charcoal were dated from a lime kiln at Duxford: Hinxton Road, Cambridgeshire (*see* below, p93; Lyons 2011).

All the samples reported in this volume were identified before submission for dating. In most cases identification was to age and species, but in some cases identification simply ensured that the dated material was short-lived (eg a seed), and in others identification was simply to species (eg hazel) and the maturity of the sample was inferred on the basis that the relevant species does not generally grow to a great age.

The identification of wood and charcoal samples is critical for interpreting the resultant radiocarbon date because of the old-wood effect (Bowman 1990, 51). The carbon in tree-rings is fixed from the atmosphere during the year in which the tree-ring formed. Consequently, the carbon in a twig is only a few years old when the twig is burnt and enters the archaeological record, but the rings at the centre of a long-lived tree can contain carbon that is several centuries older than the burning event. If this age-at-death offset is unknown, the radiocarbon date may be much older than archaeological activity with which the sample is associated.

Only seven samples of charcoal or waterlogged wood consisted of a species of tree which lives to some age (eg oak or ash), where the potential offset between the dated material and the outside of the tree could not be assessed. These samples could have an old-wood offset of several centuries, if wood from the centre of a mature tree was sampled, although many trees were felled before they reach such an age and, even when a mature tree was dated, the majority of the wood would have derived from the later rings rather than the central heartwood. In these circumstances, old-wood offsets of more than a century or two are probably rare, although, as with unidentified samples, the potential for an age-at-death offset in such samples means that they can only strictly be interpreted as *termini post quos* for the deposits from which they were recovered.

Bone and antler constituted the largest category of dated samples (Figs 7 and 9). Over 60% of these samples are of human bone, which formed the material for nearly a quarter of all the measurements reported in this volume. Although bone and antler are short-lived materials, with the turnover of carbon between ingested food and bone protein being within a decade or two at most (Hedges *et al* 2007, 810–14), you are what you eat. This means that there is the potential for radiocarbon offsets to be transferred to the bones of terrestrial carnivores and omnivores if the dated individuals consumed a component of marine or freshwater protein. This can have a substantive effect on the methods used to infer accurate chronologies from these radiocarbon dates (Bayliss *et al* 2004c).

Although, in areas such as Britain that are naturally devoid of C4 plants, the marine component of diet can be assessed purely on the basis of $\delta^{13}C$ values (Arneborg *et al* 1999), an input of freshwater resources may not be apparent simply on the basis of stable carbon isotopes (Lanting and van der Plicht 1998). This is a complex area that has been the subject of much research in the decades following the submission of the samples reported in this volume (eg Phillips and Gregg 2003; Hedges and Reynard 2007; Parnell *et al* 2010; Fernandez *et al* 2014), and is still far from completely understood.

Fig 9. *Iron Age inhumation from Abingdon: Spring Road Cemetery, Oxfordshire (GrA-22752 and OxA-12102) (© Oxford Archaeology)*

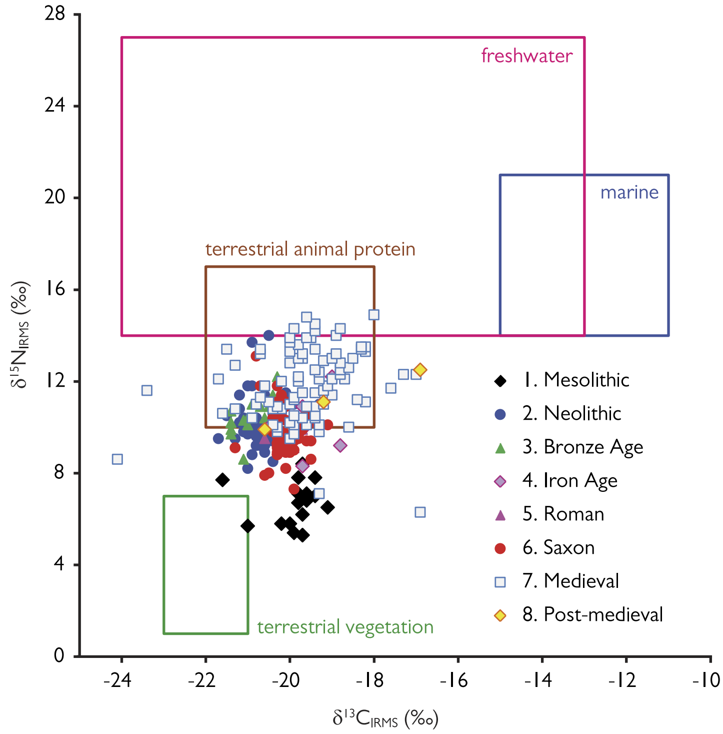


Fig 10. *Stable-istope values for the human skeletons whose radiocarbon dates are reported in this volume. The boxes are created from graphing the minimum and maximum stable isotope values of $\delta^{13}C$ and $\delta^{15}N$ from ancient food sources (vegetarian, terrestrial animal protein, freshwater fish, and marine fish), following Beavan and Mays (2013, fig 4.3). Note error bars on isotopic measurements are not given as these were only routinely quoted for measurements commissioned after April 2002).*

For this reason, in most cases $\delta^{15}N$ values were obtained on human bone samples submitted for dating (in addition to the $\delta^{13}C$ values obtained to allow the calculation of conventional radiocarbon ages). It was hoped that any elevated nitrogen values obtained would highlight individuals who may have consumed significant quantities of fish or other marine or freshwater foods, and so act as a warning that the resultant chronologies should be interpreted with an appropriate degree of caution. On the release of OxCal v3.4β1 in March 2000, it became possible to attempt to account for mixed dietary sources in the calibration process (Bronk Ramsey 1998; 2001).

For this to be possible, it is necessary to estimate the proportion of marine or freshwater protein in the diet of each dated individual and to estimate the reservoir age of that protein. During the period covered by this volume, diet proportions were estimated by linear interpolation from the isotopic endpoints of the potential food sources (Mays 1998, 181–90). At this time the marine component of a diet could be estimated using $\delta^{13}C$ (Arneborg *et al* 1999), and potential freshwater components by $\delta^{15}N$ (Cook *et al* 2001). It is also necessary to know the radiocarbon reservoir of the various potential dietary sources. Fortunately, the scale of the marine offset in the coastal waters around England is relatively well understood (Harkness 1983), although at the time these measurements were made there was almost no understanding of the reservoir ages of freshwater sources within England.

Figure 10 shows the carbon and nitrogen stable isotopic values for the dated human skeletons in this volume. There is a clear enrichment in $\delta^{15}N$ values through time. In comparison to the isotope values of ancient food sources, most individuals clearly fit well within the parameters for diet mainly based on terrestrial food sources. A slight increase in the utilisation of fish resources may be evident in medieval and post-medieval periods. It should be noted, however, that the medieval data on this graph is dominated by samples from the cemetery at Barton-upon-Humber, Lincolnshire (n=78/88), which is on the Humber estuary.

Peat, sediment, and soil constitute the last categories of samples that were frequently dated (Fig 7). These samples are rarely described more specifically. Generally, the term used to describe the deposit submitted for dating appears to reflect its perceived organic content, rather than any more technical definition.

The character of the sample material is only one criterion by which the association between a radiocarbon date and the target event that is of archaeological interest can be assessed. The importance of considering the taphonomy of dated material has been long known (Waterbolk 1971).

The types of archaeological deposits which provided the samples considered here are shown in Figure 11. The largest group is provided by samples from graves and collective burial deposits, such as early Neolithic long barrows. A large majority of radiocarbon dates on human bone reported in this datelist come from graves containing articulated human skeletons. Here, the juxtaposition of the bones provides good evidence that the individual had recently died when their corpse was interred, and so the radiocarbon date should be close in age to that of the burial. For disarticulated bones from

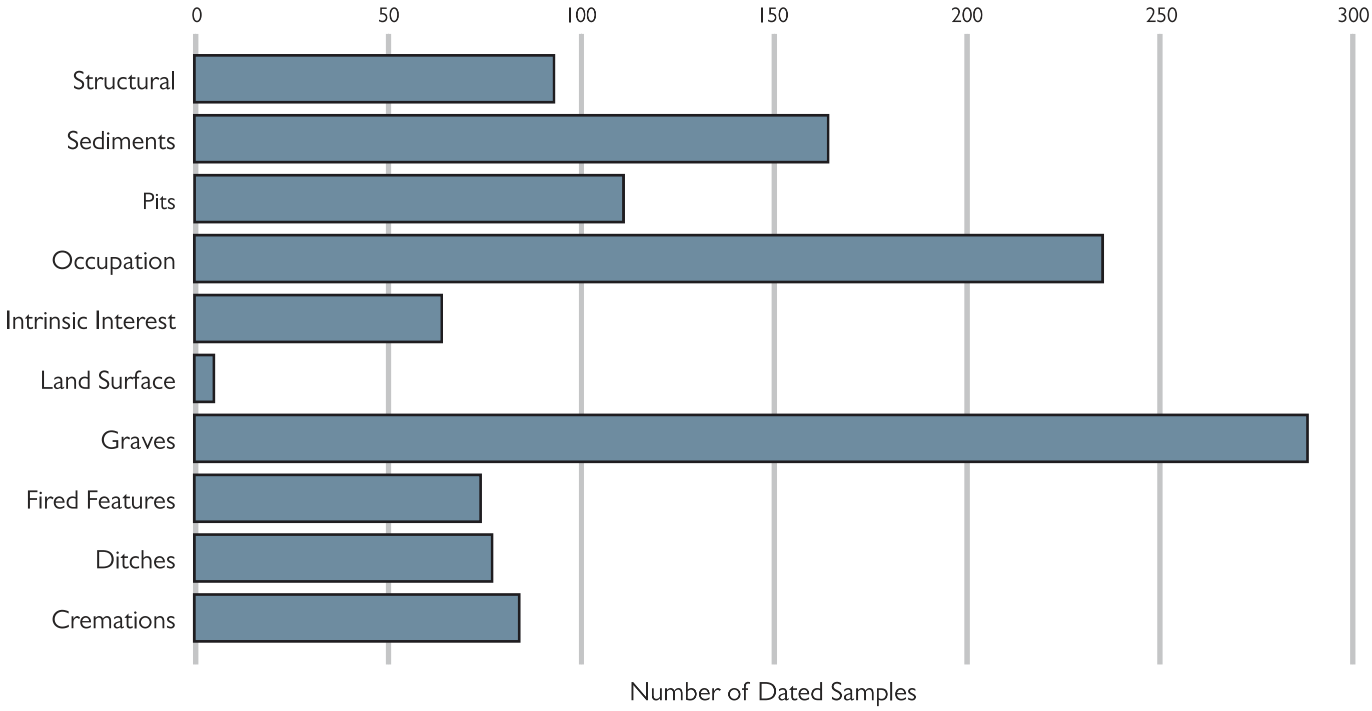


Fig 11. *Contexts of dated samples.*

collective burial deposits, the association is less certain, as the dated bones could come from bodies that were original deposited whole but have subsequently been dispersed or could represent bones that were already defleshed when deposited. A small number of bone or antler artefacts, buried as grave goods, were also dated. These, again, have the potential to be substantially earlier than the time of burial if they were heirlooms.

Charred plant remains or fragments of short-lived charcoal were generally dated from cremation deposits. The dated material in these contexts was probably derived from fuel used in the cremation process, and so is functionally related to the deposit from which the dated material was recovered. During the period covered by this datelist, a new method for dating calcined bone was proposed (Lanting *et al* 2001). As part of the introduction of this technique, replicate measurements were obtained on fragments of calcined bone and short-lived charcoal from four urned cremation burials from Eye Kettleby, Leicestershire (Table 2; Finn 2011). Only one of these cremation deposits produced results that are statistically consistent (1689). In one case, the dated charcoal clearly derived from an adjacent early Saxon period ditch, although the two results on the calcined bone are statistically consistent (980); and in another, one of the fragments of charcoal appears to be residual (332). Cremation deposit 974, however, produced one result on calcined bone that is slightly more recent than the other results from this context. Overall, however, these results seemed to confirm that the protocol suggested by Lanting *et al* (2001) produced reproducible results on fragments of calcined bone, and that these generally produced results that were compatible with those from short-lived charred plant remains from the same deposit.

These funerary contexts furnished over 30% of the samples included in this volume.

Samples from pits, ditches, and other occupation deposits make up just over 35% of sampled contexts (Fig 11), with most samples being composed of short-lived charred plant remains or animal bone and antler. The association of these samples with the activity concerned is of variable security. Samples such as the sheep/goat foetuses from the upper fill of pit 1133 at Bleadon, Whitegates Farm, Somerset (OxA-11423–4 and OxA-14989–90; *see* below p62; Young 2008) must be contemporary with their deposition. Antler tools, such as those from the base of the flanking ditch at Fussell's Lodge long barrow, Wiltshire (GrA-28199/OxA-13205 and GrA-28218, *see* below p191; Wysocki *et al* 2007), may be functionally associated with construction. Charred plant remains may be similarly functionally associated with these contexts, for example, the charred fragments of hazel charcoal from a spread of burnt material thought to have been part of the burned Stepleton inner outwork at Hambledon Hill (OxA-8859–60, *see* below p138; Mercer and Healy 2008). In other cases, such as infilling of substantial pits and waterholes at Kemerton, Huntsman's Quarry, Worcestershire (eg OxA-9483; *see* below p177; Jackson 2015; Fig 12) and at West London Landscape: Cranford Lane, field system, Greater London (eg OxA-12263; *see* below p285) samples appear to derive from the disposal of rubbish in the features. In other cases, the taphonomy of the dated material is much less certain. For example, it is unclear exactly how the short-lived charred plant material from the postholes of a series of Iron Age roundhouses at West London Landscape: Stockley Park, Greater London (eg OxA-11430; *see* below, p290) arrived in those features, although they may be material charred during the use of the buildings.

Functional arguments also apply to short-lived charred material recovered from fired-features, such as hearths and kilns, which provide another 6% of samples.

Sedimentary units produced almost 14% of samples dated (Fig 11). In many cases (45%), the bulk organic content of a

Table 2. Replicate measurements on fragments of calcined bone and short-lived charcoal from urned cremations at Eye Kettleby, Leicestershire.

Laboratory Number	Sample Reference	Material	Radiocarbon Age (BP)	Weighted Mean	$\delta^{13}C$ (‰)
OxA-9710	332 (A)	charcoal, *Alnus* sp.	3300±39		-25.6
OxA-12689	332 (C)	calcined bone	3267±33	3273±20 (T′=0.7; T′(5%)=6.0; ν =2)	-22.3
OxA-12690	332 (D)	calcined bone	3260±33		-22.1
OxA-9711	332 (B)	charcoal, *Quercus* sp. sapwood	3480±40	3462±27 (T′=0.4; T′(5%)=3.8; ν =1)	-23.3
OxA-10376	332 (B)[3]	charcoal, *Quercus* sp. sapwood	3447±37		-24.3
OxA-9718	974 (A)	charcoal, *Corylus* sp.	3327±38		-24.7
OxA-9743	974 (B)	charcoal, *Corylus* sp.	3315±65	3335±23 (T′=0.2; T′(5%)=6.0; ν =2)	-24.1
OxA-12732	974 (C)	calcined bone	3346±33		-20.8
OxA-12691	974 (D)[4]	calcined bone	3212±32	3212±32	-25.4
OxA-9744	980 (A)	charcoal, *Prunus* sp.	1520±55	1513±39 (T′=0.0; T′(5%)=3.8; ν =1)	-25.8
OxA-9745	980 (B)	charcoal, *Prunus* sp.	1505±55		-25.3
OxA-12692	980 (C)	calcined bone	3296±32	3327±23 (T′=1.8; T′(5%)=3.8; ν =1)	-25.8
OxA-12693	980 (D)	calcined bone	3357±32		-22.4
OxA-9735	1689 (A)	charcoal, *Quercus* sp. twig	3225±40		-25.9
OxA-9669	1689 (B)	charcoal, *Quercus* sp. sapwood	3090±60	3203±18 (T′=5.1; T′(5%)=7.8; ν =3)	-25.1
OxA-12694	1689 (C)	calcined bone	3187±30		-26.3
OxA-12695	1689 (D)	calcined bone	3233±30		-26.7

deposit, usually peat, was itself dated. The sample is therefore composed of the unit that is of interest. In other cases, however, fragments of waterlogged plant remains, waterlogged wood, or charcoal were isolated from a deposit and dated. Even when dating the sediment itself, however, the relationship between the dated material and the archaeological event that is of interest has to be considered. All the material within an organic deposit does not necessarily date to the time when it formed. It could contain reworked material, for example, if already waterlogged material was washed into a deposit as it was being laid down, or it could contain a component of more recent rootlets that grew down into an existing layer. Such issues can only be assessed on a case-by-case basis by consideration of the characteristics of particular deposits and by assessing the compatibility of groups of related dates (*see* below).

Fig 12. *Pit CG4 at Kemerton, Huntsman's Quarry, Worcestershire under excavation (© Worcestershire Archaeology)*

A further 8% derive from structural contexts (Fig 11). In this category, there is usually a direct functional relationship between the dated material and the archaeological structure that is of interest, as almost all samples derive from the wood from which the structure was built. This material was all identified as from relatively short-lived timber (or was part of wiggle-matching, *see* below), but even so, complications can arise. Although in the past most wood was not seasoned before use, as this makes it much harder to work, building timber was a valuable resource which could, and was, reused. Such reuse would make a radiocarbon date older than the structure from which it was recovered. This potential issue highlights the advantages of obtaining dates from more than one timber in a structure wherever possible.

A small number of samples were dated from old land surfaces (Fig 11). Here, the objective was usually to provide a *terminus post quem* for the construction of an overlying earthwork (eg OxA-13211 and OxA-13333 from Silbury Hill, Wiltshire, *see* below p240; Leary *et al* 2013), rather than to date the activity on the old land surface itself.

Fig 13. *Lattice-decorated antler macehead from Windmill Lane, Brentford (part of the Layton collection, c 1850–1900) (© Museum of London)*

The final class of material that was submitted for dating comprises those samples which are of intrinsic interest (Fig 11). In these cases, the context of the find is irrelevant. Such material includes, for example, an antler macehead recovered from Windmill Lane, Brentford at a depth of *c* 4 m in the late-nineteenth century (Fig 13). The radiocarbon date (OxA-13207, *see* below p23; Loveday *et al* 2007), however, provides an important date for lattice-decorated antler maceheads.

Laboratory methods

Details of the methods used for the preparation and radiocarbon dating of the samples included in this volume are provided in the references cited in this section. It is important that these technical details can be traced for each measurement as scientific methods are continuously evolving. This information is essential in assessing the reliability of each measurement in any future analysis.

Samples dated at the Scottish Universities Research and Reactor Centre (GU-) were prepared as described by Stenhouse and Baxter (1983). Organic samples were combusted to carbon dioxide, converted to benzene using a chromium-activated catalyst, and dated by liquid scintillation spectrometry (Noakes *et al* 1965).

The gelatin fraction of antler and bone samples was extracted and dated (Longin 1971). All other organic samples underwent an acid-alkali-alkali-acid pretreatment protocol (Olsson 1979). For charred and waterlogged plant remains the alkali- and acid-insoluble fractions were dated. Wood samples underwent an additional stage of bleaching with a hypochlorite solution before combustion. For organic sediments, different fractions could be selected for dating: the alkali-soluble 'humic acid' fraction after either the first or second alkali pretreatment (or both together if the sample was small), or the acid- and alkali-insoluble 'humin' fraction. The chemical fraction selected for dating for each sediment sample dated at the Scottish Research and Reactor Centre (SURRC) is noted in the datelist.

Seventeen samples, following pre-treatment and combustion for conventional dating, produced insufficient carbon dioxide for benzene synthesis. Sub-samples of carbon dioxide were graphitised using methods described by Slota *et al* (1987). Nine of these graphite targets were sent to the Arizona Accelerator Mass Spectrometer Laboratory (AA-53194–202, see p217), where they were dated by AMS as described by Linick *et al* (1986); the other eight targets were dated at the Scottish Universities Environmental Research Centre by AMS (Xu *et al* 2004) (SUERC-510–12 and SUERC-517–21, see p226).

The period between 1998 and 2003 was a time of transition in the methods used at the Oxford Radiocarbon Accelerator Unit (OxA-). For many sample types, the standard pretreatment method used was changed during this period, and the protocol selected for a particular sample was often varied based on its specific characteristics. Similarly, at this time, both carbon dioxide and graphite targets could be loaded into the accelerator for dating. A general description of the methods used for producing the Oxford measurements reported in this volume follows,

Fig 14. *Robert Anderson homogenising a bulk sample of peat at the Scottish Universities Research and Reactor Centre. (© Historic England, photography by Amanda Grieve)*

but full details of the methods used for each sample are available from http://c14.arch.ox.ac.uk/ (pretreatment codes can be found in Brock *et al* 2010).

Samples of charcoal and carbonised plant macrofossils, were generally pretreated using the acid-alkali-acid protocol described by Hedges *et al* (1989, and see Brock *et al* 2010, table 1 (ZR)). Occasionally, a slightly milder variant of this protocol was used (VV), and sometimes, a sample was so fragile that it would not withstand the alkali step, and so it was simply treated with acid and multiple water rinses (RR). For a few samples, a bleaching stage was added (UW).

The majority of carbonised residues on pottery sherds were treated with acid and a series of water rinses (RR), although this was sometimes augmented by solvent extraction (RR*). A few carbonised residues were pretreated using an alkali step (ZR), again sometimes augmented with solvent extraction (ZR*).

Bone and antler samples in this datelist with laboratory numbers OxA-9232 and below were pretreated and gelatinised using the continuous flow system as described by Hedges *et al* (1989) and Law and Hedges (1989; AG). Two samples, OxA-8845 and OxA-8855, additionally underwent solvent extraction using acetone, methanol, and chloroform (Brock *et al* 2010, 106; AG*).

Bone and antler samples with laboratory numbers in the range OxA-9361–OxA-11851 and OxA-12214–OxA-12236 were pretreated, gelatinised, and ultrafiltered as described by Bronk Ramsey *et al* (2000b; AF). A small proportion of these also underwent solvent extraction using acetone, methanol, and chloroform (AF*). Unfortunately, it was subsequently discovered that this pretreatment method could on occasion produce measurements which were slightly too old (Bronk Ramsey *et al* 2004a; Bayliss *et al* 2007b, fig 25). As part of quantifying this issue and improving the method of ultrafiltration, almost all bone and antler samples funded by English Heritage and originally processed using this method were redated.

The redating programme is reported in detail by Bronk Ramsey *et al* (2011). For some samples, new bone was available and was processed and dated using the revised ultrafiltration protocol described by Bronk Ramsey *et al* (2004a). These measurements have laboratory numbers in the range OxA-12090–OxA-12136 and OxA-12239 and above. In some cases, replicate measurements were also obtained from the Centre of Isotope Research at the Rijkuniversiteit Groningen (*see* below; Table 3). In other cases, samples were redated following the re-purification of excess gelatin from the original pretreatment. This method was developed using a number of samples from Abingdon Spring Road (OxA-X-2037-15 to OxA-X-2037-18 inclusive; NRC1), and subsequently employed more widely (NRC; laboratory numbers in the range OxA-12759–OxA-15796).

Eight measurements made on gelatin extracted using the original ultrafiltration protocol (Bronk Ramsey *et al* 2000b) are reported. In five cases, statistically consistent replicate measurements are available (Table 3; OxA-9858, OxA-11141–2, and OxA-11423–4) and so the original measurements are probably accurate. The other three measurements, OxA-11648 from Barnetby-le-Wold, Lincolnshire (*see* below, p29), OxA-9670 from Eton Rowing Course: area 6, Buckinghamshire (*see* below, p101), and OxA-10735 from the Fenland Management Project: Wardy Hill Ringwork, Cambridgeshire (*see* below, p122), were published whilst the ultrafiltration issue was still under investigation and in retrospect may be slightly too old.

Except for the samples that were re-dated from excess gelatin as described above, all bone and antler samples with laboratory numbers OxA-12239 and above were prepared using the revised ultrafiltration protocol described by Bronk Ramsey *et al* (2004a; AF).

Samples of calcined bone were pretreated as described by Lanting *et al* (2001).

Waterlogged wood, waterlogged plant remains, and organic sediments were pretreated using an acid-alkali-acid protocol, followed by a bleaching step using sodium hypochlorite (Hedges *et al* 1989, and see Brock *et al* 2010, table 1 (UV or UW)). For fragile samples, the bleaching step was omitted (Hedges *et al* 1989, and see Brock *et al* 2010, table 1 (VV, WW, or ZR)), and for particularly fragile waterlogged plant material sometimes an acid only pretreatment was undertaken (RR). Some samples of organic sediment were pretreated using an acid-alkali-acid protocol, with a solvent extraction (acetone or chloroform) after the first acid step (SS). The acid- and alkali-insoluble, 'humin', fraction was generally selected for dating. A series of samples from the Ferriby Boats, Yorkshire (*see* below, p124) were measured in replicate, using a variety of pretreatment protocols because of past conservation treatments. These are detailed by Wright *et al* (2001).

Samples were then converted to carbon dioxide, usually by combustion (Hedges *et al* 1992) although the carbonate from calcined bone was devolved under vacuum using phosphoric acid (Brock *et al* 2010, 108).

Over 90% of the samples processed at Oxford and reported in this datelist were then then graphitised (Dee and Bronk Ramsey 2000), although samples which yielded very little carbon were run as carbon dioxide targets (Bronk Ramsey and Hedges 1997). An intermittent problem with the graphitisation system arose and was resolved during 2000 (Bronk Ramsey *et al* 2002). A number of additional replicate and replacement measurements were obtained as part of the investigation of this issue (ibid, table 3).

Samples with laboratory numbers below OxA-11739 were dated in the General IONEX AMS machine at Oxford using a hybrid ion source (Bronk Ramsey and Hedges 1997; those with laboratory numbers above this were dated using the replacement HVEE AMS machine (Bronk Ramsey *et al* 2004b).

At the Belfast Radiocarbon Dating Laboratory samples of waterlogged wood were bleached to de-lignify and extract cellulose as described by Hoper *et al* (1998). The method of pretreatment used for bone and antler samples at Belfast was essentially that described by Longin (1971). The sample was demineralised in 2% hydrochloric acid until the bone had softened and the pH remained stable. The acid was replaced if necessary. The sample was then washed in demineralised water to remove calcium humates, and placed in slightly acid

Figure 15. *James MacDonald preparing benzene at the Queen's University, Belfast radiocarbon laboratory (© Historic England, photography by Amanda Grieve)*

(pH 2) demineralised water, heated to 90°C for 5–18 hours, and the supernatant vacuum filtered. The sample was then evaporated dry, re-dissolved in de-ionised water and filtered again. The supernatant was then evaporated dry before combustion.

Samples were then combusted to carbon dioxide in a positive pressure combustion stream of oxygen, converted to benzene using a chromium-based catalyst as described by Noakes *et al* (1965; Fig 15), and dated by liquid scintillation spectrometry (Pearson 1984; McCormac 1992; McCormac *et al* 1993; 2001). Three samples were processed using the small sample system described by Wilson *et al* (1995; UB-4270–2 from Hambledon Hill: long barrow and Hanford outer outwork, *see* below, p135 and p130).

All the samples dated at the Rijkuniversiteit Groningen that are included in this datelist were of bone or antler. These were prepared as described by Longin (1971), combusted to carbon dioxide and graphitised as outlined in Aerts-Bijma *et al* (1997; 2001) and dated by AMS (van der Plicht *et al* 2000).

The single bone sample processed by the British Museum laboratory was treated with cold dilute acid, to extract the acid insoluble organic fraction. The sample was combusted, converted to benzene, and dated by liquid scintillation spectrometry (Ambers *et al* 1986).

Samples dated at the Rafter radiocarbon laboratory were processed and dated by AMS as described by Beavan Athfield *et al* (2001) and Zondervan and Sparks (1997).

Fractionation and radiocarbon ages

The conventions for quoting radiocarbon ages and supporting information used here conform to the international standard known as the Trondheim Convention (Stuiver and Kra 1986).

The uncalibrated results are given as radiocarbon years before present (BP) where present has been fixed at AD 1950. These results are conventional radiocarbon ages (Stuiver and Polach 1977), and have been corrected for fractionation using measured $\delta^{13}C$ values. Four samples, fractions of groundwater from Drigg: burnt mound, Cumbria (AA-43497–8, *see* below p90), a peat sample from the Humber Wetlands Project: Vale of York, Askham bog, Yorkshire (OxA-8254, *see* below p164), and a fragment of charcoal from Irby: late Roman and early medieval, Merseyside (OxA-9533, *see* below p172) date to after AD 1950. The radiocarbon content of these samples is expressed as a fraction of modern carbon (Mook and van der Plicht 1999).

Results which are, or may be, of the same actual radiocarbon age have been tested for statistical consistency using methods described by Ward and Wilson (1978).

All $\delta^{13}C$ and $\delta^{15}N$ values in this volume were measured by Isotope Ratio Mass Spectrometry (IRMS) on sub-samples of the material combusted for dating. For conventional measurements, where open-tubed combustion was undertaken, this measurement can include a component of fractionation that occurred during laboratory processing. This measurement most closely reflects the fractionation in the dating process and is thus used for age calculation.

In order to obtain more accurate estimates of the natural isotopic composition of the dated samples, however, for conventional samples, aliquots of the dated gelatin were recombusted using closed-tube combustion and repeat $\delta^{13}C$ values (and $\delta^{15}N$ values) obtained by IRMS. These are indicated as $\delta^{13}C$ (diet) and $\delta^{15}N$ (diet) in the datelist. It should be noted that, as closed-tube combustion is used in AMS dating, these measurements are equivalent to those obtained as part of the dating process by the AMS laboratories whose measurements are included in this volume.

For some sites, quality indicators of the protein extracted for dating are available, either C:N ratios (De Niro 1985) or amino-acid analysis (Stafford *et al* 1988).

Calibration

Radiocarbon results are not true calendar ages, but have to be converted to calendar time using a calibration curve (Pearson 1987). This is made up of radiocarbon measurements on samples whose age is known through other methods. High-precision data are currently available back to 10,600 BC, based on tree-ring samples which have been dated by dendrochronology. Beyond this, a variety of archives now provide calibration back to 50,000 cal BP, although the uncertainties in this period are much greater. Reimer *et al* (2013) present the calibration curves which are presently agreed by the international radiocarbon community, and provide a discussion of current understanding of the subject.

Calibrated date ranges provided in this datelist have been calculated using the maximum intercept method (Stuiver and Reimer 1986), OxCal v4.2 (Bronk Ramsey 1995; 1998; 2001; 2009a), and the dataset for terrestrial samples from the Northern hemisphere published by Reimer *et al* (2013). Where appropriate, the modern results have been calibrated using the post-1950 calibration curve for the northern hemisphere atmosphere (zone 1) compiled by Hua *et al* (2013).

Calibrated date ranges are quoted in this volume in the form recommended by Mook (1986) with the end points rounded outwards to 10 years (or five years when error terms are less than ±25 BP). The date ranges for measurements which calibrate before 10,600 cal BC have been rounded outwards to 100 years to reflect the greater uncertainty on the calibration data for this early period. For the modern results, date ranges have been rounded outwards to the nearest year. Ranges in the datelist itself are quoted at 1σ and 2σ; the calibrated date ranges referred to in the commentaries are those for 2σ unless otherwise specified.

The maximum intercept method has been used for the calibrated dates provided in this datelist and, whilst it is hoped that readers will find the calibrations provided is this volume helpful, it is necessary to recognise their limitations. First, the intercept method itself is best regarded as a 'quick and simple' way of providing an indication of the calendar date of a sample. The full complexity of the calendar age is only apparent from the probability distribution of the calibrated date. This can be illustrated by considering the calibration of OxA-10786, a determination on a carbonised residue from the inside face of a rim sherd of late Bronze Age Plainware from Kemerton, Huntsman's Quarry, Worcestershire (*see* below, p181). This measurement (2282±37 BP) calibrates to 1210–930 cal BC (at 2σ) and 1120–1000 cal BC (at 1σ) using the maximum intercept method. The calibration of this sample using the probability method (Stuiver and Reimer

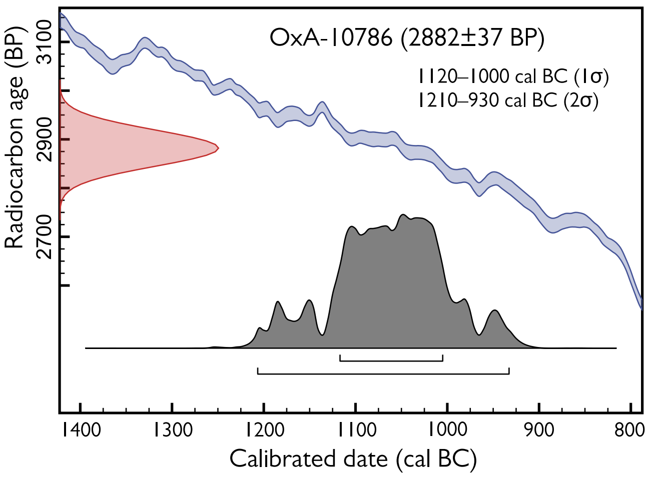


Figure 16. *Calibrated radiocarbon date for OxA-10786*

1993) is shown in Figure 16. It can be seen that some parts of the calibrated range are more probable than others. It is not so much that the intercept calibration is wrong, but it does not necessarily convey the full complexity of the scientific information available.

The second limitation of the calibrated dates provided in this volume is that they are not definitive. Radiocarbon calibration is continually being refined, with updated and internationally agreed calibration curves being issued periodically (eg Stuiver and Pearson 1986; Pearson and Stuiver 1986; Stuiver *et al* 1998; Reimer *et al* 2004, Reimer *et al* 2009; and currently Reimer *et al* 2013). It is thus certain that the calibrated dates quoted here will become outmoded, and that the measurements listed here will need to be recalibrated. It is one of the major objectives of this datelist to provide easy access to the information needed for such re-calibration so that these data can be used in future research. It is for this reason that it is so important that users cite both the unique laboratory identifier for each measurement and the uncalibrated radiocarbon age when using the results listed in this volume – this is a courtesy and convenience to the readers of your publications who will themselves need to recalibrate the results in due course!

Quality assurance

By the time the measurements reported in this volume were made, the ongoing series of international radiocarbon inter-comparison studies had been established (Otlet *et al* 1980; International Study Group 1982; Scott *et al* 1990; Rozanski 1991; Rozanski *et al* 1992; Scott 2003).

A Fourth International Radiocarbon Inter-comparison study (FIRI) was carried out between 1999 and 2000. Of the laboratories whose measurements are reported in this datelist, only the British Museum Laboratory (which closed in 2001) did not take part in this exercise (Scott 2003, table 2.2). The study provided a spot-check of the operational performance of the participating laboratories at the time the inter-comparison samples were analysed. It does not measure consistent performance over a period of time, and so only the anonomised analysis of the reported results has been published (Scott 2003, 151–248). The study did provide valuable information to the laboratories at the time of the inter-comparison, however, which enabled them to deal with any issues identified. Overall, approximately 10% of all the results reported in this inter-comparison were identified as outliers (which is around twice as many as would be expected on purely statistical grounds), although more than 60% of these values came from only 14% of the participating laboratories. Evidence was also found for small systematic offsets in some laboratories. Analysis of duplicate results and the deviation of reported results from the consensus values suggested that reported ages were generally accurate and precise within the quoted error (Scott 2003, 287). The results reported by the Queen's University, Belfast in this study have been reported subsequently (McCormac *et al* 2011).

Periodic, formal international inter-comparison exercises are only one strand in the protocols that radiocarbon laboratories adopt to ensure the accuracy of the measurements they report. All the laboratories whose results are included in this datelist also maintained a continual programme of internal laboratory quality assurance procedures during the time when the reported measurements were made. The results of these internal quality control procedures are not usually published.

A summary of results on known-age material measured at the Oxford Radiocarbon Accelerator Unit between 1995 and 2001, however, is provided by Bronk Ramsey *et al* (2002, table 1). These results demonstrate that the error terms quoted on the radiocarbon determinations describe the true uncertainty very well and that any laboratory offset relative to the calibration data available at that time was well under 10 years. The intermittent problem with the graphitisation process at Oxford which was diagnosed and eliminated in 2000 was identified by these quality control data.

A summary of duplicate measurements made at the Oxford Radiocarbon Accelerator Unit between 1997 and 2001 is provided by Bronk Ramsey *et al* (2002, table 2). This includes both random replicate analyses and samples where repeat measurement was requested because of concerns about the original result. These data suggest that the reliability of the dating process at Oxford during this period was about 97% for real archaeological samples (reduced from about 99% for standard materials).

The variation in replicate measurements made on the same material is one of the principal methods for assessing the reproducibility of dating laboratories. This is only one of a number of reasons why repeat analyses may be undertaken, however, and many of the replicate groups reported in this volume were undertaken for other reasons. In total, there are 106 sets of replicate measurements relevant to dated samples reported in this volume, with 14 samples having more than two measurements. These results are listed in Table 3.

Five sets of repeat measurements were made to assess the effectiveness of chemical protocols used to remove consolidants or past conservation treatments. Samples of human bone from the Anglo-Saxon project: Gally Hills, Bansted, Surrey (UB-4727 and UB-4920, *see* below, p17) and Whitwell Quarry Long

Table 3. Replicate radiocarbon measurements for samples included in this datelist; entries in red are statistically significantly different at 95% confidence (Ward and Wilson 1978). LSS = liquid scintillation spectrometry; AMS = accelerator mass spectrometry; HP = high-precision liquid scintillation spectrometry.

Site	Material	Laboratory Number	Radiocarbon Age (BP)	Method	Ward and Wilson (1978)
Abingdon: Spring Road cemetery	human bone	GrA-22752	2310±50	AMS	T'=7.7; T'(5%)=6.0; ν=2
		OxA-12102	2253±27	AMS	
		OxA-X-2037-17	2357±26	AMS	
Abingdon: Spring Road cemetery	human bone	GrA-22754	2330±60	AMS	T'=0.7; T'(5%)=6.0; ν=2
		OxA-12103	2301±27	AMS	
		OxA-X-2037-18	2279±28	AMS	
Abingdon: Spring Road cemetery	human bone	NZA-15865	3834±45	AMS	T'=2.2; T'(5%)=7.8; ν =3
		NZA-15866	3841±40	AMS	
		OxA-12100	3861±29	AMS	
		OxA-X-2037-15	3901±31	AMS	
Abingdon: Spring Road cemetery	human bone	OxA-12101	2286±26	AMS	T'=0.0; T'(5%)=3.8; ν =1
		OxA-X-2037-16	2281±38	AMS	
Anglo-Saxon project: Edix Hill	human bone	UB-4510	1479±19	HP	T'=1.2; T'(5%)=3.8; ν =1
		UB-4922	1508±19	HP	
Anglo-Saxon project: Gally Hills	human bone	UB-4727	1487±16	HP	T'=8.0; T'(5%)=3.8; ν =1
		UB-4920	1419±18	HP	
Anglo-Saxon Project: Melbourn Water Lane	human bone	UB-4886	1458±20	HP	T'=3.6; T'(5%)=3.8; ν =1
		UB-6345	1516±23	HP	
Argosy Washolme	waterlogged wood	OxA-9536	3117±35	AMS	T'=0.0; T'(5%)=3.8; ν =1
		OxA-9537	3113±34	AMS	
Barton-upon-Humber: St Peter's Church	human bone	GU-5832	1010±50	LSS	T'=5.8; T'(5%)=3.8; ν =1
		GU-5865	840±50	LSS	
Barton-upon-Humber: St Peter's Church	human bone	GU-5868	190±50	LSS	T'=0.0; T'(5%)=3.8; ν =1
		GU-5897	180±50	LSS	
Binchester	animal bone	OxA-8606	1600±40	AMS	T'=5.5; T'(5%)=3.8; ν =1
		OxA-12370	1714±26	AMS	
Binchester	animal bone	OxA-8707	1610±40	AMS	T'=5.7; T'(5%)=3.8; ν =1
		OxA-12371	1723±27	AMS	
Binchester	animal bone	OxA-8711	1735±35	AMS	T'=0.3; T'(5%)=3.8; ν =1
		OxA-12372	1761±30	AMS	

Site	Material	Laboratory Number	Radiocarbon Age (BP)	Method	Ward and Wilson (1978)
Binchester	animal bone	OxA-9059	1380±40	AMS	T′=26.8; T′(5%)=3.8; ν =1
		OxA-14991	1637±29	AMS	
Bleadon: Whitegate Farm	animal bone	OxA-12378	2152±30	AMS	T′=0.6; T′(5%)=3.8; ν =1
		OxA-12379	2185±30	AMS	
Bleadon: Whitegate Farm	animal bone	OxA-12380	2182±31	AMS	T′=2.1; T′(5%)=3.8; ν =1
		OxA-12894	2244±30	AMS	
Bleadon: Whitegate Farm	animal bone	OxA-11423	2290±40	AMS	T′=2.7; T′(5%)=3.8; ν =1
		OxA-14989	2202±35	AMS	
Bleadon: Whitegate Farm	animal bone	OxA-11424	2260±40	AMS	T′=0.9; T′(5%)=3.8; ν =1
		OxA-14990	2210±36	AMS	
Church Lammas	sediment (humic acid)	OxA-9528	6605±45	AMS	T′=1521.5; T′(5%)=6.0; ν =2
	sediment (humin) & charcoal	OxA-9529	8840±50	AMS	
	sediment (humin)	OxA-10097	6455±55	AMS	
Church Lammas	sediment (humic acid)	OxA-9530	8580±50	AMS	T′=42.7; T′(5%)=6.0; ν =2
	sediment (humin) & charcoal	OxA-9531	8435±50	AMS	
	sediment (humin)	OxA-9602	8910±55	AMS	
Drigg	charcoal	GU-5884	3900±50	LSS	T′=0.7; T′(5%)=3.8; ν =1
		GU-5885	3960±50	LSS	
Drigg	peat (humic acid)	GU-5886	3800±50	LSS	T′=0.7; T′(5%)=3.8; ν =1
	peat (humin)	GU-5887	3740±50	LSS	
Drigg	peat (humic acid)	GU-5888	4980±50	LSS	T′=5.8; T′(5%)=3.8; ν =1
	peat (humin)	GU-5889	5150±50	LSS	
Drigg	peat (humic acid)	GU-5890	3940±50	LSS	T′=1.6; T′(5%)=3.8; ν =1
	peat (humin)	GU-5891	3840±60	LSS	
Easington Barrow	human bone	OxA-9093	3400±55	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-9094	3390±55	AMS	
Eton Rowing Course	animal bone	GrA-22560	4910±45	AMS	T′=0.9; T′(5%)=3.8; ν =1
		OxA-9858	4970±45	AMS	
Eton Rowing Course	carbonised residue	OxA-10660	4915±55	AMS	T′=10.5; T′(5%)=3.8; ν =1
		OxA-9925	5240±85	AMS	
Eton Rowing Course	carbonised residue	OxA-X-1028-12	4580±65	AMS	T′=0.1; T′(5%)=3.8; ν =1
		OxA-X-1045-9	4610±65	AMS	
Exmoor Iron: Sherracombe Forde	charcoal	GU-5941	1880±70	AMS	T′=0.8; T′(5%)=3.8; ν =1
		OxA-12603	1949±31	AMS	
Exmoor Iron: Sherracombe Forde	charcoal	GU-5942	2000±50	LSS/AMS	T′=5.6; T′(5%)=3.8; ν =1
		OxA-12602	1862±30	LSS/AMS	
Eye Kettleby	calcined bone	OxA-12689	3267±33	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-12690	3260±33	AMS	
Eye Kettleby	calcined bone	OxA-12692	3296±32	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-12693	3357±32	AMS	
Eye Kettleby	calcined bone	OxA-12694	3187±30	AMS	T′=1.8; T′(5%)=3.8; ν =1
		OxA-12695	3233±80	AMS	
Eye Kettleby	calcined bone	OxA-12732	3346±33	AMS	T′=8.5; T′(5%)=3.8; ν =1
		OxA-12691	3212±32	AMS	
Eye Kettleby	charcoal	OxA-9711	3480±40	AMS	T′=0.4; T′(5%)=3.8; ν =1
		OxA-10376	3447±37	AMS	
Eye Kettleby	charcoal	OxA-9723	3299±39	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-10378	3287±38	AMS	
Eye Kettleby	charcoal	OxA-9728	3193±39	AMS	T′=2.6; T′(5%)=3.8; ν =1
		OxA-10478	3090±50	AMS	
Eye Kettleby	charcoal	OxA-9724	3300±40	AMS	T′=1.3; T′(5%)=3.8; ν =1
		OxA-10379	3362±37	AMS	
Ferriby (Boat 1)	waterlogged wood	OxA-9236	3419±30	AMS	T′=162.2; T′(5%)=15.5; ν =8
		OxA-9237	3520±45	AMS	
		OxA-9519	3501±34	AMS	
		OxA-9520	3403±35	AMS	

Site	Material	Laboratory Number	Radiocarbon Age (BP)	Method	Ward and Wilson (1978)
		OxA-7457	3470±30	AMS	
		Q-1197	3380±100	GPC	
		Q-1217	3312±100	GPC	
		Q-3043	2980±55	LSS	
		Q-3124	3020±40	LSS	
	water-soluble contaminants	OxA-9307	3409±40	AMS	n/a
	solvent-soluble contaminants	OxA-9308	3472±40	AMS	
	water-soluble contaminants	OxA-9309	3240±36	AMS	
	solvent-soluble contaminants	OxA-9310	3260±40	AMS	
Ferriby (Boat 2)	waterlogged wood	OxA-9196	3750±45	AMS	T′=246.4; T′(5%)=12.6; ν =6
		OxA-9197	3750±45	AMS	
		OxA-9521	3510±38	AMS	
		OxA-9522	3536±35	AMS	
		OxA-7458	3315±30	AMS	
		Q-3044	3095±40	LSS	
		Q-3023	3120±45	LSS	
	water-soluble contaminants	OxA-9299	1445±65	AMS	n/a
	solvent-soluble contaminants	OxA-9311	2075±36	AMS	
	water-soluble contaminants	OxA-9312	1983±34	AMS	
	solvent-soluble contaminants	OxA-9313	8120±900	AMS	
Ferriby (Boat 3)	waterlogged wood	OxA-9198	3550±40	AMS	T′=256.4; T′(5%)=11.1; ν =5
		OxA-9199	3625±45	AMS	
		OxA-9524	3560±40	AMS	
		OxA-7532	3340±50	AMS	
		Q-3145	2975±45	LSS	
		Q-3147	2945±40	LSS	
	water-soluble contaminants	OxA-9314	5225±45	AMS	n/a
	solvent-soluble contaminants	OxA-9315	33640±390	AMS	
	water-soluble contaminants	OxA-9316	5450±40	AMS	
	solvent-soluble contaminants	OxA-9317	32870±290	AMS	
Hambledon Hill: long barrow	animal bone	OxA-7828	4795±50	AMS	T′=2.0; T′(5%)=3.8; ν =1
		OxA-7829	4910±65	AMS	
Holme Dunes Reserve	waterlogged plant macrofossil	OxA-9610	3330±40	AMS	T′=0.3; T′(5%)=3.8; ν =1
		OxA-10209	3295±45	AMS	
Holme Dunes Reserve	waterlogged plant macrofossil	OxA-9611	3535±39	AMS	T′=0.1; T′(5%)=3.8; ν =1
		OxA-10208	3515±39	AMS	
Holme-next-the-Sea: intertidal peat	charcoal	GU-5881	3280±50	LSS	T′=0.5; T′(5%)=3.8; ν =1
		GU-5882	3330±50	LSS	
Howick, Sea Houses Farm: Environmental	organic sediment (humic acid)	OxA-11852	8465±45	AMS	T′=504.4; T′(5%)=3.8; ν =1
	organic sediment (humin)	OxA-12825	10265±70	AMS	
Howick, Sea Houses Farm: Environmental	organic sediment (humic acid)	OxA-11870	8250±45	AMS	T′=271.7; T′(5%)=3.8; ν =1
	organic sediment (humin)	OxA-12824	10430±140	AMS	
Humber Wetlands Project: Hull Valley, Stone Carr, Wawne	peat (humic acid)	GU-5788	5060±120	LSS	T′=8.5; T′(5%)=3.8; ν =1
	peat (humin)	GU-5789	5470±70	LSS	
Humber Wetlands Project: Hull Valley, Stone Carr, Wawne	peat (humic acid)	GU-5794	4280±80	LSS	T′=1.4; T′(5%)=3.8; ν =1
	peat (humin)	GU-5795	4400±60	LSS	
Humber Wetlands Project: Vale of York, Askham Bog	peat (humin)	OxA-8252	3465±45	AMS	T′=1992.9; T′(5%)=3.8; ν =1
	peat (humin)	OxA-8253	920±35	AMS	
Isles of Scilly: Hillside Farm, Bryher	human bone	GrA-22411	2100±35	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-12095	2098±27	AMS	
Kemerton, Huntsman's Quarry: CG8	waterlogged plant macrofossil	OxA-10375	3077±34	AMS	T′=0.8; T′(5%)=3.8; ν =1
		OxA-9488	3122±39	AMS	
London: Chamber's Wharf	human bone	OxA-11141	421±31	AMS	T′=1.9; T′(5%)=6.0; ν =2
		OxA-11142	415±33	AMS	
		OxA-X-2204-36	372±25	AMS	
Long Barrows Project: Fussell's Lodge	human bone	GrA-23183	4950±50	AMS	T′=2.9; T′(5%)=3.8; ν =1

Site	Material	Laboratory Number	Radiocarbon Age (BP)	Method	Ward and Wilson (1978)
		OxA-12281	4850±31	AMS	
Long Barrows Project: Fussell's Lodge	human bone	GrA-23195	4955±45	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-13185	4955±42	AMS	
Long Barrows Project: Fussell's Lodge	antler	GrA-28199	4880±50	AMS	T′=0.3; T′(5%)=6.0; ν =2
		GrA-28218	4880±50	AMS	
		OxA-13205	4851±37	AMS	
Long Barrows Project: West Kennet	human bone	GrA-23178	4835±45	AMS	T′=0.9; T′(5%)=3.8; ν =1
		OxA-13179	4778±38	AMS	
Long Barrows Project: West Kennet	human bone	GrA-23179	4855±45	AMS	T′=1.2; T′(5%)=3.8; ν =1
		OxA-13180	4787±41	AMS	
Long Barrows Project: West Kennet	human bone	GrA-23180	4790±50	AMS	T′=1.3; T′(5%)=3.8; ν =1
		OxA-12652	4856±31	AMS	
Long Barrows Project: West Kennet	human bone	GrA-23181	4950±50	AMS	T′=6.2; T′(5%)=3.8; ν =1
		OxA-12653	4803±32	AMS	
Long Barrows Project: West Kennet	human bone	OxA-12282	4819±30	AMS	T′=1.9; T′(5%)=3.8; ν =1
		OxA-450	4700±80	AMS	
March Hill	charcoal	OxA-9644	6020±55	AMS	T′=0.5; T′(5%)=3.8; ν =1
		OxA-10210	6070±45	AMS	
March Hill	charcoal	OxA-9645	6090±55	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-10211	6085±45	AMS	
Merrivale	peat (humic acid)	GU-5773	1670±50	LSS	T′=1.6; T′(5%)=3.8; ν =1
	peat (humin)	GU-5774	1760±50	LSS	
Milfield Basin: Ewart-Etal (River Till)	organic sediment (humic acid)	AA-53194	2830±45	AMS	T′=3.1; T′(5%)=3.8; ν =1
	organic sediment (humin)	AA-53195	2930±35	AMS	
Milfield Basin: Weetwood-Ewart-Doddington	organic sediment (humic acid)	SUERC-510	1850±65	AMS	T′=0.2; T′(5%)=3.8; ν =1
	organic sediment (humin)	SUERC-511	1815±45	AMS	
Milfield Basin: Weetwood-Ewart-Doddington	organic sediment (humic acid)	AA-53200	5105±45	AMS	T′=0.2; T′(5%)=3.8; ν =1
	organic sediment (humin)	AA-53201	5075±55	AMS	
Milfield Basin: Weetwood-Ewart-Doddington	organic sediment (humic acid)	SUERC-512	2185±45	AMS	T′=1038.8; T′(5%)=3.8; ν =1
	organic sediment (humin)	SUERC-517	4545±60	AMS	
Milfield Basin: Weetwood-Ewart-Doddington	organic sediment (humic acid)	SUERC-518	5180±50	AMS	T′=0.0; T′(5%)=3.8; ν =1
	organic sediment (humin)	SUERC-519	5185±50	AMS	
Milfield Basin: Weetwood-Ewart-Doddington	organic sediment (humic acid)	SUERC-520	1770±45	AMS	T′=3.6; T′(5%)=3.8; ν =1
	organic sediment (humin)	SUERC-521	1650±45	AMS	
North Peak Environmentally Sensitive Area: Arnfield Clough	charcoal	OxA-9538	4431±38	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-9539	4438±39	AMS	
North Peak Environmentally Sensitive Area: Arnfield Flats	charcoal	OxA-9544	3924±39	AMS	T′=0.3; T′(5%)=3.8; ν =1
		OxA-9545	3953±38	AMS	
North Peak Environmentally Sensitive Area: Arnfield Flats	charcoal	OxA-9603	3990±40	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-10212	3995±40	AMS	
Padstow: Althea Library	human bone	GrA-22554	1270±40	AMS	T′=0.5; T′(5%)=3.8; ν =1
		GU-5975	1320±60	LSS	
Shapwick, Old Church Field	charcoal	OxA-11474	1251±32	AMS	T′=0.3; T′(5%)=3.8; ν =1
		OxA-11475	1277±31	AMS	
Silbury Hill	antler	OxA-13210	3401±36	AMS	T′=0.0; T′(5%)=3.8; ν =1
		GrA-27336	3390±40	AMS	
Silbury Hill	antler	OxA-13333	3916±28	AMS	T′=3.5; T′(5%)=3.8; ν =1
		GrA-27332	4015±45	AMS	
Sutton Common: peat bog pollen	peat (humin)	OxA-8602	6180±65	AMS	T′=38.4; T′(5%)=3.8; ν =1
	peat (humin)	OxA-8603	6750±65	AMS	
Sutton Common: peat bog pollen	peat (humin)	OxA-8636	2235±45	AMS	T′=0.0; T′(5%)=3.8; ν =1
	peat (humin)	OxA-8682	2260±40	AMS	
Thames Foreshore Survey: Chelsea Foreshore	human bone	OxA-11086	3373±39	AMS	T′=0.5; T′(5%)=3.8; ν =1
		OxA-11087	3412±40	AMS	
West Heslerton: Anglian cemetery	human bone	UB-4641	1510±19	HP	T′=6.3; T′(5%)=3.8; ν =1
		HAR-6516	1690±70	LSS	

Site	Material	Laboratory Number	Radiocarbon Age (BP)	Method	Ward and Wilson (1978)
West Heslerton: Anglian cemetery	human bone	UB-4642	1487±19	HP	T′=20.1; T′(5%)=3.8; ν =1
		HAR-6907	1840±90	LSS	
West Heslerton: Anglian settlement	animal bone	UB-4565	1280±17	HP	T′=0.4; T′(5%)=6.0; ν =2
		OxA-12097	1279±25	AMS	
		GrA-22416	1260±30	AMS	
West Heslerton: Anglian settlement	animal bone	GrA-22562	1535±40	AMS	T′=4.0; T′(5%)=7.8; ν =3
		OxA-12090	1441±26	AMS	
		OxA-12098	1469±25	AMS	
		GrA-22550	1455±40	AMS	
West Heslerton: Anglian settlement	animal bone	OxA-12276	1641±26	AMS	T′=0.8; T′(5%)=6.0; ν =2
		OxA-13163	1614±34	AMS	
		OxA-13177	1610±24	AMS	
West Heslerton: Anglian settlement	animal bone	GrA-22412	1285±30	AMS	T′=0.4; T′(5%)=3.8; ν =1
		OxA-12091	1309±26	AMS	
West Heslerton: Anglian settlement	animal bone	GrA-22624	1345±40	AMS	T′=1.9; T′(5%)=3.8; ν =1
		OxA-13153	1418±35	AMS	
West Heslerton: Anglian settlement	animal bone	OxA-13146	1305±33	AMS	T′=0.2; T′(5%)=3.8; ν =1
		OxA-13247	1325±23	AMS	
West Heslerton: Anglian settlement	animal bone	OxA-13161	1576±37	AMS	T′=3.4; T′(5%)=3.8; ν =1
		OxA-13249	1487±31	AMS	
West Heslerton: Anglian settlement	animal bone	OxA-13162	1640±37	AMS	T′=1.4; T′(5%)=3.8; ν =1
		OxA-13172	1575±40	AMS	
West Heslerton: Anglian settlement	animal bone	OxA-13204	1342±33	AMS	T′=0.6; T′(5%)=3.8; ν =1
		OxA-13234	1310±24	AMS	
West Heslerton: Anglian settlement	animal bone	OxA-13235	1299±23	AMS	T′=0.2; T′(5%)=3.8; ν =1
		OxA-13248	1284±31	AMS	
West Heslerton: Anglian settlement	animal bone	GrA-22821	1460±40	AMS	T′=1.2; T′(5%)=3.8; ν =1
		OxA-13195	1518±34	AMS	
West Heslerton: Anglian settlement	carbonised plant macrofossil	UB-4558	1208±18	HP	T′=0.0; T′(5%)=3.8; ν =1
		UB-4559	1207±18	HP	
West Heslerton: Anglian settlement	charcoal	UB-4563	1557±22	HP	T′=1.3; T′(5%)=3.8; ν =1
		UB-4564	1593±22	HP	
West Heslerton: pre-Anglian Settlement	animal bone	GrA-22606	1745±40	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-13237	1753±34	AMS	
West Heslerton: pre-Anglian Settlement	carbonised residue	OxA-9747	1880±80	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-9984	1897±34	AMS	
West Heslerton: pre-Anglian Settlement	carbonised plant macrofossil	OxA-9629	1728±26	AMS	T′=0.4; T′(5%)=3.8; ν =1
		OxA-10213	1701±36	AMS	
West Heslerton: prehistoric	carbonised plant macrofossil	OxA-9560	3761±37	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-9561	3771±38	AMS	
West London Landscape: Wall Garden Farm	carbonised residue	OxA-12288	6367±34	AMS	T′=0.2; T′(5%)=3.8; ν =1
		OxA-12289	6347±37	AMS	
Whitwell Quarry Long Cairn	animal bone	OxA-12758	3677±31	AMS	T′=1.7; T′(5%)=3.8; ν =1
		OxA-12759	3673±38	AMS	
Whitwell Quarry Long Cairn	carbonised plant macrofossil	OxA-9646	4890±55	AMS	T′=4.5; T′(5%)=3.8; ν =1
		OxA-10214	5035±40	AMS	
Whitwell Quarry Long Cairn	carbonised plant macrofossil	OxA-9647	4960±50	AMS	T′=0.2; T′(5%)=3.8; ν =1
		OxA-10219	5005±75	AMS	
Whitwell Quarry Long Cairn	carbonised plant macrofossil	OxA-9648	4950±55	AMS	T′=0.0; T′(5%)=3.8; ν =1
		OxA-10215	4945±40	AMS	
Whitwell Quarry Long Cairn	carbonised plant macrofossil	OxA-9649	4960±55	AMS	T′=0.3; T′(5%)=3.8; ν =1
		OxA-10216	5000±45	AMS	
Whitwell Quarry Long Cairn	human bone	OxA-12763	4925±38	AMS	T′=9.6; T′(5%)=7.8; ν =3
		OxA-4177	5910±100	AMS	
		OxA-14494	4961±33	AMS	
		GrA-27513	4875±40	AMS	

Cairn, Derbyshire (OxA-4177, OxA-12763, OxA-14494, and GrA-27513, *see* below, p297) had been consolidated with Polyvinyl Acetate PVA (Bayliss *et al* 2013, 232–7; Vyner and Wall 2011, 30–40). The challenges of providing accurate dates for the sewn-plank boats found on the foreshore at North Ferriby have been fully documented by Wright *et al* (2001).

Many replicate measurements were obtained as part of resolving the technical problems identified at the Oxford Radiocarbon Accelerator Unit in 2000–2. These samples were not selected randomly, but either because they were bone or antler samples with low gelatin yields that were more likely to have been significantly affected by the ultrafiltration issue, or because they appeared to be misfits on archaeological grounds (usually because they had very low individual indices of agreement in Bayesian chronological models for specific sites). In many cases, the radiocarbon ages originally quoted were replaced by new measurements made either on re-ultrafiltered gelatin remaining from the original analysis, or by new measurements on replacement samples.

Exceptions are the replicate groups on the sheep/goat foetuses from Bleadon: Whitegate Farm (OxA-11423 and OxA-14989, and OxA-11424 and OxA-14990), a cattle bone from Eton Rowing Lake (OxA-9858 and GrA-22560), and the human skeleton from the Thames foreshore at Chamber's Wharf, London (OxA-11141–2 and OxA-X-2204-36), where the measurements made using the original ultrafiltration protocol (Bronk Ramsey *et al* 2000b) were published before they could be repeated. As all four groups of replicate measurements are statistically consistent (Table 3), the original measurements have not been withdrawn (although it should be noted that, in all cases, the original results are very slightly older than the repeat measurements).

As described by Bronk Ramsey *et al* (2011), excess gelatin from the original pretreatment was re-ultrafiltered from four skeletons from Abingdon: Spring Road cemetery as part of establishing the effectiveness of this approach. These samples were also re-dated from new bone samples at Oxford using the revised ultrafiltration protocol (Bronk Ramsey *et al* 2004a), and three of them were also dated at other AMS facilities. Three of these groups of measurements are statistically consistent at 95% confidence, with the fourth consistent at 99% confidence (Table 3).

Following these tests (and others described in Bronk Ramsey *et al* 2004a), almost all of the samples processed for English Heritage using the original ultrafiltration protocol were re-ultrafiltered and re-dated. Figure 17 shows the offsets between these measurements (OxA (NRC)) and results on new bone samples either processed at Rijksuniversiteit Groningen using methods outlined in Longin (1971) or at the Oxford Radiocarbon Accelerator Unit using the revised ultrafiltration protocol (Bronk Ramsey *et al* 2004a)[1]. All fourteen replicate groups are statistically consistent, and their scatter is consistent with statistical expectation[2]. The three pairs of measurements on re-ultrafiltered gelatin are also statistically consistent. These data confirm the accuracy of the measurements made on re-ultrafiltered

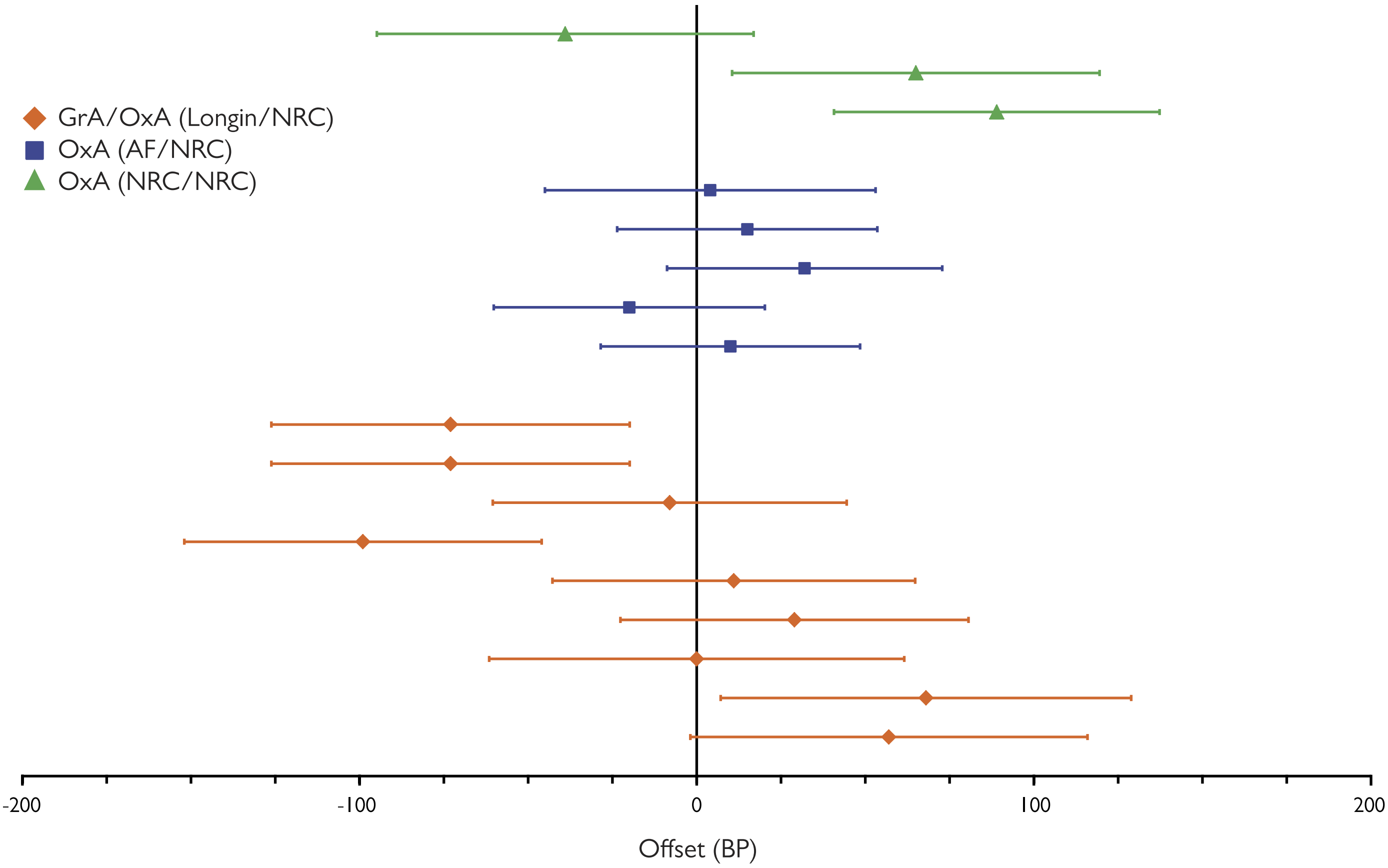
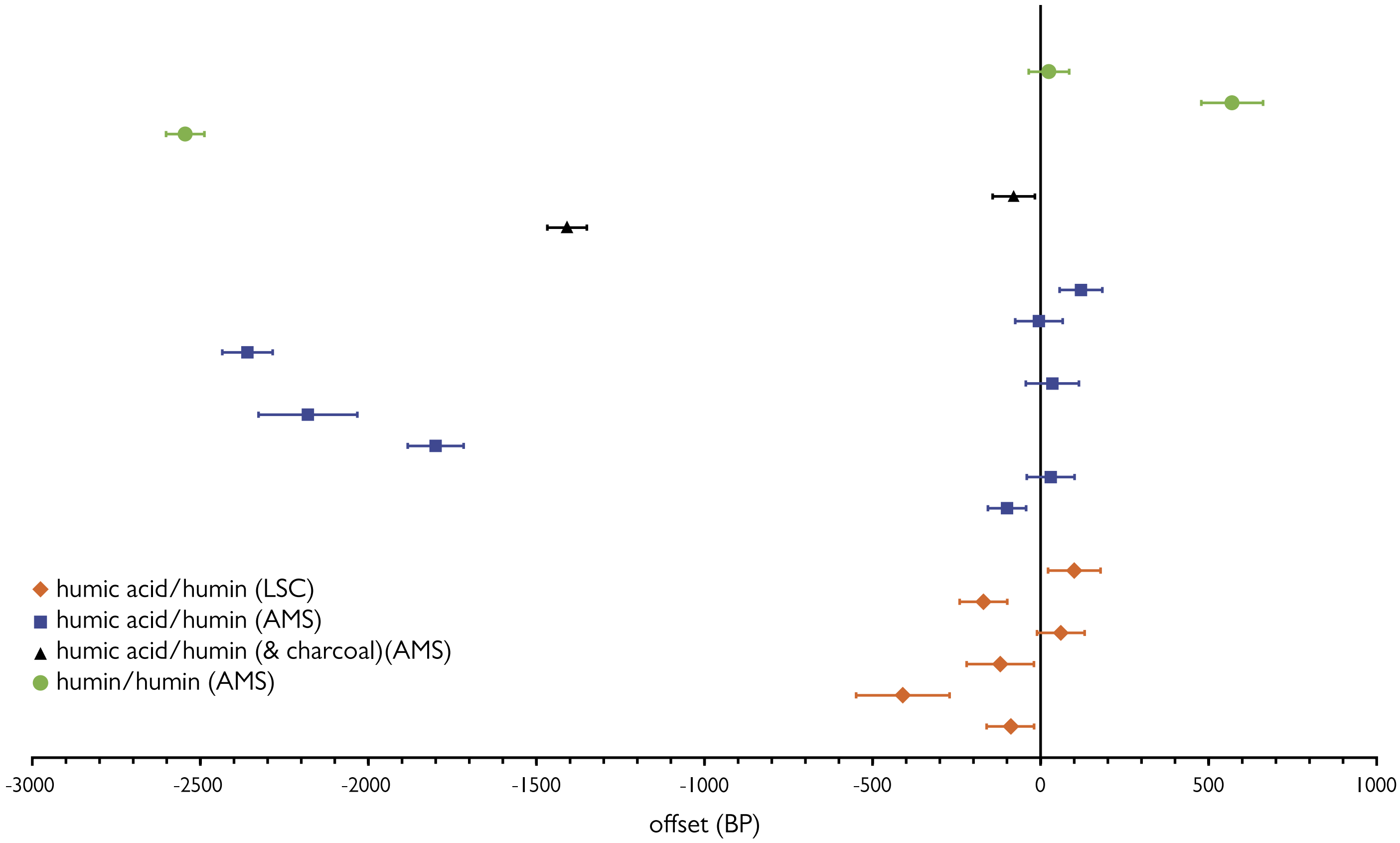


Figure 17. *Offsets between pairs of radiocarbon measurements on re-ultrafiltered excess gelatin (NRC; Bronk Ramsey et al 2004a) and on new antler or bone samples from the same specimens made at Oxford (AF; Bronk Ramsey et al 2004a) or Groningen (Longin 1971).*

Figure 18. *Offsets between pairs of radiocarbon measurements on different chemical fractions of bulk sediment.*



gelatin that are reported in this datelist.

Figure 18 shows offsets between groups of replicate measurements on a variety of chemical fractions of bulk samples of organic sediment. In sixteen cases the alkali-soluble (humic acid) and alkali- and acid-insoluble (humin) fractions have been dated. Six of these samples were dated by liquid scintillation spectrometry, and thus consisted of several hundred grams of peat (Table 1). Only one of these pairs of measurements is statistically significantly different at more than 99% confidence (Table 3). In contrast, five out of the ten samples where both fractions were dated by accelerator mass spectrometry are statistically inconsistent at more than 99% confidence (Table 3). It is clear that the humic acid fraction can be significantly younger (Fig 18). Of the three pairs of replicate measurements on the bulk humin fractions of sediment samples, two are statistically significantly different at more than 99% confidence (Table 3). This appears to relate to inhomogeneity in the dated sediment.

The remaining 57 groups of replicate measurements, including two samples which were dated more than twice, were not undertaken to investigate problematic samples or laboratory procedures, and so are more relevant to issues of quality assurance (Fig 19). Most were undertaken on a random basis at the time the original results were produced, either as part of the internal quality assurance procedures of the collaborating laboratories or as part of the quality assurance procedures for the radiocarbon dating funded by English Heritage. Some, however, are replicate measurements that have been undertaken on samples that had been dated previously.

There is a total of 49 measurements on 23 bone and antler samples, including two groups of more than two results. On statistical grounds alone we expect 1 in 20 results to be more than two standard deviations away from the true value. This means that in two or three cases we would expect groups of results on the same sample to be statistically significantly different at 95% confidence (using the method of Ward and Wilson 1978). In fact, seven groups of replicate measurements are different at this level of confidence, although three of these are statistically consistent at 99% confidence and so probably simply include one measurement that is a slight statistical outlier. In the three other cases, one measurement in the group is clearly problematic. HAR-6516 and HAR-6907 from burials in the Anglian cemetery at West Heslerton, Yorkshire (North Riding), are clearly anomalously old (*see* below, p255), and OxA-8711 on a bone artefact from an Anglian burial at Binchester, Durham, is clearly anomalously recent (*see* below, p59). The weighted mean of the two results on partially articulated skeleton WK16 from the West Kennet long barrow, Wiltshire, however, has good individual agreement in both models for the chronology of the monument presented by Bayliss *et al* (2007c, figs 6 and 9) and it is likely that one of the measurements on this individual is simply an extreme statistical outlier.

Four pairs of replicate measurements are available on carbonised residues on pottery sherds. Those from a sherd of Neolithic pottery from Eton Rowing Course: area 10, Buckinghamshire, are statistically inconsistent at more than 99% confidence (OxA-9925 and OxA-10660; Table 3). OxA-9925 appears to be slightly too old for pottery of this type (*see* below, p103).

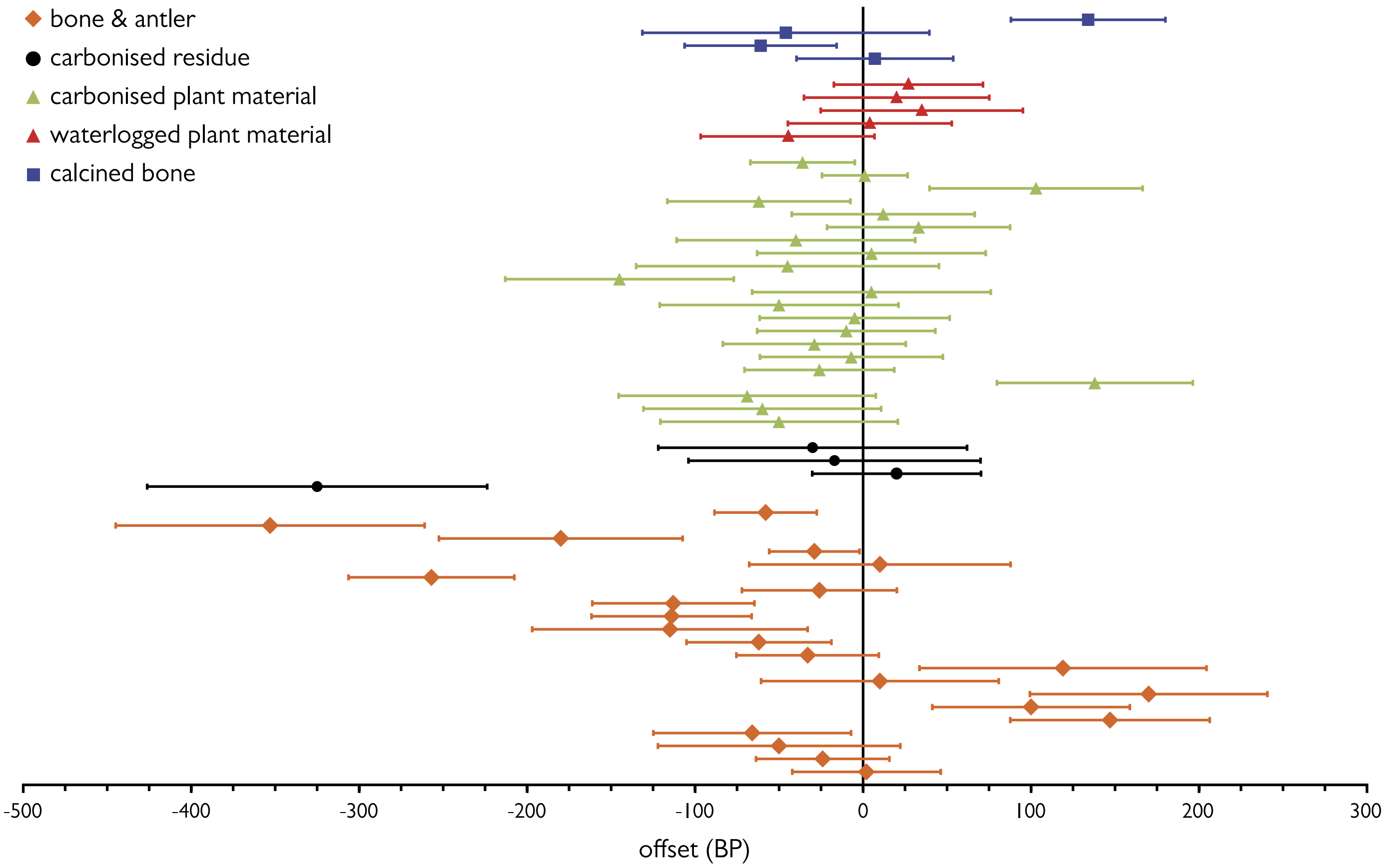


Figure 19. *Offsets between replicate pairs of radiocarbon measurements on the same sample undertaken for quality assurance purposes.*

Twenty-one replicate groups of measurements are available on samples of charcoal and other carbonised plant remains. In only two cases are the replicates statistically inconsistent at 95% confidence, although both are statistically consistent at 99% confidence (GU-5942 and OxA-12602 from Exmoor Iron: Sherracombe Ford, Devon, *see* below, p106, and OxA-9646 and OxA-10214 from Whitwell Quarry Long Cairn, Derbyshire, *see* below, p298; Table 3).

Five sets of replicate measurements were made on single-entity samples of waterlogged plant remains, including wood. All of these are statistically consistent at 95% confidence (Table 3).

At the time the measurements reported in this datelist were made, the dating of calcined bone was a novel technique (Lanting *et al* 2001). Four calcined bones from Eye Kettleby, Leicestershire (*see* below, p107), were thus dated in replicate. One of these is statistically inconsistent at more than 99% confidence (OxA-12691 and OxA-12732). By comparison with measurements on fragments of short-lived charcoal from the same cremation urn, OxA-12691 is considered to be slightly too recent.

There are 117 measurements in the 57 replicate groups that we consider to be relevant to the quality assurance of the dates reported in this volume. There are five clear misfits: two measurements on human bones dated by AERE Harwell in 1984 (HAR-6516 and HAR-6907; Bayliss *et al* 2012, 298–9), one result on a carbonised residue on a pottery sherd (OxA-9925), and one result on a fragment of calcined bone (OxA-12691). There is one measurement that appears to be an extreme outlier at more than 99% confidence (either GrA-23181 or OxA-12653 from West Kennet long barrow, Wiltshire (*see* below, p202)), and five measurements that are outliers at more than 95% confidence (OxA-8606 or OxA-23270 and OxA-8607 or OxA-12371 from Binchester, Durham (*see* below, p58), GU-5832 or GU-5865 from Barton-upon-Humber, St Peter's Church, Lincolnshire (*see* below, p48), GU-5942 or OxA-12602 from Exmoor Iron: Sherracombe Ford, Devon (*see* below, p106), and OxA-9646 or OxA-10214 from Whitwell Quarry Long Cairn, Derbyshire (*see* below, p299); Table 3).

Overall, this analysis suggests that the measurements reported in this volume are accurate within the precision quoted, although there are likely to be a small number of measurements that are misfits well beyond statistical expectation (1–2% of the total). The statistically consistent, but archaeologically implausible, replicate measurements on a sherd of Peterborough Ware in the Mortlake sub-style from West London Landscape: Wall Garden Farm, Sipson, Greater London (OxA-12288–9; *see* below, p296) fall into this category.

Weighted means of replicate results

Weighted means of replicate radiocarbon measurements should be taken before calibration for samples which ceased exchanging carbon with the biosphere at exactly the same time. Most commonly these are replicate samples from the same living organism. For example, the weighted mean of the two measurements on the logboat from Argosy Washolme, Derbyshire (OxA-9536–7; Table 3, *see* below p25) is 3115 ±25 BP, which calibrates to 1435–1305 cal BC (2σ) or 1425–1320 cal BC (1σ).

Measurements which derive from bulk samples made up of material from more than one organism are more problematic. In a sample of bulk charcoal, for example, it is extremely unlikely that all the dated fragments derive from tree-rings which were laid down in exactly the same year. Even if composed entirely of short-lived wood species, it is likely that brushwood which formed over several years, or even several decades, may be represented in the sample. In these circumstances, the (probably incorrect) assumption that all the dated material died in the same year has already been made when submitting a bulk sample for radiocarbon dating. For this reason, weighted means of replicate measurements from bulk samples have also been taken before calibration, as the assumption of the statistical approach is consistent with that made in the submission of the samples for dating.

Statistical modelling

The Bayesian approach to the interpretation of archaeological chronologies has been described by Buck *et al* (1996). It is based on the principle that although the calibrated age ranges of radiocarbon measurements accurately estimate the calendar ages of the samples themselves, it is the dates of archaeological events associated with those samples that are important. Bayesian techniques can provide realistic estimates of the dates of such events by combining scientific dating evidence, such as radiocarbon dates with relative dating evidence, such as stratigraphic relationships between radiocarbon samples. These 'posterior density estimates', (which, by convention, are always expressed in italics) are not absolute. They are interpretative estimates, which will change as additional data become available or as the existing data are modelled from different perspectives (Fig 20).

Lindley (1985) provides a user-friendly introduction to the principles of Bayesian statistics, and Bayliss *et al* (2007b) provide an introduction to the practice of chronological modelling for archaeological problems.

The technique used to implement Bayesian statistics in practice is a form of Markov Chain Monte Carlo sampling (Gilks *et al* 1996; Gelfand and Smith 1990). Almost all the models considered in this volume have been constructed using the OxCal software, usually v.1.3–v.3.10 (Bronk Ramsey 1995; 1998; 2000; 2001; Bronk Ramsey *et al* 2001), but v.4.0–v.4.2 (Bronk Ramsey 2008, 2009a–b; Bronk Ramsey and Lee 2013) has also been used more recently, particularly for sediment sequences where age-depth modelling is required for samples where mixed-source calibration is required.

$$\frac{P(\text{data}|\text{parameters})}{P(\text{data})} \times P(\text{parameters}) = P(\text{parameters}|\text{data})$$

Standardised Likelihoods	x	Prior Beliefs	=	Posterior Beliefs
"The Dates"		"The Archaeology"		"An Answer"

Figure 20. *Bayes' theorem as applied to chronological modelling in archaeology.*

An OxCal model is constructed explicitly specifying the known or assumed relative ages of the radiocarbon samples. The model structure is typically defined by the site's Harris matrix. The program calculates the probability distributions of the individual calibrated radiocarbon dates (Stuiver and Reimer 1993), and then attempts to reconcile these distributions with the relative ages of the samples, by repeatedly sampling each distribution to build up the set of solutions consistent with the model structure.

This process produces a posterior density estimate of each sample's calendar age, which occupies only part of the calibrated probability distribution (the prior distribution of the sample's calendar age). The posterior distribution is then compared to the prior distribution; an index of agreement is calculated that reflects the consistency of the two distributions. If the posterior distribution is situated in a high-probability region of the prior distribution, the index of agreement is high (sometimes 100% or more). If the index of agreement falls below 60% (a threshold value analogous to the 0.05 significance level in a $\chi 2$ test), however, the radiocarbon date is regarded as inconsistent with the sample's calendar age, if the latter is consistent with the sample's age relative to the other dated samples. Sometimes this merely indicates that the radiocarbon result is a statistical outlier (more than 2 standard deviations from the sample's true radiocarbon age), but a very low index of agreement may mean that the sample is residual or intrusive (ie that its calendar age is different to that implied by its stratigraphic position).

An overall index of agreement is calculated from the individual agreement indices, providing a measure of the consistency between the archaeological information included in the model and the radiocarbon dates. Again, this has a threshold value of 60%. The program is also able to calculate distributions for the dates of events that have not been dated directly, such as the beginning and end of a continuous phase of activity (which is represented by several radiocarbon results), and for the durations of phases of activity or hiatuses between such phases.

By the time the samples reported in this datelist were measured, the selection and interpretation of radiocarbon dates within a Bayesian statistical framework was routinely employed for sites funded by English Heritage (Bayliss and Bronk Ramsey 2004). Overall, 82% of radiocarbon dates in this volume were interpreted using Bayesian statistics (Fig 21). Implementation, however, was uneven, with 96% of samples from post-excavation analysis being included in Bayesian models, but only 39% of samples from wetland and foreshore surveys. The approach was rarely employed for dates obtained from objects of intrinsic interest or site assessments.

At this time, most models addressed the chronology of single sites. There was a group of Mesolithic burials from Aveline's Hole, Somerset (Marshall and van der Plicht 2005), a Mesolithic structure with a contemporary environmental

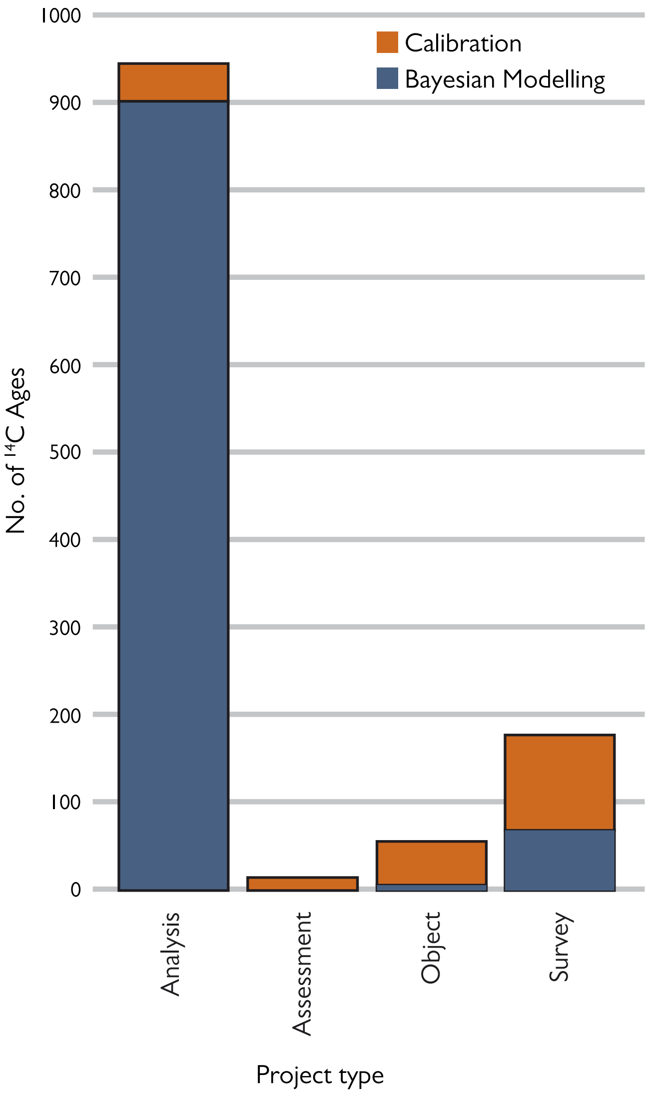


Figure 21. *The use of Bayesian chronological modelling for the interpretation of the radiocarbon dates reported in this volume.*

profile from Howick, Northumberland (Bayliss *et al* 2007d; Boomer *et al* 2007), and a late hunter-gatherer camp at March Hill, West Yorkshire (Spikins 1999; Griffiths 2011).

The chronology of Neolithic monuments continued to be a particular focus of attention, with major programmes of dating undertaken not just on long barrows at Fussell's Lodge (Wysocki *et al* 2007), Wayland's Smithy (Whittle *et al* 2007b), and West Kennet, Wiltshire (Bayliss *et al* 2007c), but also at Whitwell Long Cairn, Derbyshire (Vyner and Wall 2011), at the complex of early Neolithic activity on Hambledon Hill, Dorset (Bayliss *et al* 2008), and at Silbury Hill, Wiltshire (Bayliss *et al* 2007e). Dating for Neolithic occupation sites was undertaken at Bridlington: Sewerby Farm, Yorkshire (Bayliss *et al* 2009), beneath Easington Barrow, Yorkshire (Mackey 2006), at Eton Rowing Lake, Berkshire (Marshall *et al* 2013), at Kirkby on Bain: Grange Farm, Lincolnshire, and at Yarnton, Oxfordshire (Hey *et al* forthcoming).

Wiggle-matching of tree-ring sequences was undertaken on the timber circle at Holme next the Sea, Norfolk (Bayliss *et al* 1999) and on a master sequence from Swalecliffe, Kent that proved key in linking parts of the national Bronze Age master sequence for dendrochronology (Masefield *et al* 2004). Bronze Age funerary sites were dated at Abingdon: Spring Road, Oxfordshire (Marshall *et al* 2008), Easington Beach, Yorkshire (Van der Noort 2004), Eye Kettleby, Leicestershire (Bayliss *et al* 2011), Fenning's Wharf, London (Bayliss 2002), Ingelby Barwick: Windmill Fields, Durham, and at West Heslerton, Yorkshire. Bronze Age field systems and settlements were dated at Irby, Merseyside (Bayliss 2010), Kemerton Quarry, Worcestershire (Bayliss *et al* 2015), and West London Landscapes: Cranford Lane, London (*see* below, p281). A burnt mound at Drigg, Cumbria was also dated (Brown 2014).

In the late 1990s, few applications of radiocarbon dating explored the chronology of Iron Age sites, as the technique was at this time considertd to be of limited use in this period (Haselgrove *et al* 2001). Following the identification and dating of a small middle Iron Age cemetery at Yarnton, Oxfordshire (Hey *et al* 1999; Hey *et al* 2011), conscious efforts were made to explore the utility of radiocarbon dating and chronological modelling in the Iron Age. The results were mixed, in some cases simply confirming the artefact-based chronologies but in some cases substantially refining our understanding of the sites involved. Chronological modelling was undertaken for the small middle Iron Age hillfort at Conderton Camp, Worcestershire (Bayliss *et al* 2005) and for the late Iron Age defended enclosure at Wardy Hill, Cambridgeshire, which formed part of the Fenland Management Project (Bayliss *et al* 2003). Further burials were identified and dated at Abingdon: Spring Road cemetery, Oxfordshire (Fig 9; Marshall *et al* 2008). Bayesian mdoels were also produced for middle Iron Age settlements at Bleadon: Whitegates Farm, Somerset (Young 2008), Irby, Merseyside (Bayliss 2010), West London Landscapes: Stockley Park, Greater London (*see* below, p289), and for various features in the landscape at Yarnton, Oxfordshire (Bayliss and Hey 2011).

In contrast, few applications of radiocarbon dating were undertaken for sites of the Roman period. Dating at Duxford: Hinxton Road, Cambridgeshire assisted in the phasing of this complex multi-period site (Hamilton and Cook 2011), and iron working at Exmoor Iron: Sherracombe Ford, Devon proved to have begun shortly after the Roman conquest and continued into the later third century AD **(Fig 22).**

Figure 22. *Early Roman iron smithing floor from Exmoor Iron: Sherracombe Ford, Devon (© University of Exeter).*

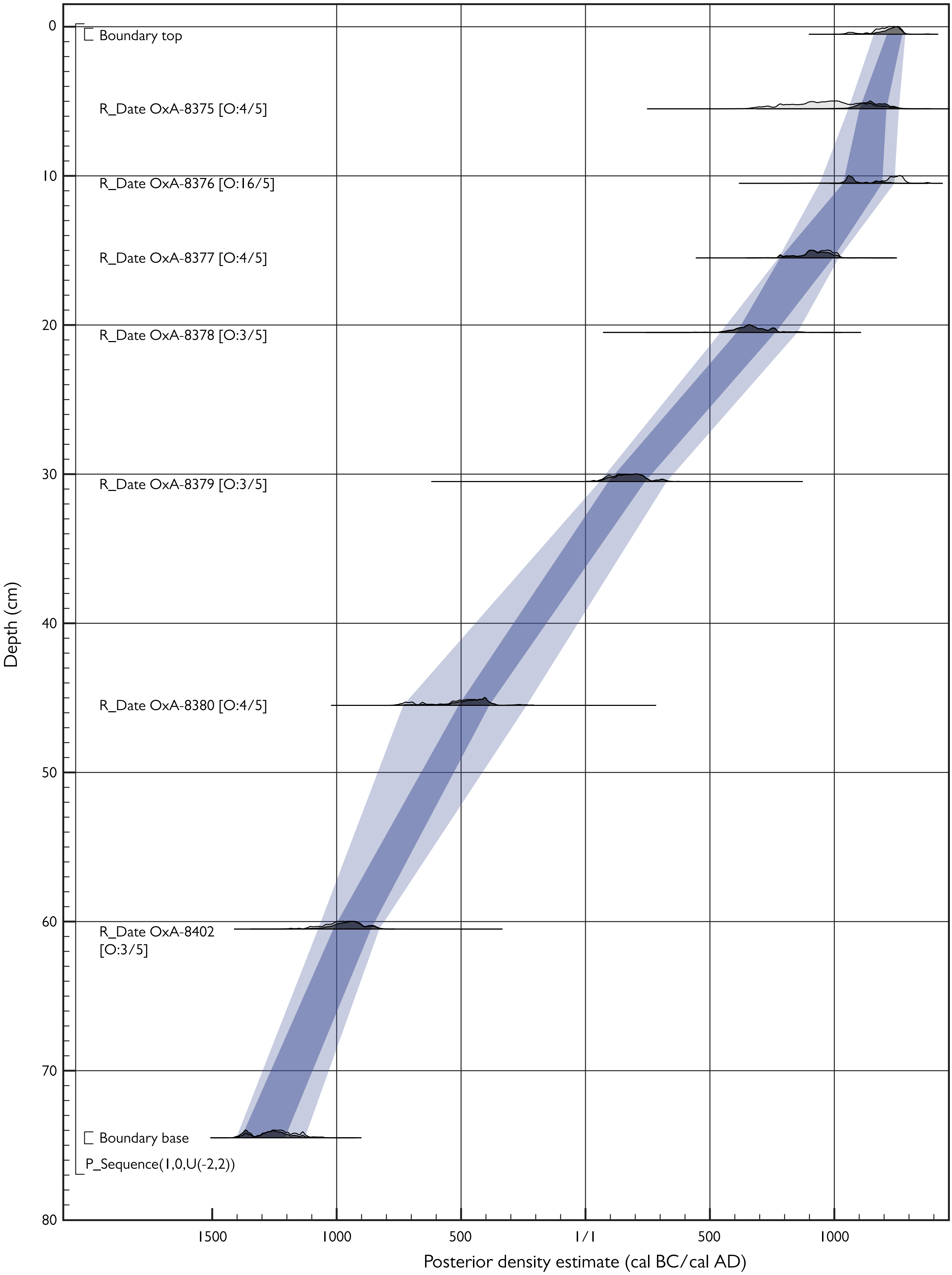


Figure 23. *Poisson-process age-depth model with variable granularity and general outlier analysis (Bronk Ramsey 2008; 2009b; Bronk Ramsey and Lee 2013) for an environmental profile from Thetford: Mill Lane, Norfolk.*

Applications in the early medieval period fell into three categories. First were those which exploited the steep slope of the radiocarbon calibration curve in the seventh century AD and relied on high-precision radiocarbon measurements. Into this category came the national project to combine the relative dating of early Anglo-Saxon grave assemblages through correspondence analysis with a series of high-precision radiocarbon dates on the skeletons from the graves (Bayliss *et al* 2013), and also the small seventh-century graveyard at Carlton Coleville: Bloodmoor Hill, cemetery, Suffolk (Marshall *et al* 2009). Second were those which attempted to combine comparatively large assemblages of radiocarbon dates with the stratigraphies of settlement sites. The long sequence of deposits above the late Roman bath-house at Binchester, Durham proved to have been formed with unexpected rapidity (Marshall *et al* 2010), and radiocarbon dating was used to refine the phasing of the Anglian settlement at West Heslerton, Yorkshire (Powlesland forthcoming) and the middle Saxon settlement at Brandon, Suffolk (Marshall and Bayliss 2014). Using the archives of a number of sites excavated in the 1980s, we also addressed the question of when Ipswich Ware first appeared in Lundenwic (Marshall *et al* 2012b). Third were those where artefactual evidence was extremely limited. Into this class fell the dating of timber buildings at Irby, Merseyside (Bayliss 2010) and Shapwick: Old Church Field, Somerset (Marshall *et al* 2007).

As part of the publication of the excavation and recording of the medieval church and cemetery at St Peter's Church, Barton-upon-Humber, Lincolnshire, radiocarbon dating and chronological modelling were used to address two important research objectives. The first was to establish the date when the cemetery began, and the second was to aid in the phasing of the substantial assemblage of skeletons, which was key to the interpretation of the osteological evidence. Both of these objectives were achieved (Rodwell with Atkins 2011).

Multi-period age-depth models for the chronologies of sediment sequences at Sutton Common, Yorkshire (Gearey *et al* 2009) and Thetford: Mill Lane Norfolk (Fig 23; Wallis 2004) should also be noted.

Already published models in due course will be reinterpreted and remodelled. Radiocarbon dates that originally simply provided spot dates for wooden structures in the foreshore or for the organic sediments surviving at particular locations, will in time become part of chronological models for other problems (the currency of particular forms of fish-trap, or the date of past sea-level, for example).

It is in the creation of new models that the detailed information contained in this datelist will prove invaluable. It will allow the necessary critical assessment of sample character and taphonomy, and measurement accuracy, to be made. This will allow informed decisions to be made about how each radiocarbon date is most realistically incorporated into a particular model.

Using the Datelist

Radiocarbon determinations are identified by a unique laboratory code. So, for example, UB- is the code for the Queen's University Belfast Radiocarbon Dating Laboratory, and UB-4655 was the 4,655th measurement produced by the laboratory. This code is the internationally agreed identifier by which every radiocarbon determination can be traced. UB-4655 refers to the result produced on a human bone from skeleton 1241 in grave F3564 at Barton-upon-Humber, St Peter's church, Lincolnshire, and only to that measurement. An index of these codes is therefore provided to enable further details of dates cited elsewhere to be easily traced.

A more traditional index of key terms is also provided. This enables dates from particular sites, or of particular materials, or with particular archaeological associations to be traced (eg dates relating to the elm decline or Collared Urns).

Acknowledgments

This datelist has be compiled and edited by Kate Cullen, on the basis of information provided by the submitters of the samples dated and by the radiocarbon laboratories. We are grateful to all the submitters of the samples included in this datelist, who have generously responded to our requests for information.

Design has been the responsibility of Mark Simmons, and the overall production of the volume has been overseen by John Hudson. The information has been output from the Historic England Radiocarbon Database. This has been developed over many years, successively by Paul Cheetham, Sarah Hill, Manuela Lopez, Marcos Guillen, Mike Gratton, David Head, Carlton Carver, and Gordon Mackay.

I am particularly indebted to Christopher Bronk Ramsey, Gordon Cook, Stephen Hoper, and Johannes van der Plicht who have all checked through the datelist and contributed materially to the accuracy of the information in this introduction. Radiocarbon dating is a complex and labour-intensive process which takes time. It would be impossible without the dedicated attention of the laboratory staff to each and every sample. We are grateful to Stephen Hoper, Oliver Lavery, James McDonald, and Michelle Thompson for processing and dating the samples at the Queen's University, Belfast, to Robert Anderson, Andrew Dougans, Elaine Dunbar, Stewart Freemanm, Philip Naysmith and Sheng Xu for similarly processing and dating samples dated at the Scottish Universities Research and Reactor Centre/Scottish Universities Environmental Research Centre, to Angela Bowles, Peter Ditchfield, Celia Sykes, Robert Hedges, Martin Humm, Philip Leach, and Christine Tompkins for undertaking the measurements at the Oxford Radiocarbon Accelerator Unit, and to Anita Aerts-Bijma, Henk Been, Fsaha Ghebru, Bert Kers, Stef Wijma and Dicky van Zonneveld for dating the samples processed at the Rijksuniversiteit Groningen.

Alex Bayliss
Historic England, 1 Waterhouse Square,
138–142 Holborn, London, EC1N 2ST

1 Weighted means have been taken on replicate measurements on new bone before comparison with the measurement on re-ultrafiltered gelatin in this graph.

2 Excluding the measurement made using ion-exchange protocol (OxA-4177; Law and Hedges 1989; Hedges and Law 1989), the measurements on skeleton W92 957 are also statistically consistent at 95% confidence (Table 3).

3 The weighted mean of the results on 332B is statistically significantly different from the results from samples 332A, 332C, and 332D (T'=32.4; T'(5%)=7.8; ν=3).

4 The result on 974D is statistically significantly different from the results on samples 974A–C (T'=9.9; T'(5%)=7.8; ν=3).

Abingdon: Spring Road Cemetery, Oxfordshire

Location: NU 48759755
Lat. 51.40.25 N; Long. 01.17.42 W

Project manager: T Allen (Oxford Archaeological Unit), July 2000

Archival body: Oxfordshire County Museums Service

Description: a municipal cemetery in north-west Abingdon. Multi-period remains have been recovered over many years from grave-digging. The series comprises two bones from the inner and outer rings of the posthole arc, and a further bone from the pit to the south. In addition, there are four bones from four burials. These samples are taken from features ranging from the Neolithic to Iron Age periods on the settlement at Spring Road.

Objectives: to establish the dates of the bones in the inner and outer posthole arc and pit, thus providing a *terminus post quem* for their deposition, with an aim to establish a date for the features and the chronological relationship of the posthole arc to the pit. In addition, to establish the date of the four burials, thus helping to determine their context within the surrounding features.

Final comment: P Marshall (2008), the dates of Beaker skeleton 3036, which was associated with a possibly early copper awl, of the timber circle, and of three of the middle Iron Age skeletons (2199, 2125, and 2245) were established by radiocarbon determinations. The dates for the timber circle were obtained from a pig maxilla from a posthole (2328) in the inner arc, and from a pig tibia in a posthole (2373) in the outer arc. The other dates were obtained on femurs from the skeletons involved. The three measurements on the Beaker skeleton are statistically consistent and suggest that the burial dates from 2345–2240 cal BC (2σ; NZA-15865–6 and OxA-12100; Reimer *et al* 2004). The two measurements for the timber circle are not statistically consistent, but do suggest a middle Bronze Age date for the feature. The measurements for all of the Iron Age skeletons are statistically indistinguishable, indicating that they could all have been of the same age. The fourth–third century cal BC date suggests that the early Iron Age pottery found in the graves was residual.

References: Allen and Kamash 2008
Reimer *et al* 2004

GrA–22752 2310 ±50 BP

$\delta^{13}C$: -20.6 ±0.1‰
$\delta^{15}N$ *(diet):* +10.3 ±0.2‰
C/N ratio: 3.3

Sample: ABSRC 00 2199, submitted on 17 October 2001 by T Allen

Material: human bone (360g) (femur) (P Hacking 2001)

Initial comment: inhumation 2200, filled by 2197, 2198, and skeleton 2199. The grave cut the subsoil 2011, and natural gravel 2007. No truncation was observed.

Objectives: to establish the date of the burial within the Iron Age and to establish whether the early Iron Age pottery is contemporary or residual. Also, to help place the burials in context by providing some indication as to whether they were broadly contemporary with the surrounding early Iron Age occupation, or were chronologically distinct from it.

Calibrated date: *1σ:* 410–360 cal BC
2σ: 430–210 cal BC

Final comment: P Marshall (2008), the results on skeleton 2199 (OxA-12102 and GrA-22752) are statistically consistent (T′=1.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and so a weighted mean can be taken before calibration (2266 ±24 BP; 395–210 cal BC at 2σ; Reimer *et al* 2004).

Laboratory comment: English Heritage (2008), following the discovery of a technical problem with bone dating at the Oxford Radiocarbon Accelerator Unit in 2002, the excess collagen from the original measurement on this sample was re-purified and re-dated. The experimental result is statistically inconsistent with the other measurements (OxA-12102, GrA-22752, and OxA-X-2037–17; T′=7.7; T′(5%)=6.0; ν=2; Ward and Wilson 1978). This suggests that the re-ultrafiltration of the excess did not completely remove whatever contaminants affected the original measurement (in this particular case).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–22754 2330 ±60 BP

$\delta^{13}C$: -20.5 ±0.1‰
$\delta^{15}N$ *(diet):* +10.3 ±0.2‰
C/N ratio: 3.3

Sample: ABSRC 00 2243, submitted on 17 October 2001 by T Allen

Material: human bone (317g) (femur) (P Hacking 2001)

Initial comment: inhumation 2241, filled by 2242 and skeleton 2243. The grave cut into the natural gravel 2007, and cut posthole 2454 to the west.

Objectives: to establish the date of the burial within the Iron Age, and to establish whether the early Iron Age pottery is contemporary or residual. Also, to help place the burials in context by providing some indication as to whether they were broadly contemporary with the surrounding early Iron Age occupation, or were chronologically distinct from it.

Calibrated date: *1σ:* 410–370 cal BC
2σ: 730–210 cal BC

Final comment: P Marshall (2008), the two results on this skeleton are statistically consistent (T′=0.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and so a weighted mean can be taken before calibration (2306 ±25 BP; 405–365 at 2σ; Reimer *et al* 2004).

Laboratory comment: English Heritage (2008), following the discovery of a technical problem with bone dating at the Oxford Radiocarbon Accelerator Unit in 2002, the excess collagen from the original measurement on this sample was re-purified and re-dated. All the measurements are statistically consistent (OxA-12103, GrA-22754, and OxA-

X-2037–18; 2279 ±28 BP; T′=0.7; T′(5%)=6.0; ν=2; Ward and Wilson 1978). At the time the measurement of the re-purified collagen was still experimental, and so the re-date was not included in the published chronological model.

References: Reimer *et al* 2004
Ward and Wilson 1978

NZA–15865 3834 ±45 BP

$\delta^{13}C$: -21.4‰
$\delta^{15}N$ *(diet):* +9.8‰
C/N ratio: 2.6

Sample: ABSRC 00 3036, submitted on 17 October 2001 by T Allen

Material: human bone (125g) (femur) (P Hacking 2001)

Initial comment: inhumation 3037, filled by 3035 and containing skeleton 3036. The grave was cut into the natural gravel and clay. The skull was slightly truncated by later ploughing.

Objectives: to enable the closer dating of the burial in area 5, which will also assist in placing the awl in its typological sequence, and provide a *terminus ante quem* for its metallurgy. Both the metallurgy and the type of burial can then be compared to others, for instance those at Radley, Barrow Hills. Radiocarbon dating would also establish its relative date to the posthole arc and assist in determining the relationship between them.

Calibrated date: *1σ:* 2400–2200 cal BC
2σ: 2470–2140 cal BC

Final comment: P Marshall (2008), the three results on this skeleton are statistically consistent (T′=0.3; T′(5%)=6.0; ν=2; Ward and Wilson 1978), and so a weighted mean can be taken before calibration (3850 ±21 BP; 2460–2205 cal BC at 2σ; Reimer *et al* 2004).

Laboratory comment: English Heritage (2008), following the discovery of a technical problem with bone samples at the Oxford Radiocarbon Accelerator Unit in October 2002, the excess collagen from the original measurement on this sample was re-purified and re-dated. All the measurements are statistically consistent (OxA-12100, NZA-15865, NZA-15866, and OxA-X-2037–15 (T′=2.2; T′(5%)=7.8; ν=3; Ward and Wilson 1978). At the time the measurement of the re-purified collagen was still experimental, and so the re-date was not included in the published chronological model.

References: Reimer *et al* 2004
Ward and Wilson 1978

NZA–15866 3841 ±40 BP

$\delta^{13}C$: -21.0‰
$\delta^{15}N$ *(diet):* +9.8‰
C/N ratio: 2.6

Sample: ABSRC 00 3036, submitted on 17 October 2001 by T Allen

Material: human bone (125g) (femur) (P Hacking 2001)

Initial comment: as NZA-15865

Objectives: as NZA-15865

Calibrated date: *1σ:* 2400–2200 cal BC
2σ: 2470–2140 cal BC

Final comment: see NZA-15865

Laboratory comment: see NZA-15865

OxA–12100 3861 ±29 BP

$\delta^{13}C$: -21.8‰
$\delta^{15}N$ *(diet):* +9.6‰
C/N ratio: 3.2

Sample: ABSRC 00 3036, submitted on 17 October 2001 by T Allen

Material: human bone (125g) (femur) (P Hacking 2001)

Initial comment: as NZA-15865

Objectives: as NZA-15865

Calibrated date: *1σ:* 2460–2280 cal BC
2σ: 2470–2200 cal BC

Final comment: see NZA-15865

Laboratory comment: see NZA-15865

OxA–12101 2286 ±26 BP

$\delta^{13}C$: -20.0‰
$\delta^{15}N$ *(diet):* +9.6‰
C/N ratio: 3.1

Sample: ABSRC 00 2125, submitted on 17 October 2001 by T Allen

Material: human bone (37g) (femur) (P Hacking 2001)

Initial comment: from inhumation 2126, filled by 2124 and containing skeleton 2125. The grave cut the natural gravel 2007. The upper part of both arms were disturbed, possibly due to decomposition.

Objectives: to establish the date of the burial within the Iron Age and to establish whether the early Iron Age pottery is contemporary or residual. Also, to help place the burials in context by providing some indication as to whether they were broadly contemporary with the surrounding early Iron Age occupation, or were chronologically distinct from it.

Calibrated date: *1σ:* 400–360 cal BC
2σ: 410–230 cal BC

Final comment: P Marshall (22 July 2003), OxA-12101, OxA-12102, OxA-12103, GrA-22752, and GrA-22754 are measurements from the three 'Iron Age burials' are not statistically significantly different (T′=2.6; T′(5%)=9.5; ν=4; Ward and Wilson 1978) and so could all be of the same actual age. The date of them (*c* fourth–third century cal BC) suggests that the early Iron Age pottery found in the fill of the graves is residual.

Laboratory comment: English Heritage (2008), the excess collagen from the original measurement on this sample was re-purified and re-dated. This pair of measurements is statistically consistent (OxA-12101 and OxA-X-2037–16; T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–12102 2253 ±27 BP

δ¹³C: -20.2‰
δ¹⁵N (diet): +11.2‰
C/N ratio: 3.1

Sample: ABSRC 00 2199, submitted on 17 October 2001 by T Allen

Material: human bone (360g) (femur) (P Hacking 2001)

Initial comment: as GrA-22752

Objectives: as GrA-22752

Calibrated date: *1σ:* 390–230 cal BC
2σ: 400–200 cal BC

Final comment: see GrA-22752

Laboratory comment: see GrA-22752

OxA–12103 2301 ±27 BP

δ¹³C: -20.3‰
δ¹⁵N (diet): +11.2‰
C/N ratio: 3.1

Sample: ABSRC 00 2243, submitted on 17 October 2001 by T Allen

Material: human bone (317g) (femur) (P Hacking 2001)

Initial comment: as GrA-22754

Objectives: as GrA-22754

Calibrated date: *1σ:* 400–370 cal BC
2σ: 410–260 cal BC

Final comment: see GrA-22754

Laboratory comment: see GrA-22754

OxA–12376 3294 ±30 BP

δ¹³C: -21.8‰
δ¹⁵N (diet): +7.4‰
C/N ratio: 3.2

Sample: ABSRC 00 2329, submitted on 17 October 2001 by T Allen

Material: animal bone: *Sus* sp., maxilla (5g) (B Charles 2001)

Initial comment: from posthole 2328 cut into secondary limestone gravel terrace, 2007, *c* 1.3m from the surface and filled by 2329. The posthole forms part of the inner posthole arc in area 8.

Objectives: to establish the date of the bone, providing a *terminus post quem* for the deposition of the bone and the construction of the monument; to establish the date and duration of the monument, determining whether the Peterborough Ware pottery is contemporary or residual, and the chronological relationship of the post arc to the pit.

Calibrated date: *1σ:* 1620–1520 cal BC
2σ: 1640–1500 cal BC

Final comment: P Marshall (22 July 2003), the results OxA-12376 and OxA-12377 on pig bones from the timber circle and are not statistically consistent (T′=7.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978); however, they do confirm a middle Bronze Age date for the monument.

References: Ward and Wilson 1978

OxA–12377 3156 ±40 BP

δ¹³C: -20.9‰
δ¹⁵N (diet): +8.7‰
C/N ratio: 3.2

Sample: ABSRC 00 2375, submitted on 17 October 2001 by T Allen

Material: animal bone: *Sus* sp., tibia with gnaw marks (34g) (B Charles 2001)

Initial comment: from posthole 2373 cut into secondary limestone gravel terrace, 2007, *c* 1.5m from surface and filled by 2375 and 2374. The posthole was cut by posthole 2012 to the east, and possibly by posthole 2028 to the south. The posthole forms part of the outer ring of the posthole arc.

Objectives: as OxA-12376

Calibrated date: *1σ:* 1500–1400 cal BC
2σ: 1510–1300 cal BC

Final comment: see OxA-12376

OxA-X–2037–15 3901 ±31 BP

δ¹³C: -21.3‰
δ¹⁵N (diet): +9.5‰
C/N ratio: 3.3

Sample: ABSRC 00 3036, submitted on 17 October 2001 by T Allen

Material: human bone (125g) (femur) (P Hacking 2001)

Initial comment: as NZA-15865

Objectives: as NZA-15865

Calibrated date: *1σ:* 2470–2310 cal BC
2σ: 2480–2280 cal BC

Final comment: see NZA-15865

Laboratory comment: see NZA-15865

OxA-X–2037–18 2279 ±28 BP

δ¹³C: -19.6‰
δ¹⁵N (diet): +11.5‰
C/N ratio: 3.3

Sample: ABSRC00 2243, submitted on 17 October 2001 by T Allen

Material: human bone (317g) (femur) (P Hacking 2001)

Initial comment: as GrA-22754

Objectives: as GrA-22754

Calibrated date: *1σ:* 400–360 cal BC
2σ: 400–230 cal BC

Final comment: see GrA-22754

Laboratory comment: see GrA-22754

OxA-X–2037–17 2357 ±26 BP

δ¹³C: -19.6‰
δ¹⁵N (diet): +11.4‰
C/N ratio: 3.3

Sample: ABSRC 00 2199, submitted on 17 October 2001 by T Allen

Material: human bone (360g) (femur) (P Hacking 2001)

Initial comment: as GrA-22752

Objectives: as GrA-22752

Calibrated date: *1σ:* 410–390 cal BC
2σ: 430–390 cal BC

Final comment: see GrA-22752

Laboratory comment: see GrA-22752

OxA-X–2037–16 2281 ±38 BP

δ¹³C: -19.4‰
δ¹⁵N (diet): +10.1‰
C/N ratio: 3.3

Sample: ABSRC 00 2125, submitted on 17 October 2001 by T Allen

Material: human bone (37g) (femur) (P Hacking 2001)

Initial comment: as OxA-12101

Objectives: as OxA-12101

Calibrated date: *1σ:* 400–260 cal BC
2σ: 410–200 cal BC

Final comment: see OxA-12101

Laboratory comment: see OxA-12101

Anglo-Saxon graves and grave goods (female graves), Bedfordshire, Cambridgeshire, Gloucestershire, Kent, North Yorkshire, Oxfordshire, Suffolk, and Sussex

Location: *see* individual sites

Project manager: J Hines and F G McCormac (Cardiff University and Queen's University, Belfast), 1998–2013

Description: typological analysis, seriation by correspondence analysis, high-precision radiocarbon dating, and Bayesian chronological modelling of the corpus of furnished Anglo-Saxon female graves covering the later part of the early Anglo-Saxon period in England. The final seriation included 300 individual grave-assemblages and 81 different artefact-types. Fifty-two radiocarbon dated graves could be included in the chronological models of this seriation.

Objectives: to provide a relative and absolute chronology for furnished female graves of the later part of the early Anglo-Saxon period in England.

Final comment: A Bayliss (27 September 2013), a relative chronology for the female graves was successfully obtained through correspondence analysis (Bayliss *et al* 2013, fig 7.62). This series was partitioned on the basis of leading artefact-types (Bayliss *et al* 2013, e-fig 7.3) and on the basis of the two-dimensional map of the correspondence analysis, producing the same phases (Bayliss *et al* 2013, fig 7.62a). A chronological model combining these identical partitions with the associated radiocarbon dates is presented by Bayliss *et al* 2013, fig 7.65). All analyses for this project have been undertaken using the project specific calibration data of McCormac *et al* (2004; 2008). Full details of the analysis of the female graves is provided by Bayliss *et al* (2013, chapter 7).

Laboratory comment: English Heritage (27 September 2013), the entries below list the radiocarbon dates from female graves that were commissioned as part of this project. Relevant radiocarbon dates from other graves were also incorporated in the statistical analyses. These are BloodH12 (UB-4914, 1397 ±18 BP) and BloodH22 (UB-4910, 1365 ±15 BP) (Lucy *et al* 2009, 322–9) ; But1674 (UB-4042, 1407 ±20 BP) and But4275 (UB-4077, 1476 ±24 BP) (Scull 2009, 261–7); BuD391a (UB-4959, 1420 ±20 BP) and BuD391B (UB-4960, 1611 ±181 BP) (Parfitt and Anderson 2012, 360–6); Ber008 (OxA-18188, 1635 ±26 BP); Ber035 (OxA-18189, 1583 ±25 BP), and Ber073 (OxA-18214, 1569 ±29 BP) (Hills and O'Connell 2009); and WHes176 (HAR-8242, 1510 ±40 BP) and WHes177 (HAR-8243, 1610 ±40 BP) (Haughton and Powlesland 1999, 308–12).

References: Bayliss *et al* 2013
Haughton and Powlesland 1999
Hills and O'Connell 2009
Lucy *et al* 2009
McCormac *et al* 2004
McCormac *et al* 2008
Parfitt and Anderson 2012
Scull 2009

Anglo-Saxon graves and grave goods (female graves): Appledown, Compton, West Sussex

Location: SU 79431509
Lat. 50.55.44 N; Long. 00.52.12 W

Project manager: A Down (Chichester Museum), 1982–7

Archival body: Chichester District Museum

Description: an Anglo-Saxon cemetery of the fifth to seventh centuries.

Objectives: to test and refine the artefact dating of furnished female burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (27 September 2013), three female graves have been dated from this site (ApD107, ApD117, and ApD134), all dating to the mid-sixth century. One replicate analysis failed.

Laboratory comment: English Heritage (31 July 2014): two further samples from this site were dated after 2002 (UB-4965 and UB-5208).

References: Bayliss *et al* 2013
Down and Welch 1990

UB–4835 1503 ±16 BP

$\delta^{13}C$: -20.5 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.6 ±0.3‰
$\delta^{15}N$ *(diet)*: +7.9 ±0.4‰
C/N ratio: 3.2 *%C:* 45.6 *%N:* 16.7

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
74.0	54.0	90.0	100.0	359.0	114.0	50.0

Sample: Grave 134, submitted on 23 August 2002 by C Scull

Material: human bone (406g) (femurs and right tibia) (S Mays 2002)

Initial comment: an inhumation of a moderately preserved adult female skeleton buried with bead-types BE1-DotReg, BE1-Koch20Ye, BE1-Koch20Wh, BE1-Dot34, BE-Koch34Wh, BE1-CylRound, and BE1-Koch34Bl.

Objectives: to test the chronological integrity and refine the date range of phase B2 in the preliminary seriation.

Calibrated date: *1σ:* cal AD 545–595
2σ: cal AD 540-605

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 545–575 (95% probability; UB-4835 (ApD134)*; Bayliss *et al* 2013, fig 7.65).

Anglo-Saxon graves and grave goods (female graves): Berinsfield, Oxfordshire

Location: SU 58059565
Lat. 51.39.21 N; Long. 01.09.39 W

Project manager: A Chamberlain (University of Sheffield), 1974–5

Archival body: Sheffield University and Oxfordshire Museums Service

Description: an Anglo-Saxon cemetery.

Objectives: to test and refine the artefact dating of furnished female burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (27 September 2013), two female graves were successfully dated as part of this project, both falling in the middle decades of the sixth century. Two further samples from graves Ber102 and Ber107 failed to produce sufficient collagen for dating. Three further female graves dated by accelerator mass spectrometry (AMS), Ber008, Ber035, and Ber073 were also included in the analysis.

References: Bayliss *et al* 2013
Boyle *et al* 1995

UB–4735 1567 ±19 BP

$\delta^{13}C$: -20.1 ±0.5‰
$\delta^{13}C$ *(diet)*: -19.9 ±0.3‰
$\delta^{15}N$ *(diet)*: +10.3 ±0.4‰
C/N ratio: 3.2 *%C:* 50.7 *%N:* 18.4

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
82.0	49.0	70.0	120.0	352.0	122.0	44.0

Sample: Grave 22, submitted on 26 October 2001 by C Scull

Material: human bone (300g) (scapulae, clavicles, humeri, left radius and ulna) (S Mays 2001)

Initial comment: an inhumation of a well-preserved young adult ?female skeleton buried with brooch-type BR2-a and bead-types BE1-Koch20Ye, BE1-CylPen, BE1-Dot34, BE1-Koch34-Wh, BE1-Koch34Bl, and BE1CylRound.

Objectives: to determine whether graves assigned to phase B2 in the preliminary seriation form a distinct chronological series from phases B1 and C.

Calibrated date: *1σ:* cal AD 430–545
2σ: cal AD 425–550

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 525–565 (95% probability; UB-4735 (Ber022)*; Bayliss *et al* 2013, fig 7.65).

UB–4739 1561 ±21 BP

$\delta^{13}C$: -20.5 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.3 ±0.3‰
$\delta^{15}N$ *(diet)*: +8.8 ±0.4‰
C/N ratio: 3.2 *%C:* 39.9 *%N:* 14.6

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
73.0	55.0	95.0	101.0	332.0	119.0	47.0

Sample: Grave 134/1, submitted on 26 October 2001 by C Scull

Material: human bone (350g) (femurs and tibiae) (S Mays 2001)

Initial comment: an inhumation of a moderately well-preserved skeleton of an elderly female buried with bead-types BE1-DotReg, BE1-KochWh, BE1-Koch34Bl, BE1-CylRound, and pin-type PI1-e.

Objectives: to establish whether graves assigned to phase B2 in the preliminary seriation form a distinct chronological horizon from phases B1 and C.

Calibrated date: *1σ:* cal AD 430–545
2σ: cal AD 425–565

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 530–570 (95% probability; UB-4739 (Ber134/1)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton has a slightly low Gly/Asp ratio (6.1), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

Anglo-Saxon graves and grave goods (female graves): Dunstable, Marina Drive, Bedfordshire

Location: TL 000213
Lat. 51.52.50 N; Long. 00.32.51 W

Project manager: C L Matthews (Manshead Archaeological Society), 1957

Archival body: Luton Museum

Description: an Anglo-Saxon cemetery.

Objectives: to test and refine the artefact dating of furnished female burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (27 September 2013), six female graves were dated from this site (MaDC7, MaDE1, MaDE2, MaDE3, MaDD10, and MaDF2), all of which dated to the third quarter of the seventh century AD.

References: Bayliss *et al* 2013
Matthews 1962

UB–4549 1328 ±19 BP

$\delta^{13}C$: -20.6 ±0.2‰
$\delta^{13}C$ *(diet)*: -20.4 ±0.3‰
$\delta^{15}N$ *(diet)*: +9.8 ±0.4‰
C/N ratio: 3.2 *%C:* 33.2 *%N:* 12.0

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
53.0	64.0	87.0	117.0	346.0	123.0	52.0

Sample: C7, submitted on 17 January 2000 by J Hines

Material: human bone (300g) (right femur and tibia) (S Mays 2000)

Initial comment: an inhumation of a well-preserved young adult female skeleton buried with pendant-types PE8 and PE2-b, bead-types BE1-Disc and BE1-WoundSp, and wire ring-types WR1-c and WR2.

Objectives: to test the dating and chronological integrity of graves assigned to phase C2 of the initial female seriation.

Calibrated date: *1σ:* cal AD 660–685
2σ: cal AD 655–765

Final comment: A Bayliss (27 September 2013), this grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 650–675 (95% probability; UB-4549 (MaDC7)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (27 September 2013), this skeleton has a slightly low Gly/Asp ratio (5.4), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4550 1379 ±19 BP

$\delta^{13}C$: -20.0 ±0.2‰
$\delta^{13}C$ *(diet)*: -19.9 ±0.3‰
$\delta^{15}N$ *(diet)*: +9.6 ±0.4‰
C/N ratio: 3.2 *%C:* 36.1 *%N:* 13.0

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
60.0	66.0	100.0	133.0	392.0	127.0	59.0

Sample: E1, submitted on 17 January 2000 by J Hines

Material: human bone (200g) (femurs, humeri, radii, ulnae) (S Mays 2000)

Initial comment: an inhumation of a juvenile skeleton from grave E1.

Objectives: to refine the dating of grave MaDE2 which was buried in the same grave cut as this individual.

Calibrated date: *1σ:* cal AD 645–665
2σ: cal AD 640–670

Final comment: A Bayliss (26 September 2013), this double grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 650-670 (95% probability; MaDE1 & E2*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton has a slightly low Gly/Asp ratio (5.9), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4551 1325 ±19 BP

$\delta^{13}C$: -20.3 ±0.2‰
$\delta^{13}C$ *(diet)*: -20.2 ±0.3‰
$\delta^{15}N$ *(diet)*: +10.4 ±0.4‰
C/N ratio: 3.2 *%C:* 54.8 *%N:* 20.2

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
56.0	68.0	92.0	118.0	339.0	122.0	55.0

Sample: E2, submitted on 17 January 2000 by J Hines

Material: human bone (340g) (right femur, tibiae, humeri) (S Mays 2000)

Initial comment: an inhumation of a moderately preserved teenage skeleton buried in a double grave with skeleton MaDE1. This skeleton was buried with a small, long brooch-type BR1-unclassified, bead-types BE1-Amethyst, BE1-WoundSp, accessory-type WBX, and wire ring-type WR2.

Objectives: to establish the dating of phase C1 of the initial female seriation and to determine whether this is chronologically distinct from phase C3.

Calibrated date: *1σ:* cal AD 660–685
2σ: cal AD 655–765

Final comment: A Bayliss (27 September 2013), the incidence of brooch-type BR1 in this grave is clearly an *object trouvé* and has been suppressed from the seriation. This double grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 650-670 (95% probability; MaDE1 & E2*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (27 September 2013), this skeleton has a low Gly/Asp ratio (5.0), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4552 1370 ±19 BP

$\delta^{13}C$: -20.5 ±0.2‰
$\delta^{13}C$ *(diet)*: -20.1 ±0.3‰
$\delta^{15}N$ *(diet)*: +9.1 ±0.4‰
C/N ratio: 3.3 *%C:* 45.2 *%N:* 16.1

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
53.0	59.0	90.0	113.0	348.0	121.0	51.0

Sample: E3, submitted on 17 January 2000 by J Hines

Material: human bone (260g) (left and right femurs, tibiae, humeri, ulnae, radius, fibulae, and right clavicle) (S Mays 2000)

Initial comment: an inhumation of a poorly preserved juvenile skeleton buried with pendant-types PE2-c and PE10-a, bead-types BE1-Cowrie, BE1-Amethyst, BE1-Wound Sp, and wire ring-type WR1-c.

Objectives: to establish the dating of phase C1 of the initial female seriation and to determine whether this is chronologically distinct from phase C3.

Calibrated date: *1σ:* cal AD 650–665
2σ: cal AD 640–670

Final comment: A Bayliss (27 September 2013), this grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 645–670 (95% probability; UB-4552 (MaDE3)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (27 September 2013), this skeleton has a slightly low Gly/Asp ratio (5.9), but the C:N ratio (3.3) suggests that protein preservation was adequate for accurate dating.

UB–4553 1326 ±21 BP

δ^{13}C: -20.8 ±0.2‰
δ^{13}C (diet): -20.3 ±0.3‰
δ^{15}N (diet): +11.1 ±0.4‰
C/N ratio: 3.2 *%C:* 30.3 *%N:* 11.0

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
56.0	53.0	83.0	124.0	354.0	119.0	51.0

Sample: D10, submitted on 17 January 2000 by J Hines

Material: human bone (270g) (right femur) (S Mays 2000)

Initial comment: an inhumation of a well-preserved young adult female skeleton buried with bead-types BE1-Cowrie, BE1-WoundSp, and BE1-Disc, wire ring-type WR1-c, and pendant-type PE8.

Objectives: to test the dating and chronological integrity of graves assigned to phase C2 in the initial female seriation.

Calibrated date: *1σ:* cal AD 650–665
2σ: cal AD 640–675

Final comment: A Bayliss (27 September 2013), this grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 650–675 (95% probability; UB-4553 (MaDD10)*; Bayliss *et al* 2013, fig 7.65).

UB–4554 1337 ±19 BP

δ^{13}C: -20.8 ±0.2‰
δ^{13}C (diet): -19.9 ±0.3‰
δ^{15}N (diet): +9.4 ±0.4‰
C/N ratio: 3.3 *%C:* 48.2 *%N:* 17.3

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
55.0	66.0	94.0	114.0	349.0	121.0	53.0

Sample: F2, submitted on 17 January 2000 by J Hines

Material: human bone (290g) (femurs, tibiae, fibulae, humeri, and skull fragments) (S Mays 2000)

Initial comment: an inhumation of a modertely preserved skeleton of a young child buried with bead-types BE1-Cowrie, BE1-WoundSp, and BE1-Disc, wire ring-types WR4 and WR1-c, and pendant-tpes PE8 and PE10-a.

Objectives: to test the dating and chronological integrity of graves assigned to phase C2 of the initial female seriation.

Calibrated date: *1σ:* cal AD 655-675
2σ: cal AD 650-690

Final comment: A Bayliss (27 September 2013), this grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 650–675 (95% probability; UB-4554 (MaDF2)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (27 September 2013), this skeleton has a low Gly/Asp ratio (5.3), but the C:N ratio (3.3) suggests that protein preservation was adequate for accurate dating.

Anglo-Saxon graves and grave goods (female graves): Edix Hill (Barrington A), Cambridgeshire

Location: TL 375495
Lat. 52.07.33 N; Long. 00.00.30 E

Project manager: T Malim (Cambridgeshire County Council Archaeological Field Unit), 1989–91

Archival body: Cambridgeshire County Council

Description: the remains of 149 individuals from 119 graves were recovered from a late-fifth- to early seventh-century Anglo-Saxon inhumation cemetery.

Objectives: to test and refine the artefact dating of furnished female burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (27 September 2013), four female graves have been dated from this site (EH079, EH083, EH091, and EH014), plus an unfurnnished male grave (EH090) which is stratigraphically related to one of them. Three of the female graves date to the mid-sixth century, the other to the mid-seventh century.

References: Malim and Hines 1998

UB–4511 1507 ±19 BP

δ^{13}C: -20.3 ±0.2‰
δ^{13}C (diet): -20.4 ±0.2‰
δ^{15}N (diet): +9.8 ±0.2‰
C/N ratio: 3.3 *%C:* 38.1 *%N:* 13.8

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
47.0	61.0	83.0	135.0	334.0	137.0	53.0

Sample: GR90, submitted on 15 October 1999 by J Hines

Material: human bone (200g) (left femur and ?left fibula) (S Mays 1999)

Initial comment: a crouched inhumation of a well-preserved skeleton of an elderly female. This grave was overlain by EH091 (UB-4512) which is included in the female seriation.

Objectives: to constrain the dating of EH091 on the basis of the relative stratigraphy of these graves.

Calibrated date: *1σ:* cal AD 540-595
2σ: cal AD 535-605

Final comment: A Bayliss (27 September 2013), this grave probably dates to the second half of the sixth century AD, and thus does not usefully constrain the date of EH091 which falls in the middle decades of the seventh century.

Laboratory comment: Rafter Radiocarbon Laboratory (27 September 2013), duplicate stable isotope analyses were run for carbon and nitrogen, in both cases the measurements are statistically consistent and weighted means are provided here (*see* Beavan *et al* 2011; tables 1–2 for full details). This skeleton has a slightly low Gly/Ala and Gly/Asp ratios (2.4 and 5.5 respectively), but the C:N ratio (3.3) suggests that protein preservation was adequate for accurate dating.

References: Beavan *et al* 2011

UB–4512 1345 ±18 BP

δ^{13}*C:* -20.5 ±0.2‰
δ^{13}*C (diet):* -20.2 ±0.3‰
δ^{15}*N (diet):* +10.7 ±0.4‰
C/N ratio: 3.3 *%C:* 51.6 *%N:* 18.4

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
47.0	60.0	83.0	134.0	341.0	136.0	53.0

Sample: GR91, submitted on 15 October 1999 by J Hines

Material: human bone (200g) (right tibia and fibulae) (S Mays 1999)

Initial comment: an inhumation of a moderately preserved young adult skeleton of indeterminate sex buried with bead-types BE1-WoundSp, and BE1-Dghnt, wire ring-type WR1-c, and pendant-type PE1.

Objectives: to establish the date range of graves assigned to phase C3 in the initial female seriation being constrained by the stratigraphical relationship with EH090. This burial is an example of the 'latest' group of female graves and will contribute to the definition of the end of the 'Final Phase'.

Calibrated date: *1σ:* cal AD 655–675
2σ: cal AD 650-685

Final comment: A Bayliss (27 September 2013), this grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 650–670 (95% probability; UB-4512 (EH091)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (27 September 2013), this skeleton has slightly low Gly/Ala and Gly/Asp ratios (2.5 and 5.7 respectively), but the C:N ratio (3.3) suggests that protein preservation was adequate for accurate dating.

References: Bayliss *et al* 2013

UB–4707 1528 ±21 BP

δ^{13}*C:* -20.6 ±0.5‰
δ^{13}*C (diet):* -20.3 ±0.3‰
δ^{15}*N (diet):* +8.8 ±0.4‰
C/N ratio: 3.2 *%C:* 28.2 *%N:* 10.2

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
82.0	50.0	81.0	116.0	313.0	122.0	54.0

Sample: GR79; SK428, submitted on 12 September 2001 by J Hines

Material: human bone (250+g) (right femur and left tibia) (S Mays 2001)

Initial comment: inhumation of a moderately well-preserved adult female skeleton buried with bead-type BE1-Reticella and brooch-type BR2-a.

Objectives: to establish the calendar dates for the beginning of phases B1 and B2 in the preliminary seriation, to determine whether phase B2 is later than phase B1, and to establish whether phases B1–B2 are genuinely earlier than phases
C1–C3 in the preliminary seriation.

Calibrated date: *1σ:* cal AD 535–570
2σ: cal AD 435–600

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 535–570 (95% probability; UB-4707 (EH079)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton had a slightly low Gly/Ala ratio (2.6), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

References: Bayliss *et al* 2013

UB–4708 1488 ±21 BP

δ^{13}*C:* -20.4 ±0.5‰
δ^{13}*C (diet):* -20.2 ±0.3‰
δ^{15}*N (diet):* +10.9 ±0.4‰
C/N ratio: 3.2 *%C:* 38.8 *%N:* 14.3

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
79.0	58.0	83.0	124.0	314.0	110.0	52.0

Sample: GR83; SK436, submitted on 29 September 2001 by J Hines

Material: human bone (250+g) (left femur) (S Mays 2001)

Initial comment: a inhumation of a well-preserved skeleton of a young adult female buried with bead-types BE1-Koch20Ye, BE1-Koch34Ye, BE1-Koch34Bl, and BE1-CylRound and brooch type BR3-c.

Objectives: to establish the calendar dates for the beginning of phases B1 and B2 in the preliminary seriation, to determine whether phase B2 is later than phase B1, and to establish whether phases B1–B2 are genuinely earlier than phases C1–C3 in the preliminary seriation.

Calibrated date: *1σ:* cal AD 555–605
2σ: cal AD 540–635

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 545–575 (95% probability; UB-4708 (EH083)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton has a low Gly/Asp ratio (5.4), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

References: Bayliss *et al* 2013

UB–4709 1495 ±21 BP

δ^{13}*C:* -20.7 ±0.5‰
δ^{13}*C (diet):* -20.4 ±0.3‰
δ^{15}*N (diet):* +10.4 ±0.4‰
C/N ratio: 3.3 *%C:* 34.9 *%N:* 12.5

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
82.0	51.0	83.0	142.0	322.0	95.0	51.0

Sample: GR14; SK29, submitted on 12 September 2001 by J Hines

Material: human bone (250g) (humeri, radii and ulnae, scapula and clavicles) (S Mays 2001)

Initial comment: inhumation of a moderately preserved skeleton of an elderly female accompanied by bead-types BE1-Koch58 and BE1-Dot34.

Objectives: to establish the calendar dates for the beginning of phases B1 and B2 in the preliminary seriation, to determine whether phase B2 is later than phase B1, and to establish whether phases B1–B2 are genuinely earlier than phases C1–C3 in the preliminary seriation.

Calibrated date: *1σ:* cal AD 550–605
2σ: cal AD 540–620

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 545–575 (95% probability; UB-4709 (EH014)*; Bayliss *et al* 2013, fig 7.65).

References: Bayliss *et al* 2013

Anglo-Saxon graves and grave goods (female graves): Lechlade, Butler's Field, Gloucestershire

Location: SU 213995
Lat. 51.41.35 N; Long. 01.41.31 W

Project manager: D Miles and S Palmer (Oxford Archaeological Unit), 1985

Archival body: Corinium Museum

Description: an Anglo-Saxon cemetery.

Objectives: to test and refine the artefact dating of furnished female burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (27 September 2013), seven female graves were dated from this site (Lec014, Lec138, Lec148, Lec179, Lec172/2, Lec187, and Lec018), one of which dated to the mid-sixth century, the rest of which dated to the mid-seventh century. One further sample Lec136 failed.

Laboratory comment: English Heritage (31 July 2014): one further sample was dated after 2002 (UB-4984).

References: Bayliss *et al* 2013
Boyle *et al* 1998
Boyle *et al* 2011

UB–4501 1321 ±21 BP

$\delta^{13}C$: -20.0 ±0.2‰
$\delta^{13}C$ *(diet)*: -19.9 ±0.3‰
$\delta^{15}N$ *(diet)*: +10.1 ±0.4‰
C/N ratio: 3.2 *%C:* 40.4 *%N:* 14.8

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
65.0	47.0	88.0	139.0	310.0	123.0	54.0

Sample: GR14, submitted on 18 October 1999 by J Hines

Material: human bone (330g) (left femur and tibia, and distal part of right femur) (S Mays 1999)

Initial comment: an inhumation of a moderately preserved teenage ?female skeleton buried with bead-types BE1-Dghnt and BE1-WoundSp, wire ring-types WR4 and WR1-c, accessory-types wooden box and WBX, and pendant-type PE10-a, and pin-type PI2-a.

Objectives: to test the dating and chronological integrity of graves assigned to phase C2 in the initial female seriation.

Calibrated date: *1σ:* cal AD 660–690
2σ: cal AD 655–770

Final comment: A Bayliss (27 September 2013), this grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 650–675 (95% probability; UB-4501 (Lec014)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (27 September 2013), this skeleton has a slightly low Gly/Ala ratio (2.5), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4502 1391 ±18 BP

$\delta^{13}C$: -20.4 ±0.2‰
$\delta^{13}C$ *(diet)*: -20.1 ±0.3‰
$\delta^{15}N$ *(diet)*: +8.9 ±0.4‰
C/N ratio: 3.2 *%C:* 43.6 *%N:* 15.9

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
64.0	55.0	91.0	133.0	308.0	121.0	53.0

Sample: GR138, submitted on 18 October 1999 by J Hines

Material: human bone (380g) (right femur and tibia) (S Mays 1999)

Initial comment: inhumation of a moderately preserved skeleton of a young adult female buried with bead-types BE1-WoundSp, BE1-Dghnt, wire ring-type WR1-c, pendant-type PE10-a, and pin-type PI2-a.

Objectives: to test the dating and chronological integrity of graves assigned to phase C2 in the initial female seriation.

Calibrated date: *1σ:* cal AD 645–660
2σ: cal AD 635–665

Final comment: A Bayliss (27 September 2013), this grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 635–665 (95% probability; UB-4502 (Lac138)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (27 September 2013), this skeleton has a slightly low Gly/Ala and Gly/Asp ratios (2.5 and 5.6 respectively), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4503 1319 ±18 BP

$\delta^{13}C$: -19.3 ±0.2‰
$\delta^{13}C$ *(diet)*: -20.1 ±0.3‰
$\delta^{15}N$ *(diet)*: +10.9 ±0.4‰
C/N ratio: 3.2 *%C:* 42.0 *%N:* 15.2

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
66.0	47.0	88.0	136.0	309.0	123.0	55.0

Sample: GR148, submitted on 18 October 1999 by J Hines

Material: human bone (240g) (skull fragments and arm bones) (S Mays 1999)

Initial comment: an inhumation of a moderately preserved child skeleton buried with accessory-type Bucket, Fe frame, bead-types BE1-Cowrie, BE1-Wound Sp, and BE1-Dghnt, and pendant-type PE9-f.

Objectives: to establish the dating of phase C1 of the initial female seriation and to determine whether this is chronologically distinct from phase C3.

Calibrated date: *1σ:* cal AD 660–685
2σ: cal AD 655–770

Final comment: A Bayliss (27 September 2013), this grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 650–675 (95% probability; UB-4503 (Lec148)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (27 September 2013), this skeleton has a low Gly/Ala ratio (2.5), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4504 1374 ±20 BP

δ¹³C: -20.3 ±0.2‰
δ¹³C (diet): -20.2 ±0.3‰
δ¹⁵N (diet): +11.4 ±0.4‰
C/N ratio: 3.2 *%C:* 43.9 *%N:* 16.1

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
90.0	48.0	71.0	114.0	347.0	118.0	46.0

Sample: GR179, submitted on 18 October 1999 by J Hines

Material: human bone (380g) (left femur and tibia) (S Mays 1999)

Initial comment: an inhumation of a moderately preserved skeleton of a middle-aged female buried with wire ring-types WR1-b and WR4 and pendant-type PE1, and a copper-alloy imitation of a VANIMUNDUS sceatt.

Objectives: to establish the date range of phase C3 in the initial female seriation. This burial is an example of the 'latest' group of female graves and this date will contribute to defining the end of the 'Final Phase'.

Calibrated date: *1σ:* cal AD 645–665
2σ: cal AD 640–670

Final comment: A Bayliss (27 September 2013), this grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 640–670 (95% probability; UB-4504 (Lec179)*; Bayliss *et al* 2013, fig 7.65). This date is slightly earlier than the conventional numismatic dating of the Vanimundus copy.

UB–4506 1352 ±19 BP

δ¹³C: -20.2 ±0.2‰
δ¹³C (diet): -20.0 ±0.3‰
δ¹⁵N (diet): +8.9 ±0.4‰
C/N ratio: 3.2 *%C:* 39.9 *%N:* 14.5

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
86.0	48.0	72.0	119.0	351.0	121.0	44.0

Sample: GR172/2, submitted on 18 October 1999 by J Hines

Material: human bone (210g) (long bones and cranial fragments) (S Mays 1999)

Initial comment: an inhumation of a moderately well-preserved skeleton of a middle-aged female buried with bead-types BE1-Dghnt, BE2-b, BE1-Amethyst, pendant-type PE9-b, and wire ring-types WR1-c and WR4. This grave was cut by Lec172/1 (UB-4505) which is included in the male seriation.

Objectives: to establish the date range of graves assigned to phase C3 in the initial female seriation being constrained by the stratigraphical relationship with Lec172/1. This burial is an example of the 'latest' group of female graves and will contribute to the definition of the end of the 'Final Phase'.

Calibrated date: *1σ:* cal AD 655–670
2σ: cal AD 645–680

Final comment: A Bayliss (27 September 2013), this grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 650–670 (95% probability; UB-4506 (Lec172/2)*; Bayliss *et al* 2013, fig 7.65). It appears to be a double burial with Lec172/1 rather than an earlier grave (*see* below; UB-4505).

UB–4507 1398 ±19 BP

δ¹³C: -20.2 ±0.2‰
δ¹³C (diet): -19.6 ±0.3‰
δ¹⁵N (diet): +9.4 ±0.4‰
C/N ratio: 3.1 *%C:* 44.0 *%N:* 16.4

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
81.0	47.0	69.0	117.0	347.0	122.0	45.0

Sample: GR187, submitted on 18 October 1999 by J Hines

Material: human bone (320g) (right tibia and femur) (S Mays 1999)

Initial comment: an inhumation of a moderately preserved skeleton of a middle-aged female buried with bead-type BE1-Dghnt, wire ring-types WR1-c and WR4, and pendant-type PE5.

Objectives: to establish the date range of phase C3 in the initial female seriation. This burial is an example of the 'latest' group of female graves and its dating will contribute to defining the end of the 'Final Phase'.

Calibrated date: *1σ:* cal AD 640–660
2σ: cal AD 610–665

Final comment: A Bayliss (27 September 2013), this grave falls into the last phase of the female seriation (AS-FE), and is dated to *cal AD 635–665 (95% probability; UB-4507 (Lec187)*; Bayliss *et al* 2013, fig 7.65).

Anglo-Saxon graves and grave goods (female graves): Melbourn Water Lane, Cambridgeshire

Location: TL 383439
Lat. 52.04.31 N; Long. 00.01.04 E

Project manager: H Duncan (Albion Archaeology), 2000

Archival body: Albion Archaeology

Description: an Anglo-Saxon cemetery.

Objectives: to test and refine the artefact dating of furnished female burials of the late sixth and seventh centuries AD.

Final comment: A Bayliss (27 September 2013), a series of three male graves (MelSG077 (UB-4886; UB-6345, 1516 ±23 BP), MelSG079 (UB-4884), and MelSG080 (UB-4882)) have been dated along with a fourth intercutting female grave (MelSG078; UB-4885). This sequence of graves spans the early and mid-seventh century AD. The radiocarbon dates are fully compatible with the stratigraphic sequence. Five further female graves were dated as part of the female seriation (MelSG095, MelSG082, MelSG085, MelSG069, and MelSG075). These span the period from the mid-sixth to the mid-seventh centuries AD.

References: Bayliss *et al* 2013
Duncan *et al* 2003

UB–4883 1416 ±20 BP

$\delta^{13}C$: -20.4 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.1 ±0.3‰
$\delta^{15}N$ *(diet)*: +10.3 ±0.4‰
C/N ratio: 3.2 *%C:* 35.8 *%N:* 13.0

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
76.0	49.0	89.0	118.0	328.0	130.0	52.0

Sample: SK 1038 SG 95, submitted on 20 December 2002 by C Scull

Material: human bone (300g) (left humerus, radius, and ulna, femora, tibia fragments, scapulae, clavicles, and pelvis fragments) (S Mays 2002)

Initial comment: an inhumation of a poorly preserved adult female skeleton buried with wire ring-type WR1-a and bead-type BE1-Orange. This grave cuts MelSG094 (undated).

Objectives: to test and refine the chronological integrity of phase C1 in the initial female seriation.

Calibrated date: *1σ:* cal AD 615–655
2σ: cal AD 600–660

Final comment: A Bayliss (27 September 2013), the incidence of WR1-a in this grave is anachronistically late and so has been suppressed from the seriation. This leaves this grave with only one bead-type included in the final seriation, BE1-Orange. This places this grave in phases AS-FC–E which is dated to *cal AD 595–660 (95% probability; UB-4883 (MelSG095)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (27 September 2013), this skeleton has a slightly low Gly/Ala ratio (2.5), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4885 1479 ±20 BP

$\delta^{13}C$: -20.3 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.3 ±0.2‰
$\delta^{15}N$ *(diet)*: +9.3 ±0.2‰
C/N ratio: 3.2 *%C:* 39.0 *%N:* 14.3

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
73.0	50.0	89.0	122.0	320.0	129.0	51.0

Sample: InL 1189 SG 78, submitted on 20 December 2002 by C Scull

Material: human bone (300g) (humeri, fibulae, left tibia) (S Mays 2002)

Initial comment: an inhumation of a well-preserved adult female skeleton buried with pendant-type PE2-d and pin-type PI1-e.

Objectives: to test and refine the chronology of graves later than phase B2 in the preliminary seriation and to constrain the dates for graves MelSG77 and MelSG79, thus refining the dating of the male sequence in the early seventh century.

Calibrated date: *1σ:* cal AD 565–610
2σ: cal AD 545–640

Final comment: A Bayliss (26 September 2013), this grave can only be assigned to phases AS-FB to AS-FE, ie to within the period covered by the female seriation, on the basis of pin-type PI1-e. It is dated to *cal AD 565–635 (95% probability; UB-4885 (MelSG078)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton has a slightly low Gly/Ala ratio (2.5), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating. Duplicate stable isotope analyses were run for carbon and nitrogen, in both cases the measurements are statistically consistent and weighted means are provided here (*see* Beavan *et al* 2011; tables 1–2 for full details).

References: Beavan *et al* 2011

UB–4887 1421 ±20 BP

$\delta^{13}C$: -20.6 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.3 ±0.3‰
$\delta^{15}N$ *(diet)*: +9.3 ±0.4‰
C/N ratio: 3.2 *%C:* 34.8 *%N:* 12.7

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
74.0	43.0	87.0	120.0	332.0	130.0	51.0

Sample: SK 1229 SG 82, submitted on 20 December 2002 by C Scull

Material: human bone (311g) (left femur and right tibia) (S Mays 2002)

Initial comment: an inhumation of a well-preserved skeleton of a young adult female buried with brooch-type BR3-b, pin-type PI1-e, buckle-type BU7, bead-type BE1-Cowrie, accessory-type T-Key, and pendant-type PE9-a.

Objectives: to test and refine the chronological integrity of phase C2 in the initial female seriation.

Calibrated date: *1σ:* cal AD 610–650
2σ: cal AD 600–660

Final comment: A Bayliss (27 September 2013), this grave falls into the penultimate phase of the female seriation (AS-FD), and is dated to *cal AD 605–650 (95% probability; UB-4887 (MelSG082)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (27 September 2013), this skeleton has a slightly low Gly/Ala ratio (2.5), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4888 1536 ±19 BP

$\delta^{13}C$: -20.6 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.3 ±0.3‰
$\delta^{15}N$ *(diet)*: +9.1 ±0.4‰
C/N ratio: 3.3 *%C:* 38.5 *%N:* 13.5

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
72.0	52.0	86.0	112.0	326.0	128.0	52.0

Sample: SK 1271 SG 89, submitted on 20 December 2002 by C Scull

Material: human bone (300g) (right radius, humerus, ulna, and skull fragments) (S Mays 2002)

Initial comment: an inhumation of a moderately well-preserved adult female skeleton buried with bead-types BE1-Koch34Ye, BE1-Koch34Wh, BE1-Koch34Bl, BE1-CylRound, BE2-c, BE1-Orange, pendant-type PE2-b, and wire ring-type WR4.

Objectives: to refine the dating of phase B3 in the interim female seriation.

Calibrated date: *1σ:* cal AD 535–560
2σ: cal AD 430–580

Final comment: A Bayliss (26 September 2013), this grave falls into the second phase of the female seriation (AS-FC), and is dated to *cal AD 555–600 (95% probability; UB-4888 (MelSG089)*; Bayliss *et al* 2013, fig 7.65). It contains an exceptionally early incidence of wire ring-type WR4.

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton has a low Gly/Ala ratio (2.5), but the C:N ratio (3.3) suggests that protein preservation was adequate for accurate dating.

UB–4889 1459 ±19 BP

δ^13^C: -20.4 ±0.5‰
δ^13^C (diet): -20.2 ±0.3‰
δ^15^N (diet): +9.4 ±0.4‰
C/N ratio: 3.3 *%C:* 34.6 *%N:* 12.4

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
75.0	53.0	87.0	121.0	336.0	129.0	50.0

Sample: SK 1293 SG 69, submitted on 20 December 2002 by C Scull

Material: human bone (350g) (femurs and left tibia) (S Mays 2002)

Initial comment: an inhumation of a poorly preserved adult skeleton of indeterminate sex, buried with bead-types BE1-Orange, BE1-WhSpiral, and BE1-Cowrie.

Objectives: to test and refine the chronological integrity of phase C1 in the preliminary female seriation.

Calibrated date: *1σ:* cal AD 590–635
2σ: cal AD 560–650

Final comment: A Bayliss (27 September 2013), this grave falls into the penultimate phase of the female seriation (AS-FD), and is dated to *cal AD 595–650 (95% probability; UB-4889 (MelSG069)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (27 September 2013), this skeleton has a slightly low Gly/Ala ratio (2.6), but the C:N ratio (3.3) suggests that protein preservation was adequate for accurate dating.

UB–4890 1548 ±20 BP

δ^13^C: -20.6 ±0.5‰
δ^13^C (diet): -20.3 ±0.3‰
δ^15^N (diet): +9.6 ±0.4‰
C/N ratio: 3.3 *%C:* 36.2 *%N:* 12.8

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
73.0	55.0	94.0	117.0	325.0	129.0	50.0

Sample: SK 1307 SG 75, submitted on 20 December 2002 by C Scull

Material: human bone (330g) (femurs and tibiae) (S Mays 2002)

Initial comment: an inhumation of a poorly preserved skeleton of an elderly female buried with buckle-type BU2-h, brooch-types BR2-a and BR1-d, and bead-types BE1-MelonBl, BE1-Koch20Ye, BE1-CylPen, BE1-Koch20Wh, BE1-Dot34, BE1-Koch34Ye, BE1-Koch34Wh, BE1-CylRound, BE1-Koch34Bl, and BE1-SegGlob.

Objectives: to test and refine the chronological integrity of phase B2 in the preliminary female seriation, and to determine whether this grave is earlier than the sequence of graves MelSG77–80.

Calibrated date: *1σ:* cal AD 440–550
2σ: cal AD 430–570

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 530–570 (95% probability; UB-4890 (MelSG075)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton has slightly low Gly/Ala and Gly/Asp ratios (2.5 and 5.9 respectively), but the C:N ratio (3.3) suggests that protein preservation was adequate for accurate dating.

Anglo-Saxon graves and grave goods (female graves): Mill Hill, Kent

Location: TR 36315074
Lat. 51.12.22 N; Long. 01.22.57 E

Project manager: K Parfitt (Dover Archaeological Group), 1986–9

Archival body: Dover Museum

Description: an Anglo-Saxon cemetery.

Objectives: to test and refine the artefact dating of furnished female burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (27 September 2013), five female graves from this site have been dated from the female seriation (MH064, MH068, MH094, MH095, and MH105C), all dating to the middle decades of the sixth century.

References: Bayliss *et al* 2013
Parfitt and Brugmann 1997

UB–4728 1496 ±22 BP

δ^13^C: -19.8 ±0.5‰
δ^13^C (diet): -19.5 ±0.3‰
δ^15^N (diet): +9.4 ±0.4‰
C/N ratio: 3.1 *%C:* 45.6 *%N:* 17.0

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
76.0	69.0	90.0	112.0	310.0	110.0	53.0

Sample: Grave 64, submitted on 26 October 2001 by C Scull

Material: human bone (316g) (femurs, tibiae, and skull) (S Mays 2001)

Initial comment: an inhumation of a poorly preserved skeleton of an adult ?female skeleton buried with buckle-types BU2-d and BU2-h, brooch-type BR2-b2, and bead-types BE1-Reticella and BE1-MelonY-G.

Objectives: to test whether graves assigned to phase B1 in the preliminary seriation constitute a genuine chronological horizon, and whether this is distinct from phases B2/3 and C.

Calibrated date: *1σ:* cal AD 545–605
2σ: cal AD 535–620

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 540–575 (95% probability; UB-4728 (MH064)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton has a low Gly/Asp ratio (4.5), but the C:N ratio (3.1) suggests that protein preservation was adequate for accurate dating.

UB–4729 1503 ±22 BP

$\delta^{13}C$: -19.7 ±0.5‰
$\delta^{13}C$ (diet): -19.5 ±0.3‰
$\delta^{15}N$ (diet): +10.2 ±0.4‰
C/N ratio: 3.2 *%C:* 47.4 *%N:* 17.5

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
79.0	65.0	87.0	115.0	318.0	112.0	52.0

Sample: Grave 68, submitted on 26 October 2001 by C Scull

Material: human bone (223g) (femora, humeri, radii, ulnae and skull) (S Mays 2001)

Initial comment: an inhumation of a poorly preserved teenage skeleton buried with bead-types BE1-Reticella, BE1-CylPen, and BE1-CylRound.

Objectives: to establish whether graves assigned to phase B2 in the preliminary seriation form a distinct chronological series from phases B1 and C.

Calibrated date: *1σ:* cal AD 545–600
2σ: cal AD 535–610

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 540–575 (95% probability; UB-4729 (MH068)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton has a low Gly/Asp ratio (4.9), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4732 1561 ±20 BP

$\delta^{13}C$: -20.0 ±0.5‰
$\delta^{13}C$ (diet): -19.7 ±0.3‰
$\delta^{15}N$ (diet): +9.9 ±0.4‰
C/N ratio: 3.2 *%C:* 47.1 *%N:* 17.0

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
81.0	61.0	85.0	121.0	318.0	111.0	51.0

Sample: Grave 94, submitted on 26 October 2001 by C Scull

Material: human bone (300g) (left femur, tibia, and right femur) (S Mays 2001)

Initial comment: an inhumation of a poorly preserved skeleton of an elderly male buried with buckle-types BU2-d and BU2-h, bead-types BE1-Reticella, BE1-MelonY-G, BE1-Koch20Ye, BE1-CylPen, BE1-Dot34, and BE1-CylRound, pin-type PI1-e, and brooch-type BR2-b2. These types are diagnostic of the female seriation and so this burial is included in that analysis.

Objectives: to test whether graves assigned to phase B1 in the preliminary seriation constitute a genuine chronological horizon, and whether this is distinct from phases B2/3 and C.

Calibrated date: *1σ:* cal AD 430–545
2σ: cal AD 425–560

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 530–565 (95% probability; UB-4732 (MH094)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton has a slightly low Gly/Asp ratio (5.2), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4733 1606 ±20 BP

$\delta^{13}C$: -20.1 ±0.5‰
$\delta^{13}C$ (diet): -19.9 ±0.3‰
$\delta^{15}N$ (diet): +10.0 ±0.4‰
C/N ratio: 3.1 *%C:* 36.0 *%N:* 13.3

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
78.0	61.0	88.0	121.0	312.0	110.0	51.0

Sample: Grave 95, submitted on 26 October 2001 by C Scull

Material: human bone (400g) (right femur, right and left tibiae) (S Mays 2001)

Initial comment: an inhumation of a poorly preserved skeleton of an elderly female buried with bead-types BE1-MelonY-G, BE1-MelonBl, BE1-Koch20Ye, BE1-Koch34Wh, and BE1-CylRound, and brocch-type BR3-a.

Objectives: to test whether graves assigned to phase B1 in the preliminary seriation constitute a genuine chronological horizon, and whether this is distinct from phases B2/3 and C.

Calibrated date: *1σ:* cal AD 415–530
2σ: cal AD 405–540

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 520–550 (95% probability; UB-4733(MH095)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton has a low Gly/Asp ratio (5.1), but the C:N ratio (3.1) suggests that protein preservation was adequate for accurate dating.

UB–4734 1587 ±19 BP

$\delta^{13}C$: -20.5 ±0.5‰
$\delta^{13}C$ (diet): -20.3 ±0.3‰
$\delta^{15}N$ (diet): +9.6 ±0.4‰
C/N ratio: 3.2 *%C:* 60.7 *%N:* 22.1

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
81.0	63.0	86.0	121.0	314.0	112.0	52.0

Sample: Grave 105C, submitted on 26 October 2001 by C Scull

Material: human bone (350g) (right femur, tibia, and fibula) (S Mays 2001)

Initial comment: inhumation of a moderately well-preserved adult female skeleton buried with buckle-types BU2-d, BU2-h, and BU4-e, and brooch-types BR2-b1 and BR2-b2.

Objectives: to test whether graves assigned to phase B1 in the interim seriation constitute a genuine chronological phase and whether this is distinct from phases B2/3 and C.

Calibrated date: *1σ:* cal AD 425–540
2σ: cal AD 415–545

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 520–555 (95% probability; UB-4734 (MH105c)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton had a low Gly/Asp ratio (5.0), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

Anglo-Saxon graves and grave goods (female graves): West Heslerton, North Yorkshire

Location: SE 917765
Lat. 54.10.34 N; Long. 00.35.42 W

Project manager: D Powlesland (Landscape Research Centre), 1978–82

Archival body: Hull Museum

Description: an Anglian cemetery was discovered at Cooks Quarry, West Heslerton in 1977. Rescue excavations funded by English Heritage were undertaken ahead of mineral extraction between 1977 and 1984. The site included multi-period and multi-function features extending over *c* 7.5ha, including a small part of the Anglian cemetery. In 1980, the Heslerton Parish Project was established, to provide a research framework for these rescue excavations. Attention was focused towards the almost total excavation of the remainder of the cemetery, which was completed in 1987. The excavations identified the cemetery was in use between the late-fifth and early-seventh centuries, utilising a prehistoric ritual site as its focus. In the region of 300 Anglian burials were recorded, both inhumations and cremations.

Objectives: to test and refine the artefact dating of furnished female burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (27 September 2013), three female graves were dated as part of this project (WHes123, WHes113, and WHes118), and two more (WHes176 and WHes177) were included in the analysis from previous research. All the graves date to the mid-sixth century except for WHes118, which is mid-seventh century, although it was accompanied by an anachronistic suite of earlier artefact-types.

Laboratory comment: English Heritage (31 July 2014): one further sample was dated after 2002 (UB-6033).

References: Haughton and Powlesland 1999

UB–4705 1502 ±21 BP

δ^13^C: -20.6 ±0.5‰
δ^13^C (diet): -20.3 ±0.3‰
δ^15^N (diet): +8.9 ±0.4‰
C/N ratio: 3.2 *%C:* 27.2 *%N:* 9.9

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
83.0	51.0	80.0	133.0	308.0	109.0	52.0

Sample: 002BA 00606, submitted on 12 September 2001 by J Hines

Material: human bone (240g) (right femur and right tibia) (S Mays 2001)

Initial comment: inhumation of an elderly female skeleton buried with a copper alloy great-square headed brooch BR1-f and bead-type BE1-Koch20Wh.

Objectives: to establish a date for a female grave characteristic of the late migration period (phase B2 in the interim seriation), in this case specifically representing the area north of the Humber.

Calibrated date: *1σ:* cal AD 545–600
2σ: cal AD 535–610

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 540–575 (95% probability; UB-4705 (WHes123)*; Bayliss *et al* 2013, fig 7.65).

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton had a slightly low Gly/Asp ratios (6.0), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

References: Bayliss *et al* 2013

UB–4706 1395 ±20 BP

δ^13^C: -20.2 ±0.5‰
δ^13^C (diet): -19.9 ±0.3‰
δ^15^N (diet): +9.0 ±0.4‰
C/N ratio: 3.2 *%C:* 47.1 *%N:* 17.2

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
80.0	56.0	83.0	125.0	314.0	111.0	49.0

Sample: 002BA 00536, submitted on 12 December 2001 by J Hines

Material: human bone (260g) (right leg, feet, skull, left femur and tibia) (S Mays 2001)

Initial comment: an inhumation of a fragmentary sub-adult skeleton buried with bead-types BE1-Koch34Wh and BE1-Koch34Bl, and brooch-type BR3-c.

Objectives: to test whether relatively lightly furnished burials with one or two artefacts characteristic of late period B (Migration period) and others of period C (Final Phase) could define an extended transitional zone betwen periods B and C2 in the preliminary seriation.

Calibrated date: *1σ:* cal AD 640–660
2σ: cal AD 610–665

Final comment: A Bayliss (26 September 2013), this grave (Whes118) falls into the first phase of the female seriation (AS-FB), but the radiocarbon date is at least a century too late for the accompanying artefact-types. These appear to be anachronistically late ocurrences in a grave that does not contain any artefact-types diagnostic of the actual time of burial. Therefore this radiocarbon date has not been included in the chronological model for the female seriation.

Laboratory comment: Rafter Radiocarbon Laboratory (26 September 2013), this skeleton has a slightly low Gly/Asp ratio (5.7), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

Anglo-Saxon graves and grave goods (female graves): Westgarth Gardens, Suffolk

Location: TL 843634
Lat. 52.14.14 N; Long. 00.41.56 E

Project manager: S West (Suffolk County Council), 1972

Archival body: Moyses Hall Museum, Bury St Edmunds

Description: a late-fifth to early seventh-century Anglo-Saxon inhumation cemetery.

Objectives: to test and refine the artefact dating of furnished female burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (27 September 2013), one female grave has been dated from this site falling in the middle decades of the sixth century.

References: Bayliss *et al* 2013
West 1988

UB–4836 1560 ±20 BP

δ¹³C: -20.1 ±0.5‰
δ¹³C (diet): -19.8 ±0.4‰
δ¹⁵N (diet): +9.6 ±0.3‰
C/N ratio: 3.2 *%C:* 44.5 *%N:* 16.1

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
71.0	53.0	96.0	119.0	340.0	123.0	52.0

Sample: Grave 27; female B2, submitted on 23 August 2002 by C Scull

Material: human bone (140g) (femurs and unidentified long bone fragment) (S Mays 2002)

Initial comment: an inhumation of a poorly preserved adult skeleton buried with brooch-type BR1-d and bead-types BE1-Dot34, BE1-Koch34Wh, and BE1-Koch34Bl.

Objectives: to test the chronological integrity and refine the date range of phase B2 in the preliminary female seriation.

Calibrated date: *1σ:* cal AD 430–545
2σ: cal AD 425–565

Final comment: A Bayliss (26 September 2013), this grave falls into the first phase of the female seriation (AS-FB), and is dated to *cal AD 530–570 (95% probability; UB-4836 (WG27)*; Bayliss *et al* 2013, fig 7.65).

Anglo-Saxon graves and grave goods (male graves), Cambridgeshire, Gloucestershire, Kent, Oxfordshire, Suffolk and Surrey

Location: *see* individual sites

Project manager: J Hines and F G McCormac (Cardiff University and Queen's University, Belfast), 1998–2013

Description: typological analysis, seriation by correspondence analysis, high-precision radiocarbon dating, and Bayesian chronological modelling of the corpus of furnished Anglo-Saxon male graves covering the later part of the early Anglo-Saxon period in England. The final seriation included 272 individual grave-assemblages and 78 different artefact-types. Thirty-eight radiocarbon dated graves could be included in the chronological models of this seriation.

Objectives: to provide a relative and absolute chronology for furnished male graves of the later part of the early Anglo-Saxon period in England.

Final comment: A Bayliss (25 September 2013), a relative chronology for the male graves was successfully obtained through correspondence analysis (Bayliss *et al* 2013, fig 6.49). This series was partitioned in two alternative ways, on the basis of leading artefact-types (Bayliss *et al* 2013, e-fig 6.6) and on the basis of the two-dimensional map of grave-assemblages (Bayliss *et al* 2013, fig 6.49a). These alternative partitions are very similar. Chronological models combining these partitions with the associated radiocarbon dates are presented by Bayliss *et al* 2013 (figs 6.52–3). All analyses for this project have been undertaken using the project specific calibration data of McCormac *et al* (2004; 2008). Full details of the analysis of the male graves is provided by Bayliss *et al* (2013, chapter 6).

Laboratory comment: English Heritage (25 September 2013), the entries below list the radiocarbon dates from male graves that were commissioned as part of this project. Relevant radiocarbon dates from other graves were also incorporated in the statistical analyses. These are UB-4958 (BuD375) 1493 ±18 BP (Parfitt and Anderson 2012, 360–6); UB-4074 (But2297), 1419 ±23 BP; UB-4039 (But3971), 1441 ±20 BP (Scull 2009, 261–7); BM-640, 1427 ±45 BP (SutH01), and UB-4423, 1420 ±28 BP (SutH17) (Carver 2005, 54–5); UB-4880 (BOB91), 1318 ±18 BP (Cowie and Blackmore 2012, 307–12); UB-4642 (WHes72), 1487 ±19 BP, and HAR-8242 (WHes176) 1510 ±40 BP (Haughton and Powlesland 1999, 107–9; 308–9).

References: Bayliss *et al* 2013
Carver 2005
Cowie and Blackmore 2012
Haughton and Powlesland 1999
McCormac *et al* 2004
McCormac *et al* 2008
Parfitt and Anderson 2012
Scull 2009

Anglo-Saxon graves and grave goods (male graves): Berinsfield, Oxfordshire

Location: SU 58059565
Lat. 51.39.21 N; Long. 01.09.39 W

Project manager: A Chamberlain (University of Sheffield), 1974–5

Archival body: Sheffield University and Oxfordshire Museums Service

Description: an Anglo-Saxon cemetery.

Objectives: to test and refine the artefact dating of furnished male burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (25 September 2013), only one male skeleton was dated from this site (Ber28) which dated to the third quarter of the sixth century AD.

References: Bayliss *et al* 2013
Boyle *et al* 1995

UB–4736 1526 ±21 BP

$\delta^{13}C$*:* -20.2 ±0.5‰
$\delta^{13}C$ *(diet):* -20.0 ±0.3‰
$\delta^{15}N$ *(diet):* +9.5 ±0.4‰
C/N ratio: 3.3 *%C:* 31.4 *%N:* 11.2

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
85.0	49.0	71.0	117.0	346.0	122.0	45.0

Sample: Grave 28, submitted on 26 October 2001 by C Scull

Material: human bone (350g) (right femur and tibia) (S Mays 2001)

Initial comment: inhumation of a moderately well-preserved adult male skeleton accompanied by shield boss-type SB3-c, and spearhead-types SP2-a3 and SP3-a.

Objectives: as part of the initial analaysis to refine the dating of 'early' male graves and to test whether this series is chronologically distinct from 'late' male graves.

Calibrated date: *1σ:* cal AD 535–570
2σ: cal AD 435–600

Final comment: A Bayliss (24 September 2013), this grave falls in the second phase of the male seriation (AS-MC/AS-Mq), and is dated to *cal AD 550–580 (95% probability; UB-4736 (Ber028)*; Bayliss *et al* 2013, fig 6.52) in the partition based on leading artefact-types, and *cal AD 555–580 (95% probability; UB-4736 (Ber028)*; Bayliss *et al* 2013, fig 6.53) in the partition based on the two-dimensional map of grave-assemblages.

Anglo-Saxon graves and grave goods (male graves): Edix Hill (Barrington A), Cambridgeshire

Location: TL 375495
Lat. 52.07.33 N; Long. 00.00.30 E

Project manager: T Malim (Cambridgeshire County Council Archaeological Field Unit), 1989–91

Archival body: Cambridgeshire County Council

Description: the remains of 149 individuals from 119 graves were recovered from a late-fifth- to early seventh-century Anglo-Saxon inhumation cemetery.

Objectives: to test and refine the artefact dating of furnished male burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (25 September 2013), four male graves (EH007, EH012, EH033, and EH048) were included in the final male seriation spanning the period from the middle decades of the sixth century to the early decades of the seventh century AD.

Laboratory comment: English Heritage (31 July 2014): two further samples from this site were dated after 2002 (UB-4922 -3).

References: Bayliss *et al* 2013
Malim and Hines 1998

UB–4508 1488 ±19 BP

$\delta^{13}C$*:* -20.2 ±0.2‰
$\delta^{13}C$ *(diet):* -20.0 ±0.3‰
$\delta^{15}N$ *(diet):* +10.2 ±0.4‰
C/N ratio: 3.2 *%C:* 34.3 *%N:* 12.5

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
42.0	72.0	89.0	123.0	314.0	137.0	57.0

Sample: GR12, submitted on 15 October 1999 by J Hines

Material: human bone (450g) (left femur) (S Mays 1999)

Initial comment: inhumation of an extended, well-preserved, adult male skeleton accompanied by shield boss-type SB4-b1+2 and spearhead-type SP3-a.

Objectives: as part of the initial analysis, to date a 'later' grave in the male series.

Calibrated date: *1σ:* cal AD 560–605
2σ: cal AD 540–625

Final comment: A Bayliss (23 September 2013), this grave falls in the penultimate phase of the male seriation (AS-ME/AS-Mr), and is dated to *cal AD 585–630 (95% probability; UB-4508 (EH012);* Bayliss *et al* 2013, figs 6.52) in the partition based on leading artefact-types, and *cal AD 570–605 (95% probability; UB-4508 (EH012)*; Bayliss *et al* 2013, figs 6.53) in the partition based on the two-dimensional map of grave-assemblages.

Laboratory comment: Rafter Radiocarbon Laboratory (23 September 2013), this skeleton had low Gly/Ala and Gly/Asp ratios (2.3 and 4.4 respectively), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4509 1521 ±18 BP

$\delta^{13}C$*:* -20.1 ±0.2‰
$\delta^{13}C$ *(diet):* -20.2 ±0.3‰
$\delta^{15}N$ *(diet):* +9.8 ±0.4‰
C/N ratio: 3.2 *%C:* 37.5 *%N:* 13.5

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
48.0	60.0	84.0	135.0	339.0	137.0	56.0

Sample: GR33, submitted on 15 October 1999 by J Hines

Material: human bone (290g) (right femur) (S Mays 1999)

Initial comment: inhumation of an extended skeleton of a young adult male in a possibly coffined grave, accompanied by shield boss-type SB3-a and spearhead-type SP2-a2b2.

Objectives: as part of the initial analysis to date an example of an 'earlier' grave in the male series.

Calibrated date: *1σ:* cal AD 540–670
2σ: cal AD 470–600

Final comment: A Bayliss (24 September 2013), this grave falls in the first phase of the male seriation (AS-MB/AS-Mp), and is dated to *cal AD 540–560 (95% probability; UB-4509 (EH033)*; Bayliss *et al* 2013, fig 6.52) in the partition based on leading artefact-types, and *cal AD 540–565 (95% probability; UB-4509 (EH033)*; Bayliss *et al* 2013, fig 6.53) in the partition based on the two-dimensional map of grave-assemblages.

Laboratory comment: Rafter Radiocarbon Laboratory (24 September 2013), this skeleton had slightly low Gly/Ala and Gly/Asp ratios (2.5 and 5.6 respectively), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4510 1479 ±19 BP

δ¹³C: -20.2 ±0.2‰
C/N ratio: 3.3

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
39.0	73.0	94.0	118.0	309.0	129.0	56.0

Sample: GR48, submitted on 15 October 1999 by J Hines

Material: human bone (390g) (right femur) (S Mays 1999)

Initial comment: inhumation of a well-preserved, adult male skeleton buried with shield boss-type SB4-b1+2 and spearhead-type SP1-a3.

Objectives: to provide an indication at an early stage of the analysis of the date of a 'later' grave in the male series.

Calibrated date: *1σ:* cal AD 565–610
2σ: cal AD 545–640

Final comment: A Bayliss (24 September 2013), this grave falls in the middle phase of the male seriation (AS-MD/AS-Mr), and is dated to *cal AD 570–605 (95% probability; UB-4510; EH048;* Bayliss *et al* 2013, figs 6.52–3).

Laboratory comment: English Heritage (24 September 2013), the two radiocarbon results on this skeleton are statistically consistent (UB-4922, 1508 ±19 BP; T′=1.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: Rafter Radiocarbon Laboratory (24 September 2013), the replicate amino acid analyses on this skeleton show greater variability than the ±5% quoted error for hydroxyproline and aspartic acid. Difficulties were reported with the first analysis and so the values reported for UB-4922 more probably reflect the protein content of the dated bone. The statistical consistency of the radiocarbon ages for this burial suggests that the protein preservation was adequate for accurate dating.

References: Ward and Wilson 1978

Anglo-Saxon graves and grave goods (male graves): Gally Hills, Banstead, Surrey

Location: TQ 250607
Lat. 51.19.51 N; Long. 00.12.22 W

Project manager: J Barfoot (Surrey Archaeological Society)
D Price-Williams (Nonsuch Antiquarian Society), 1972

Archival body: Bourne Hall Museum, Ewell

Description: an Anglo-Saxon barrow burial.

Objectives: to test and refine the artefact dating of furnished male burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (26 September 2013), the single skeleton (GaH) sampled for dating from this site has been treated in PVA. The repeat measurement (UB-4727) is probably the more accurate estimate of the radiocarbon age of the primary burial, although in the light of the contamination problems, the radiocarbon date of this individual must be interpreted with some caution.

References: Barfoot and Price-Williams 1976, 59–76

UB–4727 1487 ±16 BP

δ¹³C: -20.6 ±0.5‰
C/N ratio: 3.3

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
77.0	71.0	91.0	111.0	306.0	116.0	53.0

Sample: primary burial, submitted on 26 October 2001 by C Scull

Material: human bone (400g) (right femur) (S Mays 2001)

Initial comment: primary inhumation of an adult male skeleton of a moderately preserved adult male skeleton in a barrow acompanied by spearhead-type SP2-a1b1 and shield boss-type SB5-b+c.

Objectives: as part of the initial analysis, to refine the dating of 'late' male graves and to test whether these are chronologically distinct from 'early' male graves.

Calibrated date: *1σ:* cal AD 560–605
2σ: cal AD 545–620

Final comment: A Bayliss (24 September 2013), *see* UB-4920. This measurement is regarded as anomalously old due to chemical contamination.

Laboratory comment: English Heritage (24 September 2013), this skeleton appears to have been treated with some form of consolidant between its excavation in 1972 and the retrieval of the sample for dating in 2001. No conservation records or other information about the treatment was found in the site archive, although Fourier Transform Infra Red Spectroscopy (FTIRS) demonstrated the presence of Polyvinyl Acetate (PVA; McCormac *et al* 2011, fig 21). A replicate measurement subsequently undertaken (UB-4920;1419 ±18 BP) is statistically significantly younger than this measurement (T′=8.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). It seems probable therefore that this measurement is anomalously old because of the incomplete removal of PVA during the pretreatment process.

Laboratory comment: Rafter Radiocarbon Laboratory (24 September 2013), this skeleton had low Gly/Ala and Gly/Asp ratios (2.6 and 4.3 respectively), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

Laboratory comment: English Heritage (31 July 2014): one further sample from this site was dated after 2002 (UB-4920).

References: McCormac *et al* 2011
Ward and Wilson 1978

Anglo-Saxon graves and grave goods (male graves): Lechlade, Butler's Field, Gloucestershire

Location: SU 213995
Lat. 51.41.35 N; Long. 01.41.31 W

Project manager: D Miles and S Palmer (Oxford Archaeological Unit), 1985

Archival body: Corinium Museum

Description: an Anglo-Saxon cemetery.

Objectives: to test and refine the artefact dating of furnished male burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (25 September 2013), four male graves (Lec040, Lec115, Lec172/1, and Lec183) were dated from this site. Grave 183 dated to the end of the sixth century cal AD in the early part of the seriation, but the other three graves all dated to the third quarter of the seventh century AD and belonged to the last phase of the seriation.

Laboratory comment: English Heritage (31 July 2014): two further samples from this site were dated after 2002 (UB-4981-2).

References: Bayliss *et al* 2013
Boyle *et al* 1998
Boyle *et al* 2011
Siegmund 1998

UB–4505 1383 ±19 BP

$\delta^{13}C$: -20.2 ±0.2‰
$\delta^{13}C$ *(diet)*: -20.3 ±0.3‰
$\delta^{15}N$ *(diet)*: +9.2 ±0.4‰
C/N ratio: 3.2 *%C:* 44.1 *%N:* 16.2

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
81.0	50.0	70.0	114.0	346.0	121.0	45.0

Sample: GR172/1, submitted on 18 October 1999 by J Hines

Material: human bone (410g) (left femur) (S Mays 1999)

Initial comment: inhumation of a well-preserved adult male skeleton buried in a grave containing spearhead-type SP2-a1a2, seax-type SX3-a, and spearhead-type SP2-a1b1. This grave cut grave 172/2 which is included in the female seriation (*see* UB-4506).

Objectives: to test and refine the dating of male burials attributed to Siegmund (1998) phases 8–9, and to constrain the dating of grave 172/2.

Calibrated date: *1σ:* cal AD 645–660
2σ: cal AD 635–670

Final comment: A Bayliss (24 September 2103), the incidence of spearhead-type SP2-a1a2 appears to be anaomalously early and has been suppressed in the final correspondence analysis. This grave falls in the last phase of the male seriation (AS-MF/AS-Mt), and is dated to *cal AD 625–670 (95% probability; UB-4505 (Lec172/1)*; Bayliss *et al* 2013, fig 6.52) in the partition based on leading artefact-types, and *cal AD 630–670 (95% probability; UB-4505 (Lec172/1)*; Bayliss *et al* 2013, fig 6.53) in the partition based on the two-dimensional map of grave-assemblages. This appears to be a double burial with Lec172/2, rather than a later grave.

References: Siegmund 1998

UB–4683 1362 ±17 BP

$\delta^{13}C$: -20.1 ±0.2‰
$\delta^{13}C$ *(diet)*: -20.2 ±0.2‰
$\delta^{15}N$ *(diet)*: +10.8 ±0.2‰
C/N ratio: 3.2 *%C:* 42.2 *%N:* 15.6

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
76.0	49.0	89.0	99.0	355.0	118.0	50.0

Sample: GR40, submitted on 15 June 2001 by J Hines

Material: human bone (358g) (left femur) (S Mays 2001)

Initial comment: inhumation of a moderately well-preserved adult male skeleton buried in a grave containing spearhead-type SP2-a1a2, shield boss-type SB5-a, spearhead-type SP2-a1b1, and seax-type SX-3-b.

Objectives: at an early stage of the analysis to date an example of a 'later' burial containing shield boss-type SB5-a; and subsequently to determine whether this burial lies within the range of Siegmund (1998) phases 9–10.

Calibrated date: *1σ:* cal AD 650–665
2σ: cal AD 645–6751

Final comment: A Bayliss (24 September 2013), the incidence of spearhead-type SP2-a1a2 appears to be anomalously early and has been suppressed in the final correspondence analysis. This grave falls in the last phase of the male seriation (AS-MF/AS-Mt), and is dated to *cal AD 645–670 (95% probability; UB-4683 (Lec040)*; Bayliss *et al* 2013, fig 6.52–3).

Laboratory comment: Rafter Radiocarbon Laboratory (24 September 2013), duplicate stable isotope analyses were run for carbon and nitrogen, in both cases the measurements are statistically consistent and weighted means are provided here (*see* Beavan *et al* 2011; tables 1–2 for full details).

References: Beavan *et al* 2011
Siegmund 1998

Anglo-Saxon graves and grave goods (male graves): Melbourn Water Lane, Cambridgeshire

Location: TL 383439
Lat. 52.04.31 N; Long. 00.01.04 E

Project manager: H Duncan (Albion Archaeology), 2000

Archival body: Albion Archaeology

Description: an Anglo-Saxon cemetery.

Objectives: to test and refine the artefact dating of furnished male burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (26 September 2013), a series of three intercutting male graves (MelSG077, MelSG079, and MelSG080) have been dated along with a fourth intercutting female grave (MelSG078; UB-4885). This sequence of graves spans the early and mid-seventh century AD. The radiocarbon dates are fully compatible with the stratigraphic sequence.

Laboratory comment: English Heritage (31 July 2014): one further sample from this site was dated after 2003 (UB-6345).

References: Bayliss *et al* 2013
Duncan *et al* 2003

UB–4882 1378 ±20 BP

$\delta^{13}C$: -20.4 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.1 ±0.3‰
$\delta^{15}N$ *(diet)*: +9.3 ±0.4‰
C/N ratio: 3.3 *%C:* 40.0 *%N:* 14.3

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
81.0	43.0	90.0	122.0	314.0	128.0	49.0

Sample: SK 1187 SG 80, submitted on 20 December 2002 by C Scull

Material: human bone (750g) (left and right femurs) (S Mays 2002)

Initial comment: inhumation of a moderately preserved extended skeleton of an elderly male buried with buckle-type BU7. This grave is stratigraphically later than MelSG079 (UB-4884).

Objectives: to constrain the date of MelSG079 and to refine the dating of the 'seventh century' male sequence.

Calibrated date: *1σ:* cal AD 645–665
2σ: cal AD 640–670

Final comment: A Bayliss (25 September 2013), this grave is allocated to after the first phase of the male seriation (ie to AS-MC–F/AS-Mq–t), on the basis of BU7 which is diagnostic of those phases. It is dated to *cal AD 635–670 (95% probability; UB-4882 (MelSG080)*; Bayliss *et al* 2013, figs 6.52–3).

Laboratory comment: Rafter Radiocarbon Laboratory (25 September 2013), this skeleton had slightly low Gly/Ala ratio (2.4), but the C:N ratio (3.3) suggests that protein preservation was adequate for accurate dating.

UB–4884 1404 ±19 BP

$\delta^{13}C$: -20.6 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.3 ±0.2‰
$\delta^{15}N$ *(diet)*: +9.3 ±0.2‰
C/N ratio: 3.2 *%C:* 39.0 *%N:* 14.3

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
76.0	45.0	90.0	118.0	327.0	130.0	53.0

Sample: SK 1188 SG 79, submitted on 20 December 2002 by C Scull

Material: human bone (400g) (right femur) (S Mays 2002)

Initial comment: inhumation of a well-preserved extended skeleton of an elderly male buried with buckle-type BU7. This grave was stratigraphically later than MelSG78 and earlier than MelSG080.

Objectives: to constrain the date of MelSG078 (UB-4885) which appears in the female seriation, and to refine the dating of the 'early seventh century' male sequence.

Calibrated date: *1σ:* cal AD 640–655
2σ: cal AD 605–660

Final comment: A Bayliss (25 September 2013), this grave is allocated to after the first phase of the male seriation (ie to AS-MC–F/AS-Mq–t), on the basis of BU7 which is diagnostic of those phases. It is dated to *cal AD 610–660 (95% probability; UB-4884 (MelSG079)*; Bayliss *et al* 2013, figs 6.52–3).

Laboratory comment: Rafter Radiocarbon Laboratory (25 September 2013), duplicate stable isotope analyses were run for carbon and nitrogen, in both cases the measurements are statistically consistent and weighted means are provided here (*see* Beavan *et al* 2011; tables 1–2 for full details). This skeleton had a slightly low Gly/Ala (2.5) ratio, but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

References: Beavan *et al* 2011

UB–4886 1458 ±20 BP

$\delta^{13}C$: -20.3 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.0 ±0.3‰
$\delta^{15}N$ *(diet)*: +8.9 ±0.4‰
C/N ratio: 3.3 *%C:* 32.1 *%N:* 11.4

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
7.2	55.0	90.0	118.0	316.0	125.0	51.0

Sample: SK 1204 SG 77, submitted on 20 December 2002 by C Scull

Material: human bone (350g) (left and right humeri and right tibia) (A Grieve 2002)

Initial comment: inhumation of a well-preserved skeleton of a young adult male buried in a grave containing spearhead-type SP4 and buckle-type BU7. This grave lay at the bottom of a sequence of four intercutting graves and is stratigraphically earlier than grave SG078 (UB-4885).

Objectives: at an early stage of the analysis to refine the dating of the male sequence in an apparent gap in the early seventh century, and to constrain the date for grave SG078 which is stratigraphically later.

Calibrated date: *1σ:* cal AD 590–640
2σ: cal AD 560–650

Final comment: A Bayliss (24 September 2013), this grave falls in the penultimate phase of the male seriation (AS-ME/AS-Ms), and is dated to *cal AD 585–620 (95% probability; MelSG077*; Bayliss *et al* 2013, fig 6.52) in the partition based on leading artefact-types, and *cal AD 590–625 (95% probability; MelSG077*; Bayliss *et al* 2013, fig 6.53) in the partition based on the two-dimensional map of grave-assemblages.

Laboratory comment: English Heritage (24 September 2013), the two measurements on this skeleton (UB-4886 and UB-6345, 1516 ±23 BP) are statistically consistent (T′=3.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: Rafter Radiocarbon Laboratory (24 September 2013), the replicate amino acid analyses on this skeleton show greater variability than the ±5% quoted error for hydroxyproline and proline. Difficulties were reported with the first analysis and so the values reported for UB-6345 more probably reflect the protein content of the dated bone. The C:N ratio (3.3) suggests that protein preservation was adequate for accurate dating. Duplicate stable isotope analyses were run for carbon and nitrogen, in both cases the measurements are statistically consistent and weighted means are quoted here (for full details *see* Beavan *et al* 2011, tables 1–2).

References: Beavan *et al* 2011
Ward and Wilson 1978

Anglo-Saxon graves and grave goods (male graves): Mill Hill, Kent

Location: TR 36315074
Lat. 51.12.22 N; Long. 01.22.57 E

Project manager: K Parfitt (Dover Archaeological Group), 1986–9

Archival body: Dover Museum

Description: an Anglo-Saxon cemetery.

Objectives: to test and refine the artefact dating of furnished male burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (26 September 2013), four male graves were dated from Mill Hill (MH040, MH079, MH081, and MH093), all falling into the first or second phase of the seriation and dating to the mid-sixth century AD.

Laboratory comment: English Heritage (31 July 2014): two further samples from this site were dated after 2002 (UB-4921 and UB-6479).

References: Bayliss *et al* 2013
Parfitt and Brugmann 1997

UB–4730 1542 ±18 BP

$\delta^{13}C$*:* -19.4 ±0.5‰
$\delta^{13}C$ *(diet):* -19.1 ±0.3‰
$\delta^{15}N$ *(diet):* +10.1 ±0.4‰
C/N ratio: 3.2 *%C:* 31.0 *%N:* 11.4

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
80.0	61.0	86.0	117.0	320.0	112.0	53.0

Sample: Grave 79, submitted on 26 October 2001 by C Scull

Material: human bone (340g) (femora and tibiae) (S Mays 2001)

Initial comment: a poorly preserved adult skeleton of indeterminate sex recovered with seax-type SX1-b and spearhead-type SP2-b1a4.

Objectives: as part of the initial stage of analysis, to refine the dating of 'early' male graves and to test whether this series is chronologically distinct from 'late' male graves.

Calibrated date: *1σ:* cal AD 465–555
2σ: cal AD 430–575

Final comment: A Bayliss (23 September 2013), the incidence of spearhead-type SP2-b1a4 was suppressed in the final seriation because it appeared to be an anomalously old artefact when buried. On the basis of the occurrence of seax-type SX1-b, which is diagnostic of male grave phases AS-MC and AS-MD/AS-Mq and AS-Mr, this grave assemblage can be allocated to these phases in the final seriation. This grave can thus be dated to *cal AD 545–585 (95% probability; UB-4730 (MH079)*; Bayliss *et al* 2013, fig 6.52) in the partition based on leading artefact-types, or to *cal AD 550–590 (95% probability; UB-4730 (MH079)*; Bayliss *et al* 2013, fig. 6.53 in the partition based on the two-dimensional map of grave-assemblages.

Laboratory comment: Rafter Radiocarbon Laboratory (23 September 2013), this skeleton had a slightly low Gly/Asp ratio (5.2), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

UB–4731 1508 ±18 BP

$\delta^{13}C$*:* -20.1 ±0.5‰
$\delta^{13}C$ *(diet):* -19.8 ±0.3‰
$\delta^{15}N$ *(diet):* +10.1 ±0.4‰
C/N ratio: 3.2 *%C:* 44.1 *%N:* 16.2

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
81.0	62.0	88.0	120.0	318.0	106.0	53.0

Sample: Grave 93, submitted on 26 October 2001 by C Scull

Material: human bone (700g) (left and right femurs and tibiae) (S Mays 2001)

Initial comment: inhumation of an extended, poorly preserved, adult male skeleton in a richly furnished grave containing sword-type SW4, buckle-type BU3-g, spearhead-type SP2-a3, and shield boss-type SB4-b1+2.

Objectives: as part of the initial analysis, to refine the dating of 'early' male graves, and to test whether this series is chronologically distinct from 'later' male graves.

Calibrated date: *1σ:* cal AD 540–585
2σ: cal AD 535–605

Final comment: A Bayliss (23 September 2013), this grave falls in the second phase of the male seriation (AS-MC/AS-Mq), and is dated to *cal AD 550–585 (95% probability; UB-4731 (MH093)*; Bayliss *et al* 2013, figs 6.52) in the partition based on leading artefact-types, and *cal AD 555–585 (95% probability; UB-4731 (MH093)*; Bayliss *et al* 2013, figs 6.53) in the partition based on the two-dimensional map of grave-assemblages.

Laboratory comment: Rafter Radiocarbon Laboratory (23 September 2013), this skeleton had a slightly low Gly/Asp ratio (5.1), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

Anglo-Saxon graves and grave goods (male graves): St Peter's Tip, Kent

Location: TR 375693
Lat. 51.22.20 N; Long. 01.24.43 E

Project manager: A Hogarth (Chatham House School Archaeology Society), 1969–71

Archival body: British Museum

Description: an inhumation cemetery of the late-sixth and seventh centuries AD.

Objectives: to test and refine the artefact dating of furnished male burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (26 September 2013), ten male graves (SPTip008, SPTip042, SPTip068, SPTip113, SPTip194, SPTip196, SPTip212, SPTip250, SPTip263, and SPTip318) were selected for dating from this cemetery representing all but the first phase of the male seriation.

Laboratory comment: English Heritage (31 July 2014): nine further samples from this site were dated after 2003 (UB-4924 -6, -4928 -9, -4962, -6346, -6478, and -6534).

UB–4927 1471 ±18 BP

$\delta^{13}C$: -20.0 ±0.5‰
$\delta^{13}C$ *(diet)*: -19.8 ±0.2‰
$\delta^{15}N$ *(diet)*: +9.5 ±0.3‰
C/N ratio: 3.2 *%C:* 39.7 *%N:* 14.7

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
70.0	51.0	99.0	118.0	341.0	125.0	52.0

Sample: Grave 263, submitted in March 2003 by C Scull

Material: human bone (348g) (left femur) (S Mays 2003)

Initial comment: inhumation of a poorly preserved articulated adult male skeleton in a grave accompanied by seax-type SX5 and spearhead-type SP2-a1b2.

Objectives: to test and refine the dating of burials attributed to Siegmund (1998) phases 6–7 in the English sequence.

Calibrated date: *1σ:* cal AD 570-615
2σ: cal AD 555-645

Final comment: A Bayliss (23 September 2013), the incidence of SX1-a in this grave proved to be problematic in this seriation, and this artefact seems simply to have been a long knife. The grave-assemblage can consequently only be allocated to phases AS-MB-AS-ME, or AS-Mp-AS-Mr, on the basis of the occrrence of spearhead-type SP2-a1b2, which is diagnostic of those phases.This grave is dated to *cal AD 565–630 (95% probability; UB-4927 (SPTip263)*; Bayliss *et al* 2013, figs 6.52) in the partition based on leading artefact-types, and *cal AD 555–610 (95% probability; UB-4927 (SPTip263)*; Bayliss *et al* 2013, figs 6.53) in the partition based on the two-dimensional map of grave-assemblages.

Laboratory comment: Rafter Radiocarbon Laboratory (23 September 2013), this skeleton had a slightly low Gly/Ala ratio (2.7), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating. Duplicate stable isotope analyses were run for carbon and nitrogen, in both cases the measurements are statistically consistent and weighted means are provided here (*see* Beavan *et al* 2011; tables 1–2 for full details).

References: Bayliss *et al* 2013
Beavan *et al* 2011
Siegmund 1998

Anglo-Saxon graves and grave goods (male graves): Westgarth Gardens, Suffolk

Location: TL 843634
Lat. 52.14.14 N; Long. 00.41.56 E

Project manager: S West (Suffolk County Council), 1972

Archival body: Moyses Hall Museum, Bury St Edmunds

Description: a late-fifth to early seventh-century Anglo-Saxon inhumation cemetery.

Objectives: to test and refine the artefact dating of furnished male burials of the late-sixth and seventh centuries AD.

Final comment: A Bayliss (26 September 2013), two male graves have been dated from this site (WG11 and WG66), both dating to the mid sixth century.

Laboratory comment: English Heritage (31 July 2014): one further sample was dated from this site after 2002 (UB-4985).

References: Bayliss *et al* 2013
West 1988

UB–4682 1491 ±18 BP

$\delta^{13}C$: -20.2 ±0.2‰
$\delta^{13}C$ *(diet)*: -19.9 ±0.4‰
$\delta^{15}N$ *(diet)*: +9.9 ±0.3‰
C/N ratio: 3.2 *%C:* 41.1 *%N:* 15.2

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
73.0	51.0	99.0	118.0	342.0	125.0	53.0

Sample: Grave 66, submitted on 15 June 2001 by J Hines

Material: human bone (200+g) (femurs) (S Mays 2001)

Initial comment: inhumation of a poorly preserved adult male skeleton in a grave containing shield boss-type SB5-a which appears to be an imported example of the continental type Muysen (Stein 1967, 22–3; Siegmund 1998, 110) and sword-type SW4.

Objectives: as part of the initial analysis, to date an example of a 'later' grave containing a shield boss-type SB5-a.

Calibrated date: *1σ:* cal AD 555–605
2σ: cal AD 540–620

Final comment: A Bayliss (24 September 2013), following the unexpectedly early radiocarbon date for this grave, the incidence of shield boss-type SB5-a has been reinterpreted as a continental import and suppressed in the seriation. This grave has therefore been allocated to the first or second phases of the English male seriation (AS-MB or AS-MC/AS-Mp or As-Mq) on the basis of sword-type SW4 which is characteristic of those phases. This grave has therefore been dated to *cal AD 545–585 (95% probability; UB-4682 (WG66)*; Bayliss *et al* 2013, figs 6.52–3).

Laboratory comment: Rafter Radiocarbon Laboratory (24 September 2013), this skeleton had a slightly low Gly/Ala ratio (2.7), but the C:N ratio (3.2) suggests that protein preservation was adequate for accurate dating.

References: Siegmund 1998
Stein 1967

Antler Maceheads Project, Cumbria, Derbyshire, Greater London, Nottinghamshire and Yorkshire (East Riding)

Location: *see* individual sites

Project manager: *see* individual sites

Description: a number of antler maceheads were identified for dating throughout England. Antler maceheads comprise the lower sections of red deer antler beams, and are perforated for hafting. A total of 58 have been identified the majority of which (41) come from the Thames valley (Simpson 1996).

Objectives: first, to establish the temporal range of maceheads and the degree of contemporaneity between the Thames Valley and northern burial series; second, to establish the

Neolithic/Mesolithic credentials of the Thames Valley Maceheads; third, to establish the potential for lattice decorated maceheads as prototypes for the stone Maesmawr series; and fourth, to establish by means of AMS dating, the temporal horizon for the introduction of spiral decoration into Southern England as witnessed by the Garboldisham macehead.

Final comment: R Loveday (2007), the results demonstrate that both the middle Thames specimens, and those from northern Britain, date to the second half of the fourth millennium cal BC. This suggests a degree of contemporaneity between riverine activity in the south and 'prestige' burial in the north, although the possibility that this is a function of the radiocarbon calibration curve cannot be discounted. The possibility that lattice decorated maceheads can be regarded as prototypes for the Maesmore series of fine stone maceheads is considered, but the failure of two out of three decorated examples to produce radiocarbon determinations means that the debate cannot yet be settled (Loveday *et al* 2007, 381).

Laboratory comment: English Heritage (2007), samples from six antler maceheads were submitted for dating in 2002. Of these samples, one (Mortlake; Simpson no. 40) failed due to a poor collagen yield following pretreatment, while the remaining five produced results. However, following the identification of a problem with the ultrafiltration procedures undertaken as part of bone pretreatment at the Oxford Radiocarbon Accelerator Unit in October 2002 (Bronk Ramsey *et al* 2004b), the results could not be regarded as reliable and consequently all five were withdrawn.One of the maceheads from Windmill Lane (MoL 01154C) was subequently resampled, and four additional samples were submitted in 2004. These samples were processed according to the new pretreatment ultrafiltration stage outlined in Bronk Ramsey *et al* (2004b). In addition, collagen from the original extraction procedures undertaken on the samples from Duggleby Howe (Hull and East Riding Museum; Simpson 1996, no. 4), Attenborough (Nottingham University Museum; Simpson 1996, no. 1), and Windmill Lane (MoL 01154D; Simpson 1996, no. 45), was also subjected to the new ultrafiltration procedures and dated. Unfortunately, it was not possible to re-date the macehead from Liffs Low due to a lack of collagen surviving from the original sample pretreatment. Of the eight samples, six produced results, and two failed due to poor collagen yields (Burwell Fen; Cambridge University 241981; Simpson 1996, no. 55 and Hammersmith; MoL A13687; Simpson 1996, no. 32). A replicate sample from Burwell Fen was also submitted to the radiocarbon dating laboratory at the University of Groningen.

References: Bronk Ramsey *et al* 2004b
Loveday *et al* 2007
Simpson 1996

Antler Maceheads Project: northern burials, Yorkshire (East Riding)

Location: *see* individual results

Project manager: R Loveday (University of Leicester) and A Gibson (University of Bradford)

Archival body: Hull and East Riding Museum, Nottingham University Museum, and Sheffield City Museum

Description: crown antler maceheads from the northern burials.

Objectives: first, to establish the temporal range of maceheads and the degree of contemporaneity between the Thames Valley and northern burial series; second, to establish the Neolithic/Mesolithic credentials of the Thames Valley Maceheads; and third, to establish the potential for lattice decorated maceheads as prototypes for the stone Maesmawr series as represented by the Knowth specimen.

Final comment: R Loveday and A Gibson (2007), the macehead from Duggleby Howe shows a similar age to those from the middle Thames (ie the second half of the fourth millennium cal BC). It is unfortunate, however, that this was the only example from the northern burial series to have been dated, since the exceptional nature of that mound and its burials may have attracted curated items deemed to have had ancestral, ceremonial, or ritual significance.

It seems that the northern burial series and southern riverine deposits are broadly contemporary, however, the marked difference between the deployment of antler maceheads in northern and southern Britain remains unexplained, as does the sudden introduction and use of these elaborate artefacts (Loveday *et al* 2007, 386–90).

Laboratory comment: English Heritage (2007), it is unfortunate that most of the results fall across a plateau in the calibration curve from *c* 3300–2900 cal BC, as this could furnish a false impression of contemporaneity.

References: Loveday *et al* 2007

OxA–13208 4463 ±37 BP

$\delta^{13}C$: -21.7‰

Sample: 1, submitted in November 2000 by R Loveday and A Gibson

Material: antler: *Cervus elaphus*, lower part of beam. Undecorated macehead, polished on burr (>2g)

Initial comment: found unstratified in a gravel pit, in Attenborough, Nottinghamshire. The pit also contained Peterborough Ware, but the macehead was not found in direct association.

Objectives: to establish the temporal range of maceheads.

Calibrated date: *1σ:* 3330–3020 cal BC
2σ: 3350–3010 cal BC

Final comment: see series comments

OxA–13327 4597 ±35 BP

$\delta^{13}C$: -22.1‰

Sample: 4, submitted on 16 February 2001 by R Loveday and A Gibson

Material: antler: *Cervus elaphus*, lower part of beam. Polished macehead. (>2g)

Initial comment: a macehead found with an inhumation, Duggleby-type flint adze, and lozenge arrowhead, placed in the hollow left by the setting of the grave pit fill at Duggleby Howe, East Yorkshire. Burials 1, 2, 3, and 4 were located below in a shaft grave (number 1 was accompanied by a Towthorpe bowl). Burial 6 was with a polished rectangular knife, and 10, 11, and 12 were unaccompanied. Excavated by Mortimer in 1890, the burial lay 0.3m into the clay (?turf) fill of the hollow at the top of the grave shaft.

Objectives: to establish the temporal range of maceheads and the degree of contemporaneity between the Thames Valley and northern burial series maceheads.

Calibrated date: *1σ:* 3490–3350 cal BC
2σ: 3500–3130 cal BC

Final comment: see series comments

Antler Maceheads Project: Thames Valley, Greater London

Location: *see* individual results

Project manager: R Loveday (University of Leicester) and A Gibson (University of Bradford)

Archival body: Museum of London and Cambridge University

Description: a selection of crown antler maceheads from the Thames Valley and a comparative example from Burwell Fen, Cambridgeshire.

Objectives: first, to establish the Mesolithic/Neolithic credentials of the Thames Valley maceheads; second, to establish the temporal range of maceheads and the degree of contemporaneity between the Thames Valley and the northern burial series; and third, to establish the potential of the lattice decorated examples to be regarded as prototypes for the Maesmawr series as represented by the Knowth specimen.

Final comment: A Bayliss and P Marshall (2007), the four maceheads from the Thames Valley (OxA-13207, -13440, -14192 (4481 ±33 BP), and -14193 (4337 ±33 BP)) are all Neolithic in date and give calibrated date ranges that span the second half of the fourth millennium cal BC. The two maceheads from Windmill Lane (OxA-13207 and -13440) have produced statistically consistent results (T′=1.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and could therefore be of the same actual age.

Laboratory comment: English Heritage (24 June 2014), three further samples from this series were dated after 2003 (GrA-27417 and OxA-14192–3).

References: Loveday *et al* 2007
Simpson 1996
Ward and Wilson 1978

OxA–13207 4611 ±37 BP

δ*[13]C:* -21.9‰

Sample: 45/ 01154D, submitted on 16 February 2001 by R Loveday and A Gibson

Material: antler: *Cervus elaphus*, lower part of beam. Macehead with distinctive facetted head decoration (>2g)

Initial comment: found at a depth of *c* 4m at Windmill Lane, Brentford, together with 11 other antler maceheads (Simpson 1996, 297). The macehead is part of the Layton collection from *c* AD 1850–1900. It probably came from low ground bordering the edge of the left bank in alluvium of the River Brent in its last reach.

Objectives: to establish the potential for lattice-decorated antler maceheads to be regarded as a prototype for the Maesmawr-type stone maceheads. Also, to establish the contemporaneity between the Thames Valley and the Northern burial maceheads series.

Calibrated date: *1σ:* 3500–3350 cal BC
2σ: 3510–3340 cal BC

Final comment: R Loveday and A Gibson (2007), this example seems likely to pre-date the stone macehead from the eastern tomb at Knowth 1, particularly as the recovery of the latter at the entrance to a recess raises the possibility of later deposition. The fact that the macehead was broken, however, could also imply that this was an old, curated item (Loveday *et al* 2007, 386).

OxA–13440 4684 ±37 BP

δ*[13]C:* -22.2‰

Sample: 47/ 01154C, submitted on 16 February 2001 by R Loveday and A Gibson

Material: antler: *Cervus elaphus*, lower part of beam. Macehead with lattice decoration (>2g)

Initial comment: as OxA-13207

Objectives: as OxA-13207

Calibrated date: *1σ:* 3520–3370 cal BC
2σ: 3630–3360 cal BC

Final comment: see series comments

OxA–14192 4481 ±33 BP

δ*[13]C:* -22.6‰

Sample: BM 1910–10–7.2, submitted on 7 October 2004 by A Gibson

Material: antler (0.50g): *Cervus elaphus*, undecorated macehead (0.50g) (D D A Simpson 1996)

Initial comment: dredged from the Thames gravels at Teddington (at approximately TQ 1671).

Objectives: as OxA-13207

Calibrated date: *1σ:* 3340–3090 cal BC
2σ: 3350–3020 cal BC

Final comment: see series comments

OxA–14193 4337 ±33 BP

δ*[13]C:* -22.2 ±0.2‰

Sample: BM R138/1938, submitted on 7 October 2004 by A Gibson

Material: antler (0.50g): *Cervus elaphus*, undecorated macehead (0.50g) (D D A Simpson 1996)

Initial comment: dredged from the Thames at Mortlake (at approximately TQ 2076).

Objectives: as OxA-13207

Calibrated date: *1σ:* 3010–2900 cal BC
2σ: 3080–2890 cal BC

Final comment: see series comments

Argosy Washolme, Derbyshire

Location: SK 431291
Lat. 52.51.26 N; Long. 01.21.35 W

Project manager: D Garton (Trent and Peak Archaeological Unit), 1998–9

Archival body: Derby Museum

Description: an oak logboat found during monitoring of excavations for gravel quarrying. The site lies in the base of a channel, at the bottom of the Holocene floodplain deposits of the River Trent. Both ends of the boat were inadvertently broken during quarrying, when the entire stern was lost. The fragments formed approximately 3.3m of the length of the boat, and retained an integral cleat between the floor and the angle of the bow. The longest portion of the boat (approximately 7.2m long) lay on the left, or port, side and contained five large blocks of Bromsgrove Sandstone, as well as several smaller blocks of the same material. The thickest part of the bow was cored by J Hillam for tree-ring analysis, providing a sequence of some 220 rings. Unfortunately, these could not be matched to provide a date (I Tyers, pers comm.). Therefore, samples were submitted for radiocarbon dating.

In situ timbers also formed a platform or part of a causeway close to the boat, covered by brushwood. A similar structure of wood and sandstone blocks excavated nearby in 1997, was previously dated to the middle Bronze Age (Beta-118363; 3060 ±50 BP and Beta-115407; 3070 ±60 BP), which combined calibrates to 1430–1210 cal BC at 2σ (Reimer *et al* 2004). These two structures were on the same projected line and may have been part of the same structure. The radiocarbon samples in this series samples are stakes, mostly ash poles with sharpened ends, which were inserted through a brushwood 'mattress' filling the base of a scour in the river bed. On one side of the 'mattress' the stakes penetrate fully through it; on the other side, the 'mattress' has been eroded away and the stakes have fallen onto the river bed. The dated samples include a stake from each side and brushwood from the base of the sequence. The brushwood mattress, together with the overlying series of off-cuts of knotty crowns of trees (sampled by dendrochronology, but not dated), probably formed the foundation of a platform or causeway across the river.

Objectives: to date the logboat and the adjacent structure constructed within the river.

Final comment: D Garton (28 December 2012), prior to receipt of the radiocarbon determinations, it was only the large size of the oak trunk made into the logboat that suggested it might be of prehistoric date. No intrinsically datable artefacts were associated with structure recorded by C Salisbury in 1997 (initially interpreted as a medieval or later 'training weir'), nor with the 'mattress' recorded in 1998–9, so radiocarbon was the only way of dating, and potentially linking, these three separate artefact/structures located within the worked quarry.

Laboratory comment: English Heritage (2001), the four radiocarbon measurements on the brushwood and stakes (GU-5809–12) are not statistically significantly different (T′=5.3; T′(5%)=11.1; ν=5; Ward and Wilson 1978) from those derived from the structure recorded in 1997, so the two structures could easily be of similar age.

References: Garton *et al* 2001
Garton *et al* 2004
Reimer *et al* 2004
Ward and Wilson 1978

GU–5809 3140 ±50 BP

$\delta^{13}C$: -26.5‰

Sample: AQB BD1, submitted in March 2000 by D Garton

Material: wood: *Fraxinus* sp., roundwood; 13 rings (900g) (R Gale 2000)

Initial comment: a stake from the brushwood 'mattress' structure. *See* also GU-5810 for a further measurement.

Objectives: the logboat was recovered with coarse debris at the base of a former river channel. C R Salisbury (who has monitored the quarry) has suggested that this deep scour and debris accumulation may be the result of a scour against a structure, particularly in times of flood. The excavated structure lines up with, and may be related to, the causeway recorded by C R Salisbury. The outer growth rings of posts were dated to 3060 ±50 BP (Beta-118363) and 3070 ±60 BP (Beta-115407). Radiocarbon dates on the stakes and basal brushwood will assist the palaeoenvironmental assessments and determine any contemporaneity with the structure already dated.

Calibrated date: *1σ:* 1490–1320 cal BC
2σ: 1510–1280 cal BC

Final comment: D Garton (28 December 2012), the 'mattress' lay on the projected line of the structure recorded by C Salisbury in 1997. As these two sets of dates are not statistically different, this opens the possibility that they may have been parts of a single causeway, even though they were constructed differently - perhaps in response to different ground conditions and proximity to the active channel within the Trent floodplain.

Laboratory comment: English Heritage (9 August 2000), the four radiocarbon measurements on the brushwood and stakes (GU-5809–12) are not statistically different (T′=1.6; T′(5%)=7.8; ν=3; Ward and Wilson 1978), and so could be of a similar age. *See* also series laboratory comments.

References: Ward and Wilson 1978

GU–5810 3190 ±50 BP

$\delta^{13}C$: -26.3‰

Sample: AQB BEH, submitted in March 2000 by D Garton

Material: wood: *Fraxinus* sp., roundwood; 19 rings (>1000g) (R Gale 2000)

Initial comment: as GU-5809

Objectives: as GU-5809

Calibrated date: *1σ:* 1510–1410 cal BC
2σ: 1610–1320 cal BC

Final comment: see GU-5809

Laboratory comment: see GU-5809

GU–5811 3160 ±50 BP

$\delta^{13}C$: -24.7‰

Sample: AQB ES 50B, submitted in March 2000 by D Garton

Material: wood: *Prunus spinosa*, roundwood; 11 growth rings, bark *in situ* (74g) (R Gale 2000)

Initial comment: brushwood from the 'mattress'. *See* GU-5812 for a further measurement from the 'mattress'.

Objectives: as GU-5809

Calibrated date: *1σ:* 1500–1400 cal BC
2σ: 1530–1300 cal BC

Final comment: see GU-5809

Laboratory comment: see GU-5809

GU–5812 3000 ±150 BP

$\delta^{13}C$: -26.4‰

Sample: AQB ES 51A, submitted in March 2000 by D Garton

Material: wood: *Prunus spinosa*, roundwood, 9 growth rings, bark *in situ* (36g) (R Gale 2000)

Initial comment: as GU-5811

Objectives: as GU-5809

Calibrated date: *1σ:* 1430–1000 cal BC
2σ: 1620–830 cal BC

Final comment: see GU-5809

Laboratory comment: see GU-5809

OxA–9536 3117 ±35 BP

$\delta^{13}C$: -26.3‰

Sample: AQB-1, submitted in March 2000 by D Garton

Material: wood: *Quercus* sp., outer rings of tree-ring sequence, 152 rings including heartwood/sapwood boundary (>10g) (I Tyers 1999)

Initial comment: from the logboat which lay on its side and contained at least five large blocks of sandstone. It was recovered with coarse debris at the base of a former river channel. C Salisbury (who has monitored the quarry) has suggested that this deep scour and debris accumulation may be the result of a scour against a structure, particularly in times of flood. The foundation of a wooden structure was excavated nearby.

Objectives: five samples taken for dendrochronological assessment have shown that the heartwood/sapwood boundary is present, but the ring sequence did not match any master chronologies (work by Ian Tyers). Logboats are undatable typologically, though the large size of the log may suggest that it came from wild wood forest and is therefore likely to be prehistoric. The character of the working of the internal cleat has also suggested to some that it is prehistoric.

Calibrated date: *1σ:* 1430–1310 cal BC
2σ: 1450–1280 cal BC

Final comment: D Garton (28 December 2012), these dates provide a close *terminus post quem* for the logboat, suggesting that it could have been contemporary with the nearby 'mattress' of brushwood and logs, interpreted as part of a causeway across the Trent floodplain.

Laboratory comment: English Heritage (2000), the two measurements OxA-9536 and OxA-9537 are not statistically significantly different (T'=0.0; T'(5%)=3.8 ; ν=1; Ward and Wilson 1978) and the weighted mean is 3115 ±25 BP, which calibrates to 1440–1310 cal BC at 2σ (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–9537 3113 ±34 BP

$\delta^{13}C$: -26.5‰

Sample: AQB-2, submitted in March 2000 by D Garton

Material: wood: *Quercus* sp., outer rings of tree-ring sequence, 152 rings including heartwood/sapwood boundary (>10g) (I Tyers 1999)

Initial comment: as OxA-9536

Objectives: as OxA-9536

Calibrated date: *1σ:* 1430–1300 cal BC
2σ: 1450–1280 cal BC

Final comment: see OxA-9536

Laboratory comment: see OxA-9536

Aveline's Hole, Somerset

Location: ST 47615867
Lat. 51.19.26 N; Long. 02.45.06 W

Project manager: R Schulting (Queen's University, Belfast), 1797, 1805, 1829, 1860, 1864, 1914, 1919–33

Archival body: University of Bristol Spelaeological Society Museum, Wells Museum, and Natural History Museum, London

Description: Aveline's Hole is a rift cave situated near the north-western edge of the limestone Mendip Hills, Somerset. The cave is some 30m long by 3.7m wide, and 3m in height. It was first discovered in AD 1797, and investigated a number of times, during which large numbers (50–100) of human skeletons were reportedly removed but subsequently lost. This material was reportedly encrusted in stalagmite. The present collection of highly fragmentary human remains derives from renewed excavations by the University of Bristol Spelaeological Society in 1914, and then again from 1919–33. Part of this material, along with practically all of the site documentation, was then lost during the bombing raids on Bristol in World War II.

Objectives: Aveline's Hole represents by far the largest known collection of Mesolithic human remains in Britain or Ireland. The purpose of this series of determinations is to document the full span of the use of the cave for burial. Previously available results suggest the possibility that the cave saw a very specific focus of use around 9000 BP. By dating almost all of distinct individuals identified, this idea will be tested. The relevance of this is in gaining a better understanding of burial practices in the early Mesolithic, a period for which little data are avialable. In addition, the associated stable carbon and nitrogen values will provide either synchronous or diachronic palaeodietary information, depending on the results of the dating programme. Either way, this will be an important contribution to our understanding of human diet in the earlier Holocene. Stable isotope analysis will also be undertaken on the limited faunal remains from the site to help calibrate the human results.

Final comment: R Schulting (2005), the results further confirm an early Mesolithic attribution for the burials, and in fact place the use of the site as a cemetery within a surprisingly brief period, between 8460 and 8140 cal BC, with a good probability that use was concentrated within a period of only 70–180 years. This is the earliest scientifically dated cemetery in Britain.The isoptope analysis of the 18 individuals suggested that there was no consumption of marine foods, and there was instead a high proportion of animal protein in the population's diet.

References: Schulting 2005

GrA–22421 8890 ±45 BP

$\delta^{13}C$: -19.7 ±0.1‰
$\delta^{15}N$ *(diet)*: +5.3 ±0.2‰
C/N ratio: 2.9

Sample: M1.13/38, submitted on 28 January 2003 by R Schulting

Material: human bone (0.68g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: little information survives on the context of the remaining skeletal elements. The collection dates to a series of excavations in the years 1914–33. Most of the material was reportedly found along the north wall of the cave. Some elements are marked with context designations but the loss of the site records during a bombing raid in World War II means that it is not known to what these refer. The cave was reportedly sealed, whether intentionally or accidentally, when found in AD 1797, and no post-Mesolithic material has been reported from the cave. Intrusion is thus unlikely. There is evidence of Late Glacial occupation in the cave, and some of the human remains could relate to this rather than to the Mesolithic period. the environment is calcareous, and calcium carbonate was found adhering to some of the specimens. A number of other specimens in the collection are covered by stalagmite.

Objectives: as series objectives

Calibrated date: *1σ:* 8230–7950 cal BC
2σ: 8250–7830 cal BC

Final comment: see series comments

GrA–22422 9095 ±45 BP

$\delta^{13}C$: -19.6 ±0.1‰
$\delta^{15}N$ *(diet)*: +6.8 ±0.2‰
C/N ratio: 2.9

Sample: M1.13/152, submitted on 28 January 2003 by R Schulting

Material: human bone (1.13g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8310–8270 cal BC
2σ: 8350–8240 cal BC

Final comment: see series comments

GrA–22428 9075 ±45 BP

$\delta^{13}C$: -19.6 ±0.1‰
$\delta^{15}N$ *(diet)*: +7.1 ±0.2‰
C/N ratio: 3.1

Sample: M1.13/154, submitted on 28 January 2003 by R Schulting

Material: human bone (0.70g) (left ulna) (R Schulting and M Wysocki 2003)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8300–8260 cal BC
2σ: 8320–8230 cal BC

Final comment: see series comments

GrA–22429 9100 ±45 BP

$\delta^{13}C$: -19.8 ±0.1‰
$\delta^{15}N$ *(diet)*: +7.1 ±0.2‰
C/N ratio: 3.2

Sample: M1.13/160, submitted on 28 January 2003 by R Schulting

Material: human bone (0.90g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8310–8270 cal BC
2σ: 8420–8240 cal BC

Final comment: see series comments

GrA–22431 8925 ±45 BP

$\delta^{13}C$: -19.4 ±0.1‰
$\delta^{15}N$ *(diet):* +7.8 ±0.2‰
C/N ratio: 2.9

Sample: M1.13/161, submitted on 28 January 2003 by R Schulting

Material: human bone (0.84g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8240–7970 cal BC
2σ: 8260–7950 cal BC

Final comment: see series comments

GrA–22432 9155 ±45 BP

$\delta^{13}C$: -19.8 ±0.1‰
$\delta^{15}N$ *(diet):* +6.7 ±0.2‰
C/N ratio: 3.2

Sample: M1.13.163, submitted on 28 January 2003 by R Schulting

Material: human bone (0.69g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8430–8290 cal BC
2σ: 8540–8270 cal BC

Final comment: see series comments

GrA–22433 9090 ±45 BP

$\delta^{13}C$: -19.1 ±0.1‰
$\delta^{15}N$ *(diet):* +6.5 ±0.2‰
C/N ratio: 3.2

Sample: M1.13/164, submitted on 28 January 2003 by R Schulting

Material: human bone (0.74g) (left ulna) (R Schulting and M Wysocki 2003)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8310–8270 cal BC
2σ: 8340–8240 cal BC

Final comment: see series comments

GrA–22546 9060 ±50 BP

$\delta^{13}C$: -21.6 ±0.1‰
$\delta^{15}N$ *(diet):* +7.7 ±0.2‰
C/N ratio: 3.8

Sample: M1.13/166, submitted on 28 January 2003 by R Schulting

Material: human bone (0.74g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8300–8240 cal BC
2σ: 8320–8220 cal BC

Final comment: see series comments

GrA–22547 9120 ±50 BP

$\delta^{13}C$: -20.2 ±0.1‰
$\delta^{15}N$ *(diet):* +5.8 ±0.2‰
C/N ratio: 2.9

Sample: M1.13/300, submitted on 28 January 2003 by R Schulting

Material: human bone (0.71g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8330–8280 cal BC
2σ: 8460–8250 cal BC

Final comment: see series comments

GrA–22548 9170 ±50 BP

$\delta^{13}C$: -19.8 ±0.1‰
$\delta^{15}N$ *(diet):* +7.8 ±0.2‰
C/N ratio: 3.2

Sample: M1.13/301, submitted on 28 January 2003 by R Schulting

Material: human bone (0.88g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8460–8290 cal BC
2σ: 8550–8280 cal BC

Final comment: see series comments

GrA–22552 9200 ±50 BP

$\delta^{13}C$: -19.7 ±0.1‰
$\delta^{15}N$ *(diet):* +5.3 ±0.2‰
C/N ratio: 2.9

Sample: M1.13/118, submitted on 28 January 2003 by R Schulting

Material: human bone (1.33g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8540–8300 cal BC
2σ: 8570–8280 cal BC

Final comment: see series comments

GrA–22555 9020 ±50 BP

$\delta^{13}C$: -19.9 ±0.1‰
$\delta^{15}N$ *(diet):* +5.4 ±0.2‰
C/N ratio: 3.0

Sample: M1.13/159, submitted on 28 January 2003 by R Schulting

Material: human bone (0.77g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8290–8230 cal BC
2σ: 8300–8020 cal BC

Final comment: see series comments

GrA–22557 9120 ±50 BP

$\delta^{13}C$: -20.0 ±0.1‰
$\delta^{15}N$ *(diet):* +5.8 ±0.2‰
C/N ratio: 2.9

Sample: M1.13/172, submitted on 28 January 2003 by R Schulting

Material: human bone (0.77g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8330–8280 cal BC
2σ: 8460–8250 cal BC

Final comment: see series comments

GrA–22558 9210 ±70 BP

$\delta^{13}C$: -19.6 ±0.1‰
$\delta^{15}N$ *(diet):* +6.9 ±0.2‰
C/N ratio: 3.4

Sample: M1.14/99, submitted on 28 January 2003 by R Schulting

Material: human bone (1.30g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8550–8300 cal BC
2σ: 8630–8280 cal BC

Final comment: see series comments

GrA–22605 8980 ±50 BP

$\delta^{13}C$: -21.0 ±0.1‰
$\delta^{15}N$ *(diet):* +5.7 ±0.2‰
C/N ratio: 3.5

Sample: M1.13/144, submitted on 28 January 2003 by R Schulting

Material: human bone (1.20g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8280–8210 cal BC
2σ: 8290–7970 cal BC

Final comment: see series comments

GrA–22607 9180 ±50 BP

$\delta^{13}C$: -19.4 ±0.1‰
$\delta^{15}N$ *(diet):* +7.0 ±0.2‰
C/N ratio: 3.1

Sample: M1.11/307, submitted on 28 January 2003 by R Schulting

Material: human bone (1.34g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8470–8290 cal BC
2σ: 8560–8280 cal BC

Final comment: see series comments

GrA–22621 9130 ±60 BP

$\delta^{13}C$: -19.7 ±0.1‰
$\delta^{15}N$ *(diet):* +6.2 ±0.2‰
C/N ratio: 3.3

Sample: M1.13/302, submitted on 28 January 2003 by R Schulting

Material: human bone (1.07g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8350–8280 cal BC
2σ: 8540–8240 cal BC

Final comment: see series comments

GrA–22938 8960 ±50 BP

$\delta^{13}C$: -19.7 ±0.1‰
$\delta^{15}N$ *(diet):* +8.4 ±0.2‰
C/N ratio: 3.1

Sample: M1.13/329, submitted on 28 January 2003 by R Schulting

Material: human bone (0.71g) (left ulna) (R Schulting and M Wysocki 2001)

Initial comment: as GrA-22421

Objectives: as series objectives

Calibrated date: *1σ:* 8260–8010 cal BC
2σ: 8290–7960 cal BC

Final comment: see series comments

Barking Abbey, Essex

Location: TQ 440840
Lat. 51.32.08 N; Long. 00.04.33 E

Project manager: D Earle Robinson (English Heritage), September 2000

Archival body: Museum of London

Description: Barking Abbey was founded around AD 666. It was abandoned in the ninth century only to be re-founded by *c* AD 950. The present ruin of the parish church is medieval in date. The central open space had factories on it at the start of the twentieth century up to AD 1970. Earlier interpretation suggests that it was divided into residential properties reminiscent of burgage plots of seventeenth-century date. Assessment of the survival of deposits within the known Abbey ruins identified that the stub walls in the lower area of the cloister were mainly twentieth-century reconstructions, and no archaeological deposits survived above the natural gravels. At the upper landscaped level within the ruins medieval deposits survive beneath the turf. In the open space in the south area further substantial domestic medieval and post-medieval deposits survive.

Objectives: to establish whether asparagus seeds found during the excavations are contemporary with the medieval deposits in which they were found.

References: Cromwell *et al* 2002
Cromwell 2001

OxA–11786 167 ±24 BP

$\delta^{13}C$: -20.6 ±0.2‰

Sample: Sample 2008, submitted on 8 August 2002 by D Earle Robinson

Material: carbonised plant macrofossil (<5g) (charred asparagus seeds, *Asparagus officinalis* L.) (W Smith 2002)

Initial comment: sample taken from pit 18, measuring 0.55m x 0.42m x 0.12m deep, filled with silty sand and no finds.

Objectives: to establish whether the seed is contemporary with the pit fill, ie medieval.

Calibrated date: *1σ:* cal AD 1665–1950
2σ: cal AD 1665–1955*

Final comment: K Cullen (10 August 2010), the asparagus seeds date to the post-medieval period and are therefore not contemporary with the medieval pit in which they were found.

Laboratory comment: English Heritage (2002), the two measurements are not statistically significantly different (T′=1.5; ν=1; T′(5%)=3.8; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–11787 209 ±24 BP

$\delta^{13}C$: -21.6 ±0.2‰

Sample: Sample 2018, submitted on 8 August 2002 by D Earle Robinson

Material: carbonised plant macrofossil (charred asparagus seeds, *Aparagus officinalis* L.) (D Earle Robinson 2002)

Initial comment: from pit 20, an irregular ovoid pit, containing twelfth- and thirteenth-century pottery, extending beyond the limit of excavation at 0.45m deep.

Objectives: as OxA-11786

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1645–1955*

Final comment: see OxA-11786

Laboratory comment: see OxA-11786

Barnetby le Wold, Lincolnshire

Location: TA 05720999
Lat. 53.34.32 N; Long. 00.24.12 W

Project manager: M Allen (Pre-Construct Archaeology), Autumn 2001

Archival body: North Linclonshire Museum, Scunthorpe

Description: located at the west end of the Kirmington Gap (near the junction with the Ancholme Valley). The site comprised a series of field systems and enclosures with associated roundhouses, dating to throughout the later pre-Roman Iron Age (LPRIA) and the Romano-British (RB) period until the end of the third century AD. Four phases of LPRIA and four phases of RB activity were recorded. The LPRIA settlement pottery is almost exclusively finewares, with some rouletted decoration and unusual rims, comparable to the Dragonby assemblage. It is a probable wealthy farming community associated with the proto-urban center at Kirmington *c* 3km to the north east. It is possibly part of an extensive linear development throughout the Kirmington Gap of LPRIA date, including Kirmington itself. The RB settlement is a continuation of fields and houses (roundhouses) until the mid-third century AD. At this point at least two (possibly five) stone-built corn driers (one square and one T-shaped) were built and an inhumation cemetery was added. The settlement was abandoned by the end of the third century AD. The site also contained a water channel that was in existence in the LPRIA, but became choked with silt by the second or third century AD.

Objectives: to provide confirmation of the later pre-Roman Iron Age date for the burial.

References: Start 2002

OxA–11648 2072 ±37 BP

$\delta^{13}C$: -19.7 ±0.2‰
$\delta^{15}N$ (diet): +10.9 ±0.3‰
C/N ratio: 3.3

Sample: BBAD1, submitted on 23 May 2002 by M Allen

Material: human bone (right tibia) (M Start 2002)

Initial comment: inhumation 090 is located within grave 088. Grave 088 is cut into the initial silting (100) of ditch 098. Later silting (099) of ditch 098 seals grave 088. Therefore, the ditch (late Iron Age) was open for a while before the grave was dug into its base. After backfilling of the grave with grey-brown sandy silt (089), the ditch was left to fill gradually with brown sand silt (099). The skeleton lay prone, fully articulated, save for the head, which was decapitated. The wrists and ankles were bound in the small of the back. A shallow gully (058) may have caused decapitation of inhumation (090), although the presence of a head (articulated) in a small pit nearby suggests otherwise. The head was of a similarly aged woman (27–49 years). Ditch (098) and grave (088) are both attributed to the first phase of late pre-Roman Iron Age (a total of four phases identified for this period).

Objectives: to establish the date for this inhumation, and to confirm the late pre-Roman Iron Age date ascertained through excavation. The date will also prove a useful indicator of the date the settlement began.

Calibrated date: *1σ:* 170–40 cal BC
2σ: 200 cal BC–cal AD 10

Final comment: K Cullen (10 August 2010), this result confirms the late pre-Roman Iron Age date for the burial.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (29 September 2005), this sample was gelatinised and ultrafiltered as described by Bronk Ramsey et al (2000b). This method was subsequently replaced by an improved version, since the original protocol could on occasion produce measurements that were slightly too old (Bronk Ramsey 2004a). As this sample had a low collagen yield of 10.2mg (1.3%), it is likely to be about 100 BP too old, although the effect is very variable (Bronk Ramsey et al 2004a).

Barton-upon-Humber, Lincolnshire

Location: TA 035219
Lat. 53.40.59 N; Long. 00.25.58 W

Project manager: W Rodwell and C Atkins (Independent), 1978–84

Description: a total of 108 graves from the cemetery at St Peter's church have absolute dating information. Dendrochronological dating has been undertaken on 31 coffins (Tyers 2001a). A total of 93 radiocarbon measurements have been made on 91 samples from Barton. Of these, 85 results relate to burials in the churchyard, 77 of these have been obtained on 75 human skeletons, the remaining 8 on waterlogged wood from surviving coffins. In addition, 13 structural timbers from the church have been dated by dendrochronology (Tyers 2001b), with 6 radiocarbon measurements obtained on this material. Two radiocarbon measurements have also been made on animal bone from the ditch beneath the eastern part of the cemetery. Four burials from nearby Castledyke South were also included in the study (*see* Bayliss *et al* 2013b, 21–4).

Objectives: the objectives of the dating programme evolved over time as the excavation and recording projects continued, but essentially the objectives of the programme were to provide a chronological framework for understanding the different phases of the church and the cemetery, and a better understanding of the burials themselves.

Final comment: A Bayliss (2011), the scientific dating programme has substantially revised the previously accepted chronologies for both the cemetery and the church fabric at St Peter's. At the time of excavation, it was believed that the waterlogged coffins were Anglo-Saxon in date. This was seemingly reinforced by the first series of radiocarbon dates, but had to be abandoned in the light of tree-ring dating. High-precision radiocarbon dates on the skeletons from the earliest phase of burials suggests the area was commonly used for burial by a sizeable community from *cal AD 975–1010 (95% probability)*. The rather later date for the beginning of burial on the site suggested that the preliminary phasing on the graves outside the present church should be reassessed. Subequently, further radiocarbon dates provided more fixed points to inform the phasing of problematic areas.The dating programme has also refined the absolute chronology of the church structure. The radioacrbon determination on the single burial that was cut by the three-celled church suggests that this may have been constructed in the early years of the eleventh century, perhaps later than previously thought (Bayliss *et al* in Rodwell with Atkins 2011).

Laboratory comment: Rafter Radiocarbon Laboratory (2011), subsamples of 49 of the skeletons were analysed for nitrogen and carbon. The atomic C:N ratios suggest generally good overall preservation despite the waterlogged nature of part of the churchyard. Only one, skeleton BH86 (GU-5868) was indicated to be less suitable for dating, however, it produced a statistically consistent result with a second determination on the same skeleton (GU-5897), and so the relatively poor preservation has not affected the accuracy of the radiocarbon date. Further isotope analysis also indicated that if there are offsets in the radiocarbon measurements caused by dietary factors, these are of a relatively modest scale.

Laboratory comment: English Heritage (8 November 2012), four further dates from this site (HAR-2863, HAR-2864, HAR-2865, and HAR-3106) were funded prior to 1981 and were published in Jordan *et al* (1994, 11); four samples were dated between 1981 and 1988 and published in Bayliss *et al* (2012, 17–8; HAR-5655, -6476, -6501, and -6838). Six further dates were funded between 1988 and 1993 and were published in Bayliss *et al* (2013b, 22–4; OxA-2282–7).

References: Bayliss *et al* 2012
Bayliss *et al* 2013b
Jordan *et al* 1994, 11
Rodwell and Atkins 2011
Tyers 2001a
Tyers 2001b

Barton-upon-Humber: Castledyke South, Humberside

Location: TA 032217
Lat. 53.40.53 N; Long. 00.26.14 W

Project manager: W Rodwell (Independent), 1982–90

Archival body: Scunthorpe Museum

Description: an extensive Anglo-Saxon cemetery, mostly of inhumations, dated by grave goods to the sixth and seventh centuries AD. The site lies 300m south-west of the late Saxon St Peter's Church and its associated cemetery. Some are part of the stratigraphic sequence, others are believed to be late on account of an absence of datable grave goods, large square-cut graves (indicative of coffins), and extended layout with the head generally towards the west.

Objectives: to establish the terminal date for the use of the Castledyke cemetery, and in particular to ascertain whether the unfurnished, west/east burials are post-seventh century in date. This series is being dated in parallel to that at St Peter's Church with the aim of establishing whether the latter cemetery follows on from Castledyke, or whether there is a gap in the middle Saxon period.

Final comment: A Bayliss and C Atkins (2011), the beginning of the excavated burial sequence at St Peter's, Barton-upon-Humber, falls in the final quarter of the tenth century AD. This is considerably later than the end of the Castledyke South cemetery, even though four of the (plausibly latest) burials from that site have been dated as part of this series. The gap between the periods of use of the two cemeteries is at least 150 years.

References: Drinkall and Foreman 1998
Rodwell and Atkins 2011

UB–4643 1428 ±16 BP

$\delta^{13}C$: -20.3 ±0.2‰
$\delta^{13}C$ *(diet):* -20.3 ±0.2‰
$\delta^{15}N$ *(diet):* +10.9 ±0.5‰

Sample: BHC 01, submitted in November 2000 by C Atkins

Material: human bone (250+g) (right leg) (A Bayliss 2000)

Initial comment: grave 5. A complete skeleton of a female aged 25–35. A supine burial which lay slightly askew in a large rectangular grave. The head lay to the west and the burial cut grave 205. There were no inclusions in the grave except for residual material. The fagment of a possible iron hook may be part of a dress.

Objectives: to establish whether this unfurnished grave close to the western edge of the cemetery is seventh century or later.

Calibrated date: *1σ:* cal AD 610–650
2σ: cal AD 600–655

Final comment: A Bayliss (25 August 2014), this burial clearly dates to the early seventh century AD.

UB–4644 1345 ±19 BP

$\delta^{13}C$: -21.3 ±0.2‰
$\delta^{13}C$ *(diet):* -21.3 ±0.2‰
$\delta^{15}N$ *(diet):* +10.8 ±0.5‰

Sample: BHC 02, submitted in November 2000 by C Atkins

Material: human bone (250+g) (right femur) (A Bayliss 2000)

Initial comment: from context 8, grave 15. A complete skeleton of a female aged 35–45. A supine burial in a generous-sized grave with the head to the west. Interesting due to the chalk and ?mortar pillow beneath the skull. There were no grave goods except for dress fastenings: a simple copper-alloy pin and a pair of lace ends. The burial was not intrinsically datable and was assigned by the excavators to the seventh or early-eighth century.

Objectives: as UB-4643

Calibrated date: *1σ:* cal AD 655–675
2σ: cal AD 650–685

Final comment: A Bayliss (25 August 2014), this burial clearly dates to the second half of the seventh century AD.

UB–4645 1423 ±15 BP

$\delta^{13}C$: -19.9 ±0.2‰
$\delta^{13}C$ *(diet):* -19.9 ±0.2‰
$\delta^{15}N$ *(diet):* +10.1 ±0.5‰

Sample: BHC 03, submitted in November 2000 by C Atkins

Material: human bone (250+g) (right femur) (A Bayliss 2000)

Initial comment: from context 63, grave 54. A complete skeleton of a male aged 25–35 in a neatly cut rectangular grave which seemingly contained an un-nailed coffin. It was a supine burial with the head to the west. Grave goods comprised a plain iron knife and pennanular iron brooch. The excavators suggested a seventh-century date.

Objectives: to establish whether this apparently coffined burial in the southern part of the cemetery is really seventh century, or later in date. It is markedly different from the many irregular, flexed burials around it.

Calibrated date: *1σ:* cal AD 615–650
2σ: cal AD 600–655

Final comment: A Bayliss (25 August 2014), this burial is clearly early seventh century in date.

UB–4646 1303 ±17 BP

$\delta^{13}C$: -20.2 ±0.2‰
$\delta^{13}C$ *(diet):* -20.2 ±0.2‰
$\delta^{15}N$ *(diet):* +10.8 ±0.5‰

Sample: BHC 04, submitted in November 2000 by C Atkins

Material: human bone (250+g) (right femur) (A Bayliss 2000)

Initial comment: from context 330, grave 84. A complete skeleton, possibly feamle, aged 17–25. It was a supine burial in a neat rectangular grave, with the head to the west. There were no grave goods certainly associated with the burial, although a piece of plain copper-alloy wire bent into a circular loop was found in the fill (too large for a finger ring and too small for a bracelet).

Objectives: to establish whether this unfurnished grave in an area at the centre of the cemetery where burials are sparse is seventh century or later.

Calibrated date: *1σ:* cal AD 670–765
2σ: cal AD 660–770

Final comment: A Bayliss (25 August 2014), this burial dates to the late seventh or early-eighth century.

Barton-upon-Humber: early Anglo-Saxon cemetery, Lincolnshire

Location: TA 035 219
Lat. 53.40.59 N; Long. 00.25.58 W

Project manager: W Rodwell (Independent), 1978–84

Archival body: English Heritage

Description: a complex Anglo-Saxon and medieval parish church serving a small market town. The church was built on the site of a pre-existing inhumation cemetery of Anglo-

Saxon date. This series is related to the earliest burials in the Anglo-Saxon cemetery, beneath and around St Peter's Church. The samples are all taken from bone. They are also securely stratified in long sequences of burials.

Objectives: to establish a date for the origin of the pre-church cemetery and, if possible, to determine where the earliest burials lay, and in which direction the cemetery developed.

Final comment: W Rodwell (November 2003), overall, the results of the scientific dating programme have required a 50–100 year shift in the dating of the church and cemetery. This shift gives a later date for the construction of the first church, and for the first organised use of the site for burial, than had been expected on purely archaeological and architectural grounds. This has a significant effect upon interpretation and it is feared that a major re-evaluation of the evidence might have been occasioned by our failure to collect samples from an appropriate number of primary graves, thus adversely influencing the calculation of the posterior density estimates. The failure to submit a representative series of samples has been due, at least in part, to the fact that many of the earliest graves in stratified strings had insufficient bone to constitute a sample. There is also a concern that the results of the current testing of the accuracy of radiocarbon dating (against the results of dendrochronology) may, at some future date, adjust the calibration and push the swing back in favour of the original archaeological interpretation.

References: Rodwell with Atkins 2011
Rodwell and Rodwell 1982

OxA–12247 955 ±30 BP

$\delta^{13}C$: -19.7‰
$\delta^{15}N$ *(diet):* +13.0‰
C/N ratio: 3.2

Sample: BH30, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (left tibia) (S Mays)

Initial comment: from skeleton 1196 in grave F3502. An older child, unsexed, in a stratified sequence which includes dendro-dated coffin F3508 and carbon dated burial D1797 (BH27).

Objectives: to establish a chronology for the earlier part of the long sequence of burials north of the Saxo-Norman church. This burial is later than F1797 (sample BH27), but earlier than F3508, a coffin dendro-dated to AD 1099.

Calibrated date: *1σ:* cal AD 1020–1160
2σ: cal AD 1010–1170

Final comment: W Rodwell (November 2003), the result suggests a somewhat later period of interment than had been anticipated, but nevertheless one which is consistent with the late tenth-century commencement of burial on the site, demonstrated by the scientific dating programme.

Laboratory comment: English Heritage (2011), BH32 (OxA-12248) was stratigraphically earlier than BH30 (OxA-12247), which was earlier than the dug-out coffin, F3564. Skeleton 1241 in the coffin is dated by UB-4655 (*see* below), and the coffin was dated by HAR-6501 (900 ±70 BP; cal AD 990–1270 at 2σ; Reimer *et al* 2004). Further dendrochronological analysis has shown that the coffin consists of 10 annual growth rings, the latest of which is the heartwood/sapwood boundary. Consequently, the radiocarbon date on the wood can be offset by the number of sapwood rings expected from this assemblage, and the resultant date combined with that from the skeleton to provide the most realistic estimate for the date of the burial. The scientific dating evidence is in good agreement with the model sequence, and has enabled some stratigraphic uncertainties to be resolved. The model suggests that burial F3502 (BH30) was made in *cal AD 1015–1100 (95% probability; fig. 808*; Bayliss *et al* in Rodwell with Atkins 2011).

References: Reimer *et al* 2004

OxA–12248 1003 ±26 BP

$\delta^{13}C$: -19.8‰
$\delta^{15}N$ *(diet):* +12.0‰
C/N ratio: 3.1

Sample: BH32, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (right femur) (S Mays)

Initial comment: from skeleton 1202 in grave F1799. An adult female. This grave lies in the earlier part of a complex sequence of burials. Others in the same chain are being dated: F1797 (sample BH27), F3502 (sample BH30) and F3508 (a dendro-dated coffin).

Objectives: to establish close dating for a sequence of late Saxon and early Norman graves on the north side of the church. This is one of three radiocarbon dates, plus one dendro-date taken from sequential burials.

Calibrated date: *1σ:* cal AD 1010–1030
2σ: cal AD 980–1120

Final comment: see OxA-12247

Laboratory comment: English Heritage (2011), BH32 (OxA-12248) was stratigraphically earlier than BH30 (OxA-12247), which was earlier than the dug-out coffin, F3564. Skeleton 1241 in the coffin is dated by UB-4655 (*see* below), and the coffin was dated by HAR-6501 (900 ±70 BP; cal AD 990–1270 at 2σ; Reimer *et al* 2004). Further dendrochronological analysis has shown that the coffin consists of 10 annual growth rings, the latest of which is the heartwood/sapwood boundary. Consequently, the radiocarbon date on the wood can be offset by the number of sapwood rings expected from this assemblage, and the resultant date combined with that from the skeleton to provide the most realistic estimate for the date of the burial. The scientific dating evidence is in good agreement with the model sequence, and has enabled some stratigraphic uncertainties to be resolved. The model suggests that burial F1799 (BH32) was made in *cal AD 995–1040 (95% probability; fig. 808*; Bayliss *et al* in Rodwell with Atkins 2011).

References: Reimer *et al* 2004

OxA–12373 930 ±26 BP

$\delta^{13}C$: -19.4‰
$\delta^{15}N$ *(diet):* +10.9‰
C/N ratio: 3.2

Sample: BH22, submitted in November 2000 by W Rodwell

Material: human bone (20g) (part of left humerus) (S Mays)

Initial comment: from skeleton 30 in grave F713. This child burial was the only one found within the tower-nave of the late Saxon church. It is almost certainly one of the group of pre-church burials on this site, and the only one from which the skeleton was not exhumed at the time of the church's construction. It was thus originally an outdoor burial.

Objectives: to date the pre-church cemetery, and specifically to provide a *terminus post quem* for the erection of the late Saxon turriform church.

Calibrated date: *1σ:* cal AD 1030–1160
2σ: cal AD 1020–1170

Final comment: W Rodwell (November 2003), the result suggests a significantly later period of interment than had been anticipated, and one which cannot be reconciled easily with the archaeological evidence. The difficulty of defining this grave, and the compactness of its filling, point strongly to a pre-tower origin which would demand a date before *c* AD 1000. The first, withdrawn, radiocarbon date matched the archaeological evidence well. No satisfactory reconciliation of the archaeological and this scientific dating evidence (OxA-12373) can be achieved.

Laboratory comment: English Heritage (2011), BH22 was potentially the only grave from the pre-church cemetery which had not been exhumed on its contruction, and provided a date of *cal AD 1025–1165 (93% probability)* or *1170–1185 (2% probability; fig. 801*; Bayliss *et al* in Rodwell with Atkins 2011).

OxA–12374 1032 ±27 BP

δ¹³C: -18.5‰
δ¹⁵N (diet): +13.0‰
C/N ratio: 3.2

Sample: BH24, submitted in November 2000 by W Rodwell

Material: human bone (10g) (medial half of left clavicle) (S Mays)

Initial comment: from skeleton 592 in grave F1364. An incomplete skeleton of an adult male, the upper part cut away by the foundations of the east wall of the chancel of the Saxon church. The lower part was removed by another early grave, probably Saxo-Norman in date.

Objectives: this is a critically important burial because it is the only pre-church example, which was physically cut by the foundation of the late Saxon building. It is part of the same cemetery phase as BH22.

Calibrated date: *1σ:* cal AD 980–1030
2σ: cal AD 970–1030

Final comment: W Rodwell (November 2003), the result suggests a somewhat later period of interment than had been anticipated, but nevertheless one which is consistent with the late tenth-century commencement of burial on the site, demonstrated by the scientific dating programme. The calibrated date provides a more acceptable allowance of time for burial to be made, and the location of the grave to be lost, before construction work commenced, than does the posterior density estimate.

Laboratory comment: English Heritage (2011), BH24 was cut by the foundation for the original chancel, and its date therefore provides a *terminus post quem* for the construction of the church of *cal AD 985–1035 (95% probability; fig. 801;* Bayliss *et al* in Rodwell with Atkins 2011). This grave provides a *terminus ante quem* for the construction of the Anglo-Saxon church of *cal AD 985–1035 (95% probability)* or *cal AD 1000–1025 (68% probability; fig. 815*; Bayliss *et al* in Rodwell with Atkins 2011).

OxA–12375 960 ±25 BP

δ¹³C: -19.6‰
δ¹⁵N (diet): +10.9‰
C/N ratio: 3.2

Sample: BH26, submitted in November 2000 by W Rodwell

Material: human bone (skull vault) (S Mays)

Initial comment: from skeleton 958 in grave F4001. An adult of unknown sex. Only a small quantity of bone remained in this grave. It lay axially east of the Saxon church, and was partly cut away by a rectangular foundation, which is thought to have been a late Saxon or Saxo-Norman cross base.

Objectives: to establish a *terminus post quem* for the construction of the stone cross base.

Calibrated date: *1σ:* cal AD 1020–1150
2σ: cal AD 1020–1160

Final comment: W Rodwell (November 2003), the result is not particularly helpful in so far as dating the burial is concerned, but it does suggest that the putative cross base is unlikely to be associated with early use of the Saxon church. The base's construction shortly prior to the subsequent period of church construction, or during the re-ordering of the churchyard associated with the completion of the Saxo-Norman church, now seems most likely.

Laboratory comment: English Heritage (2011), BH26, the most easterly of the three burials dated from within the church, and thought to belong to the pre-church cemetery, provided a date of *cal AD 1015–1130 (74% probability)* or *cal AD 1135–1160 (21% probability; fig. 801*; Bayliss *et al* in Rodwell with Atkins 2011). This suggests that the burial is unlikely to be contemporary with the first stone church, and the cross base that it was cut by is rather later than anticipated. This grave provides a *terminus post quem* for the erection of this foundation.

UB–4440 940 ±18 BP

δ¹³C: -20.0 ±0.2‰
δ¹³C (diet): -20.0‰
δ¹⁵N (diet): +9.5‰
C/N ratio: 2.6

Sample: BH14, submitted in March 1999 by W Rodwell

Material: human bone (300g) (tibia from skeleton 1911) (J Rogers)

Initial comment: grave F5032 - skeleton 1911. A sample from one of two male adults, accompanied by three children, carefully laid in a multiple grave. There were no coffins or accompanying items. This was the only Saxon multiple burial, and was sealed by a succession of later interments.

The skeletons were fully artoculated so there was no possibly of disturbance or intrusion. The grave was 1.5m below the ground surface.

Objectives: to establish the period of origin of the cemetery into which the late Saxon church was introduced. This is one of the coffin-less graves just outside the middle Saxon enclosure ditch surrounding the manor house of Barton and perhaps the earliest part of the cemetery. In addition, the burial is of such intrinsic interest that it deserves to be dated.

Calibrated date: *1σ:* cal AD 1030–1155
2σ: cal AD 1025–1160

Final comment: W Rodwell (November 2003), the barely compatible results produced by the samples taken from skeleton 1911 (BH14) and skeleton 1910 (BH38) have led to the suggestion that the two adults in this grave may not have been interred at the same time. Nevertheless, the carefully observed and recorded relationships between these two skeletons, and the superimposed skeletons of the three children, leaves little doubt that all five individuals were interred as part of a single operation.

Laboratory comment: English Heritage (2011), two skeletons were dated by radiocarbon from grave F5032 (BH14; UB-4440 and BH38; UB-4658). The results are statistically significantly different at 95% confidence (T′=18.4; T′=3.8; ν=1; Ward and Wilson 1978), and the burials are dated to *cal AD 1020–1065 (95% probability*; BH14; UB-4440) and *cal AD 990–1025 (95% probability; BH38; UB-4658; fig. 808*; Bayliss *et al* in Rodwell with Atkins 2011).

References: Ward and Wilson 1978

UB–4441 990 ±21 BP

δ^{13}*C:* -20.2 ±0.2‰
δ^{13}*C (diet):* -20.0‰
δ^{15}*N (diet):* +11.0‰
C/N ratio: 2.6

Sample: BH15, submitted in March 1999 by W Rodwell

Material: human bone (200g) (tibia) (J Rogers)

Initial comment: from skeleton 2789 in grave F7626. An adult grave at the very bottom of a stratified stack of 12 burial generations, in a densely used part of the Anglo-Saxon cemetery south of the late Saxon church. The skeleton was partly cut away by other Saxon graves, but the remaining parts were articulated and undisturbed. The grave was 1.5m below modern ground surface.

Objectives: to establish the period of use of the cemetery to the south of the late Saxon church. In particular, to establish the date of origin of this area of cemetery.

Calibrated date: *1σ:* cal AD 1020–1035
2σ: cal AD 1015–1120

Final comment: W Rodwell (November 2003), the result offers a broad range of possibility within which the late tenth- to early eleventh-century potential for interment is archaeologically the most likely. A stratified sequence of nine burials lay between the source of this sample and the foundation courses for the west wall of the wide south aisle (thirteenth century).

Laboratory comment: English Heritage (2011), BH15 was the most southerly of the phase E burials to be dated and was the earliest in its stratigraphic sequence. It provided a date of *cal AD 995–1045 (67% probability)* or *cal AD 1090–1120 (13% probability) or cal AD 1140–1155 (15% probability; fig. 803;* Bayliss *et al* in Rodwell with Atkins 2011).

UB–4442 929 ±19 BP

δ^{13}*C:* -20.4 ±0.2‰
δ^{13}*C (diet):* -20.4‰
δ^{15}*N (diet):* +10.1‰
C/N ratio: 2.7

Sample: BH16, submitted in March 1999 by W Rodwell

Material: human bone (208.91g) (femur and fibula shaft from skeleton 1070) (J Rogers)

Initial comment: a sample from an adult grave, stratified as the second earliest in a densely used part of the Anglo-Saxon cemetery, south-east of the late Saxon church. [NB the earliest grave in the sequence was too badly disturbed to yield sufficient bone for dating]. This sample came from skeleton 1070, in grave F4071. Articulated and incomplete, this part was undisturbed and uncoffined. The grave was 1.3m below floor level in the medieval church, cut into chalky boulder clay. The burial was originally outdoors, but the church expanded over it in the thirteenth century.

Objectives: to establish the origin of this part of the cemetery, south-east of the late Saxon church.

Calibrated date: *1σ:* cal AD 1035–1160
2σ: cal AD 1025–1165

Final comment: W Rodwell (November 2003), the result suggests a somewhat later period of interment than had been anticipated, but since it belongs to the second generation of burials in this part of the cemetery it is not inconsistent with the late tenth-century commencement of burial on the site, demonstrated by the scientific dating programme.

Laboratory comment: English Heritage (2011), BH16 is the second earliest burial in its stratigraphic sequence (the earliest burial, F4070, did not provide sufficient bone for dating), and was buried in *cal AD 1030–1160 (95% probability; fig. 802;* Bayliss *et al* in Rodwell with Atkins 2011).

UB–4443 1000 ±22 BP

δ^{13}*C:* -19.6 ±0.2‰
δ^{13}*C (diet):* -19.4‰
δ^{15}*N (diet):* +10.4‰
C/N ratio: 2.6

Sample: BH17, submitted in March 1999 by W Rodwell

Material: human bone (227.14g) (two tibia from skeleton 1260) (J Rogers)

Initial comment: a sample from an adult grave, stratified as the second earliest in a densely used part of the Anglo-Saxon cemetery, south-west of the late Saxon church. [NB the earliest grave in the sequence was almost entirely cut away by later ones, leaving nothing in articulation]. This sample came from skeleton 1260, in grave F3247. The skeleton was articulated, undisturbed, and uncoffined. The grave was 1.25m below floor level in the medieval church, cut into chalky boulder clay.

Objectives: to establish the origin of this part of the cemetery, south-west of the late Saxon church.

Calibrated date: *1σ:* cal AD 1015–1030
2σ: cal AD 990–1040

Final comment: W Rodwell (November 2003), although the result suggests a somewhat later period of interment than had been anticipated, it is possible that this grave formed a part of the new cemetery lay-out which immediately post-dated the construction of the Anglo-Saxon church (perhaps its more than usually accurate west/east orientation reflects the sweep of a path leading to the south door of the tower). The entirely exhumed predecessor, at the bottom of the sequence, may represent the pre-church cemetery within which the positions of graves were lost during the construction process (the demonstrably pre-church graves were aligned north-west/south-east, whereas the bulk of the early church congregation had a west-north-west/east-south-east grave aligned on the church walls). There is no getting away from the fact that this is quite an odd grave.

Laboratory comment: English Heritage (2011), BH17 provided a date for the digging of grave F3247 of *cal AD 995–1040 (81% probability)* or *cal AD 1095–1120 (6% probability)* or *cal AD 1140–1155 (8% probability; fig. 803;* Bayliss *et al* in Rodwell with Atkins 2011).

UB–4444 959 ±19 BP

$\delta^{13}C$*:* -19.9 ±0.2‰
$\delta^{13}C$ *(diet):* -20.0‰
$\delta^{15}N$ *(diet):* +10.2‰
C/N ratio: 2.6

Sample: BH18, submitted in March 1999 by J Rogers

Material: human bone (239g) (tibia from skeleton 2501) (J Rogers)

Initial comment: a sample from an adult grave, the earliest in a stratified sequence of four Anglo-Saxon burial generations. It is from uncoffined burial F7348, which lay beneath a grave lined with planks taken from a boat (boat timbers in graves belong to the second burial generation at Barton). The burial was articulated and undisturbed. The grave was 1.3m below ground level, cut into chalky boulder clay.

Objectives: to establish the origin of this part of the cemetery, north of the late Saxon church. Also, to provide a *terminus post quem* for the use of boat parts in Saxon graves at Barton.

Calibrated date: *1σ:* cal AD 1025–1150
2σ: cal AD 1020–1155

Final comment: W Rodwell (November 2003), the result offers a broad range of possibility within which the mid-eleventhth century potential for interment is the most likely, given that this sample was collected from a grave partially disturbed by a later burial associated with a significant number of roves/clench bolts. The latest period for the deposition of roves suggested by scientific dating falls within the first half of the twelfth century (Bayliss *et al* in Rodwell with Atkins 2011, fig 813). Even if the source of this sample was interred at the very beginning of the range of possibility, it suggests that no burials were made in this part of the cemetery before the church was built, indicating that the centre of the pre-church cemetery lay further to the south (assuming that the slope down to the Whitecross Street watercourse would not be a favoured spot).

Laboratory comment: English Heritage (2011), BH18 was one of three early burials north of the tower and annexe, and dated to *cal AD 1020–1070 (36% probability)* or *cal AD 1080–1125 (37% probability)* or *cal AD 1135–1160 (22% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

UB–4445 1002 ±19 BP

$\delta^{13}C$*:* -19.9 ±0.2‰
$\delta^{13}C$ *(diet):* -19.9‰
$\delta^{15}N$ *(diet):* +9.7‰
C/N ratio: 2.6

Sample: BH19, submitted in March 1999 by W Rodwell

Material: human bone (209.63g) (long bone from skeleton 2429) (J Rogers)

Initial comment: skeleton 2429 in grave F5393: a sample from an adult grave, the earliest in a stratified sequence of Anglo-Saxon burials in the north-east part of the cemetery. These burials dug into the backfill of the middle Saxon enclosure ditch around the site of the manor house to the east of the Saxon church. Samples from the enclosure ditch are also being dated. This uncoffined burial is believed to belong to the earliest phase in the cemetery. The grave was 1.5m below ground level, cut into the silt and gravel filling of the enclosure ditch.

Objectives: to establish the date of origin of this part of the cemetery, and relate it to the abandonment of the middle Saxon enclosure ditch.

Calibrated date: *1σ:* cal AD 1015–1030
2σ: cal AD 995–1040

Final comment: W Rodwell (November 2003), this result would be unsurprising were it not for the set of dates supplied by dendrochronology, which appears to suggest that this north-eastern part of the cemetery was little used for burial until the early part of the twelfth century. However, a kind of logic may be glimpsed - all of the dendro dates relate to coffins with a west-north-west/east-south-east orientation, whereas this grave lies north-west/south-east, as do a significant number of uncoffined burials (at least one of which pre-dates a coffined burial dating to AD 1120–1153). It is possible that this sample was derived from an early part of the cemetery which had a different focus from that of the cemetery centred upon the church.

Laboratory comment: English Heritage (2011), BH19 was one of four burials radiocarbon dated to the north of the three-celled church. It dates to *cal AD 995–1040 (89% probability)* or *cal AD 1105–1115 (1% probability)* or *cal AD 1140–1155 (5% probability*; *fig. 810*; Bayliss *et al* in Rodwell with Atkins 2011).

UB–4647 1068 ±16 BP

$\delta^{13}C$*:* -18.8 ±0.2‰
$\delta^{13}C$ *(diet):* -18.9‰
$\delta^{15}N$ *(diet):* +13.2‰
C/N ratio: 2.9

Sample: BH23, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (S Mays)

Initial comment: skeleton 537, an adult male from grave F4096. This is the earliest grave in a long stratified sequence in the central southern area of the cemetery, just south of the chancel of the Saxon church. Cut into chalky boulder clay it was well-sealed by later graves and the south aisle of the medieval church.

Objectives: to establish the origin of the Saxon cemetery south of the chancel of the first church.

Calibrated date: *1σ:* cal AD 975–995
2σ: cal AD 900–1020

Final comment: W Rodwell (November 2003), the result suggests a somewhat later period of interment than had been anticipated but nevertheless one which is consistent with the late tenth-century commencement of burial on the site, demonstrated by the scientific dating programme. This burial still has the potential to be part of the pre-church cemetery, with grave 1364 (BH24) (also on a north-west/south-east alignment).

Laboratory comment: English Heritage (2011), BH23 is the earliest burial in its stratigraphic sequence and was buried in *cal AD 985–1020 (95% probability; fig. 802;* Bayliss *et al* in Rodwell with Atkins 2011).

UB–4648 970 ±15 BP

$\delta^{13}C$: -19.9 ±0.2‰
$\delta^{13}C$ *(diet)*: -19.7‰
$\delta^{15}N$ *(diet)*: +11.5‰
C/N ratio: 2.8

Sample: BH25, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (sacrum, part of the right ilium and right humerus) (S Mays)

Initial comment: skeleton 842, from grave F1774, an adult female. This is the earliest in a stratified sequence of late Saxon or Saxo-Norman graves to the north of the chancel of the late Saxon church. This burial also contained iron roves, resulting from the use of pieces of boat in the grave, probably as a simple cover for the body.

Objectives: to establish the date of origin of the cemetery; also to establish the period of use of fragments of clinker-built boats in graves.

Calibrated date: *1σ:* cal AD 1025–1040
2σ: cal AD 1020–1150

Final comment: W Rodwell (November 2003), the result suggests that this grave could belong in any one of several cemetery lay-outs, ranging from the first ordering of the churchyard, to that which followed completion of the early twelfth-century eastward expansion of the church. Since this range of possibility was indicated by the stratigraphy, it is disappointing that radiocarbon dating has failed to provide a more precise date for the burial.

Laboratory comment: English Heritage (2011), BH25 was one of four burials radiocarbon dated to the north of the three-celled church. It dates to *cal AD 1015–1045 (44% probability)* or *cal AD 1085–1125 (27% probability)* or *cal AD 1135–1160 (24% probability*; *fig. 810*; Bayliss *et al* in Rodwell with Atkins 2011).

UB–4649 964 ±15 BP

$\delta^{13}C$: -20.1 ±0.2‰
$\delta^{13}C$ *(diet)*: -20.2‰
$\delta^{15}N$ *(diet)*: +12.0‰
C/N ratio: 2.8

Sample: BH27, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (parts of left femur and left tibia) (S Mays)

Initial comment: skeleton 986 from grave F1797. An adult, possibly male. This is the earliest grave in a dense stratified cluster, north of the Saxo-Norman chancel. The grave is likely to belong to the late Saxon phase of cemetery.

Objectives: to establish the date of origin of the north-eastern part of the cemetery.

Calibrated date: *1σ:* cal AD 1025–1120
2σ: cal AD 1020–1155

Final comment: W Rodwell (November 2003), the result suggests a somewhat later period of interment than had been anticipated, but nevertheless one which is consistent with the late tenth-century commencement of burial on the site, demonstrated by the scientific dating programme. The posterior density estimate, with its wide range of dating possibilities, goes no way towards answering the objective.

Laboratory comment: English Heritage (2011), BH27 was one of four burials radiocarbon dated to the north of the three-celled church. It dates to *cal AD 1020–1050 (37% probability*) or *cal AD 1085–1125 (33% probability)* or *cal AD 1135–1160 (25% probability*; *fig. 810*; Bayliss *et al* in Rodwell with Atkins 2011).

UB–4650 921 ±21 BP

$\delta^{13}C$: -19.9 ±0.2‰
$\delta^{13}C$ *(diet)*: -19.4‰
$\delta^{15}N$ *(diet)*: +12.5‰
C/N ratio: 2.9

Sample: BH28, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (left and right tibiae and fibulae) (S Mays)

Initial comment: from skeleton 1082 in grave F3157. The earliest grave in a long sequence of densely packed burials immediately west of the Saxon church. This is likely to be within the earliest part of the cemetery.

Objectives: to establish the date of origin of the south-eastern area of the Saxon cemetery. This may well be primary.

Calibrated date: *1σ:* cal AD 1040–1160
2σ: cal AD 1030–1165

Final comment: W Rodwell (November 2003), the result suggests a disappointingly late period of interment, particularly since this grave lay perpendicular to the west wall of the baptistry and had the potential to belong in the pre-church cemetery. It would appear that the grave's north-west/south-east alignment was prompted by the north-east/south-west alignment of the baptistry wall.

Laboratory comment: English Heritage (2011), BH28 was interred in *cal AD 1030–1145 (95% probability; fig. 805;* Bayliss *et al* in Rodwell with Atkins 2011), which is good agreement with the recorded stratigraphy.

UB–4651 962 ±17 BP

$\delta^{13}C$*:* -19.4 ±0.2‰
$\delta^{13}C$ *(diet):* -19.1‰
$\delta^{15}N$ *(diet):* +14.5‰
C/N ratio: 2.5

Sample: BH29, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (right tibia and right humerus) (S Mays)

Initial comment: from skeleton 1162 in grave F3202. An adult male. One of a small group of burials at the west end of the cemetery, aligned on the skewed baptistery. This grave cuts F3157, which is being dated as sample BH28.

Objectives: to establish the period of use of the cemetery to the west of the church, and in particular the early graves that are aligned with the walls of the Saxon baptistery.

Calibrated date: *1σ:* cal AD 1025–1150
2σ: cal AD 1020–1155

Final comment: W Rodwell (November 2003), the result suggests a disappointingly late period of interment, particularly since this grave lay perpendicular to the west wall of the baptistry and had the potential to belong in the pre-church cemetery. It would appear that the grave's north-west/south-east alignment was prompted by the north-east/south-west alignment of the baptistry wall.

Laboratory comment: English Heritage (2011), BH29 was interred in *cal AD 1080–1130 (48% probability) or cal AD 1135–1160 (47% probability; fig. 805;* Bayliss *et al* in Rodwell with Atkins 2011), which is good agreement with the recorded stratigraphy.

UB–4652 965 ±18 BP

$\delta^{13}C$*:* -19.4 ±0.2‰
$\delta^{13}C$ *(diet):* -19.6‰
$\delta^{15}N$ *(diet):* +14.2‰
C/N ratio: 2.5

Sample: BH31, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (right femur) (S Mays)

Initial comment: from skeleton 1198 in grave F4131. An adult female. The earliest grave in a complex stratified sequence at the south-east corner of the excavated cemetery.

Objectives: to establish the beginning of use of the south-east part of the cemetery. It is suspected that expansion in this area may be later eleventh century in date.

Calibrated date: *1σ:* cal AD 1025–1120
2σ: cal AD 1020–1155

Final comment: W Rodwell (November 2003), the result suggests a somewhat later period of interment than had been anticipated, but nevertheless one which is consistent with the late tenth-century commencement of burial on the site, demonstrated by the scientific dating programme. Neither the calibrated result nor the posterior density estimate go any way towards answering the objective - apparently, expansion of the cemetery into this area could have occurred during the early or late-eleventh century, or during the middle of the twelfth century.

Laboratory comment: English Heritage (2011), BH31 is the earliest burial in its stratigraphic sequence and provided a date of *cal AD 1015–1065 (38% probability)* or *cal AD 1085–1125 (33% probability)* or *cal AD 1135–1160 (24% probability; fig. 802;* Bayliss *et al* in Rodwell with Atkins 2011).

UB–4653 954 ±20 BP

$\delta^{13}C$*:* -20.0 ±0.2‰
$\delta^{13}C$ *(diet):* -19.9‰
$\delta^{15}N$ *(diet):* +13.9‰
C/N ratio: 2.6

Sample: BH33, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (left femur) (S Mays)

Initial comment: from skeleton 1208 in grave F3228. An adult female. The lowest in a stratified sequence of primary graves against the south side of the late Saxon church. This appears to be part of one of the rows over which the first church was built (where they fell within the curtilage of the church, the contents of the graves were exhumed).

Objectives: to establish the origin of the Saxon cemetery, particularly at the western end of the site where several rows of graves were partially exhumed in order to erect the first church.

Calibrated date: *1σ:* cal AD 1025–1150
2σ: cal AD 1020–1160

Final comment: W Rodwell (November 2003), the result suggests a somewhat later period of interment than had been anticipated, and clearly one which is not compatible with the theory that this grave lay in the pre-church cemetery. This is particularly perplexing since the burial appears to form part of a row, cut by the construction of the first church. Neither the calibrated result nor the posterior density estimate go any way towards answering the objective.

Laboratory comment: English Heritage (2011), BH33 was located at the base of the sequence and was dated to estimate when the cemetery area to the south of the tower and the annexe came into use. It provided a date of *cal AD 1020–1070 (34% probability) or cal AD 1080–1130 (40% probability) or cal AD 1135–1160 (21% probability; fig. 803;* Bayliss *et al* in Rodwell with Atkins 2011).

UB–4654 947 ±18 BP

$\delta^{13}C$*:* -19.7 ±0.2‰
$\delta^{13}C$ *(diet):* -19.6‰
$\delta^{15}N$ *(diet):* +14.8‰
C/N ratio: 2.5

Sample: BH34, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (left femur) (S Mays)

Initial comment: from skeleton 1234 in grave F3244. An adult male. The lowest in a stratified sequence of primary graves against the south side of the late Saxon church. This appears to be part of one of the rows over which the first church was built (*see* also sample BH 33).

Objectives: to establish the origin of the Saxon cemetery, particularly at the western end of the site where several rows of graves were partially exhumed in order to erect the first church. *See* also sample BH33, from the same row.

Calibrated date: *1σ:* cal AD 1030–1155
2σ: cal AD 1025–1160

Final comment: see UB-4653

Laboratory comment: English Heritage (2011), BH34 may have been the earliest burial in the sequence, although its relationship to one other burial (F3091), which may be earlier, is uncertain. It provided a date of *cal AD 1020–1070 (32% probability) or cal AD 1080–1130 (42% probability) or cal AD 1135–1160 (21% probability; fig. 803;* Bayliss *et al* in Rodwell with Atkins 2011).

UB–4655 959 ±17 BP

$\delta^{13}C$: -19.8 ±0.2‰
$\delta^{13}C$ *(diet)*: -20.1‰
$\delta^{15}N$ *(diet)*: +12.2‰
C/N ratio: 2.5

Sample: BH35, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (left femur) (S Mays)

Initial comment: from skeleton 1241 in grave F3564. An adult male. This was contained in the only dug-out coffin found in the waterlogged area of the site. The oak from the coffin has already been dated (BH07). This forms part of a stratified sequence with other samples: BH27, BH32, BH30, and dendro-dated coffin F3508.

Objectives: to refine the dating of the dug-out coffin from which this skeleton came (coffin sample BH07), and to assist with dating the early phases of burial to the north of the Saxon and Saxo-Norman churches.

Calibrated date: *1σ:* cal AD 1025–1150
2σ: cal AD 1020–1155

Final comment: W Rodwell (November 2003), the result suggests a somewhat later period of interment than had been anticipated, and fails to improve upon the original supposition that this grave could belong in either the Saxon or the Saxo-Norman cemetery.

Laboratory comment: English Heritage (2011), this measurement on this skeleton and the measurement on its coffin (F3564; HAR-6501; 900 ±70 BP; Bayliss *et al* 2012, 17–8) are statistically consistent (T'=0.6; T'(5%)=3.8; ν=1; Ward and Wilson 1978), even though the wood sample is likely to be at least a decade earlier than the burial because of missing sapwood.

References: Bayliss *et al* 2012
Ward and Wilson 1978

UB–4656 958 ±20 BP

$\delta^{13}C$: -20.0 ±0.2‰
$\delta^{13}C$ *(diet)*: -19.8‰
$\delta^{15}N$ *(diet)*: +13.6‰
C/N ratio: 2.5

Sample: BH36, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (right femur) (S Mays)

Initial comment: from skeleton 1283 in grave F4183. An adult male. The earliest of a long sequence of stratified graves to the south of the chancel of the Saxon church.

Objectives: to establish the date of origin of the Saxon cemetery in the area south of the first church.

Calibrated date: *1σ:* cal AD 1025–1150
2σ: cal AD 1020–1155

Final comment: W Rodwell (November 2003), neither the calibrated result nor the posterior density estimate go any way towards answering the objective - apparently, expansion of the cemetery into this area could have occurred at almost any time during the eleventh century, or the first half of the twelfth century.

Laboratory comment: English Heritage (2011), BH36 is the earliest burial in its stratigraphic sequence and was buried in *cal AD 1020–1070 (35% probability)* or *cal AD 1080–1130 (38% probability)* or *cal AD 1135–1160 (22% probability; fig. 802;* Bayliss *et al* in Rodwell with Atkins 2011).

UB–4657 1002 ±16 BP

$\delta^{13}C$: -19.5 ±0.2‰
$\delta^{13}C$ *(diet)*: -19.7‰
$\delta^{15}N$ *(diet)*: +13.9‰
C/N ratio: 2.4

Sample: BH37, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (left femur) (S Mays)

Initial comment: from skeleton 1323 in grave F3288. An adult male. The earliest of a long sequence of stratified burials in the south-west corner of the excavated cemetery (south of the Saxon church).

Objectives: to establish the origin of the Saxon cemetery in the south-east corner of the site. This is one of several samples being dated from what are believed to be comparably early burials in history of the cemetery.

Calibrated date: *1σ:* cal AD 1015–1030
2σ: cal AD 995–1035

Final comment: W Rodwell (November 2003), the result suggests a somewhat later period of interment than had been anticipated, but nevertheless one which is consistent with the late tenth-century commencement of burial on the site, demonstrated by the scientific dating programme.

Laboratory comment: English Heritage (2011), BH37 was located at the base of the sequence and was dated to estimate when the cemetery area to the south of the tower and the annexe came into use. It provided a date of *cal AD 995–1040 (92% probability) or cal AD 1140–1150 (3% probability; fig. 803;* Bayliss *et al* in Rodwell with Atkins 2011).

UB–4658 1038 ±14 BP

$\delta^{13}C$: -19.5 ±0.2‰
$\delta^{13}C$ *(diet)*: -19.8‰
$\delta^{15}N$ *(diet)*: +13.0‰
C/N ratio: 2.4

Sample: BH38, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (right femur) (S Mays)

Initial comment: from skeleton 1910 in grave F5032. The sample is from the second of two adult males who were buried along with three children in a single grave. There were no coffins or accompanying items. The other male has previously been submitted for dating (BH14).

Objectives: to refine the dating obtained from sample BH14 (the other adult skeleton in the same grave); also to establish the date of this unique multiple grave at Barton.

Calibrated date: *1σ:* cal AD 990–1020
2σ: cal AD 985–1025

Final comment: W Rodwell (November 2003), the barely compatible results produced by the samples taken from skeleton 1911 (BH14) and skeleton 1910 (BH38) have led to the suggestion that the two adults in this grave may not have been interred at the same time. Nevertheless, the carefully observed and recorded relationships between these two skeletons, and the superimposed skeletons of the three children, leaves little doubt that all five individuals were interred as part of a single operation. If both the scientific dating evidence and the archaeological evidence are combined, the grave has a date in the region of AD 1020–1025.

Laboratory comment: see UB-4440

UB–4659 1057 ±15 BP

$\delta^{13}C$*:* -19.4 ±0.2‰
$\delta^{13}C$ *(diet):* -19.6‰
$\delta^{15}N$ *(diet):* +13.9‰
C/N ratio: 2.4

Sample: BH39, submitted in November 2000 by W Rodwell

Material: human bone (250g+g) (right humerus, radius and ulna, and part of the left humerus) (S Mays)

Initial comment: from skeleton 2545 in grave F7382. An adult female. A large grave situated outside the north door of the Saxon church. The earliest feature in the area and cut by a late Saxon or Saxo-Norman wall trench running north-south.

Objectives: to date this intrinsically interesting grave and to provide a *terminus post quem* for the wall trench (part of an unfinished Saxo-Norman structure?) that crosses it. Also, to establish the origin date of the cemetery north of the church.

Calibrated date: *1σ:* cal AD 980–1020
2σ: cal AD 970–1020

Final comment: W Rodwell (November 2003), this result provides a good date for the burial, and on its own might be taken to indicate that the 'wall trench' (context 7302) was associated with the later stages in the construction of the first stone church, which could be compatible with the archaeological evidence.

Laboratory comment: English Heritage (2011), BH39 was one of three early burials north of the tower and annexe, and dated to *cal AD 985–1020 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

UB–4660 978 ±21 BP

$\delta^{13}C$*:* -19.5 ±0.2‰
$\delta^{13}C$ *(diet):* -20.0‰
$\delta^{15}N$ *(diet):* +13.7‰
C/N ratio: 2.5

Sample: BH40, submitted in November 2000 by W Rodwell

Material: human bone (250+g) (skull vault) (S Mays)

Initial comment: from skeleton 2569 in grave F7398. An adult female. The earliest grave in a long stratified sequence north of the church. It appears to be part of one of the early rows of burials here, which the construction of the Saxon church disrupted.

Objectives: to establish the origins of burial in the north-eastern area of the Saxon cemetery.

Calibrated date: *1σ:* cal AD 1020–1040
2σ: cal AD 1015–1150

Final comment: W Rodwell (November 2003), this result provides a disappointingly vague date for the burial but may serve to extend the time during which trench 7302 could have been opened, into the period of Saxo-Norman construction. This later date for trench 7302 would be compatible with the archaeological evidence only if a large area to the north of the tower was not used for burial for a considerable period of time.

Laboratory comment: English Heritage (2011), BH40 was one of three early burials north of the tower and annexe, and dated to *cal AD 1000–1060 (56% probability)* or *cal AD 1085–1125 (23% probability)* or *cal AD 1135–1160 (16% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011). The date of BH40 is almost certain to fall within the first, most probable, range.

UB–4661 998 ±17 BP

$\delta^{13}C$*:* -20.4 ±0.2‰
$\delta^{13}C$ *(diet):* -19.9‰
$\delta^{15}N$ *(diet):* +14.3‰
C/N ratio: 2.5

Sample: BH41, submitted in November 2000 by W Rodwell

Material: human bone (350g) (left and right femurs and right humerus, all incomplete) (S Mays)

Initial comment: from skeleton 1916 in grave F5037. An adult female (aged 25). The earliest grave in a stratified sequence in the northern part of the excavated area of the cemetery. The grave is also of intrinsic interest because it contained roves, nails, and pillow-stones.

Objectives: to establish the date of origin of the Saxon cemetery in the northern area of the site. A secondary aim is to date the period when fragments of clinker-built boat and pillow-stones were placed in graves.

Calibrated date: *1σ:* cal AD 1015–1030
2σ: cal AD 1015–1040

Final comment: W Rodwell (November 2003), the result suggests a somewhat later period of interment than had been anticipated, but nevertheless one which is consistent with the late tenth-century commencement of burial on the site, demonstrated by the scientific dating programme. Unfortunately, the result does not make it clear whether this grave belonged to the pre-church cemetery, or to the primary ordering of the new churchyard.

Laboratory comment: English Heritage (2011), BH41 was one of four burials radiocarbon dated to the north of the three-celled church. It dates to *cal AD 995–1040 (87% probability)* or *cal AD 1105–1115 (1% probability)* or *cal AD 1140–1155 (7% probability*; *fig. 810*; Bayliss *et al* in Rodwell with Atkins 2011).

UB–4662 911 ±16 BP

$\delta^{13}C$*:* -20.1 ±0.2‰
$\delta^{13}C$ *(diet):* -20.0‰
$\delta^{15}N$ *(diet):* +12.8‰
C/N ratio: 2.6

Sample: BH72, submitted in December 2000 by W Rodwell

Material: human bone (250+g) (left and right femurs, incomplete) (S Mays)

Initial comment: from skeleton 1916 in grave F5037. An adult, possibly male. This is part of a group of seven graves excavated in the south aisle, but which were originally outside the Norman nave, the aisle having been erected over them in the mid-late thirteenth century. The burials are distinguished by having had liquid riverine mud poured over the corpse, inside a timber coffin. It is suggested that the purpose of this action was to contain an infectious disease.

Objectives: to establish the date of this special and evidently homogenous group of mud-filled graves.

Calibrated date: *1σ:* cal AD 1045–1165
2σ: cal AD 1040–1170

Final comment: W Rodwell (November 2003), the range would support either a very late Saxon or Norman date. The deviation of the grave from the general orientation hereabouts suggests that its alignment may have been influenced by the Saxo-Norman apse, or a path around it. Deviations of alignment commonly occurred close to apses. The scientific dating agrees with the archaeological evidence.

Laboratory comment: English Heritage (2011), BH72 was the earliest burial in its stratigraphic sequence and provided a date of *cal AD 1035–1145 (81% probability) or cal AD 1150–1165 (8% probability; fig. 802;* Bayliss *et al* in Rodwell with Atkins 2011).

UB–4663 968 ±16 BP

$\delta^{13}C$*:* -19.2 ±0.2‰
$\delta^{13}C$ *(diet):* -19.2‰
$\delta^{15}N$ *(diet):* +12.9‰
C/N ratio: 2.6

Sample: BH73, submitted in December 2000 by W Rodwell

Material: human bone (250+g) (left femur) (S Mays)

Initial comment: skeleton 1015 from grave F4040. An adult possibly male. A second example from the group of seven graves with liquid riverine mud.

Objectives: as UB-4662

Calibrated date: *1σ:* cal AD 1025–1120
2σ: cal AD 1020–1155

Final comment: W Rodwell (November 2003), the range would support either a late Saxon or Norman date. The scientific dating agrees with the archaeological evidence.

Laboratory comment: English Heritage (2011), BH73 was the earliest burial in its stratigraphic sequence and provided a date of *cal AD 1015–1050 (40% probability)* or *cal AD 1085–1125 (30% probability)* or *cal AD 1135–1160 (25% probability; fig. 802;* Bayliss *et al* in Rodwell with Atkins 2011).

UB–4719 995 ±19 BP

$\delta^{13}C$*:* -19.9 ±0.2‰
$\delta^{13}C$ *(diet):* -19.6‰
$\delta^{15}N$ *(diet):* +10.1‰
C/N ratio: 2.7

Sample: BH89, submitted on 31 August 2001 by C Atkins

Material: human bone (420gg) (left and right femora) (A Bayliss 2001)

Initial comment: the sample comes from grave 3280 (skeleton 1321). This is the lowest in a stack of at least 18 burials, and there were four burials between it and grave 3129 (BH42). Grave 3280 contained a complete, fully articulated, and apparently undisturbed skeleton.

Objectives: to establish the date of the earliest use of the cemetery to the south of the Anglo-Saxon tower.

Calibrated date: *1σ:* cal AD 1015–1030
2σ: cal AD 1015–1040

Final comment: W Rodwell (November 2003), this sample was submitted in the hope that it would provide an exceptionally early date, but it produced a vague and disappointing result, merely confirming that this part of the cemetery may have been used for burial from the early eleventh century.

Laboratory comment: English Heritage (2011), BH89 was submitted for dating to confirm the surprisingly early result from BH42 (GU-5821), which is certainly stratigraphically later. It provided a date of *cal AD 1000–1045 (65% probability) or cal AD 1090–1125 (17% probability) or cal AD 1135–1155 (13% probability; fig. 803;* Bayliss *et al* in Rodwell with Atkins 2011). The radiocarbon results are in poor agreement with the recorded relative chronology (A=16.0%; Bronk Ramsey 1995). The probability that GU-5821 is earlier than UB-4719 is less than 1% on the basis of their radiocarbon measurements. It seems that GU-5821 is an anomalous measurement, or at least an extreme statistical outlier, and was therefore excluded from the analysis.

Unfortunately, after the chronological modelling had been completed, a technical problem at the Belfast laboratory became apparent which required the recalculation of this result to 995 ±19 BP, rather than 980 ±18 BP (since withdrawn) which was used in the modelling (McCormac *et al* 2011).

References: Bronk Ramsey 1995
McCormac *et al* 2011

UB–4720 1028 ±20 BP

$\delta^{13}C$*:* -19.6 ±0.2‰
$\delta^{13}C$ *(diet):* -19.9‰
$\delta^{15}N$ *(diet):* +11.2‰
C/N ratio: 2.6

Sample: BH90, submitted on 31 August 2001 by C Atkins

Material: human bone (410g) (right humerus, left femur and tibia) (S Mays 2001)

Initial comment: the sample comes from grave 4970 (skeleton 2576). This is the second lowest in a stack of at least ten burials, and there were two burials between it and grave 7321 (BH58 - which has a preliminary radiocarbon date in the tenth century). Grave 4970 contained a decapitated, but otherwise fully articulated and apparently undisturbed, skeleton. The skull of skeleton 2576 had been cut away by grave 4966. Grave 4970 lay above grave 7415 (no skeletal material was available from this lowest grave).

Objectives: to establish the date of the earliest use of the cemetery to the north of the Anglo-Saxon tower.

Calibrated date:	*1σ:* cal AD 990–1025
	2σ: cal AD 985–1030

Final comment: W Rodwell (November 2003), the result did not fall within a positively pre-church cemetery range, but it confirmed that this part of the cemetery may have been used for burial from the late tenth century.

Laboratory comment: English Heritage (2011), BH90, which is stratigraphically earlier than BH58 (GU-5837), was submitted to test the unexpectedly early result provided by this sample. The relative dating sequence has been incorporated in the model and shows good agreement with the radiocarbon measurements. BH90 dates to *cal AD 990–1030 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

Unfortunately, after the chronological modelling had been completed, a technical problem at the Belfast laboratory became apparent which required the recalculation of this result to 1028 ±20 BP, rather than 1013 ±19 BP (since withdrawn) which was used in the modelling (McCormac *et al* 2011).

References: McCormac *et al* 2011

Barton-upon-Humber: St Peter's Church, area 10, Lincolnshire

Location:	TA 035219
	Lat. 53.40.59 N; Long. 00.25.58 W
Project manager:	C Atkins (Independent), 1978–84
Archival body:	English Heritage

Description: this series is related to the burials excavated in area 10, to the north of the Anglo-Saxon baptistery. All burials included in this series lack recorded relationships with deposits that have a direct connection with the church structure, or which may be datable by association with other features or artefacts of known date. All burials included in this series have a recorded relationship with one or more graves.

Objectives: the objective of this series is to provide dating evidence for stratified strings of burials in those parts of the excavation area where previous rounds of radiocarbon dating have shown that unassisted phasing is particularly problematic. Radiocarbon dates derived from the samples in this series will be used to refine the phasing such that it is sufficiently reliable for the associated burials to be included in palaeopathological and demographic analyses.

Final comment: C Atkins (November 2003), the results produced by this series of samples have provided a reliable means of phasing this part of the excavated cemetery. It is regrettable that it was not possible to submit these samples at an earlier stage in the post-excavation analysis.

References:	Rodwell with Atkins 2011
	Rodwell and Rodwell 1982

GU–5871 900 ±50 BP

$\delta^{13}C$*:* -19.3‰
$\delta^{15}N$ *(diet):* +7.1‰
C/N ratio: 3.2

Sample: BH74, submitted on 31 August 2001 by C Atkins

Material: human bone (325g) (left femur) (S Mays 2001)

Initial comment: this sample derives from skeleton 1574 in grave 4635, which lay in a stack of at least nine burials. The skeleton was fully articulated and lacked only its head, which had been cut away by a grave 4663 (a late coffined burial).

Objectives: to provide dating evidence to assist in the phasing of stratified strings of burials in excavation area to the north of the Anglo-Saxon baptistry, where previous rounds of radiocarbon dating have shown that unassisted phasing is particularly problematic.

Calibrated date:	*1σ:* cal AD 1030–1220
	2σ: cal AD 1020–1260

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified stack containing 11 other burials (4 above and 7 below, excluding late, coffined burials).

Laboratory comment: English Heritage, BH74 dates to *cal AD 1020–1225 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5872 610 ±60 BP

$\delta^{13}C$*:* -18.7‰
$\delta^{15}N$ *(diet):* +12.1‰
C/N ratio: 3.4

Sample: BH75, submitted on 31 August 2001 by C Atkins

Material: human bone (330g) (left and right femora) (S Mays 2001)

Initial comment: this sample derives from skeleton 1532 in grave 4753, which lay in a stack of at least eight burials. The skeleton was fully articulated and lacked only upper part of its right arm, which had been cut away by grave 4540 (a late, coffined burial).

Objectives: as GU-5871

Calibrated date: *1σ:* cal AD 1290–1410
2σ: cal AD 1270–1440

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified stack containing 12 other burials (4 above and 8 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH75 dates to *cal AD 1280–1355 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011). It should be noted that in reality this may have been interred as late as AD 1420, as the uniform prior distribution of the model constrains these estimates to be slightly earlier than they would be otherwise.

GU–5873 750 ±50 BP

δ¹³C: -18.2‰
δ¹⁵N (diet): +13.5‰
C/N ratio: 3.4

Sample: BH76, submitted on 31 August 2001 by C Atkins

Material: human bone (320g) (left femur) (S Mays 2001)

Initial comment: this sample derives from skeleton 1644 in grave 4792, which lay in a stack of at least eight burials. The skeleton was fully articulated and lacked only upper part of its right arm, which had been cut away by grave 4669.

Objectives: as GU-5871

Calibrated date: *1σ:* cal AD 1240–1290
2σ: cal AD 1200–1380

Final comment: C Atkins, the submission of this sample for scientific dating has provided a dated division within a stratified stack containing 15 other burials (8 above and 7 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), this burial (BH76) provided a date of *cal AD 1185–1305 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5874 640 ±50 BP

δ¹³C: -19.3‰
δ¹⁵N (diet): +9.8‰
C/N ratio: 3.6

Sample: BH77, submitted on 31 August 2001 by C Atkins

Material: human bone (246g) (fragments of right femur and pelvis) (A Bayliss 2001)

Initial comment: this sample derives from skeleton 1572 in grave 4634, which lay in a stack of at least eight burials. The grave had been cut away at the east end by grave 4556, and the skull had been disturbed by grave 4630, but the remainder of the skeleton was articulated and had not been disturbed.

Objectives: as GU-5871

Calibrated date: *1σ:* cal AD 1280–1400
2σ: cal AD 1270–1420

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified stack containing six other burials (two above and four below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH77 dates to *cal AD 1275–1360 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011). It should be noted that in reality this (and BH52 and BH79), may have been interred as late as AD 1400, as the uniform prior distribution of the model constrains these estimates to be slightly earlier than they would be otherwise.

GU–5875 580 ±50 BP

δ¹³C: -18.2‰
δ¹⁵N (diet): +13.3‰
C/N ratio: 3.3

Sample: BH78, submitted on 31 August 2001 by C Atkins

Material: human bone (325g) (right femur) (S Mays 2001)

Initial comment: this sample derives from skeleton 1738 in grave 4695, which lay in a stack of at least four burials. The skeleton was found complete and fully articulated.

Objectives: as GU-5871

Calibrated date: *1σ:* cal AD 1300–1420
2σ: cal AD 1280–1440

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified stack containing five other burials (all above, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH78 dates to *cal AD 1290–1355 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

Barton-upon-Humber: St Peter's Church, area 14, Lincolnshire

Location: TA 035219
Lat. 53.40.59 N; Long. 00.25.58 W

Project manager: C Atkins (Independent), 1978–84

Archival body: English Heritage

Description: this series is related to the burials excavated in area 14, to the north of the Anglo-Saxon tower. All burials included in this series lack recorded relationships with deposits that have a direct connection with the church structure, or which may be datable by association with other features or artefacts of known date. All burials included in this series have a recorded relationship with one or more graves.

Objectives: the objective of this series is to provide dating evidence for stratified strings of burials in those parts of the excavation area where previous rounds of radiocarbon dating have shown that unassisted phasing is particularly problematic. Radiocarbon dates derived from the samples in this series will be used to refine the phasing such that it is sufficiently reliable for the associated burials to be included in palaeopathological and demographic analyses.

Final comment: C Atkins (November 2003), the results produced by this series of samples have provided a reliable means of phasing this part of the excavated cemetery. It is regrettable that it was not possible to submit these samples at an earlier stage in the post-excavation analysis.

References: Rodwell and Atkins 2011
Rodwell and Rodwell 1982

GU–5876 670 ±50 BP

$\delta^{13}C$: -16.9‰
$\delta^{15}N$ *(diet):* +6.3‰
C/N ratio: 3.0

Sample: BH79, submitted on 31 August 2001 by C Atkins

Material: human bone (225g) (left femur) (S Mays 2001)

Initial comment: this sample derives from skeleton 2352 in grave 7220, which lay in a stack of at least 14 burials. The skeleton was found complete and fully articulated.

Objectives: to provide dating evidence to assist in the phasing of stratified strings of burials in excavation area to the north of the Anglo-Saxon tower, where previous rounds of radiocarbon dating have shown that unassisted phasing is particularly problematic.

Calibrated date: *1σ:* cal AD 1270–1390
2σ: cal AD 1260–1410

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified set of stacks containing 26 other burials (11 above and 15 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH79 dates to *cal AD 1255–1360 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011). It should be noted that in reality this (and BH52 and BH77), may have been interred as late as AD 1400, as the uniform prior distribution of the model constrains these estimates to be slightly earlier than they would be otherwise.

GU–5877 710 ±50 BP

$\delta^{13}C$: -19.1‰
$\delta^{15}N$ *(diet):* +11.8‰
C/N ratio: 3.1

Sample: BH80, submitted on 31 August 2001 by C Atkins

Material: human bone (340g) (left femur and left tibia) (S Mays 2001)

Initial comment: this sample derives from skeleton 2238 in grave 4877, which lay in a stack of at least eight burials. The lower part of the body had been cut away by grave 7160, and the skull had been squashed by grave 7027, but the remainder of the body was fully articulated.

Objectives: as GU-5876

Calibrated date: *1σ:* cal AD 1260–1300
2σ: cal AD 1220–1390

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified set of stacks containing eight other burials (one above and seven below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH80 dated to *cal AD 1215–1330 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5878 500 ±50 BP

$\delta^{13}C$: -19.0‰
$\delta^{15}N$ *(diet):* +13.0‰
C/N ratio: 3.4

Sample: BH81, submitted on 31 August 2001 by C Atkins

Material: human bone (215g) (left femur) (S Mays 2001)

Initial comment: this sample derives from skeleton 2243 in grave 4880, which lay in a stack of at least seven burials. The skeleton was fully articulated and lacked only the upper left arm, which had been cut away by grave 4876.

Objectives: as GU-5876

Calibrated date: *1σ:* cal AD 1400–1450
2σ: cal AD 1310–1460

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified set of stacks containing 24 other burials (10 above and 14 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH81 has poor agreement with the uniform prior distribution of the model (A=32.9%; Bronk Ramsey 1995), as it is rather late and extends into the period which was not sampled representatively for radiocarbon dating. For this reason it was excluded from the model.

References: Bronk Ramsey 1995

GU–5879 600 ±50 BP

$\delta^{13}C$: -18.3‰
$\delta^{15}N$ *(diet):* +13.5‰
C/N ratio: 3.4

Sample: BH82, submitted on 31 August 2001 by C Atkins

Material: human bone (220g) (fragments of left and right femora) (A Bayliss 2001)

Initial comment: this sample derives from skeleton 2436 in grave 7290, which lay in a stack of at least eight burials. The skeleton was fully articulated but lacked the right arm, which had been cut away by grave 7211.

Objectives: as GU-5876

Calibrated date: *1σ:* cal AD 1290–1410
2σ: cal AD 1280–1430

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified set of stacks containing 14 other burials (9 above and 5 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH82 dates to *cal AD 1285–1355 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5880 710 ±50 BP

$\delta^{13}C$: -18.0‰
$\delta^{15}N$ *(diet):* +14.9‰
C/N ratio: 3.4

Sample: BH83, submitted on 31 August 2001 by C Atkins

Material: human bone (460g) (right femur) (S Mays 2001)

Initial comment: this sample derives from skeleton 2499 in grave 7212, which lay in a stack of at least eight burials. The skeleton was fully articulated and complete.

Objectives: as GU-5876

Calibrated date: *1σ:* cal AD 1260–1300
2σ: cal AD 1220–1390

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified set of stacks containing 19 other burials (7 above and 12 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH83 dates to *cal AD 1215–1330 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

Barton-upon-Humber: St Peter's Church, area 8, Lincolnshire

Location: TA 035219
Lat. 53.40.59 N; Long. 00.25.58 W

Project manager: C Atkins (Independent), 1978–84

Archival body: English Heritage

Description: this series is related to the burials excavated in area 8, to the south of the Anglo-Saxon tower and baptistry. All burials included in this series lack recorded relationships with deposits that have a direct connection with the church structure, or which may be datable by association with other features or artefacts of known date. All burials included in this series have a recorded relationship with one or more graves.

Objectives: the objective of this series is to provide dating evidence for stratified strings of burials in those parts of the excavation area where previous rounds of radiocarbon dating have shown that unassisted phasing is particularly problematic. Radiocarbon dates derived from the samples in this series will be used to refine the phasing such that it is sufficiently reliable for the associated burials to be included in palaeopathological and demographic analyses.

Final comment: C Atkins (November 2003), the results produced by this series of samples have provided a reliable means of phasing this part of the excavated cemetery. It is regrettable that it was not possible to submit these samples at an earlier stage in the post-excavation analysis.

References: Rodwell with Atkins 2011
Rodwell and Rodwell 1982

GU–5866 770 ±50 BP

$\delta^{13}C$: -18.6‰
$\delta^{15}N$ *(diet):* +10.0‰
C/N ratio: 3.4

Sample: BH84, submitted on 31 August 2001 by C Atkins

Material: human bone (365g) (right femur) (S Mays 2001)

Initial comment: this sample derives from skeleton 641 in grave 3492, which lay in a stack of at least 20 burials. The skeleton was found complete and fully articulated, except for the left arm, which had been cut away by grade 3472.

Objectives: to provide dating evidence to assist in the phasing of stratified strings of burials in excavation area to the south of the Anglo-Saxon tower, where previous rounds of radiocarbon dating have shown that unassisted phasing is particularly problematic.

Calibrated date: *1σ:* cal AD 1220–1280
2σ: cal AD 1160–1300

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified set of stacks containing 35 other burials (13 above and 22 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH84 is in good agreement with the recorded stratigraphy. It provided a date of *cal AD 1160–1175 (2% probability) or cal AD 1180–1300 (93% probability; fig. 803;* Bayliss *et al* in Rodwell with Atkins 2011).

GU–5867 770 ±50 BP

$\delta^{13}C$: -18.8‰
$\delta^{15}N$ *(diet):* +14.3‰
C/N ratio: 3.3

Sample: BH85, submitted on 31 August 2001 by C Atkins

Material: human bone (230g) (right femur) (S Mays 2001)

Initial comment: this sample derives from skeleton 539 in grave 3490, which lay in a stack of at least 13 burials. The skeleton was found almost complete (the right shoulder was cut away by grave 3050) and fully articulated.

Objectives: as GU-5866

Calibrated date: *1σ:* cal AD 1220–1280
2σ: cal AD 1160–1300

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified set of stacks containing nine other burials (three above and six below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH85 dates to *cal AD 1160–1175 (2% probability)* or *cal AD 1180–1300 (93% probability; fig. 803*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5868 190 ±50 BP

$\delta^{13}C$: -20.6‰
$\delta^{15}N$ *(diet):* +9.9‰
C/N ratio: 4.2

Sample: BH86, submitted on 31 August 2001 by C Atkins

Material: human bone (325g) (right femur) (A Bayliss 2001)

Initial comment: this sample derives from skeleton 898 in grave 7869, which lay in a stack of at least eight burials. The skeleton lacked head and left arm, which had been cut away by grave 7934, but the remainder was fully articulated.

Objectives: as GU-5866

Calibrated date: *1σ:* cal AD 1650–1955*
2σ: cal AD 1640–1955*

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified set of stacks containing eight other burials (two above and six below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), the two measurements on skeleton 898 (GU-5868 and GU-5897) are statistically consistent (T'=0.0; T'(5%)=3.8; ν=1; Ward and Wilson 1978), and so a weighted mean can be taken before calibration (185 ±35 BP; cal AD 1640–1955* at 2σ; Reimer *et al* 2004). It is late, and so falls within the period of use of the cemetery which was not representatively sampled for radiocarbon dating. Consequently, the results have poor agreement with the uniform prior distribution incorporated into the model (A=8.4% and A=0.1%; Bronk Ramsey 1995), and were excluded from the mathematical analysis. The simple calibrated date of these measurements is cal AD 1650–1950 (2σ; Reimer *et al* 2004). However, we know that St Peter's churchyard ceased to be used for burial after AD 1851, and so this information can be used to provide posterior density estimates for the date of this burial (along with BH65; GU-5843) of *cal AD 1650–1700 (25% probability)* or *cal AD 1720–1820 (66% probability)* or *cal AD 1830–1860 (4% probability; fig. 805*; Bayliss *et al* in Rodwell with Atkins 2011).

Laboratory comment: SURRC Radiocarbon Dating Laboratory (AMS) (1 February 2002), this sample gave some concern because of the loss of benzene during storage, possibly resulting in fractionation.

References: Bronk Ramsey 1995
Reimer *et al* 2004
Ward and Wilson 1978

GU–5869 760 ±50 BP

$\delta^{13}C$: -19.4‰
$\delta^{15}N$ *(diet):* +11.5‰
C/N ratio: 3.5

Sample: BH87, submitted on 31 August 2001 by C Atkins

Material: human bone (435g) (left femur) (S Mays 2001)

Initial comment: this sample derives from skeleton 671 in grave 3092, which lay in a stack of at least nine burials. The skeleton was found complete and fully articulated.

Objectives: as GU-5866

Calibrated date: *1σ:* cal AD 1220–1290
2σ: cal AD 1180–1300

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified set of stacks containing 19 other burials (10 above and 9 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH87 is in good agreement with the recorded stratigraphy. It provided a date of *cal AD 1185–1305 (95% probability; fig. 803;* Bayliss *et al* in Rodwell with Atkins 2011).

GU–5870 770 ±50 BP

$\delta^{13}C$: -19.4‰
$\delta^{15}N$ *(diet):* +13.4‰
C/N ratio: 3.4

Sample: BH88, submitted on 31 August 2001 by C Atkins

Material: human bone (220g) (left femur) (S Mays 2001)

Initial comment: this sample derives from skeleton 748 in grave 3089, which lay in a stack of at least 11 burials. The skeleton was found complete, except for the lower left arm, which had been cut away by grave 3344 and fully articulated.

Objectives: as GU-5866

Calibrated date: *1σ:* cal AD 1220–1280
2σ: cal AD 1160–1300

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has provided a dated division within a stratified set of stacks containing 27 other burials (14 above and 13 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH88 dates to *cal AD 1160–1175 (2% probability)* or *cal AD 1180–1300 (93% probability; fig. 803*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5897 180 ±50 BP

$\delta^{13}C$: -19.2‰

Sample: BH86, submitted in 2002 by C Atkins

Material: human bone (325g) (right femur) (S Mays 2001)

Initial comment: a replicate of GU-5868.

Objectives: as GU-5868

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1640–1955*

Final comment: see GU-5868

Laboratory comment: see GU-5868

Laboratory comment: see GU-5868

Barton-upon-Humber: St Peter's Church, middle Saxon ditch series, Lincolnshire

Location: TA 035219
Lat. 53.40.59 N; Long. 00.25.58 W

Project manager: W Rodwell (Independent), 1983

Archival body: English Heritage

Description: a large sub-circular earthwork, believed to be of middle Saxon origin, enclosing the nucleus of early settlement at Barton. The late Saxon cemetery, which underlies St Peter's church, was established immediately outside this earthwork to the west. Some of the earliest graves were cut into the silting of the ditch, and the ditch can only be dated by the aceramic midden material found in its fills.

Objectives: to establish a date for the large sub-circular earthwork.

Final comment: W Rodwell (November 2003), unfortunately, there was some confusion about deposit reference numbers with the result that the two samples in this series were derived from a single deposit associated with a ditch cut by the sub-circular earthwork, rather than from the earthwork itself. Consequently, the series did not answer the objective but instead provided a broad date range for the material contained by the earlier ditch.

References: Rodwell with Atkins 2011

OxA–8780 1510 ±40 BP

$\delta^{13}C$: -21.7‰

Sample: BH20, submitted in March 1999 by W Rodwell

Material: animal bone (>10g) (sheep or goat; right mandible) (S Davis)

Initial comment: one of two samples from the primary fill, F3890, from 1.9m below the modern surface.

Objectives: to establish the date of the primary silting of the enclosure ditch and to provide a *terminus anti quem* for the beginning of the overlying cemetery.

Calibrated date: *1σ:* cal AD 530–610
2σ: cal AD 420–650

Final comment: see series comments

OxA–8866 1655 ±25 BP

$\delta^{13}C$: -21.2‰

Sample: BH21, submitted in March 1999 by W Rodwell

Material: animal bone: *Bos* sp., second phalanx (>10g) (S Payne)

Initial comment: as OxA-8780

Objectives: as OxA-8780

Calibrated date: *1σ:* cal AD 380–420
2σ: cal AD 330–430

Final comment: see series comments

Barton-upon-Humber: St Peter's Church, phase B/C, Lincolnshire

Location: TA 035219
Lat. 53.40.59 N; Long. 00.25.58 W

Project manager: C Atkins (Independent), 1978–84

Archival body: English Heritage

Description: this series relates to the burials which, on the basis of relative depth and alignment, have been assigned to post-excavation burial phase B/C. All burials included in this series lack recorded relationships with deposits that have a direct connection with the church structure, or which may be datable by association with other features or artefacts of known date. This lack of dating evidence resulted in the need to rely upon alignment and depth as indicators of possible association with other more securely stratified burials in the immediate vicinity. All burials included in this series have a recorded relationship with one or more graves.

Objectives: the objective is to ascertain whether the use of relative depths and alignments of graves as broad indicators of burial phase is sufficiently reliable for those burials to be included in palaeopathological and demographic analyses.

Final comment: C Atkins (November 2003), the results produced by this series of samples demonstrated that although the relative depths and alignments of graves may usefully be employed as indicators of an approximate period of burial for individual interments, they cannot be relied upon in all circumstances. In certain parts of the excavated cemetery it was found that the relative depth and alignment of the graves could be positively misleading, and in such areas phasing was only possible with the aid of scientific dating techniques. It is therefore regrettable that it was not possible to submit this series of samples at an earlier stage in the post-excavation analysis of the cemetery. As a consequence of the fact that most of the scientific dating results straddled a burial phase boundary, the majority of the single phase allocations (ie to burial phases B, C, or D) were scrapped in favour of double phase allocations (ie burial phases B/C, C/D, and D/E) during the recent re-phasing of the exterior cemetery.

References: Rodwell and Atkins 2011
Rodwell and Rodwell 1982

GU–5823 520 ±50 BP

$\delta^{13}C$: -20.0‰
$\delta^{15}N$ *(diet)*: +13.3‰

Sample: BH44, submitted on 18 December 2000 by C Atkins

Material: human bone (230g) (left humerus and left radius) (S Mays)

Initial comment: from skeleton 272 in grave 3342. An adult male, approximately 40 years-old at death. The skeleton was fully articulated but his lower right leg and both feet had been cut away by grave 3332. Grave 3342 lay in a stack above a minimum of seven earlier burials and below two other burials.

Objectives: to test the validity of assigning this burial to burial phase B/C, on the basis of relative depths and alignments in the cemetery to the south of the Saxon church.

Calibrated date: *1σ:* cal AD 1400–1440
2σ: cal AD 1300–1460

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was reasonable to assign the burial to phase B/C on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has also helped to refine the burial phase allocation and has provided a dated upper limit for 27 other burials.

Laboratory comment: English Heritage (2011), four samples (GU-5823, -5839, -5844, and -5845) provide simple calibrated dates which span the violent fourteenth-century 'wiggle' in the radiocarbon calibration curve. They produce posterior density estimates of *cal AD 1300–1350, 1260–1360, 1250–1360,* and *1215–1355* respectively (*fig. 803*; Bayliss *et al* in Rodwell with Atkins 2011). It should be noted that in reality these burials may have been interred as late as *c* AD 1400, since the uniform prior distribution of the model constrains these estimates to be slightly earlier than they would be otherwise.

GU–5824 420 ±50 BP

$\delta^{13}C$: -17.3‰
$\delta^{15}N$ *(diet):* +12.3‰

Sample: BH45, submitted on 18 December 2000 by C Atkins

Material: human bone (230g) (left femur) (S Mays)

Initial comment: from skeleton 333 in grave 3374. An adult female, approximately 25 years-old at death. The skeleton was fully articulated and complete. Grave 3374 lay in a stack above six graves and below three other graves.

Objectives: as GU-5823

Calibrated date: *1σ:* cal AD 1430–1490
2σ: cal AD 1410–1640

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was entirely reasonable to assign the burial to phase B/C on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has failed to refine the burial phase allocation but it has provided a dated division between 33 other burials (4 above and 29 below).

Laboratory comment: English Heritage (2011), BH45 was excluded from the chronological modelling as it is rather late. This means it falls within part of the cemetery which has not been representatively sampled for radiocarbon dating. The simple calibrated date confirms its allocation to phase B/C.

GU–5826 870 ±60 BP

$\delta^{13}C$: -23.4‰
$\delta^{15}N$ *(diet):* +11.6‰

Sample: BH47, submitted on 18 December 2000 by C Atkins

Material: human bone (270g) (left femur and right humerus) (S Mays)

Initial comment: from skeleton 1606 in grave 4643. An adult female skeleton found fully articulated but lacking her head and left arm, which had been cut away by grave 4663. Grave 4643 lay in a stack above two earlier graves and below three later graves.

Objectives: as GU-5823

Calibrated date: *1σ:* cal AD 1040–1230
2σ: cal AD 1020–1280

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was not reasonable to assign the burial to phase B/C on the basis of its depth and alignment. Relatively few burials, and no securely stratified deposits relating to periods of church construction in this part of the cemetery, meant that allocation to a burial phase was extremely challenging. In this case, scientific dating provided a much earlier than expected date and a dated division between 14 other burials (7 above and 7 below).

Laboratory comment: English Heritage (2011), BH47 dates to *cal AD 1030–1265 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5827 390 ±50 BP

$\delta^{13}C$: -17.6‰
$\delta^{15}N$ *(diet):* +11.7‰

Sample: BH48, submitted on 18 December 2000 by C Atkins

Material: human bone (220g) (left and right humeri) (S Mays)

Initial comment: from skeleton 1673 in grave 4653. An adult male. The skeleton was fully articulated but with the lower body lying outside of the excavation trench. Grave 4653 lay above two earlier graves and below one later grave.

Objectives: as GU-5823

Calibrated date: *1σ:* cal AD 1440–1620
2σ: cal AD 1420–1650

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was entirely reasonable to assign the burial to phase B/C on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has failed to refine the burial phase allocation but it has provided a dated division between four other burials (two above and two below), in an under-used part of the cemetery.

Laboratory comment: English Heritage (2011), BH48 was excluded from the model as it is later than the main phase of the cemetery dated by radiocarbon.

GU–5832 1010 ±50 BP

$\delta^{13}C$: -19.9‰
$\delta^{15}N$ *(diet):* +11.3‰

Sample: BH53, submitted on 18 December 2000 by C Atkins

Material: human bone (280g) (left femur) (S Mays)

Initial comment: from skeleton 2139 in grave 5246. An adult male. The skeleton was fully articulated but his head had been cut away by grave 5187. Grave 5246 lay in an area of the cemetery which was little used for burial, at the bottom of a small stack of burials, below three late coffin burials

Objectives: as GU-5823

Calibrated date: *1σ:* cal AD 980–1040
2σ: cal AD 900–1160

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating appeared to demonstrate that, in this instance, it was not reasonable to assign the burial to phase B/C on the basis of its depth and alignment.

Relatively few burials, and relatively few securely stratified deposits relating to periods of church construction in this part of the cemetery, meant that allocation to a burial phase was something of a challenge. However, scientific dating provided a very much earlier than expected date, prompting doubts as to its validity, and consequently a second sample was submitted.

Laboratory comment: English Heritage (2011), the two measurements on skeleton 2139 (GU-5832 and GU-5865) are statistically significantly different at 95% confidence (T'=5.8; $T'(5\%)$=3.8; ν=1; Ward and Wilson 1978), but are sufficiently similar to allow a weighted mean to be taken before calibration (926 ±35 BP). This provides a date for the burial of *cal AD 1020–1190 (94% probability)* or *cal AD 1200–1210 (1% probability*; *fig. 810*; Bayliss *et al* in Rodwell with Atkins 2011).

References: Ward and Wilson 1978

GU–5836 850 ±90 BP

$\delta^{13}C$: -20.3‰
$\delta^{15}N$ *(diet)*: +9.8‰

Sample: BH57, submitted on 18 December 2000 by C Atkins

Material: human bone (220g) (right tibia) (S Mays)

Initial comment: from skeleton 2259 in grave 7204. An adult female. The skeleton was fully articulated, but the right side of her torso had been cut away by later graves. Grave 7204 lay in a stack of burials, above six earlier graves and below three later graves.

Objectives: as GU-5823

Calibrated date: *1σ:* cal AD 1040–1270
2σ: cal AD 1010–1300

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was not reasonable to assign the burial to phase B/C on the basis of its depth and alignment. In this case, scientific dating provided a much earlier than expected date and a dated division between 18 other burials (12 above and 6 below, excluding late coffins).

Laboratory comment: English Heritage, BH57 dates to *cal AD 1035–1145 (27% probability)* or *cal AD 1150–1285 (68% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5846 680 ±50 BP

$\delta^{13}C$: -19.0‰
$\delta^{15}N$ *(diet)*: +12.1‰

Sample: BH68, submitted on 18 December 2000 by C Atkins

Material: human bone (300g) (right femur and left tibia) (S Mays)

Initial comment: from skeleton 1780 in grave 3930. An adult female. The skeleton was complete and fully articulated. Grave 3930 lay above two earlier burials and below two later burials, cut into a very mixed graveyard soil over fills of an early Saxon ditch.

Objectives: to test the validity of assigning this burial to phase B/C, on the basis of relative depths and alignments in the cemetery to the north of the church. Also, to test the lower limit of an aligned group of burials, which lay above the early coffined burials previously assigned to burial phase E. Dendrochronological dating of one of these early coffins indicated it belonged to burial phase D.

Calibrated date: *1σ:* cal AD 1270–1390
2σ: cal AD 1250–1400

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was not unreasonable to assign the burial to phase B/C on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating was unable to be as usefully precise as one might like, but suggested that a slightly earlier interment was possible than had been expected. The radiocarbon date provided a dated division between ten other burials (six above and four below).

Laboratory comment: English Heritage (2011), BH68 was one of two burials radiocarbon dated to the north of the wide north aisle. It dates to *cal AD 1240–1335 (92% probability)* or *cal AD 1340–1360 (3% probability*; *fig. 810*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5865 840 ±50 BP

$\delta^{13}C$: -18.8‰
$\delta^{15}N$ *(diet)*: +12.3‰
C/N ratio: 3.4

Sample: BH53A, submitted on 18 December 2000 by C Atkins

Material: human bone (330g) (right femur) (S Mays)

Initial comment: a replicate of GU-5832.

Objectives: as GU-5823

Calibrated date: *1σ:* cal AD 1160–1260
2σ: cal AD 1040–1280

Final comment: C Atkins (November 2003), this second sample was submitted to test the unexpectedly early date supplied by the first sample from the skeleton. Although the date ranges produced by the two samples were not identical, they did overlap and they demonstrated that in this instance it was not reasonable to assign the burial to phase B/C on the basis of its depth and alignment. The phasing of only two other burials was affected by this dated sample.

Laboratory comment: see GU-5832

Barton-upon-Humber: St Peter's Church, phase C, Lincolnshire

Location: TA 035219
Lat. 53.40.59 N; Long. 00.25.58 W

Project manager: C Atkins (Independent), 1978–84

Archival body: English Heritage

Description: this series relates to the burials which, on the basis of relative depth and alignment, have been assigned to post-excavation burial phase C. All burials included in this series lack recorded relationships with deposits that have a direct connection with the church structure, or which may be datable by association with other features or artefacts of known date. This lack of dating evidence resulted in the need to rely upon alignment and depth as indicators of possible association with other more securely stratified burials in the immediate vicinity. All burials included in this series have a recorded relationship with one or more graves.

Objectives: the objective is to ascertain whether the use of relative depths and alignments of graves as broad indicators of burial phase is sufficiently reliable for those burials to be included in palaeopathological and demographic analyses.

Final comment: C Atkins (November 2003), the results produced by this series of samples demonstrated that although the relative depths and alignments of graves may usefully be employed as indicators of an approximate period of burial for individual interments, they cannot be relied upon in all circumstances. In certain parts of the excavated cemetery it was found that the relative depth and alignment of the graves could be positively misleading, and in such areas phasing was only possible with the aid of scientific dating techniques. It is therefore regrettable that it was not possible to submit this series of samples at an earlier stage in the post-excavation analysis of the cemetery. As a consequence of the fact that most of the scientific dating results straddled a burial phase boundary, the majority of the single phase allocations (ie to burial phases B, C, or D) were scrapped in favour of double phase allocations (ie burial phases B/C, C/D, and D/E) during the recent re-phasing of the exterior cemetery.

References: Rodwell and Atkins 2011
Rodwell and Rodwell 1982

GU–5831 690 ±50 BP

$\delta^{13}C$: -19.7‰
$\delta^{15}N$ *(diet):* +13.2‰

Sample: BH52, submitted on 18 December 2000 by C Atkins

Material: human bone (240g) (distal part of left femur) (S Mays)

Initial comment: from skeleton 2304 in grave 4901. An adult male. The skeleton was fully articulated, but the upper body and lower left leg had been cut away by later graves. Grave 4901 lay in a stack of graves, above three earlier graves and below three later graves.

Objectives: to test the validity of assigning this burial to phase C, on the basis of relative depths and alignments in the cemetery to the north of the church. Also, to provide an upper date limit for the stack of three significantly deeper graves, two of which contain roves, which lie below grave 4901.

Calibrated date: *1σ:* cal AD 1270–1390
2σ: cal AD 1250–1400

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase C on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has failed to refine the burial phase allocation, but has provided a dated division within a set of related stacks containing 20 other burials (11 above and 9 below).

Laboratory comment: English Heritage (2011), BH52 dates to *cal AD 1220–1335 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011). It should be noted that in reality this (and BH79 and BH77), may have been interred as late as AD 1400, as the uniform prior distribution of the model constrains these estimates to be slightly earlier than they would be otherwise.

GU–5833 620 ±50 BP

$\delta^{13}C$: -20.4‰
$\delta^{15}N$ *(diet):* +10.8‰

Sample: BH54, submitted on 18 December 2000 by C Atkins

Material: human bone (220g) (left femur and right fibula) (S Mays)

Initial comment: from skeleton 2348 in grave 5335. An adult female. The skeleton was fully articulated but lacking most of her left arm, which had been cut away by grave 5334. Grave 5335 lay above one earlier burial, and below two later burials in sparse stack.

Objectives: to test the validity of assigning this burial to phase C, on the basis of relative depths and alignments in the cemetery to the north of the church.

Calibrated date: *1σ:* cal AD 1290–1410
2σ: cal AD 1270–1420

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase C on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has failed to refine the burial phase allocation, but has provided a dated division within a stack containing six other burials (three above and three below).

Laboratory comment: English Heritage (2011), BH54 provides a date for the burial of *cal AD 1280–1355 (95% probability*; *fig. 810*; Bayliss *et al* in Rodwell with Atkins 2011). It is possible that this burial may have been interred slightly later than these estimates in reality, since the uniform prior distribution of the model constrains these estimates to be slightly earlier than they would be otherwise.

GU–5839 660 ±50 BP

$\delta^{13}C$: -18.8‰
$\delta^{15}N$ *(diet):* +12.8‰

Sample: BH60, submitted on 18 December 2000 by C Atkins

Material: human bone (250g) (left femur) (S Mays)

Initial comment: from skeleton 2701(A) in grave 7551. An adult female who appeared to have died in childbirth. The skeleton was found fully articulated. Grave 7551 lay in a stack above three graves and below five graves.

Objectives: as GU-5833

Calibrated date: *1σ:* cal AD 1280–1390
2σ: cal AD 1260–1410

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase C on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has failed to refine the burial phase allocation, but has provided a dated division within a set of related stacks containing 28 other burials (17 above and 11 below).

Laboratory comment: see GU-5823

GU–5841 810 ±50 BP

$\delta^{13}C$: -18.6‰
$\delta^{15}N$ *(diet):* +12.6‰

Sample: BH62, submitted on 18 December 2000 by C Atkins

Material: human bone (330g) (left femur) (S Mays)

Initial comment: from skeleton 649 in grave 7714. An adult male. This skeleton was found fully articulated, but the head and upper body had been removed by grave 7715. Grave 7714 lay above three skeletons and below four skeletons.

Objectives: as GU-5833

Calibrated date: *1σ:* cal AD 1180–1270
2σ: cal AD 1050–1290

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase C on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has failed to refine the burial phase allocation, but has provided a dated division within a stack containing six other burials (three above and three below).

Laboratory comment: English Heritage (2011), BH62 was buried in *cal AD 1065–1090 (3% probability)* or *cal AD 1120–1140 (3% probability)* or *cal AD 1155–1295 (89% probability; fig. 803*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5856 830 ±60 BP

$\delta^{13}C$: -18.9‰
$\delta^{15}N$ *(diet):* +14.0‰

Sample: BH63, submitted on 18 December 2000 by C Atkins

Material: human bone (250g) (right femur) (S Mays)

Initial comment: from skeleton 765 in grave 7799. An adult male. The skeleton was found complete and fully articulated. Grave 7799 lay midway down a sparse stack of five burials.

Objectives: as GU-5833

Calibrated date: *1σ:* cal AD 1160–1270
2σ: cal AD 1030–1290

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was not reasonable to assign the burial to phase C on the basis of its depth and alignment. In this case, scientific dating provided a much earlier than expected date and a dated division between 24 other burials (20 above and 4 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH63 provided a date of *cal AD 1035–1100 (14% probability)* or *cal AD 1110–1145 (7% probability)* or *cal AD 1150–1285 (74% probability; fig. 803*; Bayliss *et al* in Rodwell with Atkins 2011).

Barton-upon-Humber: St Peter's Church, phase C/D, Lincolnshire

Location: TA 035219
Lat. 53.40.59 N; Long. 00.25.58 W

Project manager: C Atkins (Independent), 1978–84

Archival body: English Heritage

Description: this series relates to the burials which, on the basis of relative depth and alignment, have been assigned to post-excavation burial phase C/D. All burials included in this series lack recorded relationships with deposits that have a direct connection with the church structure, or which may be datable by association with other features or artefacts of known date. This lack of dating evidence resulted in the need to rely upon alignment and depth as indicators of possible association with other more securely stratified burials in the immediate vicinity. All burials included in this series have a recorded relationship with one or more graves.

Objectives: the objective is to ascertain whether the use of relative depths and alignments of graves as broad indicators of burial phase is sufficiently reliable for those burials to be included in palaeopathological and demographic analyses.

Final comment: C Atkins (November 2003), the results produced by this series of samples demonstrated that although the relative depths and alignments of graves may usefully be employed as indicators of an approximate period of burial for individual interments, they cannot be relied upon in all circumstances. In certain parts of the excavated cemetery, it was found that the relative depth and alignment of the graves could be positively misleading, and in such areas phasing was only possible with the aid of scientific dating techniques. It is therefore regrettable that it was not possible to submit this series of samples at an earlier stage in the post-excavation analysis of the cemetery. As a consequence of the fact that most of the scientific dating results straddled a burial phase boundary, the majority of the single phase allocations (ie to burial phases B, C, or D) were scrapped in favour of double phase allocations (ie burial phases B/C, C/D, and D/E) during the recent re-phasing of the exterior cemetery.

References: Rodwell with Atkins 2011
Rodwell and Rodwell 1982

GU–5830 960 ±50 BP

$\delta^{13}C$: -21.7‰
$\delta^{15}N$ *(diet)*: +12.1‰

Sample: BH51, submitted on 18 December 2000 by C Atkins

Material: human bone (260g) (left tibia) (S Mays)

Initial comment: from skeleton 2282 in grave 4897. An adult male. The skeleton was fully articulated, but the head and left arm had been cut away by lower burials. Grave 4897 ay in a stack of graves, above two earlier burials and below four later graves.

Objectives: to test the validity of assigning this burial to burial phase C/D, on the basis of relative depths and alignments in the cemetery to the north of the Saxon church.

Calibrated date: *1σ:* cal AD 1020–1160
2σ: cal AD 980–1210

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase C/D on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has slightly shifted, but failed to tighten, the burial phase allocation, and has provided a dated division within a set of related stacks containing ten other burials (seven above and three below).

Laboratory comment: English Heritage (2011), BH51 dates to *cal AD 995–1190 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5835 840 ±60 BP

$\delta^{13}C$: -20.6‰
$\delta^{15}N$ *(diet)*: +11.8‰

Sample: BH56, submitted on 18 December 2000 by C Atkins

Material: human bone (210g) (right tibia) (S Mays)

Initial comment: from skeleton 2242 in grave 7161. An adult male. The skeleton was fully articulated, but his head and left shoulder had been cut away by later graves. Grave 7161 lay above three earlier graves and below four later graves.

Objectives: as GU-5830

Calibrated date: *1σ:* cal AD 1150–1270
2σ: cal AD 1030–1280

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase C/D on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has also helped to refine the burial phase allocation, and has provided a dated division between 17 other burials (9 above and 8 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH56 dated to *cal AD 1040–1100 (9% probability)* or *cal AD 1110–1145 (7% probability)* or *cal AD 1150–1285 (79% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5843 200 ±60 BP

$\delta^{13}C$: -19.2‰
$\delta^{15}N$ *(diet)*: +11.1‰

Sample: BH65, submitted on 18 December 2000 by C Atkins

Material: human bone (230g) (left femur) (S Mays)

Initial comment: from skeleton 1000 in grave 7944. An adult female. The skeleton was fully articulated, but the upper body (from the top of the pelvis up) was not excavated because it lay outside the trench. Grave 7944 lay over grave 3159, there were no other stratigraphic relationships recorded.

Objectives: as GU-5830

Calibrated date: *1σ:* cal AD 1640–1955*
2σ: cal AD 1520–1955*

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was not at all reasonable to assign the burial to burial phase C/D on the basis of its depth and alignment. Relatively few burials, and no securely stratified deposits, relating to periods of church construction in this part of the cemetery, meant that allocation to a burial phase was extremely challenging. In this case, scientific dating provided a much later than expected date and a dated upper limit for three other graves.

Laboratory comment: English Heritage (2011), BH65 was sampled in the area to the west of the annexe as part of the programme to test the preliminary phasing structure. It was late, and so fell within the period of use of the cemetery which was not representatively sampled for radiocarbon dating. Consequently the results have poor agreement with the uniform prior distribution incorporated into the model (A=8.4% and A=0.1%; Bronk Ramsey 1995), and have been excluded from the mathematical analysis. The simple calibrated date of this measurement is cal AD 1520–1955* (2σ; Reimer *et al* 2004). However, we know that St Peter's churchyard ceased to be used for burial after 1851, and so this information can be used to provide posterior density estimates for the date of this burial (along with BH86; GU-5868 and GU-5897) of *cal AD 1520–1570 (4% probability)* or *cal AD 1630–1860 (91% probability; fig. 805*; Bayliss *et al* in Rodwell with Atkins 2011).

References: Bronk Ramsey 1995
Reimer *et al* 2004

GU–5844 660 ±60 BP

$\delta^{13}C$: -17.0‰
$\delta^{15}N$ *(diet)*: +12.3‰

Sample: BH66, submitted on 18 December 2000 by C Atkins

Material: human bone (260g) (proximal parts (80%) of right femur and distal end of left femur) (S Mays)

Initial comment: from skeleton 809 in grave 7826. An adult female. The skeleton was found fully articulated but the head, shoulder, and upper arms had been cut away by 7760. Grave 7826 lay in a stack above three earlier graves and below five later graves.

Objectives: as GU-5830

Calibrated date: *1σ:* cal AD 1270–1400
2σ: cal AD 1250–1420

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase C/D on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has failed to refine the burial phase allocation, but has provided a dated division within a stack containing 18 other burials (7 above and 11 below).

Laboratory comment: see GU-5823

GU–5847 690 ±50 BP

$\delta^{13}C$: -19.0‰
$\delta^{15}N$ *(diet):* +11.4‰

Sample: BH69, submitted on 18 December 2000 by C Atkins

Material: human bone (260g) (left femur) (S Mays)

Initial comment: from skeleton 1491 in grave 3731. An adult female. The skeleton was found complete and fully articulated. Grave 3731 lay in a part of the cemetery only sparsely occupied by graves belonging to the period between early coffins and late coffins. Grave 3731 lay above one earlier burial and below two later burials.

Objectives: as GU-5830

Calibrated date: *1σ:* cal AD 1270–1390
2σ: cal AD 1250–1400

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase C/D on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has failed to refine the burial phase allocation, but has provided a dated division within a stack containing five other burials (four above and one below).

Laboratory comment: English Heritage (2011), BH69 was one of two burials radiocarbon dated to the north of the wide north aisle. It dates to *cal AD 1220–1335 (95% probability*; *fig. 810*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5849 750 ±60 BP

$\delta^{13}C$: -19.9‰
$\delta^{15}N$ *(diet):* +10.5‰

Sample: BH71, submitted on 18 December 2000 by C Atkins

Material: human bone (280g) (right femur) (S Mays)

Initial comment: from skeleton 2509 in grave 7351. An adult female. The skeleton was found fully articulated (and complete, if skeleton 1739 in grave 4696, excavated the previous year in the adjoining excavation area is indeed the upper part of skeleton 2509. Grave 7351 lay in a stack, above four earlier graves and below five later graves.

Objectives: as GU-5830

Calibrated date: *1σ:* cal AD 1220–1290
2σ: cal AD 1160–1390

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase C/D on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has failed to refine the burial phase allocation, but has provided a dated division within a stack containing 15 other burials (10 above and 5 below).

Laboratory comment: English Heritage (2011), BH71 dates to *cal AD 1160–1325 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

Barton-upon-Humber: St Peter's Church, phase D, Lincolnshire

Location: TA 035219
Lat. 53.40.59 N; Long. 00.25.58 W

Project manager: C Atkins (Independent), 1978–84

Archival body: English Heritage

Description: this series relates to the burials which, on the basis of relative depth and alignment, have been assigned to post-excavation burial phase D. All burials included in this series lack recorded relationships with deposits that have a direct connection with the church structure, or which may be datable by association with other features or artefacts of known date. This lack of dating evidence resulted in the need to rely upon alignment and depth as indicators of possible association with other more securely stratified burials in the immediate vicinity. All burials included in this series have a recorded relationship with one or more graves.

Objectives: the objective is to ascertain whether the use of relative depths and alignments of graves as broad indicators of burial phase is sufficiently reliable for those burials to be included in palaeopathological and demographic analyses.

Final comment: C Atkins (November 2003), the results produced by this series of samples demonstrated that although the relative depths and alignments of graves may usefully be employed as indicators of an approximate period of burial for individual interments, they cannot be relied upon in all circumstances. In certain parts of the excavated cemetery it was found that the relative depth and alignment of the graves could be positively misleading, and in such areas phasing was only possible with the aid of scientific dating techniques. It is therefore regrettable that it was not possible to submit this series of samples at an earlier stage in the post-excavation analysis of the cemetery. As a consequence of the fact that most of the scientific dating results straddled a burial phase boundary, the majority of the single phase allocations (ie to burial phases B, C, or D) were scrapped in favour of double phase allocations (ie burial phases B/C, C/D, and D/E) during the recent re-phasing of the exterior cemetery.

References: Rodwell with Atkins 2011
Rodwell and Rodwell 1982

GU–5821 1120 ±50 BP

$\delta^{13}C$: -18.3‰
$\delta^{15}N$ *(diet):* +13.4‰

Sample: BH42, submitted on 18 December 2000 by C Atkins

Material: human bone (240g) (left tibia) (S Mays)

Initial comment: from skeleton 1022 in grave 3129. An adult male, approximately 45 years of age. The skeleton was fully articulated and complete. It overlay two earlier burials and six burials had been made above it.

Objectives: to test the validity of assigned burial phase D, on the basis of relative depths and alignments in the cemetery to the south of the Saxon church.

Calibrated date: *1σ:* cal AD 880–990
2σ: cal AD 770–1020

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was not reasonable to assign this burial to phase D on the basis of its depth and alignment. In this case, scientific dating provided a surprisingly early date for the grave, which provided both a dated division within a set of related stacks containing 31 other burials (18 above and 13 below, excluding late, coffined burials) and suggested that this part of the cemetery might have been used for burial much earlier than were other areas.

Laboratory comment: English Heritage (2011), BH89 (UB-4719) was submitted for dating to confirm the surprisingly early result from BH42 (GU-5821), which is certainly stratigraphically later. It provided a date of *cal AD 1000–1045 (65% probability) or cal AD 1090–1125 (17% probability) or cal AD 1135–1155 (13% probability; fig. 803;* Bayliss *et al* in Rodwell with Atkins 2011). The radiocarbon results are in poor agreement with the recorded relative chronology (A=16.0%; Bronk Ramsey 1995). The probability that GU-5821 is earlier than UB-4719 is less than 1% on the basis of their radiocarbon measurements. It seems that GU-5821 is an anomalous measurement, or at least an extreme statistical outlier, and was therefore excluded from the analysis.

GU–5834 570 ±50 BP

$\delta^{13}C$: -20.3‰
$\delta^{15}N$ *(diet):* +10.0‰

Sample: BH55, submitted on 18 December 2000 by C Atkins

Material: human bone (230g) (right femur) (S Mays)

Initial comment: from skeleton 2422 in grave 5382. An adult female. The skeleton was found almost completely articulated, although the lower left arm and left side of rib cage had been disturbed by an undefined intrusion, which had also removed the left femur. The right femur and both lower legs and feet were completely undisturbed. Grave 5382 was sandwiched between one late coffined burial and one earlier burial.

Objectives: as GU-5821

Calibrated date: *1σ:* cal AD 1310–1420
2σ: cal AD 1290–1440

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase D on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has failed to refine the burial phase allocation, but has provided a dated division within a stack containing two other burials (one above and one below), in a part of the cemetery which was particularly under-used for burial.

Laboratory comment: English Heritage (2011), BH55 provides a date for the burial of *cal AD 1290–1355 (95% probability*; *fig. 810*; Bayliss *et al* in Rodwell with Atkins 2011). It is possible that this burial may have been interred slightly later than these estimates in reality, since the uniform prior distribution of the model constrains these estimates to be slightly earlier than they would be otherwise.

GU–5837 1080 ±50 BP

$\delta^{13}C$: -18.2‰
$\delta^{15}N$ *(diet):* +11.1‰

Sample: BH58, submitted on 18 December 2000 by C Atkins

Material: human bone (230g) (right humerus and proximal (80%) right femur) (S Mays)

Initial comment: from skeleton 2465 in grave 7321. An adult female. The skeleton was found complete and fully articulated. Grave 7321 lay in a stack of burials, above three earlier graves and below five later graves.

Objectives: as GU-5821

Calibrated date: *1σ:* cal AD 890–1020
2σ: cal AD 780–1030

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was not reasonable to assign this burial to phase D on the basis of its depth and alignment. In this case, scientific dating provided a surprisingly early date for the grave, which gave both a dated division within a set of related stacks containing 12 other burials (6 above and 6 below, excluding late, coffined burials) and suggested that this part of the cemetery might have been used for burial much earlier than were other areas.

Laboratory comment: English Heritage (2011), BH90, which is stratigraphically earlier than this skeleton BH58 (GU-5837), was submitted to test the unexpectedly early result provided by this sample. The relative dating sequence has been incorporated in the model and shows good agreement with the radiocarbon measurements. BH58 dates to *cal AD 990–1045 (80% probability)* or *cal AD 1085–1120 (8% probability)* or *cal AD 1135–1160 (7% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5840 970 ±60 BP

$\delta^{13}C$: -20.5‰
$\delta^{15}N$ *(diet)*: +11.1‰

Sample: BH61, submitted on 18 December 2000 by C Atkins

Material: human bone (240g) (humeri, ulnae, radii, left clavicle, left scapula, four metacarpals, and three phalanges) (S Mays)

Initial comment: from skeleton 2745 in grave 7593. An adult female. The skeleton was found fully articulated, but the hips and legs had been cut away by chalk-filled pit 7578. Grave 7593 lay in a stack above two graves and below five graves.

Objectives: as GU-5821

Calibrated date: *1σ:* cal AD 1010–1160
2σ: cal AD 970–1220

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was reasonable to assign the burial to phase D on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has failed to refine the burial phase allocation, but has provided a dated division within a stack containing 14 other burials (12 above and 2 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH61 was buried in *cal AD 995–1210 (95% probability; fig. 803*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5842 870 ±50 BP

$\delta^{13}C$: -20.9‰
$\delta^{15}N$ *(diet)*: +10.4‰

Sample: BH64, submitted on 18 December 2000 by C Atkins

Material: human bone (310g) (left femur) (S Mays)

Initial comment: from skeleton 1050 in grave 7910. An adult female. The skeleton was found complete and fully articulated. Grave 7910 lay in a stack above four graves and below four graves.

Objectives: as GU-5821

Calibrated date: *1σ:* cal AD 1050–1230
2σ: cal AD 1020–1270

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was reasonable to assign the burial to phase D on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has not refined the burial phase allocation, but has provided a dated division within a stack containing 13 other burials (7 above and 6 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH64 is in good agreement with the recorded stratigraphy. It provided a date of *cal AD 1040–1265 (95% probability; fig. 803;* Bayliss *et al* in Rodwell with Atkins 2011).

Barton-upon-Humber: St Peter's Church, phase D/E, Lincolnshire

Location: TA 035219
Lat. 53.40.59 N; Long. 00.25.58 W

Project manager: C Atkins (Independent), 1978–84

Archival body: English Heritage

Description: this series relates to the burials which, on the basis of relative depth and alignment, have been assigned to post-excavation burial phase D/E. All burials included in this series lack recorded relationships with deposits that have a direct connection with the church structure or which may be datable by association with other features or artefacts of known date. This lack of dating evidence resulted in the need to rely upon alignment and depth as indicators of possible association with other more securely stratified burials in the immediate vicinity. All burials included in this series have a recorded relationship with one or more graves.

Objectives: the objective is to ascertain whether the use of relative depths and alignments of graves as broad indicators of burial phase is sufficiently reliable for those burials to be included in palaeopathological and demographic analyses.

Final comment: C Atkins (November 2003), the results produced by this series of samples demonstrated that although the relative depths and alignments of graves may usefully be employed as indicators of an approximate period of burial for individual interments, they cannot be relied upon in all circumstances. In certain parts of the excavated cemetery it was found that the relative depth and alignment of the graves could be positively misleading, and in such areas phasing was only possible with the aid of scientific dating techniques. It is therefore regrettable that it was not possible to submit this series of samples at an earlier stage in the post-excavation analysis of the cemetery. As a consequence of the fact that most of the scientific dating results straddled a burial phase boundary, the majority of the single phase allocations (ie to burial phases B, C, or D) were scrapped in favour of double phase allocations (ie burial phases B/C, C/D, and D/E) during the recent re-phasing of the exterior cemetery.

References: Rodwell and Atkins 2011
Rodwell and Rodwell 1982

GU–5822 850 ±50 BP

$\delta^{13}C$: -21.6‰
$\delta^{15}N$ *(diet)*: +10.6‰

Sample: BH43, submitted on 18 December 2000 by C Atkins

Material: human bone (260g) (right femur and distal half of right tibia) (S Mays)

Initial comment: from skeleton 1041 in grave 3135. An adult female of uncertain age at death. The skeleton was fully articulated, but the head and shoulders were cut away by grave 3134. Grave 3135 lay above one earlier burial and below four later burials.

Objectives: to test the validity of assigned burial phase D/E, on the basis of relative depths and alignments in the cemetery to the south-west of the Saxon church.

Calibrated date: *1σ:* cal AD 1150–1260
2σ: cal AD 1030–1280

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was reasonable to assign the burial to burial phase D/E on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has not been able to refine the burial phase allocation but has provided a dated division within a stack containing 14 other burials (18 above and 1 below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH43 was buried in *cal AD 1035–1100 (17% probability)* or *cal AD 1110–1145 (9% probability)* or *cal AD 1150–1280 (69% probability; fig. 803*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5825 840 ±50 BP

$\delta^{13}C$: -19.3‰
$\delta^{15}N$ *(diet):* +12.1‰

Sample: BH46, submitted on 18 December 2000 by C Atkins

Material: human bone (260g) (proximal 70% of left femur) (S Mays)

Initial comment: from skeleton 1548 in grave 4624. An adult male. The skeleton was fully articulated and complete. Grave 4624 lay in a very sparse stack of graves, above one earlier grave and below two later graves.

Objectives: to test the validity of assigning this burial to phase D/E, on the basis of relative depths and alignments in the cemetery to the north of the Saxon church.

Calibrated date: *1σ:* cal AD 1160–1260
2σ: cal AD 1040–1280

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase D/E on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has refined the burial phase allocation and it has provided a dated division within a stack containing four other burials (three above and one below, excluding late, coffined burials).

Laboratory comment: English Heritage (2011), BH46 dates to *cal AD 1035–1100 (14% probability)* or *cal AD 1115–1145 (7% probability)* or *cal AD 1150–1285 (74% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5828 750 ±50 BP

$\delta^{13}C$: -19.7‰
$\delta^{15}N$ *(diet):* +10.4‰

Sample: BH49, submitted on 18 December 2000 by C Atkins

Material: human bone (230g) (right femur, humerus, and tibia (all incomplete)) (S Mays)

Initial comment: from skeleton 1745 in grave 4712. An adult female. The skeleton was fully articulated. Part of her left leg had been cut away by the probable head-end of a grave (unexcavated, since it lay under the baulk), and her feet remain unexcavated (also under the baulk). Grave 4712 lay above one earlier burial and below one later burial.

Objectives: to test the validity of assigning this burial to phase D/E, on the basis of relative depths and alignments in the cemetery to the north of the Saxon church. Also, to test the period during which this most northerly margin of the cemetery was used.

Calibrated date: *1σ:* cal AD 1240–1290
2σ: cal AD 1200–1380

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase D/E on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has refined the burial phase allocation and it has provided a dated division within a stack containing three other burials (two above and one below) in this northern part of the cemetery which was little used for burial.

Laboratory comment: English Heritage (2011), BH49 was the most northerly dated burial, interred in *cal AD 1185–1305 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).There was one burial stratigraphically earlier than BH49, suggesting the cemetery extended this far north relatively early.

GU–5829 560 ±50 BP

$\delta^{13}C$: -21.5‰
$\delta^{15}N$ *(diet):* +13.4‰

Sample: BH50, submitted on 18 December 2000 by C Atkins

Material: human bone (220g) (right tibia) (S Mays)

Initial comment: from skeleton 1694 in grave 4818. An adult male. The skeleton was fully articulated but the upper arms, shoulders, and head had been removed by a brick burial vault construction trench. Grave 4818 lay in a sparse stack above two earlier burials and below three later burials.

Objectives: as GU-5825

Calibrated date: *1σ:* cal AD 1310–1430
2σ: cal AD 1290–1450

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was not reasonable to assign the burial to phase D/E on the basis of its depth and alignment. In this case, scientific dating provided a much later than expected date and a dated division within a stack containing six other burials (four above and two below).

Laboratory comment: English Heritage (2011), BH50 dates to *cal AD 1295–1355 (95% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011). It should be noted that in reality this may have been interred as late as AD 1440, as the uniform prior distribution of the model constrains these estimates to be slightly earlier than they would be otherwise.

GU–5838 950 ±50 BP

$\delta^{13}C$: -20.7‰
$\delta^{15}N$ *(diet):* +11.3‰

Sample: BH59, submitted on 18 December 2000 by C Atkins

Material: human bone (280g) (right tibia) (S Mays)

Initial comment: from skeleton 2486 in grave 7340. An adult male. The skeleton was found complete and fully articulated. Grave 7340 lay in a stack of burials, above three earlier graves and below four later graves.

Objectives: as GU-5825

Calibrated date: *1σ:* cal AD 1020–1160
2σ: cal AD 990–1220

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was entirely reasonable to assign the burial to phase D/E on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has not been able to refine the burial phase allocation but has provided a dated division within a set of related stacks containing 27 other burials (24 above and 3 below, excluding late, coffined burials).

Laboratory comment: English Heritage, BH59 dates to *cal AD 1000–1195 (94% probability)* or *cal AD 1200–1210 (1% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

GU–5845 690 ±60 BP

$\delta^{13}C$: -18.8‰
$\delta^{15}N$ *(diet):* +12.5‰

Sample: BH67, submitted on 18 December 2000 by C Atkins

Material: human bone (230g) (right femur) (S Mays)

Initial comment: from skeleton 885 in grave 7863. An adult ?female. The skeleton was found complete and fully articulated. Grave 7863 lay in a stack above two earlier graves and below three later graves.

Objectives: to test the validity of assigning this burial to phase D/E, on the basis of relative depths and alignments in the cemetery to the south of the church.

Calibrated date: *1σ:* cal AD 1270–1390
2σ: cal AD 1220–1410

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that, in this instance, it was not reasonable to assign the burial to phase D/E on the basis of its depth and alignment. In this case, scientific dating provided a much later than expected date and a dated division within a stack containing 12 other burials (7 above and 5 below, excluding late, coffined burials).

Laboratory comment: see GU-5823

GU–5848 820 ±50 BP

$\delta^{13}C$: -19.2‰
$\delta^{15}N$ *(diet):* +11.6‰

Sample: BH70, submitted on 18 December 2000 by C Atkins

Material: human bone (240g) (right femur and right tibia) (S Mays)

Initial comment: from skeleton 2417 in grave 7278. An adult female. The skeleton was found fully articulated but with the left arm cut away by later graves. Grave 7278 lay in a stack of burials, above one earlier burial and below six later burials

Objectives: as GU-5825

Calibrated date: *1σ:* cal AD 1160–1270
2σ: cal AD 1050–1280

Final comment: C Atkins (November 2003), the submission of this sample for scientific dating has demonstrated that it was reasonable to assign this burial to phase D/E on the basis of its depth and alignment relative to its more securely stratified neighbours. In this case, scientific dating has refined the burial phase allocation and it has provided a dated division within a stack containing 12 other burials (10 above and 2 below, excluding late, coffined burials).

Laboratory comment: (2011), BH70 dates to *cal AD 1040–1055 (1% probability)* or *cal AD 1060–1090 (4% probability)* or *cal AD 1115–1140 (4% probability)* or *cal AD 1150–1285 (86% probability; fig. 807*; Bayliss *et al* in Rodwell with Atkins 2011).

Berwick: Castle Terrace, Northumberland

Location: NT 988538
Lat. 55.46.39 N; Long. 02.01.09 W

Project manager: A Williams (University of Newcastle), 1998

Archival body: University of Newcastle

Description: evaluation and excavation of the church and graveyard at 21 Castle Terrace ahead of proposed development revealed the remains of an unexpected medieval church and associated burial ground. The church was Romanesque in plan, with an apsidal extension to the chancel. The nave, of which *c* 9.5m was uncovered, was unusual in having a dividing wall running along much of its length. There was also a extension south of the nave, possibly a chapel or transept. Twenty-six burials were recorded on the north, south, and east sides of the church. The cemetery was shown to have been abandoned in the medieval period. The church is one of the 'lost' extramural churches of Berwick, possibly St Mary the Virgin, Bondington, St Lawrence, or even the nunnery of St Leonard's.

Objectives: to shed light on the period of abandonment of the church.

References: Cambridge *et al* 2001

OxA–15176 587 ±26 BP

$\delta^{13}C$: -18.4 ±0.3‰
$\delta^{15}N$ *(diet):* +11.2 ±0.4‰
C/N ratio: 3.2

Sample: Skeleton 1, submitted in May 2000 by A Williams

Material: human bone (femur; adult male, 20–24 years) (A Williams)

Initial comment: the sample was removed from a securely stratified grave cut and was part of a disturbed, but articulated skeleton within the grave. The disturbance was modern, by preliminary site stripping for a residential development, and so the context is secure and the possibility of intrusion or residuality can be excluded. The grave was fairly shallow (*c* 0.5m) and cut into a sandy boulder clay.

Objectives: this sample was within a grave cut through what appeared to be a demolition layer within the chancel of the church. The church and associated graveyard were newly discovered in 1998 with no documentary evidence to provide historical context. Dating of the skeleton cut through the demolition layer will provide a cut-off date for abandonment of the church.

Calibrated date: *1σ:* cal AD 1310–1410
2σ: cal AD 1290–1420

Final comment: A Bayliss (11 August 2014), the result suggests that the burial had probably been made in the fourteenth century, slightly later than the late thirteenth-century date suggested by Cambridge *et al* (2001, 43) based on the anomalous radiocarbon measurements that have been withdrawn.

Laboratory comment: English Heritage (2 March 2007), due a technical problem that affected bone dates from the Oxford Laboratory, this sample was re-measured. The original measurements on this bone (OxA-9952 and 9953) were withdrawn by the laboratory, although they had unfortunately ben published by Cambridge *et al* (2001, fn 2).

Binchester, Durham

Location: NZ 210313
Lat. 54.40.34 N; Long. 01.40.27 W

Project manager: (University of Birmingham), 1976–81, 1986–91

Description: a Roman fort of the first to fourth/fifth centuries AD. There was also subsequent sub-Roman and Anglo-Saxon activity, and medieval settlement.

Objectives: to understand the stratigraphic sequence that runs from the mid-fourth to the mid-sixth centuries AD, and in order to understand the transitional Roman to sub-Roman to Saxon use of the site.

Final comment: P Marshall (12 October 2012), the pattern of activity at Binchester appears to be one of a gradual decline into the fifth century, but with some residual importance retained. The recognition of a cemetery dating to the middle Saxon period by radiocarbon dating underlines the possibility of a redefinition of the relationship between power and status after the end of Roman occupation. The radiocarbon results have demonstrated that the technique does have a place in understanding the chronology of the Roman and post-Roman period in England.

References: Ferris 2010

Binchester: antler working, Durham

Location: NZ 210313
Lat. 54.40.34 N; Long. 01.40.27 W

Project manager: I Ferris (University of Birmingham), 1987

Archival body: Bowes Museum and Barnard Castle

Description: inside the shell of the former northern *praefurnium* a stone surface was laid on which a spread of worked antler and some articulated bone was found.

Objectives: to date where this post-*praefurnium* use sits in the sub-Roman sequence.

Final comment: P Marshall (12 October 2012), the best estimate for the laying of the flagstone floor that was used as a workshop in the northern *praefurnium* is that it took place after the end of the slaughter phase, providing a *terminus post quem* of *cal AD 370–410* (*95% probability*). The workshop went out of use by *cal AD 380–450*; and probably by *cal AD 390–430* (*68% probability*). Analysis shows it is 53.7% probable that the workshop went out of use before AD 410.

OxA–8714 1720 ±35 BP

$\delta^{13}C$: -21.5‰

Sample: A5068(a), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated first and second phalanges and distal end of metacarpal (<100g) (S Davis 1999)

Initial comment: from the surface of river-cobble flagstones. The deposit is stratigraphically later than the cess-like dumps (A1821 and A1884).

Objectives: this deposit is stratigraphically later than the disuse of the *praefurnium*, and also the cess-like butchery deposits. Dating of this surface will constrain the calibration of dates from the sub-Roman activity and provide absolute dating for the associated episode of antler working.

Calibrated date: *1σ:* cal AD 250–390
2σ: cal AD 230–410

Final comment: P Marshall (12 October 2012), the measurement, along with the other samples dated from this phase of activity, have confirmed its position in the late Roman sequence at Binchester.

Laboratory comment: English Heritage (12 October 2012), four samples were processed, three consisting of rearticulated cattle metapodials and phalanges (OxA-8714–6) and one of worked antler (OxA-8717), all found in the 'antler working' deposit on the flagstone floor which overlay A5070 in the former north *praefurnium*. The samples are statistically consistent (T'=4.8; T'(5%)=7.8, ν=3; Ward and Wilson 1978) and could therefore be of the same actual age.

References: Ward and Wilson 1978

OxA–8715 1645 ±40 BP

$\delta^{13}C$: -21.4‰

Sample: A5068(b), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated first and second phalanges and distal end of metatarsal (S Davis)

Initial comment: as OxA-8714

Objectives: as OxA-8714

Calibrated date: *1σ:* cal AD 380–430
2σ: cal AD 260–540

Final comment: see OxA-8714

Laboratory comment: see OxA-8714

OxA–8716 1625 ±40 BP

$\delta^{13}C$: -21.7‰

Sample: A5068(c), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated first and second phalanges and distal half of metatarsal (S Davis)

Initial comment: as OxA-8714

Objectives: as OxA-8714

Calibrated date: *1σ:* cal AD 390–530
2σ: cal AD 330–550

Final comment: see OxA-8714

Laboratory comment: see OxA-8714

OxA–8717 1625 ±35 BP

$\delta^{13}C$: -21.1‰

Sample: A5068(d), submitted on 18 March 1999 by I Ferris

Material: antler (worked)

Initial comment: as OxA-8714

Objectives: as OxA-8714

Calibrated date: *1σ:* cal AD 390–510
2σ: cal AD 340–540

Final comment: see OxA-8714

Laboratory comment: see OxA-8714

Binchester: butchery, Durham

Location: NZ 210313
Lat. 54.40.36 N; Long. 01.40.28 E

Project manager: I Ferris (University of Birmingham), 1976–81 and 1986–91

Archival body: Bowes Museum and Barnard Castle

Description: one room of a former commandant's house was turned into a slaughterhouse, with structures for penning animals, an associated cess deposit. Some articulated cattle bones were found in this horizon (A60). Nearby were dumps of bone and cess-like material in and around the former western *praefurnium*.

Objectives: to date the butchery in the sub-Roman sequence and also the dumping.

Laboratory comment: English Heritage (24 June 2014), three further samples from this site were dated after 2003 (OxA-12370–2).

OxA–8705 1650 ±40 BP

$\delta^{13}C$: -21.2‰

Sample: A1884(a), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated second and third phalanges (S Davis)

Initial comment: from a cess-like deposit [A1884] dumped in the backfill of the western *praefurnium* and containing butchery waste, some of which was articulated. This deposit post-dated the last firing of the flue (A1591), and pre-dated a horizon of bone and antler working (A5068).

Objectives: to provide absolute dating for the butchery activity in the disused *praefurnium* of the bath house. In particular, to confirm that this episode is post-Roman in date.

Calibrated date: *1σ:* cal AD 350–430
2σ: cal AD 260–540

Final comment: P Marshall (12 October 2012), this result, when combined with others from the butchery phase in a chronological model, provides an estimate for a short-lived phase of activity after the end of the use of the bath house furnace in the late-fourth century cal AD.

OxA–8706 1600 ±40 BP

$\delta^{13}C$: -21.1‰

Sample: A1884(b), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated first and second phalanges (S Davis)

Initial comment: as OxA-8705

Objectives: as OxA-8705

Calibrated date: *1σ:* cal AD 400–540
2σ: cal AD 380–560

Final comment: see OxA-8705

Laboratory comment: English Heritage (12 October 2012), the duplicate measurements on A1884(b) (OA-8706 and OxA-12370; 1714 ±26 BP) are statistically inconsistent (T'=5.5; $T'(5\%)$=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–8707 1610 ±40 BP

$\delta^{13}C$: -21.3‰

Sample: A1884(d), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated first, second, and third phalanges (S Davis)

Initial comment: as OxA-8705

Objectives: as OxA-8705

Calibrated date: *1σ:* cal AD 390–540
2σ: cal AD 350–550

Final comment: see OxA-8705

Laboratory comment: English Heritage (12 October 2012), the duplicate measurements on A1884(d) (OxA-8707 and OxA-12371; 1723 ±27 BP) are statistically inconsistent (T′=5.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–8708 1715 ±40 BP

δ*13C:* -21.4‰

Sample: A1821(a), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated first and second phalanges (S Davis)

Initial comment: from a cess-like deposit dumped in the backfill of the western praefurnium and containing butchery waste, some of which was articulated. This deposit is stratigraphically later than butchery deposit A1884, and earlier than burial SF1861. A probably equivalent cess-like deposit was also found in the northern *praefurnium*, by analogy therefore this deposit pre-dates an horizon of bone and antler working (A5068).

Objectives: as OxA-8705

Calibrated date: *1σ:* cal AD 250–390
2σ: cal AD 230–420

Final comment: see OxA-8705

Laboratory comment: (12 October 2012), the six measurements made on the samples from A1821 (OxA-8708–12 and OxA-12372) are statistically consistent (T′= 8.8; T′(5%)=11.1; ν=5; Ward and Wilson 1978) and could be of the same age.

References: Ward and Wilson 1978

OxA–8709 1695 ±35 BP

δ*13C:* -21.6‰

Sample: A1821(b), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated first, second, and third phalanges (S Davis)

Initial comment: as OxA-8708

Objectives: as OxA-8705

Calibrated date: *1σ:* cal AD 260–400
2σ: cal AD 240–420

Final comment: as OxA-8705

Laboratory comment: see OxA-8708

OxA–8710 1735 ±40 BP

δ*13C:* -21.3‰

Sample: A1821(c), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated first, second, and third phalanges (S Davis)

Initial comment: as OxA-8708

Objectives: as OxA-8705

Calibrated date: *1σ:* cal AD 240–390
2σ: cal AD 220–400

Final comment: see OxA-8705

Laboratory comment: see OxA-8708

OxA–8711 1735 ±35 BP

δ*13C:* -21.5‰

Sample: A1821(d), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated first, second, and third phalanges (S Davis)

Initial comment: as OxA-8708

Objectives: as OxA-8705

Calibrated date: *1σ:* cal AD 240–380
2σ: cal AD 220–400

Final comment: see OxA-8705

Laboratory comment: English Heritage (12 October 2012), the two measurements on sample A1821(d) (OxA-8711 and OxA-12372; 1761 ±30 BP) are statistically consistent (T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and therefore a weighted mean can be calculated before calibration (1750 ±23 BP; cal AD 230–380 at 2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–8712 1620 ±40 BP

δ*13C:* -21.7‰

Sample: A1821(e), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated first, second, and third phalanges (S Davis)

Initial comment: as OxA-8708

Objectives: as OxA-8705

Calibrated date: *1σ:* cal AD 390–540
2σ: cal AD 340–550

Final comment: see OxA-8705

Laboratory comment: see OxA-8708

OxA–8713 1830 ±40 BP

δ*13C:* -22.3‰

Sample: A5070, submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., proximal radius and ulna (right side) (S Davis)

Initial comment: from a mixed deposit containing articulated animal bone which must have been deposited fresh with the tendon attached. The deposit is stratigraphically later than the cess-like material (including A1821 and A1884), and immediately pre-dates the antler-working surface.

Objectives: this sample will constrain the calibrated dates for the episode of cess-like butchery and the antler-working surface, as it is stratigraphically dated to between these phases of activity. This sample will refine the estimated dates of archaeological interest.

Calibrated date: *1σ:* cal AD 120–240
2σ: cal AD 70–330

Final comment: P Marshall (12 October 2012), the result is too early for its stratigraphic position, although when the bone was returned from the laboratory it did not appear to have been sampled!

OxA–8781 1750 ±50 BP

$\delta^{13}C$: -21.2‰

Sample: A1884(c), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated first and second phalanges (S Davis)

Initial comment: as OxA-8705

Objectives: as OxA-8705

Calibrated date: *1σ:* cal AD 230–380
2σ: cal AD 130–410

Final comment: see OxA-8705

Laboratory comment: see OxA-8705

OxA–8792 1740 ±40 BP

$\delta^{13}C$: -21.6‰

Sample: A1884(e), submitted on 18 March 1999 by I Ferris

Material: animal bone: *Bos* sp., articulated first, second, and third phalanges (S Davis)

Initial comment: as OxA-8705

Objectives: as OxA-8705

Calibrated date: *1σ:* cal AD 240–380
2σ: cal AD 210–400

Final comment: see OxA-8705

Laboratory comment: see OxA-8705

Binchester: north praefurnium, Durham

Location: NZ 210313
Lat. 54.40.36 N; Long. 01.40.28 E

Project manager: I Ferris (University of Birmingham), 1976–81 and 1986–91

Archival body: Bowes Museum and Barnard Castle

Description: the final stages of use of the *praefurnium* and subsequent activity inside the building, and in its shell once partially demolished.

Objectives: to date the sequence.

Final comment: P Marshall (12 October 2012), the radiocarbon dates are remarkably consistent given that the bath house must have been constructed after AD 350–360, a date provided by a coin.

References: Bayliss forthcoming
Ferris 2010

OxA–8684 1750 ±40 BP

$\delta^{13}C$: -26.8‰

Sample: A5226(a), submitted on 18 March 1999 by I Ferris

Material: charcoal: Ericaceae, twig (R Gale)

Initial comment: from a mixed deposit of burnt clay, ash, and charcoal from raking out the stokehole in the northern *praefurnium*. This deposit must be later than the construction of the bath house which is dated by a coin in the construction trench of the western *praefurnium* (AD 350–360).

Objectives: to establish the date of the last firing of the stokehole in the northern *praefurnium*. This sample will constrain the calibration of the dates from later in the use of the stokehole.

Calibrated date: *1σ:* cal AD 230–350
2σ: cal AD 140–400

Final comment: P Marshall (12 October 2012), the end of the use of the bath house furnace is estimated to have taken place in *cal AD 370–400; (95% probability; disuse_of_furnace;* Marshall *et al* in Ferris 2010, fig 172).

OxA–8685 1785 ±35 BP

$\delta^{13}C$: -26.8‰

Sample: A5226(b), submitted on 18 March 1999 by I Ferris

Material: charcoal: Ericaceae, twig (R Gale)

Initial comment: as OxA-8684

Objectives: as OxA-8684

Calibrated date: *1σ:* cal AD 210–330
2σ: cal AD 130–340

Final comment: P Marshall (12 October 2012), OxA-8685 is one of three charcoal samples that apparently pre-date the building (the *terminus post quem* for the sequence is provided by a copy of a coin of Magnentius (AD 350–360) from the foundation trench of the west *praefurnium*). The coin must have been struck after Magnentius assumed the throne, so the bath house cannot have been built before AD 350–360. OxA-8685 (1785 ±35 BP), from A5226, OxA-8686 (1770 ±40 BP) from A5235, and OxA-8687 (1910 ±35 BP) from A5115 must therefore be regarded as residual.

OxA–8686 1770 ±40 BP

$\delta^{13}C$: -25.0‰

Sample: A5235(a), submitted on 18 March 1999 by I Ferris

Material: charcoal: *Quercus* sp., sapwood (R Gale)

Initial comment: from a deposit with charcoal from the raking out of a stokehole in the northern *praefurnium*. This deposit is stratigraphically later than rake-out A5226, and stratigraphically earlier than rake-out A5115.

Objectives: as OxA-8684

Calibrated date: *1σ:* cal AD 220–340
2σ: cal AD 130–390

Final comment: see OxA-8685

OxA–8687 1910 ±35 BP

$\delta^{13}C$: -22.5‰

Sample: A5115(b), submitted on 18 March 1999 by I Ferris

Material: charcoal (*Euonymus* sp.) (R Gale)

Initial comment: from a deposit with a heavy concentration of charcoal from the raking out of the stokehole in the northern *praefurnium*. The deposit is stratigraphically later than A5235, and stratigraphically earlier than A5207.

Objectives: as OxA-8684

Calibrated date: *1σ:* cal AD 60–130
2σ: cal AD 20–210

Final comment: see OxA-8685

OxA–8688 1745 ±35 BP

$\delta^{13}C$: -26.4‰

Sample: A5207(a), submitted on 18 March 1999 by I Ferris

Material: charcoal: Pomoideae (R Gale)

Initial comment: from a deposit of charcoal and burnt stone recovered from the flue of the stokehole in the northern *praefurnium*. The charcoal relates to the last firings of the stokehole. This deposit is stratigraphically later than A5115, and earlier than the cess-like deposit of which A1884 in the western *praefurnium* represents the first sample.

Objectives: to establish the date of the last firing of the stokehole in the northern *praefurnium*. This sample will also constrain the calibration of the dates from the cess-like butchery deposits which it pre-dates.

Calibrated date: *1σ:* cal AD 240–350
2σ: cal AD 220–400

Final comment: see OxA-8684

OxA–8689 1725 ±40 BP

$\delta^{13}C$: -27.8‰

Sample: A5207(b), submitted on 18 March 1999 by I Ferris

Material: charcoal: Ericaceae, twig (R Gale)

Initial comment: as OxA-8688

Objectives: as OxA-8688

Calibrated date: *1σ:* cal AD 250–390
2σ: cal AD 230–410

Final comment: see OxA-8684

OxA–8740 1730 ±35 BP

$\delta^{13}C$: -24.1‰

Sample: A5235(b), submitted on 18 March 1999 by I Ferris

Material: charcoal: *Quercus* sp., sapwood (R Gale)

Initial comment: as OxA-8686

Objectives: as OxA-8684

Calibrated date: *1σ:* cal AD 250–390
2σ: cal AD 230–400

Final comment: see OxA-8684

OxA–8741 1690 ±35 BP

$\delta^{13}C$: -24.1‰

Sample: A5115(a), submitted on 18 March 1999 by I Ferris

Material: charcoal: *Corylus* sp. (R Gale)

Initial comment: as OxA-8687

Objectives: as OxA-8684

Calibrated date: *1σ:* cal AD 260–400
2σ: cal AD 250–430

Final comment: see OxA-8684

Binchester: Saxon burial A1584, Durham

Location: NZ 210313
Lat. 54.40.36 N; Long. 01.40.28 E

Project manager: I Ferris (University of Birmingham), 1976–81 and 1986–91

Archival body: Bowes Museum and Barnard Castle

Description: a burial of a female in a shallow grave, accompanied by grave goods, including a brooch of mid sixth-century type. Other grave goods included objects of bone and antler.

Objectives: to provide tighter dating of the burial which closes the extended sequence of activity that starts in the mid-fourth century AD.

Final comment: P Marshall (12 October 2012), the Anglo-Saxon burial of a female was found just outside the now-disused Roman bath house in a grave cut into a layer of rubble (from the collapsed roof of the main bath house building) that sealed the butchery deposits in the former west *praefurnium*. The burial is spatially separate from the other burials lying to the north, and from the presence of grave goods is also culturally and chronologically separate. Although the grave post-dates the butchery phase, there is no demonstrable stratigraphic relationship between A1584 and A5068.

Three samples were dated: SF1861, a human bone (OxA-9058), and two grave goods: SF1908, an antler object (OxA-9059 and OxA-14991), and SF1907, a bone artefact (OxA-9232). It is not thought that the grave goods were curated artefacts (ie significantly older than the burial itself).

The two measurements on SF1908 are not statistically consistent (T′=26.8; T′(5%)=6.0; ν=2; Ward and Wilson 1978). As OxA-9059 is considerably younger than the articulated skeleton it was buried with we have chosen to exclude this measurement from the published analysis. The dating of the burial of a young woman in a grave cut into the spread of rubble collapsed from the partially-derelict Roman bath building to the early Anglo-Saxon period is significant for understanding the evolution of the post-Roman north of England.

Laboratory comment: English Heritage (24 June 2014), one further sample from this series was dated after 2003 (OxA-14991; SF1908).

References: Ward and Wilson 1978

OxA–9058 1572 ±37 BP

$\delta^{13}C$: -20.1‰
$\delta^{15}N$ *(diet):* +9.9‰
C/N ratio: 3.2

Sample: SF1861, submitted on 18 March 1999 by I Ferris

Material: human bone (mature adult female)

Initial comment: from a furnished female inhumation, cut into a rubble surface formed from stone and tufa collapse from the bath house building. This collapse post-dates the dumping of the cess-like butchery waste and the more general levelling of this area (A1821 and A1884).

Objectives: this deposit is stratigraphically later than the disuse of the praefurnium and butchery deposits. Dating of this grave will constrain the calibration of the dates from the sub-Roman activity and provide absolute dating for the artefact assemblage associated with the burial.

Calibrated date: *1σ:* cal AD 420–550
2σ: cal AD 400–580

Final comment: P Marshall (12 October 2012), the dating of the burial to the early Anglo-Saxon period is significant for understanding the evolution of the post-Roman north of England. The estimated date *cal AD 400–540* (*95% probability; OxA-9058;* Marshall *et al* in Ferris 2010, fig 172) is broadly in agreement with an accompanying brooch suggesting a date in the mid-sixth century AD.

OxA–9059 1380 ±40 BP

$\delta^{13}C$: -21.8‰

Sample: SF1908, submitted on 18 March 1999 by I Ferris

Material: antler (<5g) (collagen)

Initial comment: as OxA-9058

Objectives: as OxA-9058

Calibrated date: *1σ:* cal AD 640–670
2σ: cal AD 600–690

Final comment: P Marshall (12 October 2012), the two measurements (OxA-9059 and OxA-14991, 1637 ±29 BP) on SF1908 are not statistically consistent (T′=26.8; T′(5%)=6.0; ν=2; Ward and Wilson 1978). As OxA-9059 is considerably younger than the articulated skeleton it was buried with, OxA-9059 would therefore seem to be a case where the offset between ultrafiltered and non-ultrafiltered collagen is much larger than expected (Bronk Ramsey *et al* 2004b).

References: Bronk Ramsey *et al* 2004b
Ward and Wilson 1978

OxA–9232 1614 ±37 BP

$\delta^{13}C$: -21.3‰

Sample: SF1907, submitted on 18 March 1999 by I Ferris

Material: bone (artefact)

Initial comment: as OxA-9058

Objectives: as OxA-9058

Calibrated date: *1σ:* cal AD 390–540
2σ: cal AD 350–550

Final comment: P Marshall (12 October 2012), radiocarbon dating of the bone artefact demonstrates that it is unlikely to have been a curated item deposited with the inhumation of the young woman.

Bleadon: Whitegate Farm, Somerset

Location: ST 33995692
Lat. 51.18.25 N; Long. 02.56.50 W

Project manager: D Young (Avon Archaeological Unit), March to May 1997

Archival body: North Somerset Museum Service

Description: a prehistoric site revealed in a farmyard at Whitegate Farm, Bleadon. It composed largely of pits, including a discrete group of six arranged in an oval form and located in the west of the site, of which two contained human inhumations.

Objectives: the site is probably of Iron Age date and is believed to be of national archaeological importance. The dating and associated modelling exercise will hopefully allow a refined chronology for the site to be constructed, which was not possible from the pottery analysis alone, and aid in the phasing of the activity represented. (The stratigraphy is largely horizontal).

Final comment: D Young (2008), period II (middle Iron Age) activity was represented by an episode of pit cutting. Chronological analysis of the radiocarbon dates indicates that this activity occurred between 400 and *c* 200 cal BC, and this estimate is in agreement with the pottery dates. The distribution of the dates suggests that this activity lasted for about a century. There is some evidence that period III may be a distinct, slightly later episode of activity. The female burial certainly falls in the later Iron Age (OxA-7193). The male burial (OxA-7207) has a rather large error term, but may also be later than the period of pitting. The radiocarbon dating programme also identified medieval activity, represented by intrusive cereal grains in pit 1092. At least one of these is of pre-Conquest date, suggesting some agricultural activity in the vicinity at this date.

Laboratory comment: English Heritage (23 July 2003), two further dates were funded by the BBC in 1998 and were included in the chronological modelling: OxA-7193 (crouched inhumation 4001 in pit 1089; 2095 ±35 BP, cal BC 210–cal AD 1; 2σ; Reimer *et al* 2004) and OxA-7207 (crouched inhumation 4000 in pit 1092; 2130 ±90 BP, 400 cal BC–cal AD 70 at 2σ; Reimer *et al* 2004; Young 2008).

References: Reimer *et al* 2004
Young 2008

OxA–11423 2290 ±40 BP

δ*13C:* -20.4‰

Sample: 1134A, submitted in February 2002 by D Young

Material: animal bone (1g) (sheep/goat foetus; individual 1) (Avon Archaeological Unit 2002)

Initial comment: a sample recovered from the upper pit fill (context 1134), which was sealed by a thin/patchy spread of ?medieval cobbles, which in turn were sealed by modern aggregates/concrete, laid after the western part of this site was terraced, during its modern usage as a farmyard.

Objectives: selected as one of a number of samples from the site, collectively the dates will be used for modelling in order to provide a more closely dated chronology for the site as a whole, and more particularly for the pit group of which this feature is a part.

Calibrated date: *1σ:* 400–360 cal BC
2σ: 410–210 cal BC

Final comment: D Young (2008), the four radiocarbon dates from pit 1133 (OxA-11423–4 and OxA-11450–1) are broadly similar dating the infilling of the pit to somewhere between *c* 400 cal BC and *c* 200 cal BC.

Laboratory comment: see OxA-14989

OxA–11424 2260 ±40 BP

δ*13C:* -20.4‰

Sample: 1134B, submitted in February 2002 by D Young

Material: animal bone (1g) (sheep/goat foetus; individual 2) (Avon Archaeological Unit)

Initial comment: as OxA-11423

Objectives: as OxA-11423

Calibrated date: *1σ:* 400–230 cal BC
2σ: 410–200 cal BC

Final comment: see OxA-11423

Laboratory comment: see OxA-14990

OxA–11450 2222 ±31 BP

δ*13C:* -24.0‰

Sample: 1149A, submitted in February 2002 by D Young

Material: grain: *Hordeum vulgare* (0.03g) (Avon Archaeological Unit 2002)

Initial comment: grains recovered from environmental sample from fill 1149, the primary deposit contained within one of a closely related group of six pits located in the west of the site. They are unlikely to be intrusive/residual, as they were sealed by a further three fills. The primary fill of the pit was some 0.5m deep.

Objectives: to establish the date of the pit and thereby the closely associated group of pits located in the west of the site. When used in conjunction with dates from other features on the site, to be used for modelling, in order to establish a refined chronology for the activity represented.

Calibrated date: *1σ:* 370–200 cal BC
2σ: 390–190 cal BC

Final comment: see OxA-11423

Laboratory comment: English Heritage (23 July 2003), in pit 1133 two carbonised cereal grains were dated from the primary fill 1149. These must be earlier than the articulated sheep/goat foetuses from the later fill above 1134. The radiocarbon results are also in good agreement with this information.

OxA–11451 2198 ±31 BP

δ*13C:* -22.8‰

Sample: 1149B, submitted in February 2002 by D Young

Material: grain: *Triticum dicoccum* (0.03g) (Avon Archaeological Unit 2002)

Initial comment: as OxA-11450

Objectives: as OxA-11450

Calibrated date: *1σ:* 360–200 cal BC
2σ: 380–170 cal BC

Final comment: see OxA-11423

Laboratory comment: see OxA-11450

OxA–11452 1153 ±30 BP

δ*13C:* -21.1‰

Sample: 1188A, submitted in February 2002 by D Young

Material: grain: *Triticum* sp., bread-type wheat morphology (0.07g) (Avon Archaeological Unit 2002)

Initial comment: grains were recovered by flotation from an environmental sample of gravel fill 1188. Fill 1188 was the tertiary fill contained within the grave pit and lay directly below skeleton 4000. The fill consisted of a mix of silty clay and limestone rubble and was apparently undisturbed. The grains are unlikely to be intrusive or residual.

Objectives: to establish a date for the filling of the pit within which the fill was revealed; to establish whether the pit was reused as a grave by the deposition of skeleton 4000, also submitted for dating; and, to use the date in conjunction with those dates recorded for other samples from the site in a modelling exercise in order to establish a refined chronology for the site as a whole.

Calibrated date: *1σ:* cal AD 780–950
2σ: cal AD 770–980

Final comment: D Young (2008), the radiocarbon date indicates that this grain was intrusive. However, it does indicate that the surrounding landscape was being farmed during this period, although the focus of settlement at that time lay elsewhere.

Laboratory comment: English Heritage (28 July 2003), the sequence from pit 1092 did not turn out as expected. The two carbonised cereals from fill 1188 produced dates which fall in the medieval period. However, this context must be earlier than skeleton 4000, which lies directly over it. This skeleton was a complete adult male crouched inhumation, and dates to the mid-to-late Iron Age. For this reason, the relative chronology provided by the stratigraphic sequence has not been included in the model. The most convincing explanation of the anomalous dates is that the cereal grains are intrusive from later agricultural activity on the site. As the base of modern hardcore was only 30cm above this context, this is by no means surprising.

OxA–11453 915 ±30 BP

δ¹³C: -22.8‰

Sample: 1188B, submitted in February 2002 by D Young

Material: grain: *Triticum* sp., bread-type wheat morphology (0.07g) (Avon Archaeological Unit 2002)

Initial comment: as OxA-11452

Objectives: as OxA-11452

Calibrated date: *1σ:* cal AD 1040–1170
2σ: cal AD 1020–1210

Final comment: see OxA-11452

Laboratory comment: see OxA-11452

OxA–12378 2152 ±30 BP

δ¹³C: -20.8‰

Sample: 1164/7233A, submitted in February 2002 by D Young

Material: animal bone (7g) (sheep/goat juvenile; right radius) (Avon Archaeological Unit 2002)

Initial comment: recovered from the primary pit fill, backfilling a substantial pit located in the centre of the site. Fill 1164 seals a 'slabbed' surface laid in the base of the pit, and is thickest towards the edges of the pit, thinning at the centre. The pit was *c* 3m in diameter and *c* 1.5m deep, and other pit fills totalling some 1.3m in depth sealed fill 1164. The sample is not intrusive, but there is some small possibility of residuality as it is uncertain whether the slabbed floor was exposed for a period of time as part of the function of the feature. However, bones of sample 1164A and B are believed to have been articulated.

Objectives: to provide dates for the backfilling of the pit from which the sample came, and for the use in conjunction with other samples taken from features on the site, in a modelling exercise in order to gain a chronology for activity over the site as a whole.

Calibrated date: *1σ:* 350–160 cal BC
2σ: 360–90 cal BC

Final comment: D Young (2008), the two articulating bones provide the date for secondary infilling of pit 800.

Laboratory comment: English Heritage (23 July 2003), OxA-12378 and OxA-12379 are two measurements on a limb from a juvenile sheep/goat, and are statistically consistent (T′=0.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978). A weighted mean (2169 ±22 BP) of these measurements has been taken before calibration, 360–160 cal BC (2σ; Reimer *et al* 2004). These radiocarbon measurements are also in good agreement with the relative dating provided by the stratigraphy (A=95.5% and A=96.7%; Bronk Ramsey 1995).

References: Bronk Ramsey 1995
Reimer *et al* 2004
Ward and Wilson 1978

OxA–12379 2185 ±30 BP

δ¹³C: -20.8‰

Sample: 1164/7233B, submitted in February 2002 by D Young

Material: animal bone (7g) (sheep/goat juvenile; right radius with cut marks) (Avon Archaeological Unit 2002)

Initial comment: this sample was articulated with sample 1164 A when recovered.

Objectives: as OxA-12378

Calibrated date: *1σ:* 360–190 cal BC
2σ: 370–160 cal BC

Final comment: see OxA-12378

Laboratory comment: see OxA-12378

OxA–12380 2182 ±31 BP

δ¹³C: -20.1‰

Sample: 1132/7206, submitted in February 2002 by D Young

Material: animal bone: *Bos* sp., right ulna (49g) (Avon Archaeological Unit 2002)

Initial comment: retrieved from context 1132, from the second of four fills backfilling a substantial pit and located in the centre of the site. It measured *c* 3m in diameter and *c* 1.4m in depth. It was sealed by two further fills (some 0.8m in depth) and overlay primary deposit 1164, a sample from which has also been submitted.

Objectives: to establish a date for the filling of the pit from which the sample came and for the use on modelling, in conjunction with other samples taken from the site, in order to establish a chronology for activity over the site as a whole.

Calibrated date: *1σ:* 360–190 cal BC
2σ: 370–160 cal BC

Final comment: D Young (2008), this sample provides a further date for the tertiary infilling of pit 800, estimated to have occurred between *c* 400 and *c* 200 cal BC.

Laboratory comment: English Heritage (11 August 2014), the two measurements on this animal bone are statistically consistent (T′=2.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978), so a weighted mean (2214 ±22 BP) can be taken, which calibrates to 385–200 cal BC (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–12894 2244 ±30 BP

$\delta^{13}C$: -20.5‰

Sample: 1132/7206, submitted in February 2002 by D Young

Material: animal bone: *Bos* sp., right ulna (49g) (Avon Archaeological Unit 2002)

Initial comment: as OxA-12380

Objectives: as OxA-12380

Calibrated date: *1σ:* 390–210 cal BC
2σ: 400–200 cal BC

Final comment: see OxA-12380

Laboratory comment: see OxA-12380

OxA-14989 2202 ±35 BP

$\delta^{13}C$: -21.3 ±0.3‰

Sample: 1134A, submitted on February 2002 by D Young

Material: animal bone (1g) (sheep/goat foetus; individual 1) (Avon Archaeology Unit 2002)

Initial comment: replicate measurement on re-ultrafiltered gelatin (Bronk Ramsey *et al* 2004a) of OxA-11423.

Objectives: as OxA-11423

Calibrated date: *1σ:* 360-200 cal BC
2σ: 385-170 cal BC

Final comment: see OxA-11423

Laboratory comment: Historic England (9 June 2016), the two results on this sample are statistically consistent (T'=2.7; T'(5%)=3.8; ν=1; Ward and Wilson 1978), although it is likely that there was a small offset to an older age in the original measurement and this is to be preferred (Bronk Ramsey *et al* 2011).

References: Bronk Ramsey et al 2004a
Bronk Ramsey *et al* 2011
Ward and Wilson 1978

OxA-14990 2210 ±36 BP

$\delta^{13}C$: -20.7 ±0.3‰

Sample: 1134B, submitted on February 2002 by D Young

Material: animal bone (1g) (sheep/goat foetus; individual 1) (Avon Archaeology Unit 2002)

Initial comment: replicate measurement on re-ultrafiltered gelatin (Bronk Ramsey *et al* 2004a) of OxA-11424.

Objectives: as OxA-11423

Calibrated date: *1σ:* 365-200 cal BC
2σ: 390-175 cal BC

Final comment: see OxA-11423

Laboratory comment: Historic England (9 June 2016), the two results on this sample are statistically consistent (T'=0.9; T'(5%)=3.8; ν=1; Ward and Wilson 1978), although it is likely that there was a small offset to an older age in the original measurement and this is to be preferred (Bronk Ramsey *et al* 2011).

References: Bronk Ramsey *et al* 2004a
Bronk Ramsey *et al* 2011
Ward and Wilson 1978

Brandon: Staunch Meadow, Suffolk

Location: TL 778864
Lat. 52.26.46 N; Long. 00.36.59 E

Project manager: A Tester (Suffolk Archaeological Unit), 1981–2, 1984–5

Description: a middle Saxon settlement including buildings, an industrial area, church, and attendant cemeteries all concentrated within a readily defined island. The occupation of the bulk of the site is restricted to the middle Saxon period. The settlement sits beside a 1km wide arm of the Fenland which follows the valley of the Little Ouse river *c* 6km inland from Hockwold Fen; Brandon was probably the lowest crossing point of the river Ouse until recent times. The site occupies a sand ridge surrounded by peat, and stands as an island in time of flood. The river is some 50m north of the 'island' while the southern margin of the peat deposits (ie the edge of the flood plain) is *c* 80m to the south. The island is *c* 350m east-west by 150m north-south at its widest point with an area of some 4.75ha; of this *c* 1.5ha at the west end appears to have been unoccupied and a further *c* 1.25ha at the east end of the island has been scheduled as an Ancient Monument.

Objectives: the scientific dating programme was designed to achieve the following objectives, to provide: a chronological framework for interpreting palaeoecological results; a precise date for the wooden causeway and bridge; a date for the use of cemetery 2; dates for the buildings; a precise estimate for the period of use of the cemetery located south of the church; and dates for the waterfront activity.

References: Carr *et al* 1988
Tester *et al* 2013

Brandon: Staunch Meadow, cemetery 2, Suffolk

Location: TL 77908656
Lat. 52.26.51 N; Long. 00.37.05 E

Project manager: S Anderson (Suffolk County Council Archaeological Service), 1984

Archival body: Suffolk County Council Archaeological Service

Description: cemetery 2 located to the north of the church, was presumed to represent the second phase of burial in the settlement. It was only partially excavated with 31 individuals recovered. Associated with these burials was a clay pad 2m x 3m that is interpreted as being a mortuary structure. The clay pad was cut by some burials and its surface then reinstated, suggesting it had significance to the whole cemetery rather than individual burials.

Objectives: these samples are being submitted in order to determine the date of cemetery 2, an incompletely excavated cemetery to the north east of the excavated area. This cemetery may be a late development in the middle Saxon settlement, or it may be of medieval date. These samples were chosen for dating as part of the assessment stage of the project. Bone condition on the site is generally poor, and the submission of these bones will provide an opportunity to assess their suitability for radiocarbon dating.

Final comment: P Marshall (14 November 2013), the radiocarbon dates have confirmed the late Saxon date for the cemetery. Unfortunately, the poor collagen preservation meant that it was not possible to obtain sufficient determinations to provide a precise date for the cemetery's use.

Laboratory comment: English Heritage (14 November 2013), given the three samples from cemetery 2 submitted in 2000 all had sufficient amounts of well-preserved collagen to produce radiocarbon measurements, an additional eight samples were selected in 2006 to provide estimates for the length of use of the cemetery, and the date of construction and subsequent modification of the clay pad mortuary structure. Unfortunately, only four of these produced sufficient carbon for dating.

Laboratory comment: English Heritage (24 June 2013), five further samples from this series were dated after 2003 (GU-6050, SUERC-11287–8, and SUERC-11292–3).

References:	Carr 1992 Tester *et al* 2013

GU–5817 1120 ±50 BP

$\delta^{13}C$: -21.3‰
$\delta^{15}N$ *(diet)*: +9.1‰

Sample: BRD018 4584, submitted on 31 October 2000 by S Anderson

Material: human bone (left femur of adult male) (S Anderson 2000)

Initial comment: from burial 4584, which was part of a cemetery group. The burial was cut into an early-middle Saxon ditch, 4509. This ditch was largely filled with grey sand. The skeleton was fully articulated and there is no suggestion of any disturbance. The site appears to have been a meadow since its use as a cemetery.

Objectives: to establish the period of use of cemetery 2 at the north east end of the excavated area, and the absolute date of this skeleton in relation to ditch 4509, which it cuts, and to the rest of the cemetery, as it forms an isolate burial at the west end. The dating of this sample as part of the assessment is also intended to determine whether further dating of skeletons, in particular those buried in cemetery 1, will be feasible given the relatively poor preservation of the bone.

Calibrated date:	*1σ:* cal AD 880–990 *2σ:* cal AD 770–1020

Final comment: see series comment

GU–5818 600 ±80 BP

$\delta^{13}C$: -24.1‰
$\delta^{15}N$ *(diet)*: +8.6‰

Sample: BRD018 4842, submitted on 31 October 2000 by S Anderson

Material: human bone (left femur of adult female) (S Anderson 2000)

Initial comment: from burial 4842 which was part of a cemetery group. The burial was cut into an early middle Saxon ditch 4961. The ditch was largely filled with grey sand. The burial was articulated but there was some bone displacement, which was attributed to burrowing animals during the excavation.

Objectives: to establish the period of use of cemetery 2 at the north east end of the excavated area, and the absolute date of this skeleton in relation to the more isolated skeleton 4584 at the opposite end of the cemetery. As GU-5817, the dating of this sample as part of the assessment is also intended to determine whether further dating of skeletons, in particular those buried in cemetery 1, will be feasible given the relatively poor preservation of the bone.

Calibrated date:	*1σ:* cal AD 1280–1420 *2σ:* cal AD 1260–1450

Final comment: P Marshall (14 November 2013), this date is anomalous.

Laboratory comment: English Heritage (14 November 2013), the δ13C for this sample -24.1‰ is anomalously negative suggesting some contamination by humic acids from the soil.

Bridlington: Sewerby Cottage Farm, Yorkshire (East Riding)

Location:	TA 185689 Lat. 54.06.08 N; Long. 00.11.15 W
Project manager:	C Fenton-Thomas (On-Site Archaeology), 1999–2003
Archival body:	East Riding of Yorkshire Museum Service

Description: excavations at Sewerby Cottage Farm, Bridlington were carried out in advance of development for housing. This work identified a sequence of middle to late Neolithic occupation, with at least three Neolithic buildings and extensive spreads of worked flints. Iron Age remains were also identified and included a square and a round barrow. The square barrow contained an inhumation with a dagger and missile head. A rural settlement built up around land boundaries and the barrows, and occupation continued into the Roman period. Three crop-driers were identified, as well as fence-lines and droveways related to livestock management. The farmstead was abandoned later in the Roman period, although there was some evidence for Anglo-Saxon activity in the eighth or ninth centuries.

Objectives: the major objective was to provide an absolute chronology for the sequence of structures in areas A and D, also determining the relative dating of activity in the two areas. A series of dates on adhering internal carbonised residues on diagnostic prehistoric ceramic sherds would provide dates for pottery types. Fragments of legume were also dated to determine whether they were Neolithic.

Final comment: A Bayliss and C Fenton-Thomas (18 July 2005), 27 radiocarbon measurements were obtained in 2002 on carbonised remains from the excavation of trench 17 at Sewerby Cottage Farm (site code: SCF). A further 14 measurements were obtained in 2004 on carbonised remains and calcined bone from other features on the site (site code: OSA02EX09). The radiocarbon results from the 2002 submission produced a number of surprises. In particular a number of samples from Neolithic contexts were much later than expected. These samples are intrusive.

References: Fenton-Thomas 2009
Higham *et al* 2007, 5235

OxA–11493 3815 ±45 BP

δ¹³C: -24.3‰

Sample: Area A; 1491 B, submitted in February 2002 by C Fenton-Thomas

Material: charcoal: *Alnus glutinosa* (R Gale 2002)

Initial comment: this sample comes from the fill of a posthole; it cuts the natural substrate and is itself cut by gully 1488. This is overlain by rammed gravel 1370. This was a very clear posthole of significant depth with a pointed base. This deposit was 0.8m below the surface a pasture field that had not been ploughed within recent memory. The deposit contained coal, charcoal, and cinder.

Objectives: this posthole 1490 forms part of a probable rectilinear post built structure. This structure is part of the earliest phase of activity in area A. It is overlain by the pear-shaped structure defined by gullies and later by the rammed gravel surface. The date would provide an indication of the date of this structure to compare with others from postholes 1600 and 1467, also from this structure. These dates would provide the earliest determinations in the sequence of dates from area A.

Calibrated date: *1σ:* 2340–2150 cal BC
2σ: 2460–2130 cal BC

Final comment: A Bayliss and C Fenton-Thomas (18 July 2005), this sample appears to be intrusive within its context.

OxA–11494 142 ±33 BP

δ¹³C: -24.8‰

Sample: Area A; 1467 A, submitted in March 2002 by C Fenton-Thomas

Material: charcoal: *Ulex/Cytisus* sp. (R Gale 2002)

Initial comment: this sample comes from the fill of a posthole; it cuts the natural and is overlain by rammed gravel 1370. This deposit was 0.8m below the surface a pasture field that had not been ploughed within recent memory. The deposit contained coal, charcoal, and cinder.

Objectives: to establish the date of the posthole 1468 that formed part of a probable rectilinear structure in area A. This structure is part of the earliest phase of activity in this area (A) and is stratigraphically below the later pear-shaped structure. The date can be compared with others from this same phase (1600 and 1491) and together they will provide an indication of the date of the earliest features in this part of the site.

Calibrated date: *1σ:* cal AD 1670–1950
2σ: cal AD 1660–1955*

Final comment: A Bayliss and C Fenton-Thomas (18 July 2005), this sample is intrusive in its context. However, the consistency of this and the 14 other late medieval and post-medieval dates suggests that most of these dates relate to the period of ploughing on the site represented by the ridge and furrow earthworks. This ploughing seems to have occurred in the fifteenth and sixteenth centuries AD, and may have continued for less than a century.

OxA–11495 2110 ±37 BP

δ¹³C: -25.5‰

Sample: Area A; 1467 B, submitted in March 2002 by R Gale

Material: charcoal: Ericaceae (R Gale 2002)

Initial comment: as OxA-11494

Objectives: as OxA-11494

Calibrated date: *1σ:* 200–50 cal BC
2σ: 350–40 cal BC

Final comment: see OxA-11493

OxA–11500 283 ±33 BP

δ¹³C: -21.5‰

Sample: Area D; 1712 A, submitted in March 2002 by C Fenton-Thomas

Material: grain: *Triticum* sp., charred (J Huntley 2001)

Initial comment: this sample comes from the fill of a posthole 1713. This is cut into the natural substrate and was sealed by stony bank 1626 (itself sealed by 1395). It was a very clear and distinct feature with a pointed base. The deposit was 1.1m from surface of the pasture field that had not been ploughed in recent memory. The deposit contained coal and some charcoal.

Objectives: to establish the date of an arc of postholes in area D of these excavations. This semi-circular arrangement of similar postholes probably represents a screen or makeshift shelter. It is likely to be later than the 9/10 post structure, its component postholes are sealed by 1395. This particular feature is sealed by stony bank 1626. A date would provide an indication of activity during one of the earliest phases on site.

Calibrated date: *1σ:* cal AD 1520–1660
2σ: cal AD 1490–1800

Final comment: see OxA-11494

OxA–11535 93 ±32 BP

$\delta^{13}C$: -23.5‰

Sample: Area A; 1563, submitted in March 2002 by C Fenton-Thomas

Material: carbonised plant macrofossil (Leguminosae; *Pisum sativum*) (J Huntley 2002)

Initial comment: gully 1564 was cut into the natural substrate. It is very similar to other gullies that are sealed by a rammed gravel floor 1365/1370. Its fill is similar to fills of postpits also sealed by the rammed gravel. It therefore probably belongs in the phase preceding this rammed gravel layer. It is not recut and is sealed by spread deposit 1075. It is overlain by a linear stone spread 1164 that belonged to the same phase as the rammed gravel. This deposit contained many small stones with some coal and a little charcoal. It was found 0.5–0.6m below ground level in a pasture field that had not been ploughed in recent memory.

Objectives: to establish the date and duration of a probable Neolithic building that was apparently rebuilt several times on the same site. This gully belongs to an early phase within the sequence immediately prior to the lying down of the rammed gravel floor. Another sample from this phase was also submitted for dating (1520).

Calibrated date: *1σ:* cal AD 1690–1920
2σ: cal AD 1680–1940

Final comment: see OxA-11494

OxA–11536 336 ±32 BP

$\delta^{13}C$: -24.1‰

Sample: Area A; 1520, submitted in 2002 by C Fenton-Thomas

Material: grain: *Hordeum* sp. (J Huntley 2001)

Initial comment: gully 1521 was cut into the natural substrate. It was very similar to other gullies that were sealed by rammed gravel 1370/1365 but was not itself sealed by this layer. Its fill 1520 (from which the sample came from) was very similar to the fills of postpits also from the phase preceding the rammed gravel. It was not recut and was sealed by spread deposit 1075. This deposit contained many small and medium sized stones, coal, and some clinker and charcoal. It was 0.5–0.6m below ground level in a pasture field that has not been ploughed in recent memory.

Objectives: to establish the date for the series of rebuilt structures in area A of these excavations and the longevity of the settlement here. Specifically to establish the date of this phase of settlement that immediately precedes the lying down of a rammed gravel floor, within a post-built structure. Another sample form this phase was also submitted for dating (1563).

Calibrated date: *1σ:* cal AD 1480–1640
2σ: cal AD 1450–1650

Final comment: see OxA-11494

OxA–11537 187 ±31 BP

$\delta^{13}C$: -23.2‰

Sample: Area A; 1372, submitted in March 2002 by C Fenton-Thomas

Material: carbonised plant macrofossil (indet. cereal) (J Huntley 2001)

Initial comment: this sample is from the fill of posthole 1373. This cut into the rammed gravel floor 1370/1365 from earlier features. A possible occupation/trample layer 1174 then sealed the feature. This deposit was 0.8m from surface of pasture field that had not been ploughed in recent memory. This feature cuts a layer of rammed gravel that overlies a layer of boulder clay subsoil, and contained mineral lumps: coal, charcoal, and cindery material.

Objectives: to establish the date and duration of a probable Neolithic building that was apparently rebuilt several times on the same site. This posthole cuts the rammed gravel floor of the building and is sealed by a probable occupation spread (1174) that built up within the walled structure. A date would give a *terminus post quem* for the occupation spread as well as some indication of the date of the rammed gravel.

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1650–1955*

Final comment: see OxA-11494

OxA–11538 4290 ±40 BP

$\delta^{13}C$: -22.4‰

Sample: Area A; 1193 A, submitted in March 2002 by C Fenton-Thomas

Material: charcoal: *Corylus* sp., nutshell (J Huntley 2001)

Initial comment: this sample is from the fill of posthole 1192. This was cut into probable occupation spread 1174 away form earlier features. It is not recut at a later date, but is sealed by a further probable occupation layer 1156. It was a very clear feature with steep vertical sides. Another sample from this phase was also submitted for dating. This deposit was 0.8m from surface of pasture field that had not been ploughed in recent memory. This feature cut a probable occupation layer that itself overlies a layer of rammed gravel. It is sealed by occupation spread 1156. The deposit contained mineral concretions, coal, and a little charcoal.

Objectives: as OxA-11537

Calibrated date: *1σ:* 2920–2880 cal BC
2σ: 3010–2870 cal BC

Final comment: A Bayliss and C Fenton-Thomas (4 February 2004), the two macrofossils from this posthole produced statistically consistent radiocarbon dates (T′=1.4; ν=1; T′(5%)=3.8; Ward and Wilson 1978). They are from posthole 1193, which forms part of structure A4. Stratigraphically later than these samples is sample 1163, a sherd of Grooved Ware with an adhering internal carbonised residue. They suggest that structure A4 was constructed and used at the beginning of the third millennium cal BC, and that the area was disused relatively shortly thereafter.

References: Ward and Wilson 1978

OxA–11539 4357 ±39 BP

$\delta^{13}C$: -23.9‰

Sample: Area A; 1193 B, submitted in March 2002 by C Fenton-Thomas

Material: charcoal: *Corylus* sp., hazelnut shell (J Huntley 2001)

Initial comment: as OxA-11538

Objectives: as OxA-11537

Calibrated date: *1σ:* 3030–2900 cal BC
2σ: 3100–2890 cal BC

Final comment: see OxA-11538

OxA–11540 358 ±32 BP

$\delta^{13}C$: -23.6‰

Sample: Area A; 1188 A, submitted in March 2002 by C Fenton-Thomas

Material: charcoal: Leguminosae, *Pisum sativum* (J Huntley 2001)

Initial comment: this sample is from the fill of posthole 1187. It was cut into probable occupation layer 1174, away from earlier features. It was not recut at a later date, but was sealed by further probable occupation layer 1156. It was a very clear feature with vertical sides. This deposit was 0.8m from surface of a pasture field that had not been ploughed in recent memory. It cut an occupation layer and was sealed by another, 1156. It contained charcoal and coal.

Objectives: to establish the date and duration of probable Neolithic building that was apparently rebuilt several times on the same site. This posthole cuts the probable occupation spread 1174 and is sealed by another probable occupation spread 1156. Both appear to have accumulated within the confines of a walled structure. The date would give a *terminus post quem* for the upper spread (1156) that probably relates to the final phase of rebuild.

Calibrated date: *1σ:* cal AD 1460–1640
2σ: cal AD 1440–1650

Final comment: A Bayliss and C Fenton-Thomas (18 July 2005), this sample, as all the legumes dated from the site, is intrusive. All but one cereal grain is also intrusive. This suggests the charred plant remains recovered from Neolithic deposits in these areas are substantially of medieval and later date. In contrast, all the dated samples of hazelnut shell are Neolithic in date.

OxA–11541 2778 ±35 BP

$\delta^{13}C$: -23.2‰

Sample: Area A; 1188 B, submitted in March 2002 by C Fenton-Thomas

Material: charcoal (indet. cereal) (J Huntley 2001)

Initial comment: as OxA-11540

Objectives: as OxA-11540

Calibrated date: *1σ:* 980–890 cal BC
2σ: 1010–830 cal BC

Final comment: A Bayliss and C Fenton-Thomas (18 July 2005), this is the only cereal grain which is late Bronze Age in date, and is therefore intrusive in its context.

OxA–11557 2855 ±36 BP

$\delta^{13}C$: -25.8‰

Sample: 1256, submitted in March 2002 by C Fenton-Thomas

Material: carbonised residue (T Manby 2001)

Initial comment: this pot sherd was contained within a spread deposit 1256 that was the upper fill of the linear hollow in area D. This deposit was overlain by the B-horizon 1207. The possibility of residuality is not significant as the sherd is being dated for its own sake. It has confidently been identified as Peterborough Ware. The deposit was 0.6m from the surface of the pasture field.

Objectives: to provide an indication of the date of use of this sherd of Peterborough Ware. This will help tighten up the site chronology but will also contribute for this type of pottery. There are, at present, very few dates from Peterborough Wares in the north of England.

Calibrated date: *1σ:* 1060–940 cal BC
2σ: 1130–910 cal BC

Final comment: A Bayliss and C Fenton-Thomas (18 July 2005), this sherd is late Bronze Age in date.

OxA–11558 402 ±32 BP

$\delta^{13}C$: -21.6‰

Sample: Area D; 1542 A, submitted in March 2002 by C Fenton-Thomas

Material: carbonised plant macrofossil (legume) (J Huntley 2001)

Initial comment: this sample comes from the fill of a posthole 1543. This was cut into the natural substrate and sealed by extensive spread 1395. It was not recut or truncated at a later date. This fill also contained packing stones, and was 0.8m from surface of the pasture field that had not been ploughed in recent memory. The deposit contained coal and charcoal.

Objectives: to establish the date of an arc of postholes in area D of these excavations, also known as 'D2' this structure is made up of nine to ten postholes arranged in lines to form a trapezoidal pattern. 1395 seals this feature and some others. This structure probably forms the earliest phase in area D. The date will help to refine duration of occupation at the site and to establish the chronological relationship between areas A and D.

Calibrated date: *1σ:* cal AD 1440–1490
2σ: cal AD 1430–1620

Final comment: see OxA-11540

OxA–11559 333 ±32 BP

δ¹³C: -23.7‰

Sample: Area A; 1196, submitted in March 2002 by C Fenton-Thomas

Material: charcoal: Leguminosae, *Pisum sativum* (J Huntley 2001)

Initial comment: this sample comes from spread deposit 1196. This deposit is seen as equivalent to 1174 that accumulated immediately on top of rammed gravel 1365/1370. It was cut by postpit 1348, itself probably contemporary with postholes filled by 1188 and 1193. This deposit was 0.7m from surface of a pasture field that has not been ploughed in recent memory.

Objectives: to establish the date of the legume. This piece has been selected to provide a date for the possible cultivated pea, as it is one of the earliest potential examples in Britain.

Calibrated date: *1σ:* cal AD 1480–1640
2σ: cal AD 1450–1650

Final comment: see OxA-11540

OxA–11560 355 ±31 BP

δ¹³C: -23.8‰

Sample: Area B; 1326, submitted in March 2002 by C Fenton-Thomas

Material: charcoal: Leguminosae, *Pisum sativum* (J Huntley 2001)

Initial comment: this sample comes from the fill of posthole 1325 in area B of excavations. It is sealed only by B-horizon 1121, as are most features in area B. It cuts the natural substrate and the deposit is 0.3m from the surface of pasture field that has not been ploughed within recent memory.

Objectives: to establish the date of use for the legume selected. This piece has been selected to provide a date for the possible cultivated pea, as it is one of the earliest potential examples in Britain. This feature is perhaps not as confidently Neolithic in date as many others, as only the B-horizon seals it.

Calibrated date: *1σ:* cal AD 1460–1640
2σ: cal AD 1440–1650

Final comment: see OxA-11540

OxA–11603 4480 ±40 BP

δ¹³C: -25.7‰

Sample: Area D; 1409, submitted in March 2002 by C Fenton-Thomas

Material: charcoal: *Corylus* sp., hazelnut shell fragment (J Huntley 2001)

Initial comment: this sample comes from the fill of postpipe 1414. Packing stones also survived *in situ*, within a wider postpit. The feature was not recut at a later date and is found on the edge of a linear hollow in area D. It was not sealed by 1395, but is part of structure D2, other features of which are sealed by 1395. Survival of the postpipe supports the probability of the lack of residuality/intrusion. This deposit was 0.7m from the surface of a pasture field that had not been ploughed in recent memory. The deposit contained coal and some charcoal.

Objectives: to establish the date of a probable Neolithic structure in area D of the excavations, also known as 'D2'. This structure is made up of nine to ten postholes arranged in lines to form a trapezoidal pattern. 1395 seals several of these postholes, but not this one. This feature was one of a few with an *in situ* postpipe and packing stones. This structure probably forms the earliest phase in area D. The date will help to refine duration of the occupation at the site and establish chronological relationship between areas A and D.

Calibrated date: *1σ:* 3340–3090 cal BC
2σ: 3360–3010 cal BC

Final comment: A Bayliss and C Fenton-Thomas (4 February 2004), this sample, like two other dated macrofossils from area D, falls in the second half of the fourth millennium cal BC.

OxA–11604 359 ±31 BP

δ¹³C: -21.3‰

Sample: Area D; 1715, submitted in March 2002 by C Fenton-Thomas

Material: grain: *Triticum* sp., carbonised (J Huntley 2001)

Initial comment: this sample is from a fill in posthole 1714. It was cut into the natural substrate and sealed by stony bank 1626. This deposit was 1.1m from the surface of a pasture field that has not been plough in recent memory. The subsoil is boulder clay and the field is not prone to flooding. The deposit contained cindery material, coal, and a little charcoal.

Objectives: to establish the date of a line of postholes running down the centre of the linear hollow in area D. Several of the postholes in this alignment are sealed by stony bank 1626 which perpetuates the earlier line followed by the posts (probably a fence). A date would provide an indication of the chronological relationship between this fence-line and the 9/10 post structure 'D2' as well as the arc of postholes.

Calibrated date: *1σ:* cal AD 1460–1640
2σ: cal AD 1440–1650

Final comment: see OxA-11494

OxA–11605 4710 ±40 BP

δ¹³C: -24.6‰

Sample: Area D; 1456A, submitted in March 2002 by C Fenton-Thomas

Material: charcoal: *Corylus* sp., hazelnut shell (J Huntley 2001)

Initial comment: from a spread of burnt material overlying another similar spread 1459. It was overlain by a probable abandonment layer 1422, surrounded by cut features but (largely) not truncated or disturbed by later activity. This deposit was 1m below the surface of a pasture field that had not been ploughed in recent memory. The subsoil was boulder clay and the field was not prone to flooring. The deposit contained sand, charcoal, and a small amount of coal/cinder.

Objectives: to establish the date and duration of activity in area D. This deposit contained much burnt material and represents one of a series of discrete horizons of dumping. It is probably made up of domestic waste that may have come from the structure in area A. A date will contribute to the series of dates from area D and help to establish the chronological relationship between activities in the two areas.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: A Bayliss and C Fenton-Thomas (4 February 2004), the results from context 1456 (OxA-11605–6) are statistically consistent (T′=0.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978), suggesting that this material may have been recently burnt when deposited. However, these radiocarbon dates are earlier than that from context 1409, even though on stratigraphic grounds this context must be earlier. We feel that the results from context 1456 provide a secure *terminus ante quem* for the construction of structure D2, because of their consistency.

References: Ward and Wilson 1978

OxA–11606 4670 ±40 BP

δ¹³C: -24.8‰

Sample: Area D; 1456 B, submitted in February 2002 by C Fenton-Thomas

Material: charcoal: *Corylus* sp., hazelnut shell (J Huntley 2001)

Initial comment: as OxA-11605

Objectives: as OxA-11605

Calibrated date: *1σ:* 3520–3360 cal BC
2σ: 3630–3360 cal BC

Final comment: see OxA-11605

OxA–11657 420 ±50 BP

δ¹³C: -21.1‰

Sample: Aread D; 1449, submitted in March 2002 by C Fenton-Thomas

Material: grain: *Triticum* sp. (J Huntley 2001)

Initial comment: this sample came from fill of pit/posthole 1451. It is probably deliberate backfill of the feature and was sealed by a spread of material 1412. This is overlain by 1390, another more extensive spread. Deposit was 0.9m from the surface of pasture field that had not been ploughed in recent memory.

Objectives: to establish the date of the pit/posthole 1451. This deposit is probably the deliberate backfill of this feature. The pit/posthole forms part of a probable post-built structure or post setting (D2). Other samples from this phase have also been submitted for dating (1409 and 1534). Together they can provide an indication of the date of this structure. This feature is sealed by spread 1412; itself sealed by more extensive spread 1390.

Calibrated date: *1σ:* cal AD 1430–1490
2σ: cal AD 1410–1640

Final comment: see OxA-11494 and OxA-11540

OxA–11658 9210 ±110 BP

δ¹³C: -26.5‰

Sample: Area A; 1491 A, submitted in March 2002 by C Fenton-Thomas

Material: charcoal: *Alnus glutinosa* (R Gale 2002)

Initial comment: this sample comes from the fill of a posthole. It cut the natural and was itself cut by gully 1488. This was overlain by rammed gravel 1370. This was a very clear posthole of significant depth, with a pointed base. This deposit was 0.8m below the surface of a pasture field that had not been ploughed within recent memory. The deposit contained coal, charcoal, and cinder.

Objectives: this posthole 1490 formed part of a probable rectilinear post-built structure. This structure is part of the earliest phase of activity in area A. It was overlain by the pear-shaped structure defined by gullies, and later by the rammed gravel surface. The date would provide an indication of the date of this structure to compare with others from postholes 1600 and 1467, also from this structure. These dates would provide the earliest determinations in the sequence of dates from area A.

Calibrated date: *1σ:* 8610–8290 cal BC
2σ: 8740–8240 cal BC

Final comment: see OxA-11493

OxA–11659 435 ±45 BP

δ¹³C: -24.8‰

Sample: Area A; 1600, submitted in March 2001 by C Fenton-Thomas

Material: carbonised plant macrofossil (Leguminosae; cf *Pisum sativum*) (J Huntley 2001)

Initial comment: this sample is from the fill of posthole 1601. This was cut into the natural clay and was not recut, but was sealed by the rammed gravel layer 1370–1365. This deposit was 1m from the surface of a pasture field that had not been ploughed in recent memory. The deposit contained charcoal and coal.

Objectives: to establish the date and duration of a probable Neolithic building that was apparently rebuilt several times on the same site. This posthole cut the natural clay and was sealed by a layer of rammed gravel 1370–1365. A date from this deposit would give a *terminus post quem* for the rammed gravel layer. This posthole may have been part of the earliest structure present.

Calibrated date: *1σ:* cal AD 1430–1470
2σ: cal AD 1410–1620

Final comment: see OxA-11494 and OxA-11540

OxA–11660 330 ±45 BP

$\delta^{13}C$: -25.2‰

Sample: Area A; 1369, submitted in March 2002 by C Fenton-Thomas

Material: grain: Cereal indet, carbonised (J Huntley 2001)

Initial comment: this sample is from the fill of posthole 1368. This was cut into the rammed gravel layer 1370–1365 away from any earlier features. The feature was sealed by possible occupation/trample layer 1174. This deposit was 0.8m from the surface of a pasture field that had not been ploughed in recent memory. The feature cut a spread of rammed gravel that overlies the boulder clay subsoil. The deposit contained cinder with a little charcoal and coal.

Objectives: to establish the date and duration of a probable Neolithic building that was apparently rebuilt several times on the same site. This posthole cut the rammed gravel floor of the building and was sealed by probable occupation spread 1174 that built up within the walled structure. It would give a *terminus post quem* for the occupation spread and in indication of the date of the rammed gravel.

Calibrated date: *1σ:* cal AD 1470–1650
2σ: cal AD 1440–1660

Final comment: see OxA-11493 and OxA-11540

OxA–11661 4380 ±60 BP

$\delta^{13}C$: -28.5‰

Sample: 1297, submitted in March 2002 by C Fenton-Thomas

Material: carbonised residue (T Manby 2001)

Initial comment: this pot sherd derives from the fill of a probable animal barrow. It is likely to have been disturbed by this animal from a nearby feature. It is intrusive to the feature but is being dated for its own sake, not to date the deposit that contained it. It has confidently been identified as Peterborough Ware. This deposit was 0.4m from the surface of a pasture field.

Objectives: as OxA-11557

Calibrated date: *1σ:* 3100–2900 cal BC
2σ: 3330–2890 cal BC

Final comment: A Bayliss and C Fenton-Thomas (18 July 2005), this sample provides a date for this Peterbrough Ware sherd.

OxA–11662 370 ±50 BP

$\delta^{13}C$: -23.2‰

Sample: Area D; 1712 B, submitted in March 2002 by C Fenton-Thomas

Material: grain: Cereal indet, charred (J Huntley 2001)

Initial comment: as OxA-11500

Objectives: as OxA-11500

Calibrated date: *1σ:* cal AD 1440–1640
2σ: cal AD 1430–1650

Final comment: see OxA-11493 and OxA-11540

OxA–11679 4180 ±55 BP

$\delta^{13}C$: -28.1‰

Sample: Area A; 1163, submitted in March 2002 by C Fenton-Thomas

Material: carbonised residue (T Manby 2001)

Initial comment: this sample is from a recut of the postpit. This was cut into probable occupation layer 1156 and sealed by probable abandonment layer 1075. This deposit was 0.6m from the surface of pasture field that had not been ploughed in recent memory. This feature cuts a probable occupation layer.

Objectives: to establish the date and duration of a probable Neolithic building that was apparently rebuilt several times on the same site. In addition to help tighten up the Grooved Ware chronology for this region. This feature cut the upper occupation layer 1156 and is sealed by the probable abandonment layer 1075. The date would give a *terminus post quem* for the probable abandonment layer, and would provide an upper date for this series of dates from area A of the excavations.

Calibrated date: *1σ:* 2890–2660 cal BC
2σ: 2910–2570 cal BC

Final comment: A Bayliss and C Fenton-Thomas (4 February 2004), the two macrofossils from posthole 1193, which forms part of structure A4 are stratigraphically earlier than this sample 1163, which also providea a date for this Grooved Ware sherd. They suggest that structure A4 was constructed and used at the beginning of the third millennium cal BC, and that the area was disused relatively shortly thereafter.

OxA–11680 390 ±45 BP

$\delta^{13}C$: -22.1‰

Sample: Area D; 1542 B, submitted in March 2002 by C Fenton-Thomas

Material: grain: *Triticum* sp. (J Huntley 2001)

Initial comment: this sample is from the fill of posthole 1543. It was cut into natural clay and sealed by extensive spread 1395. It was not recut or truncated at a later date. This fill also contained packing stones. This deposit was 0.8m from the surface of a pasture field that was not been ploughed in recent memory. This deposit contained charcoal and coal.

Objectives: to establish the date of a probable Neolithic structure in area D of this excavation also known as 'D2'. This structure is made up of nine to ten postholes arranged in lines to form a trapezoidal pattern. This feature and some others are sealed by 1395. This structure probably forms the earliest phase in area D. The date will help to refine the duration of occupation at the site and to establish the chronological relationship between areas A and D.

Calibrated date: *1σ:* cal AD 1440–1620
2σ: cal AD 1430–1650

Final comment: see OxA-11494

Camber Castle, East Sussex

Location: TQ 92181845
Lat. 50.55.58 N; Long. 00.44.07 E

Project manager: S Davis (English Heritage), 1963–5, 1974, 1978–83

Archival body: English Heritage

Description: a rare example of an Henrician fort surviving in its original plan.

Objectives: there are >1,000 rabbit bones (ie 25–30% of the animal bone assemblage by number). The castle was occupied for a brief period (AD 1539–1637). There is little direct evidence, except for cut marks, of a clear association between the human occupants of the castle and these rabbits. A date will test whether they are contemporary with other animal remains or merely intrusive (ie post-date the site).

Final comment: S Davis (3 January 2001), with five out of six results dating roughly to the period of occupation of the castle, it looks most probable that the majority of the huge (>1000 rabbit bones) accumulation of rabbit bones at Camber is indeed old and not derived from say eighteenth- or nineteenth-century intrusions. This of course does solve one important problem. Rabbits are burrowing animals, and their bones, when found in archaeological deposits, tend to be dismissed as 'intrusive'. Clearly zoo-archaeologists need to be careful on this point! So, at the very least, dating the six Camber rabbit bones had not been a useless exercise. But the main zoo-archaeological question of how the rabbit bones got there in the first place still remains to be answered. With only one rabbit bone showing signs of butchery while the small number of similar-sized bird bones have many cut marks, it is probable that the soldiers at Camber were not responsible for the majority of the rabbits. This means that they probably got there as a result of 'natural' means. Perhaps some died in infancy in their burrows while others were brought into the castle by predators such as large birds of prey, or dogs and cats. We noted two age groups of rabbits, the very young ones may have been taken by the former category of prey and the older rabbits perhaps by the latter category of prey.

Laboratory comment: English Heritage (23 June 2014), two further dates were funded prior to 1998 and were published in Bayliss *et al* (2015, 19; OxA-7533–4).

References:
Ames 1975
Bayliss *et al* 2015
Biddle *et al* 1982
Biddle *et al* 2001
Bronk Ramsey *et al* 2002
Elson 1990
Locker *et al* 1997

OxA–9065 342 ±36 BP

$\delta^{13}C$: -21.4‰

Sample: Box 834692 04 PR153, submitted on 2 July 1999 by S Davis

Material: animal bone: *Oryctolagus cuniculus*, rabbit mandible (S Davis)

Initial comment: from phase 4 of the castle. According to archaeologists all layers in the site are mixed (pottery matching evidence for example) but all said to be definitely fifteenth or sixteenth century AD.

Objectives: to ascertain whether the rabbit bones are contemporary with a brief period of occupation, AD 1539–1637, or intrusive.

Calibrated date: *1σ:* cal AD 1470–1640
2σ: cal AD 1450–1650

Final comment: see series comments

OxA–9066 424 ±39 BP

$\delta^{13}C$: -20.6‰

Sample: Box 834714 04 PR280, submitted on 2 July 1999 by S Davis

Material: animal bone: *Oryctolagus cuniculus*, rabbit tibia (S Davis)

Initial comment: rabbit bones found associated with other animal bones such as cattle, sheep etc., within archaeological levels inside Camber Castle courtyard and bastions.

Objectives: as OxA-9065

Calibrated date: *1σ:* cal AD 1430–1470
2σ: cal AD 1420–1620

Final comment: see series comments

OxA–9067 365 ±50 BP

$\delta^{13}C$: -21.3‰

Sample: Box 834692 04 PR86, submitted on 2 July 1999 by S Davis

Material: animal bone: *Oryctolagus cuniculus*, rabbit ulna from young individual (S Davis)

Initial comment: as OxA-9065

Objectives: as OxA-9065

Calibrated date: *1σ:* cal AD 1450–1640
2σ: cal AD 1430–1650

Final comment: see series comments

OxA–9068 301 ±36 BP

$\delta^{13}C$: -22.5‰

Sample: Box 834692 05 PR147, submitted on 2 July 1999 by S Davis

Material: animal bone: *Oryctolagus cuniculus*, rabbit right mandible (S Davis)

Initial comment: as OxA-9065

Objectives: as OxA-9065

Calibrated date: *1σ:* cal AD 1520–1650
2σ: cal AD 1470–1670

Final comment: see series comments

Carlton Colville: Bloodmoor Hill, Suffolk

Location: TM 52089002
Lat. 52.26.58 N; Long. 01.42.34 E

Project manager: A Dickens (Cambridge Archaeological Unit), 1998

Description: an early Anglo-Saxon settlement and cemetery was excavated at Bloodmoor Hill, near Lowestoft, Suffolk. The area excavated covered just over 3ha, and produced material from two main periods: first and second century Romano-British, associated with a ditched field and track system; and sixth-eighth century Anglo-Saxon associated with dense settlement remains including *Grubenhauser*, post-buildings, pits, a midden, a cemetery, and evidence of industrial activity. Twenty-nine inhumation burials also were excavated. Twenty-six were buried in a formal but unenclosed cemetery within the central area of the settlement. Three graves were located 50m to the east, but still within the settlement area and contemporary with the main cemetery. The Anglo-Saxon features both overlay, and were in parts contained by, the Romano-British system. There were also small prehistoric and medieval/post-medieval elements. The features were relatively well-preserved, though with some truncation as a result of medieval and later ploughing.The primary focus for both the initial and subsequent excavations was the early Anglo-Saxon settlement. The northern boundary of the settlement lies under 1980s and 1990s housing development, while western, eastern, and southern limits have now been defined.The area is situated on the south-eastern slope of a broad, shallow valley, with hills to both sides rising gently to a height of *c* 18m. The valley is a little over 2km wide, and runs south-west to north-east, flowing into the eastern end of Lake Lothing, and then to the sea at Lowestoft. The site lies on sand at 8–10m AOD.

Fifty-nine radiocarbon age determinations have been obtained on samples of human bone, animal bone, and charred residues on the interior of pottery sherds.

Objectives: the radiocarbon programme was designed to achieve the following: to provide overall estimates of the start, end, and duration of the settlement activity; to refine the dating of the cemetery, and to understand its development; to date the isolated group of burials to the east of the site; to understand the process of filling disused *Grubenhauser*; and to provide absolute dating for the ceramic typologies.

References: Lucy *et al* 2009

Carlton Colville: Bloodmoor Hill, cemetery, Suffolk

Location: TM 52089002
Lat. 52.26.58 N; Long. 01.42.34 E

Project manager: A Dickens (Cambridge Archaeological Unit), January to July 1998

Archival body: Suffolk Museums

Description: the sampling strategy adopted for the dating of the cemetery was severely constrained by the survival of bone in the graves. This was extremely variable, and all skeletons which produced the *c* 250g of bone necessary for high-precision dating were dated.The cemetery comprised 24 west-east aligned graves lies within the settlement, with two further graves lying some 50m to the east, though still within the main area of occupation. The limits of the main cemetery group were defined by two rows the 'east' and 'west'. Four samples of human bone were submitted from graves of the 'west' row; grave 5 (UB-4911) was the most northern of the row and contained some possible grave goods; grave 4 (UB-4909), grave 3 (UB-4908), and grave 2 (UB-4907) came from its southern extent. The three samples of human bone from the 'east' row came from grave 25 (UB-4912), grave 24 (UB-4913) buried with grave goods including an iron knife, rod, and nails, and grave 22 (UB-4910) buried with a wide range of goods including a gold pendant with glass settings. Two samples of human bone from the main cemetery group, although not aligned to any row came from grave 8 (UB-4916) and grave 12 (UB-4914) buried with a number of grave goods.The satellite group of burials to the east of the main cemetery comprised a re-cut double burial (grave 28) from which a sample of human bone (UB-4915), subsequently cut by a sub-adult internment was dated.

Objectives: the objectives were two-fold: at the broadest level to determine a date and time span for the cemetery as a whole - is there a relationship between rows in the cemetery and generations of the population, are the outlier burials contemporary with the main group, what is the likely temporal relationship with the 'folk cemetery' nearby (known through antiquarian references); and, for individual burials (between which there are few direct stratigraphic relationships) can dating assist in determining sequence, and more specifically in relation to grave goods - are the dates being suggested for the items contemporary with the actual dates of the skeletons? Also, through stable isotope analysis of the skeletons, what evidence is there for diet, particularly whether there is a marine element which is central to a better understanding of the economic fabric of the settlement.

Final comment: P Marshall (25 October 2013), there is excellent agreement between conventional artefact dating and the estimates derived from radiocarbon modelling, both for the date range of the main cemetery as a whole, and for dating of individual burials with chronologically diagnostic artefacts and assemblages (graves 5, 12, 22, 24, and 28a).

Laboratory comment: English Heritage (25 October 2006), the results show no chronological differentiation between the use of various rows within the main cemetery area, and the outlier burial is also shown to be contemporary with the rest of the dated burials. The cemetery was in use for only 1–2 generations *(20–80 years at 95% probability; cemetery_span;* Lucy *et al* 2009, fig 6.7) in the seventh century cal AD, and the results show that the isolated burials to the east of the site were part of the same single phase of burial activity.The isotopic measurements from the human bones are extremely unusual as the $\delta^{13}C$ values suggest a terrestrial based diet with a negligible marine input, while the $\delta^{15}N$ values are too enhanced to be explained by the consumption of terrestrial herbivore protein alone. Two possible explanations for the high $\delta^{15}N$ values are that the individuals were consuming a large proportion of omnivore protein (eg pigs feeding on animal refuse) or freshwater resources (Müldner and Richards 2005).

References: Lucy *et al* 2009
Müldner and Richards 2005

UB–4907 1271 ±19 BP

$\delta^{13}C$: -20.1 ±0.5‰
$\delta^{13}C$ *(diet)*: -19.9 ±0.32‰
$\delta^{15}N$ *(diet)*: +10.5 ±0.36‰
C/N ratio: 3.3

Sample: F.165 [2304] Grave 2, submitted on 17 February 2003 by N Dodwell

Material: human bone (775g) (left and right femora and tibias) (N Dodwell 2003)

Initial comment: part of main cemetery group. The grave cut the natural sand, and the fill was sealed by subsoil F159. There was no truncation of the grave or skeleton which was fully articulated and well-preserved to the east, but poorly to the west. The burial contained no grave goods.

Objectives: to establish the date and time-span of use of the main cemetery group.

Calibrated date: *1σ:* cal AD 685–770
2σ: cal AD 670–775

Final comment: see series comments

UB–4908 1331 ±21 BP

$\delta^{13}C$: -20.5 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.3 ±0.32‰
$\delta^{15}N$ *(diet)*: +10.6 ±0.36‰
C/N ratio: 3.4

Sample: F.173 [1440] Grave 3, submitted on 17 February 2003 by N Dodwell

Material: human bone (610g) (left and right femora) (N Dodwell 2003)

Initial comment: part of main cemetery group. The grave cut the natural sand, and the fill was truncated by two pits, one which had removed the feet (F166), and the other which cut to just above the main body of the skeleton (F167). The skeleton was fully articulated but poorly preserved. The burial contained no grave goods.

Objectives: as UB-4907

Calibrated date: *1σ:* cal AD 660–680
2σ: cal AD 650–765

Final comment: see series comments

UB–4909 1368 ±20 BP

$\delta^{13}C$: -20.6 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.3 ±0.32‰
$\delta^{15}N$ *(diet)*: +10.7 ±0.36‰
C/N ratio: 3.4

Sample: F.185 [1520] Grave 4, submitted on 17 February 2003 by N Dodwell

Material: human bone (740g) (left and right femora and tibias) (N Dodwell 2003)

Initial comment: part of main cemetery group. The grave cut the natural sand, and the fill was sealed by subsoil F159. It was heavily truncated by post-medieval ditch F156. The remains of the skeleton were fully articulated but poorly preserved. The burial contained no grave goods.

Objectives: as UB-4907

Calibrated date: *1σ:* cal AD 650–665
2σ: cal AD 640–675

Final comment: see series comments

UB–4910 1365 ±15 BP

$\delta^{13}C$: -20.5 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.2 ±0.32‰
$\delta^{15}N$ *(diet)*: +10.7 ±0.36‰
C/N ratio: 3.1

Sample: F.236 [2280] Grave 22, submitted on 17 February 2003 by N Dodwell

Material: human bone (360g) (left and right femora, fibulas, and tibias) (N Dodwell 2003)

Initial comment: part of main cemetery group. The grave cut the natural sand. The remains of the skeleton were fully articulated but fairly poorly preserved. The burial contained grave goods including an iron rod, rivets, fittings, a pin, knife, copper lace tag, silver pins and chain and four rings, a gold pendant, and three glass beads.

Objectives: to establish the date and time-span of use of the main cemetery group, and to compare with the presumed date of the grave goods.

Calibrated date: *1σ:* cal AD 650–665
2σ: cal AD 645–670

Final comment: see series comments

UB–4911 1401 ±21 BP

$\delta^{13}C$: -20.4 ±0.5‰
$\delta^{13}C$ *(diet)*: -20.1 ±0.32‰
$\delta^{15}N$ *(diet)*: +11.1 ±0.36‰
C/N ratio: 3.4

Sample: F.241 [2283] Grave 5, submitted on 17 February 2003 by N Dodwell

Material: human bone (560g) (femora and tibias, left humerus) (N Dodwell 2003)

Initial comment: part of main cemetery group. The grave cut the natural sand, and was cut by pit F240 but this did not truncate the skeleton. The remains of the skeleton (pelvis and upper legs) were articulated but poorly preserved. The burial contained possible grave goods including a spatulate implement and iron object.

Objectives: as UB-4910

Calibrated date: *1σ:* cal AD 640–655
2σ: cal AD 610–665

Final comment: see series comments

UB–4912 1326 ±16 BP

δ^{13}C: -20.7 ±0.5‰
δ^{13}C (diet): -20.5 ±0.32‰
δ^{15}N (diet): +11.1 ±0.36‰
C/N ratio: 3.2

Sample: F.256 [2259] Grave 25, submitted on 17 February 2003 by N Dodwell

Material: human bone (720g) (femora, left tibia) (N Dodwell 2003)

Initial comment: part of main cemetery group. The grave cut the natural sand, and was well sealed. Bone preservation was fairly good, and the skeleton was fully articulated. The burial contained no grave goods.

Objectives: as UB-4907

Calibrated date: *1σ:* cal AD 660–680
2σ: cal AD 655–690

Final comment: see series comments

UB–4913 1371 ±15 BP

δ^{13}C: -21.0 ±0.5‰
δ^{13}C (diet): -20.7 ±0.32‰
δ^{15}N (diet): +11.8 ±0.36‰
C/N ratio: 3.8

Sample: F.257 [2260] Grave 24, submitted on 17 February 2003 by N Dodwell

Material: human bone (930g) (femora and tibias) (N Dodwell 2003)

Initial comment: part of main cemetery group. The shallow grave cut the natural sand. Bone preservation was poor, and the skeleton was fully articulated. The burial contained grave goods including an iron knife, rod, and nails.

Objectives: as UB-4910

Calibrated date: *1σ:* cal AD 650–665
2σ: cal AD 645–670

Final comment: see series comments

UB–4914 1397 ±18 BP

δ^{13}C: -20.5 ±0.5‰
δ^{13}C (diet): -20.3 ±0.32‰
δ^{15}N (diet): +11.8 ±0.36‰
C/N ratio: 3.3

Sample: F.261 [2261] Grave 12, submitted on 17 February 2003 by N Dodwell

Material: human bone (330g) (femor, tibias, and feet) (N Dodwell 2003)

Initial comment: part of main cemetery group. The grave cut the natural sand, and was slightly truncated along the southern side by post-medieval ditch F156, although it did not reach the skeleton. Bone preservation was poor, and the skeleton was fully articulated. The burial contained grave goods including a shear, chatelaine rods and links, a slide key, and rod fragments.

Objectives: as UB-4910

Calibrated date: *1σ:* cal AD 640–660
2σ: cal AD 615–665

Final comment: see series comment

UB–4915 1364 ±19 BP

δ^{13}C: -20.4 ±0.5‰
δ^{13}C (diet): -20.1 ±0.32‰
δ^{15}N (diet): +9.7 ±0.36‰
C/N ratio: 3.2

Sample: F.364 [3417] Grave 28, submitted on 17 February 2003 by N Dodwell

Material: human bone (770g) (femora, tibias, and humeri) (N Dodwell 2003)

Initial comment: a separate burial, one of three 50m east of the main cemetery. The grave cut the natural sand, and this sample comes from the lower body of the initial burial in grave cut [3415]. A second burial was subsequently cut into the south-western end of the grave, and a juvenile interred. There was no cross contamination between the two burials. Bone preservation was poor, and the adult skeleton was fully articulated. The burial contained a single iron knife.

Objectives: as UB-4910

Calibrated date: *1σ:* cal AD 650–665
2σ: cal AD 645–675

Final comment: see series comments

UB–4916 1372 ±19 BP

δ^{13}C: -19.9 ±0.5‰
δ^{13}C (diet): -19.6 ±0.32‰
δ^{15}N (diet): +10.6 ±0.36‰
C/N ratio: 3.2

Sample: F.265 [2269] Grave 8, submitted on 17 February 2003 by N Dodwell

Material: human bone (470g) (left femur, right arm, and skull) (N Dodwell 2003)

Initial comment: from the main cemetery group. The grave cut the natural sand and was truncated by a post-medieval ditch F156 - although this did not disturb the skeleton very little except the skull survived. Bone preservation was poor. The burial contained no grave goods.

Objectives: as UB-4907

Calibrated date: *1σ:* cal AD 650–665
2σ: cal AD 640–670

Final comment: see series comments

Church Lammas, Surrey

Location: TQ 027721
Lat. 51.26.16 N; Long. 00.31.22 W

Project manager: P Jones (Surrey County Archaeological Unit), 1995

Archival body: Surrey County Council

Description: a natural hollow close to, but not necessarily contemporary with, a later Upper Palaeolithic knapping and carcass reduction site. The principal fill was of over a metre of laminated peats and micro-charcoal material, palynological assessments of which suggest an accumulation from late pre-Boreal times down to the Atlantic Period, *c* 9500–7000 BP (*c* 9000–5800 cal BC).

Objectives: to confirm or deny the dating suggested from the palynological data by analyses of lamina samples from 4cm and 20cm depth.

Final comment: P Jones (2013), six radiocarbon dates were obtained: three from the upper part at 4cm, and three from the lower part at 20cm. It should be emphasised that this dating is by no means satisfactory, although the deposit probably spans the mid-eighth to mid-sixth millennia cal BC. Consequently, these sediments clearly post-date the Late Glacial Scatter 1 that lay 10m west, and so palaeoenvironmental work was not continued beyond assessment. Despite the limitations of the radiocarbon dates and environmental evidence currently available from hollow 2, it is clear that this peat deposit at Church Lammas constitutes an important record for the early Holocene in southern England.

Laboratory comment: English Heritage (2000), two samples of horse tooth from the faunal scatter (Staines XI/515-2) failed to produce sufficient collagen for dating.

References: Jones 2013

OxA–10097 6455 ±55 BP

$\delta^{13}C$: -27.0‰

Sample: 519B 4cm, submitted on 2 March 2000 by P Wiltshire

Material: sediment (humin)

Initial comment: a replicate of OxA-9528.

Objectives: as OxA-9528

Calibrated date: *1σ:* 5480–5360 cal BC
2σ: 5520–5310 cal BC

Final comment: see OxA-9528

Laboratory comment: see OxA-9528

OxA–9528 6605 ±45 BP

$\delta^{13}C$: -26.2‰

Sample: 519B 4cm, submitted on 2 March 2000 by P Wiltshire

Material: sediment (humic acid)

Initial comment: from the lower fill of a ?natural depression in the gravel, containing waterlogged sediments. The sample came from a sediment monolith.

Objectives: to provide an absolute chronology for the environmental evidence within the sediment sequence.

Calibrated date: *1σ:* 5620–5480 cal BC
2σ: 5630–5470 cal BC

Final comment: P Jones (2013), this basal level probably dates to the mid-eighth millennium cal BC. At this time, the immediate environment was woodland, which was overwhelmingly dominated by pine, with some hazel, birch, sedges, and grasses.

Laboratory comment: English Heritage (11 September 2001), the three measurements from 4cm are statistically significantly different (T′=1521.5; T′(5%)=6.0; ν=2; Ward and Wilson 1978). This inconsistency reflects the composition of the dated material. The most reliable dating for the level at 4cm may be provided by OxA-9528 and OxA-10097, although these two results are still statistically significantly different (T′=4.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978). In this case, OxA-9529, which contained a significant proportion of hand-picked charcoal fragments, may constitute material reworked from burning episodes further down the profile and the level at 4cm probably dates to the middle of the sixth millennium cal BC.

References: Ward and Wilson 1978

OxA–9529 8840 ±50 BP

$\delta^{13}C$: -28.5‰

Sample: 519B 4cm, submitted on 2 March 2000 by P Wiltshire

Material: sediment (humin; enriched with hand-picked unidentified charcoal fragments)

Initial comment: a replicate of OxA-9528.

Objectives: as OxA-9528

Calibrated date: *1σ:* 8190–7820 cal BC
2σ: 8230–7740 cal BC

Final comment: see OxA-9528

Laboratory comment: see OxA-9528

OxA–9530 8580 ±50 BP

$\delta^{13}C$: -27.5‰

Sample: 519B 20cm, submitted on 2 March 2000 by P Wiltshire

Material: sediment (humic acid)

Initial comment: as OxA-9528

Objectives: as OxA-9528

Calibrated date: *1σ:* 7600–7570 cal BC
2σ: 7660–7540 cal BC

Final comment: P Jones (2013), this upper level probably dates to the mid-sixth millennium cal BC. At this time, pollen evidence suggests that the pine component of the woodland was much reduced, with an increase of birch, hazel, and oak. Lime and alder make their first appearance at the site at this time.

Laboratory comment: English Heritage (11 September 2001), the three measurements from 20cm are statistically significantly different (T′=42.7; T′(5%)=6.0; ν=2; Ward and Wilson 1978). This inconsistency reflects the composition of the dated material. The relative consistency of the ‘humic acid' and 'humin' fractions from 20cm, although these two results are still statistically significantly different (OxA-9530–1; T′=4.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978), may suggest that this level dates to the middle of the sixth millennium cal BC. This may also be the date of the *in situ* burning event(s) in the deposit, although this sample produced very little hand-picked charcoal to add to OxA-9531. If this is the case, then it is likely that the cellulosic fraction contained a proportion of in-washed or reworked material.

References: Ward and Wilson 1978

OxA–9531 8435 ±50 BP

δ¹³C: -28.1‰

Sample: 519B 20cm, submitted on 2 March 2000 by P Wiltshire

Material: sediment (humin; enriched with hand-picked unidentified charcoal fragments)

Initial comment: a replicate of OxA-9530.

Objectives: as OxA-9530

Calibrated date: *1σ:* 7550–7480 cal BC
2σ: 7590–7370 cal BC

Final comment: see OxA-9530

Laboratory comment: see OxA-9530

OxA–9602 8910 ±55 BP

δ¹³C: -28.0‰

Sample: 519B 20cm, submitted on 2 March 2000 by P Wiltshire

Material: sediment (humin)

Initial comment: a replicate of OxA-9530.

Objectives: as OxA-9530

Calibrated date: *1σ:* 8240–7960 cal BC
2σ: 8270–7830 cal BC

Final comment: see OxA-9530

Laboratory comment: see OxA-9530

Conderton Camp, Worcestershire

Location: SO 972384
Lat. 52.02.37 N; Long. 02.02.27 W

Project manager: N Thomas (Birmingham City Museum & Art Gallery), 1958–9

Archival body: Birmingham City Museum

Description: a univallate Iron Age hillfort (*c* 1.2ha) occupying a spur from the southern edge of Bredon Hill. Plain entrances (phase 1) were given inturns in phase 2, when a cross-rampart was added to define a space filled with houses, pits etc. In phase 3 the north entrance was blocked.

Objectives: precise dating for the middle Iron Age in the Severn Valley is unknown. Recent study of the distinctive pottery has established general phases, to which more precise dating would make a major addition. This would also throw light on the salt trade with Cheshire. Finally, the Conderton earthworks, which are related structurally to those of the major hillfort on Bredon, Bredon Hill Camp, need to be dated. The objective of the series is therefore to establish a dated middle Iron Age chronology for these communities in the West Midlands.

Final comment: N Thomas (14 November 2000), period 1, the start of the hillfort, is satisfactorily early and samples Aa and Ab are important for the beginning of the middle Iron Age hereabouts. The cross-rampart (period 2i) is early enough to contain all the excavated structures within the constricted circuit of ramparts. But it is also made clear by radiocarbon that the development of the community began at once; and resistivity and excavation showed that dense occupation had just begun before construction of the cross-rampart. The order of house building appears to be (1)H4, (2)H6/H2, (3)H1/H3. This is acceptable, although ceramically H6 should have been as late as H3. The radiocarbon dating does not support the stratigraphic order of pit BB (earlier) and pit CC (later). The early date of pit A goes against the late ceramic phase for the large urn PO81 found there. All in all, radiocarbon gives no more than qualified support to the ceramic phasing.

Laboratory comment: English Heritage (11 August 2014), a chronological model for activity at Conderton Camp is provided by Thomas (2005, fig 84). This suggests that the hillfort was initially constructed in *520–400 cal BC (95% probability; start_conderton)* and occupied until *200–80 cal BC (95% probability; end_conderton)*. This model suggests that only the sample dated by OxA-8612 was residual.

References: Thomas 2005

OxA–8516 2115 ±40 BP

δ¹³C: -26.0‰

Sample: O(a), submitted on 7 December 1998 by N Thomas

Material: charcoal: Rosaceae, single fragment (R Gale 1998)

Initial comment: from the base, layer 11, of pit BB, an area of dense occupation. The top half of the pit was removed by pit CC, of ceramic phase D, and in turn filled with domestic rubbish from nearby house 3 (ceramic phase D and later). The sample came from a charcoal spread on the pit floor, closely sealed and stratified, 1.22m below modern turf.

Objectives: this area of Conderton, known as mound 1, contained a dense occupation of storage pits and parts of three houses. The houses belonged to ceramic phase D (ie are late) and could be shown to overlie some of the pits. The latter also had stratigraphical relationships to one another and overall offered excellent evidence for the development of the hillfort from its construction onwards (mound 1 impinged upon the tail of the original rampart, Phase 1 of Conderton). Pit BB, on stratigraphical grounds, is early here, with pit CC and then house 3 rubbish following in clear sequence. This sample could offer a crucial *terminus post quem* for a series of superimposed features. *See* also Li(a) and Li(b) (OxA-8614 and OxA-8615) and Lii(a) and Lii(b) (OxA-8785 and OxA-8727).

Calibrated date: *1σ:* 200–50 cal BC
2σ: 350–40 cal BC

Final comment: N Thomas (14 November 2000), stratigraphy showed that pit BB (samples O(a), O(b); OxA-8516/7) was earlier than Pit CC (sample P, OxA-8649), which had removed its top. The radiocarbon results here appear therefore to be back to front.

Laboratory comment: English Heritage (2001), the two measurements on different fragments of Rosaceae charcoal from this pit are statistically significantly different at 95% confidence (OxA-8516–7; T′=4.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Bronk Ramsey *et al* 2002
Ward and Wilson 1978

OxA–8517 2225 ±35 BP

$\delta^{13}C$: -25.9‰

Sample: O(b), submitted on 7 December 1998 by N Thomas

Material: charcoal: Rosaceae, single fragment (R Gale 1998)

Initial comment: as OxA-8516

Objectives: as OxA-8516

Calibrated date: *1σ:* 380–200 cal BC
2σ: 400–190 cal BC

Final comment: N Thomas (14 November 2000), *see* comment for OxA-8516. These two results should have confirmed that pit CC was later than pit BB, but they show the opposite.

References: Bronk Ramsey *et al* 2002

OxA–8568 2510 ±40 BP

$\delta^{13}C$: -24.7‰

Sample: A(a), submitted on 7 December 1998 by N Thomas

Material: charcoal: *Quercus* sp., sapwood; single fragement (R Gale 1998)

Initial comment: from posthole 3, one of a group of at least seven defining a timber structure forming one side of the period 1 gate at the north entrance of the hillfort. This entrance was modified in period 2, when inturns were added, in part sealing the postholes of the period 1 gate. A new gate was erected at the inner ends of the inturns. Some posts of period 1 were removed, but the stumps of others, including phase 3, were left in their holes. Phase 3 was intact and sealed by subsequent roadway and, finally, by collapse of dry stone facings to the western inturn.

Objectives: this sample comes, uncontaminated, from the earliest structural feature of the hillfort apart from the phase 1 earthworks themselves. A radiocarbon determination would provide a *terminus post quem* for all subsequent features of the camp and its occupation and lengthy history. Middle Iron Age in the Severn Valley, with its characteristic stamped and incised pottery, its links with the Malvernian pottery industry and the Droitwich/Cheshire salt trade, is so far quite undated in absolute years. This sample, with its associated cultural artefacts, would have significant application to the many sites in this region and up on to the Cotswold edge. It would help us to define the start of the middle Iron Age hereabouts.

Calibrated date: *1σ:* 790–540 cal BC
2σ: 800–490 cal BC

Final comment: N Thomas (14 November 2000), these give a highly important result for the dating of the hillfort of Conderton - period 1 and the beginning of construction of its north entrance. They show how early was the middle Iron Age hereabouts; broadly a sixth century BC for its beginning is thoroughly acceptable and supports a similar date range for Croft Ambrey (Birm-185, 2410 ±135 BP, 830–170 cal BC at 2σ; Reimer *et al* 2004) and Midsummer Hill (Birm-142, 2370 ±185 BP, 900 cal BC–cal AD 20 at 2σ; Reimer *et al* 2004) Birm-143, 2000 ±100 BP, 350 cal BC–cal AD 240 at 2σ; Reimer *et al* 2004) obtained from only two samples.

Laboratory comment: English Heritage (2001), the two measurements on different single fragments of oak sapwood from this post are statistically significantly different at 95% confidence (OxA-8568–9; T′=4.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Bronk Ramsey *et al* 2002
Reimer *et al* 2004
Ward and Wilson 1978

OxA–8569 2385 ±45 BP

$\delta^{13}C$: -26.1‰

Sample: A(b), submitted on 7 December 1998 by N Thomas

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 1998)

Initial comment: as OxA-8568

Objectives: as OxA-8568

Calibrated date: *1σ:* 520–390 cal BC
2σ: 750–380 cal BC

Final comment: see OxA-8568

References: Bronk Ramsey *et al* 2002

OxA–8612 2415 ±30 BP

$\delta^{13}C$: -22.1‰

Sample: D, submitted on 7 December 1998 by N Thomas

Material: animal bone: *Sus* sp., pig, articulating radial, intermediate and ulna carpals (>5g) (M Iles and K Clark)

Initial comment: this sample was associated with sample C (UB-4413) in house 2 (H2), occurring among the bones of the sheep skeleton. These all lay within a rubble layer (H2.II) representing collapse of the inner drystone facing of the house wall. The skeleton together with the pig joint was concentrated as if dumped from a container and abandoned; the bones were all associated with the wall spill and not added to its top. They were stratified within it.

Objectives: this sample occurred with sample C (UB-4413), part of the same deposit of ?unwanted food. Both were associated with the end of an important house. H2 is the earliest house (by ceramic evidence) so far found at

Conderton and was followed by its near neighbour H1. Later still, the working hollow to the east came into use. H2 was built almost on virgin ground, whereas house 1 overlay a series of (ceramically) early pits. Much of the chronology of occupation at Conderton is based upon dating the sequence of houses and related pits represented by H2 and its surrounding structures. This sample, which should be contemporary with sample C (UB-4413), would provide a valuable check on sample C, both being animals of comparable age.

Calibrated date: *1σ:* 540–400 cal BC
2σ: 750–400 cal BC

Final comment: N Thomas (14 November 2000), this is a surprise result which suggests that, contrary to the excavated evidence, these bones were not associated with the sheep skeleton represented by sample C (UB-4413). The sample D (OxA-8612) bones were certainly in articulation: their much earlier date suggests that surprisingly, they were residual. But their actual date goes well with the start of Conderton (period 1) or even with the start of the dense occupation of the upper camp following construction of the cross-rampart (period 2i).

References: Bronk Ramsey *et al* 2002

OxA–8614 2260 ±40 BP

$\delta^{13}C$: -21.2‰

Sample: Li (a), submitted on 7 December 1998 by N Thomas

Material: animal bone (unidentified; various, not articulating) (M Iles and K Clark)

Initial comment: from the bottom fill, layer 6, of pit LL whose digging cut the tail of the phase 2 hillfort rampart. When its filling had become complete and consolidated, House 6 was built over it. All finds from pit LL were well-stratified and uncontaminated. This pit is early - ceramic phase B/C - and animal bone in it is unlikely to have been residual. No occupation of this spur has been recorded before the hillfort and its settlement was built upon it.

Objectives: pit LL occurred at the southern edge of mound 1, close to the original rampart whose tail it cut. It is known to be an early pit (by ceramic evidence) within this area of dense, prolonged occupation. Some time after its filling had been completed, H6 was built over it. Dating from this sample, together with Lii(a) and Lii(b) (OxA-8785 and OxA-8727), would be a valuable check on samples O(a) and O(b) (OxA-8516 and OxA-8517), and between them all would provide solid evidence for the beginnings of settlement within the upper hillfort. *See* also sample Li(b) (OxA-8615) from the same context.

Calibrated date: *1σ:* 400–230 cal BC
2σ: 410–200 cal BC

Final comment: N Thomas (14 November 2000), the bones from this sample were not in articulation. But their date goes well with sample Li(b) (OxA-8615) to show how early within period 2 pit LL was. It may thus be the earliest pit so far excavated at Conderton. Its ceramic phase supports this suggestion.

References: Bronk Ramsey *et al* 2002

OxA–8615 2355 ±40 BP

$\delta^{13}C$: -22.0‰

Sample: Li (b), submitted on 7 December 1998 by N Thomas

Material: animal bone (unidentified; various, not articulating) (M Iles and K Clark)

Initial comment: as OxA-8614

Objectives: as OxA-8614

Calibrated date: *1σ:* 410–390 cal BC
2σ: 540–370 cal BC

Final comment: N Thomas (14 November 2000), *see* comments for OxA-8614. It is satisfactory that radiocarbon supports stratigraphy and ceramic phasing to place pit LL well before house 6 which overlay it.

References: Bronk Ramsey *et al* 2002

OxA–8639 2285 ±25 BP

$\delta^{13}C$: -21.2‰

Sample: F, submitted on 7 December 1998 by N Thomas

Material: animal bone: *Sus* sp., pig radius and ulna (>20g) (M Iles and K Clark)

Initial comment: found on the top of the ancient land surface immediately outside house 1 (H1) and is to be regarded as contemporary occupation debris (H1.III). It was sealed by the collapse of the outer drystone facing of the house wall (H1.II) and there was no intrusion nor residuality. H1 is regarded as later than H2 to its south, and therefore later than samples B-D (UB-4412, UB-4413, and OxA-8612).

Objectives: H1 was excavated completely and a reconstruction made (Avoncroft Museum of Buildings, Bromsgrove, Worcestershire). It belongs to ceramic phase C. A radiocarbon date from a sample on the ground surface immediately outside would complement the date of sample E (UB-4414), in a pre-house 1 context. It would help fill out a sequence in this part of the hillfort provided by H2 (samples B-D, UB-4412, UB-4413, and OxA-8612 respectively) earlier than H1, then sample E (UB-4414), stratified beneath House 1 and, finally, this sample (F) of H1 itself. Such determinations would be highly important since they represent the ?floruit of the chief houses at Conderton.

Calibrated date: *1σ:* 400–360 cal BC
2σ: 400–230 cal BC

Final comment: N Thomas (14 November 2000), I would have expected this result to be closer to sample E (UB-4414) than it is. Articulating bone on the old land surface sealed beneath house 1 wall collapse should have been broadly contemporary with the house but this result seems to be so early that I can only regard it as something of a rogue date. It goes well with the beginnings for the camp or with its period 2 development, but not with this house. Perhaps, despite the apparent articulation, it was residual bone?

References: Bronk Ramsey *et al* 2002

OxA–8640 2265 ±25 BP

δ¹³C: -21.8‰

Sample: H, submitted on 7 December 1998 by N Thomas

Material: animal bone: *Bos* sp., cattle, 1st and 2nd phalanges, articulated (>30g) (M Iles and K Clark)

Initial comment: sample H occurred stratified in occupation debris immediately outside house 4 (H4). This house had been built over the tail of the central rampart and just inside one arm of the inturn of the central entrance. This central rampart had been added in general phase 2 to the hillfort, to define the south side of an upper camp within which the main settlement developed. The occupation debris belonged to the use of H4. It was securely stratified and was not intrusive or residual.

Objectives: this sample, with samples F, I, and J (OxA-8639, OxA-8641, and OxA-8642), would provide a precise chronology for the later main occupation of Conderton, which had begun with the addition of a central cross-rampart with its central entrance, and the elaboration of the north entrance to match it. H4 was the mirror of H1 and H2 but it clearly overlies the inner slope of this central cross-rampart and must belong to a mature period of the camp. It overlay a number of pits. A possible four-post watchtower had been erected within it after it had ceased to be used as a house.

Calibrated date: *1σ:* 390–260 cal BC
2σ: 400–210 cal BC

Final comment: N Thomas (14 November 2000), by a narrow margin this result suggests that, so far, house 4 is the earliest on record at Conderton. It is useful in that it supports other radiocarbon evidence for the date of the period 2i cross-rampart on which it was built soon after. This result has helped to establish a chronology of all the houses so far excavated here.

References: Bronk Ramsey *et al* 2002

OxA–8641 2235 ±25 BP

δ¹³C: -21.6‰

Sample: I, submitted on 7 December 1998 by N Thomas

Material: animal bone: *Equus* sp., horse, zygomatic process and nasal bone, articulated (M Iles and K Clark)

Initial comment: recovered from the heavy rubble core or spine of the central cross-rampart. It was well stratified in a primary position (layer B) which could not have been intrusive. Occupation hereabouts was minimal before construction of the central rampart and it would have been unlikely for food waste to have been lying about at an early stage in the history of the site, especially bones that joined. This sample is therefore also unlikely to be residual.

Objectives: excavation established that the central cross-rampart had been inserted into the hillfort in a major re-design of its defended space, early in the history of the main settlement. Samples H-J (OxA-8640, OxA-8641, and OxA-8642) should establish the time when this occurred. This sample was particularly well-stratified in the core of the cross-rampart, which makes it a very good specimen for dating purposes.

Calibrated date: *1σ:* 380–210 cal BC
2σ: 390–200 cal BC

Final comment: N Thomas (14 November 2000), this seems to be a good result for the age of the cross-rampart of period 2. It is early, as sample J (OxA-8642) also indicates, but it is clearly later than the period 1 hillfort ramparts (samples Aa and Ab (OxA-8568–9). It is a little surprising that it is generally later than the sample (J) from this rampart's spread; but in general the two samples are satisfactory.

References: Bronk Ramsey *et al* 2002

OxA–8642 2295 ±25 BP

δ¹³C: -21.1‰

Sample: J, submitted on 7 December 1998 by N Thomas

Material: animal bone: *Bos* sp., cattle, 2nd and 3rd phalanges, articulated (M Iles and K Clark)

Initial comment: recovered from spread (layer H) of the western inturn of the central entrance of the central cross-rampart. Layer H was overlain here by the eastern curve of the wall of house 4 (H4). It therefore belonged to a later phase than sample I (OxA-8641) in the history of the central cross-rampart. It was protected from intrusion from above and was also unlikely to have been residual.

Objectives: this sample came from a context which represents the spread rearwards of one inturned arm of the central entrance. It was here stratified beneath the edge of the wall of H4. It therefore belonged to a later phase than sample I (OxA-8641) in the history of the central cross-rampart and its entrance. H4 had been built upon this spread of the inturn, in the sheltered area provided by it and the cross-rampart. The context is very important for the later history of the central entrance, as well as providing a *terminus post quem* for the construction of H4.

Calibrated date: *1σ:* 400–370 cal BC
2σ: 410–260 cal BC

Final comment: N Thomas (14 November 2000), with sample I (OxA-8641), this suggests an early date within the hillfort sequence for period 2, while making it clear that this cross-rampart with its central entrance are later than the construction of the hillfort in period 1. I am a little surprised that sample J (OxA-8642) indicates an earlier time than sample I (OxA-8641); I would have expected the opposite. But I think that together they give a consistent and useful result.

References: Bronk Ramsey *et al* 2002

OxA–8643 2155 ±25 BP

δ¹³C: -21.8‰

Sample: K, submitted on 7 December 1998 by N Thomas

Material: animal bone (articulating animal bone from one sheep/goat, metacarpals, metatarsals, six 1st phalanges) (M Iles and K Clark)

Initial comment: recovered from within a dense rubble spread filling the interior of house 3 (H3). This material (H3.II) was derived from the collapse of the inner face and upper parts of the stone surrounding foundation of H3. It was securely enclosed within this material and could not have been intrusive or residual, except as being debris from the final occupation of H3.

Objectives: this sample came from mound 1, an area of densely stratified occupation on the western edge of the upper camp. Here, many pits were early in the history of mound 1 - samples O(a) and O(b) (OxA-8516 and OxA-8517), Li(a) and Li(b) (OxA-8614 and OxA-8615), and Lii(a) and Lii(b) (OxA-8785 and OxA-8727). There were also the remains of three houses all thought to be late here, of which house 6 overlay pit LL (samples Li, Lii). H3 also overlay pits and its ceramic phase (D) makes it a late construction. This sample came from the abandonment of H3. The sample is important because it would help to indicate how late the occupation of the hillfort continued. Samples Liv(a) and Liv(b) (OxA-8644 and OxA-8645), Lv(a) and Lv(b) (OxA-8646 and OxA-8647), and M (UB-4415) could also be contemporary and thus late.

Calibrated date: *1σ:* 350–170 cal BC
2σ: 360–110 cal BC

Final comment: N Thomas (14 November 2000), considering the evidence from pottery phasing, ie a late date for house 3, this result is surprising. But there is no difficulty here, it still seems to leave houses 3 and 1 as the latest among the houses so far excavated here, a fact which fits with other evidence from excavation, eg the way both these houses overlie earlier pits.

References: Bronk Ramsey *et al* 2002

OxA–8644 2315 ±35 BP

$\delta^{13}C$: -21.2‰

Sample: Liv (a), submitted on 7 December 1998 by N Thomas

Material: animal bone (mixed animal bone, sheep and cattle, not in articulation) (M Iles and K Clark)

Initial comment: this sample of mixed animal bone belonged to a concentration of occupation debris on the floor (H6.III) of H6. This floor overlay the mouth of pit LL, from which samples Li(a) and Li(b) (OxA-8614 and OxA-8615) and Lii(a) and Lii(b) (OxA-8785 and OxA-8727) came. The sample was securely stratified beneath the rubble spread (H6.II) from the collapsed inner face of the wall of H6. The material could not have been intrusive. It was residual only in the sense of being sealed occupation debris within this house.

Objectives: the sample came from the southern edge of mound 1, an area of dense occupation comprising early and later pits, and later houses. This sample was one of two collected from occupation rubbish lying on the floor of H6, *see* also Liv(b) (OxA-8645). This house overlay pit LL (samples Li and Lii) as well as the tail of the original rampart. It seems therefore to be late, but a radiocarbon determination would greatly help to fill out the chronology of this major area of occupation at Conderton. Here, especially, the slightly smaller houses attached to the original rampart seem to suggest some sort of domestic change at Conderton, later than houses 1, 2, and 4 and secure dating is needed for this change.

Calibrated date: *1σ:* 410–380 cal BC
2σ: 410–260 cal BC

Final comment: N Thomas (14 November 2000), this result helps to indicate that house 6, of which we examined only a fraction, is an early house at Conderton, perhaps later only than House 4. Although these bones (and those of sample Liv(b) (OxA-8645)) were not in articulation, they all show a consistent and early date for the house. Although there is not too much difference between this pair and the four samples (Li(a+b), Lii(a+b), OxA-8614–5, OxA-8785, and -8727 respectively) from pit LL beneath the house, the date range for the two features seems to be acceptable.

References: Bronk Ramsey *et al* 2002

OxA–8645 2310 ±35 BP

$\delta^{13}C$: -21.5‰

Sample: Liv (b), submitted on 7 December 1998 by N Thomas

Material: animal bone (mixed animal bone, sheep and cattle, not in articulation) (M Iles and K Clark)

Initial comment: as OxA-8644

Objectives: as OxA-8644

Calibrated date: *1σ:* 410–370 cal BC
2σ: 410–260 cal BC

Final comment: N Thomas (14 November 2000), like sample Liv(a) (OxA-8644), this suggests an early date for house 6 within the sequence for excavated houses at Conderton, and its comparison with the range of results for the underlying pit LL (Li a+b, Lii a+b, OxA-8614–5, OxA-8785, and -8727 respectively) is acceptable.

References: Bronk Ramsey *et al* 2002

OxA–8646 2270 ±35 BP

$\delta^{13}C$: -21.3‰

Sample: Lv (a), submitted on 7 December 1998 by N Thomas

Material: animal bone (mixed animal bone, sheep and cattle, not in articulation) (M Iles and K Clark)

Initial comment: this sample belonged to a concentration of occupation debris on the floor (H6.III) of house 6 (H6). This floor overlay the mouth of pit LL and this sample came from that part of the floor (unlike samples Liv(a) and Liv(b), OxA-8644 and OxA-8645). This sample was securely stratified beneath the rubble spread (H6.III) from the collapsed inner facing of the house wall where it was hooked on to the inner slope of the hillfort rampart here. The sample could not have been intrusive; it was only residual in the sense of being sealed occupation debris within this house.

Objectives: the sample came from the southern edge of mound 1, an area of dense occupation comprising early and late pits and later houses. The sample, like Liv(a) and Liv(b) (OxA-8644 and OxA-8645), was collected from occupation rubbish lying on the floor of H6. This house overlay Pit LL (samples Li(a) and Li(b) (OxA-8614 and OxA-8615) and Lii(a) and Lii(b) (OxA-8785 and OxA-8727)) as well as the tail of the original rampart. It must have been a late house, but a radiocarbon determination would greatly help to fill out the chronology of this major area of occupation at Conderton. Here, especially, the slightly smaller houses attached to the original rampart seem to suggest some sort of domestic change at Conderton, later than houses 1, 2, and 4, and secure dating is needed here.

Calibrated date: *1σ:* 400–250 cal BC
2σ: 410–200 cal BC

Final comment: N Thomas (14 November 2000), the good range of results for house 6 (samples M, Liv a+b and Lv a+b; UB-4415 and OxA-8644–7 respectively) are consistent and show the house's early history within period 2 at the hillfort.

References: Bronk Ramsey *et al* 2002

OxA–8647 2275 ±35 BP

$\delta^{13}C$: -22.3‰

Sample: Lv (b), submitted on 7 December 1998 by N Thomas

Material: animal bone (sheep and cattle, not in articulation) (M Iles and K Clark)

Initial comment: as OxA-8646

Objectives: as OxA-8646

Calibrated date: *1σ:* 400–260 cal BC
2σ: 410–200 cal BC

Final comment: N Thomas (14 November 2000), this result is the same as for Lv(a) (OxA-8646) and is a satisfactory indication of the early age of house 6 within the Conderton settlement's history.

References: Bronk Ramsey *et al* 2002

OxA–8648 2280 ±25 BP

$\delta^{13}C$: -21.4‰

Sample: N, submitted on 7 December 1998 by N Thomas

Material: animal bone: *Ovis* sp., 3 articulating lumbar vertebrae, mandible, maxila, from one sheep (>60g) (M Iles and K Clark)

Initial comment: from pit A which was an isolated pit in the north west corner of the upper camp. It may possibly have been used as a latrine. This sample came from a depth of about 3ft in layer 5. The total pit depth was *c* 5ft. The sample was thus well stratified in the lower half of a filled pit. It was not intrusive nor was it likely to have been residual.

Objectives: this is the only sample selected from an isolated pit. The contents of pit A was particularly important because of the large amount of mainly late pottery (ceramic phase D), including much the largest urn so far found and which suggests use as a latrine. So far, no absolute dating has been available for middle Iron Age ceramics found widespread in the Severn Valley and along its edges. All samples from Conderton will help to put this right, especially a radiocarbon determination for late pottery like that from pit A.

Calibrated date: *1σ:* 400–360 cal BC
2σ: 400–230 cal BC

Final comment: N Thomas (14 November 2000), this result suggests strongly that pit A could have been in use quite early in the history of the hillfort, period 2. The very large pot, PO81, found here, is ceramically late, unlike the rest of the sherds from this pit. This result shows that ceramic phases are only general indicators of chronology.

References: Bronk Ramsey *et al* 2002

OxA–8649 2265 ±25 BP

$\delta^{13}C$: -21.2‰

Sample: P, submitted on 7 December 1998 by N Thomas

Material: animal bone: *Bos* sp., cattle, almost intact radius and articulating ulna (M Iles and K Clark)

Initial comment: from layer D in pit CC. This was an upper layer in the pit but nevertheless well below its mouth and the sample was thus clearly stratified. It could not have been intrusive; being in articulation it is also unlikely to have been residual. The mouth of the pit was sealed by heavy deposits including occupation debris from House 3 to the north. ppit CC was one of the latest features beneath mound 1.

Objectives: pit CC together with pit FF was one of the exceptionally large, late pits (both ceramic phase D) at Conderton. Its stratigraphical position gave it great importance within the dense area of occupation beneath mound 1. Its original building involved cutting away the upper two-thirds of pit BB (samples O(a) and O(b), OxA-8516 and OxA-8517). It is linked with pit FF on grounds of size and their complete lining with drystone walling (otherwise unique at Conderton). And it was sealed by deposits including occupation debris from H3 to the north (sample K, OxA-8643). A radiocarbon determination for this sample would add detail to the chronology of pit BB and H3 and, overall, the occupation within the hillfort.

Calibrated date: *1σ:* 390–260 cal BC
2σ: 400–210 cal BC

Final comment: N Thomas (14 November 2000), on stratigraphic grounds I would have expected sample P to be later than samples Oa and Ob (OxA-8516/7), which came from a pit (BB) truncated by pit CC. It should also be later than the use of house 3 (or at least close in time), which it is not. Results from this complex (house 3, pits BB, CC) seem to be broadly consistent, however, and acceptable.

References: Bronk Ramsey *et al* 2002

OxA–8727 2085 ±55 BP

$\delta^{13}C$: -20.8‰

Sample: Lii (b), submitted on 7 December 1998 by N Thomas

Material: animal bone (various animal bone, not articulating) (M Iles and K Clark)

Initial comment: Lii(b) and Lii(a) (OxA-8785), like samples Li(a) and Li(b) (OxA-8614 and OxA-8615) came from the bottom fill, layer 6, of pit LL, whose digging cut the tail of the phase 1 rampart of the hillfort. When its filling had become complete and consolidated, House 6 was built over it. All finds from pit LL were well stratified and uncontaminated. This pit is early (ceramic phase B/C) and animal bone in it is unlikely to be residual; no occupation of the spur has been recorded before the hillfort and its settlement was established here. This sample was a separate find from sample Li but of the same context.

Objectives: pit LL occurred at the southern edge of mound 1, close to the original rampart whose tail it cuts. It is known to be an early pit (ceramic evidence) within this area of dense, prolonged occupation. Some time after its filling had been completed, House 6 was built over it. Dating of this sample, together with samples Li(a) and Li(b) would be a valuable check on samples O(a) and O(b) (OxA-8516 and OxA-8517), and between them all would provide solid evidence for the beginnings of settlement within the upper hillfort.

Calibrated date: *1σ:* 190–40 cal BC
2σ: 350 cal BC–cal AD 50

Final comment: N Thomas (14 November 2000), with samples Lii(a) and Li(a+b) (OxA-8785 and OxA-8614–5), this result helps to show the early date for pit LL within a complex of associated features including the overlying house 6. Sample Lii(b) (OxA-8727) seems, however, to suggest a rather later date than the others in this group.

References: Bronk Ramsey *et al* 2002

OxA–8785 2275 ±40 BP

$\delta^{13}C$: -20.8‰

Sample: Lii (a), submitted on 7 December 1998 by N Thomas

Material: animal bone (various animal bone, not articulating) (M Iles and K Clark)

Initial comment: as OxA-8727

Objectives: as OxA-8727

Calibrated date: *1σ:* 400–250 cal BC
2σ: 410–200 cal BC

Final comment: N Thomas (14 November 2000), this result goes well with samples Li(a+b) (OxA-8614/5) and shows an early date for pit LL. Only sample Lii(b) (OxA-8727) has produced a slightly later age range. Broadly, this group of results is satisfactory.

References: Bronk Ramsey *et al* 2002

UB–4412 2105 ±21 BP

$\delta^{13}C$: -21.3 ±0.2‰

Sample: B, submitted on 7 December 1998 by N Thomas

Material: animal bone: *Ovis* sp., horned sheep, almost all bones complete (>600g) (M Iles and K Clark)

Initial comment: uncovered beneath a rubble layer (H2.II) representing collapse of the drystone inner facing of the wall of house 2 (H2). The skeleton was virtually complete, some bones were in articulation and compact as if, for example, dumped from a container. It was well-stratified, without possibility of disturbance or intrusion through the covering layer (H2.II).

Objectives: this sample is stratigraphically contemporary with H2. On ceramic evidence H2 is the oldest house so far uncovered. It is one of a series of at least four in this prominent part of the hillfort and, from the relative richness of small finds from within it, perhaps the most important at Conderton. H2 was earlier than House 1 to the north, and much earlier than the Working Hollow to the east. H2 is part of a sequence in construction of houses and pits (under and surrounding) whose close absolute dating is crucial to the overall sequence at Conderton.

Calibrated date: *1σ:* 175–90 cal BC
2σ: 200–45 cal BC

Final comment: N Thomas (14 November 2000), archaeologically and ceramically, house 2 had been expected to be early within the range of houses excavated at Conderton, but this sample is a little later than expected. It also does not match up with sample C (UB-4413) because the latter came from an archaeologically later context within the house. Samples C and D (UB-4413 and OxA-8612), from house 2, were also inconsistent with this sample (sample C should have been a little later than sample B). As dating for house 2, however, this sample, sample B, is satisfactory.

UB–4413 2156 ±17 BP

$\delta^{13}C$: -21.5 ±0.2‰

Sample: C, submitted on 7 December 1998 by N Thomas

Material: animal bone: *Ovis* sp., horned sheep, almost all bones complete (>800g) (M Iles and K Clark)

Initial comment: this sample came from near sample B (GU-4412) in house 2 (H2). It was incorporated within a rubble layer (H2.II) representing collapse of the inner drystone facing of the house wall. The skeleton, virtually complete, some bones articulating, was concentrated as if dumped from a container, and was associated with the wall spill. They had not been added to the top of layer H2.II but were stratified within it.

Objectives: stratigraphically later than sample B (GU-4412) from house 2, this sample was associated with the end of use of an important house. House 2 is the earliest house, on ceramic evidence, so far found at Conderton and was succeeded by its near neighbour house 1. Later still, the Working Hollow to the east came into use. H2 was built almost on virgin ground, whereas H1 overlay a series of ceramically early pits. Much of the chronology of Conderton is based upon dating the sequence of houses, pits and working hollow represented by H2 and its surrounding structures. This sample should be a few decades later than UB-4412, and it marks the end of use of H2.

Calibrated date: *1σ:* 345–170 cal BC
2σ: 350–165 cal BC

Final comment: N Thomas (14 November 2000), on grounds of stratigraphy, sample C was expected to be somewhat later than sample B (UB-4412), which it is not. But it is not too far away from B to be useful evidence for the date of house 2, making it closer in time to house 6 than to house 1.

UB–4414 2131 ±19 BP

$\delta^{13}C$*:* -22.2 ±0.2‰

Sample: E, submitted on 7 December 1998 by N Thomas

Material: animal bone: *Ovis* sp., horned sheep, almost all bones complete, articulated (M Iles and K Clark)

Initial comment: from a concentrated bone deposit on top of layer 3 in pit S, sealed by a dump of heavy stones (layer 2) designed to level the mouth of the pit before house 1 (H1) was built over it. Pit S was one of a series of small, early (ceramic) pits, filled and out of use when H1 was built to overlie several. Layer 2 in the pit was a solid dump of heavy oolitic rubble and this sample was sealed beneath it. There was no possibility of intrusion or residuality.

Objectives: radiocarbon samples from the houses and pits concentrated within the upper hillfort allow absolute date determinations to be associated with the ceramic phasing of the site. This sample is one of a series from the earliest occupation of the hillfort (phase 2i): it would help to link the dating of H2 (samples B-D, UB-4412, UB-4413, and OxA-8612) with that of H1 as well as providing a *terminus post quem* for H1. It was significantly stratified there, coming immediately before the latter's construction. This is a key sample within the dating sequence.

Calibrated date: *1σ:* 200–115 cal BC
2σ: 345–90 cal BC

Final comment: N Thomas (14 November 2000), this sample came from one of the three sheep buried, as butchered, in association with houses 1 and 2. Sample E (UB-4414) underlay house 1 and is the only acceptable date for that house (sample F (OxA-8639) had a result which makes it suspect dating evidence for house 1, being too early). Samples B, C, and E (UB-4412, UB-4413, and UB-4414), the three sheep, broadly carry a consistent date range. The three finds are most unusual and it is valuable to have a good idea of their ages.

UB–4415 2167 ±33 BP

$\delta^{13}C$*:* -22.2 ±0.2‰

Sample: M, submitted on 7 December 1998 by N Thomas

Material: animal bone: *Bos* sp., cattle, articulating bone (M Iles and K Clark)

Initial comment: part of a concentration of occupation debris on the floor of house 6 (H6.III). This floor overlay the mouth of pit LL, from which samples Li(a) and Li(b) (OxA-8614 and OxA-8615) and Lii(a) and Lii(b) (OxA-8785 and OxA-8727) came; from the same floor, but not in articulation, came samples Liv(a) and Liv(b) (OxA-8644 and OxA-8645) and Lv(a) and Lv(b) (OxA-8646 and OxA-8647). All the samples were well sealed beneath a rubble spread (H6.II), derived from the inner face of the H6 wall. The material could not have been intrusive. Being in articulation, this sample is almost certain not to have been residual.

Objectives: like samples Li/Lii, Liv/Lv (OxA-8614, OxA-8615, OxA-8785, OxA-8727, OxA-8644, OxA-8646, and OxA-8647), the sample came from the southern edge of mound 1, an area of dense occupation - early and late pits, later houses. This sample came from the floor of H6 (like samples Liv and Lv). H6 overlay pit LL (samples Li/Lii) and also the tail of the original rampart. It should therefore be late in this area. A radiocarbon determination would greatly help to fill out the chronology of this major area of occupation at Conderton. Here, especially, these slightly smaller houses attached to the original rampart suggest some sort of domestic change in the settlement later than houses 1, 2, and 4, and secure dating is needed for the change.

Calibrated date: *1σ:* 360–170 cal BC
2σ: 360–110 cal BC

Final comment: N Thomas (14 November 2000), this sample gives a slightly later age range for house 6 than the four other samples from the house floor (Liv a+b, Lv a+b; OxA-8644–7 respectively) but still seems close enough to be consistent; it is the only sample among these to have been taken from articulating bone.

Crowlink Barrow, East Sussex

Location: TV 54459660
Lat. 50.44.52 N; Long. 00.11.22 E

Project manager: C Greatorex (University College London Field Archaeology Unit), 1998

Archival body: Towner Museum, Eastbourne

Description: Bronze Age barrows, the main structural element of which comprised a rounded heap or cairn of flint pieces. The evidence of burnt bone and pottery suggests that at least eight cuts found below the cairn were repositories for Bronze Age cremations.

Objectives: to ascertain the date of the two cremation deposits found below the cairn.

Final comment: C Greatorex (25 January 2000), broadly speaking, the results of the radiocarbon dating have confirmed the utilization of Crowlink Barrow during the Bronze Age. Even so, cuts 32 (fill 39) and 40 (fill 41) clearly represent two different phases of activity. This theory is in fact supported by the flint analysis, which has suggested the presence of both an early Bronze Age assemblage and a distinct and contextually discrete middle/late Bronze Age flint-working tradition. Although the pottery study has yet to be completed, sherds of all periods from the Neolithic to the late Bronze Age have been identified within the barrow deposits. The mixed (disturbed?) collection may in some way mirror the context inhomogeneity identified in the AMS samples. However, any serious consideration of monument phasing must await the final pottery report.

References: Greatorex 2001

OxA–8979 2990 ±39 BP

$\delta^{13}C$*:* -25.8‰

Sample: CRW98 41 A, submitted on 24 May 1999 by C Greatorex

Material: carbonised plant macrofossil (onion couch tubers (*Arrhenatherum elatius* spp. bulbosum)) (G Campbell 1999)

Initial comment: this sample from cut 40 was collected from one of twelve discrete and undisturbed sub-circular features sealed below the flint cairn. Cut 40 contained burnt bone and charcoal and has consequently been interpreted as a Bronze Age cremation repository.

Objectives: to ascertain the absolute date of cremation activity sealed beneath the flint cairn and to enable a comparison to be made between this date and that obtained from pottery recovered from the actual barrow structure. Valuable data will thus be provided for the use and possible construction of a specific type of burial monument on the South Downs.

Calibrated date: *1σ:* 1270–1120 cal BC
2σ: 1390–1110 cal BC

Final comment: C Greatorex (25 January 2000), the dating has confirmed the practice of cremation at the site during the later middle to late Bronze Age. Cut 40 was sealed below the main body of the barrow which itself yielded late Bronze Age pottery and flintwork.

OxA–8980 3145 ±40 BP

$\delta^{13}C$: -26.1‰

Sample: CRW98 41 B, submitted on 24 May 1999 by C Greatorex

Material: carbonised plant macrofossil (onion couch tubers (*Arrhenatherum elatius* spp. bulbosum)) (G Campbell 1999)

Initial comment: as OxA-8979

Objectives: as OxA-8979

Calibrated date: *1σ:* 1450–1400 cal BC
2σ: 1500–1300 cal BC

Final comment: C Greatorex (25 January 2000), the somewhat earlier date produced for this sample compared to that of 41A (OxA-8979) suggests cut 40 contained material of mixed origin. In fact, the middle Bronze Age date is generally what might have been anticipated for any Sussex prehistoric barrow displaying the structural characteristics evident at Crowlink.

OxA–8981 3820 ±45 BP

$\delta^{13}C$: -24.4‰

Sample: CRW98 39 A, submitted on 24 May 1999 by C Greatorex

Material: charcoal: Pomoideae, single fragment (G Campbell 1999)

Initial comment: from cut 32 which contained burnt bone as well as charcoal and has been interpreted as a Bronze Age cremation repository.

Objectives: to ascertain the absolute date of cremation activity sealed beneath the flint cairn and to enable a comparison to be made between this date and that obtained from pottery recovered from the actual barrow structure. Valuable data will thus be provided for the use and possible construction of a specific type of burial monument on the South Downs. Cut 32 was the only undisturbed feature found below the cairn to contain pottery or any other artefactual dating evidence. Therefore this sample also presents a rare opportunity in Sussex to obtain a direct association between an AMS date and what currently appears to be early Bronze Age pottery.

Calibrated date: *1σ:* 2340–2190 cal BC
2σ: 2470–2130 cal BC

Final comment: C Greatorex (25 January 2000), as the circular cut from which this sample was gleaned (cut 32) held burnt human bone, cremations were clearly being deposited at Crowlink during the early Bronze Age. The radiocarbon dates produced for sample 41 (OxA-8979 and OxA-8980) also indicate that the site retained such a position of ritual significance well into the middle/late Bronze Age. Indeed it appears that at some time during this later period, cut 32 was covered by the main body of the barrow, which itself yielded late Bronze Age pottery and flintwork.

OxA–8982 4015 ±45 BP

$\delta^{13}C$: -25.5‰

Sample: CRW98 39 B, submitted on 24 May 1999 by C Greatorex

Material: charcoal: Pomoideae, single fragment (G Campbell 1999)

Initial comment: as OxA-8981

Objectives: as OxA-8981

Calibrated date: *1σ:* 2580–2470 cal BC
2σ: 2840–2460 cal BC

Final comment: C Greatorex (25 January 2000), this sample yielded the earliest radiocarbon date produced for the Crowlink Barrow. Again the significant discrepancy between the results of samples 39A and 39B (OxA-8981 and OxA-8982) suggests that cut 32 contained material of varying ages. It is hoped that the pottery analysis undertaken on material from all possible contexts will help to further elucidate the nature of this first funerary activity at the site.

Cudmore Grove: site A, Essex

Location: TM 0729915132
Lat. 51.47.48 N; Long. 01.00.17 E

Project manager: E Heppell (Essex County Council Field Archaeology Unit), 2002–3

Archival body: Colchester Museum

Description: three parallel linear groups of timber piles located on the foreshore at East Mersea through survey, and subsequently partially excavated. These lie seaward of the remains of a Tudor fort (SAM 24881), built in AD 1547, repaired in AD 1587, and occupied in the Siege of Colchester in AD 1648. The timbers proved to be part of a timber-framed quay and revetment along with other alignments of posts. The parallel rows of timbers may represent three phases of construction, on typological and spatial grounds. The landward-most row (group 86) comprises cleft elm posts, closely set together and are thought to have been a revetment. The middle row comprises oak posts and two surviving elm sills which were part of a timber-framed jetty (group 126), and the outer row comprising small squared/cleft elm stakes (group 127) may be associated with this. Samples from six of the timbers at Cudmore Grove, site A (two from each group of posts as identified by type and spatial distribution) were submitted for radiocarbon dating. The samples are from the top of the timbers, which were exposed at the time of sampling. The possibilities for excavation have been limited as any excavated areas flood rapidly.

Objectives: to establish a site chronology in the absence of securely dated or *in situ* artefactual material. Also, to establish if the features are related to the Tudor fort which lies to the west, or Cudmore Grove site B, which lies to the north-north-east. These dates will also contribute to an understanding of the coastal landscape in this area.

Final comment: E Heppell (19 December 2013), although the radiocarbon dates were wide-ranging and thus, in this instance, insufficient to firmly establish a relative site chronology, they confirmed the initial interpretation of these timbers being post-medieval (rather than modern) in date. This would support the interpretation of these structures as being, in all likelihood, associated with the nearby earthwork fort.

References: Heppell and Brown 2002a
Heppell and Brown 2002b

GU–5955 180 ±50 BP

δ¹³C: -25.1‰

Sample: Timber [18] (part of group 126), submitted on 20 March 2003 by E Heppell

Material: wood: *Quercus* sp., sapwood; 16 rings (400g) (I Tyers and D Goodburn 2003)

Initial comment: group 126 is a double row of oak posts located seawards of group 86 (elm piles). It is comprised of a line of rounded posts to the seaward side, surviving up to a height of 0.54m above surface. A further row (partial) *c* 1m to the rear is barely visible above the surface. Samples were taken from those is good condition. The posts were driven through sands and gravels, and are covered over at high tide.

Objectives: to establish a site chronology in the absence of any artefactual material. Also, to establish if the features are related to the Tudor fort which lies to the west or Cudmore Grove, site B which lies to the north-north-east. These dates will also contribute to an understanding of the coastal landscape in this area.

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1640–1955*

Final comment: see series comments

GU–5956 270 ±50 BP

δ¹³C: -24.5‰

Sample: Timber [58] (part of group 86), submitted on 20 March 2003 by E Heppell

Material: wood: *Quercus* sp., roundwood; 28 rings with pith and bark (1100g) (I Tyers and D Goodburn 2003)

Initial comment: as GU-5957

Objectives: as GU-5957

Calibrated date: *1σ:* cal AD 1520–1670
2σ: cal AD 1470–1955*

Final comment: see series comments

GU–5957 240 ±50 BP

δ¹³C: -24.6‰

Sample: Timber [70] (part of group 86), submitted on 20 March 2003 by E Heppell

Material: wood: *Ulmus* sp., roundwood; comprising 23 rings including pith and bark (490g) (I Tyers and D Goodburn 2003)

Initial comment: the timbers [58] and [70] are part of the landward row of piles at Cudmore Grove, site A (part of group 86) which has been interpreted as being the remains of a revetment. They are driven through clay deposits which overlay sands and gravels. Timbers [58] and [70] have the top 0.29m and 0.3m, respectively, exposed above the present surface. Test pit D1 was excavated to attempt to recover a complete example of a pile. This was excavated to a depth of *c* 0.7–0.8m, but the base of the timbers were not exposed (at least 1.5m deep). The excavations were abandoned due to flooding. The site is situated below the high-tide water line and only expose *c* 3–4 hours either side of low-tide. Although the very tops of the post are in bad condition, the bottom portions are in good condition. Bark is present at the base of both posts.

Objectives: to establish a site chronology in the absence of any artefactual material. Also, to establish if the features are related to the Tudor fort which lies to the west or Cudmore Grove, site B which lies to the north-north-east. These dates will also contribute to an understanding of the coastal landscape in this area.

Calibrated date: *1σ:* cal AD 1640–1955*
2σ: cal AD 1510–1955*

Final comment: see series comments

GU–5958 270 ±50 BP

δ¹³C: -25.1‰

Sample: Timber [92] (part of group 126), submitted on 20 March 2003 by E Heppell

Material: wood: *Ulmus* sp., outermost five rings to bark (I Tyers and D Goodburn 2003)

Initial comment: group 126 is a double row of oak posts located seawards of group 86 (elm piles). It is comprised of a line of rounded posts to the seaward side, surviving up to a height of 0.54m above surface. A further row (partial) *c* 1m to the rear is barely visible above the surface. Samples were taken from those is good condition. The posts were driven through sands and gravels, and are covered over at high tide.

Objectives: to establish a site chronology in the absence of any artefactual material. Also, to establish if the features are related to the Tudor fort which lies to the west or Cudmore Grove, site B which lies to the north-north-east. These dates will also contribute to an understanding of the coastal landscape in this area.

Calibrated date: *1σ:* cal AD 1520–1670
2σ: cal AD 1470–1955*

Final comment: see series comments

GU–5959 340 ±50 BP

$\delta^{13}C$: -25.3‰

Sample: Timber [110] (part of group 127), submitted on 20 March 2003 by E Heppell

Material: wood: *Ulmus* sp., 9 heartwood rings (490g) (C Locatelli 2003)

Initial comment: as GU-5960

Objectives: as GU-5960

Calibrated date: *1σ:* cal AD 1460–1650
2σ: cal AD 1440–1660

Final comment: see series comments

GU–5960 380 ±50 BP

$\delta^{13}C$: -24.1‰

Sample: Timber [113] (part of group 127), submitted on 20 March 2003 by E Heppell

Material: wood: *Ulmus* sp., 15 heartwood rings (330g) (C Locatelli 2003)

Initial comment: a single row (group 127) of small squared piles at Cudmore Grove, site A. The timbers are very fragmentary and barely visible above the surface. Possibly associated with Cudmore Grove, site B (similar in size and appearance). The piles are driven through sands and gravels, and covered at high tide. They appear to be in good condition below the surface.

Objectives: to establish a site chronology in the absence of any artefactual material. Also, to establish if the features are related to the Tudor fort which lies to the west or Cudmore Grove, site B which lies to the north-north-east. These dates will also contribute to an understanding of the coastal landscape in this area.

Calibrated date: *1σ:* cal AD 1440–1630
2σ: cal AD 1430–1650

Final comment: see series comments

Cudmore Grove: site B, Essex

Location: TM 0729915132
Lat. 51.47.47 N; Long. 01.00.17 E

Project manager: E Heppell (Essex County Council Field Archaeology Unit), 2002–3

Archival body: Colchester Museum

Description: site B comprises irregular rows of wooden posts located on the foreshore at East Mersea. Comprises at least 38 timbers, most of which are squared. The conditions of preservation of these vary. Some have survived to a height of 0.3m whereas others are only just visible above sand and the shingle they are driven through. The irregular alignment, although difficult to follow, may link with the seaward timbers (group 127) at Cudmore Grove, site A, which lies to the south. The function of these timbers remains unclear, but it is possible that they represent some form of revetting or consolidation. Samples were taken from two elm stakes from site B. These were chosen from the larger and better preserved examples. The stakes have square tips and were driven through the underlying gravel deposits.

Objectives: to establish a site chronology in the absence of any artefactual or stratigraphic material. Also, to establish if the features are related to the Tudor fort which lies to the west or to Cudmore Grove, site A, which lies to the south-west. These dates will also contribute to an understanding of the coastal landscape in this area.

Final comment: E Heppell (19 December 2013), although the radiocarbon dates were wide ranging and thus, in this instance, insufficient to firmly establish a relative site chronology they confirmed the initial interpretation of these timbers being post-medieval (rather than modern) in date. This would support the interpretation of these structures as being, in all likelihood, associated with the nearby earthwork fort.

References: Heppell and Brown 2002a
Heppell and Brown 2002b

GU–5961 330 ±50 BP

$\delta^{13}C$: -24.8‰

Sample: Timber [124], submitted on 20 March 2003 by E Heppell

Material: wood: *Ulmus* sp., 51 heartwood rings (740g) (I Tyers and D Goodburn 2003)

Initial comment: as GU-5962

Objectives: as GU-5962

Calibrated date: *1σ:* cal AD 1470–1650
2σ: cal AD 1440–1670

Final comment: see series comments

GU–5962 270 ±50 BP

$\delta^{13}C$: -25.2‰

Sample: Site B: EMCG02 Timber [125], submitted on 20 March 2003 by E Heppell

Material: wood: *Ulmus* sp., 26 heartwood rings (530g) (I Tyers and D Goodburn 2003)

Initial comment: timbers [124] and [126] are posts that form part of a series of elm stakes and piles of varying length. They are driven into beach gravels, sands, and shingle. Examples sampled for wood technological assessment have a square-section pointed tip. Timbers [124] and [125] are driven through beach gravels, sands, and shingle. The top 0.2m were exposed and therefore worn and covered by barnacles. Samples were taken from the posts below this where the timbers were better preserved. The posts are covered at high tide.

Objectives: to establish a site chronology in the absence of any artefactual material. Also, to establish if the features are related to the Tudor fort which lies to the west or to Cudmore Grove, site A, which lies to the south-west, and has an outer row of timbers that may be contemporary. These dates will also contribute to an understanding of the coastal landscape in this area.

Calibrated date: *1σ:* cal AD 1520–1670
2σ: cal AD 1470–1955*

Final comment: see series comments

Cudmore Grove: site B(2), Essex

Location: TM 0729615162
Lat. 51.47.48 N; Long. 01.00.17 E

Project manager: E Heppell (Essex County Council Field Archaeology Unit), 2002–3

Archival body: Colchester Museum

Description: one of a series of groups of timbers on the foreshore at East Mersea, close to a Tudor fort. The site comprises a group of small elm stakes, and further to the west two large oak uprights. These uprights appear to be associated with a dump deposit containing sixteenth- to seventeenth-century AD pottery. An initial wood technology assessment has suggested that these larger posts may be the base of a beacon/watchtower. Sample of one oak post from Cudmore Grove, site B located near the edge of the foreshore was also submitted for radiocarbon dating (one of a pair left, with both found and left *in situ*).

Objectives: to establish the site chronology in relation to the other timber features found in the area and the nearby Tudor fort. Although there is little artefactual material present, it is considered to be in a secure context. The timber was sampled for dendrochronological analysis, but the results could not be cross-matched to provide a date.

Final comment: E Heppell (19 December 2013), although the radiocarbon date was wide-ranging and thus, in this instance, insufficient to firmly establish a relative site chronology it confirmed the initial interpretation of these timbers being post-medieval (rather than modern) in date.

References: Heppell and Brown 2002a

GU–5993 300 ±50 BP

$\delta^{13}C$: -25.9‰

Sample: 125B (rings 70–81), submitted in August 2003 by E Heppell

Material: wood: *Quercus* sp., 11 heartwood rings below heartwood-sapwood boundary (91.50g) (C Groves and I Tyers 2003)

Initial comment: large oak timber post [125], one of a pair located on the foreshore. Set in a timber sill. The top of the timber was exposed above beach sands, but covered by water at high tide. The lower portion was set in a clay deposit (117).

Objectives: to establish if this feature is associated with any of the other wooden structures at Cudmore Grove, and its chronological relationship to the nearby Tudor fort. This will also provide a better understanding of the coastal landscape.

Calibrated date: *1σ:* cal AD 1490–1660
2σ: cal AD 1450–1800

Final comment: see series comments

Cudmore Grove: site C, Essex

Location: TM 0658414319
Lat. 51.47.22 N; Long. 00.59.38 E

Project manager: E Heppell (Essex County Council Field Archaeology Unit), 2002–3

Archival body: Colchester Museum

Description: Cudmore Grove, site C lies below the East Mersea 'cliffs' in an area of rapid coastal erosion. In this area an irregular line of posts was identified. The larger posts comprised cleft log posts, some of which were virtually untrimmed. Oak stems and large half cleft elm posts were also present. The large posts appear to be set in post pits. In addition, there are a number of smaller elm stakes, similar in type to those at Cudmore Grove, site B. This line of posts may represent an attempt to protect the base of the cliffs from erosion when they extended further out. The samples submitted come from two of the elm posts at Cudmore Grove, site C. They were selected based upon being better preserved than others. The samples were taken from as close to the present surface level as possible. Excavation proved almost impossible due to constant flooding.

Objectives: to establish if the postulated post-medieval date for this feature is correct. Dating will prove useful in understanding the coastal evolution of the area and will allow for further comparison with historic maps (where available).

Final comment: E Heppell (19 December 2013), the results did confirm that these timbers were post-medieval in date.

References: Heppell and Brown 2002a
Heppell and Brown 2002b

GU–5963 120 ±50 BP

$\delta^{13}C$: -25.7‰

Sample: Timber [128], submitted on 20 March 2003 by E Heppell

Material: wood: *Ulmus* sp., outer 10 rings to bark (520g) (I Tyers and D Goodburn 2003)

Initial comment: timber [128] is set in posthole [130]. The full dimensions are unknown due to constant flooding, but 0.5m of the timber is visible above the surface with the top 0.25m covered in barnacles. Timber [129] is set in posthole [131] and is also barnacle covered, but there remains fragmentary bark at the base. Both timbers are of elm. Part of an irregular row of timbers. These timbers are set in postholes that cut through the natural clays. The tops of the posts are covered at high tide.

Objectives: to establish if the postulated post-medieval date for this feature is correct. Dating will prove useful in understanding the coastal evolution of the area and will allow for further comparison with historic maps (where available).

Calibrated date: *1σ:* cal AD 1670–1950
2σ: cal AD 1660–1955*

Final comment: E Heppell (19 December 2013), the result has supported the interpretation of these timbers as being post-medieval in date.

GU–5964 150 ±50 BP

δ^13^C: -24.9‰

Sample: Site C: EMCG02 Timber [129], submitted on 20 March 2003 by E Heppell

Material: wood: *Ulmus* sp., sapwood; 20 rings (240g) (I Tyers and D Goodburn 2003)

Initial comment: as GU-5963

Objectives: as GU-5963

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1650–1955*

Final comment: see GU-5963

Drigg: burnt mound, Cumbria

Location: SD 04509860
Lat. 45.22.26 N; Long. 03.28.13 W

Project manager: E Huckerby (Oxford Archaeology North), October 2000

Archival body: Whitehaven Office of the Cumbrian Record Office and Whitehaven Museum

Description: a burnt mound/large hearth sealed in peat or peat-like material, which was sealed by clays below and sand dunes above. The site is 0.5–1km west of the British Nuclear Fuel storage dump at Drigg.

Objectives: to establish a chronology for the site by dating a sequence through the mound and associated features to provide as accurate chronology as possible.

Laboratory comment: English Heritage (April 2000), a preliminary series of measurements on local groundwater was made to ensure that the archaeological deposits could be dated by radiocarbon despite the site's proximity to the nuclear fuel storage dump.

References: Brown 2014
Oxford Archaeology North 2009

AA–43497 1.142 ±0.006 fM

δ^13^C: -23.1‰

Sample: Groundwater, submitted in November 2000 by E Huckerby

Material: water (E Huckerby 2000)

*Initial comment: c*ollected from a surface pond a few metres inland from the site.

Objectives: to check if there are any problems associated with the British Nuclear Fuel activities in West Cumbria.

Final comment: E Huckerby (22 May 2013), the result suggests that the radiocarbon results can be assumed to be accurate despite the nearby nuclear facility.

Laboratory comment: English Heritage (April 2000), the results show evidence of ^{14}C enrichment, probably due to atmospheric nuclear weapons testing. The ambient atmosphere value in AD 2000 was about 1.100 fM, although in AD 1963 it was about 2.00 fM. There is no evidence of enrichment due to leakage from the nearby nuclear fuel storage dump, and we can have confidence in radiocarbon measurements made on archaeological material submitted from excavation of the burnt mound.

AA–43498 1.196 ±0.005 fM

δ^13^C: -30.3‰

Sample: Groundwater, submitted in November 2000 by E Huckerby

Material: water (E Huckerby 2000)

Initial comment: as AA-43497

Objectives: as AA-43497

Final comment: see AA-43497

Laboratory comment: SUERC Radiocarbon Dating Laboratory (AMS) (28 August 2001), the dissolved inorganic carbon fraction of this sample was dated.

GU–5884 3900 ±50 BP

δ^13^C: -26.2‰

Sample: Charcoal [15 (1008)], submitted in November 2000 by E Huckerby

Material: charcoal: *Alnus* sp. (8g) (R Gale 2000)

Initial comment: charcoal extracted from the layer of burnt stones constituting the burnt mound/hearth. The charcoal and stones were sealed in a layer of organic material which was waterlogged. The layer is sealed above by sand dunes. It lies just above the normal high tide level.

Objectives: the sample will date the age of the wood that was burnt, when the burnt mound/hearth was in use and therefore will be older than the mound itself.

Calibrated date: *1σ:* 2470–2290 cal BC
2σ: 2570–2200 cal BC

Final comment: E Huckerby (22 May 2013), the date suggests that the burnt mound was being used in the Bronze Age.

Laboratory comment: English Heritage (April 2000), the two measurements on charcoal from the mound (GU-5884 and GU-5885) are statistically consistent ($T'=0.7$; $\nu=1$; $T'(5\%)=3.8$; Ward and Wilson 1978) and could therefore be of the same actual age.

References: Ward and Wilson 1978

GU–5885 3960 ±50 BP

δ^13^C: -26.9‰

Sample: Charcoal [15 (1010)], submitted in November 2000 by E Huckerby

Material: charcoal: *Alnus* sp. (8g) (R Gale 2000)

Initial comment: as GU-5884

Objectives: as GU-5884

Calibrated date: *1σ:* 2570–2450 cal BC
2σ: 2580–2290 cal BC

Final comment: see GU-5884

Laboratory comment: see GU-5884

GU–5886 3800 ±50 BP

$\delta^{13}C$: -29.0‰

Sample: Peat [14 (1007)], submitted in November 2000 by E Huckerby

Material: peat (humic acid) (E Huckerby 2000)

Initial comment: a 1cm slice of peat above burnt stones in the burnt mound/hearth. The peat is sealed above by sand dunes. The sample was waterlogged. It lies on the coast just above high tide level.

Objectives: the sample is to date when the burnt mound/hearth ceased to be used.

Calibrated date: *1σ:* 2300–2140 cal BC
2σ: 2460–2040 cal BC

Final comment: E Huckerby (22 May 2013), the peat sealing the burnt mound was forming by 2460–2040 cal BC, suggesting that by this time burnt mound activity had ceased.

Laboratory comment: English Heritage (April 2000), the measurements on the humin acid and humic fractions from this sample are statistically consistent (T′=0.7; ν=1; T′(5%)=3.8; Ward and Wilson 1978) and their weighted mean (3770 ±35 BP) calibrates to 2300–2040 cal BC (at 2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GU–5887 3740 ±50 BP

$\delta^{13}C$: -29.8‰

Sample: Peat [14 (1007)], submitted in November 2000 by E Huckerby

Material: peat (humin) (E Huckerby 2000)

Initial comment: as GU-5886

Objectives: as GU-5886

Calibrated date: *1σ:* 2210–2040 cal BC
2σ: 2300–1980 cal BC

Final comment: E Huckerby (22 May 2013), the peat sealing the burnt mound was forming by 2300–2040 cal BC (2σ; Reimer *et al* 2004), suggesting that by this time burnt mound activity had ceased.

Laboratory comment: see GU-5887

References: Reimer *et al* 2004

GU–5888 4980 ±50 BP

$\delta^{13}C$: -28.7‰

Sample: Peat [17 (1016)], submitted in November 2000 by E Huckerby

Material: peat (humic acid) (E Huckerby 2000)

Initial comment: the sample was taken from the waterlogged peat directly beneath the worked wood (16-1020) in trench B. It was the top 1–2cm of this peat. There were sand dunes above and it lay above the normal high tide level.

Objectives: this sample should be dated to provide a chronology for the worked wood and also an additional date prior to the use of burnt mound/hearth.

Calibrated date: *1σ:* 3900–3700 cal BC
2σ: 3950–3650 cal BC

Final comment: E Huckerby (22 May 2013), despite the discrepancy between the humic acid and humin fragment dates, the date in the Neolithic gives a chronology for the worked wood and pre-dates the burnt mound activity.

Laboratory comment: English Heritage (April 2000), the measurements on the humic acid and humin fragments from the peat (GU-5888 and GU-5889) are not statistically consistent (T′=5.8; ν=1; T′(5%)=3.8; Ward and Wilson 1978). Given we can assume a fairly acidic environment for the peat, thus discounting the possibility of a downwards migration of humic acids, as is often the case in alkaline conditions (Dresser 1970), the difference in the measurements is perplexing. It is also worth noting that no systematic difference between the fractions is apparent in the other two pairs of results on peat samples from the site. The comparability of 'humic acid' and 'humin' fractions has been observed by Shore *et al* (1995), and so the difference may be an example of the one in twenty cases where the measurement error on the sample does not include its true date.

References: Dresser 1970
Shore *et al* 1995
Ward and Wilson 1978

GU–5889 5150 ±50 BP

$\delta^{13}C$: -28.8‰

Sample: Peat [17 (1016)], submitted in November 2000 by E Huckerby

Material: peat (humin) (E Huckerby 2000)

Initial comment: the sample was taken from the waterlogged peat directly beneath the worked wood (16-1020) in trench B. It was the top 1–2cm of this peat. Sand dunes lay above the organic band. It was above the normal high tide level.

Objectives: this sample should be dated to provide a chronology for the worked wood and also an additional date prior to the use of burnt mound/hearth.

Calibrated date: *1σ:* 3990–3940 cal BC
2σ: 4050–3800 cal BC

Final comment: see GU-5888

Laboratory comment: see GU-5888

GU–5890 3940 ±50 BP

$\delta^{13}C$: -28.9‰

Sample: Peat [16 (1011)], submitted in November 2000 by E Huckerby

Material: peat (humic acid) (E Huckerby 2000)

Initial comment: the 1cm thick slice of waterlogged peat was taken from below the burnt stone layer. There were sand dunes above and it lay above the normal high tide level.

Objectives: this sample should be give a date to prior to the use of burnt mound/hearth as the stones sit on the peat.

Calibrated date: *1σ:* 2490–2340 cal BC
2σ: 2580–2280 cal BC

Final comment: E Huckerby (22 May 2013), the date from the 1cm thick slice of waterlogged peat immediately beneath the layer of burnt stone suggests that the peat at this location was sealed by the burnt mound between 2580–2280 cal BC in the Bronze Age and is prior to the use of the burnt mound.

Laboratory comment: English Heritage (April 2000), the measurements on the humin acid and humic fractions from this sample are statistically consistent (T′=1.6;T′(5%)=3.8; ν=1; Ward and Wilson 1978) and give a weighted mean of 3899 ±38 BP which calibrates to 2480–2210 cal BC at 2σ (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GU–5891 3840 ±60 BP

δ*13C:* -29.3‰

Sample: Peat [16 (1011)], submitted in November 2000 by E Huckerby

Material: peat (humin) (E Huckerby 2000)

Initial comment: as GU-5890

Objectives: as GU-5890

Calibrated date: *1σ:* 2460–2200 cal BC
2σ: 2480–2130 cal BC

Final comment: see GU-5890

Laboratory comment: see GU-5890

GU–5892 4410 ±50 BP

δ*13C:* -25.9‰

Sample: Wood [16 (1024A)], submitted in November 2000 by E Huckerby

Material: wood (waterlogged): *Quercus* sp., roundwood; ?outer 10+ rings (R Gale 2000)

Initial comment: the waterlogged sample came from the peat below the burnt mound and above the natural mineral deposits. It was at the same level as the worked wood (16-1023) in trench A.

Objectives: the sample needs to be dated because it is at the same level as the worked wood and may provide additional evidence for the worked wood and the formation of the burnt stones/hearth.

Calibrated date: *1σ:* 3270–2920 cal BC
2σ: 3340–2900 cal BC

Final comment: E Huckerby (22 May 2013), this date suggests possible Neolithic activity at the site.

Laboratory comment: English Heritage (April 2000), the two measurements (GU-5892 and GU-5893) on different pieces of wood are statistically consistent (T′=0.0; ν=1; T′(5%)=3.8; Ward and Wilson 1978) and both could be of the same actual age.

References: Ward and Wilson 1978

GU–5893 4420 ±60 BP

δ*13C:* -26.0‰

Sample: Wood [16 (1024B)], submitted in November 2000 by E Huckerby

Material: wood (waterlogged): *Quercus* sp., roundwood; outer ?10 rings (R Gale 2000)

Initial comment: the waterlogged sample came from the peat below the burnt mound and above the natural mineral deposits. It was at the same level as the worked wood (16-1023) in trench A.

Objectives: the sample needs to be dated because it is at the same level as the worked wood and may provide additional evidence for the worked wood and the formation of the burnt stones/hearth.

Calibrated date: *1σ:* 3310–2920 cal BC
2σ: 3350–2900 cal BC

Final comment: see GU-5892

Laboratory comment: see GU-5892

GU–5894 3990 ±70 BP

δ*13C:* -28.0‰

Sample: Wood [16 (1022A)], submitted in November 2000 by R Gale

Material: wood (waterlogged): *Betula* sp., narrow roundwood; diameter 25mm, *c* 5 growth rings (R Gale 2000)

Initial comment: a waterlogged piece of wood from the same level as the worked wood (1020) in trench B (context 15/16). It was embedded in the peat.

Objectives: the sample should be dated because it is at the same level as large plank like piece thought to be worked but too large to remove from site.

Calibrated date: *1σ:* 2580–2460 cal BC
2σ: 2840–2290 cal BC

Final comment: E Huckerby (22 May 2013), the date in the early Bronze Age from narrow roundwood, which came from waterlogged peat below the level of the burnt mound and above the natural mineral deposits and at the same level as the worked wood, suggests possible early Bronze Age activity at the site.

Laboratory comment: English Heritage (April 2000), the two measurements (GU-5894 and GU-5895) are statistically consistent (T′=0.2; ν=1; T′(5%)=3.8; Ward and Wilson 1978), and therefore both samples could be of the same actual age. These samples were initially thought to come from context 16, ie below the burnt stone layer (15), however, following interrogation of the site archive it became apparent that they actually came from context 19, and their relationship to the burnt mound was thus less secure than at first thought. The two samples were, however, recovered in association with a massive plank of wood [19/10202], and appeared to have been placed deliberately, perhaps as a simple walkway across boggy ground. The plank itself was too large to be removed during the excavation, although subsequent erosion of the cliff face at Drigg has resulted in its removal and dendrochronological analysis (Groves pers comm). The sample did not match any reference chronologies and therefore cannot be dated.

References: Ward and Wilson 1978

GU–5895 4030 ±70 BP

$\delta^{13}C$: -28.1‰

Sample: Wood [16 (1022B], submitted in November 2000 by E Huckerby

Material: wood: *Betula* sp., compressed roundwood; diameter 70 x 30mm, bark *in situ* (R Gale 2000)

Initial comment: as GU-5894

Objectives: as GU-5894

Calibrated date: *1σ:* 2830–2470 cal BC
2σ: 2870–2340 cal BC

Final comment: see GU-5894

Laboratory comment: see GU-5894

GU–5896 3790 ±50 BP

$\delta^{13}C$: -28.0‰

Sample: Wood [14 (1021)], submitted in November 2000 by E Huckerby

Material: wood (waterlogged): Salicaeceae (R Gale 2000)

Initial comment: the wood was recovered from the layer of peat above the burnt mound/hearth. It is uncertain as to its exact location above the stones.

Objectives: to date when the burnt mound/hearth ceased to be used.

Calibrated date: *1σ:* 2300–2140 cal BC
2σ: 2460–2030 cal BC

Final comment: E Huckerby (22 May 2013), the date in the Bronze Age from the unworked wood, which was recovered from above the burnt mound, indicates that the burnt mound activity had ceased in the Bronze Age

Duxford: Hinxton Road, Cambridgeshire

Location: TL 48104580
Lat. 52.05.27 N; Long. 00.09.37 W

Project manager: J Roberts (Archaeological Field Unit, Fulbourn Community Centre Site), 2002

Archival body: Cambridgeshire County Council

Description: the Hinxton Road site sites on a chalk slope west of and overlooking the River Cam. The site comprises features that span the Iron Age through the post medieval period. The Iron Age remains include ritual features (possible shrine or temple), pits (one containing a crouched burial), inhumations, and cremations. Saxon settlement remains have been found in the southern part of the site and one burial was dated by pottery found in the grave fill to this period. A lime kiln and mortar mixer were also identified in the southern part of the site. Post-medieval structural and garden features have truncated some of the remains.

Objectives: to provide a date for the use of the lime kiln and by association the nearby mortar mixer and to determine the period of use of the cemetery.

Final comment: A Lyons (3 July 2014), the radiocarbon dating undertaken at this site allowed for the many features, including a complex Iron Age to Romano-British cemetery, lime kiln, and a mortar mixer to be successfully phased and interpreted. The lime kiln structure was subsequently reinterpreted as a drying building, in use in the late Roman/early Saxon period and possibly beyond.

Laboratory comment: English Heritage (2004), chronological modelling of the radiocarbon results showed good agreement between the results and the stratigraphic record ($A_{overall}$ =94.4%); however, GU-5930 has an individual index agreement only just within the acceptable limit (A=60.9%), and could be an earlier outlier. Without additional radiocarbon dates from the cemetery it is impossible to determine whether there are two discrete phases of use, or if GU-5930 (DUXHR02 4065) simply represents a slightly earlier burial at this site.

Laboratory comment: English Heritage (3 July 2014), three further dates were funded from this site after 2003 (GU-5999–6001).

References: Lyons 2011

GU–5919 1690 ±50 BP

$\delta^{13}C$: -24.6‰

Sample: <32> from context (3481), submitted on 3 February 2003 by J Roberts

Material: charcoal: *Prunus spinosa*, 13 fragments, including roundwood (10g) (R Gale 2003)

Initial comment: context (3481) from which sample <32> was taken appeared to be charcoal from the same context as sample (31), which had spilled over the retaining wall of the kiln.

Objectives: to establish the period of use of the lime kiln close to the Saxon building, but possibly associated with a nearby medieval structure.

Calibrated date: *1σ:* cal AD 260–410
2σ: cal AD 230–510

Final comment: A Lyons (3 July 2014), the two radiocarbon dates from this feature suggest it was in use in the late fourth and early fifth century AD, although the possibility that this building continued in use further into the early Saxon period cannot be discounted.

Laboratory comment: English Heritage (2004), the two measurements (GU-5919 and GU-5920) from this structure are statistically consistent, and therefore these two contexts may have been contemporary (T′=2.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

GU–5920 1560 ±60 BP

$\delta^{13}C$: -24.8‰

Sample: <31> from context (3184), submitted on 3 February 2003 by J Roberts

Material: charcoal: *Prunus spinosa*, 21 fragments, probably all roundwood (10g) (R Gale 2003)

Initial comment: context (3184) from which sample <31> was taken was a layer of charcoal-rich material between layers of chalk in a lime kiln.

Objectives: as GU-5919

Calibrated date: *1σ:* cal AD 410–570
2σ: cal AD 380–630

Final comment: see GU-5919

Laboratory comment: see GU-5919

GU–5924 1830 ±50 BP

$\delta^{13}C$: -20.0‰
$\delta^{13}C$ *(diet)*: -19.9 ±0.2‰
$\delta^{15}N$ *(diet)*: +9.1 ±0.3‰
C/N ratio: 2.5

Sample: 3003, submitted on 19 February 2003 by J Roberts

Material: human bone (350g) (right femur) (C Duhig 2003)

Initial comment: grave (3001), skeleton (3003), was cut by modern plastic pipe trench. The skeleton was fully articulated with a hand and the pelvis damaged by the pipe trench. There was also slight disturbance in the pelvic region.

Objectives: to establish the period of use of the cemetery. One skeleton in the cemetery appears to have Saxon pottery in the fill, while the others are clearly Iron Age from their associated grave goods.

Calibrated date: *1σ:* cal AD 120–250
2σ: cal AD 60–340

Final comment: A Lyons (3 July 2014), a Romano-British date for this burial was confirmed.

Laboratory comment: English Heritage (2004), chronological modelling indicates this burial dates to *cal AD 70–270 (at 91% probability)* or *cal AD 280–320 (at 4% probability; GU-5924;* Lyons 2011; fig App.1.1, 127*)*.

GU–5925 1870 ±50 BP

$\delta^{13}C$: -20.5‰
$\delta^{13}C$ *(diet)*: -19.7 ±0.2‰
$\delta^{15}N$ *(diet)*: +9.9 ±0.3‰
C/N ratio: 2.7

Sample: 3007, submitted on 19 February 2003 by J Roberts

Material: human bone (350g) (left femur) (C Duhig 2003)

Initial comment: a grave cut by grave (3797), containing skeleton (3796). The skeleton (3007) was fully articulated. The grave was also cut by a small pit (3015) on the northern edge and by a modern trench containing a plastic pipe at the head.

Objectives: to establish the period of use of the cemetery and as a possible comparative date with skeleton (3796) in grave (3797), which cuts it at the western end.

Calibrated date: *1σ:* cal AD 70–230
2σ: cal AD 20–250

Final comment: A Lyons (3 July 2014), a late Iron age or Romano-Britsh date was confirmed for this burial.

Laboratory comment: English Heritage (2004), chronological modelling indicates this burial dates to *cal AD 20–240 (at 95% probability; GU-5925;* Lyons 2011, fig App. 1.1, 127*)*.

GU–5926 1910 ±50 BP

$\delta^{13}C$: -19.4‰
$\delta^{13}C$ *(diet)*: -19.9 ±0.2‰
$\delta^{15}N$ *(diet)*: +9.7 ±0.3‰
C/N ratio: 3.3

Sample: 3770, submitted on 19 February 2003 by J Roberts

Material: human bone (350g) (right femur) (C Duhig 2003)

Initial comment: this was one of a group of three burials cut into the top of a pit containing a horse burial and infant. Stratigraphically it is the (ie later than burial (3767) and earlier than burial (3764)). This burial has its right arm displaced by burial (3764). The level of articulation indicates the burial of all three in a fairly short period of time.

Objectives: dating will be useful to provide relative dates for the other burials associated with this pit. There are three in a group on the northern edge and one on the southern edge. The dates will also be compared with the horse (4085) that is sealed by fills into which the burials are cut.

Calibrated date: *1σ:* cal AD 50–140
2σ: 40 cal BC–cal AD 240

Final comment: A Lyons (3 July 2014), a late Iron Iron or early Romano-British date for this burial was confirmed.

Laboratory comment: English Heritage (2004), chronological modelling indicates this burial dates to *20–10 cal BC (at 1% probability)* or *cal AD 1–210 (at 94% probability; GU-5926*; Lyons 2011, fig App 1.1, 127).

GU–5927 1810 ±50 BP

$\delta^{13}C$: -20.6‰
$\delta^{13}C$ *(diet)*: -20.6 ±0.2‰
$\delta^{15}N$ *(diet)*: +9.5 ±0.3‰
C/N ratio: 3.5

Sample: 3796, submitted on 19 February 2003 by J Roberts

Material: human bone (350g) (left femur) (C Duhig 2003)

Initial comment: the grave of this individual (3797) cut grave (3008), at the western, foot end. The skeleton was fully articulated.

Objectives: to help determine the period of use of the cemetery and as a comparative date with burial (3007).

Calibrated date: *1σ:* cal AD 130–320
2σ: cal AD 70–350

Final comment: A Lyons (3 July 2014), this confirms a Romano-British date for the burial.

Laboratory comment: English Heritage (2004), chronological modelling indicates this burial dates to *cal AD 120–340 (at 95% probability; GU-5927*; Lyons 2011, fig App 1.1, 127).

GU–5928 2190 ±50 BP

$\delta^{13}C$: -20.6‰
$\delta^{13}C$ *(diet):* -19.7 ±0.2‰
$\delta^{15}N$ *(diet):* +10.3 ±0.3‰
C/N ratio: 3.6

Sample: 3812, submitted on 19 February 2003 by J Roberts

Material: human bone (350g) (right femur) (C Duhig 2003)

Initial comment: a fully articulated skeleton in a very 'snug' grave cut. It was an isolated burial, but close to intercutting graves and a disturbed grave.

Objectives: to establish the period of use of the cemetery. As it was not cut by surrounding graves, there is an element of contemporaneity with those around it.

Calibrated date: *1σ:* 370–170 cal BC
2σ: 390–100 cal BC

Final comment: A Lyons (3 July 2014), the radiocarbon date places this burial in the mid-to-late Iron Age.

Laboratory comment: English Heritage (2004), chronological modelling indicates this burial dates to *390–110 cal BC (at 95% probability; GU-5928*; Lyons 2011, fig App 1.1, 127).

GU–5929 1840 ±50 BP

$\delta^{13}C$: -19.7‰
$\delta^{13}C$ *(diet):* -20.2 ±0.2‰
$\delta^{15}N$ *(diet):* +10.7 ±0.3‰
C/N ratio: 3.6

Sample: 3880, submitted on 19 February 2003 by J Roberts

Material: human bone (350g) (right femur) (C Duhig 2003)

Initial comment: a fully articulated skeleton cut into the southern edge of pit containing horse (4085). The grave was cut 0.25m into natural chalk and the fill of pit (3981) contained horse (4085). The foot end (south-west end) of the grave had been cut by a post-Roman boundary ditch.

Objectives: this burial is part of a complex in the northern part of the site. The date will feed more comparative information into the human and horse burials in this area.

Calibrated date: *1σ:* cal AD 80–240
2σ: cal AD 60–330

Final comment: A Lyons (3 July 2014), this confirmed a Romano-British date for the burial.

Laboratory comment: English Heritage (2004), chronological modelling indicates this burial dates to *cal AD 70–260 (at 93% probability)* or *cal AD 300–320 (at 2% probability*; *GU-5929;* Lyons 2011, fig App 1.1, 127).

GU–5930 2570 ±50 BP

$\delta^{13}C$: -20.6‰
$\delta^{13}C$ *(diet):* -18.8 ±0.2‰
$\delta^{15}N$ *(diet):* +9.2 ±0.3‰
C/N ratio: 3.1

Sample: 4065, submitted on 19 February 2003 by J Roberts

Material: human bone (350g) (right femur) (C Duhig 2003)

Initial comment: an articulated crouched burial from the base of a pit. The skeleton was in pit (4057), which was cut 1.40m into the chalk.

Objectives: this was the only articulated crouched burial in a pit on the site. Dating may provide information on changing burial practices of burial over time.

Calibrated date: *1σ:* 810–760 cal BC
2σ: 820–540 cal BC

Final comment: A Lyons (3 July 2014), this radiocarbon date suggests an early to middle Iron Age date for the burial. There may have been a break in the cemetery's use between the early-middle Iron Age and the late Iron Age-Romano-British period.

Laboratory comment: English Heritage (2004), chronological modelling indicates this burial dates to *810–760 cal BC (at 7% probability)* or *690–480 cal BC (at 69% probability)* or *470–400 cal BC (at 19% probability; GU-5930*; Lyons 2011, fig App 1.1, 127).

GU–5931 2130 ±60 BP

$\delta^{13}C$: -21.2‰
$\delta^{13}C$ *(diet):* -21.9 ±0.2‰
$\delta^{15}N$ *(diet):* +7.5 ±0.3‰
C/N ratio: 3.5

Sample: 4085, submitted on 19 February 2003 by J Roberts

Material: animal bone: *Equus* sp., left femur (J Keen 2003)

Initial comment: an articulated skeleton of a stallion in a pit. The upper fills were cut by at least four burials and the lower fills of the pit contained an infant. The pit was cut 1.9m into chalk natural with the horse skeleton 0.9m from the top of the pit.

Objectives: the horse will help in dating the underlying infant bones and tie in with skeletons (3770) and (3880).

Calibrated date: *1σ:* 350–50 cal BC
2σ: 370 cal BC–cal AD 10

Final comment: A Lyons (3 July 2014), the dating of this horse skeleton in the middle of the stratigraphic sequence suggests that this pit was originally excavated in the middle to late Iron Age and was contemporary with the sub-circular enclosure. It may have been open and in use for a significant period, and it is certain that this pit remained the focus of ritualistic behaviour for a long time.

Laboratory comment: English Heritage (2004), chronological modelling indicates the stallion dates to *360–1 cal BC (at 95% probability; GU-5931*; Lyons 2011, fig App 1.1, 127), and so the undated infant must be earlier than this.

Easington Barrow, Yorkshire (East Riding)

Location: TA 40871807
Lat. 53.38.25 N; Long. 00.07.46 W

Project manager: R Mackey (East Riding Archaeological Society), 1996–7

Archival body: Hull and East Riding Museum

Description: a late Neolithic (Beaker) round barrow, sealing a ?mid Neolithic settlement with hearths and posted structures and a large quantity of pottery and worked flint. The site lies on the beach with imminent threat of destruction by sea erosion.Six charcoal samples were taken from three postholes, two of which are part of an eight-posted oblong structure lying just beyond the edge of the barrow mound. The other posthole was sealed beneath the mound itself and is likely to be associated with others, one of which produced the earliest radiocarbon date for the site (Beta-108149, 4950 ±50 BP; 3920–3640 cal BC at 2σ; Reimer *et al* 2004).

Objectives: to confirm/establish the dating for the pre-barrow structures/hearths beneath the mound; to determine whether a posted building on the edge of the mound belongs to the earlier mid-Neolithic settlement or the barrow phase; and to help date the pre-barrow occupation, which has produced a large quantity of mid Neolithic pottery, worked flint, saddle querns, and a clay loom-weight.

Final comment: R Mackey (26 February 2009), with the exception of OxA-10983 (*see* comment below), all samples in this series together with the three submitted previously, lie within the Neolithic period. However, the date spread is very wide, suggesting activity over a long period rather than a single short-lived event. The forthcoming pottery report may help to confirm this. The residuality of charcoal presents a problem on this site and all results should be read as a *terminus post quem*. This may be particularly so with the oblong structure. Charcoal from its post-holes suggests a mid-late Neolithic date for its demise, but the structure appears to have a spatial relationship with the beaker barrow: the primary grave lies at the apex of a natural rise, but the barrow mound and timber kerb is offset well to the west. The oblong structure occupying the vacant space on the east could be the reason for this offset.

References: Evans and Steedman 2001
Mackey 2006
Reimer *et al* 2004

OxA–10981 4081 ±37 BP

$\delta^{13}C$: -24.4‰

Sample: S43(a), submitted in July 2001 by R Mackey

Material: charcoal: *Corylus avellana*, one fragment (R Gale 2001)

Initial comment: from the upper fill of the northwest corner posthole (125) of an oblong, eight-posted structure lying just beyond the edge of the original barrow mound. Sealed beneath *c* 0.25m of silty clay, which was probably hill wash from the barrow or alternatively could be estuarine alluvium. The sealing layer was truncated to its present level by bulldozing around the barrow to build the adjacent sea defences in the 1950s. Originally the sealing layer would have been considerably thicker. The posthole is cut into solid natural boulder clay and filled with similar, but less compact material. The charcoal samples both came from the uppermost 0.2m of the fill. The top of the post hole cut was at 2.9m OD. The overlying sealing layer has been subject to marine flooding since 1966.

Objectives: to establish whether the oblong (building?) is contemporary with the barrow phase or the mid-Neolithic occupation sealed beneath it (together with samples EB97/107/848 a and b).

Calibrated date: *1σ:* 2840–2500 cal BC
2σ: 2860–2490 cal BC

Final comment: R Mackey (26 February 2009), the residuality of charcoal presents a problem on this site and all results should be read as a *terminus post quem*. This may be particularly so with the oblong structure. Charcoal from its postholes suggests a mid-late Neolithic date for its demise, but the structure appears to have a spatial relationship with the beaker barrow: the primary grave lies at the apex of a natural rise, but the barrow mound and timber kerb is offset well to the west. The oblong structure occupying the vacant space on the east could be the reason for this offset.

OxA–10982 4360 ±37 BP

$\delta^{13}C$: -24.6‰

Sample: S43(b), submitted in July 2001 by R Mackey

Material: charcoal: *Corylus avellana*, one fragment (R Gale 2001)

Initial comment: as OxA-10981

Objectives: as OxA-10981

Calibrated date: *1σ:* 3030–2910 cal BC
2σ: 3100–2890 cal BC

Final comment: see OxA-10981

OxA–10983 2868 ±34 BP

$\delta^{13}C$: -24.3‰

Sample: S48(b), submitted in July 2001 by R Mackey

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2001)

Initial comment: from the fill of posthole (107) from west side of the eight-posted oblong structure, lying just beyond the barrow mound. Sealed beneath *c* 0.25m of silty clay, probably hill wash from the barrow mound, but alternatively could be estuarine alluvium. This sealing layer was truncated to its present level by bulldozing around the barrow, to build the adjacent sea defences in the 1950s. Originally, this sealing layer would have been considerably thicker. The posthole was cut into solid boulder clay at 2.9m OD. It was filled with similar, but less compact material. The overlying sealing layer has been subject to marine flooding since 1966.

Objectives: as OxA-10981

Calibrated date: *1σ:* 1110–990 cal BC
2σ: 1190–920 cal BC

Final comment: R Mackey (26 February 2009), the late Bronze Age date of this sample suggests that it is most likely intrusive to the fill of the posthole, possibly introduced through deep cracks in the sealing clay during a period of drought.

OxA–10984 4500 ±40 BP

$\delta^{13}C$: -26.1‰

Sample: S60(a), submitted in July 2001 by R Mackey

Material: charcoal: Pomoideae, 3 fragments (R Gale 2001)

Initial comment: from the fill of small posthole (160) sealed beneath *c* 0.75m of the disturbed clay barrow mound. The barrow is Beaker period (with seven radiocarbon dates all around cal BC 2000). The land surface beneath (from which the post is cut/truncated) is common to both the barrow construction period and the earlier ?mid Neolithic settlement phase. An adjacent (and associated?) posthole produced an AMS radiocarbon date of 3920–3640 cal BC (Beta-108149, 4950 ±50 BP), whereas charcoal from an adjacent hearth on the sealed land surface give a date of 3320–2580 cal BC (Beta-108829, 4290 ±100 BP). The posthole was cut into the solid natural boulder cay and was filled with similar material. The overlying barrow mound was a mixture of sandy boulder clay and plastic boulder clay in irregular broad horizontal lenses. The area around the mound has been subject to marine flooding since 1966, and at the time of excavation the barrow stood on the beach. It lies on the edge of the estuarine alluvial deposit laid down in the prehistoric period. The level of the post hole beneath the barrow was 3.1m OD.

Objectives: to establish a firmer date for the pre-barrow occupation phase. As the sealed land surface beneath the mound is common to both phases, only the fills of cut features are secure. This posthole is suspected to belong to the earlier phase and may be associated with others, one of which produced the earliest radiocarbon date on the site. Another of these postholes produced what may be the earliest clay loom-weight in Britain.

Calibrated date: *1σ:* 3350–3090 cal BC
2σ: 3370–3020 cal BC

Final comment: R Mackey (26 February 2009), this sample is probably closer in date to the infilling of the posthole than OxA-10985, which may include some residual charcoal.

OxA–10985 4871 ±39 BP

$\delta^{13}C$: -24.6‰

Sample: S60(b), submitted in July 2001 by R Mackey

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2001)

Initial comment: as OxA-10984

Objectives: as OxA-10984

Calibrated date: *1σ:* 3700–3630 cal BC
2σ: 3710–3540 cal BC

Final comment: R Mackey (26 February 2009), this sample may include some residual charcoal (*see* also OxA-10984).

OxA–11027 4953 ±35 BP

$\delta^{13}C$: -27.5‰

Sample: S48(a), submitted in July 2001 by R Mackey

Material: charcoal: *Corylus/Alnus* sp., single fragment (R Gale 2001)

Initial comment: as OxA-10983

Objectives: as OxA-10981

Calibrated date: *1σ:* 3780–3660 cal BC
2σ: 3800–3650 cal BC

Final comment: see OxA-10981

Easington Beach, Yorkshire

Location: TA 41001825
Lat. 53.38.29 N; Long. 00.07.59 E

Project manager: R Van de Noort (University of Hull), August 1998

Archival body: University of Hull, Hull and East Riding Museum

Description: the circular site identified as a possible henge monument lies within the parish of Easington, on the Holderness peninsula leading to Spurn Point. This area, which is susceptible to coastal erosion, is well known for its prehistoric sites of late Neolithic and Bronze Age date.

Objectives: to allow the establishment of a date, the elucidation of the stratigraphic sequence, and the phasing of the monument. As well as the dating of the various phases of the monument, this will provide an opportunity to address the temporal development of the hengiform monument. The dating of the buried soil provides a *terminus ante quem* for the construction of the monument while the dating of the charred timbers in the cremation pit provides a *terminus post quem* for the construction of the inner ditch and bank. The single piece of animal bone from the gravel capping on the platform may provide a date for the construction of the outer ditch and bank. The dating of the nearby barrow will provide some landscape context to the site.

References: Van de Noort 2004

OxA–8974 3652 ±40 BP

$\delta^{13}C$: -25.1‰

Sample: Easing2, submitted on 12 July 1999 by R Van de Noort

Material: charcoal: *Quercus* sp., sapwood (R Gale 1999)

Initial comment: from cremation grave [023], an *in situ* cremation, which took place within the inner ditch of the hengiform monument. No primary silt was found between the cremated bone and charcoal and the underlying gravel - this suggests either that the cremation took place soon after the ditch and bank construction, or that the cremation took place in a shallow pit dug into the ditch. On discovery the cremated bone and charcoal was exposed to the sea. *See* OxA-8975 for a further measurement from this cremation.

Objectives: to provide a date for the cremation activity, and the best possible date *ante quem* for when the hengiform monument was constructed.

Calibrated date: *1σ:* 2130–1950 cal BC
2σ: 2140–1910 cal BC

Final comment: R Van de Noort (10 January 2014), the results from OxA-8974 and OxA-8975 provide a *terminus ante quem* for the construction of the ditch of the hengiform and a direct date for the cremation itself; on the basis of the stratigraphy it seems that the inner ditch of the hengiform monument was dug only a short period before the cremation was placed in it.

Laboratory comment: English Heritage (10 June 2000), the two results from the cremation (OxA-8974 and OxA-8975) are statistically significantly different (T′=40.70; T′(5%)=3.8; ν=1; Ward and Wilson 1978). As both samples were of comparatively short-lived oak sapwood, this suggests that the charcoal sample was of mixed derivation, containing some residual material. On the basis that a context dates to the latest material within it, this suggests that OxA-8974 provided a more reliable indication of the date of the cremation. It should be noted, however, that on excavation this context was being actively eroded by the sea and so contamination is by no means impossible.

References: Ward and Wilson 1978

OxA–8975 4035 ±45 BP

$\delta^{13}C$: -25.5‰

Sample: Easing2, submitted on 12 July 1999 by R Van de Noort

Material: charcoal: *Quercus* sp., sapwood (R Gale 1999)

Initial comment: as OxA-8974

Objectives: as OxA-8974

Calibrated date: *1σ:* 2620–2480 cal BC
2σ: 2840–2460 cal BC

Final comment: see OxA-8974

Laboratory comment: see OxA-8974

OxA–9093 3400 ±55 BP

$\delta^{13}C$: -21.0‰
$\delta^{15}N$ *(diet):* +10.0‰
C/N ratio: 3.4

Sample: Eas 98 [barrow], submitted on 12 July 1999 by R Van de Noort

Material: human bone (sub-adult femur, right side) (M Lillie 1999)

Initial comment: from a partial surviving skeleton from a central grave of a barrow, which had been eroded by the sea. Finds from this grave included a Beaker. *See* also OxA-9094.

Objectives: to provide a date for the barrow.

Calibrated date: *1σ:* 1750–1620 cal BC
2σ: 1880–1530 cal BC

Final comment: R Van de Noort (10 January 2014), the results from OxA-9093 and OxA-9094 provide a direct date for the construction of the burial mound located a short distance to the south of the hengiform monument. The date places the mound, burial, and associated finds in the early Bronze Age 2 or 3 phase. This is a time when the inclusion of Beakers in burials came to an end and this type of Beaker is regionally referred to as Late Beakers.

Laboratory comment: English Heritage (10 May 2000), the two results from the human burial (OxA-9093 and OxA-9094) are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1) and so a weighted mean can be taken before calibration (Ward and Wilson 1978). This is 3395 ±39 BP (which calibrates to 1860–1530 cal BC at 2σ; Reimer *et al* 2004). The stable isotope measurements from this skeleton are consistent with a fully terrestrial diet (Mays 1998, fig 9.2).

References: Mays 1998
Reimer *et al* 2004
Ward and Wilson 1978

OxA–9094 3390 ±55 BP

$\delta^{13}C$: -20.9‰
$\delta^{15}N$ *(diet):* +10.2‰
C/N ratio: 3.3

Sample: Eas 98 [barrow], submitted on 12 July 1999 by R Van de Noort

Material: human bone (sub-adult femur, right side) (M Lillie 1999)

Initial comment: a replicate of OxA-9093.

Objectives: as OxA-9094

Calibrated date: *1σ:* 1750–1620 cal BC
2σ: 1880–1530 cal BC

Final comment: see OxA-9093

Laboratory comment: see OxA-9093

Essex Cropmarks Project, Essex

Location: *see* individual sites

Project manager: P Murphy (Centre of East Anglian Studies, University of East Anglia), 1996–7

Description: a group of circular cropmarks is located in north-east Essex and south-east Suffolk. Although none of these sites have been excavated, they appear typical of the relatively small henges which occur in East Anglia. Recent study of the Ardleigh Group of Deverel-Rimbury pottery has emphasised the localised distribution of this material in East Anglia and its association with highly distinctive, densely-packed ring-ditch cemeteries which are often sited in close proximity to ‘hengiform’ monuments. The Essex cropmark enclosures project undertaken by the Archaeology Section of Essex County Council Planning Department, is designed to explore the way in which familiar elements including henge monuments, ring-ditch cemeteries, Deverel-Rimbury pottery etc, combine to create a distinctive cultural landscape in this part of East Anglia.

Objectives: to date the sediment sequences.

References: Murphy *et al* 2002

Essex Cropmarks Project: Clare Downs Farm, Essex

Location: TL 787455
Lat. 52.04.43 N; Long. 00.36.29 E

Project manager: P Murphy (Centre of East Anglian Studies, University of East Anglia), 1997

Archival body: Essex County Council

Description: prehistoric circular and linear ditches on terrace of River Stour: adjacent section 2.70m deep through valley sediments.

Objectives: archaeological deposits were dry and truncated, with no palaeoecological potential. The objective is to date the sediment sequence (in outline), thereby establishing whether macrofossil and pollen studies will be pertinent to the monuments and their environment.

Final comment: P Murphy (28 January 2003), the two dates from the basal fill of a palaeochannel are consistent with one another. Combined with palaeoecological results, a local environment of floodplain woodland with some open habitats is inferred for the late Neolithic.

References: Murphy *et al* 2002

OxA–8492 4315 ±45 BP

$\delta^{13}C$: -24.4‰

Sample: BPCF97 266–270, submitted on 8 December 1998 by P Murphy

Material: wood (waterlogged): *Alnus* sp., roundwood (P Murphy 1997)

Initial comment: from a machine-cut trench in the valley floor. The sample was taken from a black twiggy organic detritus mud; slightly sandy; abundant mollusc shells.

Objectives: lowest deposit from sequence including roundwood - to establish date bracket.

Calibrated date: *1σ:* 2930–2890 cal BC
2σ: 3080–2880 cal BC

Final comment: P Murphy (28 January 2003), the date on alder wood from the basal fill of a palaeochannel relates to late Neolithic floodplain woodland.

OxA–8493 4100 ±45 BP

$\delta^{13}C$: -26.8‰

Sample: BPCF97 224-230, submitted on 8 December 1997 by P Murphy

Material: wood (waterlogged): *Alnus* sp., roundwood (P Murphy 1997)

Initial comment: from a machine-cut trench in the valley floor. The sample was taken from black twiggy organic detritus mud; narrow boundary.

Objectives: to provide a *terminus post quem* for beginning of clastic alluviation.

Calibrated date: *1σ:* 2860–2570 cal BC
2σ: 2880–2490 cal BC

Final comment: P Murphy (28 January 2003), this date, on alder wood within the basal fill of a palaeochannel, implies persistence of floodplain woodland for a period of some centuries in the late Neolithic. The sample was from some 40cm above OxA-8492.

Essex Cropmarks Project: Coleman's Farm, Essex

Location: TL 845165
Lat. 51.48.58 N; Long. 00.40.37 E

Project manager: P Murphy (Centre of East Anglian Studies, University of East Anglia), 1996

Archival body: Essex County Council

Description: 'hengiform' cropmarks and ring-ditches adjacent to a minor (un-named) tributary of the river Blackwater. Sediment sequence up to 2.18m.

Objectives: archaeological feature fills had no potential for palaeoecological study. The objective is to date the horizon within the sediment sequence, to determine whether analysis would provide information relevant to the monuments.

Final comment: P Murphy (28 January 2003), the series provides a chronological framework for an alluvial floodplain sequence (Bronze Age to late-/post-medieval).

References: Murphy *et al* 2002

OxA–8494 325 ±40 BP

$\delta^{13}C$: -26.9‰

Sample: RHCF96 74, submitted on 8 December 1998 by P Murphy

Material: charcoal: bark, unidentified (P Murphy 1996)

Initial comment: from machine trench in Valley floor. The sample was taken from a light yellowish-brown, mottled reddish-brown calcareous sand; slightly stony with coarse sand lenses; abundant calcareous concretions; mollusc shells common; charcoal patches; some woody roots; merging undulating boundary. A Holocene sediment sequence, above the water table and calcareous sediment.

Objectives: from coarse alluvial sediment near the top of the sequence - to establish a date bracket.

Calibrated date: *1σ:* cal AD 1480–1650
2σ: cal AD 1450–1660

Final comment: P Murphy (28 January 2003), charcoal from alluvium at a depth of 74cm shows that alluviation here continued into the post-medieval period.

OxA–8495 3290 ±45 BP

$\delta^{13}C$: -27.5‰

Sample: RHCF96 175–180, submitted on 8 December 1998 by P Murphy

Material: wood (waterlogged): *Alnus* sp., roundwood (P Murphy 1996)

Initial comment: as OxA-8494. The sample was taken from a dark greyish-brown organic alluvium with sand lenses; some mollusc shells and wood fragments; woody roots; a very sharp but irregular and undulating boundary.

Objectives: near the base of the main alluvial unit - to establish the date of the main phase of alluviation.

Calibrated date: *1σ:* 1630–1500 cal BC
2σ: 1690–1450 cal BC

Final comment: P Murphy (28 January 2003), the date was on older wood from an organic silt unit within an alluvial sequence. Combined with palaeoecological evidence it establishes that by the middle Bronze Age the floodplain was grazing land.

OxA–8496 3450 ±45 BP

$\delta^{13}C$: -27.6‰

Sample: RHCF96 201–206, submitted on 8 December 1998 by P Murphy

Material: wood (waterlogged): *Alnus* sp., roundwood (P Murphy 1996)

Initial comment: as OxA-8494. The sample was taken from a very dark greyish-brown, very sandy peat; thickness again variable, up to 10cm; wood fragments; sharp, irregular boundary.

Objectives: from the lowest deposit from the sequence including roundwood - to establish a date bracket.

Calibrated date: *1σ:* 1880–1690 cal BC
2σ: 1890–1630 cal BC

Final comment: P Murphy (28 January 2003), this date was from approximately 30cm below OxA-8495 and indicated quite early use of floodplain grassland.

Eton Rowing Course, Buckinghamshire

Location: SU 919787 to SU 937774
Lat. 51.29.56 N; Long. 00.40.35 W, to
Lat. 51.29.13 N; Long. 00.39.02 W

Project manager: T Allen (Oxford Archaeology), 1996–7

Description: approximately 150ha of gravel terrace deposits crossed by former palaeochannels incised in the late Devensian on the north bank of the River Thames.

Objectives: to date the Neolithic midden deposits, their inception, longevity, and likely date of abandonment; to compare the dates of the two deposits and use these to date other Neolithic activity on the site; to date the use of the Carinated Bowl assemblage in area 6.

Final comment: P Marshall (14 November 2013), the radiocarbon dating has confirmed that the midden deposits in areas 6 and 10 are broadly contemporary, and date to the fourth millennium cal BC. The dates from area 6 however cluster in the first half of the fourth millennium cal BC, with a start early in the millennium, while those from area 10 (a much smaller sample group) cluster in the second half of the fourth millennium. The ceramic evidence however suggests that occupation began earlier, contemporary with that in area 6.

References: Allen *et al* 2013

Eton Rowing Course: area 6, Buckinghamshire

Location: SU 919787to SU 937774
Lat. 51.29.56 N; Long. 00.40.35 W, to
Lat. 51.29.13 N; Long. 00.39.02 W

Project manager: T Allen (Oxford Archaeology), 1996–7

Archival body: Buckinghamshire County Museum

Description: area 6 lay at the south-eastern end of the Rowing Course.

Objectives: to date the Neolithic midden deposits, their inception, longevity, and likely date of abandonment; to compare the dates of the two midden deposits, and their chronological relationship to other Neolithic activity on the site; to date the use of the Carinated bowl assemblage from area 6, and confirm the presence of beech (*Fagus sylvatica*) in the Neolithic.

Final comment: P Marshall (14 November 2013), radiocarbon dating has shown that the area 6 midden started to form early in the fourth millennium cal BC, with deposition of material taking place over a period as long as four centuries. The dates for the use of the Carinated bowl assemblage is in good agreement with the currency for this vessel type in southern England (Whittle *et al* 2011, fig 14.88). Although beech was growing in the vicinity of the site in the Neolithic, the dated fragment is not contemporary with the primary use of the early Neolithic middens.

References: Allen *et al* 2013
Whittle *et al* 2011

GrA–22560 4910 ±45 BP

$\delta^{13}C$: -22.6 ±0.2‰

Sample: SF 23932, submitted on 20 March 2000 by T Allen

Material: animal bone: *Bos* sp., phalanx I (G Jones 2000)

Initial comment: this bone 23932 was located in 5986, a distinctive midden deposit located on land surface 11201. The deposit was sealed by 11200, a layer which accumulated over the entire hollow through the Neolithic and early Bronze Age. The phalanx probably refits to SF 23370 found in the same deposit 1m away.

Objectives: to establish a date for the bone, and indirectly the deposit in which it was found. This should assist in establishing the duration of the early Neolithic occupation.

Calibrated date: *1σ:* 3710–3640 cal BC
2σ: 3790–3630 cal BC

Final comment: P Marshall (14 November 2013), the date confirms the Neolithic age of the cow.

Laboratory comment: English Heritage (11 August 2014), this is a repeat of OxA-9858, which was processed using the original ultra-filtration protocol at Oxford (Bronk Ramsey *et al* 2000). The two measurements are statistically consistent (T'=0.9; T'(5%)=3.8; ν=1; Ward and Wilson 1978), and so a weighted mean may be calculated (4940 ±32 BP), which calibrates to 3790–3650 cal BC (2σ; Reimer *et al* 2004).

References: Bronk Ramsey *et al* 2000
Reimer *et al* 2004
Ward and Wilson 1978

GrA–22561 4970 ±45 BP

δ¹³C: -22.4 ±0.2‰

Sample: SF 82706, submitted on 20 March 2000 by T Allen

Material: animal bone: *Bos* sp., mandible (17g) (G Jones 2000)

Initial comment: SF 82706 was found in context 11176, the upper fill of a tree throw hole, which resembles a midden deposit. The bone was found at approximately 0.4m into this deposit. The tree throw hole cut land surface 11201 and was overlain by 11200, a deposit thought to have accumulated through the Neolithic. The bone is unlikely to be either intrusive or residual as several pieces of bone, broken in antiquity refit to form a relatively complete mandible.

Objectives: as GrA-22560

Calibrated date: *1σ:* 3800–3690 cal BC
2σ: 3940–3650 cal BC

Final comment: see GrA-22560

OxA–10660 4915 ±55 BP

δ¹³C: -30.5‰

Sample: SF 82594, submitted on 20 March 2000 by T Allen

Material: carbonised residue (A Barclay 2000)

Initial comment: a replicate of OxA-9925.

Objectives: as OxA-9925

Calibrated date: *1σ:* 3760–3640 cal BC
2σ: 3800–3630 cal BC

Final comment: see OxA-9850

Laboratory comment: see OxA-9925

OxA–9670 5295 ±70 BP

δ¹³C: -21.8‰

Sample: 77496, submitted on 20 March 2000 by T Allen

Material: animal bone: *Bos* sp., pelvis (G Jones 2000)

Initial comment: SF 77496 was found in context 11160, a distinctive midden deposit, situated on land surface 11201 and overlain by layer 11201 which accumulated in the hollow throughout the Neolithic. Although the bone does not articulate to other bones, it represents one of the largest bones from this context. The bone was also found from towards the base of this deposit, which was approximately 0.25m deep.

Objectives: to date the bone and indirectly the deposit in which it was found; to assist in establishing the duration of the early Neolithic occupation of the site.

Calibrated date: *1σ:* 4240–3990 cal BC
2σ: 4330–3960 cal BC

Final comment: see GrA-22560

Laboratory comment: Oxford Radiocarbon Accelerator Unit (18 May 2016), this measurement was processed at Oxford (Bronk Ramsey *et al* 2000b). It had a very low yield of gelatin (3.4mg). This, and a subsequent unsuccessful attempt to re-date this sample, suggest that this measurement is anomalously old.

References: Bronk Ramsey *et al* 2000b

OxA–9819 4925 ±40 BP

δ¹³C: -25.9‰

Sample: context 11172, submitted on 20 March 2000 by T Allen

Material: grain: *Triticum dicoccum* , charred single grain (D Robinson 2000)

Initial comment: midden deposit 11172 was located on land surface 11201, and was sealed by layer 11200, which gradually accumulated through the Neolithic and early Bronze Age.

Objectives: to establish a date for the cereal grains and the deposit in which they were found. This should also assist in establishing the duration of the site.

Calibrated date: *1σ:* 3720–3650 cal BC
2σ: 3790–3640 cal BC

Final comment: P Marshall (14 November 2013), the date confirms the Neolithic age of the cereal grain.

OxA–9850 4645 ±55 BP

δ¹³C: -28.1‰

Sample: SF 84566, submitted on 20 March 2000 by T Allen

Material: carbonised residue (interior) (A Barclay 2000)

Initial comment: SF84566 was found in context 11320 (sa11313), the upper fill of tree throw hole 11352. The fill is 0.4m deep, and appears to be a finds-rich, dark, 'midden' deposit. Tree throw hole 11352 cuts land surface 11201, and is overlain by 11200, a deposit believed to have accumulated through the Neolithic.

Objectives: to date the burnt residue and so date the pottery sherd to which the residue is adhered. This should indirectly date the context in which the sherd was found, and assist in establishing the duration of the early Neolithic occupation of the site.

Calibrated date: *1σ:* 3520–3360 cal BC
2σ: 3630–3340 cal BC

Final comment: P Marshall (14 November 2013), the date is in agreement with the accepted currency for Neolithic ceramics of this type.

OxA–9851 4760 ±50 BP

$\delta^{13}C$: -27.3‰

Sample: SF 84429, submitted on 20 March 2000 by T Allen

Material: carbonised residue (interior) (A Barclay 2000)

Initial comment: SF 84429 was found in 11313, the upper fill in tree throw hole, 11352. 11313 is 0.4m deep and appears to be a dense, finds-rich, midden deposit. Tree throw hole 11352 cuts land surface 11201, and is overlain by 11200, a deposit believed to have accumulated through the Neolithic.

Objectives: as OxA-9850

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3650–3370 cal BC

Final comment: see OxA-9850

OxA–9858 4970 ±45 BP

$\delta^{13}C$: -20.0‰

Sample: SF 23932, submitted on 20 March 2000 by T Allen

Material: animal bone: *Bos* sp., phalanx I (G Jones 2000)

Initial comment: a replicate of GrA-22560.

Objectives: as GrA-22560

Calibrated date: *1σ:* 3800–3690 cal BC
2σ: 3940–3650 cal BC

Final comment: see GrA-22560

Laboratory comment: see GrA-22560

Laboratory comment: Oxford Radiocarbon Accelerator Unit (18 May 2016), this sample yielded 12.2mg of gelatin, but despite this low yield, seems to be only sightly offset towards an older age.

OxA–9859 4895 ±50 BP

$\delta^{13}C$: -26.1‰

Sample: soil sample 2304, context 11187, submitted on 20 March 2000 by T Allen

Material: grain: *Triticum dicoccum* , charred single grain (M Robinson 2000)

Initial comment: the context from which this sample was taken is the upper (of two) fills in tree throw hole 11190. The tree throw hole cuts the preserved surface 11201 and is sealed by 11201 which seals the deposits considered to be of early Neolithic date.

Objectives: to date the cereal grain, and in turn the deposit in which it was contained. This should also assist in establishing the duration of the early Neolithic occupation.

Calibrated date: *1σ:* 3710–3640 cal BC
2σ: 3780–3540 cal BC

Final comment: see OxA-9819

OxA–9860 346 ±35 BP

$\delta^{13}C$: -24.7‰

Sample: SF 2329 11316, submitted on 20 2000 by T Allen

Material: charcoal: *Fagus sylvatica* L. (M Robinson 2000)

Initial comment: soil sample 2329 was taken from context 11316 (part of 11200). Layer 11316 seals tree throw hole 11352 and the midden deposits found within it (11313, 11314, 11187, 11307, 11320, and 11321). This layer was directly overlain by topsoil.

Objectives: to establish the date of the twig found in this deposit, and indirectly the deposit. The dating of this deposit may provide a date for the silting of the hollow after the occupation has ended.

Calibrated date: *1σ:* cal AD 1460–1640
2σ: cal AD 1440–1650

Final comment: P Marshall (14 November 2013), the beech twig is not Neolithic in date and is clearly intrusive.

OxA–9889 4935 ±40 BP

$\delta^{13}C$: -24.5‰

Sample: soil sample 2306 context 11160, submitted on 20 March 2000 by T Allen

Material: grain: *Triticum dicoccum* , charred single grain (M Robinson 2000)

Initial comment: the grain was found in a soil sample taken from a distinctive, dark 'midden' deposit (11160) on a preserved land surface (11201). The deposits were sealed by 11200, a layer which accumulated through the Neolithic and into the early Bronze Age.

Objectives: to establish a date for the cereal grains and indirectly the deposit they are contained within; to assist in establishing the duration of the early Neolithic occupation.

Calibrated date: *1σ:* 3770–3650 cal BC
2σ: 3800–3640 cal BC

Final comment: see OxA-9819

OxA–9890 4995 ±40 BP

$\delta^{13}C$: -25.6‰

Sample: SS 2317, submitted on 20 March 2000 by T Allen

Material: carbonised plant macrofossil (charred hazelnut shell; single fragment) (M Robinson 2000)

Initial comment: SS 2317 was taken from 11194, the upper fill of tree throw hole 11345. The fill 11194 resembled a midden deposit contained within a tree throw hole. The tree throw hole cuts the land surface 11201, and was sealed by 11200, a deposit which is thought to have slowly accumulated through the Neolithic and early Bronze Age.

Objectives: to establish the date of the hazelnut shell and indirectly the deposit in which it was found. This should assist in establishing the duration of the early Neolithic occupation on site.

Calibrated date: *1σ:* 3900–3700 cal BC
2σ: 3950–3660 cal BC

Final comment: P Marshall (14 November 2013), the date confirms the Neolithic age of the hazelnut.

OxA–9891 4910 ±0 BP

δ¹³C: -24.6‰

Sample: SS 2307, 11159, submitted on 20 March 2000 by T Allen

Material: grain: *Triticum dicoccum* , charred single grain (M Robinson 2000)

Initial comment: soil sample 2307 was taken from context 11159. Context 11159 is part of general land surface deposit 11201. This context is overlain by 11200 and topsoil. Due to the small depth of overburden it is possible the grain could be intrusive, although the species is contemporary with the period in question.

Objectives: to establish the date of the grain and indirectly the deposit in which it was contained. To assist in establishing the duration of the early Neolithic occupation.

Calibrated date: *1σ:* 3700–3655 cal BC
2σ: 3705–3650 cal BC

Final comment: *see* OxA-9819

OxA–9924 4920 ±65 BP

δ¹³C: -25.5‰

Sample: SF 82319, submitted on 20 March 2000 by T Allen

Material: carbonised residue (interior) (A Barclay 2000)

Initial comment: SF 82319 was recovered from context 11194, the upper fill of tree throw hole 11345. Context 11194 resembled a midden deposit. Tree throw hole 11345 cut land surface 11201 and was sealed by 11200.

Objectives: to date the burnt residue and so date the pottery sherd to which the residue is adhered. This should indirectly date the context in which the sherd was found and in which the sherd was found and assist in establishing the duration of the early Neolithic occupation of the site.

Calibrated date: *1σ:* 3780–3640 cal BC
2σ: 3930–3530 cal BC

Final comment: *see* OxA-9850

OxA–9925 5240 ±85 BP

δ¹³C: -28.6‰

Sample: SF 82594, submitted on 20 March 2000 by T Allen

Material: carbonised residue (interior) (A Barclay 2000)

Initial comment: SF 82594 was found in context 11344, the lower fill of 11345. The context is overlain by 11194. The tree throw hole cut 11345 cuts the early Neolithic land surface 11201 and the channel deposits. The feature is sealed by 11200 - a sealing layer in the hollow which accumulated through the Neolithic and early Bronze Age.

Objectives: to date the burnt residue and so date the pottery sherd to which the residue is adhered. This should indirectly date the context in which the sherd was found and assist in establishing the duration of the early Neolithic occupation of the site.

Calibrated date: *1σ:* 4230–3960 cal BC
2σ: 4330–3810 cal BC

Final comment: P Marshall (14 November 2013), the date of the residue is anomalously early for a Neolithic vessel of this type.

Laboratory comment: English Heritage (14 November 2013), a replicate measurement was made on the organic residue from pottery sherd (SF 82594) as a check on the very early measurement of OxA-9925. The two measurements (OxA-9925 and OxA-10660) are statistically different (T′=10.5; ν=1; T′(5%)=3.8; Ward and Wilson 1978). In addition to the difference in the radiocarbon measurements, the δ¹³C values are quite different as well (-28.6‰ for OxA-9925, and -30.5‰ for OxA-10660). This would seem to suggest that either a different fraction of the residue recovered from the pot is being measured, or that there is a contaminant whose removal is reflected in a shift in the δ¹³C values. Since the pretreatment of both samples was identical, the former is the more likely interpretation. There is also variation in the percentage pretreatment yields of both samples, and the CO_2 generated from the combustion of this pre-treated material also varies between them. This would seem to imply that the differences in the radiocarbon and carbon isotope results may be due to the 'residues' recovered from the pot being chemically different, with variable proportions of carbonaceous materials and possibly contaminating material present, or a varying presence or proportion of lipids. As a group, the pottery residues dated from Eton Rowing Lake have very high (50–80%) yields after pretreatment, and very low CO_2 yields after combustion. Of the two measurements made on SF 82594 (OxA-10660) maintains the closest similarity to the general trend (pre-treatment yield 50%; combustion yield 3%).

References: Ward and Wilson 1978

OxA–9926 4075 ±65 BP

δ¹³C: -25.4‰

Sample: SS 2302 11172B, submitted on 20 March 2000 by T Allen

Material: charcoal: *Fagus sylvatica* L., twig (A Barclay 2000)

Initial comment: from midden deposit 11172 (=5980), located on land surface 11201, sealed by layer 11200 which gradually accumulated through the Neolithic and early Bronze Age.

Objectives: to establish a date for the charcoal in this deposit and in conjunction other dates from this context, establish if the charcoal is contemporary with the early Neolithic midden.

Calibrated date: *1σ:* 2860–2490 cal BC
2σ: 2880–2460 cal BC

Final comment: P Marshall (14 November 2013), the date confirms the presence of beech in the Neolithic although the sample is clearly not related to the primary formation of the middens.

OxA-X–1028–12 4580 ±65 BP

δ¹³C: -29.5‰

Sample: SF 83461 context 11344, submitted on 10 September 2001 by T Allen

Material: carbonised residue (interior) (A Barclay 2001)

Initial comment: the potsherd was found within the primary fill of tree throw hole 11345 on the western edge of the main area of midden deposits within the hollow of a silted palaeochannel in area 6. This was overlain by a dark, finds-rich silt containing much artefactual material, 1197, interpreted as deliberate infilling of the tree throw hole with midden material of early Neolithic date. The tree throw hole was sealed by layer 1159, itself of Neolithic/early Bronze Age date.

Objectives: three samples from this feature have already been dated by radiocarbon to the early Neolithic. A hazelnut shell and pot residue from the overlying fill date to the first half of the fourth millennium cal BC, and a pot residue from the primary fill to the later fifth or first quarter of the fourth millennium. This sample is being dated to establish the date of last use of the pottery vessel, to provide an additional *terminus post quem* date for the primary deposit within the tree throw hole, and for the dating of the stratigraphic sequence within it. It is also hoped to confirm the very early date for pottery indicated by the date already obtained from a pot residue from this context.

Calibrated date: *1σ:* 3500–3130 cal BC
2σ: 3520–3090 cal BC

Final comment: see OxA-9850

Laboratory comment: English Heritage (14 November 2013), the two measurements (OxA-X-1028–12 and OxA-X-1045–09) are statistically consistent (T′=0.1; ν=1; T′(5%)=3.8 Ward and Wilson 1978) and could be of the same actual age. Their weighted mean (4598 ±42 BP) calibrates to 3500–3120 cal BC (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA-X–1045–9 4610 ±65 BP

δ¹³C: -31.2‰

Sample: SF 83461 context 11344, submitted on 10 September 2001 by T Allen

Material: carbonised residue (interior) (A Barclay 2001)

Initial comment: a replicate of OxA-X-1028–12.

Objectives: as OxA-X-1028–12

Calibrated date: *1σ:* 3500–3340 cal BC
2σ: 3630–3100 cal BC

Final comment: see OxA-9850

Laboratory comment: see OxA-X-1028–12

Eton Rowing Course: area 10, Buckinghamshire

Location: SU 919797 to SU 937774
Lat. 51.29.56 N; Long. 00.40.35 W, to
Lat. 51.29.13 N; Long. 00.39.02 W

Project manager: T Allen (Oxford Archaeology), 1996–7

Archival body: Buckinghamshire County Museum

Description: area 10 lies upon a large block of gravel terrace deposits between the course of the former Thames channel and the modern Thames in the centre of the site.

Objectives: to date the Neolithic midden deposits, their inception, longevity, and likely date of abandonment.

Laboratory comment: English Heritage (14 November 2013), the four determinations from area 10 are statistically consistent (T′=0.3; ν=3; T′(5%)=7.8; Ward and Wilson 1978) which might mean that all the material was incorporated in the midden at the same time. However, it is possible that if the midden accumulated over a relatively short period of time it could produce such a group of results.

References: Allen *et al* 2013
Ward and Wilson 1978

BM–3188 4530 ±50 BP

δ¹³C: -19.9‰

Sample: context 6915, submitted on 20 March 2000 by T Allen

Material: animal bone: *Bos* sp., vertebra (G Jones 2000)

Initial comment: this semi-articulated skeleton was found in layer 6331 - a layer in the hollow containing midden material. The thickness of the deposit which this skeleton was at the base of is only 6cm below the topsoil. There is some evidence of ploughing having disturbed some of the bones, although many elements of the skeleton were articulated and so are unlikely to be either residual or intrusive.

Objectives: to date the skeleton and assist in dating the duration of Neolithic activity on site (in conjunction with other dates).

Calibrated date: *1σ:* 3360–3100 cal BC
2σ: 3490–3020 cal BC

Final comment: P Marshall (14 November 2013), the date confirms the Neolithic age of the cow.

OxA–10206 4565 ±60 BP

δ¹³C: -26.9‰

Sample: DBC 40929, submitted on 20 March 2000 by T Allen

Material: carbonised residue (interior) (A Barclay 2000)

Initial comment: a sample from the excavation of a discrete flint scatter, 6880, lying in a shallow hollow to the north of a choked late Glacial channel crossing the flint gravel terrace, the top of which contained a spread of Neolithic struck flint, pottery, bone, and charcoal. Layer 6880 was overlain by 0.6m of ploughsoil.

Objectives: to date the burning of the residue and, by implication, the last use of the pot. Indirectly to establish the date of the activity which resulted in formation of the deposit.

Calibrated date: *1σ:* 3490–3120 cal BC
2σ: 3510–3090 cal BC

Final comment: see OxA-9671

OxA–9671 4590 ±150 BP

$\delta^{13}C$: -32.0‰

Sample: DBC 32522, submitted on 20 March 2000 by T Allen

Material: carbonised residue (interior) (A Barclay 2000)

Initial comment: a sample from the excavation of a layer of greyish-brown sandy silt 6331, which filled the top of a choked late Glacial channel crossing the flint gravel terrace. Layer 6331 was excavated in 2m squares, and in spits, and context 6566 was given to the second spit excavated in the square. The square lay in the middle of a spread of Neolithic struck flint, pottery, bone, and charcoal at a depth of 0.15m below the top of the deposit; layer 6331 was overlain by 0.6m of ploughsoil.

Objectives: to date the burning of the residue and, by implication, the last use of the pot; indirectly to establish the date of the occupation which resulted in the midden deposit.

Calibrated date: *1σ:* 3630–3090 cal BC
2σ: 3660–2900 cal BC

Final comment: P Marshall (14 November 2013), the date is in agreement with the accepted currency for Neolithic ceramics of this type.

OxA–9672 4520 ±120 BP

$\delta^{13}C$: -27.8‰

Sample: DBC 41577, submitted on 20 March 2000 by T Allen

Material: carbonised residue (interior) (A Barclay 2000)

Initial comment: a sample from the excavation of a layer of greyish brown sandy silt 6331, which filled the top of a choked late Glacial channel crossing the flint gravel terrace. Layer 6331 was excavated in 2m squares and in spits, and context 6221 was given to the third spit excavated in this square. The square lay in the middle of a spread of Neolithic struck flint, pottery, bone, and charcoal, at a depth of 0.15m below the top of the deposit; layer 6331 was overlain by 0.6m of ploughsoil.

Objectives: as OxA-9671

Calibrated date: *1σ:* 3490–3020 cal BC
2σ: 3630–2890 cal BC

Final comment: see OxA-9671

OxA–9852 5110 ±90 BP

$\delta^{13}C$: -26.4‰

Sample: SF 50842, submitted on 20 March 2000 by T Allen

Material: carbonised residue (interior) (A Barclay 2000)

Initial comment: SF 50842 was found in context 8194, a 2m^2 area of land surface 11201. This deposit was sealed by 11200 and topsoil. A small number of intrusive sherds were recorded, though they constitute less than 2.5% of the assemblage. It is, however, unlikely this sherd is intrusive as it is of early Neolithic date.

Objectives: as OxA-9671

Calibrated date: *1σ:* 3990–3790 cal BC
2σ: 4220–3700 cal BC

Final comment: see OxA-9671

Exmoor Iron Project, Devon and Somerset

Location: *see* individual sites

Project manager: G Juleff (University of Exeter), 1996–2008

Description: archaeological survey and excavation on Exmoor during the late 1990s and early 2000s has, for the first time, recognised extensive evidence for iron-working on the upland since the late first millennium cal BC. Survey and excavations have focussed on field evidence for all stages or primary iron production, from ore extraction to smelting and initial metal refining. These surveys have demonstrated near-continuous exploitation of the upland for metallurgic products over at least the last 2000 years. Until now, explanations of landscape change and economic development of the upland have revolved around its use as an agricultural resource and a recognition of the role of this and other uplands as centres of extractive metal industries demands a rethink of a range of issues. These include reviewing existing ideas around the social and economic functioning of Exmoor in the wider region, and from an environmental perspective the relative importance of woodland management and clearance in relation to agrarian and industrial purposes.

Objectives: the investigation of the development of iron-working as a rural industry through time and the role it has played in shaping the wider physical and cultural landscapes that are now threatened by agricultural improvement and forestry. The development of a methodological approach to the investigation of pre-industrial metal-working. The project will explore ways in which the repertoire of techniques can be extended to help bridge the gap between archaeology and archaeometallurgy.

Exmoor Iron: Sherracombe Ford, Devon

Location: SS 720366
Lat. 56.06.48 N; Long. 03.49.42 W

Project manager: G Juleff (University of Exeter), 2002

Archival body: University of Exeter

Description: iron-production site of probable Romano-British date on the western side of Exmoor. It consists of several platforms on the sides of a steep-sided combe opening out to the west-south-west. Downslope of the platforms lie slagheaps; some of these are being eroded by a stream that runs down to the base of the combe. The whole site is under grass with a little light scrub (generally grazed). A spring-mire runs through part of the site (away from the excavated area), probably developing after the iron-production activity. The site excavated in 2002 consisted of a rectangular trench on one platform (which revealed remains of furnaces and a smithing floor). A narrow trench was also dug into the hillslope above the platform and through the slagheap below it.

Objectives: to date the production of material from the slagheap and furnace.

Final comment: P Marshall (11 November 2013), the statistical consistency of the dated material from the individual contexts indicates that each deposit does relate to a single 'dump' of slag and other waste from a discrete episode of metallurgical activity. Chronological modelling of all the radiocarbon dates shows good agreement with the stratigraphy and suggests that the start of activity took place very soon after the Roman invasion of Britain and ended in the late third century cal AD.

Laboratory comment: English Heritage (24 June 2014), 12 further samples were dated from this site after 2003 (OxA-13773–81, -13884–5, and -13891).

GU–5941 1880 ±70 BP

$\delta^{13}C$: -24.2‰

Sample: Context 63, submitted in February 2003 by G Juleff

Material: charcoal: *Quercus* sp., roundwood (R Gale 2002)

Initial comment: context 63 lies, straitgraphically near the bottom of the portion of the slagheap excavated in 2002. The very nature of the deposit, a dump of slag and other waste materials, means it has been redeposited at least once since its production. However, the position of context 63 as a very clear layer between other, similarly obvious layers, and the sampling by an experienced excavator, makes contamination by intrusion or residuality unlikely. The layer lay 0.3–0.9m beneath the surface, sandwiched between layers of redeposited 'natural' shillet - a soft, platey, weathered shale.

Objectives: to date the chronological span of deposits revealed by section through the slag heap. Stratigraphically context 63 lies at the bottom of the excavated sequence. However, there is a suspicion that part of the slagheap may have been cut and redeposited. If the radiocarbon dates appear out of sequence when compared to the stratigaphy this suspicion would be confirmed.

Calibrated date: *1σ:* cal AD 50–240
2σ: 40 cal BC–cal AD 330

Final comment: see series comments

Laboratory comment: English Heritage (11 November 2013), the two measurements from context 63 (GU-5941 and OxA-12603) are statistically consistent (T′=0.8; T′(5%)=3.8; ν=1, Ward and Wilson 1978) and thus both could be of the same age.

References: Ward and Wilson 1978

GU–5942 2000 ±50 BP

$\delta^{13}C$: -23.0‰

Sample: Context 99 sample 13, submitted in February 2003 by G Juleff

Material: charcoal: *Quercus* sp., sapwood (31g) (R Gale 2002)

Initial comment: context 99 lies stratigraphically in the middle of the layers in the slagheap excavated in 2002. The nature of the deposit, a dump of waste materials in a slagheap, means that it must be redeposited from its original point of production. However, context 99 contains large pieces of clay furnace lining. This is very fragile and unlikely to survive repeated redeposition as large pieces.

Objectives: as GU-5941; context 99 lies in the middle of the excavated sequence.

Calibrated date: *1σ:* 50 cal BC–cal AD 60
2σ: 170 cal BC–cal AD 130

Final comment: see series comments

Laboratory comment: English Heritage (11 November 2013), the two measurements from context 99 (GU-5942 and OxA-12602) are not statistically consistent (T′=5.6; T′(5%)=3.8; ν=1, Ward and Wilson 1978) and suggest the context may contain material of different ages, although this is likely to be material that was deposited over a relatively short period of time.

References: Ward and Wilson 1978

OxA–12602 1862 ±30 BP

$\delta^{13}C$: -25.6 ±0.2‰

Sample: context 99 sample 13, submitted in February 2003 by G Juleff

Material: charcoal: *Corylus* sp., single fragment (2.50g) (R Gale 2002)

Initial comment: as GU-5942

Objectives: as GU-5942

Calibrated date: *1σ:* cal AD 80–220
2σ: cal AD 70–240

Final comment: see series comments

Laboratory comment: see GU-5942

OxA–12603 1949 ±31 BP

$\delta^{13}C$: -24.3 ±0.2‰

Sample: context 63, submitted in February 2003 by G Juleff

Material: charcoal: *Quercus* sp., roundwood; single fragment (5g) (R Gale 2002)

Initial comment: as GU-5941

Objectives: as GU-5941

Calibrated date: *1σ:* cal AD 20–80
2σ: 40 cal BC–cal AD 130

Final comment: see series comments

Laboratory comment: see GU-5941

OxA–12604 1845 ±31 BP

$\delta^{13}C$: -24.8 ±0.2‰

Sample: context 24 sample 26 A, submitted in February 2003 by G Juleff

Material: charcoal: *Corylus* sp., single fragment (2.50g) (R Gale 2002)

Initial comment: sample from a deposit within the truncated base of a furnace. Although collapsed and compacted it is unlikely to have been redeposited.

Objectives: to establish the date of the furnace. This may be supplemented by other radiocarbon dates from other furnaces on the platform, in order to extablish a date range of iron production on the platform.

Calibrated date: *1σ:* cal AD 120–230
2σ: cal AD 70–250

Final comment: see series comments

Laboratory comment: English Heritage (11 November 2013), the two measurements from context 26 (OxA-12604 and OxA-12605) are statistically consistent (T′=0.4; T′(5%)=3.8; ν =1, Ward and Wilson 1978) and thus both could be of the same age.

References: Ward and Wilson 1978

OxA–12605 1818 ±31 BP

$\delta^{13}C$: -24.6 ±0.2‰

Sample: context 24 sample 26 B, submitted in February 2003 by G Juleff

Material: charcoal: *Corylus* sp., single fragment (1.70g) (R Gale 2002)

Initial comment: as OxA-12604

Objectives: as OxA-12604

Calibrated date: *1σ:* cal AD 130–250
2σ: cal AD 120–330

Final comment: see series comments

Laboratory comment: see OxA-12604

OxA–12606 1883 ±31 BP

$\delta^{13}C$: -23.3 ±0.2‰

Sample: context 84 A, submitted in February 2003 by G Juleff

Material: charcoal: *Fraxinus excelsior* (R Gale 2002)

Initial comment: as OxA-12607

Objectives: as OxA-12607

Calibrated date: *1σ:* cal AD 70–140
2σ: cal AD 50–230

Final comment: see series comments

Laboratory comment: English Heritage (11 November 2013), the two measurements from context 84 (OxA-12606 and OxA-12607) are statistically consistent (T′=0.3; T′(5%)=3.8; ν=1, Ward and Wilson 1978) and thus both could be of the same age.

References: Ward and Wilson 1978

OxA–12607 1859 ±30 BP

$\delta^{13}C$: -24.3 ±0.2‰

Sample: context 84 B, submitted in February 2003 by G Juleff

Material: charcoal: *Fraxinus excelsior* (R Gale 2002)

Initial comment: context 84, despite its position on the downslope side of the slagheap, actually lies stratigraphically towards the top of the excavated sequence (it overlies context 110, which itself seals most of the slagheap). It consists largely of ore-finds - a by-product of ironworking, and must have been redeposited once to its posiiton. It is sandwiched between compacted surfaces and against context 09, which seems to be a revetting baulk of large pieces of furnace lining.

Objectives: to date the span of deposits in the slagheap. Context 84 lies at the top of the stratigraphic sequence, with the possibility of redeposition.

Calibrated date: *1σ:* cal AD 80–220
2σ: cal AD 70–240

Final comment: see series comments

Laboratory comment: see OxA-12606

Eye Kettleby, Leicestershire

Location: SK 732178
Lat. 52.45.09 N; Long. 00.54.55 W

Project manager: N Finn (University of Leicester Archaeological Services), 1996–7

Description: a multi-period site including Neolithic pits, early Bronze Age and middle Bronze Age burials, a late Bronze Age/Iron Age settlement and pit alignment, an Anglo-Saxon settlement, and a medieval village. Samples were submitted for dating from the following: a waterlogged sequence from the carr; the northern ring-ditch and burial 1717; the southern ring-ditch and associated features; the western

D-shaped enclosure, and the cremation burials. The cremation burials were split into the following groups: group 1, burials within the northern ring-ditch; group 2, burials outside the south-west quadrant of the northern ring-ditch; group 3, burials within the western D-shaped enclosure; group 4, burials within the southern ring-ditch; group 5, burials outside the north-west quadrant of the southern ring-ditch; group 6, burials outside the south-west quadrant of the southern ring-ditch; group 7, burials to the north of the western D-shaped enclosure; group 9, burials to the north of the eastern D-shaped enclosure; and group 9, miscellaneous unurned burials.

Objectives: to establish when the Bronze Age cemetery was in use, how long for, and whether this use was continuous or sporadic; to assess whether the urned and unurned cremations were of the same date; to establish whether stylistic distinctions in ceramic form were chronologically significant; to determine whether the cremations buried inside the northern ring-ditch were of a different date to those outside it; to investigate whether there was spatial development of the cemetery through time; and to indicate when the western D-shaped enclosure was in use.

Final comment: P Clay and N Finn (20 November 2012), Eye Kettleby is one of the largest excavated Bronze Age burial grounds in Britain, in use according to the radiocarbon modelling for between 220 and 400 years (Finn 2011, fig 51). The radiocarbon dates were of critical importance in providing the chronological sequence for the cremation cemetery and, combined with typological analysis of the urns, demonstrates evolving funerary practices throughout the Bronze Age.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2011), the pretreatment method used for the calcined bone samples was that described by Lanting *et al* (2001). The first set of measurements on the calcined bone samples was undertaken when this procedure was still in development and were given laboratory numbers beginning 'OxA-X-'. The scatter of results on replicate samples in this series was too great, and a second set of measurements (OxA-) was therefore undertaken. These latter results were regarded as accurate and were included in the model, unlike the OxA-X results. The OxA-X results, although reported in Appendix VI in the publication (Finn 2011), are not to be cited in the future and are considered unreliable.

Laboratory comment: English Heritage (2011), 16 cremation burials were dated, all of which have more than one radiocarbon measurement. Of these seven produced results that are statistically consistent. In the other nine cases, the measurements are not statistically consistent, suggesting that material of more than one age was present in the context.Chronological modelling of the results suggests that all of the burials in the main cemetery were interred between *1740–1610 cal BC (95% probability; 'start';* figure 49; Bayliss *et al* in Finn 2011) and *1410–1310 cal BC (95% probability; 'end';* figure 48). Burial in this tradition continued for a period of *220–400 years (95% probability; 'use'*; figure 51).Two distinct ceramic traditions were identified with the early to middle Bronze Age assemblage independently of the radiocarbon dating programme. The radiocarbon dates are in good agreement with the suggested relative chronology of this material (Aoverall=122.4%; Bronk Ramsey 1995). The model suggests that the early to middle Bronze Age ceramic phase began in *1700–1590 cal BC (95% probability; 'earlierMBAstart';* figures 48 and 52). The middle Bronze Age ceramic phase ended in *1420–1320 cal BC (95% probability; 'laterMBAend';* figures 48 and 52; Bayliss *et al* in Finn 2011). The boundary between these traditions is estimated to have occurred in *1570–1480 cal BC (95% probability; 'transition';* figures 48 and 52; Bayliss *et al* in Finn 2011).

References:	Bronk Ramsey 1995 Finn 2011 Lanting *et al* 2001

Eye Kettleby: unurned cremations, Leicestershire

Location:	SK 732178 Lat. 52.45.09 N; Long. 00.54.55 W
Project manager:	N Finn (University of Leicester Archaeological Services), 1996–7
Archival body:	Leicestershire County Council Museums

Description: this series of samples is from nine unurned cremation burials selected from the various spatial groups identified within the cremation cemetery.

Objectives: to establish whether the unurned cremation burials are contemporary with, earlier, or later than the urned cremation burials, the majority of which appear to be middle Bronze Age in date. The results will also assist in determining whether or not the various spatial groupings within the cemetery are chronologically distinctive.

Final comment: P Clay (20 November 2012), the radiocarbon dates were of critical importance in providing the chronological sequence for the cremation cemetery.

References:	Finn 2011 Ward and Wilson 1978

OxA–9719 3340 ±40 BP

$\delta^{13}C$: -25.5‰

Sample: 2544(A), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: this sample came from the lower fill of the burial pit, which contained all of the calcined bone from this feature. As an upper fill sealed the cremation deposit, there appears not to have been any post-depositional disturbance. The burial is situated just outside the northern ring-ditch (group 2), and has no stratigraphic relationships with any other features. A hole inside the pit was tentatively identified as a rodent burrow. *See* 2544(B) (OxA-9720) for a further measurement.

Objectives: whilst we can broadly date the urned burials to either the early or middle Bronze Age based on the form/fabric of the cremation urns, we currently have no idea what date the un-urned burials are. Dating this burial will permit comment on the contemporaneity or otherwise of the urned and un-urned burials within group 2, and will also assist in determining whether or not the various spatial groupings evident within the cemetery represent chronologically discreet episodes of burial.

Calibrated date: *1σ:* 1690–1560 cal BC
2σ: 1740–1510 cal BC

Final comment: P Clay (20 November 2012), this measurement has helped to phase the unurned burials.

Laboratory comment: English Heritage (2004), the two samples on charcoal fragments from cremation 2544, burial 2545, (OxA-9719 and OxA-10377) are statistically significantly different (T′=11.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Chronological modelling of the results suggests that burial 2545 dates to *1690–1520 cal BC (95% probability; '2545';* figure 49; Bayliss *et al* in Finn 2011), and confirms its middle Bronze Age date.

References: Ward and Wilson 1978

OxA–9721 3518 ±38 BP

$\delta^{13}C$: -24.0‰

Sample: 951(A), submitted in March 2000 by N Finn

Material: charcoal: *Quercus* sp., sapwood; single fragment (<5g) (R Gale 2000)

Initial comment: from an un-urned cremation burial situated within the western sub-rectangular enclosure (group 3). The burial has no stratigraphical relationship with any other feature. *See* 951(B) (OxA-9722) for a further measurement.

Objectives: to assist in determining the contemporaneity or otherwise of the urned and un-urned burials within group 3, and allow comparison with other spatial groups within the cemetery to establish whether these groups represent chronologically discreet burial episodes.

Calibrated date: *1σ:* 1900–1770 cal BC
2σ: 1950–1700 cal BC

Final comment: see OxA-9719

Laboratory comment: English Heritage (2000), the two samples on charcoal fragments from cremation 951, burial 988, (OxA-9721–2) are statistically significantly different at 95% confidence (T′=3.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978). This sample (951 A) represents material older than the date of the burial, and is therefore residual or represents recycled wood used as fuel for the cremation. This sample can only therefore be regarded as a *terminus post quem* for the burial. OxA-9722 represents the most reliable date for this burial. Modelling of the results suggests that burial 988 dates to *1710–1600 cal BC (85% probability; '988'; figure 49)* or *1590–1530 (5%;* Bayliss *et al* in Finn 2011), confirming its middle Bronze Age date (group 3).

References: Ward and Wilson 1978

OxA–9722 3410 ±39 BP

$\delta^{13}C$: -24.0‰

Sample: 951(B), submitted in March 2000 by N Finn

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 2000)

Initial comment: as OxA-9721

Objectives: as OxA-9721

Calibrated date: *1σ:* 1750–1660 cal BC
2σ: 1880–1620 cal BC

Final comment: see OxA-9719

Laboratory comment: see OxA-9721

OxA–9729 3279 ±36 BP

$\delta^{13}C$: -25.6‰

Sample: 2507(A), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (<5g) (R Gale 2000)

Initial comment: from the fill of an un-urned cremation burial, excavated in spits. The feature has no stratigraphic relationship with any other features on the site. The burial is located just to the south of the northern ring-ditch (group 2). *See* 2507(B), 2507(C), 2507(D), 2507(E), and 2507(F) (OxA-9730–4 respectively) for further measurements.

Objectives: to permit comment on the contemporaneity or otherwise of the urned (c/f 891) and un-urned (this context and 2544) burials within this particular spatial group (group 2), in addition to allowing comparison between the dating of burials within the various spatial groups identified on the site. Six separate fragments of charcoal from this burial were submitted for dating to assess the chronological homogeneity of the carbonised remains accompanying the cremation.

Calibrated date: *1σ:* 1620–1500 cal BC
2σ: 1640–1450 cal BC

Final comment: P Clay (20 November 2012), this burial helped to phase the urned and un-urned burials.

Laboratory comment: English Heritage (2004), the six samples on charcoal fragments from cremation 2507, burial 2508, (OxA-9729–34) are statistically significantly different (T′=15.5; T′(5%)=11.1; ν=5; Ward and Wilson 1978). Chronological modelling of the results suggests that burial 2508 dates to *1610–1490 cal BC (90% probability; '2508';* figure 49) *or 1480–1450 cal BC (5%;* Bayliss *et al* in Finn 2011), and confirms its middle Bronze Age date (group 2).

References: Ward and Wilson 1978

OxA–9730 3445 ±40 BP

$\delta^{13}C$: -26.0‰

Sample: 2507(B), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9729

Objectives: as OxA-9729

Calibrated date: *1σ:* 1870–1690 cal BC
2σ: 1890–1640 cal BC

Final comment: see OxA-9729

Laboratory comment: English Heritage (2004), *see* OxA-9729. This sample (2507 B) represents material older than the date of the burial, and is therefore residual or represents recycled wood used as fuel for the cremation. This sample can only therefore be regarded as a *terminus post quem* for the burial.

OxA–9731 3443 ±40 BP

$\delta^{13}C$: -25.6‰

Sample: 2507(C), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9729

Objectives: as OxA-9729

Calibrated date: *1σ:* 1870–1690 cal BC
2σ: 1890–1640 cal BC

Final comment: see OxA-9729

Laboratory comment: see OxA-9730

OxA–9732 3339 ±38 BP

$\delta^{13}C$: -25.4‰

Sample: 2507(D), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (<5g) (R Gale 2000)

Initial comment: as OxA-9729

Objectives: as OxA-9729

Calibrated date: *1σ:* 1690–1560 cal BC
2σ: 1740–1520 cal BC

Final comment: see OxA-9729

Laboratory comment: see OxA-9729

OxA–9733 3370 ±38 BP

$\delta^{13}C$: -25.2‰

Sample: 2507(E), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9729

Objectives: as OxA-9729

Calibrated date: *1σ:* 1740–1620 cal BC
2σ: 1750–1540 cal BC

Final comment: see OxA-9729

Laboratory comment: see OxA-9729

OxA–9734 3310 ±45 BP

$\delta^{13}C$: -26.5‰

Sample: 2507(F), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9729

Objectives: as OxA-9729

Calibrated date: *1σ:* 1640–1520 cal BC
2σ: 1730–1490 cal BC

Final comment: see OxA-9729

Laboratory comment: see OxA-9729

OxA–10377 3524 ±37 BP

$\delta^{13}C$: -25.3‰

Sample: 2544(B), submitted in March 2000 by N Finn

Material: charcoal: *Corylus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9719

Objectives: as OxA-9719

Calibrated date: *1σ:* 1910–1770 cal BC
2σ: 1950–1740 cal BC

Final comment: see OxA-9719

Laboratory comment: English Heritage (2004), *see* OxA-9719. This sample represents material older than the date of the burial, and is therefore residual or represents recycled wood used as fuel for the cremation. This sample can only therefore be regarded as a *terminus post quem* for the burial.

OxA–11324 2914 ±37 BP

$\delta^{13}C$: -24.6‰

Sample: A15.1996 808B, submitted on 8 February 2002 by N Finn

Material: charcoal: *Corylus* sp., single fragment (R Gale 2002)

Initial comment: this burial was assigned as spatial group 7. One of a fairly dispersed group of burials located close to the northern limit of excavation in the western half of the site. It was located *c* 1m west of a medieval field boundary which had probably suffered some truncation by medieval and/or modern ploughing. Burnt material was concentrated in the central part of the feature, perhaps indicating burial within an organic container, no trace of which remained.

Objectives: dating this sample will assist in determining the period of use of the cemetery. No burial from group 7 has so far been dated.

Calibrated date: *1σ:* 1200–1040 cal BC
2σ: 1230–1000 cal BC

Final comment: P Clay (20 November 2012), this sample helped to phase the urned and unurned burials.

Laboratory comment: English Heritage (2004), *see* OxA-11374. The two samples on charcoal fragments from cremation 808 (OxA-11324 and OxA-11374) are statistically significantly different at 95% confidence (T′=10.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978). This sample (808 B) represents material older than the date of the burial, and is therefore residual or represents recycled wood used as fuel for the cremation. This sample can only therefore be regarded as a *terminus post quem* for the burial.

References: Ward and Wilson 1978

OxA–11325 3570 ±40 BP

$\delta^{13}C$: -24.1‰

Sample: A15.1996 981A, submitted on 8 February 2002 by N Finn

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 2002)

Initial comment: assigned to spatial group 4. It was located to the centre of the southern ring-ditch and had no stratigraphic relationships with any other features, but was situated close to another similar burial [984] (983). Probably truncated by medieval activity and/or ploughing.

Objectives: in conjunction with the previous round of radiocarbon dates the present series of samples is intended to establish the period of use of the cemetery. These dates from unurned cremation burials will be compared with those from urned burials on the site. In order to determine whether the mode of deposition has any significance. Specifically this sample will provide a date for the use of the southern ring-ditch for burial.

Calibrated date: *1σ:* 1960–1880 cal BC
2σ: 2030–1770 cal BC

Final comment: P Clay (20 November 2012), this sample has helped to phase the burials - both urned and unurned.

Laboratory comment: English Heritage (2004), the two samples on charcoal fragments from cremation 981 (OxA-11325–6) are statistically consistent at 95% confidence (T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Chronological modelling suggests an estimated date of *2010–1770 cal BC (95% probability; '982';* figure 32; Bayliss *et al* in Finn 2011) for this deposit. This burial [982] from group 4 therefore belongs in the early Bronze Age period.

References: Ward and Wilson 1978

OxA–11326 3600 ±40 BP

$\delta^{13}C$: -25.5‰

Sample: A15.1996 981B, submitted on 8 February 2002 by N Finn

Material: charcoal: Pomoideae, single fragment (R Gale 2002)

Initial comment: as OxA-11325

Objectives: as OxA-11325

Calibrated date: *1σ:* 2030–1890 cal BC
2σ: 2120–1880 cal BC

Final comment: see OxA-11325

Laboratory comment: see OxA-11325

OxA–11327 3278 ±40 BP

$\delta^{13}C$: -23.4‰

Sample: A15.1996 969A, submitted on 8 February 2002 by N Finn

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 2002)

Initial comment: assigned to spatial group 6. It was located close to the southern boundary of the main excavation area. It had no stratigraphic relationships with any other features but was spatially close to an Anglo-Saxon fire-pit. It was probably truncated by medieval activity and/or modern ploughing.

Objectives: this sample will assist in determining the period of use of the cemetery and in particular to which episode of activity the group 6 cremations belong. A comparison of this sample with that from within the southern ring-ditch (group 4 - sample 981) should determine whether group 6 represents a later depositional episode. Dating this sample will also permit a meaningful comparison between the group 1/group 2 burials - within and without the northern ring-ditch, respectively and the group 4/ group 6 burials within and without the southern ring-ditch.

Calibrated date: *1σ:* 1620–1500 cal BC
2σ: 1650–1450 cal BC

Final comment: P Clay (20 November 2012), this sample has helped to phase both the urned and unurned burials.

Laboratory comment: English Heritage (2004), the two samples on charcoal fragments from cremation 969, burial 970, (OxA-11327–8 are statistically consistent at 95% confidence (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The radiocarbon modelling gave an estimated date of *1620–1450 cal BC (95% probability; '970';* figure 49; Bayliss *et al* in Finn 2011), confirming its middle Bronze Age date (group 6).

References: Ward and Wilson 1978

OxA–11328 3295 ±40 BP

$\delta^{13}C$: -23.2‰

Sample: A15.1996 969B, submitted on 8 February 2002 by N Finn

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 2002)

Initial comment: as OxA-11327

Objectives: as OxA-11327

Calibrated date: *1σ:* 1630–1500 cal BC
2σ: 1690–1460 cal BC

Final comment: see OxA-11327

Laboratory comment: see OxA-11327

OxA–11329 3302 ±40 BP

$\delta^{13}C$: -25.5‰

Sample: A15.1996 2667A, submitted on 8 February 2002 by N Finn

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 2002)

Initial comment: assigned to spatial group 1. One of a number of burials located within the northern ring-ditch. Calcined bone was visible on the stripped surface indicating some degree of post-depositional truncation. Located within the area of layer 1711. A clay/silt/sand deposit filled a slight hollow in the ground, but no stratigraphic relationship between the layer and burial was recorded.

Objectives: in conjunction with a previous round of dates, this series of samples is intended to establish the period of use of the cemetery. Comparison with other dated samples from within the northern ring-ditch will assist in determining whether the mode of deposition, either with an urn or without, has any temporal significance.

Calibrated date: *1σ:* 1630–1520 cal BC
2σ: 1690–1490 cal BC

Final comment: P Clay (20 November 2012), this measurement has helped to phase the urned and unurned burials.

Laboratory comment: English Heritage (2004), the two samples on charcoal fragments from cremation 2667, burial 2668, (OxA-11329 and OxA-11375) are statistically significantly different at 95% confidence (T′=6.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978). This sample (2667 A) represents material older than the date of the burial, and is therefore residual or represents recycled wood used as fuel for the cremation. This sample can only therefore be regarded as a *terminus post quem* for the burial, and OxA-11375 represents the most reliable date for this burial.Chronological modelling suggests that burial 2668 dates to *1510–1380 cal BC (95% probability; '2668';* figure 49; Bayliss *et al* in Finn 2011), and confirms its middle Bronze Age date (group 1).

References: Ward and Wilson 1978

OxA–11374 2747 ±35 BP

δ^{13}C: -24.8‰

Sample: A15.1996 808A, submitted on 8 February 2002 by N Finn

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2002)

Initial comment: as OxA-11324

Objectives: as OxA-11324

Calibrated date: *1σ:* 930–830 cal BC
2σ: 980–810 cal BC

Final comment: P Clay and N Finn (20 November 2012), this measurement assisted phasing of the burials to take place. It is also consistent with the ceramic dating.

Laboratory comment: English Heritage (2011), a model that includes burial [809] as part of the early to middle Bronze Age cemetery has poor agreement (OxA-11374; A=14.9%; Bronk Ramsey 1995). It was interred in *980–810 cal BC (95% probability; '809';* figure 50; Bayliss *et al* in Finn 2011), indicating that the burials in group 7 on the northern edge of the excavation area represent a different phase of burial, attributable to the late Bronze Age. There was a gap of *380–570 years (95% probability; 'middle-late Bronze Age gap';* figure 55) between the final burial in the middle Bronze Age and this interment.

References: Bronk Ramsey 1995

OxA–11375 3159 ±37 BP

δ^{13}C: -27.5‰

Sample: A15.1996 2667B, submitted on 8 February 2002 by N Finn

Material: charcoal: bark (R Gale 2002)

Initial comment: as OxA-11329

Objectives: as OxA-11329

Calibrated date: *1σ:* 1500–1410 cal BC
2σ: 1510–1310 cal BC

Final comment: see OxA-11329

Laboratory comment: see OxA-11329

OxA–11488 3104 ±38 BP

δ^{13}C: -26.7‰

Sample: A15.1996 1482/1483A, submitted on 14 March 2002 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2002)

Initial comment: assigned to spatial group 1, and located in the southern half of the northern ring-ditch. No stratigraphic relationships with any other features were present. It was located *c* 1m south of burial 1489, which has probably suffered some degree of horizontal truncation as a result of medieval activity and/or modern ploughing.

Objectives: in conjunction with the previous round of dates the present series of samples is intended to establish the period of use of the cemetery. These dates, from unurned cremation burials will be compared with the dates from urned burials on the site in order to determine whether or not the mode of burial - within an urn or unurned - has any temporal significance. Where stratigraphic relationships exist between urned and unurned burials in this group, the urned burials are consistently later. Dating this burial will assist in producing an absolute time frame.

Calibrated date: *1σ:* 1430–1300 cal BC
2σ: 1450–1260 cal BC

Final comment: P Clay (20 November 2012), this sample has helped to phase the urned and unurned burials.

Laboratory comment: English Heritage (2004), the two samples on charcoal fragments from cremation 1482, burial 1483, (OxA-11488–9) are statistically consistent at 95% confidence (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Modelling of these results along with the other radiocarbon dates on burials from group 1 (northern ring-ditch) suggest that burial [1483] dates to *1430–1330 cal BC (95% probability; '1483';* figure 49; Bayliss *et al* in Finn 2011), confirming its middle Bronze Age date (group 1).

References: Ward and Wilson 1978

OxA–11489 3085 ±40 BP

δ^{13}C: -26.1‰

Sample: A15.1996 1482/1483B, submitted on 14 March 2002 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2002)

Initial comment: as OxA-11488

Objectives: as OxA-11488

Calibrated date: *1σ:* 1420–1280 cal BC
2σ: 1440–1230 cal BC

Final comment: see OxA-11488

Laboratory comment: see OxA-11488

Eye Kettleby: urned cremations, Leicestershire

Location: SK 732178
Lat. 52.45.09 N; Long. 00.54.55 W

Project manager: N Finn (University of Leicester Archaeological Services), 1996–7

Archival body: Leicestershire County Council Museums

Description: this series consists of samples from two cremation burials identified as early Bronze Age in date, based on urn style, and samples from six middle Bronze Age urned cremations (based on urn styles and fabrics). Eight replicate samples of calcined human bone were also undertaken on the six urned cremations, each also dated by two charred plant macrofossils.

Objectives: to determine the date of the early Bronze Age cremation cemetery, which subsequently became the focus of a middle Bronze Age flat cremation cemetery. Also to establish the date range for the middle Bronze Age cemetery and to determine whether the spatial groupings identified within the cemetery represent chronologically distinguishable episodes of burial. The replicate samples will demonstrate the accuracy of the novel approach to the dating of calcined bone proposed by Lanting and Brindley (1998) and Lanting *et al* (2001).

Final comment: P Clay (20 November 2012), the results allowed chronological modelling of the urned and unurned cremations.

Laboratory comment: English Heritage (2011), the results obtained from burial [982] and [1717] suggest that if the construction of the ring-ditches was contemporary with the date of these centrally placed burials, then the two ring-ditches may have been precisely contemporary and part of the same funerary rite, as the four measurements from these two burials are statistically indistinguishable (OxA-9712–3 and OxA-11325–6; T′=6.9; T′(5%)=7.8; ν=3; Ward and Wilson 1978).

References: Finn 2011
Lanting *et al* 2001
Lanting and Brindley 1998
Ward and Wilson 1978

OxA–9669 3090 ±60 BP

$\delta^{13}C$: -25.1‰

Sample: 1689(B), submitted in March 2000 by N Finn

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 2000)

Initial comment: from within a cremation urn situated within the northern ring-ditch (group 1). The burial was cut into an earlier cremation, related feature 1693. The material selected for sampling is not likely to be residual, deriving from the earlier feature into which this burial was cut, because the charcoal was extracted from the fill of the urn. The precise stratigraphic relationship between this burial and layer 1711 is not certain. *See* 1689(A) (OxA-9735) for a further measurement.

Objectives: to assist in establishing the period of use of the middle Bronze Age cemetery, in addition to determining whether the various spatial groupings evident within the cemetery have any chronological significance. The dating will also permit comparison between cremations exhibiting varying burial practices such as urned burials which are upright/inverted/on their side; un-urned burials; and burials of small quantities of bone with urn fragments. Absolute dating will assist in the analysis of prehistoric pottery forms/fabrics.

Calibrated date: *1σ:* 1430–1260 cal BC
2σ: 1500–1200 cal BC

Final comment: P Clay (20 November 2012), the measurement helped to phase the urned and unurned burials.

Laboratory comment: English Heritage (2004), the two samples on charcoal fragments from cremation 1689 (OxA-9669 and OxA-9735) are statistically consistent at 95% confidence (T′=3.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Modelling of the results indicates that burial 1690 dates to *1490–1340 cal BC (95% probability; '1690';* figure 48; Bayliss *et al* in Finn 2011), confirming it belongs in the later phase of the middle Bronze Age cremations (group 1).

References: Ward and Wilson 1978

OxA–9710 3300 ±39 BP

$\delta^{13}C$: -25.6‰

Sample: 332 (A), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: from an isolated cremation burial having no stratigraphic relationships with any other features. The base of the inverted urn was sliced off by machine bucket as the site was stripped, although the contents of the urn were not disturbed. The urn was otherwise complete and undisturbed in the ground, and was excavated immediately, precluding the possibility of any contamination. *See* 332(B) (OxA-9711 and OxA-10376) for further measurements from this burial.

Objectives: this burial was one of a small number of early Bronze Age burials (based on urn style) identified on the site, which pre-date the majority of the other cremation burials, which appear to be middle Bronze Age in date (again based on urn style). Dating will serve to establish the date of the early Bronze Age cemetery (possibly a series of barrows) which subsequently became the focus of the middle Bronze Age flat cemetery. The urn containing the cremated remains is also intrinsically interesting and warrants dating for the contribution this will make to the study of the prehistoric pottery from the site.

Calibrated date: *1σ:* 1630–1510 cal BC
2σ: 1690–1490 cal BC

Final comment: P Clay (20 November 2012), this measurement helped to refine the phasing of the urned and unurned burials.

Laboratory comment: English Heritage (2000), the two samples on charcoal fragments from urned cremation 332 (OxA-9710 and OxA-9711/OxA-10376) are statistically significantly different (T′=7.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Radiocarbon modelling gave an estimated date for the burial of *1610–1500 cal BC (95% probability; '331';* figure 48; Bayliss *et al* in Finn 2011), placing it in the earlier phase of the middle Bronze Age cremations (group 8).

References: Ward and Wilson 1978

OxA–9711 3480 ±40 BP

$\delta^{13}C$: -23.3‰

Sample: 332(B), submitted in March 2000 by N Finn

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 2000)

Initial comment: as OxA-9710

Objectives: as OxA-9710

Calibrated date: *1σ:* 1890–1700 cal BC
2σ: 1920–1680 cal BC

Final comment: see OxA-9710

Laboratory comment: English Heritage, the two samples on charcoal fragments from urned cremation 332 (OxA-9710 and OxA-9711/OxA-10376) are statistically significantly different (T′=7.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978). OxA-9711 and OxA-10376 are, however, statistically consistent (T′=0.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and provide a weighted mean of 3462 ±27 BP, which calibrates to 1890–1690 cal BC (at 95% confidence; Reimer *et al* 2004). This sample represents material older than the date of the burial, and is therefore residual or represents recycled wood used as fuel for the cremation. This sample can only therefore be regarded as a *terminus post quem* for the burial. *See* also OxA-9710.

References: Ward and Wilson 1978

OxA–9712 3680 ±38 BP

$\delta^{13}C$: -24.7‰

Sample: 1716(A), submitted in March 2000 by N Finn

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 2000)

Initial comment: situated in the centre of the northern ring-ditch, and possibly the primary burial associated with it. It has no direct stratigraphic relationships with any other features, although an ?Anglo-Saxon gully/ditch was very close by. This feature is not an urned cremation burial, but a burial deposit containing a small quantity of bone, fragments of a highly decorated vessel (possibly a small Collared Urn, or a Food Vessel), and some charcoal. The urn was broken prior to burial, indicated by the fact that some sherds were burnt (post-firing) but others joining sherds were not. The small quantity of bone contained within the fill and the incomplete state of the urn are not considered to be the result of post-depositional truncation, although some horizontal truncation by ploughing in the medieval or later period has occurred. *See* 1716(B) (OxA-9713) for a further measurement.

Objectives: dating this feature will serve to determine the date of the early Bronze Age monument (possibly a disc barrow) which later became the focus of the middle Bronze Age cemetery.

Calibrated date: *1σ:* 2140–1980 cal BC
2σ: 2200–1940 cal BC

Final comment: P Clay (20 November 2012), this measurement assisted in the phasing of the urned and unurned burials.

Laboratory comment: English Heritage (2004), the two fragments of charcoal from cremation 1716 (OxA-9712–3) produced measurements which are statistically consistent at 95% confidence (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Chronological modelling yielded a posterior density estimate of *2140–1940 cal BC (95% probability; '1717';* figure 32) for the burial deposit; Bayliss *et al* in Finn 2011). This burial in group 4 therefore belongs to the early Bronze Age period.

References: Ward and Wilson 1978

OxA–9713 3700 ±45 BP

$\delta^{13}C$: -24.5‰

Sample: 1716(B), submitted in March 2000 by N Finn

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 2000)

Initial comment: as OxA-9712

Objectives: as OxA-9712

Calibrated date: *1σ:* 2200–2020 cal BC
2σ: 2210–1950 cal BC

Final comment: see OxA-9712

Laboratory comment: see OxA-9712

OxA–9714 3243 ±37 BP

$\delta^{13}C$: -26.2‰

Sample: 934(A), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: one of a tight group of three cremation burials situated just outside the north-west quarter of the southern ring-ditch, between that and the adjacent rectangular ditched enclosure. It has no stratigraphic relationships with any other features. The upper body and rim of the urn, within which the burial was deposited, had been truncated by subsequent ploughing, possibly in the medieval period or more recently. The charcoal was recovered from within the urn. *See* 934(B) (OxA-9715) for a further measurement.

Objectives: the middle Bronze Age cremation cemetery includes several discrete groups of burials. Dating will serve to determine whether these spatial groups are chronologically distinctive or not. This burial is one of a small group (group 5) situated immediately outside the southern ring-ditch. Dating will also facilitate direct comparison between differing burial practices (urned/un-urned) from which it should be possible to determine whether this variation occurred as a function of time.

Calibrated date: *1σ:* 1600–1450 cal BC
2σ: 1620–1430 cal BC

Final comment: see OxA-9712

Laboratory comment: English Heritage (2004), the two fragments of charcoal from cremation 934, burial 932, (OxA-9714–5) produced measurements which are statistically consistent at 95% confidence (T′=0.3;

T′(5%)=3.8; ν=1; Ward and Wilson 1978). Chronological modelling indicates that burial 932 dates to *1510–1410 cal BC (95% probability; '932';* figure 48; Bayliss *et al* in Finn 2011), and confirms it belongs in the later phase of the middle Bronze Age cremations (group 5).

References: Ward and Wilson 1978

OxA–9715 3216 ±39 BP

δ¹³C: -26.2‰

Sample: 934(B), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9714

Objectives: as OxA-9714

Calibrated date: *1σ:* 1520–1430 cal BC
2σ: 1610–1410 cal BC

Final comment: see OxA-9712

Laboratory comment: see OxA-9714

OxA–9716 3144 ±40 BP

δ¹³C: -26.6‰

Sample: 891(A), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: from a cremation burial situated just to the west of the northern ring-ditch. Urn fragments were recovered from the fill of the feature, but this does not seem to have been an un-urned burial as such - in this respect it is similar to 1716 (OxA-9712–3): urn fragments, a small quantity of bone, and a relatively large amount of charcoal. The urn fragments in 891 (this sample and OxA-9717) are of middle Bronze Age type. The feature had no stratigraphic relationships with any other features but had suffered some degree of horizontal truncation as a result of ploughing in the medieval period or later. The small quantity of bone present and the incomplete state of the urn are not considered to have been the result of post-depositional truncation. *See* 891(B) (OxA-9717) for a further measurement.

Objectives: to determine whether the burials outside the northern ring-ditch (group 2) are of a different date than those middle Bronze Age burials deposited within that ring-ditch. In addition, it may be possible to determine, by comparison with other dated features, whether or not differing burial practices (eg urned; unurned; small quantity of bone deposited with urn fragments) are chronologically distinguishable.

Calibrated date: *1σ:* 1450–1390 cal BC
2σ: 1500–1300 cal BC

Final comment: see OxA-9712

Laboratory comment: English Heritage (2004), the two fragments of charcoal from cremation 891, burial 928, (OxA-9716–7) produced measurements which are statistically consistent at 95% confidence (T′=1.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Modelling of the radiocarbon dates indicates that burial 928 dates to *1490–1370 cal BC (95% probability; '928'*; figure 48; Bayliss *et al* in Finn 2011), and confirms it belongs to the later phase of middle Bronze Age cremations (group 2).

References: Ward and Wilson 1978

OxA–9717 3215 ±40 BP

δ¹³C: -26.0‰

Sample: 891(B), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9716

Objectives: as OxA-9716

Calibrated date: *1σ:* 1520–1430 cal BC
2σ: 1610–1410 cal BC

Final comment: see OxA-9712

Laboratory comment: see OxA-9716

OxA–9718 3327 ±38 BP

δ¹³C: -24.7‰

Sample: 974(A), submitted in March 2000 by N Finn

Material: charcoal: *Corylus* sp., single fragment (R Gale 2000)

Initial comment: one of a group of burials (group 3) situated inside the western sub-rectangular enclosure, adjacent to the ring-ditch, which seems to have been the focus of the middle Bronze Age cemetery. The urn containing the cremated remains had been laid on its side - only three burials on the side were deposited in this way and all were in group 3. The burial was truncated by an Anglo-Saxon ditch, which maybe a potential contaminant. *See* 974(B) OxA-9743 for a further measurement.

Objectives: to determine whether the spatial group 3 represents a chronologically distinctive episode of burial within the cemetery. The occurrence, exclusively, in this part of the site, of burials deposited in urns laid on their side indicates a distinctive burial practice associated with this group. In addition, an absolute date for this burial will contribute towards the analysis of the burial urns.

Calibrated date: *1σ:* 1660–1530 cal BC
2σ: 1740–1500 cal BC

Final comment: see OxA-9712

Laboratory comment: English Heritage (2004), the two fragments of charcoal from cremation 974 (OxA-9718 and OxA-9743) produced measurements which are statistically consistent at 95% confidence (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The result confirms the burial [992] belongs in the earlier phase of the middle Bronze (group 3) and the chronological modelling indicates the burial dates to *1610–1500 cal BC (95% probability; '992'*; figure 48; Bayliss *et al* in Fin 2011).

References: Ward and Wilson 1978

OxA–9723 3299 ±39 BP

$\delta^{13}C$: -25.1‰

Sample: 967(A), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: one of a small group of burials (group 5) situated just outside the north-west quarter of the southern ring-ditch. The edge of this feature was very slightly truncated by cremation burial cut 1003. The charcoal sample was recovered from within the burial urn and is not likely to have been contaminated by the later burial.

Objectives: to assist in establishing the period of use of the middle Bronze Age cemetery and also in determining whether the various spatial groupings have any chronological significance. Comparison of dates between cremations exhibiting different burial practices will serve to test whether or not these variations occurred as a function of time. Absolute dating of this feature will also assist in the analysis of burial urn forms/fabrics.

Calibrated date: *1σ:* 1630–1510 cal BC
2σ: 1690–1490 cal BC

Final comment: see OxA-9712

Laboratory comment: English Heritage (2004), the six results on separate charcoal fragments from urned cremation 967, burial 965, (OxA-9723–8, and replicates OxA-10378–9 and OxA-10478) are statistically significantly different (T′=63.5; T′(5%)=11.1; ν=5; Ward and Wilson 1978). The material appears to be of two different actual ages, reinforcing the argument for dating single-entity samples (Ashmore 1999). This sample represents material older than the date of the burial, and is therefore residual or represents recycled wood used as fuel for the cremation. It is also statistically consistent with replicate sample OxA-10378; T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978), the weighted mean (3293 ±27 BP) of which calibrates to 1640–1490 cal BC (Reimer *et al* 2004). These two samples can only therefore be regarded as a *terminus post quos* for the burial. Modelling of the radiocarbon dates suggests that burial 965 dates to *1420–1320 cal BC (95% probability; '965';* figure 48; Bayliss *et al* in Finn 2011), and indicates the burial belongs in the later phase of the middle Bronze Age cremations (group 5).

References: Ashmore 1999
Reimer *et al* 2004
Ward and Wilson 1978

OxA–9724 3300 ±40 BP

$\delta^{13}C$: -25.2‰

Sample: 967(B), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9723. A replicate of OxA-10379.

Objectives: as OxA-9723

Calibrated date: *1σ:* 1630–1510 cal BC
2σ: 1690–1490 cal BC

Final comment: see OxA-9712

Laboratory comment: English Heritage (2011), *see* OxA-9723. OxA-9724 and OxA-10379 (its replicate) are statistically consistent (T′=1.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and a weighted mean of the two results (3334 ±27 BP) calibrates to 1690–1520 cal BC (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–9725 3092 ±39 BP

$\delta^{13}C$: -25.6‰

Sample: 967(C), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9723

Objectives: as OxA-9723

Calibrated date: *1σ:* 1420–1290 cal BC
2σ: 1440–1230 cal BC

Final comment: see OxA-9712

Laboratory comment: see OxA-9723

OxA–9726 3096 ±38 BP

$\delta^{13}C$: -27.4‰

Sample: 0967(D), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9723

Objectives: as OxA-9723

Calibrated date: *1σ:* 1420–1290 cal BC
2σ: 1440–1260 cal BC

Final comment: see OxA-9712

Laboratory comment: see OxA-9723

OxA–9727 3080 ±38 BP

$\delta^{13}C$: -25.9‰

Sample: 967(E), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9723

Objectives: as OxA-9723

Calibrated date: *1σ:* 1420–1280 cal BC
2σ: 1440–1220 cal BC

Final comment: see OxA-9712

Laboratory comment: see OxA-9723

OxA–9728 3193 ±39 BP

$\delta^{13}C$: -24.9‰

Sample: 967(F), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9723

Objectives: as OxA-9723

Calibrated date: *1σ:* 1510–1420 cal BC
2σ: 1530–1400 cal BC

Final comment: see OxA-9712

Laboratory comment: English Heritage (2004), *see* OxA-9723. OxA-9728 and OxA-10478 (its replicate) are statistically consistent (T′=2.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and a weighted mean of the two results (3155 ±31 BP) calibrates to 1500–1380 cal BC (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–9735 3225 ±40 BP

$\delta^{13}C$: -25.9‰

Sample: 1689(A), submitted in March 2000 by N Finn

Material: charcoal: *Quercus* sp., twig; single fragment (R Gale 2000)

Initial comment: as OxA-9669

Objectives: as OxA-9669

Calibrated date: *1σ:* 1530–1440 cal BC
2σ: 1620–1410 cal BC

Final comment: see OxA-9669

Laboratory comment: see OxA-9669

OxA–9743 3315 ±65 BP

$\delta^{13}C$: -24.1‰

Sample: 974(B), submitted in March 2000 by N Finn

Material: charcoal: *Corylus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9718

Objectives: as OxA-9718

Calibrated date: *1σ:* 1690–1500 cal BC
2σ: 1750–1440 cal BC

Final comment: see OxA-9712

Laboratory comment: see OxA-9718

OxA–9744 1520 ±55 BP

$\delta^{13}C$: -25.8‰

Sample: 980(A), submitted in March 2000 by N Finn

Material: charcoal: *Prunus* sp., single fragment (R Gale 2000)

Initial comment: one of a group of burials (group 3) situated inside the western sub-rectangular enclosure, adjacent to the ring-ditch, which seems to have been the focus of the middle Bronze Age cemetery. This burial had no stratigraphic relationships with any other features but was quite badly truncated by ploughing, probably in the medieval period or more recently. *See* 980(B) (OxA-9745) for a further measurement.

Objectives: to determine whether spatial group 3 represents a chronologically distinctive episode of burial activity within the middle Bronze Age cemetery; and in addition to provide an absolute date for the burial urn which will contribute towards the analysis of the prehistoric ceramics from the site.

Calibrated date: *1σ:* cal AD 430–610
2σ: cal AD 410–650

Final comment: N Finn (2011), this radiocarbon date provides an Anglo-Saxon date for the charcoal, thought to derive from the ditch that cut the burial.

Laboratory comment: English Heritage (2000), the two samples on charcoal fragments from cremation 980, burial 1034 (OxA-9744–5) are statistically consistent at 95% confidence (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). These results provide an early Anglo-Saxon date, and are believed to be intrusive (*see* OxA-12692). Modelling of the radiocarbon dates indicates that this burial actually dates to *1670–1520 cal BC (95% probability;* figure 48; Bayliss *et al* in Finn 2011). This places the burial in the earlier phase of the middle Bronze Age cremations (group 3).

References: Ward and Wilson 1978

OxA–9745 1505 ±55 BP

$\delta^{13}C$: -25.3‰

Sample: 980(B), submitted in March 2000 by N Finn

Material: charcoal: *Prunus* sp., single fragment (R Gale 2000)

Initial comment: as OxA-9744

Objectives: as OxA-9744

Calibrated date: *1σ:* cal AD 430–620
2σ: cal AD 410–660

Final comment: see OxA-9744

Laboratory comment: see OxA-9744 and OxA-12692

OxA–10376 3447 ±37 BP

$\delta^{13}C$: -24.3‰

Sample: 332(B), submitted in March 2000 by N Finn

Material: charcoal: *Quercus* sp., sapwood; single fragment (<5g) (R Gale 2000)

Initial comment: a replicate of OxA-9711 on the same fragment of charcoal.

Objectives: part of the internal quality assurance procedures undertaken routinely by the Oxford Radiocarbon Accelerator Unit.

Calibrated date: *1σ:* 1870–1690 cal BC
2σ: 1890–1660 cal BC

Final comment: see OxA-9710

Laboratory comment: see OxA-9711

OxA–10378 3287 ±38 BP

$\delta^{13}C$: -25.3‰

Sample: 967(A), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (<5g) (R Gale 2000)

Initial comment: a replicate of OxA-9723 on the same fragment of charcoal.

Objectives: as OxA-10376

Calibrated date: *1σ:* 1620–1500 cal BC
2σ: 1660–1450 cal BC

Final comment: see OxA-9712

Laboratory comment: see OxA-9723

OxA–10379 3362 ±37 BP

$\delta^{13}C$: -26.1‰

Sample: 967(B), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: a replicate on the same fragment of charcoal as OxA-9724.

Objectives: as OxA-10376

Calibrated date: *1σ:* 1700–1610 cal BC
2σ: 1750–1530 cal BC

Final comment: see OxA-9712

Laboratory comment: see OxA-9724

OxA–10478 3090 ±50 BP

$\delta^{13}C$: -25.4‰

Sample: 967(F), submitted in March 2000 by N Finn

Material: charcoal: *Alnus* sp., single fragment (R Gale 2000)

Initial comment: a replicate on the same fragment of charcoal as OxA-9728.

Objectives: as OxA-10376

Calibrated date: *1σ:* 1420–1280 cal BC
2σ: 1490–1210 cal BC

Final comment: see OxA-9712

Laboratory comment: see OxA-9728

OxA–12689 3267 ±33 BP

$\delta^{13}C$: -22.3‰

Sample: 332C, submitted in September 2000 by A Bayliss

Material: calcined human bone (long bone fragments of mature adult female) (A Bayliss 2000)

Initial comment: an isolated cremation burial having no stratigraphical relationships with any other features. The base of the inverted urn was sliced off by machine bucket as the site was stripped, although the contents of the urn were not disturbed. The urn was otherwise complete and undisturbed in the ground.

Objectives: the burial is one of a small number of early Bronze Age burials (based on urn style) identified on the site. It pre-dates the majority of the other cremation burials which appear to be middle Bronze Age in date (again based on urn style). Dating will serve to establish the date of the early Bronze Age cemetery (possibly a series of barrows) which subsequently became the focus of the middle Bronze Age flat cemetery. The urn containing the cremated remains is also intrinsically interesting and warrants dating for the contribution this will make to the study of the prehistoric pottery from the site.

Calibrated date: *1σ:* 1610–1500 cal BC
2σ: 1630–1450 cal BC

Final comment: see OxA-9710

Laboratory comment: English Heritage (7 November 2005), the results from the two samples of calcined bone from cremation 332 (OxA-12689 and OxA-12690) are statistically consistent at 95% confidence (T'=0.0; T'(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean of these results is 3264 ±23 BP, which calibrates to 1620–1460 cal BC (at 2σ; Reimer *et al* 2004). *See* also OxA-9710.

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–12690 3260 ±33 BP

$\delta^{13}C$: -22.1‰

Sample: 332D, submitted in September 2000 by A Bayliss

Material: calcined human bone (long bone fragments of mature adult female) (A Bayliss 2000)

Initial comment: a replicate of OxA-12689.

Objectives: as OxA-12689

Calibrated date: *1σ:* 1610–1490 cal BC
2σ: 1630–1440 cal BC

Final comment: see OxA-9710

Laboratory comment: see OxA-12689 and OxA-9710

OxA–12691 3212 ±32 BP

$\delta^{13}C$: -25.4‰

Sample: 974D, submitted in September 2000 by A Bayliss

Material: calcined human bone (long bone fragments of possible adult male) (A Bayliss 2000)

Initial comment: this was one of a group of burials (group 3), situated inside the western sub-rectangular enclosure, adjacent to the ring-ditch which seems to have been the focus of the middle Bronze Age cemetery. The urn containing the cremated remains had been laid on its side - only three burials on the site were deposited in this way and were in group 3. The burial was truncated by an Anglo-Saxon ditch.

Objectives: to determine whether the spatial group 3 represents a chronologically distinctive episode of burial within the cemetery. The occurrence, exclusively, in this part of the site, of burials deposited in urns laid on their side indicates a distinctive burial practise associated with this group. In addition an absolute date for this burial will contribute towards the analysis of the burial urns.

Calibrated date: *1σ:* 1510–1430 cal BC
2σ: 1600–1410 cal BC

Final comment: see OxA-9712

Laboratory comment: English Heritage (7 November 2005), the results from the two samples of calcined bone from cremation 992 (OxA-12691 and OxA-12732) are statistically inconsistent at 95% confidence (T′=8.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978). As OxA-12732 is almost identical to the determinations on the two fragments of charcoal from this burial (OxA-9718 and OxA-9743), OxA-12691 is therefore thought to be a statistical outlier, and the two charcoal fragments are not regarded as residual in this case. Modelling of the radiocarbon measurements indicates burial 992 dates to *1610–1500 cal BC (95% probability; '992'*; figure 48; Bayliss *et al* in Finn 2011), and belongs in the earlier phase of the middle Bronze Age cremations (group 3).

References: Ward and Wilson 1978

OxA–12692 3296 ±32 BP

$\delta^{13}C$: -25.8‰

Sample: 980C, submitted in September 2000 by A Bayliss

Material: calcined human bone (long bone fragments from a mature adult ?male) (A Bayliss 2000)

Initial comment: one of a group of burials (group 3) situated inside the western sub-rectangular enclosure, adjacent to the ring-ditch which seems to have been the focus of the middle Bronze Age cemetery. This burial had no stratigraphical relationships with any other features, but was quite badly truncated by ploughing, possibly in the medieval period or more recently.

Objectives: dating will serve to determine whether the spatial group 3 represents a chronologically distinctive episode of burial activity within the middle Bronze Age cemetery. In addition providing an absolute date for the burial urn will contribute towards analysis of the prehistoric ceramics from the site.

Calibrated date: *1σ:* 1630–1520 cal BC
2σ: 1660–1500 cal BC

Final comment: N Finn (2011), this result in conjunction with OxA-12693 provides a date for burial 1034 (group 3), and belongs to the earlier phase of the middle Bronze Age cremations.

Laboratory comment: Luminescence Dating Laboratory, University of Oxford (September 2002): OxL-1324 produced a result on the urn of 1630 BC ±470 (Field code and location: A15 1996 980; Lab code X990; Depth: 0.3m; De (Gy)=9.84 ±0.51; Dose rate (mGy/a): 2.71 ±0.32).

Laboratory comment: English Heritage (7 November 2005), the results from the two calcined bone samples from burial 1034 (OxA-12692 and OxA-12693) are statistically consistent at 95% confidence (T′=1.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978). A weighted mean (3327 ±23 BP) of these two results calibrates to 1690–1520 cal BC (2σ; Reimer *et al* 2004). The two charcoal samples from this burial [(1034; OxA-9744–5) are statistically consistent with each other but of a completely different age (Anglo-Saxon) to the early to middle Bronze Age urn with which they were found. An OSL date (OxL-1324) was also undertaken on the urn and confirmed a prehistoric date. The charcoal would therefore seem to be intrusive, derived from an Anglo-Saxon ditch [1031], which truncated the burial. Modelling of the radiocarbon dates suggests that burial [1034] dates to *1670–1520 cal BC (95% probability; '1034';* figure 48; Bayliss *et al* in Finn 2011).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–12693 3357 ±32 BP

$\delta^{13}C$: -22.4‰

Sample: 980D, submitted in September 2000 by A Bayliss

Material: calcined human bone (long bone fragments from mature adult ?male) (A Bayliss 2000)

Initial comment: a replicate of OxA-12692.

Objectives: as OxA-12692

Calibrated date: *1σ:* 1690–1610 cal BC
2σ: 1740–1530 cal BC

Final comment: see OxA-12692

Laboratory comment: see OxA-12692 and OxA-9744

OxA–12694 3187 ±30 BP

$\delta^{13}C$: -26.3‰

Sample: 1689C, submitted in September 2000 by A Bayliss

Material: calcined human bone (long bone fragments from adult ?male) (A Bayliss 2000)

Initial comment: situated within northern ring-ditch (group 1), the sample was from within the cremation urn. The burial was cut into the earlier cremation related feature 1693. The material selected for sampling is not likely to be residual, deriving from the earlier feature into which this burial was cut, because the charcoal was extracted from the fill of the urn. The precise stratigraphic relationship between this burial and layer 1711 was not certain. The upper part of the feature, including the rim of the urn, was truncated by ploughing of medieval or later date.

Objectives: dating will assist establishing the period of use of the middle Bronze Age cemetery, in addition to determining whether the various spatial groupings evident within the cemetery have any chronological significance. Dating will also permit comparison between cremations exhibiting varying burial practises, such as urned burials which are upright/inverted/on their side; un-urned burial; and burials of small quantities of bone with urn fragments. Absolute dating will assist in the analysis of prehistoric pottery forms and fabrics.

Calibrated date: *1σ:* 1500–1420 cal BC
2σ: 1510–1410 cal BC

Final comment: see OxA-9712

Laboratory comment: English Heritage (7 November 2005), the results from the two samples from cremation 1690 (OxA-12694 and OxA-12695) are statistically consistent at 95% confidence (T′=1.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean of these results is 3210 ±21 BP, which calibrates to 1520–1430 cal BC (Reimer *et al* 2004). *See* also OxA-9669.

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–12695 3233 ±80 BP

$\delta^{13}C$: -26.7‰

Sample: 1689D, submitted in September 2000 by A Bayliss

Material: calcined human bone (long bone fragments from adult ?male) (A Bayliss 2000)

Initial comment: a replicate of OxA-12694.

Objectives: as OxA-12694

Calibrated date: *1σ:* 1620–1420 cal BC
2σ: 1690–1300 cal BC

Final comment: see OxA-9712

Laboratory comment: see OxA-12694

OxA–12732 3346 ±33 BP

$\delta^{13}C$: -20.8‰

Sample: 974C, submitted in September 2000 by A Bayliss

Material: calcined human bone (long bone fragments from adult ?male) (A Bayliss 2000)

Initial comment: a replicate of OxA-12691.

Objectives: as OxA-12691

Calibrated date: *1σ:* 1690–1610 cal BC
2σ: 1740–1530 cal BC

Final comment: see OxA-9712

Laboratory comment: see OxA-12691 and OxA-9712

Eye Kettleby: waterlogged sequence, Leicestershire

Location: SK 732178
Lat. 52.45.09 N; Long. 00.54.55 W

Project manager: N Finn (University of Leicester Archaeological Services), 1996–7

Archival body: Leicestershire County Council Museums Service

Description: the waterlogged sequence from the multi-period site.

Objectives: to determine the chronological relationship of the environmental evidence from organic deposits with the prehistoric monuments from the site.

Final comment: P Clay (20 November 2012), these results helped to phase the depositional sequence within the carr.

References: Finn 2011

OxA–10714 3855 ±45 BP

$\delta^{13}C$: -27.0‰

Sample: 159 context 3738, submitted on 12 January 2001 by N Finn

Material: wood (waterlogged): *Fraxinus* sp., ?twigs; *Alnus* sp., twigs (J Greig 2001)

Initial comment: the sample was recovered from *c* 1.3m down in a machine excavated section through a waterlogged sequence of the deposits close to the stream forming the western site boundary. The sample came from the upper part of an organic layer *c* 0.36m thick.

Objectives: the pollen analysis suggests that this horizon within the waterlogged sequence corresponds to a time period prior to the major woodland clearance, although some evidence of human activity was suggested in the form of pollen from a cultivated species. In conjunction with a sample from lower down in this deposit it will be possible to test the chronological make up of the material.

Calibrated date: *1σ:* 2460–2200 cal BC
2σ: 2470–2140 cal BC

Final comment: N Finn (2011), the radiocarbon dating was somewhat inconclusive regarding the origins and longevity of the deposit sequence in the carr, although it evidently accumulated over a long period of time, and is interpreted as having been present from the Mesolithic period onwards.

Laboratory comment: English Heritage (2011), this sample, although stratigraphically later than OxA-10715, returned a significantly earlier date, suggesting that this organic horizon contained reworked material. The best estimate for the date of the carr deposit and the environmental evidence it contained is therefore provided by OxA-10715. This environmental evidence therefore seems to relate to the early Bronze Age use of the site, and the period of apparent disuse between this and the establishment of the early to middle Bronze Age cemetery.

OxA–10715 3500 ±45 BP

$\delta^{13}C$: -29.0‰

Sample: 160 context 3738, submitted on 12 January 2001 by N Finn

Material: wood (waterlogged): twig (A Bayliss 2001)

Initial comment: as OxA-10714

Objectives: as OxA-10714

Calibrated date: *1σ:* 1900–1740 cal BC
2σ: 1950–1690 cal BC

Final comment: see OxA-10714

Laboratory comment: see OxA-10714

Eye Kettleby: western D-shaped enclosure, Leicestershire

Location: SK 732178
Lat. 52.45.09 N; Long. 00.54.55 W

Project manager: N Finn (University of Leicester Archaeological Services), 1996–7

Archival body: Leicestershire County Council Museums

Description: the western enclosure ditch defined a D-shaped enclosure measuring approximately 55m east-west by 41m north-south. It had rounded corners with a single entrance in the centre of the western end. It lay close to the northern and southern ring-ditches.

Objectives: the samples were submitted in order to determine if the enclosure was Neolithic or Bronze Age in date and to elucidate the phasing of the enclosure and the funerary landscape in general.

Final comment: A Bayliss and N Finn (2011), the two radiocarbon dates provided a posterior density estimate of *1940–1740 cal BC (95% probability, '924';* figure 32; Bayliss *et al* in Fin 2011) for the use of the monument. The monument must have been constructed some time before this for the first phase ditch to have filled up prior to the excavation of the second phase entrance ditch. The ring-ditches and the D-shaped enclsoures may have been broadly contemporary monuments.

References: Finn 2011

OxA–11372 3584 ±37 BP

$\delta^{13}C$: -27.3‰

Sample: A15.1996 922A, submitted on 8 February 2002 by N Finn

Material: charcoal: *Corylus* sp., single fragment (R Gale 2002)

Initial comment: this feature relates to the western rectangular enclosure, of presumed early-middle Neolithic date. The sample derives from the charcoal-rich fill within a ditch cut across the originally wide entrance of the enclosure to form a narrower entrance. This layer (922) overlay a primary silt (942) and was in turn overlain by an upper fill (923). The sizeable charcoal deposit was restricted to context (922) only. The sample is unlikely to be residual from the first phase of the use of the enclosure as no charcoal was noted in the adjacent excavated sections; the ditch is also cut across an earlier feature at the point where the charcoal is concentrated. The sample derived from *c* 0.3m down in the ditch section.

Objectives: this is one of two similar enclosures of early Neolithic date (based on sherds of early Neolithic decorated pottery from a feature within the other enclosure), which form part of an extensive monumental/funerary landscape of Neolithic/early-middle Bronze Age date. The sample for dating is derived from a secondary, but discrete phase of this monument and is unlikely, therefore, to be residual. What is not clear at this stage is how influential it was in the siting of the earliest phase of the Bronze Age cemetery. A large 'marker stone' was positioned at the east end of this Neolithic enclosure, within the partly backfilled ditch. This seems to have provided a focus for the group 3 cremation burials and the early Bronze Age pit 621, which contained an unusual, complete bone-tempered vessel. It is unclear whether the enclosure itself survived as a landscape feature until this date. As the latest identified phase of the monument, dating the ditch section from which sample 922 was derived will enhance our understanding, and provide firm dating of the relative sequence of events established from the stratigraphic and artefactual evidence.

Calibrated date: *1σ:* 2010–1880 cal BC
2σ: 2040–1780 cal BC

Final comment: P Clay (20 November 2012), this measurement assisted in the dating of the enclosure (feature 924 in group 4) to the early Bronze Age period.

Laboratory comment: English Heritage (2004), the two charcoal fragments from this deposit (OxA-11372–3) are statistically consistent at 95% confidence (T′=1.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978), suggesting that the material may have been fresh when deposited in the ditch fill.

References: Ward and Wilson 1978

OxA–11373 3520 ±37 BP

$\delta^{13}C$: -25.9‰

Sample: A15.1996 922B, submitted on 8 February 2002 by N Finn

Material: charcoal: *Corylus* sp., single fragment (R Gale 2002)

Initial comment: as OxA-11372

Objectives: as OxA-11372

Calibrated date: *1σ:* 1900–1770 cal BC
2σ: 1950–1740 cal BC

Final comment: see OxA-11372

Laboratory comment: see OxA-11372

Fenland Management Project: Wardy Hill Ringwork, Cambridgeshire

Location: TL 478820
Lat. 52.24.56 N; Long. 00.10.24 E

Project manager: C Evans (Cambridge Archaeological Unit), 1991

Archival body: Cambridge Archaeological Unit

Description: a defended later Iron age enclosure, located on a spur of Ampthill Clay.

Objectives: to determine when the later Iron Age ringwork was built, when it was abandoned, and for how long it was in use; to determine the relative chronology of different elements of the ringwork complex; to provide absolute dating for the ceramic phases, particularly the introduction of wheel-made wares; and, to test the presumption of a 'short chronology' (based on the immediate succession of the two main buildings within the ring-ditch (structures I and IV))

Final comment: A Bayliss and C Evans (26 October 2001), nine radiocarbon measurements have been obtained on samples from Wardy Hill. The first and last of the objectives of the dating programme have been achieved - there is now a basic chronology for the use of the ringwork and its associated structures. The possibility of a short chronology can also now be dismissed. The dating programme has been less successful in providing absolute dating for the ceramic phases and in disentangling the relative sequence of different elements in the complex. This is at least partially because there are insufficient measurements to tackle such questions, which require refined dating resolution. It is not possible to obtain sufficient measurements, firstly because the collagen preservation means that a number of samples have failed to produce results, and secondly because the 'open' character of the ringwork's circuits and the paucity of closed contexts, means that material suitable for dating is scarce. Nevertheless, the limited number of radiocarbon dates which could be obtained, have significantly altered our interpretation of the site.

Laboratory comment: English Heritage (26 October 2001), the model (as presented in Evans 2003, 238–43) estimates the date of the primary construction of the defended farmstead (phases 2 and 3). This dates from *cal BC 700–390 (95% probability; 'starT')*. The single date from structure I probably provides the best estimate for the start of the Iron Age settlement on this site. This is rather earlier than expected.The construction of the phase 4 ringwork is dated by an articulated bone sample from the base of the ditch F1 (*UB-4448; cal BC 390–340 (26% probability)* or *cal BC 320–200 (69% probability)*). Another sample of articulated bone from the primary fill of the inner ringwork circuit, F2 may provide a date for phase 3, unless it comes from a portion of ditch which was recut (*UB-4453; cal BC 400–350 (51% probability)* or *cal BC 320–230 (41% probability)*). It appears that structure I was built before the ringwork proper (*98.2% probability*), which may belong to the third century cal BC.

The remaining dates from the F1 circuit form a coherent group, which suggests that active deposition within the ditches continued until *170–50 cal BC (95% probability; 'Last Ringwork')*. This estimate is to be preferred to the estimate for the end of the farmstead (*160 cal BC*–cal AD *30; 'end'*) because, again, there are too few radiocarbon determinations to counteract the scatter on the measurements. Comparing this estimate, with that for the use of structure I, suggests that this period of use of the site lasted *between 230 and 410 years (95% probability)*.The other sample from the inner ringwork circuit, F2, is considerably later than all other radiocarbon samples from the site, and is interpreted as associated with the final use of the site (phase 5). This activity is dated to *cal AD 1–90 (92% probability; UB-4454)*, and must relate to a localised recut of this ditch and may be associated with reuse of the site relating to structure IV. There appears to be a gap between the two major phases of activity on the site, lasting between *70 and 240 years (95% probability)*.

Laboratory comment: English Heritage (26 October 2001), one further sample failed to produce sufficient collagen for radiometric dating (F1 [606] <2670>B), and three other samples which were submitted for dating by Accelerator Mass Spectrometry also failed to produce results (F58 [243] <1952>A and B and F56 [220] <1818>A).

References: Evans 2003

OxA–10735 2370 ±29 BP

$\delta^{13}C$: -21.5‰

Sample: F6 [220] 1818 B, submitted on 11 March 1999 by C Evans

Material: animal bone (26.40g) (sheep/goat femur (probably articulating with tibia)) (S Davies 1999)

Initial comment: a sample found in the fills of the eaves gully of the primary large/main round house (I). The bone was not articulated but is clearly doorway related. As it derived from the toss zone it is unlikely to be residual.

Objectives: to date the use of the main primary round house within the ringwork.

Calibrated date: *1σ:* 420–390 cal BC
2σ: 520–390 cal BC

Final comment: A Bayliss and C Evans (26 October 2001), chronological modelling of the results indicates a date for the use of structure I *510–380 cal BC (95% probability; OxA-10735)*.The model estimates the date of the primary construction of the defended farmstead (phases 2 and 3). This dates from *700–390 cal BC (95% probability; 'start')*. This is rather earlier than the estimate for OxA-10735 which is the only sample dated from these phases of activity. This suggests that there are insufficient age determinations within this phase to counteract the inevitable statistical scatter on the radiocarbon measurements. In default of further data, this single date from structure I probably provides the best estimate for the start of the Iron Age settlement on this site. This is rather earlier than expected.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (18 May 2016), this sample yielded 11.1mg of gelatin, and is probably slightly too old (Bronk Ramsey et al 2011)

References: Bronk Ramsey *et al* 2011

UB–4446 2107 ±17 BP

$\delta^{13}C$: -21.5 ±0.2‰

Sample: F1 [606] <2670> A, submitted on 11 March 1999 by C Evans

Material: animal bone: *Bos* sp., metacarpal and proximal phalanges (200g) (S Davies 1999)

Initial comment: the sample was found in the basal fill of the main outer enclosure ditch on the west side of the primary 'landward' entrance.

Objectives: to establish the use of the primary entrance way and the primary phase of the outer ringwork circuit.

Calibrated date: *1σ:* 175–95 cal BC
2σ: 195–50 cal BC

Final comment: A Bayliss and C Evans (26 October 2001), three samples of disarticulated bone were dated from what was initially interpreted as the toss zone of the secondary landward entrance. The three results are statistically significantly inconsistent, suggesting that the bones were not precisely contemporary. The model which constrains all these the dates to be later than UB-4446 shows poor agreement ($A_{overall}$=25.2%; *UB-4446*, A=1.5%; Bronk Ramsey 1995). However, given the structural sequence, the inter-relationship between the two entranceways does seem justified. Rather, it is the identification of these bones as relating to entranceway-specific toss zone deposition that must be at fault. Either UB-4450 is residual and the statistical consistent measurements on the other two bones relate to the toss zone (UB-4451 and UB-4452), or all these bones derive from activity earlier than the construction of the entranceway. The limited area of excavation makes both options tenable.The model presumes the latter, and suggests that UB-4451 and UB-4452 are not redeposited but do not relate to the entrance way deposition but rather to the earlier recutting of the ditch at the same time as the primary landward entrance was established. This may be supported by the fact that these measurements are statistically indistinguishable from UB-4446 which dates this event (T′=3.9; T′(5%)=6.0; ν=2; Ward and Wilson 1978). It should be noted that the other bone from this deposit (UB-4450) is statistically indistinguishable from the bones relating to the primary construction of the ringwork circuits (UB-4448 and UB-4453). This may mean that there we have dated material from two major episodes in the development of the ringwork circuit: the third, the establishment of the secondary landward entrance, has no absolute dating.

References: Bronk Ramsey 1995
Ward and Wilson 1978

UB–4448 2236 ±19 BP

$\delta^{13}C$: -21.9 ±0.2‰

Sample: F1 [397] <2262>, submitted on 11 March 1999 by C Evans

Material: animal bone: *Bos* sp., left metatarsal and proximal phalanges (200g) (S Davies 1999)

Initial comment: a sample found at the basal fill of the outer ringwork ditch (*c* 1m down from the surface) in the western terminal of the north-eastern fenward entranceway, which was formally waterlogged.

Objectives: to establish the date of the primary use of the outer ringwork circuit.

Calibrated date: *1σ:* 370–210 cal BC
2σ: 385–205 cal BC

Final comment: A Bayliss and C Evans (26 October 2001), the construction of the phase 4 ringwork is dated by the articulated bone sample from the base of the ditch F1 (*UB-4448; 390–340 cal BC (26% probability)* or *320–200 cal BC (69% probability)*). It appears that structure I was built before the ringwork proper (*98% probability*), which may belong to the third century cal BC.

Laboratory comment: English Heritage (26 October 2001), UB-4448 and UB-4453 are statistically consistent and may be precisely contemporary (T′=1.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978). It should be noted that UB-4450 is statistically indistinguishable from the bones relating to the primary construction of the ringwork circuits (UB-4448 and UB-4453; T′=1.4; T′(5%)=6.0; ν=2; Ward and Wilson 1978). This may mean that there we have dated material from two major episodes in the development of the ringwork circuit: the third, the establishment of the secondary landward entrance, has no absolute dating.

References: Ward and Wilson 1978

UB–4449 2157 ±19 BP

$\delta^{13}C$: -22.2 ±0.2‰

Sample: F26 [355] <1677>, submitted on 11 March 1999 by C Evans

Material: animal bone: *Equus* sp., metatarsal (230g) (S Davies 1999)

Initial comment: the sample was found within the fills of the eaves gully of the main secondary round house (IV); up to 0.50m depth. Corresponding to the loss zone deposition (south-eastern sector) relating to the doorway activity. The bone was not articulated but given its depositional pattern it is not residual.

Objectives: to establish the date of the secondary main roundhouse (IV) superseding (I).

Calibrated date: *1σ:* 345–170 cal BC
2σ: 355–160 cal BC

Final comment: A Bayliss and C Evans (26 October 2001), UB-4449 was a disarticulated bone from the toss zone of structure IV, and was intended to date its use. However, the result suggests that it must have been residual from the underlying ditch (F37). This is because structure IV is associated with both wheel-made Iron Age wares and early Roman ceramics. However, UB-4449, may suggest that there was domestic occupation within the interior of the ringwork from its primary phases of use.

UB–4450 2259 ±21 BP

$\delta^{13}C$: -20.8 ±0.2‰

Sample: F1 [61] <1015> Group C, submitted on 11 March 1999 by C Evans

Material: animal bone: *Bos* sp., radius (210g) (S Davies 1999)

Initial comment: a sample found in the base of the main outer ringwork circuit (*c* 0.85m depth) from the south-western circuit corresponding to the location of the secondary (bridged) entrance way. The bone was not articulated but reflects the toss zone pattern relating to entrance crossing and cannot be residual.

Objectives: to establish the date and use of the secondary ringwork entranceway.

Calibrated date: *1σ:* 385–255 cal BC
2σ: 395–210 cal BC

Final comment: see UB-4446

References: Ward and Wilson 1978

UB–4451 2105 ±20 BP

$\delta^{13}C$: -21.6 ±0.2‰

Sample: F1 [61] <1014> Group B, submitted on 11 March 1999 by C Evans

Material: animal bone: *Bos* sp., mandible (280g) (S Davies 1999)

Initial comment: as UB-4450

Objectives: as UB-4450

Calibrated date: *1σ:* 175–90 cal BC
2σ: 200–50 cal BC

Final comment: A Bayliss and C Evans (26 October 2001), *see* UB-4450. Either UB-4450 is residual and the statistical consistent measurements on the other two bones relate to the toss zone (UB-4451 and UB-4452; T′=3.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978), or all these bones derive from activity earlier than the construction of the entranceway. The limited area of excavation makes both options tenable.

References: Ward and Wilson 1978

UB–4452 2155 ±21 BP

$\delta^{13}C$: -21.7 ±0.2‰

Sample: F1 [61] <1017> Group E, submitted on 11 March 1999 by C Evans

Material: animal bone: *Equus* sp., pelvis (230g) (S Davies 1999)

Initial comment: as UB-4450

Objectives: as UB-4450

Calibrated date: *1σ:* 345–170 cal BC
2σ: 355–115 cal BC

Final comment: see UB-4450 and UB-4451

UB–4453 2277 ±32 BP

$\delta^{13}C$: -22.2 ±0.2‰

Sample: F2 [621] <2570>, submitted on 11 March 1999 by C Evans

Material: animal bone: *Bos* sp., right metatarsal and cubonavicular (273g) (S Davies 1999)

Initial comment: a sample found within the fill of the inner ringwork circuit on the southern side.

Objectives: to date the final use and disuse of the phase II ringwork.

Calibrated date: *1σ:* 400–360 cal BC
2σ: 410–210 cal BC

Final comment: A Bayliss and C Evans (26 October 2001), it should be noted that UB-4450 is statistically indistinguishable from the bones relating to the primary construction of the ringwork circuits (UB-4448 and UB-4453; T′=1.4; T′(5%)=6.0; ν=2; Ward and Wilson 1978). This may mean that there we have dated material from two major episodes in the development of the ringwork circuit: the third, the establishment of the secondary landward entrance, has no absolute dating.

Laboratory comment: see UB-4448

References: Ward and Wilson 1978

UB–4454 1966 ±19 BP

$\delta^{13}C$: -21.8 ±0.2‰

Sample: F2 [283] <2176>, submitted on 11 March 1999 by C Evans

Material: animal bone: *Equus* sp., skull (left upper teeth P2-M3) (794g) (S Davies 1999)

Initial comment: a sample found in the lower fill of the inner enclosure circuit between *c* 0.5–0.8m depth.

Objectives: to date the final use and abandonment of the ringwork.

Calibrated date: *1σ:* cal AD 15–65
2σ: 20 cal BC–cal AD 80

Final comment: A Bayliss and C Evans (26 October 2001), on the basis that the fragility of this bone means it is unlikely to be redeposited. The sample is considerably later than all other radiocarbon samples from the site, and is interpreted as associated with the final use of the site (phase 5). This activity is dated to *1–90 cal AD (92% probability; UB-4454)*, and must relate to a localised recut of this ditch and may be associated with reuse of the site relating to structure IV.

Ferriby Boats, North Ferriby, Yorkshire (East Riding)

Location: SE 985250
Lat. 53.42.44 N; Long. 03.03.3 W

Project manager: A Bayliss (English Heritage), 1937–63

Archival body: Hull and East Riding Museum

Description: the Ferriby Boats (F1, F2, and F3) were discovered on the Humber foreshore. F1 and F2 were excavated in 1946 and F3 in 1963. All three boats have been dated to the Bronze Age and are similar in design: the planks are stitched together with yew withies, and systems of cleats with transverse timbers provide structural integrity to the hull, which was perhaps amplified by inserted frames.

Objectives: to establish the absolute date for these important finds, as the advent of AMS allows replicate determinations to be made on the short-lived structural elements of the boats.

Final comment: A Bayliss (30 March 2001), the date for the construction of Ferriby 3 (2030–1780 cal BC; mean of OxA-9198–9 and OxA-9524; 3575 ±30 BP; Stuiver *et al* 1998) makes it the oldest known sewn-plank boat in western Europe. The other two boats are both slightly younger but also date to the early Bronze age. As archaeological evidence from this time shows goods from international exchange (eg Baltic amber and central European bronze), it may be that the emergence of sewn-plank boats provides a mechanism for the start of regular continental exchange.

Laboratory comment: English Heritage (2001), a full description of the radiocarbon methods and analysis is published in Wright *et al* (2001). As suggested independently by the tree-ring analysis, F1 and F2 are very close in age and may be precisely contemporary (T′=2.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978). F3 is also close in date, although it may be slightly earlier as its radiocarbon content is significantly different from that of the other boats (T′=9.3; T′=6.0; ν=2; Ward and Wilson 1978).

References: Stuiver *et al* 1998
Switsur and Wright 1989
Van de Noort *et al* 1999
Ward and Wilson 1978
Wright *et al* 2001
Wright and Wright 1990

OxA–9196 3750 ±45 BP

$\delta^{13}C$: -25.1‰

Sample: F2 STITCH (A), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 5 growth rings (pretreatment method: UW) (Rowena Gale 1999)

Initial comment: plank constructed wooden boat with moss caulking, oak laths, and stitches of yew withy. Recovered from the tidal Humber foreshore at North Ferriby, lying in grey marl. Excavation in 1946 was prompted by imminent destruction through tidal erosion.

Objectives: to establish the absolute date of this important find. The existing radiocarbon determinations from the top of the cleat are statistically significantly inconsistent (OxA-7458, 3315 ±30 BP; Q-3044, 3095 ±40 BP; Q-3023, 3120 ±45 BP; T′=93.4; T′(5%) =6.0; ν=2; Ward and Wilson 1978). The advent of AMS allows replicate determinations to be made on short-lived structural elements of the boat. Further information has also been retrieved about the conservation history of the artefacts.

Calibrated date: *1σ:* 2270–2040 cal BC
2σ: 2300–2020 cal BC

Final comment: E V Wright *et al* (2001), the four replicate measurements on the cellulose fraction (OxA-9196–7 and -9521–2) are not statistically consistent (T′=30.9; T′(5%)=7.8; ν=3; Ward and Wilson 1978). However, the pairs on each chemical process are internally consistent (two extractions: OxA-9521–2; T′=0.3; T′(5%)=3.8; ν=1; one extraction: OxA-9196–7; T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The measurements on material that underwent processing twice are statistically consistent with OxA-7458 (3515 ±30 BP), which underwent the standard wood processing technique (T′=0.3; T′(5%)=6.0; ν=2). These (OxA-7458 and OxA-9521–2) provide the most reliable date for the construction of F2. The weighted mean of which is 3520 ±20 BP. A minimum error of ±30 years is suggested takes qualitative account of the consistent difference between the pretreated samples. This calibrates to 1940–1720 cal BC (at 2σ; Stuiver *et al* 1998) (Wright *et al* 2001, 730–1).

References: Stuiver *et al* 1998
Ward and Wilson 1978

OxA–9197 3750 ±45 BP

$\delta^{13}C$: -25.1‰

Sample: F2 STITCH (B), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 5 growth rings (pretreatment method: UW) (Rowena Gale 1999)

Initial comment: as OxA-9196

Objectives: as OxA-9196

Calibrated date: *1σ:* 2270–2040 cal BC
2σ: 2300–2020 cal BC

Final comment: see OxA-9196

OxA–9198 3550 ±40 BP

$\delta^{13}C$: -24.1‰

Sample: F3 STITCH (A), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 4 growth rings (pretreatment method: UW) (Rowena Gale 1999)

Initial comment: plank constructed wooden boat with moss caulking, oak laths, and stitches of yew withy. Recovered from the tidal Humber foreshore at North Ferriby, lying in grey marl. Excavation in 1946 was prompted by imminent destruction through tidal erosion.

Objectives: to establish the absolute date of this important find. The existing radiocarbon determinations on a yew withy are statistically significantly inconsistent (Q-3147, 2945 ±40 BP; Q-3145, 2975 ±45 BP; OxA-7532, 3340 ±50 BP; T′=43.2; T′(5%) =6.0; ν=2; Ward and Wilson 1978). The advent of AMS allows replicate determinations to be made on short-lived structural elements of the boat. Further information has also been retrieved about the conservation history of the artefacts.

Calibrated date: *1σ:* 1950–1780 cal BC
2σ: 2020–1750 cal BC

Final comment: E V Wright *et al* (2001), the three replicate measurements on the cellulose fraction (OxA-9198–9 and -9524) are statistically consistent (T′=1.8; T′(5%)=6.0; ν=2; Ward and Wilson 1978). Unfortunately, the fourth measurement of this type failed. Uncertainties over possible contamination make the dating of F3 the least satisfactory; although it appears the most reliable date for the construction of the boat is provided by the weighted mean of the consistent results on the cellulose fraction (OxA-9198–9 and OxA-9524). This is 3575 ±24 BP, with a minimum error of ±30 years quoted as realistic for the combined result. This calibrates to 2030–1780 cal BC (at 2σ; Stuiver *et al* 1998). (Wright *et al* 2001, 731–2).

References: Stuiver *et al* 1998
Ward and Wilson 1978

OxA–9199 3625 ±45 BP

$\delta^{13}C$: -24.0‰

Sample: F3 STITCH (B), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 4 growth rings (pretreatment method: UW) (Rowena Gale 1999)

Initial comment: as OxA-9198

Objectives: as OxA-9198

Calibrated date: *1σ:* 2040–1920 cal BC
2σ: 2140–1880 cal BC

Final comment: see OxA-9198

OxA–9236 3419 ±30 BP

δ¹³C: -21.9‰

Sample: F1 STITCH (A), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; probably 13 growth rings (pretreatment method: UW) (Rowena Gale 1999)

Initial comment: plank constructed wooden boat with moss caulking, oak laths, and stitches of yew withy. Recovered from the tidal Humber foreshore at North Ferriby, lying in grey marl. Excavation in 1946 was prompted by imminent destruction through tidal erosion.

Objectives: to establish the absolute date of this important find. The existing radiocarbon determinations on the yew withies and oak plank are statistically significantly inconsistent (Q-3124, 3020 ±40 BP; Q-3043, 2980 ±55 BP; Q-1217, 3312 ±100 BP; Q-1197, 3380 ±100 BP; OxA-7457, 3470 ±30 BP; T′=112.6; T′ (5%) =9.5; ν=4; Ward and Wilson 1978). The advent of AMS allows replicate determinations to be made on short-lived structural elements of the boat. Further information has also been retrieved about the conservation history of the artefacts.

Calibrated date: *1σ:* 1750–1680 cal BC
2σ: 1870–1630 cal BC

Final comment: E V Wright et al (2001), the five new dates on the cellulose fraction (OxA-7457; 3470 ±30 BP, -9236–7, and -9519–20) are statistically consistent (T′=7.8; T′(5%)=9.5; ν=4; Ward and Wilson 1978). The most reliable date for the construction of Ferriby 1 is provided by the weighted mean of these results (3457 ±15 BP). The dating measurement may have a systematic error of up to ten years (this corresponds to independent determination and decalibration of known-age wood). Any systematic error due to additives cannot be strictly estimated, although the variance in the five results is likely to be a useful clue. Taking these into account, a minimum error of ±25 years for the combined result is thought to be realistic. This calibrates to 1880–1680 cal BC at 2σ; Stuiver *et al* 1998) (Wright *et al* 2001, 730).

References: Stuiver *et al* 1998
Ward and Wilson 1978

OxA–9237 3520 ±45 BP

δ¹³C: -22.0‰

Sample: F1 STITCH (B), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; probably 13 growth rings (pretreatment method: UW) (Rowena Gale 1999)

Initial comment: as OxA-9236

Objectives: as OxA-9236

Calibrated date: *1σ:* 1920–1760 cal BC
2σ: 1960–1690 cal BC

Final comment: see OxA-9236

OxA–9299 1445 ±65 BP

δ¹³C: -25.5‰

Sample: F2 STITCH (A), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 5 growth rings (pretreatment method: NRC1) (Rowena Gale 1999)

Initial comment: as OxA-9196

Objectives: as OxA-9196

Calibrated date: *1σ:* cal AD 550–660
2σ: cal AD 430–680

Final comment: (24 August 2000), this measurement was carried out the water soluble contaminants recovered in the water solvent extracts. It does not date the boat but does help in understanding the potential for radiocarbon contamination in the dates (Wright *et al* 2001, 727–9).

OxA–9307 3409 ±40 BP

δ¹³C: -18.6‰

Sample: F1 STITCH (A), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; probably 13 growth rings (pretreatment method: NRC1) (Rowena Gale 1999)

Initial comment: as OxA-9236

Objectives: as OxA-9236

Calibrated date: *1σ:* 1750–1650 cal BC
2σ: 1880–1610 cal BC

Final comment: see OxA-9299

OxA–9308 3472 ±40 BP

δ¹³C: -22.5‰

Sample: F1 STITCH (A), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; probably 13 growth rings (pretreatment method: NRC2) (Rowena Gale 1999)

Initial comment: as OxA-9236

Objectives: as OxA-9236

Calibrated date: *1σ:* 1880–1690 cal BC
2σ: 1900–1680 cal BC

Final comment: English Heritage (24 August 2000), this measurement was carried out on the contaminants recovered in the non-polar extracts (the combined chloroform, methanol, and acetone extracts). It does not date the boat, but does help in understanding the potential for radiocarbon contaminants in the dates (Wright *et al* 2001, 727-9).

References: Wright *et al* 2001

OxA–9309 3240 ±36 BP

$\delta^{13}C$: -18.3‰

Sample: F1 STITCH (B), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; probably 13 growth rings (pretreatment method: NRC1) (Rowena Gale 1999)

Initial comment: as OxA-9236

Objectives: as OxA-9236

Calibrated date: *1σ:* 1600–1450 cal BC
2σ: 1620–1430 cal BC

Final comment: see OxA-9299

OxA–9310 3260 ±40 BP

$\delta^{13}C$: -23.6‰

Sample: F1 STITCH (B), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; probably 13 growth rings (pretreatment method: NRC2) (Rowena Gale 1999)

Initial comment: as OxA-9236

Objectives: as OxA-9236

Calibrated date: *1σ:* 1610–1490 cal BC
2σ: 1630–1430 cal BC

Final comment: see OxA-9308

OxA–9311 2075 ±36 BP

$\delta^{13}C$: -24.4‰

Sample: F2 STITCH (A), submitted in 1999 by A Bayliss

Material: wood (waterlooged): *Taxus* sp., roundwood; 5 growth rings (pretreatment method: NRC2) (Rowena Gale 1999)

Initial comment: as OxA-9196

Objectives: as OxA-9196

Calibrated date: *1σ:* 170–40 cal BC
2σ: 200 cal BC–cal AD 10

Final comment: see OxA-9308

OxA–9312 1983 ±34 BP

$\delta^{13}C$: -24.5‰

Sample: F2 STITCH (B), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 5 growth-rings (pretreatment method: NRC1) (Rowena Gale 1999)

Initial comment: as OxA-9196

Objectives: as OxA-9196

Calibrated date: *1σ:* 40 cal BC–cal AD 70
2σ: 50 cal BC–cal AD 90

Final comment: see OxA-9308

OxA–9313 8120 ±900 BP

$\delta^{13}C$: -25.3‰

Sample: F2 STITCH (B), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 5 growth rings (pretreatment method: NRC2) (Rowena Gale 1999)

Initial comment: as OxA-9196

Objectives: as OxA-9196

Calibrated date: *1σ:* 8290–6090 cal BC
2σ: 9870–5470 cal BC

Final comment: see OxA-9299

OxA–9314 5225 ±45 BP

$\delta^{13}C$: -25.2‰

Sample: F3 STITCH (A), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 4 growth rings (pretreatment method: NRC1) (Rowena Gale 1999)

Initial comment: as OxA-9198

Objectives: as OxA-9198

Calibrated date: *1σ:* 4050–3970 cal BC
2σ: 4230–3950 cal BC

Final comment: see OxA-9299

OxA–9315 33640 ±390 BP

$\delta^{13}C$: -25.2‰

Sample: F3 STITCH (A), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 4 growth rings (pretreatment method: NRC2) (Rowena Gale 1999)

Initial comment: as OxA-9198

Objectives: as OxA-9198

Calibrated date: *1σ:* 36700-35500 cal BC
2σ: 36700-34700 cal BC

Final comment: see OxA-9308

OxA–9316 5450 ±40 BP

$\delta^{13}C$: -24.8‰

Sample: F3 STITCH (B), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 4 growth rings (pretreatment method: NRC1) (Rowena Gale 1999)

Initial comment: as OxA-9198

Objectives: as OxA-9198

Calibrated date: *1σ:* 4350–4260 cal BC
2σ: 4360–4230 cal BC

Final comment: see OxA-9299

OxA–9317 32870 ±290 BP

$\delta^{13}C$: -25.2‰

Sample: F3 STITCH (B), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 4 growth rings (pretreatment method: NRC2) (Rowena Gale 1999)

Initial comment: as OxA-9198

Objectives: as OxA-9198

Calibrated date: *1σ:* 34500-34400 cal BC
2σ: 36200-34200 cal BC

Final comment: see OxA-9299

OxA–9519 3501 ±34 BP

$\delta^{13}C$: -21.8‰

Sample: F1 STITCH (A), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; probably 13 growth rings (pretreatment method :NRC4) (Rowena Gale 1999)

Initial comment: as OxA-9236

Objectives: as OxA-9236

Calibrated date: *1σ:* 1890–1750 cal BC
2σ: 1930–1690 cal BC

Final comment: see OxA-9236

OxA–9520 3403 ±35 BP

$\delta^{13}C$: -21.5‰

Sample: F1 STITCH (B), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; probably 13 growth rings (pretreatment method: NRC4) (Rowena Gale 1999)

Initial comment: as OxA-9237

Objectives: as OxA-9237

Calibrated date: *1σ:* 1750–1650 cal BC
2σ: 1870–1620 cal BC

Final comment: see OxA-9236

OxA–9521 3510 ±38 BP

$\delta^{13}C$: -23.9‰

Sample: F2 STITCH (A), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 5 growth rings (pretreatment method: NRC4) (Rowena Gale 1999)

Initial comment: as OxA-9196

Objectives: as OxA-9196

Calibrated date: *1σ:* 1900–1760 cal BC
2σ: 1950–1690 cal BC

Final comment: see OxA-9196

OxA–9522 3536 ±35 BP

$\delta^{13}C$: -23.8‰

Sample: F2 STITCH (B), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 5 growth rings (pretreatment method: NRC4) (Rowena Gale 1999)

Initial comment: as OxA-9196

Objectives: as OxA-9196

Calibrated date: *1σ:* 1930–1770 cal BC
2σ: 1960–1750 cal BC

Final comment: see OxA-9196

OxA–9524 3560 ±40 BP

$\delta^{13}C$: -24.3‰

Sample: F3 STITCH (B), submitted in 1999 by A Bayliss

Material: wood (waterlogged): *Taxus* sp., roundwood; 4 growth rings (pretreatment method: NRC4) (Rowena Gale 1999)

Initial comment: as OxA-9198

Objectives: as OxA-9198

Calibrated date: *1σ:* 1950–1880 cal BC
2σ: 2030–1770 cal BC

Final comment: see OxA-9198

Fiskerton (1999–2000), Lincolnshire

Location: TF 055716
Lat. 53.13.50 N; Long. 00.25.10 W

Project manager: N Field (North Lincolnshire Archaeological Unit), 1980–1

Archival body: Lindsey Archaeological Services

Description: a timber causeway built in 457 BC into the River Witham on its north bank. Artefacts deposited on the site include Iron Age weapons, tools, and ornaments and Roman pottery and bronzes. Fiskerton is one of the pre-eminent Iron Age ritual sites in Europe, comparable with La Tène in Switzerland, Hjortspring in Denmark, and Llyn Cerrig Bach in Wales.

Objectives: to establish whether the two human bones belong to the middle Iron Age phase (457–339 BC) or to the later Roman period (*c* cal AD 120–410) of deposition. Due to artefact movement in these soft sediments, the human bone cannot be dated stratigraphically. The cut marked skull fragment invites comparison from certain Iron Age burials in East Yorkshire or from the Roman period bog body Lindow II.

Final comment: M Parker Pearson (24 March 2000), the dating of two of the three human bones from this votive deposition site indicates that they belong to the early-middle La Tène, Iron Age phase of deposition and not to the Roman phase. More precisely, the bones probably date to the later period of the timber causeway's construction and repair or even to the period after repairs to it had ceased. The causeway's construction and multiple repairs are dated by dendrochronology to the period 457/456 BC to 321–282 BC. The cutmark on the skull accords well with other Iron Age finds of this type from Britain and Europe.

References: Field 1986
Hillam 1985
Hillam 1992

OxA–9070 2201 ±39 BP

$\delta^{13}C$: -19.4‰

Sample: SF 212, submitted on 27 April 1999 by M Parker Pearson

Material: human bone (10g) (left parietal, probably male) (A Chamberlain)

Initial comment: the skull fragment was found in a silt layer (192) in association with early–middle Iron Age and Roman finds. These had worked their way down through the soft muds from layer 32, three layers higher up. The Iron Age and Roman artefacts occur in deposits, which were sealed by a thick clay layer in the Saxo-Norman period. The context is thus problematic but we wish to date the skull fragment itself and not the layer in which it was found.

Objectives: to establish the date of the human remains from this offering site, in relation to the other artefacts of fifth to fourth century BC and second to fourth century AD date, deposited in relation to the timber causeway dated dendrochronologically to 457/456 BC. This individual died soon after/at the same time as the ?sword blow and may be a watery sacrifice/execution. If so, he maybe from the Iron Age, like many continental examples, or from the Roman period, like many British examples.

Calibrated date: *1σ:* 370–190 cal BC
2σ: 390–160 cal BC

Final comment: M Parker Pearson (24 March 2000), this skull fragment has an unhealed wound, most probably from a sword blow. Given its context, it may have derived from a human sacrificial/executed victim deposited along with the La Tène period weaponry, tools, and ornaments. Its stratified position was known but the recovery of both Iron Age and Roman finds from that layer had, until now, precluded its dating as an Iron Age individual.

OxA–9182 2290 ±50 BP

$\delta^{13}C$: -20.7‰

Sample: SF 450, submitted on 27 April 1999 by M Parker Pearson

Material: human bone (10g) (right femur) (A Chamberlain)

Initial comment: from a silt layer equivalent to layer 26 in the main trench, but located in a small machine-cut trench to the north of the main excavation. It was sealed beneath the thick clay layer, which separated the Iron Age, and Roman finds from those of Saxo-Norman date. The context is thus problematic but we wish to date the femur itself and not the layer from which it came.

Objectives: to establish the date of the human remains from this offering site, in relation to the other artefacts of fifth to third century BC and second to fourth century AD date deposited in association with a timber causeway dated to 457/456 BC. We cannot say if this bone is from a different individual to SF212 but a widely differing date, within the late Iron Age as opposed to mid-first millennium BC, for example, would enhance the probability.

Calibrated date: *1σ:* 400–260 cal BC
2σ: 410–200 cal BC

Final comment: M Parker Pearson (24 March 2000), this femur shaft was recovered from an uncertain stratigraphic position and is of Iron Age date rather than Roman, placing it chronologically with the La Tène period weaponry, tools and ornaments. It was found several meters from OxA-9070 but the two bones could conceivably derive from the same individual, given their indistinguishable determinations (T'=2.0; T'(5%)=3.8; ν=1; Ward and Wilson 1978. It may, just as equally, derive from a second individual whose body was deposited here and dispersed in the river and its deposits.

References: Ward and Wilson 1978

Haddenham: Hermitage Farm round barrow, Cambridgeshire

Location: TL 410750
Lat. 52.21.16 N; Long. 00.04.14 E

Project manager: C Evans (Cambridge Archaeological Unit) I Hodder (University of Cambridge), 1985

Archival body: Cambridgeshire County Council

Description: excavation of part of a round barrow on the Hermitage Farm terrace in 1985 revealed a low, ovoid, ditched mound with a child inhumation, with an inserted cremation burial in a Collared Urn.

Objectives: to date the primary construction of the barrow mound.

Final comment: C Evans (20 July 2004), this dates an infant skeleton, the primary interment within the excavated Hermitage Farm round barrow at Haddenham, to the earlier/middle Bronze Age, which is a perfectly reasonable assignation.

References: Evans and Hodder 2006a
Evans and Hodder 2006b

OxA–8791 3420 ±45 BP

$\delta^{13}C$: -20.0‰

Sample: 2174, submitted in March 1999 by C Evans

Material: human bone (child, *c* 190g with soil)

Initial comment: found in the base of primary upcast (*c* 0.8–0.9m depth) of the round barrow. The skeleton is associated with ?Beaker ware.

Objectives: to establish a date for the primary construction of the mound/barrow. This is important for providing a broader context for the chronology of the barrow field. It complements BM-2497 (3360 ±150 BP, which calibrates to 2040–1320 cal BC at 2σ (Reimer *et al* 2004) obtained from a secondary Collared Urn cremation in the barrow.

Calibrated date: *1σ:* 1770–1660 cal BC
2σ: 1880–1620 cal BC

Final comment: see series comments.

References: Reimer *et al* 2004

Hambledon Hill, Dorset

Location: ST 84921226
Lat. 50.54.31 N; Long. 02.12.52 W

Project manager: R J Mercer (University of Edinburgh), 1974–86

Description: the hill lies off the south-west edge of Cranborne Chase, immediately north of Hod Hill in the confluence of the rivers Iwerne and Stour. It consists of a central dome of Upper Chalk with radiating spurs, largely of Lower Chalk. The central dome is occupied by a large causewayed enclosure of 8.3ha and a smaller causewayed enclosure of just under 1ha occupies the southern (Stepleton) spur. There are two long barrows and numerous pits. The two enclosures and all or most of the hill are surrounded by outworks. The extent of Neolithic earthworks on the north spur is obscured by an Iron Age hillfort.The investigations of 1974–86 followed on from trial excavations by Sieveking and Erskine in 1951 and by Bonney in 1958–60. By the end of 1986, it was clear that the hill had been the site of an early-middle Neolithic earthwork complex up to 100ha in extent, and that Neolithic earthworks extended to the north spur. In 1996, a new earthwork survey by the RCHME confirmed the possibility of a Neolithic date for the outworks around the north spur, under the Iron Age defences. Equally important, the survey has advanced understanding of the development of the Iron Age hillfort and the later landscape and provided a baseline for its future management.

Objectives: to define the form, function, extent, use, and development of the complex and their implications for contemporary social organisation.

References: Healy 2004
Mercer 1980
Mercer 1988
Mercer and Healy 2008
Oswald *et al* 2001

Hambledon Hill: Hanford outer outwork, Dorset

Location: ST 849116
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1982

Archival body: Dorset County Museum

Description: continuous linear outworks link the Hanford and Stepleton spurs of the hill. Parts of three segments of the outer of the two were excavated on the Hanford spur. It was subsequently suggested on the basis of earthwork survey (Palmer and Oswald, in Mercer and Healy 2008) that the outworks on the two spurs had been connected after their construction. Fortuitously, the excavated segments included components of both proposed elements, segment 2 belonging to the possibly original Hanford spurwork and segment 3 to the possibly later, longer connecting earthwork.

Objectives: the two outworks on the Hanford spur of the hill remain imprecisely dated. It is impossible to tell, for example, to which of the three outworks on the Stepleton spur they relate, although all appear part of a continuous system.

Laboratory comment: English Heritage (8 July 2013), one further sample was submitted prior to 1998 (HAR-6038; HN82 C113) and was published in Bayliss *et al* (2012, 136).

References: Bayliss *et al* 2012, 136
Mercer and Healy 2008

OxA–7850 4755 ±35 BP

$\delta^{13}C$: -20.1‰

Sample: HN82 304, submitted in January 1998 by F Healy

Material: animal bone: *Sus* sp., articulating astragalus, calcaneum, and navicular-cuboid (A Legge 1997)

Initial comment: from a localised lens of dark grey ashy silt on the base of a segment butt of the outer of two chalk-cut outwork ditches. Archival reference: HN82 outer Hanford outwork, new segment 2 (originally part of D3), U7, layer 5C.

Objectives: the articulation of the foot bones indicates that they were incorporated in their context soon after the death of the animal from which they came, before they could become dispersed. The silt in which they lay would have accumulated soon after the earthwork was built. They should be close in age to this event.

Calibrated date: *1σ:* 3640–3510 cal BC
2σ: 3640–3370 cal BC

Final comment: F Healy (26 November 2006), From the east butt of segment 2. Unless the three articulating bones were redeposited in close proximity to each other when already separated, which seems unlikely, the measurement indicates that segment 2, and with it segment 1 on the centre of the spur, was built before segment 3, and with it the outer of the two linear earthworks linking the Stepleton and Hanford spurs.

UB–4271 4492 ±27 BP

$\delta^{13}C$: -22.6 ±0.2‰

Sample: HN82 153, submitted in January 1998 by F Healy

Material: animal bone: *Bos* sp., several lower vertebrae and sacrum, found articulated (A Legge 1997)

Initial comment: the vertebrae were found articulated on the base of the outer of two chalk-cut outwork ditches, in a segment butt, *c* 0.30m away from HN 82 154 (UB-4272), an articulated cattle pelvis. They were overlain by chalky primary silt. Archival reference: HN82 outer Hanford outwork, new segment 3 (originally part of D3), U1, base of ditch.

Objectives: the size of the sample makes it suitable for high-precision dating. The articulation of the vertebrae shows that they were placed on the ditch bottom soon after the death of the animal from which they came. The lack of silts below them indicates that this occurred soon after the earthwork was built. They should be very close in age to this event.

Calibrated date: *1σ:* 3340–3090 cal BC
2σ: 3350–3030 cal BC

Final comment: F Healy (26 November 2006), the articulation makes the sample virtually certain to have been fresh when deposited. Unless the segment was completely cleaned out before that event, they and the nearby sample for UB-4272 place the construction of segment 3, and with it the outer of the two linear earthworks linking the Stepleton and Hanford spurs, later than that of segment 2, and with it the segment 1 on the centre of the spur.

UB–4272 4476 ±26 BP

δ13C: -22.4 ±0.2‰

Sample: HN82 154, submitted in January 1998 by F Healy

Material: animal bone: *Bos* sp., pelvis and femur, found articulated, some cut-marks (A Legge 1997)

Initial comment: found articulated in a slight fissure in the base of the outer of two chalk-cut outwork ditches, in a segment butt, *c* 0.30m away from HN82 153 (UB-4271), articulated lower cattle vertebrae. They were overlain by chalky primary silt. Archival reference: HN82 outer Hanford outwork, new segment 3 (originally part of D3), U1, base of ditch.

Objectives: the size of the sample makes it suitable for high-precision dating. The articulation of the pelvis and femur shows that they were placed on the ditch bottom soon after the death of the animal from which they came. The lack of silts below them indicates that this occurred soon after the earthwork was built. They should be very close in age to this event.

Calibrated date: *1σ:* 3330–3090 cal BC
2σ: 3350–3020 cal BC

Final comment: see UB-4271

Hambledon Hill: Hanford, pre-Neolithic contexts, Dorset

Location: ST 849122
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1982

Archival body: Dorset County Museum

Description: identification of charcoal from apparently Neolithic features in break-of-slope locations on the western edge of the hill showed that a small minority contained exclusively pine and birch, a combination characteristic of Boreal vegetation.

Objectives: to determine whether the charcoal and hence possibly the features were indeed of Boreal date.

Laboratory comment: English Heritage (8 July 2013), two further samples were dated prior to 1998 and were published in Bayliss *et al* (2015, 51; OxA-7845–6).

References: Baylis et all 2015
Healy 2004
Mercer and Healy 2008

OxA–8861 4780 ±45 BP

Sample: WOWK82 C4 A, submitted in June 1999 by F Healy

Material: charcoal: *Fraxinus* sp., single fragment (P Austin)

Initial comment: from the near the base of the second of what appeared to be two consecutive postholes and may represent the charred remains of the post which it once held. The feature lay in an area where two Neolithic earthwork banks (those of the western outwork and the inner south cross dyke) converged. Archival reference: WOWK82 area 3 F4.

Objectives: *Pinus* sp. charcoal from the earlier of the two sockets in this feature is of Boreal age (OxA-7816). Dating this *Fraxinus* sp. charcoal from the later socket will determine whether this species formed part of the local Boreal vegetation and whether the second socket, if not the whole posthole, is of much later, Neolithic, date.

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3660–3380 cal BC

Final comment: F Healy (26 November 2006), from near the bottom of the second of two successive sockets in a possible posthole within the protected chalk of the inner south cross dyke bank, OxA-7816 coming from the first. OxA-8861 and -8862 probably date a post in the substructure of the inner south cross-dyke bank. WOWK area 3 included both a section of the western outwork and the adjacent west butt of the inner south cross-dyke.

OxA–8862 4690 ±45 BP

δ13C: -24.1‰

Sample: WOWK82 C4 B, submitted in June 1999 by F Healy

Material: charcoal: *Fraxinus* sp., single fragment (P Austin)

Initial comment: as OxA-8861

Objectives: as OxA-8861

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: see OxA-8861

Hambledon Hill: inner east cross dyke, Dorset

Location: ST 849122
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (Edinburgh University), 1975

Archival body: Dorset County Museum

Description: the inner of two segmented bank-and-ditch earthworks, parallel to each other and to the east side of the main enclosure, running the width of the neck of land between the main enclosure and the Shroton spur.

Objectives: to refine the date of the earthwork.

Final comment: F Healy (2005), formal modelling of the chronology of Hambledon Hill suggests that the inner east cross dyke was constructed in *3690–3620 cal BC (95% probability; iecd_const;* Bayliss *et al* 2008; table 4.2).

Laboratory comment: English Heritage (8 July 2013), one further sample was dated prior to 1998 and was published in Bayliss *et al* (2013, 85; HAR-9168).

References: Bayliss *et al* 2008
Bayliss *et al* 2013, 85
Mercer and Healy 2008

OxA–8856 4780 ±55 BP

$\delta^{13}C$: -20.7‰

Sample: HH75 313, submitted in June 1999 by F Healy

Material: antler: *Cervus elaphus*, antler tip with two tines, heavy, probably non-natural wear on tine tips (A Legge)

Initial comment: from chalky primary silt, partly underlying cattle rib HH75 314 (OxA-8857 below). Archival reference: HH75, site D2, inner E cross-dyke, new segment 4, section I, layer 11.

Objectives: the form and context of the sample suggest that it was broken from an antler implement during the digging of the ditch, in which case it should be close in age to that event. If the inferred functional link is false, the antler will nonetheless provide a *terminus post quem* for the initial silting of the ditch and will thus better define the construction date of the inner east cross dyke.

Calibrated date: *1σ:* 3640–3510 cal BC
2σ: 3660–3370 cal BC

Final comment: F Healy (2005), segment 4, cutting I, layer 11. The date is consistent with the interpretation above. The sample post-dates the cattle rib which overlay it (OxA-8857), indicating that the rib was redeposited.

OxA–8857 4995 ±45 BP

$\delta^{13}C$: -21.1‰

Sample: HH75 314, submitted in June 1999 by F Healy

Material: animal bone: *Bos* sp., rib fragments (A Legge)

Initial comment: from chalky primary silt, partly overlying antler fragment HH75 313 (OxA-8856 above). Archival reference: HH75, site D2, inner E cross dyke, new segment 4, section I, layer 11.

Objectives: the sample will provide a *terminus post quem* for the initial silting of the ditch and will thus better define the construction date of the inner east cross dyke.

Calibrated date: *1σ:* 3910–3700 cal BC
2σ: 3950–3650 cal BC

Final comment: F Healy (2005), segment 4, cutting I, layer 11. The sample pre-dates the antler implement which underlay it (OxA-8857), indicating that the rib was redeposited.

OxA–8863 4875 ±45 BP

$\delta^{13}C$: -25.0‰

Sample: HH75 1535A, submitted in June 1999 by F Healy

Material: charcoal: *Corylus* sp., single fragment (P Austin)

Initial comment: part of a coherent, restricted patch of charcoal in the primary silt. Archival reference: HH75 site D2, inner east cross dyke, new segment 4, section II, layer 11.

Objectives: the coherence of the charcoal patch suggests that it was deposited in a single event and was cut or gathered and burnt not long before. It should be little older than the primary silts in which it was found and close in age to the construction of the earthwork. It is desirable to refine the existing date (HAR-9168; 4660 ±100 BP) on part of the same find, in order to better define the place of the cross-dykes in the development of the complex.

Calibrated date: *1σ:* 3700–3630 cal BC
2σ: 3750–3530 cal BC

Final comment: F Healy (2005), two single entity samples of *Corylus* charcoal (OxA-8863–4) from a discrete spread in the primary silt in segment 4 yielded measurements which are statistically consistent with the pre-existing measurement on part of the bulk sample from which they were extracted (HAR-9168; T′=4.3; T′(5%)=6.0; ν=2; Ward and Wilson 1978), suggesting that it was homogenous.

References: Ward and Wilson 1978

OxA–8864 4880 ±45 BP

$\delta^{13}C$: -25.0‰

Sample: HH75 1535B, submitted in June 1999 by F Healy

Material: charcoal: *Corylus* sp., single fragment (P Austin)

Initial comment: as OxA-8863

Objectives: as OxA-8863

Calibrated date: *1σ:* 3700–3630 cal BC
2σ: 3760–3530 cal BC

Final comment: see OxA-8863

OxA–8892 4785 ±60 BP

$\delta^{13}C$: -21.3‰

Sample: HH75 2052, submitted in June 1999 by F Healy

Material: animal bone: *Bos* sp., radius (A Legge)

Initial comment: from the primary silt. Archival reference: HH75, site E2, inner east cross dyke, new segment 5, section 3, layer 12.

Objectives: to provide a *terminus post quem* for the initial silting of the ditch and thus better define the construction date of the inner east cross dyke.

Calibrated date: *1σ:* 3650–3510 cal BC
2σ: 3700–3370 cal BC

Final comment: F Healy (2005), segment 5, cutting 3, layer 12. Agreement with other samples from this context (except for OxA-8857) suggests that it may approximate to the date of the digging of the ditch.

OxA–8893 4255 ±50 BP

$\delta^{13}C$: -21.9‰

Sample: HH76 680, submitted in June 1999 by F Healy

Material: animal bone: *Bos* sp., two articulating lumbar cattle vertebrae (A Legge)

Initial comment: part of a compact pile of butchered bone, made up of the remains of two cows and a caprine, placed in a slot up to 0.50m wide and 0.4m deep cut into a largely silted segment of the inner east cross dyke and filled with dark brown clayey material with chalk lumps and large flint nodules. Planned as if found in articulation (HH76 #8, xxi and xxii). Archival reference: HH76, site J2, inner east cross dyke, new segment 1 (formerly segment 2A), section 6, layer 5A.

Objectives: the compact nature of the bone deposit, heaped bone-on-bone with little intervening matrix, indicates derivation from a butchery event which took place only a short time before the bone was placed in the ditch, so that the animal from which the sample came is unlikely to have been long dead at this stage, an impression reinforced by the probable articulation of the vertebrae in the ground. The date of the sample will help to resolve the still uncertain age of the phase VI deposits in the cross dykes and hence to better define the end of Neolithic use of the complex.

Calibrated date: *1σ:* 2910–2870 cal BC
2σ: 2930–2700 cal BC

Final comment: F Healy (2005), segment 1, quadrant 6, layer 5A. The early third millennium date indicates that there was an episode of large-scale meat consumption on the hill at a time when there is no other trace of activity. On re-examination of the archive, it appears that the deposit may have been over, rather than in, a slot-like recut.

Hambledon Hill: long barrow, Dorset

Location: ST 84511265
Lat. 50.54.44 N; Long. 02.13.13 W

Project manager: R Mercer (University of Edinburgh), 1977

Archival body: Dorset County Museum

Description: the long barrow lies along the axis of the southern spur of the hill, oriented north-north-west/south-south-east. Its north-west end is some 18m from the main causewayed enclosure ditch; its southeast end abuts the tail of the inner south cross dyke bank, which bows around it. The mound was bulldozed in the 1960s. Its spread material and the surviving ditch fills were excavated in 1977.

Objectives: the southern long barrow on Hambledon Hill remains undated, and its place and role in the history of the monument complex remain speculative.

Final comment: F Healy (26 November 2006), formal modelling of the chronology of Hambledon Hill suggests that the southern long barrow was constructed in *3680–3640 cal BC (95% probability; lb_const;* Bayliss *et al* 2008, table 4.2).

References: Bayliss *et al* 2008
Mercer and Healy 2008

OxA–7813 4580 ±30 BP

$\delta^{13}C$: -21.3‰

Sample: HH77 2241, submitted in January 1998 by F Healy

Material: animal bone: *Bos* sp., articulating astragalus and distal tibia fragment (A Legge)

Initial comment: the bones lay in a silty matrix with numerous large flint nodules and chalk lumps. This filled a narrow slot cut into the almost completely silted chalk-cut barrow ditch. Archival reference: HH77 site PLB LB3 SIV, layer 19.

Objectives: the articulation of the bones forming the sample means that the animal from which they came is unlikely to have been long dead before they were incorporated in their context. There date will provide a *terminus ante quem* for silting of the ditch and will be close in age to the filling of the slot in which it was found. Together with dates on bone samples from under- and over-lying layers, will provide a chronology for the barrow. It will also indicate whether the cutting of slots in the barrow ditches was broadly contemporary with the cutting of slots in the ditches of other earthworks in the complex.

Calibrated date: *1σ:* 3370–3340 cal BC
2σ: 3500–3130 cal BC

Final comment: F Healy (26 November 2006), from the west ditch (segment 1). The result is consistent with the above interpretation.

OxA–7827 4655 ±40 BP

$\delta^{13}C$: -21.3‰

Sample: HH77 1256, submitted in January 1998 by F Healy

Material: animal bone: *Bos* sp., scapula fragment (A Legge)

Initial comment: the bone lay in a 'pinky-buff' silt with small chalk fragments, overlying the base of the chalk-cut barrow ditch at the outer edge and a small accumulation of silt-bound chalk rubble at the inner edge. Archival reference: HH77 site PLB LB3 SI layer 26.

Objectives: in the absence of articulated bone in primary contexts, the youngest of multiple dates on samples from primary and immediately post-primary contexts will provide a *terminus post quem* for construction, rendered more precise by measurements on articulating and ?articulating samples and a concentration of charred hazelnut shell from higher up the ditch sequence.

Calibrated date: *1σ:* 3520–3360 cal BC
2σ: 3630–3350 cal BC

Final comment: F Healy (26 November 2006), from the west ditch (segment 1). The measurement is consistent with those for an antler implement and for three other disarticulated bone samples from the primary silts of the same ditch (OxA-7848, -8846–8).

OxA–7828 4795 ±50 BP

$\delta^{13}C$: -21.4‰

Sample: HH77 1403, submitted in January 1998 by F Healy

Material: animal bone: *Sus* sp., pig; 2 metacarpals, ?articulating (A Legge)

Initial comment: the bones lay in silts with abundant comminuted chalk derived from the inner edge of the east barrow ditch, overlying chalk rubble fills and cut by a slot. Archival reference: HH77 site PLB LB5 layer 15.

Objectives: the possible articulation of the bones forming the sample means that the animal from which they came may not have been long dead before they were incorporated in their context. Their date, together with those of samples from under- and over-lying layers, will provide a chronology for the barrow.

Calibrated date: *1σ:* 3650–3520 cal BC
2σ: 3660–3380 cal BC

Final comment: F Healy (26 November 2006), from the east ditch (segment 3). OxA-7828 and -7829 were considerably earlier than OxA-7813 and UB-4273, both of which should predate them if the infilling of the two flanking ditches was contemporaneous. Either the filling of the two ditches occurred at different rates or the pig metacarpals were redeposited. It should be noted that this sample caused problems in chemistry, one of the pre-treatments giving a very anomalous $\delta^{15}N$ (2.8 ‰). This pretreated material gave a radiocarbon result which is more than 200 radiocarbon years younger than either of the results quoted here. This suggests that, if anything, the contaminant in OxA-7828–9 would make the results too young. OxA-7828 and -7829 were on replicate samples with two separate chemical preparations. These are statistically consistent ($T'=2.0$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978) and represent the best estimate of the age of the sample, although the results must be treated with some additional caution.

Laboratory comment: Ancient Monuments Laboratory (2006), the mean of OxA-7828 and OxA-7829 is 4837 ±39 BP which calibrates to 3700–3530 cal BC at 95% confidence (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–7829 4910 ±65 BP

$\delta^{13}C$: -20.6‰

Sample: HH77 1403, submitted in January 1998 by F Healy

Material: animal bone: *Sus* sp., pig; two metacarpals, ?articulating (A Legge)

Initial comment: a replicate of OxA-7828.

Objectives: as OxA-7828

Calibrated date: *1σ:* 3770–3640 cal BC
2σ: 3910–3530 cal BC

Final comment: see OxA-7828

OxA–7848 4950 ±55 BP

$\delta^{13}C$: -21.6‰

Sample: HH77 1366, submitted in January 1998 by F Healy

Material: animal bone: *Bos* sp., 2 cattle metatarsals (A Legge)

Initial comment: the bone lay in a 'pinky-buff' primary silt with small chalk fragments, overlying the base of the chalk-cut barrow ditch. Archival reference: HH77 site PLB LB2 SIV layer 26.

Objectives: in the absence of articulated bone from primary contexts, the youngest of multiple dates on samples from primary contexts provide a *terminus post quem* for construction, rendered more precise by measurements on articulating and ?articulating samples and a concentration of charred hazelnut shell from higher up the ditch sequence.

Calibrated date: *1σ:* 3790–3650 cal BC
2σ: 3940–3640 cal BC

Final comment: F Healy (26 November 2006), from the west ditch (segment 1). The measurement is consistent with those for an antler implement and for three other disarticulated bone samples from the primary silts of the same ditch (OxA-7827, OxA-8846–8).

OxA–8845 4870 ±35 BP

$\delta^{13}C$: -21.1‰

Sample: HH77 1018, submitted in June 1999 by F Healy

Material: antler: *Cervus elaphus*, antler crown with 2 poorly developed terminal tines, beam anciently broken below crown, very eroded (A Legge)

Initial comment: found with its tip embedded in the crumbling natural chalk of the bottom of the north east long barrow ditch bottom, surrounded and covered by primary silt. Archival reference: HH77, site PLB, LB4, layer 17.

Objectives: the form and location of the sample indicate that the antler from which it came was used to dig the barrow ditch, and broke off in the process, the tip which constitutes the sample being left behind. It must be close in age to the construction of the long barrow and will help to establish the date of that event.

Calibrated date: *1σ:* 3700–3630 cal BC
2σ: 3710–3540 cal BC

Final comment: F Healy (26 November 2006), from the east ditch (segment 3). The measurement is consistent with those for four disarticulated bone samples from the primary silts of the same ditch (OxA-7848, -8846–8). Together they should provide an estimate for the construction date.

OxA–8846 4875 ±40 BP

$\delta^{13}C$: -20.3‰

Sample: HH77 1367, submitted in June 1999 by F Healy

Material: animal bone: *Bos* sp., cattle scapula fragments (A Legge)

Initial comment: the sample lay in primary silt in the south west ditch of the long barrow. Archival reference: HH77, site PLB, LB2, section IV, layer 26.

Objectives: to provide a *terminus post quem* for the initial silting of the ditch and thus better define the construction date of the long barrow.

Calibrated date: *1σ:* 3700–3630 cal BC
2σ: 3710–3540 cal BC

Final comment: F Healy (26 November 2006), from the west ditch (segment 1). The measurement is consistent with those for an antler implement and for three other disarticulated bone samples from the primary silts of the same ditch (OxA-7827, -7848, 8847–8). Together they should provide the construction date.

OxA–8847 4835 ±45 BP

$\delta^{13}C$: -21.4‰

Sample: HH77 1948 (a), submitted in January 1998 by F Healy

Material: animal bone: *Bos* sp., proximal cattle phalanx (A Legge)

Initial comment: from the 'pinky-buff' primary silt with small chalk fragments, overlying the base of the chalk-cut barrow ditch. Archival reference: HH77 site PLB LB2 SVII layer 26.

Objectives: in the absence of articulated bone from primary contexts, samples from primary contexts will provide a *terminus post quem* for construction, rendered more precise by measurements on articulating and ?articulating samples and a concentration of charred hazelnut shell from higher up the ditch sequence.

Calibrated date: *1σ:* 3660–3530 cal BC
2σ: 3710–3520 cal BC

Final comment: F Healy (26 November 2006), from the west ditch (segment 1). The measurement is consistent with those for an antler implement and for three other disarticulated bone samples from the primary silts of the same ditch (OxA-7827, -7848, -8846, -8848). Together they should provide an estimate for the construction date.

OxA–8848 4760 ±50 BP

$\delta^{13}C$: -21.6‰

Sample: HH77 1948 (b), submitted in January 1998 by F Healy

Material: animal bone: unidentifiable, mammal (A Legge)

Initial comment: as OxA-8847

Objectives: as OxA-8847

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3650–3370 cal BC

Final comment: F Healy (26 November 2006), from the west ditch (segment 1). The measurement is consistent with those for an antler implement and for three other disarticulated bone samples from the primary silts of the same ditch (OxA-7827, -7848, 8846–7). Together they should provide an estimate for the construction date.

UB–4270 4779 ±27 BP

$\delta^{13}C$: -23.7 ±0.2‰

Sample: HH77 S167, submitted in January 1998 by F Healy

Material: carbonised plant macrofossil (charred hazelnut shell) (G Jones)

Initial comment: the nutshell lay with others in a dense deposit of burnt flint, animal bone (some also burnt), and artefacts in a sparse loam matrix. There was little or no charcoal and no sign of *in situ* burning. This deposit occupied the south butt of the silted west ditch of the barrow, overlying the fill of a slot. Archival reference: HH77 site PLB LB3 SII layer 17.

Objectives: hazelnut shells represent a single year's growth and are likely to have been discarded and burnt in the year in which they were harvested. They are likely to be close in age to the filling of the slot in which they were found. Together with dates on bone samples from underlying layers they will provide a chronology for the barrow. It will also indicate whether the cutting of slots in the barrow ditches was broadly contemporary with the cutting of slots in the ditches of other earthworks in the complex.

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3640–3510 cal BC

Final comment: F Healy (26 November 2006), from the west ditch (segment 1). The date is consistent with the sample's stratigraphic position.

Hambledon Hill: main enclosure 4, Dorset

Location: ST 84921226
Lat. 50.54.31 N; Long. 00.12.53 W

Project manager: R Mercer (University of Edinburgh), 1974–7

Archival body: Dorset County Museum

Description: scattered segments of the main enclosure.

Objectives: to date this part of the enclosure as a step towards establishing the chronology of the whole.

Final comment: F Healy (26 November 2006), formal modelling of the chronology of Hambledon Hill suggests that the main enclosure was constructed in *3680–3630 cal BC (95% probability; mce_const*; Bayliss *et al* 2008, table 4.2).

Laboratory comment: English Heritage (8 July 2013), one further sample was dated prior to 1998 and was published in Bayliss *et al* (2012, 136; HAR-2369).

References: Bayliss *et al* 2008
Bayliss *et al* 2012, 136
Mercer and Healy 2008

OxA–8849 4855 ±45 BP

$\delta^{13}C$: -21.7‰

Sample: HH76 2218, submitted in June 1999 by F Healy

Material: animal bone: *Bos* sp., three cattle phalanges, found in articulation (A Legge)

Initial comment: the sample lay with artefacts and other animal bone in a spread of dark, almost black loam with flint blocks and much charcoal, dumped or, less probably, cut into the end of the segment of the main enclosure ditch from the causeway. It was at the same stratigraphic horizon as the first of up to three successive slots cut into the silted ditch. The bones were recorded in the site notebook as 'articulated hoof' (27.9.76, t.n.7). Archival reference: HH76, site H, main enclosure, new segment 14, section k, layer 9.

Objectives: to help resolve the still uncertain age of the phase VI deposits in the main enclosure ditch and hence to better define the end of Neolithic use of the complex.

Calibrated date: *1σ:* 3660–3630 cal BC
2σ: 3710–3530 cal BC

Final comment: F Healy (26 November 2006), segment 14, section k, layer 9. Consistent with its stratigraphic position.

OxA–8850 4810 ±50 BP

δ^{13}C: -21.9‰

Sample: HH75 2007, submitted in June 1999 by F Healy

Material: animal bone: *Bos* sp., articulating cattle tibia and astragalus, butchered, planned as if articulated in ground (A Legge)

Initial comment: the sample lay with artefacts and other animal bone in loamy, spongy brown soil with large flint nodules and chalk lumps which filled a slot up to 1.00m wide and 0.70m deep cut into the top of the largely silted main enclosure ditch. The two bones were planned in articulation and recorded in the site notebook as 'astragalus and tibia in articulated context' (3/10/75 t.n.6). Archival reference: HH75, site E1, main enclosure, new segment 10, layer 6B.

Objectives: to help resolve the still uncertain age of the slot-like recuts in the main enclosure ditch and hence to better define the end of the Neolithic use of the complex.

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3700–3380 cal BC

Final comment: F Healy (26 November 2006), segment 10 layer 6B. Consistent with its stratigraphic position.

OxA–8851 4870 ±45 BP

δ^{13}C: -21.8‰

Sample: HH77 358, submitted in June 1999 by F Healy

Material: animal bone: *Bos* sp., cattle distal tibia fragment, astragalus, calcaneum, found in articulation (A Legge)

Initial comment: found articulated in the earthy fill of a shallow slot cut into the top of the silted ditch, in which there were also artefacts and other animal bone. Archival reference: HH77, site P1, main enclosure, new segment 1, F5.

Objectives: as OxA-8850

Calibrated date: *1σ:* 3700–3630 cal BC
2σ: 3720–3530 cal BC

Final comment: F Healy (26 November 2006), consistent with its stratigraphic position.

OxA–8852 4620 ±40 BP

δ^{13}C: -22.0‰

Sample: HH76 2977, submitted in June 1999 by F Healy

Material: animal bone: *Bos* sp., cattle, left ilium fragment (A Legge)

Initial comment: the sample lay in chalky primary silt. Archival reference: HH76, site J1, main enclosure, new segment 6.2, layer 9.

Objectives: to provide a *terminus post quem* for the initial silting of the ditch and thus better define the construction date of the main enclosure.

Calibrated date: *1σ:* 3500–3350 cal BC
2σ: 3520–3340 cal BC

Final comment: F Healy (26 November 2006), segment 6.2, ayer 9. Significantly later than ten other measurements from ditch base or from primary silts, including an articulated human skeleton and a pair of articulating cattle bones, which are consistent without it. OxA-8852 is probably an outlier.

OxA–8853 4790 ±45 BP

δ^{13}C: -21.9‰

Sample: HH76 2976, submitted in June 1999 by F Healy

Material: animal bone: *Bos* sp., cattle or *Cervus elaphus*, right ilium fragment (A Legge)

Initial comment: the sample lay in chalky primary silt. Archival reference: HH76, site J1, main enclosure, new segment 6.2, layer 9.

Objectives: as OxA-8852

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3660–3380 cal BC

Final comment: F Healy (26 November 2006), segment 6.2, layer 9. From same context as OxA-8852. Statistically consistent with nine other measurements from ditch base or from primary silts, including an articulated human skeleton and a pair of articulating cattle bones, inconsistent only with OxA-8852.

OxA–8854 4855 ±45 BP

δ^{13}C: -20.9‰

Sample: HH76 2900A, submitted in June 1999 by F Healy

Material: animal bone: *Bos* sp., cattle right scapula, in fragments with butchery cuts (A Legge)

Initial comment: the sample lay in light-coloured primary silt with chalk blocks, artefacts, and other animal bone. Archival reference: HH76, site J1, main enclosure, new segment 7, layer 9.

Objectives: as OxA-8852

Calibrated date: *1σ:* 3660–3630 cal BC
2σ: 3710–3530 cal BC

Final comment: F Healy (26 November 2006), segment 7 layer 9. Statistically consistent with nine other measurements from ditch base or from primary silts, including an articulated human skeleton and a pair of articulating cattle bones, inconsistent only with OxA-8852.

OxA–8855 4805 ±45 BP

δ^{13}C: -21.2‰

Sample: HH76 1942, submitted in June 1999 by F Healy

Material: animal bone: *Bos* sp., cattle rib (A Legge)

Initial comment: the bones lay in chalky primary silt. Archival reference: HH76, site J1, main enclosure, new segment 5, quadrant 1, layer 8.

Objectives: as OxA-8852

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3660–3380 cal BC

Final comment: F Healy (26 November 2006), segment 5, quadrant 1, layer 8. Statistically consistent with nine other measurements from ditch base or from primary silts, including an articulated human skeleton and a pair of articulating cattle bones, inconsistent only with OxA-8852.

OxA–8906 4820 ±45 BP

δ^{13}C: -20.2‰

Sample: HH76 2900, submitted in June 1999 by F Healy

Material: animal bone: *Sus* sp., pig, left calcaneum (A Legge)

Initial comment: from light-coloured primary silt with chalk blocks, with artefacts and other animal bone. Archival reference: HH76, site J1, main enclosure, new segment 7, layer 9.

Objectives: as OxA-8852

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3700–3520 cal BC

Final comment: F Healy (26 November 2006), segment 7, layer 9. Statistically consistent with nine other measurements from ditch base or from primary silts, including an articulated human skeleton and a pair of articulating cattle bones, inconsistent only with OxA-8852.

Hambledon Hill: Stepleton inner outwork, Dorset

Location: ST 849122
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1977–80

Archival body: Dorset County Museum

Description: a linear earthwork with a timber-framed rampart and the largest ditch of all the Neolithic earthworks on the hill, in places over 2m deep and over 3m wide, but very irregular. Its eastern end followed and slighted the east and south sides of the Stepleton enclosure. Beyond the enclosure to the west it followed the contours of the spur and continued for an uncertain distance beyond the excavated area.

Objectives: to date the earthwork as a step to refining the chronology of the enclosure.

Final comment: F Healy (26 November 2006), formal modelling of the chronology of Hambledon Hill suggests that the Stepleton inner outwork was constructed in *3630–3500 cal BC (95% probability; inner_const;* Bayliss *et al* 2008, table 4.2).

Laboratory comment: English Heritage (2013), four further dates from this site were funded before 1993 and are published in Bayliss *et al* (2012, 136–7; HAR-4433–5 and HAR-4437–8). Ten further samples were also dated between 1993 and 1998 (Bayliss *et al* 2015, 67–9; OxA-7026, -7044–5, -7059, -7100–1, -7835, UB-4135, and UB-4137).

References: Bayliss *et al* 2008
Bayliss *et al* 2012, 136–7
Bayliss *et al* 2015, 67-9
Mercer and Healy 2008

OxA–8858 4855 ±45 BP

δ^{13}C: -21.1‰

Sample: HH79 1098, submitted in June 1999 by F Healy

Material: animal bone (caprine bone, right humerus from 1 of 2 articulating sheep forelimbs) (A Legge)

Initial comment: part of a collection of bone, most of it from at last two sheep, including articulating right and left forelimbs but no skull fragments. There was also an articulating beaver hind limb. The collection lay in a layer of medium-brown silt with medium-packed chalk lumps and pebbles, which had entered the ditch from the exterior, overlying chalk rubble fills and underlying an early Bronze Age midden deposit. Archival reference: ST79 area 2B, inner outwork, new segment 5, cutting 11S, layer 3B.

Objectives: the sheep bones were thought to be the burial of a single articulated individual; this does not now seem to be the case. Dates on a sheep femur shaft from this find (OxA-7026 and OxA-7059; 4820 ±60 BP and 4660 ±60 BP; T′=3.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978) can no longer be taken with total confidence to have been made on an articulated sample, although they may have been. Dating part of a definitely articulating forelimb will provide a measurement more reliably close in age to the silts in which the bone was found, providing a check on the two existing measurements. An accurate age for these deposits is important because they are the latest datable Neolithic horizon in the innermost outwork, constraining the dates of the earlier stages of the sequence and providing an indication of the time by which the earthwork had ceased to function as a defence or barrier.

Calibrated date: *1σ:* 3660–3630 cal BC
2σ: 3710–3530 cal BC

Final comment: F Healy (26 November 2006), Segment 5, cutting 11S, layer 3B. From a dump of post-cranial bones from two sheep (including articulating right and left forelimbs), with a beaver hind limb. This sheep humerus was certainly articulated. Because these dates are older than UB-4135, from the chalk rubble fills in the same segment, the dump has been interpreted as redeposited from an earlier context. It is, however, possible to identify an originally undetected recut in the rubble fills in the area from which the sample for UB-4135 came, so that this bone dump may have been *in situ* after all.

OxA–8859 4825 ±45 BP

$\delta^{13}C$: -25.9‰

Sample: ST79 C34A, submitted in June 1999 by F Healy

Material: charcoal: *Corylus* sp., single fragment (P Austin)

Initial comment: part of a spread of burnt material, including coherent charred sticks, lying on a thin layer of primary silt. The deposit, which was predominantly of hazel, seems to represent collapsed, burnt hurdling, apparently the breastwork of the rampart behind the ditch. Oak uprights in the rampart structure are represented by charred timbers in some of the postholes in the bank area. Archival reference: ST79 area 2B, inner outwork, new segment 6, cutting 1N, layer 4A.

Objectives: the hazel is likely to have been cut and made into hurdling when the rampart was built, and is thus likely to have been only slightly older than that event. Its date will be close to that of the construction of the earthwork and will complement dates on articulated human burials from the ditch bottom (UB-4242 below, and OxA-7101 above), helping to refine the chronology of this earthwork and the complex of which it forms a part.

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3700–3520 cal BC

Final comment: F Healy (26 November 2006), segment 6, cutting 1N, layer 4A. The date is in good agreement with the sample's stratigraphic position.

OxA–8860 4810 ±45 BP

$\delta^{13}C$: -24.2‰

Sample: ST79 C34B, submitted in June 1999 by F Healy

Material: charcoal: *Corylus* sp., single fragment (P Austin)

Initial comment: from the same deposit as OxA-8859.

Objectives: as OxA-8859

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3660–3510 cal BC

Final comment: F Healy (26 November 2006), segment 6, cutting 1N, layer 4A. The date is in good agreement with the sample's stratigraphic position.

UB–4242 4738 ±28 BP

$\delta^{13}C$: -20.8 ±0.2‰

Sample: ST79 2726, submitted on 25 January 1997 by F Healy

Material: human bone (left femur of a young/younger mature adult) (J McKinley)

Initial comment: the sample forms part of an articulated skeleton, some bones of which were slightly displaced (by burrowing animals?) Found on the bottom of a segmented ditch near the butt of one segment. The skeleton lay on the chalk floor of the ditch under a dark grey-tan silty loam with medium-packed chalk lumps and pebbles and light grey mould. It is unclear whether this deposit (layer 3B) was part of the secondary silting of the ditch or the fill of a cut made through the lower secondary silts from a level with Beaker and early Bronze Age pottery. Archival reference: inner outwork, new segment 7, cutting 15/19, base of ditch.

Objectives: if the body was laid on the base of the ditch immediately after construction of the earthwork, before any silt had accumulated, it would be indistinguishable in age from the earthwork. If it was placed in a grave cut through the secondary silts to the base of the ditch, it would represent a so far unidentified aspect of activity on the site after the earthworks had gone out of use.

Calibrated date: *1σ:* 3630–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: F Healy (26 November 2006), segment 7, cutting 15/19, base of ditch. The date is in good agreement with the skeleton's stratigraphic position as part of the original earthwork.

High Throston, Cleveland

Location: NZ 486343
Lat. 54.42.06 N; Long. 01.14.45 W

Project manager: P G Johnson (Tees Archaeology), September 2002

Archival body: Tees Archaeology, Hartlepool Museum

Description: a local metal detectorist was searching an area of land which was being developed for new housing and discovered the rim of a pot. Tees Archaeology were notified and the area around the pit was excavated. The find spot occupies a false crest on the north-western slopes overlooking Hartlepool Bay. It lies within 100m of a small, deeply indented stream.

A small quantity of ash and burnt bone had been placed at the bottom of the pit, with a bronze spearhead on top along with a number of bronze pins, fragments of a bronze vessel, and a ring with a loop projecting from one edge.The crudely made, undecorated pot was then placed on top of the spearhead. After laboratory excavation by Dr Jennifer Jones at the University of Durham, the pot was shown to contain a remarkable collection of finds: six wire rings, one tin alloy bead, one circular spoked rouelle, four amber beads, and two jet beads.

Other finds recovered at the site included bronze rings, a large jet D-section bracelet 109mm in diameter, strips of bronze, and a rectangular jet spacer with two holes. This hoard seems to have been a one-off deposit, as an archaeological evaluation of the area failed to reveal any significant archaeological features and no other finds were made.These finds are clearly late Bronze Age, probably dating to the eighth or ninth century BC. This is a major find for the north-east of England and particularly from the area of the Tees Valley where very little late Bronze Age material is known.

Objectives: firstly, to ascertain precise date of deposition, and secondly to facilitate dating of similar artefacts through topological sequences by reinforcement of generally accepted dates.

Final comment: R Daniels (30 January 2009), the confirmation of the date of the deposit will be of great assistance in providing dating for the presence of diagnostically late

Bronze Age objects in the north-east of England. There are few dates from this period from the area between Yorkshire and Scotland.

Laboratory comment: English Heritage (27 May 2003), the results are clearly consistent with the attribution of the finds to the late Bronze Age. They are also statistically consistent with a single radiocarbon age, according to the test of Ward and Wilson (1978) (T′=0.3; T′(5%)=3.8, ν=1).

References: Ward and Wilson 1978

OxA–12257 2782 ±28 BP

$\delta^{13}C$: -27.2 ±0.2‰

Sample: HHT02 A, submitted on 7 January 2003 by J Jones

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2003)

Initial comment: from the shallow deposit situated directly below spearhead, containing charcoal and calcined bone. The hoard was deposited in a pit *c* 0.5m deep, cut into boulder clay. The fill of the pit was subsequently sealed by medieval ploughsoil.

Objectives: the deposition of the hoard appears to be funerary or ritual; the charcoal deposit was situated directly below the artefactual material and would seem to be part of the same event. Associated with calcined bone.

Calibrated date: *1σ:* 980–900 cal BC
2σ: 1010–840 cal BC

Final comment: R Daniels (30 January 2009), this date is within the range expected, and with its accompanying date provides a good chronological context for this type of material in the region.

OxA–12258 2758 ±31 BP

$\delta^{13}C$: -26.3 ±0.2‰

Sample: HHT02 B, submitted on 7 January 2003 by J Jones

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2003)

Initial comment: as OxA-12257

Objectives: as OxA-12257

Calibrated date: *1σ:* 930–840 cal BC
2σ: 1000–820 cal BC

Final comment: see OxA-12257

Higham Ferrers: Kings Meadow Lane (middle Saxon), Northamptonshire

Location: SP 95856935
Lat. 52.18.49 N; Long. 00.35.38 W

Project manager: A Hardy (Oxford Archaeological Unit), 1995

Archival body: Northampton Museum

Description: a multi-period site comprising of an Iron Age farmstead and associated enclosures with a Saxon settlement with a large oval enclosure.

Objectives: a human bone sample was submitted to establish whether the burial in the footprint of an Anglo-Saxon building is contemporary or earlier. A rivet wheat rachis was also submitted in order to elucidate the history of the crop.

Laboratory comment: English Heritage (9 June 2008), an infant burial was submitted for dating from within shallow oval feature 2604. The skeleton was articulated and near complete, although there was evident truncation of the top of the grave by medieval/post-medieval ploughing. The oval feature 2604 could not be dated although the other features in the vicinity can be demonstrated to be Saxon. It is rare to find human remains in Saxon settlement features. Other features on the site are Iron Age. It was hoped radiocarbon dating would indicate whether the burial belonged to the Iron Age or the Saxon phase of activity. A measurement (OxA-10125) on this skeleton was withdrawn after publication as a problem was detected in the pretreatment of bone collagen samples by the ultrafiltration method used at Oxford in 2001, in which small amounts of geological-age carbon may have contaminated the collagen (Bronk Ramsey *et al* 2004a). This means that the reported age of 1095 ±45 BP may be too early. Offsets of up to 200–300 years have been identified at other sites, but it is impossible to quantify the error in this sample (HFKM 95/SK 2591), which must therefore be regarded as having failed to date.

References: Bronk Ramsey 1995
Hardy *et al* 2007

OxA–10126 1150 ±45 BP

$\delta^{13}C$: -26.1‰

Sample: HFKM 95 2004, submitted on 26 September 2000 by L Moffett

Material: carbonised plant macrofossil (*Triticum turgidum* rachis) (L Moffett 2000)

Initial comment: from the fill of a shallow gully, 0.12m deep, one of several defining late Saxon, tenth-eleventh-century field boundaries relating to a settlement focus *c* 100m to the east. The location of the sample context is very close to the focus of a mid Saxon settlement, and late-seventh to eighth century gully, truncated by medieval/post medieval ridge and furrow ploughing.

Objectives: Triticum turgidum is a wheat whose history is poorly understood. Current well-dated records of *Triticum turgidum* in Britain are all clearly post-Conquest. There are, however, finds of *Triticum turgidum* from West Cotton, Northamptonshire, not far from Higham Ferrers, which are suspected may be late Saxon, though the ceramic and contextual evidence are unclear. Dating the *Triticum turgidum* from Higham Ferrers will clarify whether this region did indeed see an early introduction of this wheat, and will not only elucidate further the history of this crop, but may also have implications for contacts between the region and other areas, perhaps beyond Britain.

Calibrated date: *1σ:* cal AD 770–970
2σ: cal AD 730–1000

Final comment: L Moffett (2001), rivet wheat is now known from an increasing number of sites in the midlands from the early medieval period onwards, with the earliest find being this one with a pre-Conquest date.

Laboratory comment: English Heritage (17 May 2001), analysis shows that we can be 100% confident that the date of the rivet wheat is before the Norman Conquest in AD 1066.

Holme Dunes Reserve, Norfolk

Location: TF 712448
Lat. 52.58.22 N; Long. 00.32.59 E

Project manager: J Wells (English Heritage), 1999

Archival body: English Heritage

Description: a Bronze Age wooden sub-circular structure in the present intertidal zone. These samples represent stratigraphic investigations off-site, borehole HDR1.

Objectives: to date the initiation of peat growth at the site and approximate peat termination, associated with relative sea-level changes, and to relate this to the Holme-next-the-sea timber structure.

Final comment: J Wells (18 October 2000), four dates were sampled from buried peat sandwiched between estuarine silt and clay recorded in boreholes undertaken at Holme Dunes Reserve on the north Norfolk coast. This work was undertaken to provide broader stratigraphical context for a nearby (*c* 300m) Bronze Age sub-circular wooden structure that existed in the present intertidal zone. Radiocarbon and dendrochronological analyses on wood from timbers and an oak stump from the structure have dated its construction to BC 2049 (Bayliss *et al* 1999; Groves 2002). Peat exposed on the foreshore close to the structure indicated that peat formation and building of the timber circle may have been contemporaneous. However, radiocarbon dating of the exposed peat was ruled out due to disturbance by recent coastal activity. Therefore, an undisturbed stratigraphical sequence containing the equivalent peat was sought and found at borehole location HDR1. Two consecutive 1cm thick samples, from both the bottom and top of the buried peat (four samples in total) were submitted for radiocarbon dating.

Laboratory comment: Ancient Monuments Laboratory (27 April 2001), a further sample OxA-9612 (HDR 1d 390–391cm), was withdrawn and replaced by OxA-10207.

References: Bayliss *et al* 1999
Groves 2002

OxA–9610 3330 ±40 BP

$\delta^{13}C$: -28.0‰

Sample: HDR 1a 378–379cm, submitted on 13 December 1999 by J Wells

Material: waterlogged plant macrofossils: *Phragmites*, culm base and node (0.08g) (G Campbell 1999)

Initial comment: buried peat sandwiched between salt-marsh silts and clays, undisturbed since burial. The sample was taken from 378–379cm. The sampled peat was well humified suggesting non-permanent waterlogging during formation. The sample was below the water table (*c* -1.61m O.D.)

Objectives: to date the timing of the end of the peat growth and submergence by the sea. Erosive contact is probable and therefore the sample will only give an approximation of this event. The aim is to establish whether the wooden structure is contemporary with the peat.

Calibrated date: *1σ:* 1670–1530 cal BC
2σ: 1740–1500 cal BC

Final comment: J Wells (25 October 2000), top of the peat layer, probably erosive. Provides a maximum date for sea-level rise and site inundation. Definitely post-dates the structure.

OxA–9611 3535 ±39 BP

$\delta^{13}C$: -26.5‰

Sample: HDR1b 379–380cm, submitted on 13 December 1999 by J Wells

Material: waterlogged plant macrofossils (0.12g) (monocotyledenous culm base) (G Campbell 1999)

Initial comment: buried peat sandwiched between salt-marsh silts and clays, undisturbed since burial. The sample was taken from 379–380cm. The sampled peat was well humified suggesting non-permanent waterlogging during formation. The sample was below the water table (*c* -1.62m O.D.).

Objectives: to date the timing of the termination of peat growth and submergence by the sea. The aim is to establish whether the wooden structure is contemporary with some part of the peat.

Calibrated date: *1σ:* 1930–1770 cal BC
2σ: 1970–1740 cal BC

Final comment: J Wells (25 October 2000), the date supports and confirms the validity of the upper date received in OxA-9610.

OxA–9748 3650 ±100 BP

$\delta^{13}C$: -25.9‰

Sample: HDR1c 389–390cm, submitted on 13 December 1999 by J Wells

Material: waterlogged plant macrofossils: *Phragmites*, culm base (0.05g) (G Campbell 1999)

Initial comment: as OxA-9610, but taken from 389–390cm.

Objectives: as OxA-10207

Calibrated date: *1σ:* 2200–1890 cal BC
2σ: 2300–1740 cal BC

Final comment: J Wells (25 October 2000), this date supports and confirms the validity of the lower date (OxA-10207).

OxA–10207 3530 ±40 BP

$\delta^{13}C$: -24.3‰

Sample: HDR 1d 390–391cm, submitted on 13 December 1999 by J Wells

Material: waterlogged plant macrofossil (cf *Phragmites* sp., culm node) (G Campbell 1999)

Initial comment: as OxA-9610, but taken from 390–391cm. (*c* -1.73m OD).

Objectives: to date the timing of initiation of peat growth and regression of the sea. The aim is to establish whether the wooden structure is contemporary with some part of the peat.

Calibrated date: *1σ:* 1930–1770 cal BC
2σ: 1970–1740 cal BC

Final comment: J Wells (25 October 2000), the dating peat directly on the peat/clay boundary and constrains the timing of relative sea-level fall at this site. Although the date has a broad calibrated range, it does indicate that the Bronze Age structure was constructed very close to the change from mineral sedimentation to peat growth.

OxA–10208 3515 ±39 BP

$\delta^{13}C$: -25.8‰

Sample: HDR 1b 379–380cm, submitted on 13 December 1999 by J Wells

Material: waterlogged plant macrofossils (0.12g) (monocotylenous culm base) (G Campbell 1999)

Initial comment: replicate of OxA-9611.

Objectives: as OxA-9611

Calibrated date: *1σ:* 1900–1760 cal BC
2σ: 1950–1700 cal BC

Final comment: see OxA-9611

Laboratory comment: Ancient Monuments Laboratory (2001), the two measurements from 379–380cm are statistically consistent (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Their weighed mean (3525 ±28 BP) calibrates to 1940–1740 cal BC (95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–10209 3295 ±45 BP

$\delta^{13}C$: -28.0‰

Sample: HDR 1a 378–379cm, submitted on 13 December 1999 by J Wells

Material: waterlogged plant macrofossils (G Campbell 1999)

Initial comment: replicate of OxA-9610.

Objectives: as OxA-9610

Calibrated date: *1σ:* 1630–1500 cal BC
2σ: 1690–1450 cal BC

Final comment: see OxA-9610

Laboratory comment: Ancient Monuments Laboratory (2001), the two measurements from 378–379cm are statistically consistent (T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Their weighed mean (3315 ±30 BP) calibrates to 1690–1510 cal BC (95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

Holme Pierrepont: Great Briggs ring-ditch, Nottinghamshire

Location: SK 61913827
Lat. 52.56.17 N; Long. 01.04.43 W

Project manager: Graeme Guilbert (Trent and Peak Archaeological Trust), 1986–8

Archival body: Trent and Peak Archaeological Trust

Description: an excavated ring-ditch, initially detected as a cropmark, enclosing a group of pits containing Grimston ware.

Objectives: to establish a date for the pits, and hence the Grimston pottery, and arguably therefore the ring-ditch.

Final comment: G Guilbert (5 March 2002), these four results from separate fragments of hazelnut shell, all derived from the bottom quarter of the fill of a basin-shaped pit (18), are consistent with the anticipated early Neolithic context suggested by sherds of Grimston Ware recovered from this and other pits within the area. This area was enclosed by the ring-ditch situated on the sand-and-gravel floodplain terrace of the Trent Valley. Besides their values for knowledge of the local Neolithic, these results provide a useful addition to the corpus of dates applicable to Grimston pottery.

Laboratory comment: English Heritage (15 August 2014), the four measurements on different fragments of hazelnut shell from this feature are statistically consistent (T′=0.8; T′(5%)=7.8; ν=3; Ward and Wilson 1978).

References: Guilbert 2009
Ward and Wilson 1978

OxA–8488 4965 ±45 BP

$\delta^{13}C$: -22.7‰

Sample: GBR/1118/EIF (a), submitted in March 1998 by G Guilbert

Material: carbonised plant macrofossil (*Corylus* sp., single fragment of hazelnut shell) (A Bayliss 1998)

Initial comment: from a homogeneous sandy silt fill of a basin-shaped pit measuring up to 1.02m x 0.84m, with steeply sloping sides and flattish base. The pit was one of a group containing early Neolithic Grimston ware, all located within the area surrounded by the ring-ditch. All of these nutshell fragments came from the lowest 0.07m of sediment in pit 18, whereas none were found in the overlying 0.10m, though apparently the same deposit (and uppermost 0.13m not subjected to flotation). There were no apparent grounds to suspect intrusion or residuality. Most flintwork from the site is early-Neolithic (like the pottery), and the only two pieces that are definitely Mesolithic came from 25m and 28m east of pit 18, well outside the ring-ditch.

Objectives: the ring-ditch and associated features can be dated only by adducing the evidence of other sites producing Grimston ware, which is not closely datable, and certainly not in the Trent Valley, though few would dispute its general attribution to the early part of the Neolithic, ie much of the fourth millennium BC, perhaps even back into the late fifth. The date of these nutshells should be applicable to pit 18 and other pits in the group clustered within the ring-ditch, and hence to the ring-ditch itself, as well as to some point during the currency of Grimston Ware.

Calibrated date: *1σ:* 3790–3690 cal BC
2σ: 3940–3650 cal BC

Final comment: see series comments

OxA–8489 4940 ±45 BP

$\delta^{13}C$: -25.7‰

Sample: GBR/1118/EIF (b), submitted in March 1998 by G Guilbert

Material: carbonised plant macrofossil (single fragment of hazelnut shell (*Corylus* sp.)) (A Bayliss 1998)

Initial comment: as OxA-8488

Objectives: as OxA-8488

Calibrated date: *1σ:* 3780–3650 cal BC
2σ: 3900–3640 cal BC

Final comment: see series comments

OxA–8490 4930 ±50 BP

$\delta^{13}C$: -22.9‰

Sample: GBR/1118/EIF (c), submitted in March 1998 by G Guilbert

Material: carbonised plant macrofossil (single fragment of hazelnut shell (*Corylus* sp.)) (A Bayliss 1998)

Initial comment: as OxA-8488

Objectives: as OxA-8488

Calibrated date: *1σ:* 3770–3650 cal BC
2σ: 3900–3630 cal BC

Final comment: see series comments

OxA–8491 4910 ±45 BP

$\delta^{13}C$: -27.0‰

Sample: GBR/1118/EIF (d), submitted in March 1998 by G Guilbert

Material: carbonised plant macrofossil (single fragment of hazelnut shell (*Corylus* sp.)) (A Bayliss 1998)

Initial comment: as OxA-8488

Objectives: as OxA-8488

Calibrated date: *1σ:* 3710–3640 cal BC
2σ: 3790–3630 cal BC

Final comment: see series comments

Holme-next-the-Sea, Norfolk

Location: TF 7112545263
Lat. 52.58.37 N; Long. 00.32.56 E

Project manager: W Boismier (Norfolk Archaeological Unit), 1999, 2003, 2004, and 2008

Description: in 1998, a circle of timber posts surrounding an up-turned tree was found on Holme Beach. A subsequent programme of surveying, recording, and dating revealed that the structure was built in the spring or early summer of 2049 BC, during the early Bronze Age (Brennard and Taylor 2003). It has become known as the Holme I timber circle or as 'seahenge'.

During 1999, a walkover survey was conducted within the immediate environs of Holme I. This revealed a possible trackway, two possible fish-traps, and two logs surrounded by a ring of posts and wattling/hurdling (Brennard and Taylor 2003). Subsequent erosion showed that two outer circles of oak posts surrounded the two logs and wattling/hurdling. The structure has become known as the Holme II timber circle. Samples were collected from all four structures for radiocarbon dating.

Between 1999 and 2003, members of the public reported two further monuments on Holme Beach. One of these was a V-shaped fish-trap; the other was a possible pit.

In 2003, a second walkover survey was carried out. It examined all of the areas of beach within the Holme Dunes Nature Reserve. In total, 13 timber structures, 5 collections of posts, 13 or 14 individual posts, 3 or 4 planks, and a possible pit/erosion scour were observed and recorded. The condition of each was assessed along with potential threats. Of the monuments observed, timber circle Holme II, a Saxon fishtrap, a V-shaped fishtrap, and the possible pit have been noted before. The timbers within all of the sampled monuments are embedded in one of two deposits. Timbers in five are embedded in exposures of silt, which are thought to have developed from about 5900–4850 cal BC in saltmarsh conditions (Funnell and Pearson 1984). Timbers in the nine other monuments are embedded in peat beds which overlie the silt. Various peat beds have been exposed by tidal erosion on Holme Beach at least since the 1940s (when they were observed during aerial photography). They form a series of islands and are up to 0.3m thick. It is thought that the peat accumulated from *c* 1970–1740 cal BC; 3530 ±40 BP, OxA-10207; sample taken *c* 150m to the west of the structure; *see* above).

Objectives: to establish absolute dates for the individual monuments, to establish a chronology of land use, and to establish a chronology of environment change on Home Beach.

Final comment: D Robertson (9 May 2005), the 33 radiocarbon dates, together with six radiocarbon dates from core HDR1 (*see* Holme Dunes Reserve above), and dendrochronology dates from the Holme I timber circle (NER 33771), established an absolute chronology for activity and monument construction at Holme Beach. They have also contributed to the understanding of past environmental changes. The dates suggest three to four phases of monument construction on Holme Beach. Two to three phases have been identified during the Bronze Age, each of which was separated by a change in environmental conditions. There was one phase of activity in the Saxon period.

References: Brennand and Taylor 2003
Funnell and Pearson 1984

Holme-next-the-Sea: intertidal peat, Norfolk

Location: TL 711452
Lat. 52.58.35 N; Long. 00.32.55 E

Project manager: P Murphy (Centre of East Anglian Studies, University of East Anglia), August 2001

Archival body: Norfolk Museums Service

Description: Bronze Age deposits in the vicinity of 'seahenge' monument.

Objectives: to date this latest phase of activity.

Laboratory comment: Ancient Monuments Laboratory (15 January 2002), the two measurements (GU 5881–2) are not statistically different (T′=0.5; ν=1; T′(5%)=3.8; Ward and Wilson 1978) and so a weighted mean can be taken of the results before calibration. The weighted mean of 3305 ±35 BP gives a calibrated date range of 1690–1490 cal BC (95% confidence; Reimer *et al* 2004).

References: Bayliss *et al* 1999
Reimer *et al* 2004
Ward and Wilson 1978

GU–5881 3280 ±50 BP

$\delta^{13}C$*:* -26.9‰

Sample: LOR 2001 A, submitted on 28 September 2001 by P Murphy

Material: charcoal: *Alnus* sp. (30g) (R Gale 2001)

Initial comment: the sample came from an area of intertidal exposure of peat intercalated within intertidal muds. There was a localised concentration of heat-shattered stone, Collared Urn sherds, and charcoal. The peat itself is unsuitable for dating, since it included intrusive annelids and pholadids. For this reason, only extracted charcoal was submitted.

Objectives: this deposit represents a late phase of activity at the site (constructed 2049 BC). It must be contemporary with the establishment of fresh-water marsh conditions, following on from a former salt-marsh, in which the monument was built. It represents the latest Bronze Age use of the site before it was engulfed by peat. This phase of activity was not detected during the main excavation, and a date is required to complete the history of the site.

Calibrated date: *1σ:* 1630–1500 cal BC
2σ: 1690–1430 cal BC

Final comment: P Murphy (2002), after the submission for dating, analysis of the plant macrofossils and insects was undertaken. These confirmed that there was a major change in local palaeoenvironments, from intertidal to fresh water conditions, developed behind a coastal barrier. It had been inferred that this must substantially have post-dated construction of the monument. The dating results are entirely consistent with the associated artefactual material.

GU–5882 3330 ±50 BP

$\delta^{13}C$*:* -26.8‰

Sample: LOR 2001 B, submitted on 28 September 2001 by P Murphy

Material: charcoal: *Alnus* sp. (30g) (R Gale 2001)

Initial comment: a replicate of GU-5881.

Objectives: as GU-5881

Calibrated date: *1σ:* 1690–1530 cal BC
2σ: 1750–1500 cal BC

Final comment: *see* GU-5881

Holme-next-the-Sea: timber circle, Norfolk

Location: TF 7112545263
Lat. 52.58.37 N; Long. 00.32.56 E

Project manager: M Brennand (Norfolk Archaeological Unit), 1998

Archival body: Norfolk Museums Service

Description: an upstanding ring of timbers surrounding an inverted oak tree bole, loated on the beach at Holme-next-the-Sea. The timber ring has a maximum diameter of 6.6m, and consists of 55 oak posts. The central feature is the inverted tree bole, measuring 1.2m in diameter. Consecutive 20 growth-ring blocks were submitted for dating from the central tree.

Objectives: to determine a date for the construction of the structure. This series of high-precision dates will allow wiggle-matching of the dendrochronological samples to take place, producing very precise dating evidence.

Final comment: A Bayliss (13 December 1999), the combined analysis of the tree-ring and radiocarbon data demonstrates that the wiggle-match sequence dates to 2200–2081 BC inclusive (Bayliss *et al* 1999). The overall agreement for this analysis, using the calibration dataset of Stuiver *et al* 1999, is A=27.7% (An=26.7%). The best overall agreement is obtained by using the dataset of Pearson and Stuiver (1986), A=40.2% (An=26.7%).

Laboratory comment: English Heritage (2002), preliminary analysis indicated that the inverted tree bole may have been felled a year earlier than some of the posts (Bayliss *et al* 1999), but this now appears not to be the case. The samples were taken close to the root buttressing and are thus likely to suffer increased distortion of ring pattern. The problem ring(s) were at 2056/2055 BC, which was originally measured as a single ring with wide spring growth, but analysis of the rest of the assemblage indicates that this must actually be two rings. The full dendrochronological analysis of the inverted tree bole, and the posts forming the surrounding timber circle, has therefore indicated that the structure was erected shortly after felling in the spring or early summer of 2049 BC. The posts and tree bole are all contemporaneous, and there is no evidence for later modifications or repairs. The tree bole is probably derived from the same tree as several of the posts, and does not appear to have any major significance as far as the use of a special tree for the central focus of the structure.

References: Bayliss *et al* 1999
Groves 2002
Pearson and Stuiver 1986
Stuiver *et al* 1998

UB–4434 3716 ±21 BP

$\delta^{13}C$: -25.8 ±0.2‰

Sample: 66/107 Q9782, submitted on 13 January 1999 by A Bayliss

Material: wood (waterlogged): *Quercus* sp., rings 1–20 (M Taylor and C Groves 1998)

Initial comment: the exposed timbers were embedded in an intertidal grey clay silt. This sample derives from the central stump of the timber circle.

Objectives: to provide precise dating evidence for the structure.

Calibrated date: *1σ:* 2190–2040 cal BC
2σ: 2200–2030 cal BC

Final comment: A Bayliss (9 December 1999), rings 1–20 of the wiggle-match sequence. The combined analysis of the tree-ring and radiocarbon data demonstrates that this sample dates to 2200–2181 BC. The radiocarbon measurement is in good agreement with this date (A=65.2%).

UB–4435 3710 ±21 BP

$\delta^{13}C$: -26.3 ±0.2‰

Sample: 66/107 Q9782, submitted on 13 January 1999 by A Bayliss

Material: wood (waterlogged): *Quercus* sp., rings 21–40 (M Taylor and C Groves 1998)

Initial comment: as UB-4434

Objectives: as UB-4434

Calibrated date: *1σ:* 2140–2035 cal BC
2σ: 2200–2030 cal BC

Final comment: A Bayliss (9 December 1999), rings 21–40 of the wiggle-match sequence. The combined analysis of the tree-ring and radiocarbon data demonstrates that this sample dates to 2180–2161 BC. The radiocarbon measurement is in poor agreement with this date (A=5.6%).

UB–4436 3748 ±21 BP

$\delta^{13}C$: -25.8 ±0.2‰

Sample: 66/107 Q9782, submitted on 13 January 1999 by A Bayliss

Material: wood (waterlogged): *Quercus* sp., rings 41–60 (M Taylor and C Groves 1998)

Initial comment: as UB-4434

Objectives: as UB-4434

Calibrated date: *1σ:* 2200–2135 cal BC
2σ: 2270–2045 cal BC

Final comment: A Bayliss (9 December 1999), rings 41–60 of the wiggle-match sequence. The combined analysis of the tree-ring and radiocarbon data demonstrates that this sample dates to 2160–2141 BC. The radiocarbon measurement is in good agreement with this date (A=142.6%).

UB–4437 3719 ±21 BP

$\delta^{13}C$: -25.1 ±0.2‰

Sample: 66/107 Q9782, submitted on 13 January 1999 by A Bayliss

Material: wood (waterlogged): *Quercus* sp., rings 61–80 (M Taylor and C Groves 1998)

Initial comment: as UB-4434

Objectives: as UB-4434

Calibrated date: *1σ:* 2195–2040 cal BC
2σ: 2200–2030 cal BC

Final comment: A Bayliss (13 December 1999), rings 61–80 of the wiggle-match sequence. The combined analysis of the tree-ring and radiocarbon data demonstrates that this sample dates to 2140–2121 BC. The radiocarbon measurement is in good agreement with this date (A=72.7%).

UB–4438 3684 ±21 BP

$\delta^{13}C$: -25.4 ±0.2‰

Sample: 66/107 Q9782, submitted on 13 January 1999 by A Bayliss

Material: wood (waterlogged): *Quercus* sp., rings 81–100 (M Taylor and C Groves 1998)

Initial comment: as UB-4434

Objectives: as UB-4434

Calibrated date: *1σ:* 2135–2025 cal BC
2σ: 2140–1980 cal BC

Final comment: A Bayliss (13 December 1999), rings 81–100 of the wiggle-match sequence. The combined analysis of the tree-ring and radiocarbon data demonstrates that this sample dates to 2120–2101 BC. The radiocarbon measurement is in good agreement with this date (A=138.7%).

UB–4439 3676 ±21 BP

$\delta^{13}C$: -25.5 ±0.2‰

Sample: 66/107 Q9782, submitted on 13 January 1999 by A Bayliss

Material: wood (waterlogged): *Quercus* sp., rings 101–120 (M Taylor and C Groves 1998)

Initial comment: as UB-4434

Objectives: as UB-4434

Calibrated date: *1σ:* 2130–2025 cal BC
2σ: 2140–1975 cal BC

Final comment: A Bayliss (13 December 1999), rings 101–120 of the wiggle-match sequence. The combined analysis of the tree-ring and radiocarbon data demonstrates that this sample dates to 2100–2081 BC. The radiocarbon measurement is in good agreement with this date (A=63.4%).

Holme-next-the-Sea: walk-over survey (2000), Norfolk

Location: TF 7112545263
Lat. 52.58.37 N; Long. 00.32.56 E

Project manager: M Brennand (Norfolk Archaeological Unit), 1999

Archival body: Norfolk Museums and Archaeology Service

Description: the material was sampled from several timber structures and post settings within the immediate environs of the Holme timber circle, within eroding peat beds in the intertidal zone, which is covered with seawater twice daily.

Objectives: to establish absolute dates for the individual monuments in the environs of the Holme I timber circle, to establish a chronology of land-use for in the environs of the Holme I timber circle and to establish a chronology of environmental change in the environs of the Holme I timber circle.

Final comment: D Robertson (9 May 2005), the nine radiocarbon dates, together with six radiocarbon dates from core HDR1 (*see* Holme Dunes Reserve above) and dendrochronology dates from the Holme I timber circle (NER 33771), established an absolute chronology for activity and monument construction at Holme Beach. They have also contributed to the understanding of past environmental changes.

References: Ward and Wilson 1978

GU–5800 1250 ±50 BP

$\delta^{13}C$: -28.2‰

Sample: Timber 084 sample 115, submitted on 12 January 2000 by M Brennand

Material: wood (waterlogged): *Alnus* sp., 18 years growth with bark (R Gale 2000)

Initial comment: one of 102 posts or stakes forming a v-shaped arrangement. The timbers were driven into a basal grey silt which we know pre-dates the Bronze Age. There is no further stratigraphic relationship. The structure could be any date, even twentieth century.

Objectives: to establish a chronology for the land use in the environs of the Holme I timber circle with particular reference to further prehistoric remains and the exploitation of fresh and salt water resources.

Calibrated date: *1σ:* cal AD 680–860
2σ: cal AD 660–900

Final comment: D Robertson (9 May 2005), the sample successfully demonstrated the use of Holme Beach and the exploitation of saltwater resources during the early/middle Saxon period. In addition, as the fish-trap was at the same elevation as the Holme I timber circle, the dating of the sample has provided a *terminus ante quem* for the tidal inundation of Holme Beach.

A second sample was collected from the structure (GU-5801, timber 083, sample 116). Although both samples were early/middle Saxon in date, the results from them were statistically different from one another. It was suggested that this could mean that the monument was maintained for several centuries.

Laboratory comment: see GU-5803

GU–5801 1510 ±50 BP

$\delta^{13}C$: -22.6‰

Sample: Timber 083 sample 116, submitted on 12 January 2000 by M Brennand

Material: wood (waterlogged): *Alnus* sp., 18 years growth with bark (R Gale 2000)

Initial comment: as GU-5800, from the north-western arm of the v-shaped arrangement.

Objectives: as GU-5800

Calibrated date: *1σ:* cal AD 430–610
2σ: cal AD 420–650

Final comment: see GU-5800

Laboratory comment: see GU-5803

GU–5802 1650 ±50 BP

$\delta^{13}C$: -28.2‰

Sample: Timber 086 sample 118, submitted on 12 January 2000 by M Brennand

Material: wood (waterlogged): Pomoideae, 11 years growth with bark (R Gale 2000)

Initial comment: from a post driven into an extensive deposit of grey silt. The post is one of 13 stakes running in a south-west to north-east direction. The silt material was laid down prior to the early Bronze Age but the stakes could be of any post Bronze Age date. There are no other stratigraphic relationships. *See* also GU-5803 for a measurement on another timber from the same group of 13 stakes.

Objectives: as GU-5800

Calibrated date: *1σ:* cal AD 340–430
2σ: cal AD 250–540

Final comment: D Robertson (9 May 2005), the sample successfully dated the alignment to the early/middle Saxon period. It also demonstrated the use of Holme Beach and the exploitation of saltwater resources at that time. In addition, as the alignment was at the same elevation as the Holme I timber circle, the dating of the sample has provided a *terminus ante quem* for the tidal inundation of Holme Beach. A second sample was collected from the alignment (GU-5803, timber 073, sample 117). Although both samples were early/middle Saxon in date, the results from them were statistically different from one another. It was suggested that this could mean that the monument was maintained for several centuries. In 2004, it was hoped it would be possible to collect and date further radiocarbon samples to test this hypothesis. Unfortunately, the monument was not visible during any of the monitoring or sampling visits (it was either buried by sand or has been destroyed by tidal erosion).

Laboratory comment: see GU-5803

GU–5803 1280 ±50 BP

$\delta^{13}C$: -30.5‰

Sample: Timber 073 sample 117, submitted on 12 January 2000 by M Brennand

Material: wood (waterlogged): *Acer* sp., minimum of 16 years growth, all surfaces worked, no bark (160mm x 45mm) (R Gale 2000)

Initial comment: as GU-5802

Objectives: as GU-5800

Calibrated date: *1σ:* cal AD 660–780
2σ: cal AD 650–890

Final comment: see GU-5802

Laboratory comment: English Heritage (2001), the results from the Anglo-Saxon post alignments are slightly problematic. Although all the results are consistently early or middle Saxon, each pair of results from a single alignment is statistically significantly different, (GU- 5800–1; T′=13.5; and GU-5802–3, T′=27.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The differences between these measurements are sufficiently large that it is extremely unlikely that they are simply an anomaly of measurement statistics. If these alignments really are coherent structures, then they must be maintained for several centuries after they were initially constructed. This hypothesis can only be tested by submitting more posts for dating.

References: Ward and Wilson 1978

GU–5804 3270 ±90 BP

$\delta^{13}C$: -27.4‰

Sample: Timber 080 sample 120, submitted on 12 January 2000 by M Brennand

Material: wood (waterlogged): *Alnus* sp., roundwood; probably 28–30 rings, outer surface abraded, only outmost 4–5 rings dated (R Gale 2000)

Initial comment: from a horizontally lain timber, one of at least 52 large timber pieces laying parallel to one another over a distance of 20m. The pieces are above the basal grey silt and appear to be contemporary with the peat but this relationship is not certain. All the pieces appear to be contemporary. *See* GU-5805 and GU-5806 for further measurements from other timbers from the same group of 52 timbers.

Objectives: to establish details of the environment in the environs of the Holme I timber circle. The timbers, whether naturally or anthropogenically laid down, appear to mark the course of a palaeochannel, likely to date from the prehistoric period, and the relationship between this and the Holme I timber circle is required.

Calibrated date: *1σ:* 1650–1440 cal BC
2σ: 1750–1320 cal BC

Final comment: D Robertson (9 May 2005), the lower contact of the peat beds at Holme has been dated by OxA-10207 to 1970–1740 cal BC (*see* above). This, and the fact that the structure was found on the surface of the peat beds, led to the hypothesis that the structure and the ?palaeochannel post-dated Holme I (Holme I has been dated to 2049 BC by dendrochronology). The dating of the sample was statistically consistent with the dates of other two samples from the structure (GU-5805 and GU-5806). The three dates demonstrated that the ?palaeochannel formed after Holme I was built and that the possible trackway was constructed a few centuries later. It is still uncertain whether or not the structure was man-made or the result of natural accumulation in the possible palaeochannel.

Laboratory comment: English Heritage (2001), the three samples from the palaeochannel are statistically consistent (GU-5804–6; T′=3.6; T′(5%)=6.0; ν=2; Ward and Wilson 1978) and could therefore all be part of the same structure (trackway?). If so, this is a few centuries later than the Home I timber circle.

References: Ward and Wilson 1978

GU–5805 3380 ±50 BP

$\delta^{13}C$: -28.2‰

Sample: Timber 081 sample 122, submitted on 12 January 2000 by M Brennand

Material: wood (waterlogged): *Alnus* sp., 11–12 years growth with bark (R Gale 2000)

Initial comment: as GU-5804

Objectives: as GU-5804

Calibrated date: *1σ:* 1750–1620 cal BC
2σ: 1870–1530 cal BC

Final comment: see GU-5804

Laboratory comment: see GU-5804

GU–5806 3250 ±50 BP

$\delta^{13}C$: -27.7‰

Sample: Timber 082 sample 121, submitted on 12 January 2000 by N Brennand

Material: wood (waterlogged): *Alnus* sp., 6 years growth with bark (R Gale 2000)

Initial comment: as GU-5804

Objectives: as GU-5804

Calibrated date: *1σ:* 1610–1450 cal BC
2σ: 1640–1420 cal BC

Final comment: see GU-5804

Laboratory comment: see GU-5804

References: Ward and Wilson 1978

GU–5807 3770 ±50 BP

$\delta^{13}C$: -27.1‰

Sample: Timber 076 sample 123, submitted on 12 January 2000 by M Brennand

Material: wood (waterlogged): bark, unidentified; from roundwood (R Gale 2000)

Initial comment: from Holme II timber circle from an extensive timber, probably oak, lain horizontal. One of two timbers lain parallel to one another surrounded by a sub-oval wicker construction. The timbers are situated on top of the grey basal silt. Both timbers have a 'dished' cut within their upper surface. There are no further stratigraphic relationships.

Objectives: to establish further information on the environs of the Holme I timber circle with particular reference to potential contemporary structures.

Calibrated date: *1σ:* 2290–2130 cal BC
2σ: 2350–2030 cal BC

Final comment: D Robertson (9 May 2005), the date of this sample was statistically consistent with the date of the second sample (GU-5808; T′=0.2; T(5%)=3.8; ν=1; Ward and Wilson 1978). Together the samples confirmed that Holme II was constructed during the early Bronze Age, either at about the same time as Holme I (which was dated by dendrochronology to 2049 BC) or in the few centuries before hand. They also confirmed the suspicion that Holme I was not constructed in isolation and that it was part of a wider monument landscape.

References: Ward and Wilson 1978

GU–5808 3810 ±70 BP

$\delta^{13}C$: -24.4‰

Sample: Timber 074 sample 124, submitted on 12 January 2000 by M Brennand

Material: wood (waterlogged): *Quercus* sp., roundwood with 6 years growth with bark (R Gale 2000)

Initial comment: from Holme II timber circle from the lowest course of wattle lining or fence forming a sub-rounded structured surrounding two horizontally lain timber logs (*see* timber 076, GU-5807). The sample is from the rod or weaver on the southern side of the structure. The structure overlies the basal grey silt but there is no other stratigraphic relationship.

Objectives: as GU-5807

Calibrated date: *1σ:* 2400–2140 cal BC
2σ: 2470–2030 cal BC

Final comment: see GU-5807

Laboratory comment: see GU-5807

Howick, Sea Houses Farm, Northumberland

Location: NU 25851660
Lat. 55.26.34 N; Long. 01.35.34 W

Project manager: C Waddington (University of Newcastle upon Tyne), June to August 2002

Archival body: University of Newcastle upon Tyne

Description: a rural site that includes an early Bronze Age cist cemetery and a Mesolithic settlement. The Mesolithic site consists of a circular sunken floored structure that is truncated by a cliff and sheep burials on its southern side. The settlement has at least two, and possibly three, distinct structural phases together with a sequence of occupation levels inside it. The internal features include successive hearths, together with pits, scoops, and stakeholes. Over 10,000 flints were recovered together with charred bone, hazelnut shell, ochre, and charred wood fragments.

Objectives: to identify the length of time the settlement was occupied; to determine whether phase B of the house is a genuinely separate structural episode than phase C or whether it is part of the same constructional phase; also, to provide dating evidence to help understand the lithic typology and sequencing.

Final comment: C Waddington (21 June 2004), the dating results from the Howick but have proved extremely successful in dating the structure to the Mesolithic period with the initial construction dated to *7970–7760 cal BC (95% probability; start_structure;* Waddington 2007, fig 6.2). Moreover, the quality of dates from the tight stratigraphic sequence have allowed not only each phase of occupation to be dated but also the duration of occupation of each phase and the recognition of an otherwise unknown later phase of Mesolithic occupation on the site of the hut. By mathematically modelling the data, the date ranges have been able to be tightened and this has given a more precise suite of dates that allows questions concerning the occupation of the hut to be answered more fully than would otherwise be the case. In particular, the dates have demonstrated that the stratigraphic evidence for different phases of hut construction were correct and that the duration of occupation at the site was significantly longer than could have been expected given the current models of hunter-gather settlement in the UK. Although there is still a probability associated with the date ranges obtained for each phase of occupation, the dating has provided unequivocal results that show occupation lasted for at least several consecutive generations, and this is something that has not been able to be demonstrated before. The dating program of the hut deposits has provided the first radiocarbon dates for a stratified Mesolithic flint assemblage in north-east England. The early eighth millennium cal BC dates push the 'narrow-blade' industry of the British Mesolithic further back than had previously been thought. Scalene triangle microlithics predominated in this assemblage although backed blades, crescents, triangles, points, and geometrics were also present. No typological changes between tool forms from different occupation phases were observed. As the date range of occupation has been able to be accurately and precisely dated this means that the site can be compared and contrasted with other north-western European sites that are genuinely contemporaneous. Indeed the quality of the Howick results has prompted the re-evaluation of dated from a number of other significant Mesolithic sites in north-western Europe.

Overall the dating of the Howick hut deposits has proved extremely successful in answering the key questions relating to the timing, duration and, therefore, the nature of occupation. The lengthy occupation of the site indicated by the dating programme will contribute to debate over just how mobile coastal hunter-gatherers were during the eighth millennium in Britain. Each of the dated is significant in its own right and adds to the overall chronology of the site, but together the dates provide a firm basis for understanding the various temporal aspects of the site.

References: Boomer *et al* 2007
Waddington *et al* 2001
Waddington 2007

OxA–11801 8734 ±37 BP

δ^{13}C: -23.7‰

Sample: Structure 1, 047, submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: the hearth feature is cut into the natural sand and overlain by hearth 291. It has been burnt *in situ*, therefore the possibility of residuality or intrusion is unlikely.

Objectives: to establish when and for how long the settlement was occupied.

Calibrated date: *1σ:* 7800–7660 cal BC
2σ: 7950–7600 cal BC

Final comment: C Waddington (21 June 2004), this sample has helped establish the timing and duration of the phase 1A occupation of the Mesolithic hut by providing the earliest posterior density estimate for a context from the site.

OxA–11802 8754 ±38 BP

δ^{13}C: -25.1 ±0.2‰

Sample: Structure 1, 357, submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: hearth feature lying below hearth [340] and above hearth [379]. It has been burnt *in situ*, therefore residuality or intrusion is unlikely.

Objectives: as OxA-11801

Calibrated date: *1σ:* 7940–7720 cal BC
2σ: 7960–7610 cal BC

Final comment: C Waddington (21 June 2004), this sample has assisted in establishing the timing of the phase 1 occupation of the Mesolithic hut and contributed to establishing the duration of occupation.

OxA–11803 8763 ±38 BP

δ^{13}C: -24.0 ±0.2‰

Sample: Structure 1, 291, submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: this hearth is situated below hearth feature 340 and above hearth 379. It has been burnt *in situ*, therefore the possibility of residuality or intrusion is unlikely.

Objectives: as OxA-11801

Calibrated date: *1σ:* 7940–7730 cal BC
2σ: 7970–7640 cal BC

Final comment: C Waddington (21 June 2004), this sample has helped establish the timing and duration of the Mesolithic hut, particularly in relation to phase 1A.

OxA–11804 8802 ±38 BP

δ^{13}C: -23.8 ±0.2‰

Sample: Structure 1, 340, submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: burnt deposit (340) is situated below hearth (268) and above hearth (357), (291), (355), and (367). *In situ* burning means residuality or intrusion is unlikely. A burnt deposit, part of the large hearth area, overlying lower phase C hearths.

Objectives: as OxA-11801

Calibrated date: *1σ:* 7960–7750 cal BC
2σ: 8180–7730 cal BC

Final comment: C Waddington (21 June 2004), this sample has helped establish the timing and duration of occupation of phase 1B from the Mesolithic hut.

OxA–11805 8324 ±37 BP

δ^{13}C: -23.7 ±0.2‰

Sample: Structure 1, 047, submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Wadidngton 2002)

Initial comment: burnt hearth feature situated below subsoil (003). *In situ* burning has taken place. Situated above occupation debris layer (049). Situated next to hearth-type feature (063). As burning was *in situ*, residuality or intrusion is unlikely. The burnt heart feature cut into the lower archaeological deposits.

Objectives: as OxA-11801

Calibrated date: *1σ:* 7480–7330 cal BC
2σ: 7520–7300 cal BC

Final comment: C Waddington (21 June 2004), this sample was submitted to help establish when and for how long the settlement was occupied, however by comparing the result with two others from the same context it is clear that this date is from re-worked material.

OxA–11806 8278 ±35 BP

δ^{13}C: -23.4 ±0.2‰

Sample: Structure 1, 063(a), submitted on 4 September 2002 by C Waddington

Material: waterlogged plant macrofossil (hazelnut shell; single fragment) (C Waddington 2000)

Initial comment: burnt hearth-type feature where *in situ* burning has taken place. Situated below subsoil (003) and on top of occupation debris layer (049). Situated next to hearth feature (047). *In situ* burning, therefore the possibility of residuality or intrusion is unlikely. The burnt hearth feature cut into the lower archaeological deposits.

Objectives: as OxA-11801

Calibrated date: *1σ:* 7450–7200 cal BC
2σ: 7480–7180 cal BC

Final comment: C Waddington (21 June 2004), this sample has contributed to establishing the duration of occupation of the Mesolithic hut, and in particular providing a date associated with the final phase of activity represented on the site.

OxA–11807 8233 ±36 BP

δ*13C:* -26.6 ±0.2‰

Sample: Structure 1, 063(b), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2000)

Initial comment: as OxA-11806

Objectives: as OxA-11801

Calibrated date: *1σ:* 7340–7170 cal BC
2σ: 7450–7080 cal BC

Final comment: see OxA-11806

OxA–11826 8630 ±40 BP

δ*13C:* -23.4 ±0.2‰

Sample: Structure 1, 173(a), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: in situ hearth located below subsoil (003) and above occupation deposit (049). Situated close to hearths (047) and (063) near centre of structure. *In situ* burning therefore residuality or intrusion is unlikely. The burnt hearth feature cut into lower archaeological deposits.

Objectives: as OxA-11801

Calibrated date: *1σ:* 7640–7590 cal BC
2σ: 7740–7580 cal BC

Final comment: C Waddington (21 June 2004), this sample has helped establish the timing and duration of occupation of the Mesolithic hut. This sample date is of particular significance for dating the phase 3 occupation.

OxA–11827 8700 ±45 BP

δ*13C:* -22.6 ±0.2‰

Sample: Structure 1, 173(b), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-11826

Objectives: as OxA-11801

Calibrated date: *1σ:* 7760–7600 cal BC
2σ: 7940–7590 cal BC

Final comment: see OxA-11826

OxA–11828 8785 ±45 BP

δ*13C:* -22.8 ±0.2‰

Sample: Structure 1, 293(a), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: hearth feature 293 is situated below occupation deposit (049) and is cut into lower occupation deposit (210). *In situ* burning therefore residuality or intrusion is highly unlikely. The burnt hearth feature cut into lower archaeological deposits.

Objectives: as OxA-11801

Calibrated date: *1σ:* 7960–7740 cal BC
2σ: 8170–7650 cal BC

Final comment: C Waddington (21 June 2004), this sample has helped establish the timing and duration of occupation of the Mesolithic hut, particularly in relation to phase 1B and phase 2.

OxA–11829 8890 ±45 BP

δ*13C:* -23.9 ±0.2‰

Sample: Structure 1, 293(b), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-11828

Objectives: as OxA-11801

Calibrated date: *1σ:* 8230–7950 cal BC
2σ: 8250–7830 cal BC

Final comment: see OxA-11828

OxA–11830 8715 ±50 BP

δ*13C:* -25.2 ±0.2‰

Sample: Structure 1, 109(a), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: feature 109, a lining for a roasting/burning pit is situated below occupation (049) and above occupation layer (210). *In situ* burning means residuality or intrusion is unlikely. The burnt hearth feature cut into archaeological deposits.

Objectives: as OxA-11802

Calibrated date: *1σ:* 7790–7600 cal BC
2σ: 7960–7590 cal BC

Final comment: C Waddington (21 June 2004), this sample has helped establish the timing and duration of occupation, and particularly the phase 2 occupation of the hut.

OxA–11831 8715 ±45 BP

$\delta^{13}C$: -28.2 ±0.2‰

Sample: Structure 1, 109(b), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-11830

Objectives: as OxA-11801

Calibrated date: *1σ:* 7790–7600 cal BC
2σ: 7950–7590 cal BC

Final comment: see OxA-11830

OxA–11832 8780 ±45 BP

$\delta^{13}C$: -25.0 ±0.2‰

Sample: Structure 1, 158(a), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: hearth feature 158 is situated below upper occupation layer (049) and above occupation layer (210). *In situ* burning means residuality or intrusion is unlikely. The burnt hearth-type feature cut into archaeological deposits.

Objectives: as OxA-11802

Calibrated date: *1σ:* 7960–7730 cal BC
2σ: 8170–7650 cal BC

Final comment: see OxA-11830

OxA–11853 8790 ±45 BP

$\delta^{13}C$: -23.1 ±0.2‰

Sample: Structure 1, 158(b), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-11832

Objectives: as OxA-11801

Calibrated date: *1σ:* 7960–7740 cal BC
2σ: 8180–7670 cal BC

Final comment: see OxA-11830

OxA–11854 8710 ±45 BP

$\delta^{13}C$: -23.1 ±0.2‰

Sample: Structure 1, 268(a), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: hearth feature (268) is situated below occupation layer (049) and above occupation layer (210) and above heat-affected sand (264). *In situ* burning means residuality or intrusion is unlikely. The burnt hearth-type feature cut into archaeological deposits.

Objectives: as OxA-11801

Calibrated date: *1σ:* 7790–7600 cal BC
2σ: 7940–7590 cal BC

Final comment: see OxA-11804

OxA–11855 8650 ±45 BP

$\delta^{13}C$: -22.4 ±0.2‰

Sample: Structure 1, 268(b), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-11854

Objectives: as OxA-11801

Calibrated date: *1σ:* 7710–7590 cal BC
2σ: 7750–7580 cal BC

Final comment: see OxA-11804

OxA–11856 8785 ±45 BP

$\delta^{13}C$: -26.5 ±0.2‰

Sample: Structure 1, 379(a), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: sealed hearth cut into natural sand. It is part of a sequence of hearths and lay below 357. *In situ* burning means residuality or intrusion is unlikely. The sample is from a deposit cut into natural sand >1m below modern surface.

Objectives: as OxA-11801

Calibrated date: *1σ:* 7960–7740 cal BC
2σ: 8170–7650 cal BC

Final comment: C Waddington (21 June 2004), this sample, together with sister sample OxA-11857, has helped determine the timing and duration of the phase 1A occupation of the Mesolithic hut.

OxA–11857 8750 ±45 BP

$\delta^{13}C$: -23.6 ±0.2‰

Sample: Structure 1, 379(b), submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-11856

Objectives: as OxA-11801

Calibrated date: *1σ:* 7940–7680 cal BC
2σ: 7970–7600 cal BC

Final comment: see OxA-11856

OxA–12292 8785 ±40 BP

δ¹³C: -25.8 ±0.2‰

Sample: HEX02, 383B, submitted on 27 January 2003 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: sample taken from a hearth feature where *in situ* burning had taken place. The hearth was very low in the deep archaeological stratigraphy and had therefore not suffered from roof or mole penetration. As the burning is *in situ,* it is not a residual sample.

Objectives: to establish the minimum length of time the Mesolithic hut was occupied. This will have important implications for understanding Mesolithic settlement.

Calibrated date: *1σ:* 7960–7740 cal BC
2σ: 8170–7680 cal BC

Final comment: C Waddington (21 June 2004), this sample, together with sister sample OxA-12402, has helped establish the timing and duration of the phase 1A occupation of the Mesolithic hut.

OxA–12293 8280 ±40 BP

δ¹³C: -23.7 ±0.2‰

Sample: HEX02, 055B, submitted on 27 January 2003 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2000)

Initial comment: sample came from a small burnt feature that was a circular pit where *in situ* burning had taken place. It formed part of a complex of hearth-type features at this level. As the burning is *in situ* it is not a residual sample.

Objectives: as OxA-12292

Calibrated date: *1σ:* 7450–7190 cal BC
2σ: 7480–7170 cal BC

Final comment: C Waddington (21 June 2004), this sample provided evidence for the final phase of activity on the hut site that was significantly later than the final phase of occupation of the site - thus demonstrating on additional phase of re-occupation/activity not immediately apparent from observation of the stratigraphy alone.

OxA–12294 8690 ±40 BP

δ¹³C: -24.4 ±0.2‰

Sample: Structure 1, 047A, submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-11805

Objectives: as OxA-11801

Calibrated date: *1σ:* 7750–7600 cal BC
2σ: 7800–7590 cal BC

Final comment: C Waddington (21 June 2004), this date has contributed to developing the chronology of the site and helped establish how long the settlement was occupied, and in particular the final phase of activity that was not previously recognised in the stratigraphy.

OxA–12322 8310 ±4230 BP

δ¹³C: -23.5 ±0.2‰

Sample: HEX02, 210(1)A, submitted on 27 January 2003 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: an area of *in situ* burning in occupation layer (210). The sample was taken from a burnt feature (210) (1) and is not residual as burnt *in situ.*

Objectives: as OxA-12292

Calibrated date: *1σ:* 15520–3660 cal BC
2σ: 1955 cal BC–cal AD 770

Final comment: C Waddington (21 June 2004), this sample was intended to assist in dating the timing and duration of occupation and particularly phase 2. However, the burnt patch from which this sample was taken dates to the same phase as the final re-occupation of the site, and indicates this feature has been cut down into the surrounding phase 2 deposits.

OxA–12323 8355 ±39 BP

δ¹³C: -23.8 ±0.2‰

Sample: HEX02, 210(1)B, submitted on 27 January 2003 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-12322

Objectives: as OxA-12292

Calibrated date: *1σ:* 7500–7350 cal BC
2σ: 7530–7320 cal BC

Final comment: see OxA-12322

OxA–12324 8739 ±0 BP

δ¹³C: -23.0 ±0.2‰

Sample: HEX 02 210 (2) B, submitted on 27 January 2003 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: a discrete area of burning in occupation layer (210). The sample was taken from a burnt feature (210) (2) and is not residual as it was burnt *in situ*.

Objectives: to establish the minimum length of time the Mesolithic hut was occupied. This will have important implications for the understanding of Mesolithic settlement.

Calibrated date: *1σ:* 7780–7730 cal BC
2σ: 7790–7685 cal BC

Final comment: C Waddington (21 June 2004), this sample, together with its sister sample OxA-12347 have helped establish the timing of the phase 2 occupation as well as the length of time the hut was occupied.

OxA–12325 8739 ±39 BP

δ¹³C: -23.0 ±0.2‰

Sample: Structure 1, 340A, submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-11804

Objectives: as OxA-11801

Calibrated date: *1σ:* 7820–7670 cal BC
2σ: 7960–7600 cal BC

Final comment: C Waddington (21 June 2004), this sample has helped establish the timing and duration of occupation of phase 1B from the Mesolithic hut.

OxA–12326 8765 ±40 BP

δ¹³C: -22.6 ±0.2‰

Sample: Structure 1, 291A, submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-11803

Objectives: as OxA-11801

Calibrated date: *1σ:* 7940–7730 cal BC
2σ: 7970–7610 cal BC

Final comment: C Waddington (21 June 2004), this sample has helped establish the timing and duration of the Mesolithic hut, particularly in relation to phase 1A.

OxA–12327 8725 ±39 BP

δ¹³C: -24.8 ±0.2‰

Sample: Structure 1, 355A, submitted on 4 September 2002 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-11801

Objectives: as OxA-11801

Calibrated date: *1σ:* 7790–7640 cal BC
2σ: 7940–7600 cal BC

Final comment: C Waddington (21 June 2004), together with sister sample OxA-11801 this sample has helped establish the timing and duration of occupation of the Mesolithic hut, particularly with reference to the commencement of activity on the site.

OxA–12347 8710 ±38 BP

δ¹³C: -23.1 ±0.2‰

Sample: HEX02, 210(2)A, submitted on 27 January 2003 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-12324

Objectives: as OxA-12292

Calibrated date: *1σ:* 7760–7600 cal BC
2σ: 7830–7590 cal BC

Final comment: C Waddington (21 June 2004), this sample, together with its sister sample OxA-12324 have helped establish the timing of the phase 2 occupation as well as the length of time the hut was occupied.

OxA–12402 8885 ±65 BP

δ¹³C: -24.2 ±0.2‰

Sample: HEX02, 383A, submitted on 27 January 2003 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2002)

Initial comment: as OxA-12292

Objectives: as OxA-12292

Calibrated date: *1σ:* 8230–7940 cal BC
2σ: 8260–7750 cal BC

Final comment: C Waddington (21 June 2004), this sample, together with sister sample OxA-12292, has helped establish the timing and duration of the phase 1A occupation of the Mesolithic hut, particularly with reference to phase 1A.

OxA–12408 8330 ±45 BP

δ¹³C: -23.7 ±0.2‰

Sample: HEX02, 055A, submitted on 27 January 2003 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (C Waddington 2000)

Initial comment: as OxA-12293

Objectives: as OxA-12292

Calibrated date: *1σ:* 7490–7330 cal BC
2σ: 7520–7190 cal BC

Final comment: C Waddington (21 June 2004), this sample provided evidence for the final phase of activity on the hut site that was significantly later than the final phase of occupation of the hut - thus demonstrating on additional phase of activity not immediately apparent from observation of the stratigraphy alone.

Howick, Sea Houses Farm: Environmental, Northumberland

Location: NU 25801628
Lat. 55.26.34 N; Long. 01.35.34 W

Project manager: I Boomer (University of Newcastle upon Tyne), June to August 2002

Archival body: University of Newcastle upon Tyne

Objectives: to assess whether the lowest units of Holocene age are contemporary with the occupation of the Mesolithic structure. They will also provide a temporal framework for the environmental changes witnessed in sedimentological and microfossil record from the core.

Final comment: I Boomer (4 July 2004), these dates have permitted us to establish a temporal framework for the environmental changes recorded in core HEX11007. Although the cored sediments began accumulating before the Mesolithic structure was occupied, it would appear that the period represented by Mesolithic occupation is missing from the core due to erosion. Nevertheless, the dates have been allowed us to create a detailed history of local environmental conditions at Howick during the last 8000 years.The evidence indicates a major hiatus between approximately 11000 and 8000 years BP (including the period of Mesolithic occupation), represented by a 30cm layer of course sands and sandstone pebbles, probably as a result of a significant high-energy event dated to about 8300 cal BP. The age and context suggests that this may be associated with the Storegga Slide event, already well-documented along the eastern coast of Scotland.

Laboratory comment: cores were taken from the river floodplain approximately 500m south/south-west of the Mesolithic aite. The river is currently tidal at its lowest 100m only. The core was approximately 8.15m in depth. The lowest 30cm is believed to be degraded carboniferous rock. The remaining sediments are from the Holocene, and the lowest of these shows alternating units of silts and coarse sand/pebbles. This series of eight samples constitutes four duplicate samples aimed at dating the earliest phases of Holocene deposition with a view to establishing synchronicity with the Mesolithic structures.

Laboratory comment: English Heritage (24 June 2014), 15 further samples from this series were dated after 2003 (OxA-12944–54, 12967, -13208–9, and -13370).

References: Boomer *et al* 2007
Waddington 2007

OxA–11833 7269 ±39 BP

$\delta^{13}C$: -24.9 ±0.2‰

Sample: Core 11007 A/07, submitted on 26 August 2002 by I Boomer

Material: waterlogged plant macrofossil (2.40g): *Corylus avellana*, nutshell (I Boomer 2002)

Initial comment: this sample was taken from near the base of a black silty 'peat' at a depth of 6.83m in the core. The sediment is a fine-grained, largely detrital peat (based upon the fine-grained nature of the sediment). Sample 7 was taken 1cm below Sample 8.

Objectives: the dating of this unit is of fundamental importance in reconstructing the early Holocene palaeovegetation history of the landscape adjacent to the Mesolithic site.

Calibrated date: *1σ:* 6220–6060 cal BC
2σ: 6230–6040 cal BC

Final comment: I Boomer (4 July 2004), sample submitted as some of the next available material above those submitted for 'basal date'. Also for dating of the palaeoenvironmental evidence, it will provide evidence of any discontinuity/erosion near the base of the core.

OxA–11852 8465 ±45 BP

$\delta^{13}C$: -25.8 ±0.2‰

Sample: Core 11007 A/04, submitted on 26 August 2002 by I Boomer

Material: organic matter (2.30g) (organic rich clay from within medium sand; humic acid) (I Boomer 2002)

Initial comment: dark grey silty material from depth of 783–784cm in the core. This is the earliest/lowest material with significant potential for radiocarbon dating. It is assumed that the dark content of the sediment originates from plant remains. This silt was recovered from within a predominantly (medium-grade) grey sand, this was the lowest sedimentary unit of Holocene age. This is almost certainly a water-lain deposit, probably of riverine origin. The clay is most likely to be derived from detailed overbank deposits; as such, there must be a small reworked element to the organic content. The sample provides an important earliest date for the sequence.

Objectives: the archaeological remains at Seahouses Farm are multi-period consisting (at present) of five Bronze Age cists and a Mesolithic dwelling structure(s). The archaeology is built into glacial/late-glacial fine-grained sands, which do not preserve significant environmental remains. Therefore, the recovery of an 8m sequence of predominantly clay-silt grade sediments preserving landscape, sea-level and vegetation throughout the Holocene. This series of dates concentrates on the earliest phase of deposition during the Mesolithic.

Calibrated date: *1σ:* 7580–7510 cal BC
2σ: 7590–7480 cal BC

Final comment: I Boomer (4 July 2004), it was hoped to establish the basal date of the core. However, proved to be anomalously young compared to humin (which had supporting date). Therefore this date is not used in the study.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2002), the humic acid fraction of this sample was dated.

Laboratory comment: English Heritage (September 2003), the measurements on the humic acid and humin fractions of this organic sediment are not statistically consistent (T′=504.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978). *See* OxA-12825.

References: Ward and Wilson 1978

OxA–11858 7308 ±0 BP

$\delta^{13}C$: -25.6 ±0.2‰

Sample: Core 11007 A/08, submitted on 26 August 2002 by I Boomer

Material: waterlogged plant macrofossil (0.80g) (hazelnut shell) (R Gale 2002)

Initial comment: sample taken from near base of a black, silty ‘peat’ at a depth of about 683cm below the surface and about 140cm above the local country rock. This sample (8) constitutes about 80% of an intact hazelnut shell (the remaining 20% was sliced-through during the opening of the core and is retained in the ‘reference’ half of the core). An adjacent sample was taken for dating (7).

Objectives: this sample was recovered from the base of the lowest organic-rich sedimentary unit in the core. The sediment is almost black when fresh and includes identifiable plant macrofossils (eg hazelnut). This unit is the earliest to show unequivocal evidence of palaeobotanitcal remains and the dating of this unit is of fundamental importance in reconstruction the early Holocene palaeovegetation history of the landscape adjacent to the Mesolithic site.

Calibrated date: *1σ:* 6220–6100 cal BC
2σ: 6225–6085 cal BC

Final comment: I Boomer (4 July 2004), the next available organic material above basal dates, submitted to establish chronological framework and correlation with archaeological site, although it proved to be at least 1500 years younger.

OxA–11859 7174 ±35 BP

$\delta^{13}C$: -26.4 ±0.2‰

Sample: Core 11007 A/09, submitted on 26 August 2002 by I Boomer

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2002)

Initial comment: sample taken from the middle of the silty-peat layer. This sample was taken from a large piece of apparently carbonised (burnt?) wood, which was clearly cored, the wood comprising most of the core at that level. Sample taken at a depth of 627cm below the surface and approximately 2m above the local country rock.

Objectives: this sample was taken from a large (6cm x 4cm x 3cm) piece of carbonised wood within a silty peat unit. The wood occurs near the top of this organic rich layer and the date will provide an important upper age for this unit.

Calibrated date: *1σ:* 6070–6010 cal BC
2σ: 6090–5980 cal BC

Final comment: I Boomer (4 July 2004), submitted to establish possible contemporaneity with archaeology and chronological framework for Holocene environmental change. Proves younger than the archaeology but helps date the onset of brackish water conditions in Howick Barn.

OxA–11860 7160 ±40 BP

$\delta^{13}C$: -27.3 ±0.2‰

Sample: Core 11007 A/10, submitted on 26 August 2002 by I Boomer

Material: wood (waterlogged): twig, probably *Corylus avellana* (R Gale 2002)

Initial comment: sample taken from the middle of the silty-peat layer. This sample (10) was taken immediately below sample 9 at a depth of 630cm. Sample taken at a depth of 630cm below the surface and approximately 2m above the local rock.

Objectives: this sample was taken from the sediment immediately below sample 9 and will also provide an important upper age limit for this unit.

Calibrated date: *1σ:* 6060–6000 cal BC
2σ: 6080–5980 cal BC

Final comment: I Boomer (4 July 2004), submitted to possible contemporaneity with archaeological evidence and to provide chronology for environmental record. Proven to be younger than archaeology but helps date onset of brackish water conditions.

OxA–11870 8250 ±45 BP

$\delta^{13}C$: -26.4‰

Sample: Core 11007 A/03, submitted on 26 August 2002 by I Boomer

Material: organic matter (0.90g) (dark grey silt; humic acid) (I Boomer 2002)

Initial comment: this dark grey silty material occurred at a depth of 7.91–7.92m in the core. This is the lowest/earliest recognisable material with significant potential for radiocarbon dating. It is assumed that the dark content of the sediment originates from plant remains. These are observed in more coherent silts higher up in the sequence. This silt was recovered from a predominately (medium grade) grey sand. This was the lowest sedimentary unit of Holocene age. This is almost certainly a water-lain deposit, probably of riverine origin. The clay is most likely to be derived from detrital organic and mineral grains associated with riverine overbank deposits. As such, there must be a small reworked element top the organic content, since it is known that the sediment rests immediately above an eroded, late-glacial surface.

Objectives: this sample will establish the earliest period of sedimentary deposition.

Calibrated date: *1σ:* 7350–7180 cal BC
2σ: 7460–7080 cal BC

Final comment: I Boomer (4 July 2004), submitted to help establish sedimentation in core 11007. The date proved anomalously young compared with humin fraction (which was supported by independent date). The date was rejected from the study.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2002), the humic acid fraction of this sample was dated.

Laboratory comment: English Heritage (September 2003), the measurements on the humic acid and humin fractions of this bulk organic sediment are not statistically consistent (T′=271.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978). *See* OxA-12825.

References: Ward and Wilson 1978

OxA–11936 10035 ±45 BP

$\delta^{13}C$: -29.4 ±0.2‰

Sample: Core 11007 A/05, submitted on 26 August 2002 by I Boomer

Material: waterlogged plant macrofossil (1.40g) (small twig) (I Boomer 2002)

Initial comment: sample 5 is taken from near the base of a dark-grey to black, organic-rich, peaty silt from a depth of 7.64–7.65m. It is considered that this material represents a combination of detrital mineral grains and *in situ* organics - probably the result of deposition in a 'floodplain' environment. A relatively minor component of detrital organic material might be expected.

Objectives: this sample is taken from the base of the next youngest sedimentary unit and marks the beginning of the deposition of fine-grained sediments containing important microfossil remains.

Calibrated date: *1σ:* 9760–9440 cal BC
2σ: 9820–9360 cal BC

Final comment: I Boomer (4 July 2004), the second oldest unequivocal plant macrofossil remains recovered from core 11007 (5cm higher). As with OxA-13370, it provides evidence to support the humin fraction dates from the basal samples.

OxA–12824 10430 ±140 BP

$\delta^{13}C$: -23.9 ±0.2‰

Sample: Core 11007 A/03, submitted on 26 August 2002 by I Boomer

Material: organic matter (0.90g) (dark grey silt; humin) (I Boomer 2002)

Initial comment: as OxA-11870

Objectives: as OxA-11870

Calibrated date: *1σ:* 10620–10100 cal BC
2σ: 10750–9860 cal BC

Final comment: I Boomer (4 July 2004), submitted to help establish age of basal sediments in core 11007. Although the date proved much older than the humic fraction, it is supported by the date from the sample immediately overlying the plant macrofossil.

Laboratory comment: see OxA-11870

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2002), the humin fraction of this sample was dated.

OxA–12825 10265 ±70 BP

$\delta^{13}C$: -24.6‰

Sample: Core 11007 A/4, submitted on 26 August 2002 by I Boomer

Material: organic matter (2.30g) (organic rich clay from within medium sand; humin) (I Boomer 2002)

Initial comment: as OxA-11852

Objectives: as OxA-11852

Calibrated date: *1σ:* 10180–9880 cal BC
2σ: 10440–9800 cal BC

Final comment: I Boomer (4 July 2004), submitted to establish the basal date for the core. The date proved much older than humic fraction, but fits well with the date from the immediately overlying plant macrofossils. Establishes a base of core date.

Laboratory comment: see OxA-11870

Laboratory comment: see OxA-12824

Humber Wetlands Project, Lincolnshire, North Yorkshire and South Yorkshire

Location: *see* individual sites

Project manager: R Van de Noort (University of Hull), 1994 and 1996–2000

Description: the Humber Wetlands comprises *c* 330,000ha of land below the 10m OD in North, East, and South Yorkshire, Lincolnshire, and Nottinghamshire. Much of this area includes waterlogged archaeological remains, and the survey of this area, alongside small-scale excavations and extensive palaeoenvironmental research, was undertaken by the Humber Wetlands Project, based at the University of Hull, between 1994 and 2000. By doing so, the project addressed a long-standing bias in archaeological research in northern England.

Objectives: the principle objectives of the Humber Wetlands Project were to develop a coherent understanding of the palaeoenvironmental changes of the lowlands of the Humber basin and people's interaction with the landscape during the Holocene. Radiocarbon dating programmes were used for the dating of palaeoenvironmental sequences, especially relating to the riparian wetland development, and for dating archaeological sites.

Final comment: R Van de Noort (20 November 2004), the radiocarbon dates obtained during the Humber Wetlands Project have contributed significantly to our understanding of the riparian wetland development of the Rivers Hull and Ancholme, and the Keyingham Drain in southern Holderness (East Yorkshire), alongside providing dates for the outline development of the Rivers Derwent and Ouse. Furthermore, dates directly related to cultural activity has allowed for the development of greater precision in our understanding of the interaction between people and their environment during the Holocene. Dates for cultural activities range from the early Mesolithic through to the middle Ages.

References: Ellis *et al* 2001
Van de Noort *et al* 1993
Van de Noort 2004
Van de Noort and Ellis 1995
Van de Noort and Ellis 1997
Van de Noort and Ellis 1998
Van de Noort and Ellis 1999
Van de Noort and Ellis 2000

Humber Wetlands Project: Hull Valley, Arram, Yorkshire (East Riding)

Location: TA 0510443009 to TA 05195 43026
Lat. 53.52.21 N; Long. 00.24.04 W, to
Lat. 53.52.22 N; Long. 00.23.59 W

Project manager: R Van de Noort (University of Hull), 1999

Archival body: Hull and East Riding Museum

Description: basal peats from a sequence of intercalated alluviums and peats in the Hull valley.

Objectives: the samples from this series provide a sequence across the valley floor, which will result in an absolute dating framework for wetland development at this location. In addition, this data will enhance the resolution of studies into sea-level change within the valley, and the Humber wetlands as a whole.

Final comment: R Van de Noort (30 November 2004), the data from the transect across the River Hull at Arram provides a surprisingly consistent trend in the development of wetlands in these part of the Humber Wetlands. The basal peat overlying till, sandy loam, or glacio-lacustrine clays, at altitudes ranging from -3.18/-3.13m OD to 04/0.00m OD, and dates from 4310-3960 cal BC (95% confidence; GU-5775; Reimer *et al* 2004) to 2880-2470 cal BC (GU-5783). Pollen analysis of basal peat samples was dominated by *Alnus glutinosa* (67% of total land pollen), with *Tilia, Quercus,* and *Corylus avellana*-type well represented. This series of results suggests that wetland development expanded very rapidly in the first half of the third millennium cal BC at Arram, perhaps caused by undetermined local environmental factors. The consistency of the trend of wetland development in the Humber Wetlands was surprising because the Ancholme valley has been considered a part of the inner estuary and the Hull valley of the outer estuary. The effects of sea-level change and the wetland development instigated by sea-level change were thought to be rather different in the outer and inner estuary, but our research has shown that in terms of wetland development, that is not the case.

References: Van de Noort 2004
Van de Noort and Ellis 2000

GU–5775 5270 ±60 BP

$\delta^{13}C$: -27.5‰

Sample: ARR1, submitted on 9 July 1999 by M Lillie

Material: sediment (c 135g) (humic acid)

Initial comment: the base of the peat was recovered at -3.133m to -3.183m OD, and represents the lowest proven point for the onset of floodplain peat development at this location, TA 0519543026.

Objectives: the samples from this series provide a sequence across the valley floor, which will result in an absolute framework for wetland development at this location. In addition, this data will enhance the resolution of studies into sea-level change within the valley, and the Humber wetlands as a whole.

Calibrated date: *1σ:* 4230–3980 cal BC
2σ: 4320–3960 cal BC

Final comment: R Van de Noort and S Ellis (2000), the two lower samples (GU-5775 and GU-5776) differ in height by *c* 0.26m and exhibit overlapping chronologically consistent dates in the later Mesolithic to early Neolithic periods.

GU–5776 5110 ±80 BP

$\delta^{13}C$: -28.7‰

Sample: ARR2, submitted on 9 July 1999 by M Lillie

Material: sediment (c 130g) (humic acid)

Initial comment: the base of the peat was recovered at -2.678m to -2.728m OD, and represents the basal point along a transect following a continuum for the onset of floodplain peat development at this location, TA 0517243022.

Objectives: as GU-5775

Calibrated date: *1σ:* 3990–3790 cal BC
2σ: 4050–3700 cal BC

Final comment: see GU-5775

GU–5777 4800 ±80 BP

$\delta^{13}C$: -28.0‰

Sample: ARR3, submitted on 9 July 1999 by M Lillie

Material: sediment (c 45g) (humic acid)

Initial comment: the base of the peat was recovered at -1.935m to -1.995m OD, and represents the basal point along a transect following a continuum for the onset of floodplain peat development at this location, TA 0516243020.

Objectives: as GU-5775

Calibrated date: *1σ:* 3660–3510 cal BC
2σ: 3720–3370 cal BC

Final comment: R Van de Noort and S Ellis (2000), from GU-5777 and GU-5778 the date range for the peats had thus extended into the mid-late Neolithic period at this point on the transect.

GU–5778 4170 ±70 BP

$\delta^{13}C$: -27.2‰

Sample: ARR4, submitted on 9 July 1999 by M Lillie

Material: sediment (c 103g) (humic acid)

Initial comment: the base of the peat was recovered at -1.780m to -1.820m OD, and represents a basal point along a transect following a continuum for the onset of floodplain peat development at this location, TA 0515143018.

Objectives: as GU-5775

Calibrated date: *1σ:* 2890–2620 cal BC
2σ: 2910–2490 cal BC

Final comment: see GU-5777

GU–5779 4110 ±60 BP

δ¹³C: -28.1‰

Sample: ARR5, submitted on 9 July 1999 by M Lillie

Material: sediment (c 75g) (humic acid)

Initial comment: the base of the peat was recovered at -1.407m to -1.447m OD, and represents the basal point along a transect following a continuum for the onset of floodplain peat development at this location, TA 0513943016.

Objectives: as GU-5775

Calibrated date: *1σ:* 2870–2570 cal BC
2σ: 2890–2480 cal BC

Final comment: R Van de Noort and S Ellis (2000), this date indicates that there is a consistent chronological progression of the radiocarbon dates, towards increasingly younger determinations up to the floodplain sequence.

GU–5780 4010 ±70 BP

δ¹³C: -26.3‰

Sample: ARR6, submitted on 9 July 1999 by M Lillie

Material: sediment (c 80g) (humic acid)

Initial comment: the base of the peat was recovered at -0.494m to -0.544m OD, and represents the basal point along a transect following a continuum for the onset of floodplain peat development at this location, TA 0512743014.

Objectives: as GU-5775

Calibrated date: *1σ:* 2620–2460 cal BC
2σ: 2860–2330 cal BC

Final comment: R Van de Noort and S Ellis (2000), this date, along with those from GU-5775, show a range of dates obtained from boreholes .01 through to .06 indicate that peat formation is occurring within the later Mesolithic through the Neolithic and into the earlier Bronze Age periods.

GU–5781 4180 ±50 BP

δ¹³C: -26.9‰

Sample: ARR7, submitted on 9 July 1999 by M Lillie

Material: sediment (272g) (humic acid)

Initial comment: the base of the peat was recovered at -0.142m to -0.162m OD, and represents the basal point along a transect following a continuum for the onset of floodplain peat development at this location, TA 0511543011.

Objectives: as GU-5775

Calibrated date: *1σ:* 2890–2670 cal BC
2σ: 2900–2580 cal BC

Final comment: R Van de Noort and S Ellis (2000), this date range overlaps fully with GU-5778.

GU–5783 4080 ±60 BP

δ¹³C: -27.5‰

Sample: ARR8, submitted on 9 July 1999 by M Lillie

Material: sediment (c 302g) (humic acid)

Initial comment: the base of the peat was recovered at -0.037m to -0.003m OD, and represents the uppermost point along a transect following a continuum for the onset of floodplain peat development at this location, TA 0510443009.

Objectives: as GU-5775

Calibrated date: *1σ:* 2860–2490 cal BC
2σ: 2880–2470 cal BC

Final comment: R Van de Noort and S Ellis (2000), this date range overlaps with GU-5779.

Humber Wetlands Project: Hull Valley, Copslanding, Yorkshire (East Riding)

Location: TA 0635053180
Lat. 53.57.49 N; Long. 00.22.44 W

Project manager: R Van de Noort (University of Hull), 1999

Archival body: Hull and East Riding Museum

Description: an isolated find of a human tibia.

Objectives: the human tibia was found near the middle Saxon bridge or jetty in the Hull valley near Skerne (Dent *et al* 2000). Considering the importance of this site, and the possibility that a middle Saxon cemetery may have existed here, the date of the tibia was tested.

Final comment: R Van de Noort (30 November 2004), the tibia was found to be Iron Age date, and any association with the middle Saxon Bridge was therefore proven to be non-existent.

References: Dent *et al* 2000

OxA–9069 2260 ±50 BP

δ¹³C: -20.5‰
δ¹⁵N (diet): +10.0‰
C/N ratio: 3.4

Sample: Copl 1, submitted on 9 July 1999 by M Lillie

Material: human bone (adult ?male, right tibia) (M Lillie 1999)

Initial comment: no contextual data is available for this find due to the fact that it represents an excavated context, possibly a cemetery located close to known Anglo-Saxon activity.

Objectives: to establish an accurate temporal location for this object prior to more detailed study. The dating is aimed at demonstrating whether this object has a direct contemporaneity to the Anglo-Saxon activity site located 200m to the north.

Calibrated date: *1σ:* 400–210 cal BC
2σ: 410–190 cal BC

Final comment: R Van de Noort (30 November 2004), the tibia was found to be Iron Age date, and any association with the middle Saxon Bridge was therefore proven to be non-existent. It is possible that the single bone had been reworked by the River Hull.

Humber Wetlands Project: Hull Valley, Stone Carr, Wawne, Yorkshire (East Riding)

Location: TA 0701738051
Lat. 53.49.39 N; Long. 00.22.26 W

Project manager: R Van de Noort (University of Hull), 1999

Archival body: Hull and East Riding Museum

Description: a late Mesolithic lithic scatter from within basal peats from a sequence of intercalated alluviums and peats in the Hull valley.

Objectives: to provide a comparable temporal relationship for potentially contemporary worked lithics found on the site. It will also provide insight into alluviation at this height in relation to dates taken in the area of the base of peat development (*see* GU-5775 to GU-5783, Humber Wetlands Project: Hull Valley, Arram).

References: Van de Noort 2004
Van de Noort and Ellis 2000

OxA–8954 3420 ±45 BP

$\delta^{13}C$: -20.4‰

Sample: Stone2A, submitted on 22 July 1999 by H Chapman

Material: animal bone: *Cervus elaphus*, probably (S Davis 1999)

Initial comment: from the base of a reworked gully cut into the natural gravel. It lay within the basal unit mixed with alluvial material and basal gravel. It was sealed by later alluvial inundation linked with sea-level rise. This later alluvium seals the rest of the site. The gully feature lay at a depth well below the ploughsoil.

Objectives: as series comments.

Calibrated date: *1σ:* 1770–1660 cal BC
2σ: 1880–1620 cal BC

Final comment: R Van de Noort (30 November 2004), the Bronze Age date of this sample shows that it was not found in its primary context, and thus does not provide a date for the lithic scatter found here. Reworking by the river provides a likely explanation.

OxA–9010 3365 ±45 BP

$\delta^{13}C$: -20.6‰

Sample: Stone2B, submitted on 22 July 1999 by H Chapman

Material: animal bone: *Cervus elaphus*, probably (S Davis 1999)

Initial comment: as OxA-8954

Objectives: as OxA-8954

Calibrated date: *1σ:* 1740–1610 cal BC
2σ: 1760–1520 cal BC

Final comment: *see* OxA-8954

Humber Wetlands Project: Hull Valley, Stone Carr, Wawne (sediments), Yorkshire (East Riding)

Location: TA 0701238046
Lat. 53.49.36 N; Long. 00.22.21 W

Project manager: R Van de Noort (University of Hull), 1999

Archival body: Hull and East Riding Museum

Description: basal peats from a sequence of intercalated alluviums and peats in the Hull valley.

Objectives: the samples from this series provide a sequence across the valley floor, which will result in an absolute dating framework for wetland development at this location. In addition, this data will enhance the resolution of studies into sea-level change within the valley, and the Humber wetlands as a whole.

Final comment: R Van de Noort (30 November 2004), the data from the transect across the River Hull at Stone Carr provides a consistent trend in the development of wetlands in these part of the Humber Wetlands. The basal peat was found overlying glaciofluvial sands and gravels. Its altitude ranged from -3.37/-3.33m OD to -0.41/-0.37m OD, and its date from 4520–3950 cal BC (95% confidence; GU-5790; Reimer *et al* 2004) to 2860–2140 cal BC (GU-5785). Pollen analyses of basal peat samples produced sparse pollen, with pollen of the prevalent *Tilia* and *Alnus glutinosa* displaying evidence of degradation. This series of results suggests that wetland development expanded very rapidly in the first half of the third millennium cal BC at Wawne, perhaps caused by undetermined local environmental factors. The consistency of the trend of wetland development in the Humber Wetlands was surprising because the Ancholme valley has been considered a part of the inner estuary and the Hull valley of the outer estuary. The effects of sea-level change and the wetland development instigated by sea-level change were thought to be rather different in the outer and inner estuary, but our research has shown that in terms of wetland development, that is not the case.

References: Van de Noort 2004
Van de Noort and Ellis 2000

GU–5784 4100 ±80 BP

δ¹³C: -27.7‰

Sample: Stone1, submitted on 9 July 1999 by M Lillie

Material: peat (*c* 70g) (humic acid)

Initial comment: from a basal peat securely stratified beneath alluvium at -0.534m to -0.564m OD on the southern side of the Mesolithic activity, TA 0705938031.

Objectives: the sample is the uppermost basal peat from a north-south transect across the floodplain. The dating of this sample will provide an indication of the more recent age of these depositional sequences.

Calibrated date: *1σ:* 2880–2490 cal BC
2σ: 2900–2460 cal BC

Final comment: R Van de Noort (30 November 2004), a late Neolithic/early Bronze Age date for the furthest lateral extension of wetland development in the Hull valley is somewhat older than expected and this date is 'out of sequence' with the ascending age of wetland deposits with lower elevations.

GU–5785 3940 ±100 BP

δ¹³C: -27.5‰

Sample: Stone2, submitted on 9 July 1999 by M Lillie

Material: peat and organic silt (*c* 50g) (humic acid)

Initial comment: from a basal organic horizon securely stratified beneath alluvium at -0.368m to -0.408m OD on the southern side of the Mesolithic activity site, TA 0707738008.

Objectives: the sample is a continuation of the basal floodplain peat from a north-south transect across the floodplain. The dating of this sample will provide an indication of the more recent age of these depositional sequences.

Calibrated date: *1σ:* 2580–2290 cal BC
2σ: 2860–2140 cal BC

Final comment: R Van de Noort (30 November 2004), late Neolithic/early Bronze Age date for the this point in the lateral extension of wetland development in the Hull valley is somewhat older than expected, but GU-5785–90 provide a clear age sequence of lateral and vertical wetland development in the Hull valley.

GU–5786 4100 ±80 BP

δ¹³C: -28.2‰

Sample: Stone3, submitted on 9 July 1999 by M Lillie

Material: peat (*c* 90g) (humic acid)

Initial comment: from a basal organic peat horizon securely stratified beneath alluvium at -0.823m to -0.873m OD on the southern side of the Mesolithic activity site, TA 0708338001.

Objectives: as GU-5785

Calibrated date: *1σ:* 2880–2490 cal BC
2σ: 2900–2460 cal BC

Final comment: see GU-5785

GU–5787 4530 ±100 BP

δ¹³C: -27.3‰

Sample: Stone4, submitted on 9 July 1999 by M Lillie

Material: peat (*c* 70g) (humic acid)

Initial comment: from a basal organic horizon securely stratified beneath alluvium at -1.753m to -1.773m OD on the southern side of the Mesolithic activity site, TA 0708837993.

Objectives: as GU-5785

Calibrated date: *1σ:* 3490–3020 cal BC
2σ: 3630–2910 cal BC

Final comment: see GU-5785

GU–5788 5060 ±120 BP

δ¹³C: -27.7‰

Sample: Stone5, submitted on 9 July 1999 by M Lillie

Material: peat (*c* 100g) (humic acid)

Initial comment: from a basal organic horizon securely stratified beneath alluvium at -2.522m to -2.602m OD on the southern side of the Mesolithic activity site, TA 0709437986.

Objectives: as GU-5785

Calibrated date: *1σ:* 3980–3700 cal BC
2σ: 4230–3630 cal BC

Final comment: see GU-5785

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on the humic acid and humin fractions of this sample (GU-5788 and GU-5789) are statistically significantly different (T′=8.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

GU–5789 5470 ±70 BP

δ¹³C: -27.2‰

Sample: Stone5, submitted on 9 July 1999 by M Lillie

Material: peat (*c* 100g) (humin)

Initial comment: a replicate measurement of GU-5788.

Objectives: as GU-5785

Calibrated date: *1σ:* 4360–4260 cal BC
2σ: 4460–4170 cal BC

Final comment: see GU-5785

Laboratory comment: see GU-5788

GU–5790 5400 ±140 BP

$\delta^{13}C$: -27.3‰

Sample: Stone6, submitted on 9 July 1999 by M Lillie

Material: peat (*c* 100g) (humic acid)

Initial comment: from a basal organic horizon securely stratified beneath alluvium at -3.328m to -3.3378m OD on the southern side of the Mesolithic activity site, TA 0710037978.

Objectives: as GU-5785

Calibrated date: *1σ:* 4360–4040 cal BC
2σ: 4520–3950 cal BC

Final comment: see GU-5785

GU–5791 5170 ±80 BP

$\delta^{13}C$: -28.4‰

Sample: Stone7, submitted on 9 July 1999 by M Lillie

Material: peat (*c* 100g) (humic acid)

Initial comment: from a basal organic peat horizon securely stratified beneath alluvium at -4.741m to -4.791m OD on the southern side of the Mesolithic activity site, TA 0710737969.

Objectives: as GU-5785

Calibrated date: *1σ:* 4050–3940 cal BC
2σ: 4240–3780 cal BC

Final comment: R Van de Noort (30 November 2004), a Mesolithic/early Neolithic Age date for the earliest wetland development in the Hull valley is somewhat older than expected and this date is 'out of sequence' with the ascending age of wetland deposits with lower elevations.

GU–5793 4270 ±60 BP

$\delta^{13}C$: -28.4‰

Sample: Stone9, submitted on 9 July 1999 by M Lillie

Material: peat (*c* 145g) (humic acid)

Initial comment: from a basal organic peat horizon securely stratified beneath alluvium at -1.164m OD on the western side of the Mesolithic activity site, TA 0710238047.

Objectives: the sample represents a continuation of the peat overlying the gravel 'island' that the site is located upon. The dating of this sample will provide an indication of the age of these depositional sequences.

Calibrated date: *1σ:* 2920–2870 cal BC
2σ: 3020–2690 cal BC

Final comment: R Van de Noort (30 November 2004), the late Neolithic/early Bronze Age date for this position in the wetland development in the Hull valley conforms to expectations.

GU–5794 4280 ±80 BP

$\delta^{13}C$: -27.7‰

Sample: Stone10, submitted on 9 July 1999 by M Lillie

Material: peat (*c* 155g) (humic acid)

Initial comment: from a basal organic peat horizon securely stratified beneath alluvium at -1.404m OD on the western side of the Mesolithic activity site, TA 0701238046.

Objectives: as GU-5793

Calibrated date: *1σ:* 2930–2870 cal BC
2σ: 3100–2630 cal BC

Final comment: see GU-5793

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on the humic acid and humin fractions of this sample (GU-5794 and GU-5795) are statistically consistent (T′=1.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

GU–5795 4400 ±60 BP

$\delta^{13}C$: -27.1‰

Sample: Stone10, submitted on 9 July 1999 by M Lillie

Material: peat (*c* 155g) (humin)

Initial comment: as GU-5794

Objectives: as GU-5793

Calibrated date: *1σ:* 3270–2910 cal BC
2σ: 3340–2890 cal BC

Final comment: see GU-5793

Laboratory comment: see GU-5794

Humber Wetlands Project: Lincolnshire Marsh, Butterbump Barrow Cemetery, Lincolnshire

Location: TF 49307230
Lat. 53.13.35 N; Long. 00.14.12 E

Project manager: R Van de Noort (University of Hull), 2000

Archival body: City and County Museum, Lincoln

Description: a scheduled Bronze Age barrow cemetery, situated on an area of glacial sand and gravel within the Lincolnshire Marsh. The Wetland, which is surrounded by up to 11 barrows contains a peat sequence from which worked wooden stakes were recovered.The samples submitted are waterlogged roundwood stakes, which have been worked by metal axe(s). One sample of *Salix* sp., and two of *Alnus* sp. are provided, all of which have less than 20 growth rings. They were recovered from a collapsing peat section overlying gyttja and unoxidised sandy clay. The upper unit of peat was highly desiccated and is in part thought to account for the lack of a complete structure. The series is believed to be from the base of a wooden structure constructed into or across a small localised wetland.

Objectives: toolmark analysis suggests these stakes may be contemporary with the barrows although this can only be confirmed by radiocarbon dates. A Bronze Age date would confirm anthropogenic use of the Wetland contemporary with the barrows, the stakes probably forming part of a platform or trackway. The series provides an insight into anthropogenic exploitation of a small fen carr wetland surrounded by a group of at least 11 Bronze Age barrows. Despite the apparent destruction of any contemporary structure, it is likely that further well-preserved elements of the wetland archaeology of the site await discovery. Currently the evidence survives in the form of two waterlogged stakes provisionally dated by axemarks to the Bronze Age and one stake from a later phase, provisionally Iron Age. One further stake remains in the series, but is too small to date, yet it is thought to belong to the structure. If indeed the samples date to the Bronze Age period it will provide a solid foundation upon which future work on this highly interesting site can be based.

Final comment: R Van de Noort (30 November 2004), the dates confirm that the timbers may all have been part of the same or similar structures within the small wetland of the Butterbump cemetery, the nature of which was not determined.

Laboratory comment: Ancient Monuments Laboratory (2000), all four results are statistically consistent (T′=5.4; T′(5%)=7.8; ν=3; Ward and Wilson 1978). This suggests that they may all derive from the same wooden structure, dated to the middle Bronze Age. This may be broadly contemporary with the barrow cemetery (Jordan *et al* 1994, 30–1).

References: Ellis *et al* 2001
Jordan *et al* 1994, 30–1
Ward and Wilson 1978

GU–5813 3220 ±50 BP

$\delta^{13}C$: -28.3‰

Sample: TF493723.11, submitted on 18 May 2000 by G Thomas

Material: wood (waterlogged): *Alnus* sp., worked stake; less than 20 growth rings (G Thomas 2000)

Initial comment: recovered from a highly humified deposit of sandy peat between 2.10m and 2.81m OD.

Objectives: the sample provides clear evidence for anthropogenic activity. Unlike the other two samples in this series, TF493723.12 (GU-5814) and TF493723.15 (GU-5815), toolmark analysis of this particular sample is indicative of a wider date range and may provide evidence of an extended period of use of the site. Dating of this sample will support this hypothesis.

Calibrated date: *1σ:* 1530–1430 cal BC
2σ: 1620–1400 cal BC

Final comment: R Van de Noort (30 November 2004), the Bronze Age date of this sample shows that rather than long-term activity within the wetland of the Butterbump cemetery, all worked timbers could belong the same or contemporaneous structures.

GU–5814 3210 ±50 BP

$\delta^{13}C$: -29.0‰

Sample: TF493723.12, submitted on 18 May 2000 by G Thomas

Material: wood (waterlogged): *Salix* sp., worked stake; less than 20 growth rings (G Thomas 2000)

Initial comment: as GU-5813

Objectives: the stake may be part of a structure associated with the exploitation of a small productive alder carr contemporary with the Bronze Age Barrows. Toolmark analysis and palynological work on the organic samples suggest this scenario which can only be confirmed by dating.

Calibrated date: *1σ:* 1530–1420 cal BC
2σ: 1620–1400 cal BC

Final comment: see GU-5813

GU–5815 3180 ±50 BP

$\delta^{13}C$: -27.5‰

Sample: TF493723.15, submitted on 18 May 2000 by G Thomas

Material: wood (waterlogged): *Alnus* sp., worked stake; less than 20 growth rings (G Thomas 2000)

Initial comment: as GU-5813

Objectives: as GU-5814

Calibrated date: *1σ:* 1510–1410 cal BC
2σ: 1600–1310 cal BC

Final comment: see GU-5813

GU–5816 3010 ±80 BP

$\delta^{13}C$: -28.5‰

Sample: TF493723.14, submitted on 30 May 2000 by G Thomas

Material: wood (waterlogged): *Alnus* sp., less than 20 growth rings (G Thomas 2000)

Initial comment: as GU-5813

Objectives: toolmark analysis on this sample within the series is inconclusive due to the small sample size and poor quality facet marks. As is the case with sample TF 493723.11 (GU-5813), this sample may also indicate an extended period of use of the site. It is hoped that dating will confirm this.

Calibrated date: *1σ:* 1400–1120 cal BC
2σ: 1440–1000 cal BC

Final comment: see GU-5813

Humber Wetlands Project: Lincolnshire Marsh, Ingoldmells Beach, Lincolnshire

Location: TF 573682
Lat. 53.11.14 N; Long. 00.21.16 E

Project manager: W Fletcher (University of Hull), 1999

Archival body: City and County Museum, Lincoln

Description: a number of sites were cored in the Ingoldmells mapview as an integral element of the archaeological assessment of the salt industry in this area, along with the dyke survey, section cleaning, and limited excavation in the region of Ingoldmells Point.

Objectives: it is one of over 30 salterns identified in the area and ascribed a late Iron Age/Romano British date from associated finds. Few of these have been accurately dated by the employment of scientific methods. This site is an important part of a research program designed to characterise such sites within a broader temporal and spatial setting.

Final comment: R Van de Noort (30 November 2004), the dates in this series indicate a late Bronze Age date for this saltern, providing the earliest evidence for salt working in the Ingoldmells area to date.

Laboratory comment: Ancient Monuments Laboratory (2000), the two results are statistically consistent (T′=0.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and suggest that this structure was constructed during the second quarter of the first millennium cal BC, in the later Bronze Age.

References: Ellis *et al* 2001
Ward and Wilson 1978

GU–5798 2610 ±50 BP

$\delta^{13}C$: -28.8‰

Sample: TF573682.01, submitted on 2 February 2000 by W Fletcher

Material: wood (waterlogged): *Salix* sp. (G Thomas 1999)

Initial comment: samples GU-5798 and GU-5799 are from an alluvial context also containing briquetage from a saltern. This area was identified as an activity area adjacent to archaeological features characteristic of a salt-making site. The samples are closely associated with these features.

Objectives: samples GU-5798 and GU-5799 will help to place an enigmatic feature to a specific temporal period.

Calibrated date: *1σ:* 810–780 cal BC
2σ: 840–670 cal BC

Final comment: R Van de Noort (30 November 2004), this date indicates a late Bronze Age date for this saltern, providing the earliest evidence for salt working in the Ingoldmells area to date.

GU–5799 2670 ±50 BP

$\delta^{13}C$: -29.1‰

Sample: TF573682.02, submitted on 2 February 2000 by W Fletcher

Material: wood (waterlogged): *Salix* sp. (G Thomas 1999)

Initial comment: as GU-5798

Objectives: as GU-5798

Calibrated date: *1σ:* 850–800 cal BC
2σ: 920–790 cal BC

Final comment: *see* GU-5798

Humber Wetlands Project: Lincolnshire Marsh, New Holland fishtrap, Lincolnshire

Location: TA 086247
Lat. 53.42.26 N; Long. 00.21.16 W

Project manager: R Van de Noort (University of Hull), August 1999

Archival body: City and County Museum, Lincoln

Description: the site is located in a shallow palaeo-gully that had deeply scored the peat shelf prior to the building of the structure. The gully can be seen as a *c* 1.5–2.0m wide channel filled with a blue-grey alluvium, contrasting against the darker browns of the peat. The structure has been interpreted as a fish trap and was probably of conical shape. It was 1.3m in length and consists of long roundwoods placed side by side to a maximum width of 0.6m (front end), tapering down to 0.2m.

Objectives: there are currently no dated sites from this side of the river, and it is important in enhancing our knowledge of the development and utilization of the Humber as a whole.

Final comment: R Van de Noort (30 November 2004), this series confirms the Bronze Age date for the fishtrap, as estimated from the axemarks.

Laboratory comment: Ancient Monuments Laboratory (2000), the two results from this fishtrap are not statistically consistent at 95% confidence (T′=4.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Although this may be one of the 1-in-20 cases when contemporary samples produce such measurements. The structure probably dates to the second quarter of the second millennium cal BC.

References: Ellis *et al* 2001
Ward and Wilson 1978

GU–5796 3430 ±70 BP

$\delta^{13}C$: -26.4‰

Sample: TA086247.AA.01, submitted on 4 February 2000 by W Fletcher

Material: wood (waterlogged): *Corylus* sp. (G Thomas 1999)

Initial comment: the two samples GU-5796 and GU-5797 were taken from a single wooden structure excavated from an alluvial context within the intertidal zone. The structure appears to have been a conical fish trap, made from long thin roundwood withies. All the samples were found together.

Objectives: dating of the structure will help date the human activity on the south bank of the Humber within the temporal setting already established on the north bank.

Calibrated date: *1σ:* 1880–1640 cal BC
2σ: 1930–1530 cal BC

Final comment: R Van de Noort (30 November 2004), this date confirms the Bronze Age date.

GU–5797 3240 ±60 BP

δ*13C:* -29.5‰

Sample: TA086247.AA.04, submitted on 4 February 2000 by W Fletcher

Material: wood (waterlogged): *Corylus* sp. (G Thomas 1999)

Initial comment: as GU-5796

Objectives: as GU-5796

Calibrated date: *1σ:* 1610–1430 cal BC
2σ: 1660–1400 cal BC

Final comment: see GU-5796

Humber Wetlands Project: Vale of York, Askham Bog, Yorkshire

Location: SE 570480
Lat. 53.55.29 N; Long. 01.07.55 W

Project manager: B Gearey (University of Hull), 1998

Description: a basin mire formed on boulder clay behind the Escrick moraine; presently Fen woodland.

Objectives: this series consists of sediment samples from a core through fen/raised bog/fen/lake sequence. Pollen analysis has been carried out and reveals an early Holocene sequence of vegetation development through to *Ulmus* and post-*Ulmus* decline vegetation. The series will provide a temporal framework for the vegetation development in the Vale of York.

Final comment: B Gearey (8 October 2013), a number of interpretive issues are associated with the results from the Askham sequence, including hard-water offsets from the lowest part of the sequence, and evidence for complex carbon cycling or physical redeposition or disturbance in the upper part of the sequence. As a result it is challenging to produce a demonstrably robust age-depth model for these parts of the sequence. For the middle part of the sequence (OxA-8255–8), it is possible to build an internally consistent age depth model, which could provide accurate estimates for the age of a dry shift, *Tilia* rise, and the fen-bog transition, which are indicated by palaeoenvironmental proxies recovered from the peat.

Laboratory comment: English Heritage (2000), the bulk humin fraction was dated throughout the sequence for consistency, as no macrofossils were extant below 1.68m.

References: Van de Noort and Ellis 1999

OxA–8250 4185 ±40 BP

δ*13C:* -26.4‰

Sample: ASK24, submitted on 4 November 1998 by B Gearey

Material: peat (bulk fraction) (B Gearey 1998)

Initial comment: from a depth of 0.24m, a black well-humified monocotyledon peat with *Phragmites* remains. The pH of the peat was 4.5, and the organic percentage *c* 76%. Some rootlet penetration is possible.

Objectives: to date the transition to fen woodland, providing a time frame for the current vegetation, birch fen woodland, at the site.

Calibrated date: *1σ:* 2890–2690 cal BC
2σ: 2900–2620 cal BC

Final comment: B Gearey (8 October 2013), results from the upper part of the sequence (OxA-8250–5) include several age inversions and inconsistencies in replicate measurements (OxA-8252–3). As a result it is not possible to produce a demonstrably robust chronology for this part of the sequence. Whether these results derive from highly localised conditions associated with ground water, physical conditions such as root penetration and so on is unclear. Because of this uncertainty, it is also unclear from this evidence whether these conditions compromise the association of the palaeoenvironmental proxy data used from these depths for landscape reconstruction.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1998), the humin fraction of this sample was dated.

OxA–8251 895 ±35 BP

δ*13C:* -28.4‰

Sample: ASK56, submitted on 4 November 1998 by B Gearey

Material: peat (bulk fraction) (B Gearey 1998)

Initial comment: from a depth of 0.56m, a black well humified monocot peat with *Phragmites* remains. The pH of the sample was 4.7, and the organic percentage 92%. Some rootlet penetration is possible.

Objectives: to provide an upper date to bracket the *Ulmus* decline.

Calibrated date: *1σ:* cal AD 1040–1210
2σ: cal AD 1030–1230

Final comment: see OxA-8250

Laboratory comment: see OxA-8250

OxA–8252 3465 ±45 BP

$\delta^{13}C$: -27.9‰

Sample: ASK58, submitted on 4 November 1998 by B Gearey

Material: peat (bulk fraction) (B Gearey 1998)

Initial comment: from at depth of 0.58m, a black well humified monocot peat with *Phragmites* remains. The pH of the sample was 4.8, and the organic percentage 93%. Some rootlet penetration is possible.

Objectives: to date the *Ulmus* decline.

Calibrated date: *1σ:* 1880–1690 cal BC
2σ: 1900–1660 cal BC

Final comment: see OxA-8250

Laboratory comment: see OxA-8250

Laboratory comment: English Heritage (2000), the replicate measurements at 58cm (OxA-8252 and OxA-8253) are very significantly different (T′=1992.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978), suggesting that the material dated is extremely inhomogenous.

References: Ward and Wilson 1978

OxA–8253 920 ±35 BP

$\delta^{13}C$: -28.3‰

Sample: ASK58, submitted on 4 November 1998 by B Gearey

Material: peat (bulk fraction) (B Gearey 1998)

Initial comment: as OxA-8252

Objectives: as OxA-8252

Calibrated date: *1σ:* cal AD 1030–1170
2σ: cal AD 1020–1220

Final comment: see OxA-8250

Laboratory comment: see OxA-8250

OxA–8254 1.185 ±0.005 fM

$\delta^{13}C$: -30.4‰

Sample: ASK60, submitted on 4 November 1998 by B Gearey

Material: peat (bulk fraction) (B Gearey 1998)

Initial comment: from at depth of 0.60m, a black well humified monocot peat with *Phragmites* remains. The pH of the sample was 4.6, and the organic percentage 94%. Some rootlet penetration is possible.

Objectives: to provide a lower date to bracket the *Ulmus* decline horizon.

Calibrated date: *1σ:* cal AD 1958–1988
2σ: cal AD 1957–1988

Final comment: see OxA-8250

Laboratory comment: see OxA-8250

Laboratory comment: English Heritage (2000), the appearance of modern material at this depth suggests that there may be rootlet penetration, pushing younger material down the profile. No rootlets were noted in the description of the sediment at 0.25–1.12m however, although some *Phragmites* rhizomes were recorded. It is possible that some of these may be of relatively recent origin, although map evidence suggests that the sampling site has been under woodland for at least the last century (Fitter and Smith 1979, 56–7). Alternatively the modern material may have been introduced into the sediment through desiccation cracks, as the water table of the bog fluctuates considerably.

Laboratory comment: English Heritage (24 August 2014), this measurement has been calibrated using the post-nuclear bomb atmospheric calibration curve for zone 1 of the northern hemisphere (Bomb13NH1; Hua *et al* 2013).

References: Fitter and Smith 1979
Hua *et al* 2012

OxA–8255 5815 ±50 BP

$\delta^{13}C$: -24.8‰

Sample: ASK112, submitted on 4 November 1998 by B Gearey

Material: peat (bulk fraction) (B Gearey 1998)

Initial comment: from at depth of 1.12m. The pH of the sample was 4.7, and the organic percentage 94%.

Objectives: to date the rise in *Calluna* sp.

Calibrated date: *1σ:* 4730–4600 cal BC
2σ: 4800–4540 cal BC

Final comment: B Gearey (8 October 2013), this, and results OxA-8256–8, appear internally consistent, and without the hard-water offsets associated with the lower part of the sequence. These results derive from a *Sphagnum* peat with *Eriophorum* unit. This depth estimates a horizon associated with a dry shift at this sample location from the bog surface.

Laboratory comment: see OxA-8250

OxA–8256 6310 ±45 BP

$\delta^{13}C$: -24.8‰

Sample: ASK136, submitted on 4 November 1998 by B Gearey

Material: peat (bulk fraction) (B Gearey 1998)

Initial comment: from at depth of 1.36m, a layer of moderately humified, dark brown *Sphagnum* peat with some *Eriophorum* also present. The pH of the sample was 4.9, and the organic percentage 96%.

Objectives: to date a rise in *Tilia* sp.

Calibrated date: *1σ:* 5330–5220 cal BC
2σ: 5380–5210 cal BC

Final comment: B Gearey (8 October 2013), *see* OxA-8255. The age for the formation of this depth estimates the time of a *Tillia* rise.

Laboratory comment: see OxA-8250

OxA–8257 6350 ±50 BP

$\delta^{13}C$: -25.0‰

Sample: ASK144, submitted on 4 November 1998 by B Gearey

Material: peat (bulk fraction) (B Gearey 1998)

Initial comment: from at depth of 1.44m. The pH of the sample was 5.3, and the organic percentage 93%.

Objectives: to provide a date for raised-bog development.

Calibrated date: *1σ:* 5370–5300 cal BC
2σ: 5470–5210 cal BC

Final comment: see OxA-8255

Laboratory comment: see OxA-8250

OxA–8258 6770 ±50 BP

$\delta^{13}C$: -23.4‰

Sample: ASK152, submitted on 4 November 1998 by B Gearey

Material: peat (bulk fraction) (B Gearey 1998)

Initial comment: from at depth of 1.52m, a layer of black, very well humified monocot peat. The pH of the sample was 4.9, and the organic percentage 96%.

Objectives: to provide a date bracket for fen development.

Calibrated date: *1σ:* 5720–5630 cal BC
2σ: 5740–5610 cal BC

Final comment: B Gearey (8 October 2013), *see* OxA-8255. The age estimate for the formation of this depth estimates the time of the fen-bog transition.

Laboratory comment: see OxA-8250

Laboratory comment: English Heritage (2000), it may be significant that the largest increase in $\delta^{13}C$ value occurs between 168cm (-18.8‰) and 152cm (-23.4‰), around the transition from fully aquatic to fen environments.

OxA–8259 7175 ±50 BP

$\delta^{13}C$: -18.8‰

Sample: ASK168, submitted on 4 November 1998 by B Gearey

Material: sediment (highly organic lake mud/unidentified organic matter; humin) (B Gearey 1998)

Initial comment: from at depth of 1.68m. The pH of the sample was 5.5, and the organic percentage 90%. Some rootlet penetration is possible.

Objectives: to date the transition from lake to fen.

Calibrated date: *1σ:* 6070–6000 cal BC
2σ: 6210–5980 cal BC

Final comment: B Gearey (8 October 2013), the results below 168cm (OxA-8259–62) present an internally consistent age-depth model of deposit formation. However, given the indications of a hard-water offset, and without an estimate for the scale of this offset, it is not possible to present a demonstrable accurate age estimates for the formation of this and the lower sample horizons.

Laboratory comment: see OxA-8250

Laboratory comment: English Heritage (2000), after 180cm *Myriophyllum* disappears from the pollen record and *Potamogeton*-type becomes more common. This appears to reflect a transition from alkaline to increasingly acid conditions (perhaps with a decrease in dissolved geologically-derived carbonates), as pondweeds generally prefer lower pH conditions to milfoils, typically pH of 5.5–7.5 (Grime *et al* 1988). Samples below 152cm (OxA-8259–62), where the freshwater lake succeeds to mesotrophic fen, exhibit a significant hard-water effect (Bowman 1990). This is demonstrated by the $d^{13}C$ values from these levels, which range between -15.0‰ and -18.0‰. This compares to an average $\delta^{13}C$ value for wood and sediment samples from the rest of the Humber Wetlands Project of -28.3‰ (n=56). In general the terrestrial plant material from the region appears to be slightly more negative than is usual for samples of this type in England (Aitken 1990), although within the range expected for this type of material globally (Stuiver and Polach 1977).

References: Aitken 1990
Bowman 1990
Grime *et al* 1988
Stuiver and Polach 1977

OxA–8260 7720 ±50 BP

$\delta^{13}C$: -18.7‰

Sample: ASK200, submitted on 4 November 1998 by B Gearey

Material: sediment (organic lake mud; humin) (B Gearey 1998)

Initial comment: from at depth of 2m, a layer of highly organic Nekron mud with some monocot remains towards the top of unit and grading onto grey minerogenic silts at the base. The pH of the sample was 5.5, and the organic percentage 89%.

Objectives: to date a rise in *Alnus* sp.

Calibrated date: *1σ:* 6610–6470 cal BC
2σ: 6650–6450 cal BC

Final comment: see OxA-8259

Laboratory comment: see OxA-8250

Laboratory comment: English Heritage (2000), at this level *Myriophyllum spicatum*, which prefers a pH of 7.10–8.5 (Rodwell 1995), appears suggesting that the lake contained leached carbonates of geological age which would have been taken up by aquatic plants included in the sample. *See* also laboratory comment for OxA-8259.

References: Rodwell 1995

OxA–8261 8605 ±50 BP

$\delta^{13}C$: -16.3‰

Sample: ASK296, submitted on 4 November 1998 by B Gearey

Material: sediment (highly organic lake mud) (B Gearey 1998)

Initial comment: from at depth of 2.96m, a layer of highly organic Nekron mud with some monocot remains towards the top of unit and grading onto grey minerogenic silts at the base. The pH of the sample was 5.5, and the organic percentage 83%.

Objectives: to date a rise in *Quercus* sp.

Calibrated date: *1σ:* 7610–7580 cal BC
2σ: 7730–7570 cal BC

Final comment: see OxA-8259

Laboratory comment: see OxA-8250

Laboratory comment: English Heritage (2000), from 290cm to 200cm pollen of *Myriophyllum alterniflorum* suggests that the lake had a pH of less than 7.0 (Rodwell 1995), base-enhanced conditions which will have included leached carbonates of geological age. These carbonates will have been taken up by aquatic species included in the sample. *See* also laboratory comment for OxA-8259.

References: Rodwell 1995

OxA–8262 9150 ±55 BP

$\delta^{13}C$: -15.0‰

Sample: ASK323, submitted on 4 November 1998 by B Gearey

Material: sediment (highly organic lake mud; humin) (B Gearey 1998)

Initial comment: from at depth of 3.23m. The pH of the sample was 5.6, and the organic percentage 79%.

Objectives: to provide a date for organic sediment accumulation and the base of the pollen sequence.

Calibrated date: *1σ:* 8430–8280 cal BC
2σ: 8550–8270 cal BC

Final comment: see OxA-8259

Laboratory comment: see OxA-8250

Humber Wetlands Project: Vale of York, sediments, Yorkshire

Location: SE 581418 to SE 720290
Lat. 53.52.08 N; Long. 01.06.59 W, to Lat. 53.45.08 N; Long. 00.54.29 W

Project manager: R Van de Noort (University of Hull), 1998

Archival body: Humber Sites and Monuments Record, Hull and East Riding Museum

Description: the River Ouse at SE 581418 (GU-5759) and SE 720270 (GU-5760 and GU-5761) and the River Derwent at SE 697397 (GU-5763); SE 720290 (NZA-9361–62); SE 718288 (NZA-9364); and SE 697397 (NZA-9365–66). Sands and gravels of glacial and late-glacial derivation underlay all the samples.

Objectives: to create a very basic temporal framework of wetland development in the region. In future, it may also be of interest for testing models of wetland development in the Humber lowlands, developed by the University of Hull in collaboration with English Heritage.

Final comment: R Van de Noort (10 January 2014), re-worked sands of Aeolian origin underlie many of the boreholes excavated within the river catchments in the southern Vale of York, reflecting a combination of fluvial activity following the draining of lake Humber and continued Aeolian deposition within the river confines. The radiocarbon dates in this series relate to peat samples from above this sand layer, which are indicative of freshwater wetland development as a direct consequence of rising sea-levels and the impounding of river runoff.

References: Van de Noort and Ellis 1999

GU–5759 5050 ±70 BP

$\delta^{13}C$: -29.2‰

Sample: SE581418.03 VOY2, submitted on 27 March 1998 by R Van de Noort

Material: waterlogged plant macrofossils (*Alnus* sp., roundwood) (R Gale 1998)

Initial comment: from a depth of 7.60–7.71m below the surface, from the base of the peat of the upper Ouse. For other measurements from the River Ouse *see* GU-5760 and GU-5761.

Objectives: to provide a global date for onset of wetland development in this part of the Vale of York.

Calibrated date: *1σ:* 3960–3710 cal BC
2σ: 3990–3660 cal BC

Final comment: R Van de Noort (10 January 2014), the time transgressive nature of wetland development within the rivers of the Vale of York is well known, with this development occurring earlier in the lower reaches of each river as a response to higher sea-levels, which in turn resulted in higher water table and paludufcation or lateral expansion of wetlands in river floodplains. This result, from the higher reaches of the River Ouse, represents the relative late onset of freshwater peat development at College Hill in the River Ouse catchment.

GU–5760 3650 ±80 BP

$\delta^{13}C$: -28.4‰

Sample: SE720270.03 VOY3, submitted on 27 June 1998 by R Van de Noort

Material: waterlogged plant macrofossils (*Alnus* sp., *Quercus* sp., *Fraxinus* sp., *Rosa* sp.; narrow roundwood and bark) (R Gale 1998)

Initial comment: from a depth of 2.82–2.92m below the surface from the base of the peat of the lower Ouse. For other measurements from the River Ouse *see* GU-5759 and GU-5761.

Objectives: to provide a global date for when the maximum extent of wetland development in this part of the Vale of York was achieved.

Calibrated date: *1σ:* 2140–1910 cal BC
2σ: 2280–1770 cal BC

Final comment: R Van de Noort (10 January 2014), the time transgressive nature of wetland development within the rivers of the Vale of York is well known, with this development occurring earlier in the lower reaches of each river as a response to higher sea-levels, which in turn resulted in higher water table and paludification or lateral expansion of wetlands in river floodplains. This result, represents the uppermost limit of carr expansion around Asselby in the River Ouse catchment.

GU–5761 6200 ±80 BP

$\delta^{13}C$: -28.9‰

Sample: SE720270.01 VOY4, submitted on 27 March 1998 by R Van de Noort

Material: waterlogged plant macrofossils (*Alnus* sp.; roundwood with bark) (R Gale 1998)

Initial comment: from a depth of 8.7–8.8m below the surface from the base of the peat of the lower Ouse. For other measurements from the River Ouse *see* GU-5759 and GU-5760.

Objectives: to provide a global date for the onset of wetland development.

Calibrated date: *1σ:* 5300–5040 cal BC
2σ: 5330–4940 cal BC

Final comment: R Van de Noort (10 January 2014), the time transgressive nature of wetland development within the rivers of the Vale of York is well known, with this development occurring earlier in the lower reaches of each river as a response to higher sea-levels, which in turn resulted in higher water table and paludification or lateral expansion of wetlands in river floodplains. This result, represents the earliest unequivocal date of freshwater wetland development in the River Ouse catchment.

GU–5763 2480 ±70 BP

$\delta^{13}C$: -29.6‰

Sample: SE697397.01 VOY7, submitted on 27 March 1998 by R Van de Noort

Material: waterlogged plant macrofossils (*Alnus* sp., roundwood with bark) (R Gale 1998)

Initial comment: from a depth of 1.7–1.8m below the surface from the base of the peat of the upper Derwent. For other measurements from the River Derwent *see* NZA-9361 to NZA-9366.

Objectives: to provide a global date for when the maximum extent of wetland development in this part of the Vale of York was achieved.

Calibrated date: *1σ:* 790–410 cal BC
2σ: 810–390 cal BC

Final comment: R Van de Noort (10 January 2014), the time transgressive nature of wetland development within the rivers of the Vale of York is well known, with this development occurring earlier in the lower reaches of each river as a response to higher sea-levels, which in turn resulted in higher water table and paludification or lateral expansion of wetlands in river floodplains. This result, represents the uppermost limit of carr expansion around Ellerton in the River Derwent catchment.

NZA–9361 3937 ±59 BP

$\delta^{13}C$: -24.4‰

Sample: SE720290.02 VOY5(a), submitted on 27 March 1998 by R Van de Noort

Material: waterlogged plant macrofossils (*Prunus* sp., fruit stones) (R Gale 1998)

Initial comment: from a depth of 3.7–3.77m below the surface from the base of the peat of the lower Derwent. *See* NZA-9362 for a further measurement from the same depth, and for other measurements from the River Derwent *see* GU-5763, NZA-9360, and NZA-9363–6.

Objectives: to provide a global date for when the maximum extent of wetland development in this part of the Vale of York was achieved.

Calibrated date: *1σ:* 2550–2340 cal BC
2σ: 2580–2210 cal BC

Final comment: R Van de Noort (10 January 2014), the time transgressive nature of wetland development within the rivers of the Vale of York is well known, with this development occurring earlier in the lower reaches of each river as a response to higher sea-levels, which in turn resulted in higher water table and paludification or lateral expansion of wetlands in river floodplains. This result, represents the *terminus ante quem* for the final stages of wetland development in the palaeochannel of the Old Derwent river.

Laboratory comment: English Heritage (2000), the replicate measurements on this sample (NZA-9361 and NZA-9362) are statistically significantly different ($T'=8.6$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978). This suggests that the sample contained plant macrofossils of different ages.

References: Ward and Wilson 1978

NZA–9362 3673 ±68 BP

$\delta^{13}C$: -27.0‰

Sample: SE720290.02 VOY5(b), submitted on 27 March 1998 by R Van de Noort

Material: waterlogged plant macrofossil: *Alnus* sp. (R Gale 1998)

Initial comment: as NZA-9361

Objectives: as NZA-9361

Calibrated date: *1σ:* 2190–1940 cal BC
2σ: 2280–1880 cal BC

Final comment: *see* NZA-9361

Laboratory comment: *see* NZA-9361

NZA–9363 6224 ±69 BP

$\delta^{13}C$: -29.0‰

Sample: SE718288.02 VOY6(a), submitted on 27 March 1998 by R Van de Noort

Material: wood (waterlogged; narrow roundwood and bark) (R Gale 1998)

Initial comment: from a depth of 9.04–9.14m below the surface from the base of the peat of the lower Derwent. *See* NZA-9364 for a further measurement from the same depth and for further measurements from the River Derwent *see* GU-5763, NZA-9360–2, and NZA-9365–6.

Objectives: to provide a global date for when the maximum extent of wetland development in this part of the Vale of York was achieved.

Calibrated date: *1σ:* 5310–5060 cal BC
2σ: 5330–4990 cal BC

Final comment: R Van de Noort (10 January 2014), the time transgressive nature of wetland development within the rivers of the Vale of York is well known, with this development occurring earlier in the lower reaches of each river as a response to higher sea-levels, which in turn resulted in higher water table and paludification or lateral expansion of wetlands in river floodplains. This result, represents the earliest date for the onset of wetland development in the palaeochannel of the Old Derwent river.

Laboratory comment: English Heritage (2000), the replicate measurements on this sample (NZA-9363 and NZA-9364) are statistically consistent ($T'=0.0$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978

NZA–9364 6211 ±62 BP

$\delta^{13}C$: -29.3‰

Sample: SE718288.02 VOY6(b), submitted on 27 March 1998 by R Van de Noort

Material: wood (waterlogged; narrow roundwood and bark) (R Gale 1998)

Initial comment: as NZA-9363

Objectives: as NZA-9363

Calibrated date: *1σ:* 5300–5050 cal BC
2σ: 5320–4990 cal BC

Final comment: *see* NZA-9363

Laboratory comment: *see* NZA-9363

NZA–9365 5683 ±59 BP

$\delta^{13}C$: -25.9‰

Sample: SE697397.05 VOY8(a), submitted on 27 March 1998 by R Van de Noort

Material: wood (waterlogged; roundwood) (R Gale 1998)

Initial comment: from a depth of 7.19–7.29m below the surface from the base of the peat of the lower Derwent. *See* NZA-9366 for a further measurement from the same depth and for further measurements from the River Derwent *see* GU-5763, and NZA-9360 to NZA-9364.

Objectives: to provide a global date for when the maximum extent of wetland development in this part of the Vale of York was achieved.

Calibrated date: *1σ:* 4580–4450 cal BC
2σ: 4690–4360 cal BC

Final comment: R Van de Noort (10 January 2014), the time transgressive nature of wetland development within the rivers of the Vale of York is well known, with this development occurring earlier in the lower reaches of each river as a response to higher sea-levels, which in turn resulted in higher water table and paludification or lateral expansion of wetlands in river floodplains. This result, represents the earliest date for the onset of wetland development on the floodplain of the River Derwent at Ellerton Ings.

Laboratory comment: Rafter Radiocarbon Laboratory (2000), the sample consisted of pale brown fragments of wood which formed a black liquid after treatment with sodium hydroxide and an orange-brown gel after bleaching.

Laboratory comment: English Heritage (2000), the replicate measurements on this sample (NZA-9365 and NZA-9366) are statistically significantly different consistent ($T'=28.8$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978). This suggests that the sample contained plant macrofossils of different ages.

References: Ward and Wilson 1978

NZA–9366 5220 ±63 BP

$\delta^{13}C$: -26.7‰

Sample: SE697397.05 VOY8(b), submitted on 27 March 1998 by R Van de Noort

Material: wood (waterlogged; roundwood) (R Gale 1998)

Initial comment: as NZA-9365

Objectives: as NZA-9365

Calibrated date: *1σ:* 4060–3960 cal BC
2σ: 4240–3940 cal BC

Final comment: *see* NZA-9365

Laboratory comment: *see* NZA-9365

Laboratory comment: Rafter Radiocarbon Laboratory (2000), the sample consisted of one large fragment of wood and two smaller fragments which were pale yellow/tan in colour. This formed a pale amber residue after treatment with sodium hydroxide and bright yellow fibres after bleaching.

Humber Wetlands Project: Vale of York, trackways, Yorkshire (East Riding)

Location: SE 955246 to SE 975247
Lat. 53.42.32 N; Long. 00.33.11 W, to
Lat. 53.42.34 N; Long. 00.31.22 W

Project manager: R Van de Noort (University of Hull), 1997 and 1998

Archival body: Hull and East Riding Museum

Description: five samples, GU-5708, GU-5709, GU-5710, GU-5711, and GU-5766 are from Melton foreshore, site code AI.002, NGR SE 975247, where *c* 15 small stakes were recovered. Sample GU-5765 came from Welton, site code AT.002, NGR SE 955246. This site consisted of a two-post structure whose function is unknown. Two samples, GU-5767 and GU-5770 are from East Clough, site code BC.001 and BC.002, NGR SE 970246 and are associated with a fish trap. GU-5768 comes from site code AT.001, and GU-5769 from site code AI.001.

Objectives: samples GU-5708–11 were submitted to establish dates for the trackway. Samples GU-5765–7 were submitted to establish absolute ages for the materials, which currently have a relative temporal framework based on axe mark analysis. The samples are both spatially and temporally diverse. Samples GU-5768–70 were submitted to establish date ranges for the sites from which they were discovered.

Final comment: R Van de Noort (10 January 2014), during the Bronze Age, extensive saltmarsh and freshwater wetlands developed on the north bank of the Humber estuary, and this landscape was utilised as pasture ground and possibly for the hunting of birds. Two hurdle type trackways were partially excavated on the foreshore and dated (GU-5708–11); the remaining dates come from structure placed on the foreshore in the Bronze Age for which the site typology is not specifically determined, but could include platforms.

Laboratory comment: Ancient Monuments Laboratory (1999), two samples were submitted from each of five timber structures exposed on the foreshore. One pair of measurements (GU-5710 and GU-5711) are statistically significantly different ($T'=9.7$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978).

Laboratory comment: English Heritage (2013), four further dates from this site were funded prior to 1998 and were published in Bayliss *et al* (2015, 94–5; GU-5708–11).

References: Bayliss *et al* 2015, 94–5
Van de Noort and Ellis 1999
Ward and Wilson 1978

GU–5765 3150 ±50 BP

$\delta^{13}C$: -28.3‰

Sample: AT.002, submitted on 6 April 1998 by W Fletcher

Material: wood (waterlogged): *Alnus* sp. (121.40g) (G Thomas 1998)

Initial comment: part of a wooden stake of whole roundwood, hammered into peat within the intertidal zone. The stake has been anthropogenically modified and introduced into a primary context. The sample was taken from alluvium over waterlogged intertidal peats.

Objectives: to establish an absolute age for the material.

Calibrated date: *1σ:* 1500–1390 cal BC
2σ: 1510–1280 cal BC

Final comment: R Van de Noort (10 January 2014), one of a number of Bronze Age structures with uncertain typology placed on the foreshore of the Humber estuary.

GU–5766 3010 ±100 BP

$\delta^{13}C$: -29.1‰

Sample: AI.002, submitted on 5 August 1998 by W Fletcher

Material: wood (waterlogged): *Alnus* sp., roundwood (G Thomas 1998)

Initial comment: as GU-6765

Objectives: as GU-6765

Calibrated date: *1σ:* 1410–1110 cal BC
2σ: 1500–930 cal BC

Final comment: *see* GU-5765

GU–5767 2500 ±60 BP

$\delta^{13}C$: -27.1‰

Sample: BC.001, submitted on 6 April 1998 by W Fletcher

Material: wood (waterlogged): *Alnus* sp., roundwood (G Thomas 1998)

Initial comment: as GU-5765

Objectives: as GU-5765

Calibrated date: *1σ:* 790–510 cal BC
2σ: 810–400 cal BC

Final comment: *see* GU-5765

GU–5768 3150 ±50 BP

$\delta^{13}C$: -28.7‰

Sample: AT.001, submitted on 22 June 1998 by R Van de Noort

Material: wood (waterlogged): *Alnus* sp. (G Thomas 1998)

Initial comment: from peat on the foreshore. The burial environment was peat within the tidal range. The pH was 5.5.

Objectives: part of an attempt to establish the date range of 40 archaeological sites discovered in 1998 by the Humber Wetlands Survey.

Calibrated date: *1σ:* 1500–1390 cal BC
2σ: 1510–1280 cal BC

Final comment: *see* GU-5765

GU–5769 3050 ±80 BP

$\delta^{13}C$: -29.9‰

Sample: AI.001, submitted on 15 September 1998 by R Van de Noort

Material: wood (waterlogged): *Ulmus* sp., from a young plant (R Van de Noort 1998)

Initial comment: from alluvial deposits exposed on the foreshore. The burial environment was clay within the tidal range. The pH was not determined.

Objectives: as GU-5768

Calibrated date: *1σ:* 1420–1200 cal BC
2σ: 1500–1050 cal BC

Final comment: see GU-5765

GU–5770 2490 ±60 BP

$\delta^{13}C$: -27.0‰

Sample: BC.002, submitted on 15 September 1998 by R Van de Noort

Material: wood (waterlogged): *Fraxinus* sp. (R Van de Noort 1998)

Initial comment: from peat exposed on the foreshore. The burial environment was peat within the tidal range. The pH was 5.5.

Objectives: as GU-5768

Calibrated date: *1σ:* 790–500 cal BC
2σ: 800–400 cal BC

Final comment: see GU-5765

Ickham, Kent

Location: TR 231591
Lat. 51.17.12 N; Long. 01.11.59 E

Project manager: C Young (Historic Buildings and Monuments Commission), 1974

Archival body: Canterbury Archaeological Trust

Description: the figurine was uncovered during excavation of a Roman roadside settlement with three associated watermills. It was found in a ditch with other finds, including a number of fourth-century coins.

Objectives: to assess the proposed late Roman date of the figurine and to complement an earlier dating programme of British wooden figurines (Coles 1990).

References: Coles 1990
Coles 1993
Young 1976

OxA–8047 1850 ±50 BP

$\delta^{13}C$: -24.5‰

Sample: CK74, submitted on 2 April 1998 by P Clark

Material: wood: *Acer* sp., maple (c 300g) (J Watson)

Initial comment: found lying on the left side in fills of a ditch running parallel to a Roman road. The precise ditch is unknown (there were several parallel to the road). The figurine is associated with fourth-century AD coins and other objects of presumed Roman date.

Objectives: the figurine was found in association with late Roman material, yet no comparable examples are known from within the empire. All other British examples are prehistoric in date. Some contemporary parallels can be found in Scandinavia. Given the uncertainty of the figurine's stratigraphic provenance, it is imperative to enhance our understanding of the figurine's chronological relationship to examples from Britain and elsewhere in Europe.

Calibrated date: *1σ:* cal AD 80–240
2σ: cal AD 50–330

Final comment: P Clark (9 June 1999), this date accords well with the stratigraphic provenance and associated artefacts. Wooden figurines of similar type in Britain have generally been dated to the prehistoric period - contemporary parallels may now be sought in Northern Europe and Scandinavia. Its presence at the Ickham site, perhaps a Roman manufactory, is intriguing.

References: Bronk Ramsey *et al* 2000, 469–70

Ingleby Barwick: Windmill Fields, Durham

Location: NZ 44601255
Lat. 54.30.24 N; Long. 01.18.40 W

Project manager: R Annis (Tees Archaeology), December 1996

Archival body: Preston Hall Museum

Description: a cemetery containing equipped and unfurnished crouched burials, and a timber structure containing disarticulated remains. A chance find made during building work, followed by a two-week rescue excavation.

Objectives: to determine the span of use of the cemetery, and to compare the dates of the (possibly) excarnated remains in the timber cist with those of the crouched burials.

Final comment: B Vyner (11 November 2013), the gap between the end of timber cist/unfurnished burial interment tradition at the site and the first furnished burial (UB-4174) is probably a number of generations. Burial seems to have continued at the site sporadically for around half a millennium. Although early Bronze Age burials are commonly found on the adjacent uplands of the North York Moors, lowland burials of this period are much scarcer. The finds assemblage is unparalleled in northern England, although it does have associations with finds from Scotland. The collection of metal objects, and the range of burial traditions represented, makes the site of European significance.

Laboratory comment: English Heritage (8 November 2013), two further dates from this site were funded prior to 1998 and are published in Bayliss *et al* (2015, 96; UB-4173–4).

Laboratory comment: English Heritage (8 November 2013), the five measurements (OxA-8650–2; and OxA-8728–9) are statistically consistent ($T'=3.4$; $\nu=4$; $T'(5\%)=9.5$; Ward and Wilson 1978) which might mean that all the dated individuals died at exactly the same time (eg as a result of an infectious epidemic). However, it is possible, and indeed more likely, given the variant burial treatments in evidence, that all the individuals were buried over a relatively short period of time.

References: Annis 1997
Bayliss *et al* 2015
Ward and Wilson 1978

OxA–8650 3755 ±40 BP

δ^{13}*C:* -21.1‰
δ^{15}*N (diet):* +8.6‰
C/N ratio: 3.3

Sample: IWF 96/1, submitted in December 1998 by R Annis

Material: human bone (78g) (right humerus) (R Annis 1998)

Initial comment: SK 1 (burial 2), a crouched inhumation, may have been mummified. The burial was disturbed by a machine during the building work. Later examination of the area suggests that this group of bones is a crouched burial similar to three others (SK 5–7) found nearby. The bone was all recovered from spoil next to the burial site. A piece of Beaker was found at the same time.

Objectives: to establish the period of use of the cemetery and to compare with the high-precision dates already obtained from two furnished burials.

Calibrated date: *1σ:* 2270–2060 cal BC
2σ: 2290–2030 cal BC

Final comment: see series comments

OxA–8651 3705 ±35 BP

δ^{13}*C:* -21.4‰
δ^{15}*N (diet):* +10.2‰
C/N ratio: 3.4

Sample: IWF 96/2, submitted in December 1998 by R Annis

Material: human bone (176g) (left femur shaft) (R Annis 1998)

Initial comment: SK 2 (burial 1) was a crouched inhumation, believed to have been mummified. It was disturbed by a machine during the building work. As OxA-8650.

Objectives: as OxA-8650

Calibrated date: *1σ:* 2190–2030 cal BC
2σ: 2210–1970 cal BC

Final comment: see series comments

OxA–8652 3785 ±40 BP

δ^{13}*C:* -21.4‰
δ^{15}*N (diet):* +9.9‰
C/N ratio: 3.3

Sample: IWF 96/3, submitted in December 1998 by R Annis

Material: human bone (196g) (right femur) (R Annis 1998)

Initial comment: SK 3 (deposit 1a) and SK 4 (deposit 1b) were two discrete deposits found in the fill of a chamber or box. The sides of this were defined by dark timber stains and by a marked colour change: the wooden structure had been built in an oval pit. The two burials were separated by a thin soil layer, and SK3 was the earlier of the two. The bones were found in a disarticulated heap and may well be an excarnation deposit.

Objectives: to provide an absolute date for this group of bone, for comparison with the neighbouring SK 4 and the crouched burials that surround the pit and its wooden chamber/cist; to attempt to establish the period of use of the cemetery.

Calibrated date: *1σ:* 2290–2140 cal BC
2σ: 2340–2040 cal BC

Final comment: see series comments

OxA–8728 3725 ±40 BP

δ^{13}*C:* -21.0‰
δ^{15}*N (diet):* +10.4‰
C/N ratio: 3.4

Sample: IWF 96/4, submitted in December 1998 by R Annis

Material: human bone (230g) (left femur) (R Annis 1998)

Initial comment: as OxA-8652

Objectives: as OxA-8652

Calibrated date: *1σ:* 2200–2030 cal BC
2σ: 2280–1980 cal BC

Final comment: see series comments

OxA–8729 3780 ±40 BP

δ^{13}*C:* -21.4‰
δ^{15}*N (diet):* +10.7‰
C/N ratio: 3.4

Sample: IWF 96/7, submitted in December 1998 by R Annis

Material: human bone (96g) (fragment from shaft of right femur) (R Annis 1998)

Initial comment: SK 7 (burial 3) was a crouched burial, accompanied by a haematite chunk, in a grave between two slightly deeper graves, each of which contained grave goods. The body may have been mummified. The skeleton was badly broken up by the pressure of farm and construction traffic and though the shape of the body was distinguishable some elements were missing. The body had clearly been articulated at the time of burial. No stratigraphic links with the neighbouring graves were present; but like SK1, 2, 5, and 6 the body may have been oriented with reference to the highest local point.

Objectives: to provide an absolute date for this burial, for comparison with other crouched inhumations and with the possibly excarnated SK 3 and 4 at the centre of the site; to establish the period of use of the cemetery and to see if there is continuity over an extended period during which two totally differing traditions were in use.

Calibrated date: *1σ:* 2290–2140 cal BC
2σ: 2340–2040 cal BC

Final comment: see series comments

Irby: late Roman and early medieval, Merseyside

Location: SJ 253853
Lat. 53.21.32 N; Long. 03.07.21 W

Project manager: M Adams (Liverpool Museum), 1993 and 1995

Archival body: Liverpool Museum

Description: Irby was a rural farmstead, the main phases of occupation dating to the second–fourth centuries AD. An earlier prehistoric phase and the final phase cannot be dated accurately. The samples were taken from the fills of large pits at the top of the stratigraphic sequence. These acted as settings for large timber posts *c* 0.3m in diameter. The posts were packed in place with sandstone blocks up to 0.4m across. The positions of the blocks suggest the posts rotted *in situ*.

Objectives: to date the final phase of occupation at Irby. The only dating evidence for these features is that they cut layers containing fourth-century AD pottery.

Final comment: R Philpott and M Adams (2010), the artefactual and radiocarbon evidence for the structures is somewhat equivocal. The possibility of an early medieval date for some of the structures is enhanced by the radiocarbon dates for S29 which extend from the mid-fifth century AD to the end of the sixth century AD. The radiocarbon dates from this feature, combined with a coin which has a *terminus post quem* of *c* AD 340, may indicate that the site did not cease to be occupied with the end of Roman administration in Britain. The overlying medieval phase with some abraded pottery makes it difficult to distinguish between a late Roman feature, of the last quarter of the fourth century AD, and one which dates to the fifth or sixth century AD but contains residual Romano-British material.

References: Philpott and Adams 2010

OxA–9533 1.065 ±0.005 fM

$\delta^{13}C$: -25.6‰

Sample: 1038 A, submitted on 19 August 1999 by M Adams

Material: charcoal: *Salix/Populus sp.*, roundwood (J Huntley 1999)

Initial comment: from context 3087, a reddish brown loamy sand containing sandstone pebbles, heat shattered igneous cobbles and charcoal flecks. It filled a large circular cut 1.0m in diameter and 0.35m deep with a shallow dish-shaped profile. The cut also contained 12 large sandstone cobbles up to 0.47m across and arranged against the sides of the cut. These were probably packing for a timber post and did not appear to have been disturbed since removal or decay of the post. *See* OxA-9534 for a further measurement.

Objectives: to provide a date for the final phase of occupation at Irby.

Calibrated date: *1σ:* cal AD 1956–1957
2σ: cal AD 1956–1957

Final comment: R Philpott and M Adams (2010), this sample produced an anomalous result, enriched by 'bomb' carbon and so is of recent date.

Laboratory comment: English Heritage (24 August 2014), this measurement has been calibrated using the post-nuclear bomb atmospheric calibration curve for zone 1 of the northern hemisphere (Bomb13NH1; Hua *et al* 2013).

References: Hua *et al* 2013

OxA–9534 1649 ±31 BP

$\delta^{13}C$: -25.1‰

Sample: 1038 B, submitted on 19 August 1999 by M Adams

Material: charcoal: *Salix/Populus sp.*, roundwood (J Huntley 1999)

Initial comment: as OxA-9533

Objectives: as OxA-9533

Calibrated date: *1σ:* cal AD 380–430
2σ: cal AD 330–530

Final comment: see series comments

Laboratory comment: English Heritage (2010), the two samples submitted from each of the two postholes belonging to the latest phase of activity on the site were statistically consistent (excluding OxA-9533 which was enriched by 'bomb' carbon) (T'=2.7; T'(5%)=6.0; ν=2; Ward and Wilson 1978), and suggest a date for this structure at the turn of the fourth century AD.

References: Ward and Wilson 1978

OxA–9557 1705 ±50 BP

$\delta^{13}C$: -20.4‰

Sample: 2677 A, submitted on 19 August 1999 by M Adams

Material: carbonised plant macrofossil (hulled barley; single grain) (J Huntley 1999)

Initial comment: from context 9603, a dark brown sandy loam containing charcoal flecks and frequent small cobbles up to 0.10m across. This filled a linear cut aligned east-west and measuring 3.4m x 1.1m in plan. It was 0.4m deep and had a broad 'U'-shaped profile. The cut also contained several large sandstone cobbles up to 0.33m across which appeared to have been used to pack a post or posts in place. This feature was not disturbed by any later activity. *See* OxA-9668 for a further measurement.

Objectives: to provide a date for the final phase of occupation at Irby. Although these features cut deposits containing late fourth-century AD material, the final occupation of the site is currently undated.

Calibrated date: *1σ:* cal AD 250–400
2σ: cal AD 230–430

Final comment: see series comments

Laboratory comment: see OxA-9534

OxA–9668 1595 ±45 BP

δ*^{13}C:* -22.6‰

Sample: 2677 B, submitted on 19 August 1999 by M Adams

Material: carbonised plant macrofossil (hulled barley; single grain) (J Huntley 1999)

Initial comment: as OxA-9557

Objectives: as OxA-9557

Calibrated date: *1σ:* cal AD 400–540
2σ: cal AD 380–570

Final comment: see series comments

Laboratory comment: see OxA-9534

Irby: later prehistoric, Merseyside

Location: SJ 253853
Lat. 53.21.32 N; Long. 03.07.21 W

Project manager: M Adams (Liverpool Museum), 1994–5 and 1998

Archival body: Liverpool Museum

Description: a long sequence of occupation from the Mesolithic, Bronze Age, Iron Age, Romano-British, early medieval, and later medieval periods was uncovered at Irby. Key discoveries included regionally important buildings from the middle Bronze Age and Viking periods, as well as an extensive Roman and late medieval occupation, which contribute significantly to the understanding of settlement and economy in Wirral and the wider region during these periods.

Objectives: to date the earliest phase of occupation at Irby and to provide a date for the associated pottery. Eight radiocarbon dates from four prehistoric contexts were taken from postholes and gullies at the base of the stratigraphic sequence. All of these features were heavily truncated by later activity. All of the samples selected for dating were associated with prehistoric pottery and/or Iron Age VCP (Very Coarse Pottery).

Final comment: R Philpott (9 February 2004), the results were fundamental in identifying two distinct prehistoric phases: the middle Bronze Age and the middle Iron Age. In light of the dates, a re-examination of the pottery showed virtually no overlap between the contexts with VCP and those with other prehistoric pottery. All the radiocarbon dates were from features with middle Bronze Age pottery and the phase was consistently associated with emmer. The VCP presumably belongs to a middle Iron Age phase, which is otherwise indicated by a spindle whorl and two radiocarbon dates (OxA-8485–6).

Laboratory comment: English Heritage (2010), the consistency of the six radiocarbon measurements (OxA-8484, -8518–9, -8487, -8587, and -9558) from the three separate Bronze Age features, which are statistically indistinguishable (T′=8.7; T′(5%)=11.1; ν=5; Ward and Wilson 1978), suggests that the middle Bronze Age activity on the site was of short duration.

References: Philpott and Adams 2010
Ward and Wilson 1978

OxA–8484 3155 ±45 BP

δ*^{13}C:* -23.0‰

Sample: 2369 (b), submitted on 30 November 1998 by M Adams

Material: grain: *Triticum dicoccum* , charred single grain (J Huntley 1998)

Initial comment: from context [8171], a dark reddish grey sandy loam containing occasional charcoal fragments. This deposit formed the only fill of a circular cut interpreted as a posthole and truncated to natural by later Romano-British activity. *See* OxA-8587 (2369(a)) below for a further measurement.

Objectives: to establish when this phase of the settlement was occupied and to date the associated pottery.

Calibrated date: *1σ:* 1500–1400 cal BC
2σ: 1510–1300 cal BC

Final comment: see series comments

Laboratory comment: see series comments

OxA–8485 2275 ±40 BP

δ*^{13}C:* -22.1‰

Sample: 2409 (a), submitted on 30 November 1998 by M Adams

Material: grain: *Triticum* sp., charred single grain (J Huntley 1998)

Initial comment: from context [8227], a very dark greyish brown sandy loam containing occasional pebbles and charcoal flecks. This deposit filled the voids around several rounded sandstone cobbles, which had been used to pack a post in place. There appeared to have been little or no movement of the packing material, suggesting that the post had decayed *in situ*. *See* OxA-8586 (2409(b)) below for a further measurement.

Objectives: as OxA-8484

Calibrated date: *1σ:* 400–250 cal BC
2σ: 410–200 cal BC

Final comment: R Philpott and M Adams (2010), these radiocarbon dates confirm the only feature of certain mid-to-late Iron Age date. They are consistent with a brooch and spindle whorl typologically dated to the third century BC.

OxA–8486 2270 ±40 BP

δ*^{13}C:* -24.5‰

Sample: 2409 (b), submitted on 30 November 1998 by M Adams

Material: carbonised plant macrofossil (hazelnut shell; single fragment) (J Huntley 1998)

Initial comment: as OxA-8485

Objectives: as OxA-8484

Calibrated date: *1σ:* 400–230 cal BC
2σ: 410–200 cal BC

Final comment: see OxA-8485

OxA–8487 3085 ±40 BP

δ^{13}C: -23.3‰

Sample: 2415 (b), submitted on 30 November 1998 by M Adams

Material: grain: *Triticum dicoccum* (J Huntley 1998)

Initial comment: from context [8236], a black sandy silt containing up to 30% charcoal and occasional fragments of fired and unfired clay. The deposit formed the lower fill of a posthole, which had been truncated to natural by later Romano-British activity. At the base of the cut was a slab of red sandstone laid 'on bed' and interpreted as a padstone for a post. *See* OxA-9558 (2415(a)) below for a further measurement.

Objectives: as OxA-8484

Calibrated date: *1σ:* 1420–1280 cal BC
2σ: 1440–1230 cal BC

Final comment: see series comments

Laboratory comment: see series comments

OxA–8518 3045 ±40 BP

δ^{13}C: -26.8‰

Sample: 2116 (a), submitted on 30 November 1998 by M Adams

Material: charcoal: *Corylus/Alnus* sp., single fragment (R Gale 1998)

Initial comment: from context [3337], a dark brown-black silty sandy loam containing up to 50% charcoal. The size of the charcoal inclusions increased with depth. The deposit filled a section of a linear gully located in the north of the settlement and aligned north west-south east. It formed part of a structure of uncertain size and shape. *See* OxA-8519 (2116(b)) below for a further measurement.

Objectives: as OxA-8484

Calibrated date: *1σ:* 1390–1230 cal BC
2σ: 1420–1130 cal BC

Final comment: R Philpott and M Adams (2010), this building differs from the majority of house plans of this date in having a short section of continuous foundation trench in the interior ring, opposite the putative entrance. This results in a very large structure of a type not previously found in middle Bronze Age context in this region. The integrity of this reconstruction is supported by similar radiocarbon dates from the two features at opposite ends of the circuit: the gully and a posthole (OxA-8518, -8519, and OxA-8587 and -8484).

Laboratory comment: see series comments

OxA–8519 3000 ±35 BP

δ^{13}C: -25.9‰

Sample: 2116 (b), submitted on 30 November 1998 by M Adams

Material: charcoal: *Prunus* sp., single fragment (R Gale 1998)

Initial comment: as OxA-8518

Objectives: as OxA-8484

Calibrated date: *1σ:* 1280–1130 cal BC
2σ: 1390–1120 cal BC

Final comment: see series comments and OxA-8518

Laboratory comment: see series comments

OxA–8587 3005 ±65 BP

δ^{13}C: -23.7‰

Sample: 2369 (a), submitted on 30 November 1998 by M Adams

Material: grain: *Triticum dicoccum* , charred single grain (<5g) (J Huntley 1998)

Initial comment: from context [8171], a dark reddish grey sandy loam containing occasional charcoal fragments. This deposit formed the only fill of a circular cut interpreted as a posthole and truncated to natural by later Romano-British activity. No modern roots or similar material were present with the flots. The environmental details are the same as OxA-8484.

Objectives: as OxA-8484

Calibrated date: *1σ:* 1380–1120 cal BC
2σ: 1420–1030 cal BC

Final comment: see series comments and OxA-8518

Laboratory comment: see series comment

OxA–9558 3075 ±60 BP

δ^{13}C: -22.2‰

Sample: 2415 (a), submitted on 13 March 2000 by M Adams

Material: grain: *Triticum* sp., charred single grain (J Huntley 1998)

Initial comment: as OxA-8487

Objectives: as OxA-8484

Calibrated date: *1σ:* 1420–1250 cal BC
2σ: 1500–1130 cal BC

Final comment: see series comments and OxA-8518

Laboratory comment: see series comments

Isles of Scilly: Hillside Farm, Bryher, Isle of Scilly

Location: SV 87741441
Lat. 49.56.50 N; Long. 06.21.11 W

Project manager: C Johns (Cornwall Archaeological Unit), 1999

Archival body: Cornwall Archaeological Unit, Isles of Scilly Museum

Description: an Iron Age/Romano British 'Porth Cressa' type cist burial containing fragmentary skeletal remains, a sword, mirror, and other grave goods. Possibly part of a larger cemetery and associated with contemporary settlement remains.

Objectives: to obtain a secure date for the burial.

Final comment: C Johns (2002), the Bryher mirror is the first to be dated by radiocarbon dating of associated skeletal material as well as by metalwork typology. The radiocarbon dates indicate that that the Bryher mirror is the earliest known British decorated bronze mirror. The metalwork typology narrows the date range to the first half of the first century BC.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (13 June 2003), two previous measurements on HSF99/79/16 (OxA-10185 and OxA-10255) were withdrawn due to a problem with low collagen yield and ultrafiltration at the laboratory.

References: Johns 2002/3

GrA–22411 2100 ±35 BP

$\delta^{13}C$: -19.6 ±0.2‰

Sample: P11747, submitted on 6 March 2003 by C Johns

Material: human bone (7g) (long bone fragments) (S Mays 2000)

Initial comment: a replicate of OxA-12095.

Objectives: as OxA-12095

Calibrated date: *1σ:* 180–50 cal BC
2σ: 210–40 cal BC

Final comment: see series comments

Laboratory comment: see OxA-12095

OxA–12095 2098 ±27 BP

$\delta^{13}C$: -19.0‰
$\delta^{15}N$ *(diet)*: +12.2‰
C/N ratio: 3.2

Sample: HSF99/79/16, submitted on 2 October 2000 by C Johns

Material: human bone (7g) (long bone fragments) (S Mays 2000)

Initial comment: the bone fragments were collected from the 'rib cage' area of the Bryher inhumation. This consisted of friable bone fragments in a matrix of dark brown, loose silty clay, context 16. This was interpreted as an accumulation of soil in the hollow formed by the collapsed rib cage of the inhumation. The sample was fragmentary and friable. It was sealed by a deposit of grey clay, which was probably derived from the clay 'luting' which sealed the capstone being washed in between the gaps of the stones. The sample was taken from approximately 0.56m below the top of the cist (ie about 0.9m below the present ground surface).

Objectives: to establish an absolute/secure date for this burial. The sword in the grave has been dated, typologically, to the second century BC. The mirror may date from the first century AD, and Scillonian 'Porth Cressa' type cist-graves have been thought to be Romano-British rather than late Iron Age. An absolute date for the burial is required to provide a secure chronological context for the grave and to aid analysis of the grave goods.

Calibrated date: *1σ:* 180–50 cal BC
2σ: 200–40 cal BC

Final comment: see series comments

Laboratory comment: English Heritage (18 December 2012), the two measurements (OxA-12095 and GrA-22411) are statistically consistent (T′=0.0; ν=1; T′(5%)=3.8; Ward and Wilson 1978) and so a weighted mean can be taken of the results before calibration. The weighted mean (2099 ±22 BP) calibrates to 200–45 cal BC (at 2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

Kemerton, Huntsman's Quarry, Worcestershire

Location: SO 939363
Lat. 52.01.19 N; Long. 02.05.20 W

Project manager: R Jackson (Worcestershire Archaeological Service), 1994–6

Description: late Bronze Age occupation areas and field systems spreading across some 8ha were excavated. Small areas of earlier prehistoric activity were also identified. Limited evidence for Upper Palaeolithic, Mesolithic, and Neolithic activity was also recovered. Three Beaker pits, along with other similarly dated features and residual finds, provided the first certain evidence of occupation, while early Bronze funerary activity was represented by a ring-ditch. Together with features and finds from the nearby Aston Mill Quarry, these provide important evidence of early prehistoric activity in this area. The majority of the deposits were, however, of late Bronze Age date, comprising waterholes and associated roundhouses, structures, and pits set within a landscape of fields and droveways, elements of which probably pre-dated the settlement. Substantial artefactual and ecofactual assemblages were recovered, mainly from the upper fills within the waterholes and larger pits. The settlement appears to have had a predominantly pastoral economy supported by some textile and bronze production.

Objectives: to contribute to forming a chronological framework for the settlement activity.

Final comment: R Jackson (November 2009), based upon the extensive programme of radiocarbon dating, it is suggested that some of the waterholes and elements of the field systems were laid out during the twelfth century BC, areas of settlement being subsequently established within this 'bounded' landscape. These settlement areas appear to have been unenclosed. Dating of charred residues from the substantial plainware assemblage indicates that occupation was focussed in the eleventh century BC, perhaps spanning as little as four or five generations.

References: Jackson and Napthan 1998

Kemerton, Huntsman's Quarry: CG1, Worcestershire

Location: SO 939363
Lat. 52.01.29 N; Long. 02.05.20 W

Project manager: R Jackson (Worcestershire Archaeological Service), 1994–6

Archival body: Worcestershire County Museum

Description: the samples derive from a finds-rich fill within a substantial pit. Lower fills representing silting of the pit were sterile but were sealed by the fill from which the sample was taken. This incorporated large re-fitting pot chunks and many sherds from the same vessels as well as animal bone and burnt debris. The fill is considered to represent a dump of debris from localised occupation/activity and is considered due to its character (re-fitting sherds) to be unlikely to contain residual material. Selected sherds re-fit or derive from vessels from which further sherds were present.

Objectives: the objectives of this series are to refine the dating of the period of occupation of the site; refine dating of the period of use of the late Bronze Age Plain Wares; and, to support the dating of the activity in the central part of the site.

Final comment: R Jackson (27 April 2004), the dating series achieved the objectives, confirming a relatively early date for the ceramic assemblage within the late Bronze Age Plain Ware tradition. As part of a programme of dating undertaken on similar material from across the site, this contributed to establishing a relatively short period of occupation *1–160 years (at 95% probability; use_ceramics;* Jackson forthcoming, fig 8) across the whole of the 8ha investigated.

References: Jackson and Napthan 1998

OxA–10776 2852 ±36 BP

$\delta^{13}C$: -24.6‰

Sample: CG1, submitted on 15 March 2001 by R Jackson

Material: carbonised residue (internal)

Initial comment: from the secondary fill of a substantial pit. Intrusions /disturbance is unlikely since top of the feature cleaned prior to excavation and feature was well defined. The fill included large assemblage of late Bronze Age Plain Ware with many diagnostic forms, re-fits, large chunks and sherds from the same vessel. The sherds sampled for dating have been taken from vessels of which many pieces (some refitting) were present and residuality is thus unlikely. Thus the secondary fill is a valid sample for dating the activity on the site in this area. The fill is considered to represent a dump of domestic debris from localised occupation. The sample derived from *c* 0.20–0.25m into the pit and 0.40–0.45m from the ground surface.

Objectives: to refine/support dating of the period of use of late Bronze Age Plain Wares at the site of which there are many examples in the fill; and, to refine/support dating of the period of activity/occupation at the site, including in the vicinity of this pit.

Calibrated date: *1σ:* 1060–940 cal BC
2σ: 1130–910 cal BC

Final comment: R Jackson (27 April 2004), the date supported the objectives of this dating series and of the overall site dating programme.

Laboratory comment: English Heritage (2002), the two measurements from context 1830 are statistically consistent (T'=0.1; T'(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–10777 2840 ±37 BP

$\delta^{13}C$: -25.8‰

Sample: 1830 B, submitted on 15 March 2001 by R Jackson

Material: carbonised residue (<5g) (internal)

Initial comment: as OxA-10776

Objectives: as OxA-10776

Calibrated date: *1σ:* 1050–930 cal BC
2σ: 1120–900 cal BC

Final comment: see OxA-10776

Laboratory comment: see OxA-10776

Kemerton, Huntsman's Quarry: CG4, Worcestershire

Location: SO 939363
Lat. 52.01.29 N; Long. 02.05.20 W

Project manager: R Jackson (Worcestershire Archaeological Service), 1994–6

Archival body: Worcestershire County Museum

Description: the samples derive from a substantial pit with a complex sequence of fills, two of which produced suitable material, [2050], a waterlogged primary silting fill, and [2032], the secondary fill. The latter incorporated dumps of domestic waste including large refitting chunks of pottery, butchered bone, and burnt stone. Although clearly representing disuse of the feature which is interpreted as a waterhole, the artefact/ecofact assemblage is felt to represent a dump, or dumps, of rubbish from nearby occupation and considered unlikely to include much residual material.

Objectives: the dating focuses on the late Bronze Age Plain ceramic assemblage which is of national significance, comparing favourably with national type sites. Potentially early decorative elements are of particular interest. Regionally this will provide a type site while locally it establishes the fabric and form series for this period in the county. The dating of the ceramics and associated material will date the period of occupation of the site.

Final comment: R Jackson (27 April 2004), the dating series achieved the objectives, firmly placing the late Bronze Age Plain Ware assemblage early within the period or use of this tradition (OxA-9483; OxA-9484; OxA-10778–80). Dating of this and other similarly composed series from across the site has established that the period of occupation across the whole of the 8ha investigated was relatively short-lived at *1–160 years (95% probability; use_ceramics;* Jackson forthcoming, fig 8). Two dates, OxA-9474 and OxA-9490 from a primary silting fill indicated that the excavation and primary use of this waterhole may have slightly pre-dated the main phase of settlement.

References: Jackson and Napthan 1998
Jackson forthcoming

OxA–9424 2992 ±36 BP

$\delta^{13}C$: -28.1‰

Sample: 2050 B, submitted on 3 March 2000 by R Jackson

Material: wood (waterlogged): *Corylus avellana*, roundwood twigs (R Gale 2000)

Initial comment: sample taken from the primary fill of the waterhole comprising waterlogged silting deposit. This included twigs and other plant macrofossils clearly contemporary with the use of this as a waterhole. The fill was well sealed (by later deposits, including [2032] from which the samples are also submitted within this series) and therefore there is little chance of contamination. The sample is believed to represent organic material trapped in silts and wet environment of waterhole and therefore there is minimal chance that it is intrusive or residual.

Objectives: to establish the period of use of the waterhole prior to disuse (as represented by samples from [2032]). This also provides dating for use of the site (centre/north) and probably relates to occupation represented by roundhouses and structures to its north-east in conjunction with the dating of the ceramic assemblage. Also dates associated with the environmental material which is richest from the site, including pollen, plant macrofossils, and evidence of parasites (whipworm probably from human, pig, or dog faeces).

Calibrated date: *1σ:* 1270–1130 cal BC
2σ: 1380–1110 cal BC

Final comment: R Jackson (27 April 2004), along with OxA-9490, this date indicated that the excavation and primary use of this feature as a waterhole may have slightly pre-dated the main phase of occupation at the site represented by material dumped into upper part of the feature - associated with dates OxA-9483, OxA-9484, and OxA-10778–80.

Laboratory comment: English Heritage (2002), the two measurements from context 2050 are not statistically significantly different (T′=2.8; T′5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–9483 2970 ±40 BP

$\delta^{13}C$: -24.8‰

Sample: 2032 A, submitted on 3 March 2000 by R Jackson

Material: carbonised residue (internal)

Initial comment: the feature was cut into calcareous gravels and seemed undisturbed therefore contamination is unlikely. The pit fill was *c* 0.70m from the surface and was probably occasionally waterlogged in winter; occasional rootlets were present. The sample was taken from the secondary fill of a waterhole. Intrusion is unlikely since the top of the feature was trowel-cleaned prior to excavation of the uppermost fill [2032]. The fill included refitting large sherds, butchered bone, and burnt stone. These were interpreted as dumps of rubbish related to the local settlement. The composition of the assemblage indicates that residuality is unlikely. These deposits sealed earlier fills including primary fill [2050] from which samples have also been submitted.

Objectives: to establish (in conjunction with the samples from [2050]) the period of use of the waterhole and to support the dating of the ceramic assemblage. This particular fill incorporated approximately 15% of the total late Bronze Age ceramic assemblage, including a range of typologically important forms and a range of fabrics, significant environmental data (pollen, plant macrofossils, charred remains, and animal bone), and other important artefactual material (ceramic weights and bronze casting moulds). This feature provides dating for the activity on this part of the site and occupational debris within this fill provides a link to the structural remains (roundhouses) to the northeast.

Calibrated date: *1σ:* 1260–1120 cal BC
2σ: 1380–1040 cal BC

Final comment: R Jackson (27 April 2004), along with OxA-9484 and OxA-10778–80 this provided dating for disuse of the waterhole and for period of settlement at the site and also established that the period of use of the late Bronze Age Plain Ware assemblage fell early within the tradition.

Laboratory comment: English Heritage (2002), the five measurements from context 2032 are statistically indistinguishable (T′=6.1; T′(5%)=9.5; ν=4; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–9484 2890 ±45 BP

$\delta^{13}C$: -26.0‰

Sample: 2032 B, submitted on 3 March 2000 by R Jackson

Material: carbonised residue (internal)

Initial comment: as OxA-9483

Objectives: as OxA-9483

Calibrated date: *1σ:* 1130–1000 cal BC
2σ: 1220–920 cal BC

Final comment: see OxA-9483

Laboratory comment: see OxA-9483

OxA–9490 2895 ±45 BP

$\delta^{13}C$: -28.4‰

Sample: 2050 A, submitted on 3 March 2000 by R Jackson

Material: wood (waterlogged): *Corylus/Alnus* sp., roundwood twig (R Gale 2000)

Initial comment: as OxA-9424

Objectives: as OxA-9424

Calibrated date: *1σ:* 1190–1000 cal BC
2σ: 1220–930 cal BC

Final comment: see OxA-9424

Laboratory comment: see OxA-9424

OxA–10778 2861 ±37 BP

$\delta^{13}C$: -28.1‰

Sample: 2032 C, submitted on 15 March 2001 by R Jackson

Material: carbonised residue (internal)

Initial comment: as OxA-9483

Objectives: to provide further dating to support first dating round results. In particular it is hoped that dating series will date use of late Bronze Age Plain Ware assemblage and period of occupation of site. This particular pit provides dating for central area of site and included within this fill approximately 15% of total site late Bronze Age assemblage (4000+ sherds) including range of fabrics and form sherds.

Calibrated date: *1σ:* 1110–970 cal BC
2σ: 1190–910 cal BC

Final comment: see OxA-9483

Laboratory comment: see OxA-9483

OxA–10779 2850 ±37 BP

$\delta^{13}C$: -24.1‰

Sample: 2032 D, submitted on 15 March 2001 by R Jackson

Material: carbonised residue (internal)

Initial comment: as OxA-9483

Objectives: as OxA-10778

Calibrated date: *1σ:* 1060–930 cal BC
2σ: 1130–910 cal BC

Final comment: see OxA-9483

Laboratory comment: see OxA-9483

OxA–10780 2868 ±37 BP

$\delta^{13}C$: -25.8‰

Sample: 2032 E, submitted on 15 March 2001 by R Jackson

Material: carbonised residue (internal)

Initial comment: as OxA-9483

Objectives: as OxA-9483

Calibrated date: *1σ:* 1120–990 cal BC
2σ: 1190–920 cal BC

Final comment: see OxA-9483

Laboratory comment: see OxA-9483

Kemerton, Huntsman's Quarry: CG6, Worcestershire

Location: SO 939363
Lat. 52.01.29 N; Long. 02.05.20 W

Project manager: R Jackson (Worcestershire Archaeological Service), 1994–6

Archival body: Worcestershire County Museum

Description: the samples were taken from a substantial pit which was interpreted as a waterhole. The feature had a complex series of fills excavated as two contexts - a primary fill 1840 and a secondary fill 1836. The samples were taken from a dump of domestic debris (1836 D at the base of 1836), a deposit sealing the fills associated with use of pit and at the base of infill deposits representing disuse. Refits within the assemblage from 1836 D suggest that residuality is limited and the deposit is associated with local occupation/activity.

Objectives: to refine the dating of the period of occupation of the site; to refine the dating of the period of use of the late Bronze Age Plain Wares; and, to support dating of activity towards southern side of the site.

Final comment: R Jackson (28 April 2004), the dating series achieved the objectives placing the late Bronze Age Plain Ware assemblage early within the period of use of this tradition. Dating of this, and other similarly composed series, from across the whole of the 8ha investigated has established that the period of occupation was relatively short (*1–160 years at 95% probability; use_ceramics*; Jackson forthcoming, fig 8).

References: Jackson and Napthan 1998
Jackson forthcoming

OxA–10781 2865 ±40 BP

$\delta^{13}C$: -23.2‰

Sample: 1836 A, submitted on 15 March 2001 by R Jackson

Material: carbonised residue

Initial comment: the sample was taken from a dump of rubbish deposit at the base of the secondary fill [1836]. This sealed silting deposits in a waterhole, and due to the presence of large chunks, re-fits, and many sherds from individual vessels, is not considered liable to incorporate much residual material. Selected sherds are from vessels with other sherds and re-fits present. Thus they are considered to date the disuse of the feature and local occupation/activity. The absence of disturbance and surface cleaning prior to excavation makes intrusion/contamination unlikely. From the pit fill at about 0.60m from the top of the pit and 0.80m from the ground surface.

Objectives: to support and refine dating of the period of use of late Bronze Age Plain Wares of which important diagnostic elements were present in this feature fill. To refine and support dating of the period of occupation at the site. This pit included domestic debris probably derived from local occupation/activity in southern part of the site. Further samples from adjacent pit (series CG7) form part of dating programme and support overall objectives.

Calibrated date: *1σ:* 1120–970 cal BC
2σ: 1200–910 cal BC

Final comment: R Jackson (28 April 2004), the date successfully supported the objectives of the series and the overall programme of dating.

Laboratory comment: English Heritage (2002), the two measurements from context [1836] are statistically consistent (T'=0.9; T'(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–10782 2812 ±37 BP

$\delta^{13}C$: -26.6‰

Sample: 1836 B, submitted on 15 March 2001 by R Jackson

Material: carbonised residue

Initial comment: as OxA-10781

Objectives: as OxA-10781

Calibrated date: *1σ:* 1010–910 cal BC
2σ: 1060–850 cal BC

Final comment: see OxA-10781

Laboratory comment: see OxA-10781

Kemerton, Huntsman's Quarry: CG7, Worcestershire

Location: SO 939363
Lat. 52.01.29 N; Long. 02.05.20 W

Project manager: R Jackson (Worcestershire Archaeological Service), 1994–6

Archival body: Worcestershire County Museum

Description: the samples derive from three fills of a large late Bronze Age pit interpreted as a waterhole. Lower fills including [1855] and [1839] (from which samples are submitted) are interpreted as silting/ slumping, while upper fills such as [1834] (from which samples are also submitted) were artefact-rich and are interpreted as disuse/secondary fills incorporating dumps of material from local activities/occupation. The character of the artefacts/ecofacts which are submitted (refitting large pot sherds and butchered bone), indicates that they are suitable for dating the ceramics and the site's activity.

Objectives: to support the dating of the ceramic assemblage, this pit included a major component of the late Bronze Age assemblage, including a range of diagnostic forms in a number of fabrics. The location of the feature towards the southern side of the site means dating will facilitate dating of activity in this area of the site which includes structural remains.

Final comment: R Jackson (3 May 2004), this dating series achieved the objectives, firmly placing the late Bronze Age Plain Ware assemblage within the period of use this tradition. Dating of this and other similarly composed series from across the site was established that the period of occupation across the whole of the 8ha investigated was relatively short-lived (*1–160 years at 95% probability; use_ceramics*; Jackson forthcoming, fig 8).

References: Jackson and Napthan 1998
Jackson forthcoming

OxA–10783 2860 ±38 BP

$\delta^{13}C$: -24.2‰

Sample: 1834 C, submitted on 15 March 2001 by R Jackson

Material: carbonised residue

Initial comment: as OxA-9486

Objectives: to support and refine the dating of the period of use of the late Bronze Age Plainware assemblage, of which many diagnostic sherds were present in this pit; also, to support the dating of the activity in the southern part of the site and the overall period of occupation of the site.

Calibrated date: *1σ:* 1110–970 cal BC
2σ: 1190–910 cal BC

Final comment: see OxA-9435

Laboratory comment: see OxA-9486

OxA–10784 2916 ±38 BP

$\delta^{13}C$: -27.2‰

Sample: 1838, submitted on 15 March 2001 by R Jackson

Material: carbonised residue

Initial comment: as OxA-9486

Objectives: to support and refine the dating of the period of use of the late Bronze Age Plainwares and occupation at the site. This pit provides dating for the southern part of the site and included significant diagnostic elements of the ceramic assemblage along with other artefacts.

Calibrated date: *1σ:* 1200–1040 cal BC
2σ: 1230–1000 cal BC

Final comment: see OxA-9435

OxA–10785 2862 ±37 BP

$\delta^{13}C$: -22.6‰

Sample: 1855 C, submitted on 15 March 2001 by R Jackson

Material: carbonised residue

Initial comment: from the basal fill of a deep pit, ie the primary silting. Samples were also submitted from the upper fills [1634] and [1838], and from [1834], [1839], and [1855]. The feature was deep and well-defined, thus contamination/intrusion are unlikely. The primary nature of the fill and its association with both butchered bone and re-fitting pot sherds suggest residuality is also very unlikely.

Objectives: to establish the period of use of the late Bronze Age Plainwares and occupation at the site. This pit produced a large quantity of pottery, including typologically diagnostic sherds; it also reflects activity/occupation towards the southern side of the site. An adjacent (broadly contemporary) pit was also sampled (series CG6 1836 A and B).

Calibrated date: *1σ:* 1110–970 cal BC
2σ: 1190–910 cal BC

Final comment: see OxA-9435

Laboratory comment: see OxA-9435

OxA–9435 2968 ±39 BP

$\delta^{13}C$: -23.3‰

Sample: 1855 B, submitted on 3 March 2000 by R Jackson

Material: carbonised residue

Initial comment: the samples derive from the base of a pit below [1839] and [1834] (from which samples are submitted). The material derived from a deep, well-defined, cut feature, thus intrusion is unlikely *c* 2.50m below the current ground surface. The presence of both butchered bone and refitting pot sherds suggests that the material (which is well-preserved) is unlikely to be residual. Although not now waterlogged this is believed to have been a waterhole. The base is interpreted as silting/ slumping. The feature was cut into calcareous gravels and seems undisturbed therefore contamination is unlikely. The pit fill is *c* 0.25–0.30m from the surface and 0.50–0.60 from the modern ground surface. The sample is from a single fill of a pit, from the central part.

Objectives: to support the dating of the ceramic assemblage and provide dating for the activity at the southern end of the site, as well as the period of use of the feature. Samples from [1839] and [1834] will provide important supporting and comparative information.

Calibrated date: *1σ:* 1260–1120 cal BC
2σ: 1370–1040 cal BC

Final comment: R Jackson (3 May 2004), this date successfully supported the objectives of this series and of the overall dating programme.

Laboratory comment: English Heritage (2002), the two measurements from context 1855 are statistically significantly different (T′=3.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978), although the measurements are sufficiently close that they may actually be of the same age this difference being due to the statistical scatter on radiocarbon results.

References: Ward and Wilson 1978

OxA–9486 2938 ±40 BP

$\delta^{13}C$: -27.0‰

Sample: 1834 A, submitted on 3 March 2000 by R Jackson

Material: carbonised residue

Initial comment: the sample derives from pottery within a dump of 'rubbish' in the uppermost fill of a large pit. Pottery included large refitting chunks and was also associated with burnt stone, butchered bone, and other finds indicating that this represents a dump of contemporary material and residuality is unlikely. The area was cleaned prior to excavation and the feature/fills were well defined so intrusion is unlikely. Samples taken from the two lower fills [1839] and [1855] have also been submitted.

Objectives: to support the dating of the late Bronze Age ceramic assemblage and the period of the pit. An important element of the late Bronze Age ceramics includes diagnostic forms/fabrics derived from this fill. The association of refitting large sherds, butchered bone, and other finds indicates they are contemporary and suggests residuality is unlikely. Comparative/supporting dates will come from samples of the central fill [1839] and the lower fill [1855]. Together these will date the use of this pit and activity in the southern end of the site.

Calibrated date: *1σ:* 1220–1050 cal BC
2σ: 1270–1010 cal BC

Final comment: see OxA-9435

Laboratory comment: English Heritage (2002), the three radiocarbon determinations from context [1834] are statistically consistent (T′=2.4; T′(5%)=6.0; ν=2; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–9559 2950 ±80 BP

$\delta^{13}C$: -29.5‰

Sample: 1834 B, submitted on 3 March 2000 by R Jackson

Material: carbonised residue

Initial comment: as OxA-9486

Objectives: as OxA-9486

Calibrated date: *1σ:* 1280–1020 cal BC
2σ: 1410–920 cal BC

Final comment: see OxA-9435

Kemerton, Huntsman's Quarry: CG8, Worcestershire

Location: SO 939363
Lat. 52.01.29 N; Long. 02.05.20 W

Project manager: R Jackson (Worcestershire Archaeological Service), 1994–6

Archival body: Worcestershire County Museum

Description: the samples derive from a substantial pit interpreted as a waterhole. The fill sequence was fairly complex. Samples are submitted from one of the primary silting/weathering fills ([1115] A & B) and two from the sequence of upper infill deposits [1103] and [1104], both rich in finds. The latter included butchered bone and pottery some of which included refitting large sherds. The material is interpreted as a dumped 'rubbish' associated with localised occupation/activity. Although clearly related to disuse, in terms of dating activity residuality is not considered a significant problem.

Objectives: to support the dating of the ceramic assemblage, the upper fills [1103] and [1104] included a major component of the late Bronze Age assemblage, including a range of diagnostic forms. An adjacent, probably contemporary pit with functional association with the waterhole included a major component of this assemblage. The location of the feature and its location will facilitate the dating of activity in this easternmost area of the site.

Final comment: R Jackson (3 May 2004), the dating series achieved its objectives firmly placing the late Bronze Age Plain Ware assemblage early within the period of use of this tradition (especially OxA-10786 on charred residue). Dating of this and other series' across site established that the period of occupation across the whole of the 8ha investigated was relatively short-lived (*1–160 years at 95% probability;*

use_ceramics; Jackson forthcoming; fig 8). Dates on material from primary silting fill (OxA-9488, OxA-9489, and OxA-10375) indicated that the excavation and primary use of this waterhole may have pre-dated the main phase of settlement at the site.

References: Jackson and Napthan 1998
Jackson forthcoming

OxA–10375 3077 ±34 BP

δ^{13}C: -26.5‰

Sample: 1115 A, submitted on 3 March 2000 by R Jackson

Material: wood (waterlogged): *Prunus spinosa* (R Gale 2000)

Initial comment: a replicate of OxA-9488.

Objectives: as OxA-9488

Calibrated date: *1σ:* 1410–1280 cal BC
2σ: 1430–1230 cal BC

Final comment: see OxA-9488

Laboratory comment: see OxA-9488

OxA–10786 2882 ±37 BP

δ^{13}C: -25.0‰

Sample: 1103 A, submitted on 15 March 2001 by R Jackson

Material: carbonised residue (internal, rim sherd)

Initial comment: the samples derive from fill [1103] one of the series of deposits filling a large feature interpreted as a waterhole. This deposit along with [1102] above it and [1104] below it represent infilling of the waterhole and include dumps of domestic debris amongst which were refitting pot sherds and butchered bone from which this sample is taken. The sampled sherd (a rim type sherd) derives from a vessel of which further large chunks were present. The character of this material assemblage and the sherd selected indicates that it is unlikely to be residual (type sherd within re-fitting assemblage).

Objectives: to refine dating of period of use of the late Bronze Age Plainwares and the period of occupation at the site. This particular pit reflects occupation/activity in the east part of the site.

Calibrated date: *1σ:* 1120–1000 cal BC
2σ: 1210–930 cal BC

Final comment: R Jackson (3 May 2004), the date supported the objectives of the dating series and of the overall dating programme. This date suggested that the use and deposition of ceramics (and by association settlement) may have post-dated the primary use of the waterhole as indicated by dates from the primary fill [1115] (OxA-9488, OxA-9489, and OxA-10375).

Laboratory comment: English Heritage (2002), the two results from context 1103 are statistically consistent (T′=2.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–9488 3122 ±39 BP

δ^{13}C: -27.1‰

Sample: 1115 A, submitted on 3 March 2000 by R Jackson

Material: wood (waterlogged): *Prunus spinosa* (R Gale 2000)

Initial comment: the sample derives from an environmental sample taken from fill [1115] of a large waterhole with a complex series of fills. The upper fills [1102], [1103], and [1104] represent disuse/infilling. The central fills [1112] and [1113] represent slumping and weathering of the unstable gravels. Basal fills [1114] and [1115] represent silting and are associated with primary use. Fill [1115] from which the sample derived was at the base of this feature and thus intrusion or contamination are highly improbable. The character of the sampled material indicates that it was incorporated into the wet silts at the time of use and that residuality is very unlikely.

Objectives: to date the use of the waterhole and associated activity. In conjunction with other samples (from [1103] and [1104]) in the series this will date the period of use of the feature and support dating of the activity in this area of the site. 'Domestic' debris was recovered from the upper fills in some quantities and included refitting pottery sherds and diagnostic forms within the nationally important late Bronze Age assemblage recovered from the site. An adjacent and probably functionally related clay-lined pit produced a particularly significant assemblage of domestic debris.

Calibrated date: *1σ:* 1440–1310 cal BC
2σ: 1500–1280 cal BC

Final comment: R Jackson (3 May 2004), the date supported the objectives of the dating series and overall dating programme. Along with OxA-9489 and OxA-10375 this date indicates that the primary use of the waterhole may have pre-dated the main phase of settlement at the site.

Laboratory comment: English Heritage (2002), the two measurements on the *Prunus spinosa* twig (1115 A are statistically consistent (T′=0.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978), although they are statistically significantly different from the other measurement from this context (OxA-9489; T′=6.7; T′(5%)=6.0; ν=2).

References: Ward and Wilson 1978

OxA–9489 2980 ±40 BP

δ^{13}C: -26.5‰

Sample: 1115 B, submitted on 3 March 2000 by R Jackson

Material: wood (waterlogged): *Salix/Populus sp.*, 1–2 years growth (R Gale 2000)

Initial comment: as OxA-9488

Objectives: as OxA-9488

Calibrated date: *1σ:* 1270–1120 cal BC
2σ: 1380–1050 cal BC

Final comment: see OxA-9488

Kemerton, Huntsman's Quarry: CG9, Worcestershire

Location: SO 939363
Lat. 52.01.29 N; Long. 02.05.20 W

Project manager: R Jackson (Worcestershire Archaeological Service), 1994–6

Archival body: Worcestershire County Museum

Description: the samples derive from the fill of a substantial pit interpreted as a waterhole. The fill was excavated as single context but in section shows a number of phases of which 'b' was noted to be finds-rich and from which the samples originated. Although representing disuse, this fill as with others on site could be interpreted as a dump of domestic debris relating to localised occupation/activity. The presence of re-fits, large chunks, and many sherds from the same vessel(s) suggests residuality is unlikely.

Objectives: to refine the dating of the period of the occupation of the site; to refine the dating of the period of use of the late Bronze Age Plainwares; and, to support the dating of the activity in the eastern part of the site along with CG8.

Final comment: R Jackson (5 May 2004), this dating series achieved its objectives placing the late Bronze Age Plainware assemblage early within the period of use of this tradition. Dating of this and other similarly composed series from across the whole of the 8ha investigated has established that the period of occupation represented was relatively short (*1–160 years at 95% probability; use_ceramics*; Jackson forthcoming, fig 8).

References: Jackson and Napthan 1998
Jackson forthcoming

OxA–10787 2860 ±40 BP

δ¹³C: -25.4‰

Sample: 1111 A, submitted on 15 March 2001 by R Jackson

Material: carbonised residue

Initial comment: from the fill of a pit; although excavated as one context, the finds came from a distinct finds-rich layer. The pit is interpreted as a waterhole with primary silting fills overlain by secondary infilling deposits. The sampled material, although derived from the latter, is felt unlikely to include much residual material since large re-fitting chunks, and many sherds from individual vessels were present, suggesting that this is a dump from local occupation/activity relating to the feature. Samples were taken from large re-fitting vessel remains.

Objectives: the pit relates to occupation/activity in this part of the site. Domestic debris within it represents waste from the adjacent activity/occupation and dates the disuse of the pit. The fill included diagnostic Plainware ceramics, including the sampled sherds. Thus dating will support refinement of the dating of the period of use of the late Bronze Age Plainware and occupation of the site. For this area of site further dating come from adjacent pit (CG 8).

Calibrated date: *1σ:* 1110–940 cal BC
2σ: 1190–910 cal BC

Final comment: R Jackson (3 May 2004), this date successfully supported objectives of thee series and the overall programme of dating.

Laboratory comment: English Heritage (2002), the three measurements from [1111] are statistically consistent (T′=1.9; T (5%)=6.0; ν=2; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–10788 2823 ±35 BP

δ¹³C: -24.9‰

Sample: 1111 B, submitted on 15 March 2001 by R Jackson

Material: carbonised residue

Initial comment: as OxA-10787

Objectives: as OxA-10787

Calibrated date: *1σ:* 1020–920 cal BC
2σ: 1060–890 cal BC

Final comment: see OxA-10787

Laboratory comment: see OxA-10787

OxA–10789 2894 ±37 BP

δ¹³C: -25.7‰

Sample: 1111 C, submitted on 15 March 2001 by R Jackson

Material: carbonised residue

Initial comment: as OxA-10787

Objectives: as OxA-10787

Calibrated date: *1σ:* 1130–1010 cal BC
2σ: 1220–940 cal BC

Final comment: see OxA-10787

Laboratory comment: see OxA-10787

Kemerton, Huntsman's Quarry: CG10, Worcestershire

Location: SO 939363
Lat. 52.01.29 N; Long. 02.05.20 W

Project manager: R Jackson (Worcestershire Archaeological Service), 1994–6

Archival body: Worcestershire County Museum

Description: the samples derive from a large pit with what was an artefact-rich fill in overall site terms. Although the fill was removed as a single context [2010], the finds were concentrated in a central band. The finds represented a dump of possibe domestic debris, and included articulated animal bone (sample 2010 A) and pottery, which included large refitting sherds, some of which bore internal residues (sample 2010 B). These finds indicated that this material represents a single or several closely related events relating to the occupation of the site.

Objectives: to support the dating of the ceramic assemblage. This pit included an important group of late Bronze Age vessels, including a range of diagnostic forms in a number of fabrics. The location of the feature means dating will facilitate dating of activity at the western end of the site which includes structural remains (roundhouses etc) and an area of industrial activity of an indeterminate nature (hearths/burnt stone concentrations).

Final comment: R Jackson (5 May 2004), this dating series achieved its objectives placing the late Bronze Age Plain Ware assemblage within the period of use of this tradition. Dating of this and other similarly composed series' from across the whole of the 8ha investigated has established that the period of occupation represented was relatively short at *1–160 years (95% probability; use_ceramics*; Jackson forthcoming, fig 8).

References: Jackson and Napthan 1998

OxA–10790 2886 ±36 BP

$\delta^{13}C$: -25.7‰

Sample: 2010 D, submitted on 15 March 2001 by R Jackson

Material: carbonised residue

Initial comment: as OxA-9485. The two additional samples now submitted represent sooted sherds from vessels of which further fragments were present in the pit.

Objectives: as OxA-9485

Calibrated date: *1σ:* 1120–1000 cal BC
2σ: 1210–930 cal BC

Final comment: see OxA-9485

Laboratory comment: see OxA-9485

OxA–10842 2810 ±50 BP

$\delta^{13}C$: -24.2‰

Sample: 2010 E, submitted on 15 March 2001 by R Jackson

Material: carbonised residue

Initial comment: as OxA-10790

Objectives: as OxA-9485

Calibrated date: *1σ:* 1020–900 cal BC
2σ: 1120–830 cal BC

Final comment: see OxA-9485

OxA–9485 2950 ±40 BP

$\delta^{13}C$: -28.1‰

Sample: 2010 B, submitted on 3 March 2000 by R Jackson

Material: carbonised residue

Initial comment: the feature is cut into calcareous gravels and seems undisturbed therefore contamination is unlikely. The pit fill is *c* 0.25–0.30m from the surface and 0.50–0.60 from the modern ground surface. The sample is from a single fill of a pit, from the central part. The association of many refitting chunks of pottery and articulated animal bone (sample 2010 A) indicate that the pottery is highly unlikely to be residual.

Objectives: to support the dating of the ceramics and provide dating for the activity at the west end of the site. The pottery assemblage from this pit included a range of typologically important forms and dating will contribute to establishing the date of the late Bronze Age assemblage and the period of activity at the west end of the site. A further sample of articulated bone (2010 A) has been submitted for dating and will provide important comparative information.

Calibrated date: *1σ:* 1230–1110 cal BC
2σ: 1280–1010 cal BC

Final comment: R Jackson (5 May 2004), the date supported the objectives of the series and overall programme of dating.

Laboratory comment: English Heritage (2002), the four measurements on charred residues adhering to pottery sherds form context 2010 are statistically consistent (T'=4.9; T'(5%)=7.8; ν=3; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–9923 2910 ±60 BP

$\delta^{13}C$: -26.9‰

Sample: 2010 C, submitted on 3 March 2000 by R Jackson

Material: carbonised residue

Initial comment: as OxA-9485

Objectives: as OxA-9485

Calibrated date: *1σ:* 1220–1000 cal BC
2σ: 1280–920 cal BC

Final comment: see OxA-9485

Kemerton, Huntsman's Quarry: CG19, Worcestershire

Location: SO 939363
Lat. 52.01.29 N; Long. 02.05.20 W

Project manager: R Jackson (Worcestershire Archaeological Service), 1994–6

Archival body: Worcestershire County Museum

Description: CG19 was a small pit or large posthole containing many sherds from a single vessel, which was associated with a dump of charred plant remains comprising mostly of cereals and associated grass (weed) seeds. This is felt to represent a sump of burnt crop resulting from an accident during crop processing (drying or parching?). This feature lay in part of the site containing numerous postholes interpreted as structural remains related to late Bronze Age settlement; two samples are submitted from charred cereals.

Objectives: the objectives of this series are to refine the dating of the period of occupation of the site; support ceramic dating and confirm the date of the important environment assemblage; and, to support dating of the activity in the south-east corner of the site.

Final comment: R Jackson (5 May 2004), this dating series met its objectives confirming that the date of a dump of charred crop debris and associated ceramics was consistent with that of the late Bronze Age within the period of use of Plain Wares and also establishing date of these important environmental remains.

References: Jackson and Napthan 1998

OxA–10791 2885 ±40 BP

δ^{13}*C:* -23.3‰

Sample: 1601 A, submitted on 15 March 2001 by R Jackson

Material: grain: *Triticum dicoccum* , single grain (E Pearson 2001)

Initial comment: the sample derived from a burnt dump of crop processing debris comprising mostly charred cereals and associated with many sherds from a highly fragmented vessel. These were contained within a small pit/large posthole and may represent a deliberate (?structured) deposition. Residuality is considered unlikely as all sherds derived from one vessel and the charred crop waste was 'clean' and locally concentrated within the feature.

Objectives: to refine/support dating of the period of use of late Bronze Age occupation/activity at the site. This feature reflects activity in the south east part of the site and is unusual in containing a distinct dump of charred cereal grains. The latter form an important element of the late Bronze Age environmental remains from the site, providing significant information relating to the agricultural economy of the settlement.

Calibrated date: *1σ:* 1130–1000 cal BC
2σ: 1210–930 cal BC

Final comment: R Jackson (5 May 2004), this date supported the objectives of this dating series providing firm date for important environment information from the site and firmly establishing contemporaneity with main period of site occupation.

Laboratory comment: English Heritage (2002), the two results from context 1601 are statistically indistinguishable (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–10792 2891 ±36 BP

δ^{13}*C:* -22.6‰

Sample: 1601 B, submitted on 15 March 2001 by R Jackson

Material: grain: *Triticum dicoccum* , single grain (E Pearson 2001)

Initial comment: as OxA-10791

Objectives: as OxA-10791

Calibrated date: *1σ:* 1130–1000 cal BC
2σ: 1210–940 cal BC

Final comment: see OxA-10791

Laboratory comment: see OxA-10791

Kirkby on Bain: Grange Farm, Lincolnshire

Location: TF 238617
Lat. 53.08.15 N; Long. 00.08.58 W

Project manager: N Field (Lindsey Archaeological Services), 1996–8

Archival body: The Collection Museum, Lincoln

Description: negative features representing several phases of activity were excavated as part of a quarry extension at Grange Farm, Kirkby-on-Bain, Lincolnshire. Interventions took the form of test-pitting, evaluation trenching, and seven open area excavations. Features included a large enclosure, at least 150m long, with at least one entrance. A smaller enclosure, on a different alignment was also recorded. Three post-built structures, along with pits, gullies, and postholes were identified. 221 sherds of neolithic pottery, mainly Peterborough Ware and Beaker, were recovered. Lithics indicative of Mesolithic, Neolithic, and the early Bronze Age were recovered. Later features on the site included a possible Saxon ditch, medieval ditches, and ridge and furrow. Twenty-two radiocarbon measurements were made on twelve features. These sampled postholes from structure 1 and pits and fences interpreted as associated with it, postholes from structure 3, and other pits on the site.

Objectives: to confirm/establish dating for the structures and estimate the duration of activity associated with the occupation; to investigate the chronology of ecofacts of intrinsic archaeobotanical interest (OxA-11471; OxA-11477).

Final comment: S Griffiths (8 July 2010), the measurements demonstrate that the structures and features represent a range of periods of activity. Structure 1, the fence line, and the results from pit 220 falling in the middle Neolithic. It is possible that these results represent a single short-lived phase of activity (all the fourth millennium results are statistically consistent (T′=14.4; T′(5%)=16.9; ν=9; OxA-9425, -9426, -9437–8, -9427–8, -9429–30, -11555–6; Ward and Wilson 1978).Other results indicate activity in the Mesolithic, Iron Age, and medieval periods. This indicates that while features may have been in close proximity in plan, they represent temporally wide ranging activity.

References: Field and McDaid 2005
Ward and Wilson 1978

OxA–9425 4498 ±38 BP

δ^{13}*C:* -24.4 ±0.3‰

Sample: 652/696–101 (a), submitted on 14 March 2000 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2002)

Initial comment: fill of posthole 652, part of structure 1. One of a row of postholes on the east of structure 1, on a similar alignment to fence line. Part of same alignment as posthole 654.

Objectives: to establish the date of construction/use of structure 1.

Calibrated date: *1σ:* 3350–3090 cal BC
2σ: 3360–3020 cal BC

Final comment: S Griffiths (8 July 2010), this result is statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978) with the second measurement from the context (OxA-9426), and provides an estimate for the use of the structure.

References: Ward and Wilson 1978

OxA–9426 4490 ±40 BP

$\delta^{13}C$: -24.4 ±0.3‰

Sample: 652/696–101 (b), submitted on 14 March 2000 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2002)

Initial comment: as OxA-9425

Objectives: as OxA-9425

Calibrated date: *1σ:* 3350–3090 cal BC
2σ: 3360–3020 cal BC

Final comment: see OxA-9425

OxA–9427 4462 ±39 BP

$\delta^{13}C$: -24.8 ±0.3‰

Sample: 662/813–68 (a), submitted on 14 March 2000 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2000)

Initial comment: fill of pit 662, part of fence line possible associated with structure 1. The pit contained fire cracked limestone which may be associated with flint preparation (many of the flints were thermally treated).

Objectives: to establish if the fence line is coeval with structure 1.

Calibrated date: *1σ:* 3330–3020 cal BC
2σ: 3350–2940 cal BC

Final comment: S Griffiths (8 July 2010), the result is not statistically consistent with OxA-9428 (T′=4.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The later of the two results from this feature, OxA-9427, provides a *terminus post quem* for the feature's infilling. These results are statistically consistent with the results from structure 1, indicating that the fence line and structure groups could have been constructed at the same point in time.

References: Ward and Wilson 1978

OxA–9428 4572 ±39 BP

$\delta^{13}C$: -24.3 ±0.3‰

Sample: 662/813-68 (b), submitted on 14 March 2000 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (Rackham 2000)

Initial comment: as OxA-9427

Objectives: as OxA-9427

Calibrated date: *1σ:* 3370–3340 cal BC
2σ: 3500–3110 cal BC

Final comment: see OxA-9427

OxA–9429 4448 ±39 BP

$\delta^{13}C$: -27.5‰

Sample: 660/661–28 (a), submitted on 14 March 2000 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2000)

Initial comment: fill of feature 660, part of a fence line possibly associated with structure 1. One of two parallel lines of postholes in the area of structure 1.

Objectives: to establish if the fence line is coeval with structure 1.

Calibrated date: *1σ:* 3320–3020 cal BC
2σ: 3340–2920 cal BC

Final comment: S Griffiths (8 July 2010), the result is statistically consistent with OxA-9430 (T′=2.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978), a second measurement from this feature, and with the results from structure 1, indicating that the fence line and structure groups could have been constructed at the same point in time.

References: Ward and Wilson 1978

OxA–9430 4533 ±38 BP

$\delta^{13}C$: -25.8 ±0.3‰

Sample: 660/661–28 (b), submitted on 14 March 2000 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2000)

Initial comment: as OxA-9429

Objectives: as OxA-9429

Calibrated date: *1σ:* 3360–3110 cal BC
2σ: 3370–3090 cal BC

Final comment: see OxA-9429

OxA–9437 4600 ±40 BP

$\delta^{13}C$: -24.7 ±0.3‰

Sample: 654/756–43 (a), submitted on 14 March 2000 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2000)

Initial comment: fill of pit 654, part of structure 1. One of a row of postholes on the east of structure 1, on a similar alignment to the fence line. Part of the same alignment as posthole 652.

Objectives: to establish the date of construction/use of structure 1.

Calibrated date: *1σ:* 3490–3350 cal BC
2σ: 3500–3130 cal BC

Final comment: S Griffiths (8 July 2010), this result is statistically consistent with the second measurement from this context (OxA-9438; T′=2.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and provides a date estimate for the use of the structure.

References: Ward and Wilson 1978

OxA–9438 4515 ±40 BP

$\delta^{13}C$: -23.1 ±0.3‰

Sample: 654/756–43 (b), submitted on 14 March 2000 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2000)

Initial comment: as OxA-9437

Objectives: as OxA-9437

Calibrated date: *1σ:* 3360–3100 cal BC
2σ: 3370–3030 cal BC

Final comment: see OxA-9437

OxA–11471 231 ±30 BP

$\delta^{13}C$: -24.1 ±0.3‰

Sample: 111/1028/1027, submitted on 13 March 2002 by J Rackham

Material: carbonised plant macrofossil (charred ?pea; cf. *Pisum sativum*) (J Giorgi 2002)

Initial comment: fill of posthole 1027, possibly part of structure 3.

Objectives: a sample of intrinsic archaebotanical interest - if it is established as an early prehistoric domesticate.

Calibrated date: *1σ:* cal AD 1640–1800
2σ: cal AD 1640–1955*

Final comment: S Griffiths (8 July 2010), the modern result demonstrates the feature, and domesticate, is not associated with earlier prehistoric activity.

OxA–11477 963 ±36 BP

$\delta^{13}C$: -24.1 ±0.3‰

Sample: 82/766/765, submitted on 13 March 2002 by J Rackham

Material: grain: Secale cereale, charred single grain (J Giorgi 2002)

Initial comment: fill of posthole 765.

Objectives: a sample of intrinsic archaebotanical interest - if it is established as an early prehistoric domesticate.

Calibrated date: *1σ:* cal AD 1020–1160
2σ: cal AD 1010–1170

Final comment: S Griffiths (8 July 2010), the medieval result demonstrates the feature, and domesticate, is not associated with earlier prehistoric activity.

OxA–11478 1835 ±36 BP

$\delta^{13}C$: -24.4 ±0.3‰

Sample: 108/1020/1019 (a), submitted on 13 March 2002 by J Rackham

Material: carbonised plant macrofossil (legume seed) (J Rackham 2002)

Initial comment: fill of posthole 1019, possibly part of structure 3.

Objectives: to estimate the infilling of posthole 1019, and establish the construction/use of structure 3.

Calibrated date: *1σ:* cal AD 120–240
2σ: cal AD 70–320

Final comment: S Griffiths (8 July 2010), the result is not statistically consistent (T′=637.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978) with the second measurement from this posthole (OxA-11479), indicating that the feature includes material from a range of activities. The results from ’structure 3’ do not form a coherent group, and interpretation is challenging. It is evident that these features do not represent a middle neolithic structure akin to structure 1.

References: Ward and Wilson 1978

OxA–11479 3190 ±40 BP

$\delta^{13}C$: -25.6 ±0.3‰

Sample: 108/1020/1019 (b), submitted on 13 March 2002 by J Rackham

Material: charcoal: *Prunus spinosa*, twig (R Gale 2002)

Initial comment: as OxA-11478

Objectives: as OxA-11478

Calibrated date: *1σ:* 1510–1420 cal BC
2σ: 1530–1400 cal BC

Final comment: see OxA-11478

OxA–11480 2125 ±37 BP

$\delta^{13}C$: -24.0 ±0.3‰

Sample: 110/1014/1013 (a), submitted on 13 March 2002 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2002)

Initial comment: fill of posthole 1013, possibly part of structure 3.

Objectives: to estimate the infilling of posthole 1013, and the construction/use of structure 3.

Calibrated date: *1σ:* 200–90 cal BC
2σ: 360–40 cal BC

Final comment: S Griffiths (8 July 2010), the result is not statistically consistent (T′=1463.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978) with the second measurement from this posthole (OxA-11481), indicating the feature includes material from a range of activities. The results from 'structure 3' do not form a coherent group, and interpretation is challenging. It is evident that these features do not represent a middle Neolithic structure akin to structure 1.

References: Ward and Wilson 1978

OxA–11481 232 ±33 BP

$\delta^{13}C$: -26.7 ±0.3‰

Sample: 110/1014/1013, submitted on 13 March 2002 by J Rackham

Material: charcoal: Ericaceae, twig (R Gale 2002)

Initial comment: as OxA-11480

Objectives: as OxA-11480

Calibrated date: *1σ:* cal AD 1640–1800
2σ: cal AD 1640–1955*

Final comment: see OxA-11480

OxA–11482 25 ±34 BP

$\delta^{13}C$: -24.2 ±0.3‰

Sample: 5/223/222, submitted on 13 March 2002 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2002)

Initial comment: fill of pit 222.

Objectives: to establish an estimate for the infilling of pits 222, and association with other activity on the site.

Calibrated date: *1σ:* cal AD 1955*–1955*
2σ: cal AD 1710–1910

Final comment: S Griffiths (8 July 2010), the result is statistically consistent (T′=1.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978) with the second measurement from pit 222 (OxA-11483). The modern/contemporary estimate indicates the infilling of this feature is not associated with earlier prehistoric activity on the site.

References: Ward and Wilson 1978

OxA–11483 88 ±34 BP

$\delta^{13}C$: -24.0 ±0.3‰

Sample: 5/223/222 (b), submitted on 13 March 2002 by J Rackham

Material: charcoal: *Ulex/Cytisus* sp., twig (J Rackham 2002)

Initial comment: as OxA-11483

Objectives: as OxA-11483

Calibrated date: *1σ:* cal AD 1690–1920
2σ: cal AD 1680–1940

Final comment: see OxA-11483

OxA–11484 8085 ±55 BP

$\delta^{13}C$: -24.7 ±0.3‰

Sample: 106/799/798, submitted on 13 March 2002 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2002)

Initial comment: material from fill of pit 798.

Objectives: to establish whether this feature was coeval with other features on the site.

Calibrated date: *1σ:* 7090–7040 cal BC
2σ: 7180–6830 cal BC

Final comment: S Griffiths (8 July 2010), this result is not statistically consistent (T′=16063.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978) with the other results from pit 798 (OxA-11485), and indicates that the feature included material from a range of activity. The feature may have been truncated after infilling, or might represent later infilling which accumulated residual material.

References: Ward and Wilson 1978

OxA–11485 170 ±34 BP

$\delta^{13}C$: -25.5 ±0.3‰

Sample: 106/799/798 (b), submitted on 13 March 2002 by J Rackham

Material: charcoal: Ericaceae, twig (J Rackham 2002)

Initial comment: as OxA-11484

Objectives: as OxA-11484

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1650–1955*

Final comment: see OxA-11484

OxA–11486 7045 ±45 BP

$\delta^{13}C$: -24.4 ±0.3‰

Sample: 35/116/115 (a), submitted on 13 March 2002 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2002)

Initial comment: fill of pit 115, area 1.

Objectives: to establish whether this feature was coeval with other features on the site.

Calibrated date: *1σ:* 5990–5880 cal BC
2σ: 6020–5830 cal BC

Final comment: S Griffiths (8 July 2010), this result is statistically consistent (T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978) with the second measurement from the fill (OxA-11487) indicating they provide accurate estimates for the infilling of the feature in the first quarter of the sixth millennium cal BC. This pit infilling cannot be associated with the middle Neolithic activity on the site.

References: Ward and Wilson 1978

OxA–11487 7010 ±50 BP

$\delta^{13}C$: -25.8 ±0.3‰

Sample: 35/116/115 (b), submitted on 13 March 2002 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2002)

Initial comment: as OxA-11486

Objectives: as OxA-11486

Calibrated date: *1σ:* 5990–5840 cal BC
2σ: 6010–5750 cal BC

Final comment: see OxA-11486

OxA–11555 4576 ±40 BP

$\delta^{13}C$: -21.1 ±0.3‰

Sample: 4/221/220 (a), submitted on 13 March 2002 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (R Rackham 2002)

Initial comment: material from the fill of pit 220.

Objectives: to estimate the infilling of pit 220, and establish whether it is coeval with structure 1.

Calibrated date: *1σ:* 3370–3340 cal BC
2σ: 3500–3110 cal BC

Final comment: S Griffiths (8 July 2010), the result is statistically consistent with OxA-11556 (T′=0.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978) from the same feature, indicating an accurate estimate for the infilling of the feature. These results are also consistent with those from the fence line and structure 1, and part of the phase of middle Neolithic activity on the site.

References: Ward and Wilson 1978

OxA–11556 4537 ±39 BP

$\delta^{13}C$: -20.1 ±0.3‰

Sample: 4/221/220 (b), submitted on 13 March 2002 by J Rackham

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.), single fragment) (J Rackham 2002)

Initial comment: as OxA-11556

Objectives: as OxA-11556

Calibrated date: *1σ:* 3360–3110 cal BC
2σ: 3370–3090 cal BC

Final comment: see OxA-11556

London: Chambers Wharf, Greater London

Location: TQ 34307985
Lat. 51.30.04 N; Long. 00.03.53 W

Project manager: J Sidell (Institute of Archaeology, London), February 2002

Archival body: Museum of London

Description: in February 2002, a partial, articulated, female human skeleton was recovered from the eroding foreshore of the river Thames downstream of Tower Bridge close to Chamber's Wharf. The body was apparently associated with twigs, six fragments of Peterborough Ware pottery, and characteristic Neolithic flintwork.

Objectives: to determine if the skelton was Neolithic or later in date.

References: Bayliss *et al* 2004

OxA–11141 421 ±31 BP

$\delta^{13}C$: -17.0‰
$\delta^{15}N$ *(diet):* +12.4‰
C/N ratio: 3.5

Sample: FSW01/C14 body, submitted on 6 February 2002 by J Sidell

Material: human bone (left scapula) (J Sidell 2002)

Initial comment: articulated remains were present in clay layer, overlying ancient gravel, probably foreshore. The clay was overlain and cut into by a post-medieval layer containing ?ceramic building material, clay pipe, glass, and pottery. The site is intertidal, at the low water mark, and would not often be exposed. It is a generally calcareous environment. No rootlet penetration but exposed to general 'river pollution'.

Objectives: is it Neolithic or later?

Calibrated date: *1σ:* cal AD 1440–1470
2σ: cal AD 1430–1620

Final comment: J Sidell (11 April 2002), the presence of Peterborough Ware and Neolithic flints in close proximity to the body indicated a prehistoric date, but the sediments must have been reworked. This leaves a problematic (but challenging) interpretation.

Final comment: A Bayliss (20 February 2002), interpretation of the results is complicated, but this body is certainly not Neolithic. It is certainly fifteenth century AD or later. Given the uncertainties of marine corrections, it is difficult to be more precise than this with any degree of reliability. However, as the probability that it is very recent seems to be relatively low, the local marine correction may be more appropriate, and so a date between the fifteenth and seventeenth centuries seems most reasonable.

Laboratory comment: English Heritage (20 February 2002), Historic England (June 2016), the three results on this sample are statistically consistent (T′=1.9; T′(5%)=6.0; ν=2; Ward and Wilson 1978), and so a weighted mean (398 ±17 BP) can be taken before calibration. This calibrates to cal AD 1445-1610 (at 2σ; Reimer et al 2013). There is, however, a considerable complication when considering these results. The $\delta^{13}C$ values indicate that there is a strong marine component in the ultimate source of carbon in the dated individual. There is not even an absolute guarantee that this body is not recent, if this individual consumed a significant amount of fish from a highly depleted source.

References: Reimer *et al* 2013
Ward and Wilson 1978

OxA–11142 415 ±33 BP

$\delta^{13}C$: -16.7‰
$\delta^{15}N$ (diet): +12.6‰
C/N ratio: 3.4

Sample: FSW01/C14 body, submitted on 6 February 2002 by J Sidell

Material: human bone (left scapula) (J Sidell 2002)

Initial comment: as OxA-11141

Objectives: as OxA-11141

Calibrated date: *1σ:* cal AD 1440–1480
2σ: cal AD 1430–1620

Final comment: see OxA-11141

Laboratory comment: see OxA-11141

OxA-X-2204-36 372 ±25 BP

$\delta^{13}C$: -17.7 ±0.3‰

Sample: FSW01/C14 body, submitted on 6 February 2002 by J Sidell

Material: human bone (left scapula) (J Sidell 2002)

Initial comment: a replicate measurement on re-ultrafiltered gelatin (Bronk Ramsey et al 2004a) of OxA-11142.

Objectives: as OxA-11141

Calibrated date: *1σ:* cal AD 1455–1620
2σ: cal AD 1445–1635

Final comment: see OxA-11141

Laboratory comment: Oxford Radiocarbon Accelerator Unit (18 May 2016), the yield on the original sample was very high (146.0mg) and so all three measurements are probably accurate.

References: Bronk Ramsey *et al* 2004a

London: Fennings Wharf, Greater London

Location: TQ 32848036
Lat. 51.30.22 N; Long. 00.05.09 W

Project manager: G Dennis (Museum of London), 1984

Archival body: Museum of London

Description: a late Bronze Age circular ring-ditch, close to the tidal Thames foreshore. There was evidence of three phases of charcoal spreads, all either cremation pyre or dumps of pyre material mixed with cremated material. There are six samples in the series, context 1100, sample 607 from the first phase; context 1104, samples 546, 547, and 573 are all from the second phase of charcoal spreads; context 1020, sample 435 is from the third and final phase of charcoal spreads. The features were sealed by a ninteenth-century basement.

Objectives: the objective is two-fold. Firstly, to precisely date this monument, which at the moment is only dated by finds of a few sherds of pottery of the late Bronze Age/Iron Age transition (also known as post-Deverel-Rimbury) *c* 1000–750 BC. The second objective is to determine if there is any significant chronological depth/time-span to the use of the monument by dating each phase of charcoal spread.

Final comment: B Watson (14 December 2000), the ring-ditch has three phases of funerary activity and the radiocarbon dates confirm that it was used for a relatively short period of time (*c* 1900–1600 cal BC). This duration is interesting as it means that the monument may only have been in use for a few generations. Without the radiocarbon dating this important monument would not be properly dated and its duration of use would have been impossible to estimate. Also without the radiocarbon dates we would not have realised the central feature was a secondary addition to the monument, as the ceramics from it would have been used to date the entire monument in the absence of other reliable dating evidence.

Laboratory comment: English Heritage (2000), there are four pairs of replicate measurements on different fragments of charcoal from the same sample. Each pair is statistically consistent (T′=0.4, OxA-8763–4; T′=1.8, OxA-8765–6; T′=1.5, OxA-8767–8; T′=3.6, OxA-8769–70; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Dennis 1984
Sidell *et al* 2002
Ward and Wilson 1978
Watson *et al* 2001

OxA–8763 3360 ±40 BP

$\delta^{13}C$: -22.7‰

Sample: FW84 435a, submitted on 26 February 1999 by B Watson

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 1999)

Initial comment: the backfill of the partial recut of the east side of the ring-ditch (F2.4) contained three adjoining small spreads of charcoal, which may be dumps of cremation pyre (not *in situ* burning). The ring-ditch recut was backfilled with iron-stained sand/gravel. *See* OxA-8764 for a further measurement on this sample.

Objectives: to date the latest phase of funerary/ritual activity at the ring-ditch.

Calibrated date: *1σ:* 1700–1610 cal BC
2σ: 1750–1530 cal BC

Final comment: B Watson (14 December 2000), this dating for the latest cremation deposit in the ring-ditch demonstrates that the central feature, which contains late Bronze Age/early Iron Age pottery, must be a secondary addition.

References: Bronk Ramsey *et al* 2002

OxA–8764 3400 ±45 BP

$\delta^{13}C$: -22.6‰

Sample: FW84 435b, submitted on 26 February 1999 by B Watson

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 1999)

Initial comment: as OxA-8763

Objectives: as OxA-8763

Calibrated date: *1σ:* 1750–1630 cal BC
2σ: 1880–1610 cal BC

Final comment: see OxA-8763

References: Bronk Ramsey *et al* 2002

OxA–8765 3345 ±45 BP

$\delta^{13}C$: -22.6‰

Sample: FW84 546a, submitted on 26 February 1999 by B Watson

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 1999)

Initial comment: the secondary fill of the ring-ditch (subgroup F2.3) contained four spreads of charcoal and calcined bone, which may be dumps of cremation pyre. This sample is from one of these spreads. The secondary fills of the ring-ditch were silty sands. See 546b (OxA-8766) for a further measurement from this sample and 547a, 547b, 573a, and 573b (OxA-8765–8 respectively) for further measurements from this phase.

Objectives: to date the second of three phases of funerary/ritual activity at the ring-ditch.

Calibrated date: *1σ:* 1690–1560 cal BC
2σ: 1750–1500 cal BC

Final comment: see series comments

References: Bronk Ramsey *et al* 2002

OxA–8766 3425 ±40 BP

$\delta^{13}C$: -22.9‰

Sample: FW84 546b, submitted on 26 February 1999 by B Watson

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 1999)

Initial comment: as OxA-8765

Objectives: as OxA-8765

Calibrated date: *1σ:* 1770–1680 cal BC
2σ: 1880–1620 cal BC

Final comment: see series comments

References: Bronk Ramsey *et al* 2002

OxA–8767 3420 ±40 BP

$\delta^{13}C$: -22.7‰

Sample: FW84 547a, submitted on 26 February 1999 by B Watson

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 1999)

Initial comment: as OxA-8765

Objectives: as OxA-8765

Calibrated date: *1σ:* 1760–1660 cal BC
2σ: 1880–1620 cal BC

Final comment: see series comments

References: Bronk Ramsey *et al* 2002

OxA–8768 3490 ±40 BP

$\delta^{13}C$: -22.5‰

Sample: FW84 547b, submitted on 26 February 1999 by B Watson

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 1999)

Initial comment: as OxA-8765

Objectives: as OxA-8765

Calibrated date: *1σ:* 1890–1740 cal BC
2σ: 1930–1690 cal BC

Final comment: see series comments

References: Bronk Ramsey *et al* 2002

OxA–8769 3430 ±45 BP

$\delta^{13}C$: -22.7‰

Sample: FW84 573a, submitted on 26 February 1999 by B Watson

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 1999)

Initial comment: as OxA-8765

Objectives: as OxA-8765

Calibrated date: *1σ:* 1870–1680 cal BC
2σ: 1890–1620 cal BC

Final comment: see series comments

References: Bronk Ramsey *et al* 2002

OxA–8770 3545 ±40 BP

$\delta^{13}C$: -22.8‰

Sample: FW84 573b, submitted on 26 February 1999 by B Watson

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 1999)

Initial comment: as OxA-8765

Objectives: as OxA-8765

Calibrated date: *1σ:* 1940–1780 cal BC
2σ: 2020–1750 cal BC

Final comment: see series comments

References: Bronk Ramsey *et al* 2002

UB–4431 3407 ±33 BP

δ^13^C: -23.5 ±0.2‰

Sample: FW84 C1100 S607, submitted on 26 February 1999 by B Watson

Material: charcoal: *Quercus* sp., sapwood (132.78g) (R Gale 1999)

Initial comment: the primary fill of the ring-ditch (subgroup F2.2) contained a large charcoal spread (from which this sample was obtained) and evidence of *in situ* burning. This spread is probably a dump of cremation/cremation pyre material. The primary fill of the ring-ditch was iron stained sand/gravel.

Objectives: to date the earliest of the three phases of funerary/ritual activity at the ring-ditch. We are also dating charcoal spreads from the two other phases of activity to see if there is any significant chronological depth/time-span to the use of the monument.

Calibrated date: *1σ:* 1750–1660 cal BC
2σ: 1870–1620 cal BC

Final comment: B Watson (14 December 2000), the difference between the radiocarbon dates from the cremation deposits within the ring-ditch suggests that its primary use spanned a relatively short period of time, possibly only a few generations.

Long Barrows Project: Fussell's Lodge, Wiltshire

Location: SU 1932
Lat. 51.05.11 N; Long. 01.43.43 W

Project manager: A Whittle (Cardiff University), 1957

Archival body: Natural History Museum and Salisbury and South Wiltshire Museum

Description: an earthen long barrow with lengthy trapezoidal mound. A timber mortuary structure held the remains of some 30 individuals. Twenty-four measurements have been obtained from Fussell's Lodge, to join the single determination obtained previous work (BM-134, 5180 ±50 BP, 4350–3690 cal BC at 2σ; Reimer *et al* 2004; Ashbee 1966). Samples were submitted from: human bone from the mortuary deposits - these samples represent bones from each of the five bone groups; antler from the bottom of the barrow ditch; an articulated ox vertebral column discovered on top of the primary silts of the ditch; an ox foot place on top of a flint cairn overlying the mortuary deposits; and an ox skull deposit in the mortuary area.

Objectives: to date the construction of the primary structures (timber revetment and mortuary structure) under the long barrow; to determine the dates of the mortuary deposits and their chronological span; to investigate whether there are any differences in date between the separate bone groups of the mortuary deposits; to determine whether the 'green bone' in group B, which exhibits a fracture morphology of fresh breaks, is earlier in date than the overlying 'dry bone' material, which exhibits a fracture morphology consistent with post mortem breakage; to determine if the weathered ox skull incorporated at the proximal end of the mortuary deposits was older than the human remains; and to establish the date of the construction of the long barrow; to establish the relative position of Fussell's Lodge in the typological sequence of long barrows and long cairns.

Final comment: A Bayliss (2007), a total of 27 radiocarbon results are now available from the Fussell's Lodge long barrow, and are presented within an interpretive Bayesian statistical framework in Wysocki *et al* (2007). Three alternative archaeological interpretations of the sequence are given, each with a separate Bayesian model, the third model is preferred. In the first, the construction is a unitary one, and the human remains included are by definition already old. In the second, the primary mortuary structure is seen as having two phases, and is set within a timber enclosure; these are later closed by the construction of a long barrow. In that model of the sequence, deposition began in the thirty-eighth century cal BC and the mortuary structure was extended probably in the 3660s-3650s cal BC; the long barrow was probably built in the 3630s-3620s cal BC; ancestral remains are not in question; and the use of the primary structure may have lasted for a century or so. In the third, preferred model, a variant of the second, we envisage the inclusion of some ancestral remains in the primary mortuary structure alongside fresh remains. This provides different estimates of the date of initial construction (probably in the last quarter of the thirty-eighth century cal BC or the first half of the thirty-seventh century cal BC) and the duration of primary use, but agrees in setting the date of the long barrow probably in the 3630s-3620s cal BC.

Laboratory comment: English Heritage (2007), following the discovery in the Oxford Radiocarbon Laboratory of a contamination problem associated with the gelatinisation protocol (Bronk Ramsey *et al* 2000), five samples were re-processed, graphitized and dated, as described by Bronk Ramsey *et al* (2004a). The original results on these samples (and the other samples unable to be re-dated) were withdrawn.

Laboratory comment: English Heritage (3 July 2014), nine further samples from this site were dated after 2003 (GrA-28174–5, -28207–9, -28218–9, OxA-14458, and OxA-14480).

References: Ashbee 1966
Bronk Ramsey *et al* 2000
Bronk Ramsey *et al* 2004b
Reimer *et al* 2004
Wysocki *et al* 2007

GrA–23183 4950 ±50 BP

δ^13^C: -21.3 ±0.2‰

Sample: FS26, submitted on 5 March 2001 by A Whittle

Material: human bone (1g) (right femur, adult female) (M Wysocki 2001)

Initial comment: a specimen from bone group D of the mortuary deposit. One of several bones from the same skeleton arranged to give appearance of articulation. Secondary burial/excarnation cannot be excluded. It is unlikely that any interval between death and deposition was greater than 10 years.

Objectives: to establish the age of the mortuary deposits in relation to the construction of the ditch and long barrow mound; to clarify questions surrounding the sequence of construction: was the construction of the mortuary 'house', the mortuary deposits, and the construction of the mound part of a single episode, or could the mortuary 'house' and deposits belong to an earlier phase of activity? The precise dates of the inhumations in comparison to FSA3, which seals them, and FSA1 and FSA2, which must be later. Also, to establish if there is a chronological sequence in the grouped deposits, and to study the isotope data for palaeodiet information.

Calibrated date: *1σ:* 3790–3650 cal BC
2σ: 3930–3640 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this individual dates to *3665–3635 cal BC (95% probability*; table 1; Wysocki *et al* 2007).

Laboratory comment: English Heritage (2007), the two measurements on this skeleton (GrA-23183 and OxA-12281) are statistically consistent (T′=2.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Their weighted mean (4878 ±26 BP) calibrates to 3780–3550 cal BC (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–23195 4955 ±45 BP

δ¹³C: -21.8 ±0.2‰

Sample: FS8.2, submitted on 5 March 2010 by A Whittle

Material: human bone (left femur, adult female) (M Wysocki 2002)

Initial comment: a specimen from bone group A2 of the mortuary deposit. It was overlain by the collapsed barrow mound. It formed part of a disarticulated comingled assemblage.

Objectives: the date from this specimen is expected to clarify if the various grouped assemblages represent phased depositional episodes.

Calibrated date: *1σ:* 3790–3660 cal BC
2σ: 3910–3640 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this individual dates to *3730–3650 cal BC (95% probability*; table 1; Wysocki *et al* 2007).

Laboratory comment: (2007), the two measurements on this skeleton (GrA-23195 and OxA-13185) are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Their weighted mean (4955 ±31 BP) calibrates to 3900–3690 cal BC (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–28199 4880 ±50 BP

δ¹³C: -23.4 ±0.2‰

Sample: FSA1, submitted on 5 March 2001 by A Whittle

Material: antler: *Cervus elaphus*, tip of pick (1–2g) (M Wysocki 2001)

Initial comment: antler from layer 11 of the ditch. This specimen is from the bottom of the flanking quarry ditch of the long barrow. It is almost certainly a broken tip from an antler pick used in the construction of the ditch and barrow long mound.

Objectives: to establish the date of the construction of the ditch and barrow mound of the long barrow. In comparison with FSA3 (an ox metacarpal from the surface of the flint cairn), whose deposition must pre-date the construction of the mound, it will establish and clarify the chronology of the various architectural components of the monument. To also establish the precise date of the ditch construction in comparison to FSA5 (which seals FSA1). It may also clarify whether the human deposits were of an earlier primary mortuary structure, or whether the monument and burials were all part of a single episode.

Calibrated date: *1σ:* 3710–3630 cal BC
2σ: 3770–3530 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this antler dates to *3650–3630 cal BC (95% probability*; table 1; Wysocki *et al* 2007).

Laboratory comment: English Heritage (2007), the three measurements (GrA-28199, GrA-28218, and OxA-13205) on the antler are statistically consistent (T′=0.3; T′(5%)=6.0; ν=2; Ward and Wilson 1978). Their weighted mean (4866 ±26 BP) calibrates to 3780–3540 cal BC (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–28218 4880 ±50 BP

δ¹³C: -23.4 ±0.2‰

Sample: FSA1, submitted on 5 March 2001 by A Whittle

Material: antler: *Cervus elaphus*, red deer antler tip from the bottom of the flanking quarry ditch of the long barrow (layer 11) (1–2g) (M Wysocki 2001)

Initial comment: as GrA-28199. An auto-duplicate.

Objectives: as GrA-28199

Calibrated date: *1σ:* 3710–3630 cal BC
2σ: 3770–3530 cal BC

Final comment: see GrA-28199

Laboratory comment: see GrA-28199

OxA–12277 4971 ±31 BP

δ¹³C: -20.6‰
δ¹⁵N (diet): +9.4‰
C/N ratio: 3.2

Sample: FS2, submitted on 5 March 2001 by A Whittle

Material: human bone (1g) (left femur, adult male) (M Wysocki 2001)

Initial comment: this specimen was from bone group A1 of the mortuary deposit. All the bones in this group were disarticulated. The possibility of excarnation cannot be excluded.

Objectives: as GrA-23183. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-10606) was withdrawn.

Calibrated date: *1σ:* 3790–3700 cal BC
2σ: 3900–3650 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this individual dates to *3895–3880 cal BC (2% probability)* or *3800–3660 cal BC (93% probability*; table 1; Wysocki *et al* 2007).

OxA–12278 5021 ±31 BP

δ¹³C: -20.6‰
δ¹⁵N (diet): +9.2‰
C/N ratio: 3.2

Sample: FS6, submitted on 5 March 2001 by A Whittle

Material: human bone (1g) (left femur, sub-adult) (M Wysocki 2001)

Initial comment: as OxA-12277

Objectives: as GrA-23183. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-10667) was withdrawn.

Calibrated date: *1σ:* 3930–3770 cal BC
2σ: 3950–3700 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this individual dates to *3945–3830 cal BC (47% probability)* or *3825–3705 cal BC (48% probability*; table 1; Wysocki *et al* 2007).

OxA–12279 4857 ±31 BP

δ¹³C: -20.8‰
δ¹⁵N (diet): +9.6‰
C/N ratio: 3.2

Sample: FS11, submitted on 5 March 2001 by A Whittle

Material: human bone (1g) (left femur, adult) (M Wysocki 2001)

Initial comment: a specimen from bone group B of the mortuary deposit.

Objectives: as GrA-23183. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-10609) was withdrawn.

Calibrated date: *1σ:* 3660–3630 cal BC
2σ: 3700–3540 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this individual dates to *3700–3645 cal BC (95% probability*; table 1; Wysocki *et al* 2007).

OxA–12280 4991 ±32 BP

δ¹³C: -20.4‰
δ¹⁵N (diet): +8.5‰
C/N ratio: 3.1

Sample: FS14, submitted on 5 March 2001 by A Whittle

Material: human bone (1g) (left femur, adult male) (M Wysocki 2001)

Initial comment: as OxA-12279

Objectives: as GrA-23183. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-10611) was withdrawn.

Calibrated date: *1σ:* 3800–3700 cal BC
2σ: 3940–3690 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this individual dates to *3735–3650 cal BC (95% probability*; table 1; Wysocki *et al* 2007).

OxA–12281 4850 ±31 BP

δ¹³C: -20.7‰
δ¹⁵N (diet): +9.6‰
C/N ratio: 3.2

Sample: FS26, submitted on 5 March 2001 by A Whittle

Material: human bone (1g) (right femur, adult female) (M Wysocki 2001)

Initial comment: a replicate of GrA-23183.

Objectives: as GrA-23183. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-10612) was withdrawn.

Calibrated date: *1σ:* 3660–3630 cal BC
2σ: 3700–3530 cal BC

Final comment: see GrA-23183

Laboratory comment: see GrA-23183

OxA–13173 4728 ±49 BP

δ¹³C: -21.7‰

Sample: FSA3 (a) and (b), submitted on 5 March 2001 by A Whittle

Material: animal bone: *Bos* sp., metapoidal (M Wysocki 2001)

Initial comment: part of deposit of a group of bones which form three articulated ox feet. The (b) ones lay on top of a flint cairn, which sealed the mortuary deposits and was overlain by the chalk rubble mound of the long barrow. The bones were almost certainly in articulation when deposited, but were not fully articulated when excavated.

Objectives: to establish the chronology of the sequence of construction. The sample will provide a *terminus post quem* for the construction of the mound which seals it. It is expected that the sample will also provide a *terminus ante quem* for the mortuary deposit below it. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-10601) was withdrawn.

Calibrated date: *1σ:* 3640–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this individual dates to *3650–3615 cal BC (95% probability*; table 1; Wysocki *et al* 2007).

OxA–13174 5075 ±40 BP

$\delta^{13}C$: -20.7‰
$\delta^{15}N$ *(diet):* +9.2‰
C/N ratio: 3.3

Sample: FS4, submitted on 5 March 2001 by A Whittle

Material: human bone (left femur, adult female) (M Wysocki 2001)

Initial comment: as OxA-12277

Objectives: as GrA-23183. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-10607) was withdrawn.

Calibrated date: *1σ:* 3960–3790 cal BC
2σ: 3970–3770 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this individual dates to *3965–3780 cal BC (95% probability*; table 1; Wysocki *et al* 2007).

OxA–13185 4955 ±42 BP

$\delta^{13}C$: -20.6‰
$\delta^{15}N$ *(diet):* +8.9‰
C/N ratio: 3.2

Sample: FS 8.2, submitted on 14 March 2002 by A Whittle

Material: human bone (left femur, adult female) (M Wysocki 2002)

Initial comment: as GrA-23195

Objectives: as GrA-23195. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-11376) was withdrawn.

Calibrated date: *1σ:* 3780–3660 cal BC
2σ: 3910–3640 cal BC

Final comment: *see* GrA-23195

Laboratory comment: *see* GrA-23195

OxA–13186 4824 ±39 BP

$\delta^{13}C$: -20.4‰
$\delta^{15}N$ *(diet):* +10.2‰
C/N ratio: 3.2

Sample: FS24.2, submitted on 5 March 2001 by A Whittle

Material: human bone (1g) (right ulna, adult female (individual 1)) (M Wysocki 2004)

Initial comment: as GrA-28209

Objectives: as GrA-21874. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-10668) was withdrawn.

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3690–3520 cal BC

Final comment: *see* GrA-28209

Laboratory comment: *see* GrA-28209

OxA–13187 4932 ±34 BP

$\delta^{13}C$: -20.6‰
$\delta^{15}N$ *(diet):* +9.6‰
C/N ratio: 3.4

Sample: FS29, submitted on 14 March 2002 by A Whittle

Material: human bone (tibia shaft) (M Wysocki 2002)

Initial comment: as OxA-11329

Objectives: as OxA-13329. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-11426) was withdrawn.

Calibrated date: *1σ:* 3750–3650 cal BC
2σ: 3790–3640 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this individual dates to *3720–3650 cal BC (95% probability*; table 1; Wysocki *et al* 2007).

OxA–13205 4851 ±37 BP

$\delta^{13}C$: -23.1‰

Sample: FSA1, submitted on 5 March 2001 by A Whittle

Material: antler: *Cervus elaphus*, tip of pick (1–2g) (M Wysocki 2001)

Initial comment: a replicate of GrA-28199.

Objectives: as GrA-28199. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-10689) was withdrawn.

Calibrated date: *1σ:* 3660–3630 cal BC
2σ: 3710–3530 cal BC

Final comment: *see* GrA-28199

Laboratory comment: *see* GrA-28199

OxA–13206 4900 ±45 BP

$\delta^{13}C$: -21.2‰

Sample: FSA4, submitted on 5 March 2001 by A Whittle

Material: animal bone: *Bos* sp., skull (M Wysocki 2001)

Initial comment: from D1, a discrete deposit at the same level as the human bone deposits. It was sealed by the flint cairn, chalk rubble, and FSA3 (a) and (b). A complete ox skull, not believed to be intrusive, but rather a deliberate deposit. The taphonomy suggests it may have been previously buried or brought from elsewhere, or exhumed prior to deposition.

Objectives: to establish the relationship of this deposit to the articulated ox feet (FSA3 (a) and (b)). Are both specimens part of the same animal? To establish the age of this deposit in relation to the human deposits. Is it contemporary with human deposits? Could it be a curated object? It will also provide comparative isotope data against which human stable isotope data can be assessed. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-10603) was withdrawn.

Calibrated date: *1σ:* 3710–3640 cal BC
2σ: 3780–3630 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this individual dates to *3665–3635 cal BC (95% probability*; table 1; Wysocki *et al* 2007).

OxA–13326 4759 ±33 BP

$\delta^{13}C$: -21.7‰

Sample: FSA5 (a) and (b), submitted on 5 March 2001 by A Whittle

Material: animal bone: *Bos* sp., vertebra (4g) (M Wysocki 2001)

Initial comment: part of an ox vertebral column and ribs deposited just above the primary silts in the ditch. The assemblage was almost fully articulated when excavated (there was evidence of slight disturbance), and must have been articulated when deposited.

Objectives: to establish the absolute date of the construction of the mound in comparison to FSA1 and FSA2 which seals it. It will also provide comparative stable isotope data against which human isotope data can be assessed. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-10604) was withdrawn.

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3640–3380 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this individual dates to *3635–3495 cal BC (79% probability)* or *3430–3375 cal BC (16% probability*; table 1; Wysocki *et al* 2007).

OxA–13329 4899 ±34 BP

$\delta^{13}C$: -20.3‰
$\delta^{15}N$ *(diet):* +9.2‰
C/N ratio: 3.2

Sample: FS28, submitted on 14 March 2002 by A Whittle

Material: human bone (<5g) (tibia shaft fragment) (M Wysocki 2002)

Initial comment: from a disarticulated/fragmented human bone assemblage overlain by bone from group B (mostly unfragmented) and sealing a deposit of burnt bone in pit B.

Objectives: the sample is from a sub-assemblage of fragmentary material, which displays taphonomic characteristics indicating peri-mortem ('green' bone) fragmentation. This is in contrast to the overlying material: human bone displaying characteristics indicating post mortem (dry bone) fragmentation. The taphonomic data suggests that FS28 could represent an earlier depositional episode. It is expected that this sample, together with FS29, FS30, and FS31 will clarify this. This sample was re-dated due to the problems at the laboratory; the original measurement (OxA-11425) was withdrawn.

Calibrated date: *1σ:* 3710–3640 cal BC
2σ: 3760–3630 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this individual dates to *3710–3650 cal BC (95% probability*; table 1; Wysocki *et al* 2007).

Long Barrows Project: Wayland's Smithy, Oxfordshire

Location: SU 28118536
Lat. 51.33.57 N; Long. 01.35.40 W

Project manager: A Whittle (Cardiff University)

Description: a two-phase Neolithic tomb. Wayland's Smithy I is a small oval barrow with a timber and sarsen mortuary structure, containing 14 inhumations. Wayland's Smithy II is a larger transepted megalithic chambered tomb with large trapezoidal barrow, incorporating the earlier Wayland's Smithy monument (Whittle 1991).

Objectives: to establish the date and span of use of the mortuary deposits in Wayland's Smithy I; to establish the date of construction of Wayland's Smithy II; to clarify the chronological interval between the two monuments; to establish the relative position of Wayland's Smithy I and Wayland's Smithy II in the typological sequence of long barrows and long cairns; and to determine the chronological relationship between Wayland's Smithy II and the transepted chambers at West Kennet.

Final comment: A Bayliss (2007), a total of 23 radiocarbon results are now available from the Wayland's Smithy long barrow, and have been presented within an interpretive Bayesian statistical framework (fully described in Bayliss *et al* 2007). Four alternative archaeological interpretations of the sequence were considered, each with a separate Bayesian model, though only two were presented in detail. The differences are based on different readings of the sequence of Wayland's Smithy II. In the preferred interpretation of the sequence, the primary mortuary structure was some kind of lidded wooden box, accessible for deposition over a period of time, and then closed by the mound of Wayland's Smithy I; Wayland's Smithy II was a unitary construction, with transepted chambers, secondary kerb, and secondary ditches all constructed together. In the Bayesian model for this interpretation, deposition began in the earlier thirty-sixth century cal BC, and probably lasted for a generation. A gap of probably 40–100 years ensued, before the first small mound was constructed in 3520–3470 cal BC. After another gap, probably of only 1–35 years, the second phase of the monument was probably constructed in the middle to later part of the thirty-fifth century cal BC (3460–3400 cal BC), and its use probably extended to the middle decades of the thirty-fourth century cal BC.

Laboratory comment: English Heritage (2007), following the discovery in the Oxford Radiocarbon Laboratory of a contamination problem associated with the gelatinization protocol (Bronk Ramsey *et al* 2000), 11 samples were re-processed, graphitized and dated, as described by Bronk Ramsey *et al* (2004a). The original results on these samples were withdrawn.

References:

Bayliss *et al* 2007b
Bronk Ramsey *et al* 2000
Bronk Ramsey *et al* 2004b
Whittle 1991

Long Barrows Project: Wayland's Smithy I, Oxfordshire

Location: SU 28118536
Lat. 51.33.57 N; Long. 01.35.40 W

Project manager: A Whittle (Cardiff University)

Archival body: Reading Museum

Description: six specimens of human bone from discrete individuals from the Wayland's Smithy I mortuary structure. WS16, WS13, and WS8 were stratified, in a sequence, WS16 being the basal deposit. WS10 was overlain by WS7, but the depositional/stratigraphical relationship of these two specimens with the first groups of three is uncertain. WS6 appears to have been the final deposit in the mortuary structure.

Objectives: the series will date the period of depositional use of the tomb, and will give a good indication of the span of use. As the samples are from articulated individuals, the series will furnish a *terminus ante quem* for the construction of the mortuary structure. In comparison, with dates from Wayland's Smithy II, the series will establish the length of time between the two monuments and help establish the absolute date of Wayland's Smithy II.

Final comment: A Bayliss (2007), the radiocarbon results have indicated that the start of the sequence at Wayland's Smithy is much later than previously thought. The mortuary structure of Wayland's Smithy I was not the first activity to take place on this site, but compared with what had already happened nearby in the thirty-eighth and thirty-seventh centuries cal BC, the situation at Wayland's Smithy from the thirty-sixth into the thirty-fifth or thirty-fourth centuries cal BC may now appear rather unusual. By the time the first people were deposited in Wayland's Smithy I, probably in the earlier thirty-sixth century cal BC, other long cairns and barrows were already old and had indeed been largely finished (*see* Ascott-under-Wychwood, Hazleton, West Kennet, and Fussell's Lodge), although it does have similarities with the wooden box at Haddenham. The form of Wayland's Smithy I is unusual, and its size modest, and this can no longer be attributed to an early date or putative stage in a developmental sequence, since the preferred chronological model suggests a date from the mid thirty-sixth to mid thirty-fifth century cal BC. It is also striking that the dates indicate there was a single generation of use at Wayland's Smithy I, rather than prolonged use over several generations, perhaps in response to a specific event.

Laboratory comment: English Heritage (2007), the preferred chronological model (fig. 4; Bayliss *et al* 2007b) has good overall agreement (Aoverall = 65.8%), suggesting that the radiocarbon dates do not contradict the reading of the monument sequence proposed by Whittle (1991). This model suggests that the first inhumations were placed in the mortuary structure of Wayland's Smithy I in *3610–3550 cal BC* (*83% probability*) or *3545–3525 cal BC* (*12% probability; start Wayland's Smithy I*: fig. 4) or *3590–3555 cal BC* (*67% probability*) or *3540–3535 cal BC* (*1% probability*). Human remains ceased to be placed in the chamber in *3590–3520 cal BC* (*95% probability; end Wayland's Smithy I*) or *3580–3550 cal BC* (*62% probability*) or *3535–3530 cal BC* (*6% probability*). Burial continued in the mortuary structure for between *1 and 65 years* (*95% probability; use Wayland's Smithy I*: fig. 5), probably for only *1–15 years* (*68% probability*) - less than a single generation! The mound was thrown up over this mortuary structure in *3530–3435 cal BC* (*95% probability; OxA-13169*: fig. 4), probably in *3520–3470 cal BC* (*68% probability*). There was a gap preceding the mound of between *5 and 130 years* (*95% probability; mortuary structure & mound I*: fig. 5), probably of *40–100 years* (*68% probability*). After the construction of the primary mound, a second period of disuse ensued, lasting *1–75 years* (*95% probability; I & II*: fig. 5), probably for *1–35 years* (*68% probability*).

Laboratory comment: English Heritage (3 July 2014), nine further samples from this site were dated after 2003 (KIA-27623–6, OxA-14471, and OxA-14769–72).

References: Bayliss *et al* 2007b
Whittle 1991

OxA–13170 4791 ±40 BP

$\delta^{13}C$: -20.4‰
$\delta^{15}N$ *(diet)*: +10.4‰
C/N ratio: 3.4

Sample: WS13, submitted on 28 February 2001 by A Whittle

Material: human bone (0.50–1g) (right femur, adult male) (M Wysocki 2001)

Initial comment: from bone group K - part of the articulated right lower limb (femur, tibia, fibula, calcaneus, talus, patella, and footbones). It overlay, and was from, a different individual to WS16. Therefore it is stratigraphically later and very likely to be part of the originally articulated skeleton which is undisturbed. it was sealed by deposits of stone and chalk rubble.

Objectives: to establish the depositional span of use of Wayland's Smithy I mortuary structure. It is stratigraphically later than WS16, which it overlay, and was overlain by WS8 with part of the stratified group in the southern part of the chamber. It was sealed by contexts containing WS1 to WS5 and will also provide stable isotope/palaeodiet data. A re-dating of the sample WS13 (OxA-10593) which was withdrawn.

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3660–3380 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this skeleton dates to *3595–3525 cal BC (95% probability*; table 1; Bayliss *et al* 2007b).

OxA–13175 4717 ±45 BP

$\delta^{13}C$: -20.7‰
$\delta^{15}N$ *(diet)*: +9.3‰
C/N ratio: 3.2

Sample: WS11, submitted on 14 March 2002 by M Wysocki

Material: human bone (right femur) (M Wysocki 2001)

Initial comment: a partially articulated skeleton (lower limbs) from the northern grouping of deposits. From the basal layer in direct contact with the sarsen paved floor.

Objectives: the first round of results could indicate that the northern grouping of bones was deposited earlier than southern grouping. This additional sample from the northern grouping will clarify the issue. A re-dating of the sample WS11 (OxA-11379) which was withdrawn.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this skeleton dates to *3605–3550 cal BC (84% probability)* or *3545–3525 cal BC (11% probability*; table 1; Bayliss *et al* 2007b).

OxA–13176 4809 ±44 BP

$\delta^{13}C$: -20.8‰
$\delta^{15}N$ *(diet):* +10.4‰
C/N ratio: 3.2

Sample: WS19, submitted on 14 March 2002 by A Whittle

Material: human bone (right femur, child) (M Wysocki 2001)

Initial comment: a specimen from a disturbed, probably partially articulated skeleton of a child, mostly deposited in the northern grouping of bones. The material was partially in contact with sarsen paving slabs and overlain by collapsed cairn material (chalk rubble).

Objectives: as OxA-13175. A re-dating of the sample WS19 (OxA-11380) which was withdrawn.

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3660–3510 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this skeleton dates to *3590–3525 cal BC (95% probability*; table 1; Bayliss *et al* 2007b).

OxA–13203 4749 ±38 BP

$\delta^{13}C$: -20.8‰
$\delta^{15}N$ *(diet):* +9.8‰
C/N ratio: 3.2

Sample: WS6, submitted on 28 February 2001 by A Whittle

Material: human bone (0.50–1g) (right femur, adult male) (M Wysocki 2001)

Initial comment: skeleton PB1. A crouched articulated skeleton placed discretely to the north of the main concentration of bones in the chamber. This was the best preserved/most complete skeleton. This is arguably the last deposit in the sequence and is undisturbed. The skeleton was placed on the stone floor.

Objectives: to establish span of use of Wayland's Smithy I for mortuary deposits. The location and condition of this skeleton strongly suggests that it represent the final deposit in the chamber. It is placed away from the main concentrations of bones and is undisturbed. Stratigraphically, however it could be an early deposit. It appears to have been treated differently to the other individuals in the tomb, and its chronological relationship with those needs to be clarified. A re-dating of the sample WS6 (OxA-10589) which was withdrawn.

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this skeleton dates to *3600–3525 cal BC (95% probability*; table 1; Bayliss *et al* 2007b).

OxA–13330 4817 ±39 BP

$\delta^{13}C$: -20.8‰
$\delta^{15}N$ *(diet):* +9.8‰
C/N ratio: 3.2

Sample: WS17, submitted on 14 March 2002 by A Whittle

Material: human bone (right femur) (M Wysocki 2001)

Initial comment: partially articulated lower limbs from the 'upper layer' of deposits overlying WS9. The material was partially in contact with the sarsen paving slabs and overlain by collapsed cairn material (chalk rubble).

Objectives: the specimen shows clear evidence of carnivore scavenging. The sample will clarify the relationship between it and WS9 (a second carnivore scavenged individual), as well as the relationship with other articulated individuals. Also *see* OxA-14771. A re-dating of the sample WS17 (OxA-11380) which was withdrawn.

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3660–3520 cal BC

Final comment: see OxA-13170

Long Barrows Project: Wayland's Smithy II, Oxfordshire

Location: SU 28118536
Lat. 51.33.57 N; Long. 01.35.40 W

Project manager: A Whittle (Cardiff University)

Archival body: Reading Museum

Description: samples from antlers from the bottom of Wayland's Smithy II ditch (WS1 and WS2) and body of the mound (WS3 and WS4). A fifth sample (WS5) is from an antler that may have been used in the construction of the Wayland's Smithy I mound. Four samples of human bone were from discrete individuals from the Wayland's Smithy II mortuary deposits (WS20, WS21, WS22, and WS23).

Objectives: the antlers, almost certainly were used as picks in the construction of the Wayland's Smithy II ditch and barrow, will date the building of the monument. The human bone samples will give some indication of the period of depositional use. In comparison with the Wayland's Smithy I series, the dates will establish the period of time between the two monuments.

Final comment: A Bayliss (2007), attachment to place could be one way to think about the later history of Wayland's Smithy, if a rather general one. A further gap ensued between Wayland's Smithy I and the initiation of Wayland's Smithy II; in our preferred chronological model this gap was of some *1–75 years* (*95% probability; I & II*: fig. 5), probably of *1–35 years* (*68% probability*). Over this kind of timespan the site was not forgotten. In our preferred model, Wayland's Smithy II was initiated as a unitary construction, though we have raised the possibility of a different kind of building history, and this took place in the thirty-fifth to thirty-fourth centuries cal BC (*3490–3390 cal BC (95% probability; start Wayland's Smithy II*: fig. 4); in our preferred model, the use of this monument ended probably in the middle decades of the thirty-fourth century cal BC. The evidence here is more constrained, but this appears now a strikingly late phenomenon. It is certainly later than the comparable monument of West Kennet. The end of use of Wayland's Smithy II might not long precede, and could even overlap, the appearance of cursus monuments in the upper Thames valley and elsewhere. By comparison with West Kennet, the form monumentalized at Wayland's Smithy II would already have been old. We are denied better understanding of the rites of deposition in this phase of the monument by the poor survival of the deposits. We could refer the style of monument simply to some generalized notion of tradition, but the form chosen might suggest a more conscious harking back to ideas and practices already old. If there was still a need to lay claim to place and land, part of the possession of this location may have been seen to now reside in a sense of history. There has been some discussion in the literature about the creation of deliberately archaic forms in Cotswold monuments, focusing on the treatment of the flanks of cairns. While the specific issue of 'extra-revetment' material now looks less likely to be the basis for such a practice, form as a whole could be a much more potent tool in the deliberate creation of history and myth. With these results, we can no longer assume that a particular form of architecture goes with a particular form of deposition and identical context. Creating Wayland's Smithy II in this particular form would align both its builders and the forebears already interred in Wayland's Smithy I with the heroic earlier generations who set up West Kennet and Windmill Hill, whose renown could still have echoed some 150 years or so later around the downland communities and beyond.

Laboratory comment: English Heritage (2007), the chronological modelling outlined in Bayliss *et al* (2007b; fig. 4) indicates that the burning episode that cleared the site of encroaching vegetation occurred before the unitary construction of Wayland's Smithy II, which took place in *3490–3390 cal BC (95% probability; start Wayland's Smithy II:* fig. 4), probably in *3460–3400 cal BC (68% probability)*. On the basis of the limited data available, the use of this monument ended in *3430–3265 cal BC (95% probability; end Wayland's Smithy II)*, probably in the middle decades of the thirty-fourth century cal BC (fig. 4). This barrow was in use for between *1–185 years (95% probability; use Wayland's Smithy II:* fig. 5), probably for *4–125 years (68% probability)*.

References: Bayliss *et al* 2007b
Whittle 1991

OxA–13167 4649 ±41 BP

$\delta^{13}C$: -21.2‰
$\delta^{15}N$ *(diet):* +6.1‰
C/N ratio: 3.4

Sample: WS1, submitted on 28 February 2001 by A Whittle

Material: antler (0.50–1g): *Cervus elaphus* (M Wysocki 2001)

Initial comment: a specimen from the bottom of the ditch fill. A portion of antler tip with use-attrition, from the bottom of north-west terminal end of the secondary ditch of Wayland's Smithy II.

Objectives: to establish the date of construction of the barrow. The specimen is almost certainly part of antler pick used in quarrying the ditch and constructing the barrow. In conjunction with dates from inhumations in Wayland's Smithy I and II, it will establish the sequence at this multi-period site. A re-dating of the sample WS1 (OxA-10565) which was withdrawn.

Calibrated date: *1σ:* 3510–3360 cal BC
2σ: 3630–3350 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this skeleton dates to *3470–3380 cal BC (95% probability*; table 1; Bayliss *et al* 2007b).

OxA–13168 4547 ±54 BP

$\delta^{13}C$: -22.6‰
$\delta^{15}N$ *(diet):* +4.8‰
C/N ratio: 3.3

Sample: WS3, submitted on 28 February 2001 by A Whittle

Material: antler: *Cervus elaphus* (0.50–1g) (M Wysocki 2001)

Initial comment: a specimen from a context of slipped material from the body of the WS2 mound. The specimen is the end fragment of an antler tine with wear attribution at the tip, and was almost certainly used in construction of WS2 mound and ditch. From the chalk rubble over the sarsen revetment.

Objectives: to establish the date of construction of the WS2 mound and ditch. The specimen was almost certainly the broken tip of a pick used to quarry the ditch/construct the mound. In conjunction with dates from inhumations in Wayland's Smithy I and II, it will establish the sequence at this multi-period site. A re-dating of the sample WS3 (OxA-10586) which was withdrawn.

Calibrated date: *1σ:* 3370–3110 cal BC
2σ: 3500–3090 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this skeleton dates to *3480–3310 cal BC (95% probability*; table 1; Bayliss *et al* 2007b).

OxA–13169 4634 ±45 BP

$\delta^{13}C$: -21.6‰
$\delta^{15}N$ *(diet):* +4.4‰
C/N ratio: 3.3

Sample: WS5, submitted on 28 February 2001 by A Whittle

Material: antler: *Cervus elaphus*, tine (0.50–1g) (M Wysocki 2001)

Initial comment: the fragment of antler pick came from a context which was made up of a dark layer of soil, which overlay and also intermingled with the stones of the primary cairn. On this basis it appears to be related to the construction of the primary cairn rather than the secondary mound. It overlies Wayland's Smithy I inhumations and is beneath material related to construction of mound. Wear at the tip indicates use as a pick.

Objectives: to establish the date of construction of the Wayland's Smithy I cairn. It is stratigraphically later than bodies in the Wayland's Smithy I cairn, and is earlier than material associated with construction of Wayland's Smithy II mound. A re-dating of the sample WS5 (OxA-10588) which was withdrawn.

Calibrated date: *1σ:* 3500–3360 cal BC
2σ: 3620–3340 cal BC

Final comment: A Bayliss, chronological modelling suggests this skeleton dates to *3530–3435 cal BC (95% probability*; table 1; Bayliss *et al* 2007b).

OxA–13171 4761 ±41 BP

$\delta^{13}C$: -20.9‰
$\delta^{15}N$ *(diet):* +10.1‰
C/N ratio: 3.3

Sample: WS20, submitted on 28 February 2001 by A Whittle

Material: human bone (0.50g) (left metatarsal V) (M Wysocki 2001)

Initial comment: from the undisturbed fill from the west corner of the west chamber of Wayland's Smithy II. Only small bones and fragments were recovered from this context. However, the material must be the remains of inhumations made in the chamber.

Objectives: to establish the period of use of the Wayland's Smithy II chambered tomb for mortuary deposits. In comparison with dates from Wayland's Smithy I, it will establish the period of time between the use of the first monument (Wayland's Smithy I) and the use of the second monument (Wayland's Smithy II). In comparison with the dates from antlers in the ditch, it may also give indication of the span of time during which Wayland's Smithy II was in use. A re-dating of the sample WS20 (OxA-10596) which was withdrawn.

Calibrated date: *1σ:* 3640–3510 cal BC
2σ: 3650–3370 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this skeleton dates to *3430–3370 cal BC (95% probability*; table 1; Bayliss *et al* 2007b).

OxA–13244 4683 ±39 BP

$\delta^{13}C$: -20.4‰
$\delta^{15}N$ *(diet):* +6.3‰
C/N ratio: 3.1

Sample: WS2, submitted on 28 February 2001 by A Whittle

Material: antler: *Cervus elaphus*, tip (0.50–1g) (M Wysocki 2001)

Initial comment: a specimen from the bottom of the west ditch, on the north segment of WS2.

Objectives: to establish the date of construction of the Wayland's Smithy II barrow. The specimen is almost certainly part of an antler pick used in quarrying the secondary ditch and constructing the Wayland's Smithy mound. In conjunction with dates from inhumations in Wayland's Smithy I and II, it will establish the sequence at this multi-period site. A re-dating of the sample WS2 (OxA-10566) which was withdrawn.

Calibrated date: *1σ:* 3620–3370 cal BC
2σ: 3630–3360 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this skeleton dates to *3470–3385 cal BC (95% probability*; table 1; Bayliss *et al* 2007b).

OxA–13245 4770 ±38 BP

$\delta^{13}C$: -20.8‰
$\delta^{15}N$ *(diet):* +10.4‰
C/N ratio: 3.1

Sample: WS21, submitted on 28 February 2001 by A Whittle

Material: human bone (0.50–1g) (right metatarsal V) (M Wysocki 2001)

Initial comment: as OxA-13171. This specimen is incommensurate with left metatarsal V from this context (WS20). It is certainly from another individual.

Objectives: as OxA-13171. This specimen is the second of four all from discrete individuals. A re-dating of the sample WS21 (OxA-10597) which was withdrawn.

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3650–3380 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this skeleton dates to *3430–3375 cal BC (95% probability*; table 1; Bayliss *et al* 2007b).

OxA–13246 4603 ±35 BP

$\delta^{13}C$: -21.2‰
$\delta^{15}N$ *(diet):* +11.4‰
C/N ratio: 3.3

Sample: WS22, submitted on 28 February 2001 by A Whittle

Material: human bone (0.50–1g) (left metatarsal V) (M Wysocki 2001)

Initial comment: as OxA-13171. Terminal chamber filling (Wayland's Smithy II). This specimen is certainly a different individual to that represented by WS20. It is also incommensurate with specimen WS21 and therefore represents a third individual.

Objectives: as OxA-13171. This specimen is the third of four all from discrete individuals. A re-dating of the sample WS22 (OxA-10598) which was withdrawn.

Calibrated date: *1σ:* 3490–3350 cal BC
2σ: 3500–3190 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this skeleton dates to *3450–3335 cal BC (95% probability*; table 1; Bayliss *et al* 2007b).

OxA–13325 4707 ±40 BP

$\delta^{13}C$: -20.4‰
$\delta^{15}N$ *(diet)*: +9.9‰
C/N ratio: 3.1

Sample: WS23, submitted on 28 February 2001 by A Whittle

Material: human bone (0.50–1g) (right metatarsal V) (M Wysocki 2001)

Initial comment: as OxA-13171. From an undisturbed fill from the northern corner of west chamber (Wayland's Smithy II). This specimen is certainly a different individual to that represented by WS21. It is also incommensurate with specimens WS20 and WS22, and therefore represents a fourth individual.

Objectives: as OxA-13171.This specimen is the fourth discrete individual from the WS2 chambered tomb inhumations. A re-dating of the sample WS23 (OxA-10599) which was withdrawn.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: A Bayliss (2007), chronological modelling suggests this skeleton dates to *3435–3365 cal BC (95% probability*; table 1; Bayliss *et al* 2007b).

Long Barrows Project: West Kennet, Wiltshire

Location: SU 10466774
Lat. 51.24.29 N; Long. 01.50.59 W

Project manager: A Whittle (Cardiff University)

Archival body: Duckworth Laboratory, Cambridge and National Museum of Scotland

Description: an earlier Neolithic chambered tomb of Cotswold-Severn type, with transepted chamber (four transepts), containing primary burials and secondary filling of chalk rubble, human and animal bones, lithics, and ceramics. The first four samples were dated at the Oxford Radiocarbon Accelerator Unit in 1984 (OxA-449–51, and OxA-563; Gowlett *et al* 1986).This series comprises sixteen samples of human bone, each from a discrete individual, and one sample of animal bone (goat) from an articulated skeleton. Nine samples were from primary burials from the north-east, south-east, north-west, and south-west chambers. Seven samples are from the secondary fill deposits, some of which are certainly stratified. The sampled goat is also from the secondary deposits.

Objectives: to date the primary construction of the monument and, if appropriate, the sequence of construction; to determine the dates of the mortuary deposits and their chronological span; to determine whether there was spatial variation in the deposition of human remains within a burial chamber over time; to determine whether the mortuary deposits in the different chambers were of different dates; to determine whether the articulated burials in the primary deposits were of a different date from the disarticulated material; to clarify the chronology of the secondary filling of the monument and to establish the date of final closure; and to establish the relative position of West Kennet in the typological sequence of long barrows.

Final comment: A Bayliss (2007), a total of 31 radiocarbon results are now available from the West Kennet long barrow, and have been presented within an interpretive Bayesian statistical framework (fully described in Bayliss *et al* 2007c). Two alternative archaeological interpretations of the sequence have been given, each with a separate Bayesian model. In the preferred interpretation, the barrow is seen as a unitary construction (given the lack of dating samples from the old ground surface, ditches or constructional features themselves), with a series of deposits of human remains made in the chambers following construction. Primary deposition in the chambers is followed by further secondary deposition of some human remains, including children, and layers of earth and chalk, the latest identifiable finds in which are Beaker sherds. In the Bayesian model for this sequence, the construction of the monument at West Kennet, as dated from the primary mortuary deposits, occurred in *3670–3635 cal BC*, probably in the middle decades of the thirty-seventh century cal BC. The last interments of this initial use of the chambers probably occurred in *3640–3610 cal BC*. The difference between these two distributions suggests that this primary mortuary activity probably continued for only *10–30 years*. After a hiatus probably lasting for rather more than a century, the infilling of the chambers began in *3620–3240 cal BC* and continued into the second half of the third millennium cal BC. In an alternative interpretation, we do not assume that all the people dated from the primary mortuary deposits were placed in the monument in a fleshed or partially articulated condition; they could therefore have died before the monument was built, although they must have died before the end of the formation of the mortuary deposit. In the Bayesian model for this interpretation, the monument appears to belong either to the thirty-seventh century cal BC or the mid thirty-sixth century cal BC, and deposition again appears short-lived, but the model is unstable.

Laboratory comment: English Heritage (2007), following the discovery in the Oxford Radiocarbon Laboratory of a contamination problem associated with the gelatinization protocol (Bronk Ramsey *et al* 2000), 18 samples were re-processed, graphitized and dated, as described by Bronk Ramsey *et al* (2004a). The original results on these samples were withdrawn.

References: Bayliss *et al* 2007c
Bronk Ramsey *et al* 2004b
Gowlett *et al* 1986
Piggott 1962
Thomas and Whittle 1986
Wysocki and Whittle 2000

GrA–23178 4835 ±45 BP

$\delta^{13}C$: -21.6 ±0.1‰
$\delta^{15}N$ *(diet)*: +9.4 ±0.2‰
C/N ratio: 3.2

Sample: WK2 P12046, submitted on 21 March 2003 by A Whittle

Material: human bone (0.50–1g) (left femur, child *c* 3 years old) (M Wysocki 2000)

Initial comment: a primary inhumation deposit from the south-east chamber. The skeleton was disarticulated, but sufficient material has been recorded (skull, mandible, and postcranial bones) to strongly suggest that it was articulated when deposited. There were no taphonomic traces (eg subaerial weathering, animal tooth marks/trampling marks) to indicate excarnation and long term exposure. They were recovered from the soil floor of the chamber (old land surface). *See* also OxA-13179. This sample was submitted in order to identify the technical difficulties experienced dating bones at the Oxford Radiocarbon Laboratory (withdrawn sample WK2; OxA-10399).

Objectives: to establish the span of use of the monument and the south-east chamber for primary burials; to clarify the relationship between the adult and child burials in this chamber; and to provide stable isotope data for palaeodiet investigation.

Calibrated date: *1σ:* 3660–3530 cal BC
2σ: 3710–3520 cal BC

Final comment: A Bayliss (2007), six individuals were dated from the primary deposits in the south-east chamber, all producing statistically consistent radiocarbon measurements (WK2 and WK4).

Laboratory comment: English Heritage (2007), GrA-23178 and OxA-13179 are statistically consistent (T′=0.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and their weighted mean (4802 ±29 BP) calibrates to 3650–3520 cal BC (2σ; Reimer *et al* 2004). Chronological modelling indicates that the skeleton dates *to 3650–3620 cal BC (79% probability)* or *3565–3530 cal BC (16% probability*; table 1, Bayliss *et al* 2007c).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–23179 4855 ±45 BP

$\delta^{13}C$*:* -21.4 ±0.1‰
$\delta^{15}N$ *(diet):* +10.1 ±0.2‰

Sample: WK4 P12048, submitted on 21 March 2003 by A Whittle

Material: human bone (0.50–1g) (left femur, child *c* 4 to 5 years old) (M Wysocki 2000)

Initial comment: as GrA-23178

Objectives: as GrA-23178. This sample was submitted in order to identify the technical difficulties experienced dating bones at the Oxford Radiocarbon Laboratory (withdrawn sample WK4; OxA-10401).

Calibrated date: *1σ:* 3660–3630 cal BC
2σ: 3710–3530 cal BC

Final comment: see GrA-23178

Laboratory comment: English Heritage (2007), GrA-23179 and OxA-13180 are statistically consistent (T′=1.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and their weighted mean (4818 ±30 BP) calibrates to 3660–3520 cal BC (2σ; Reimer *et al* 2004). Chronological modelling indicates that the skeleton dates to *3655–3620 cal BC (80% probability)* or *3560–3535 cal BC (15% probability*; table 1, Bayliss *et al* 2007c).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–23180 4790 ±50 BP

$\delta^{13}C$*:* -22.3 ±0.1‰
$\delta^{15}N$ *(diet):* +10.5 ±0.2‰

Sample: WK12 P12056, submitted on 21 March 2003 by A Whittle

Material: human bone (0.50–1g) (right femur from skeleton NE111; adult *c* 35 years of unknown sex) (M Wysocki 2000)

Initial comment: a partially articulated, contracted skeleton, overlying skeleton NEII (previously dated: OxA-449; 4825 ±90 BP) in the north-west corner of the north-east chamber. It was overlain by chalk rubble of the secondary filling.

Objectives: to establish the span of use of the monument and the north-east chamber for primary burials. To establish the absolute date of this burial in comparison to NEII (OxA-449), which it overlies, and WK1 which lies over it. This sample was submitted in order to identify the technical difficulties experienced dating bones at the Oxford Radiocarbon Laboratory (withdrawn sample WK12; OxA-10464).

Calibrated date: *1σ:* 3650–3520 cal BC
2σ: 3660–3380 cal BC

Final comment: A Bayliss (2007), five radiocarbon results on three skeletons are available from the primary deposits in the north-east chamber (WK11, WK12, and WK20 (the latter previously dated by OxA-450; 4700 ±80 BP)).

Laboratory comment: English Heritage (2007), GrA-23180 and OxA-12652 are statistically consistent (T′=1.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and their weighted mean (4838 ±26 BP) calibrates to 3660–3530 cal BC (2σ; Reimer *et al* 2004). Chronological modelling indicates that the skeleton dates to *3655–3630 cal BC (81% probability)* or *3560–3540 cal BC (14% probability*; table 1, Bayliss *et al* 2007c).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–23181 4950 ±50 BP

$\delta^{13}C$*:* -20.9 ±0.2‰

Sample: WK16 (P12060), submitted on 21 March 2003 by A Whittle

Material: human bone (0.50–1g) (right scapula from skeleton NW1; adult male, estimated dental age 24–30 years) (M Wysocki 2000)

Initial comment: a disturbed, partially articulated skeleton placed on the north-west chamber floor. The skull and axial skeleton (vertebrae, scapulae, ribs etc) were in articulation. The limb bones assigned by the original excavator/bone specialist lay in close association. The sample was certainly from the articulated elements assigned to this skeleton.

Objectives: to establish the span of use of the monument and the north-west chamber for primary burials. Together with data from WK17, which seals it, this will provide an indication of span of time between primary and secondary deposition episodes. This sample was submitted in order to identify the technical difficulties experienced dating bones at the Oxford Radiocarbon Laboratory (withdrawn sample WK16; OxA-10468).

Calibrated date: *1σ:* 3790–3650 cal BC
2σ: 3930–3640 cal BC

Final comment: A Bayliss (2007), five individuals have now been dated from the primary deposits in the north-west chamber (WK16, WK21, WK22, and previous measurements OxA-449 (4825 ±90 BP, 3790–3370 cal BC at 95% at 2σ; Reimer *et al* 2004) and OxA-563 (4780 ±90 BP, 3710–3360 cal BC at 2σ; Reimer *et al* 2004) - the latter believed to be a replicate measurement on the same skeleton as GrA-23181 and OxA-12653).

Laboratory comment: English Heritage (2007), GrA-23181 and OxA-12653 are statistically inconsistent (T′=6.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978), although the difference between the two measurements is sufficiently small to suggest that one may simply be a statistical outlier. Therefore, the measurements have been combined and their weighted mean (4847 ±27 BP) calibrates to 3670–3540 cal BC (2σ; Reimer *et al* 2004). Chronological modelling indicates that the skeleton dates to *3655–3625 cal BC (81% probability)* or *3555–3535 cal BC (14% probability;* table 1, Bayliss *et al* 2007c).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–12282 4819 ±30 BP

$\delta^{13}C$*:* -20.2‰
$\delta^{15}N$ *(diet):* +10.6‰
C/N ratio: 3.1

Sample: WK20, submitted on 14 March 2002 by A Whittle

Material: human bone (<5g) (right femur) (M Wysocki 2002)

Initial comment: the sample is from articulated skeleton NEII, sealed by chalk rubble and overlain by OxA-12652/GrA-23180 in the corner of north-east chamber.

Objectives: the individual was previously dated in 1980s (OxA-450), but the date did not 'fit' the stratigraphic information. There is some confusion in published reports about the precise stratigraphic relationship of NEII and NEIII (OxA-12652/GrA-23180). It is possible that OxA-12652/GrA-23180 is overlain by NEII. The sample will confirm the quality of the OxA-450 date and resolve this issue. A re-dating of the sample for OxA-11382 which was withdrawn.

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3660–3520 cal BC

Final comment: see GrA-23180

Laboratory comment: English Heritage (2007), the replicate measurements OxA-450 (4700 ±80 BP) and OxA-12282 are statistically consistent (T′=1.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and their weighted mean (4805 ±28 BP) calibrates to 3660–3520 cal BC (2σ; Reimer *et al* 2004). Chronological modelling indicates that the skeleton dates to *3650–3620 cal BC (79% probability)* or *3560–3530 cal BC (16% probability*; table 1, Bayliss *et al* 2007c).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–12283 4835 ±33 BP

$\delta^{13}C$*:* -19.9‰
$\delta^{15}N$ *(diet):* +11.0‰
C/N ratio: 3.1

Sample: WK21, submitted on 14 March 2002 by A Whittle

Material: human bone (<5g) (right humerus) (M Wysocki 2002)

Initial comment: the sample is from disarticulated specimen from a previously undated individual from the north-west chamber.

Objectives: as OxA-12284. A re-dating of the sample for OxA-11389 which was withdrawn.

Calibrated date: *1σ:* 3650–3630 cal BC
2σ: 3670–3530 cal BC

Final comment: see GrA-23181

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3655–3625 cal BC (79% probability)* or *3560–3535 cal BC (16% probability;* table 1, Bayliss *et al* 2007c).

OxA–12284 4797 ±31 BP

$\delta^{13}C$*:* -20.5‰
$\delta^{15}N$ *(diet):* +9.4‰
C/N ratio: 3.1

Sample: WK24, submitted on 14 March 2002 by A Whittle

Material: human bone (<5g) (right humerus) (M Wysocki 2002)

Initial comment: the sample is from disarticulated specimen from a previously undated individual from the south-west chamber.

Objectives: to test the hypothesis that articulated remains represent primary deposits and disarticulated remains were deposited later. A re-dating of the sample for OxA-11390 which was withdrawn.

Calibrated date: *1σ:* 3640–3530 cal BC
2σ: 3650–3520 cal BC

Final comment: A Bayliss (2007), five individuals have now been dated from the primary deposits in the south-west chamber (WK15, 24, 25, 26, and a previously dated individual (OxA-451; 4780 ±90 BP, 3710–3360 cal BC at 2σ; Reimer *et al* 2004).

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3650–3620 cal BC (79% probability)* or *3565–3530 cal BC (16% probability*; table 1, Bayliss *et al* 2007c).

References: Reimer *et al* 2004

OxA–12652 4856 ±31 BP

$\delta^{13}C$*:* -20.6 ±0.2‰
$\delta^{15}N$ *(diet):* +10.4‰
C/N ratio: 3.3

Sample: WK12, submitted on 21 March 2003 by A Whittle

Material: human bone (0.50–1g) (right femur from skeleton NE111; adult, *c* 35 years of unknown sex) (M Wysocki 2000)

Initial comment: as GrA-23180. A replicate sample.

Objectives: as GrA-23180

Calibrated date: *1σ:* 3660–3630 cal BC
2σ: 3700–3540 cal BC

Final comment: see GrA-23180

Laboratory comment: see GrA-23180

OxA–12653 4803 ±32 BP

$\delta^{13}C$: -19.6 ±0.2‰
$\delta^{15}N$ *(diet):* +11.8‰
C/N ratio: 3.3

Sample: WK16, submitted on 21 March 2003 by A Whittle

Material: human bone (0.50–1g) (right scapula from skeleton NW1; adult male, estimated dental age 24–30 years) (M Wysocki 2000)

Initial comment: as GrA-23181. A replicate sample.

Objectives: as GrA-23181

Calibrated date: *1σ:* 3640–3530 cal BC
2σ: 3650–3520 cal BC

Final comment: see GrA-23181

Laboratory comment: see GrA-23181

OxA–13179 4778 ±38 BP

$\delta^{13}C$: -20.8‰
$\delta^{15}N$ *(diet):* +11.0‰
C/N ratio: 3.3

Sample: WK2, submitted on 18 December 2000 by A Whittle

Material: human bone (0.50–1g) (left femur, child *c* three years old) (M Wysocki 2000)

Initial comment: as GrA-23178, a replicate sample.

Objectives: as GrA-23178

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3650–3380 cal BC

Final comment: see GrA-23178

Laboratory comment: see GrA-23178

OxA–13180 4787 ±41 BP

$\delta^{13}C$: -21.1 ±0.2‰
$\delta^{15}N$ *(diet):* +8.8 ±0.3‰
C/N ratio: 3.3

Sample: WK4, submitted on 21 March 2003 by A Whittle

Material: human bone (0.50–1g) (left femur, child *c* four to five years old) (M Wysocki 2000)

Initial comment: a replicate of GrA-23179.

Objectives: as GrA-23178

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3650–3380 cal BC

Final comment: see GrA-23178

Laboratory comment: see GrA-23179

OxA–13181 4105 ±35 BP

$\delta^{13}C$: -20.5‰
$\delta^{15}N$ *(diet):* +14.0‰
C/N ratio: 3.3

Sample: WK5, submitted on 18 December 2000 by A Whittle

Material: human bone (0.50–1g) (rib, child *c* 12 to 18 months old) (M Wysocki 2000)

Initial comment: an infant skeleton from the surface of the undisturbed chalk of the secondary filling of the south-east chamber. The skeleton was largely complete, indicating articulation.

Objectives: to provide a *terminus ante quem* for the primary burials, in relation to dates from primary deposits (WK2, WK3, WK4, WK13, and WK14) which are stratified beneath; to establish the span of use over which secondary deposits were laid down in relation to WK1, WK 6, WK7, WK8, and WK9, which it overlay. A re-dating of the sample for OxA-10402 which was withdrawn.

Calibrated date: *1σ:* 2860–2570 cal BC
2σ: 2870–2500 cal BC

Final comment: A Bayliss (2007), the remains of five infants from the secondary infilling of the south-east chamber have been dated (WK5, WK6, WK7, WK8, and WK9). Probably the earliest of these burials is WK6 (OxA-13182). WK7, WK8, and WK9 (OxA-13242, -13183, and -13184) are likely to be later than this. WK8 (OxA-13183) may be the latest of these, and WK5 is the latest of the dated samples in this chamber.

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *2840–2805 cal BC (4% probability) or 2760–2565 cal BC (87% probability)* or *2525–2495 cal BC (4% probability*; table 1, Bayliss *et al* 2007c).

OxA–13182 4454 ±34 BP

$\delta^{13}C$: -19.3‰
$\delta^{15}N$ *(diet):* +11.0‰
C/N ratio: 3.4

Sample: WK6, submitted on 18 December 2000 by A Whittle

Material: human bone (0.50–1g) (right tibia, neonate, *c* birth to six months) (M Wysocki 2000)

Initial comment: this is from the secondary filling of the south-east chamber, overlying primary deposits. Largely complete and with a set of postcranial remains, there was no other infant material, strongly suggesting articulation or partial articulation at the time of deposition.

Objectives: to provide a *terminus ante quem* for the primary deposits in this chamber. In relation to dates from WK5, WK7, WK8, and WK9 this will establish the span of time over which secondary deposits were laid down in this chamber. A re-dating of the sample for OxA-10403 which was withdrawn.

Calibrated date: *1σ:* 3330–3020 cal BC
2σ: 3340–2970 cal BC

Final comment: see OxA-13181

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3345–3205 cal BC (88% probability)* or *3195–3150 cal BC (7% probability*; table 1, Bayliss *et al* 2007c).

OxA–13183 4103 ±38 BP

δ^13^C: -20.6‰
δ^15^N (diet): +11.4‰
C/N ratio: 3.4

Sample: WK8, submitted on 18 December 2000 by A Whittle

Material: human bone (0.50–1g) (right humerus, infant, *c* birth to six months) (M Wysocki 2000)

Initial comment: this is from the secondary filling overlying the primary deposits. A partial infant skeleton from which sufficient elements survived to strongly suggest that this specimen was from a skeleton articulated at the time of deposition.

Objectives: as OxA-13182. A re-dating of the sample for OxA-10404 which was withdrawn.

Calibrated date: *1σ:* 2860–2570 cal BC
2σ: 2880–2490 cal BC

Final comment: see OxA-13181

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *2875–2800 cal BC (41% probability)* or *2780–2595 cal BC (54% probability*; table 1, Bayliss *et al* 2007c).

OxA–13184 4478 ±37 BP

δ^13^C: -21.2‰
δ^15^N (diet): +10.8‰
C/N ratio: 3.3

Sample: WK9, submitted on 18 December 2000 by A Whittle

Material: human bone (0.50–1g) (right tibia, child two to three years old) (M Wysocki 2000)

Initial comment: this is from the secondary filling in the south-east chamber, overlying primary deposits. Most of the skeleton was present, indicating articulation or partial articulation at the time of deposition.

Objectives: as OxA-13182. A re-dating of the sample for OxA-10405 which was withdrawn.

Calibrated date: *1σ:* 3340–3090 cal BC
2σ: 3360–3020 cal BC

Final comment: see OxA-13181

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3305–3320 cal BC (95% probability;* table 1, Bayliss *et al* 2007c).

OxA–13188 4767 ±38 BP

δ^13^C: -20.4‰
δ^15^N (diet): +9.4‰
C/N ratio: 3.3

Sample: WK22, submitted on 14 March 2002 by A Whittle

Material: human bone (right humerus) (M Wysocki 2002)

Initial comment: the sample is from a disarticulated specimen from a previously undated individual from the north-west chamber.

Objectives: as OxA-12284. A re-dating of the sample for OxA-11383 which was withdrawn.

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3650–3380 cal BC

Final comment: see GrA-23181

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3650–3615 cal BC (79% probability)* or *3570–3530 cal BC (16% probability*; table 1, Bayliss *et al* 2007c).

OxA–13190 4680 ±39 BP

δ^13^C: -21.0‰
δ^15^N (diet): +11.8‰
C/N ratio: 3.3

Sample: WK26, submitted on 14 March 2002 by A Whittle

Material: human bone (right humerus) (M Wysocki 2002)

Initial comment: as OxA-13332

Objectives: as OxA-12284. A re-dating of the sample for OxA-11386 which was withdrawn.

Calibrated date: *1σ:* 3520–3370 cal BC
2σ: 3630–3360 cal BC

Final comment: see OxA-12284

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3645–3605 cal BC (80% probability)* or *3570–3525 cal BC (15% probability*; table 1, Bayliss *et al* 2007c).

OxA–13198 4838 ±37 BP

δ^13^C: -20.5‰
δ^15^N (diet): +9.6‰
C/N ratio: 3.1

Sample: WK11, submitted on 18 December 2000 by A Whittle

Material: human bone (0.50–1g) (right femur of skeleton NE1, young adult female) (M Wysocki 2000)

Initial comment: a disturbed, partially articulated skeleton placed centrally on the north-east chamber floor of brown soil (the old land surface). Bones from the skull, upper limbs, and torso were scattered, but the lower limbs and lower axial skeleton were articulated and in a contracted posture. It was sealed beneath secondary deposits.

Objectives: to establish the span of use of the monument and the north-east chamber for primary burials. A re-dating of the sample for OxA-10463 which was withdrawn.

Calibrated date: *1σ:* 3660–3630 cal BC
2σ: 3700–3530 cal BC

Final comment: see GrA-23180

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3655–3625 cal BC (80% probability)* or *3560–3535 cal BC (15% probability*; table 1, Bayliss *et al* 2007c).

OxA–13199 4880 ±38 BP

$\delta^{13}C$: -20.4‰
$\delta^{15}N$ *(diet):* +10.6‰
C/N ratio: 3.1

Sample: WK13, submitted on 18 December 2000 by A Whittle

Material: human bone (0.50–1g) (right femur from skeleton SEIX, adult, probable male *c* 30+ years) (M Wysocki 2000)

Initial comment: this is from the soil floor of the south-east chamber, sealed beneath secondary chalk rubble fill. The bones of this skeleton were disarticulated. The skeleton is one of two clearly discrete individuals. There is no taphonomic evidence to suggest that the bones were exposed or buried elsewhere before interment.

Objectives: to establish the span of use of the monument and the south-east chamber for primary burials. With WK2, WK3, and WK4 it may clarify the relationship between the adult and child burials in this chamber. It will also provide stable isotope data for palaeodiet investigation. A re-dating of the sample for OxA-10465 which was withdrawn.

Calibrated date: *1σ:* 3700–3640 cal BC
2σ: 3710–3630 cal BC

Final comment: see GrA23178

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3660–3625 cal BC (81% probability)* or *3555–3535 cal BC (14% probability*; table 1, Bayliss *et al* 2007c).

OxA–13200 4872 ±38 BP

$\delta^{13}C$: -20.6‰
$\delta^{15}N$ *(diet):* +9.4‰
C/N ratio: 3.1

Sample: WK14, submitted on 18 December 2000 by A Whittle

Material: human bone (0.50–1g) (right femur from skeleton SE X, adult female *c* 25–35 years old) (M Wysocki 2000)

Initial comment: as OxA-13199

Objectives: as OxA-13199. A re-dating of the sample for OxA-10466 which was withdrawn.

Calibrated date: *1σ:* 3700–3630 cal BC
2σ: 3710–3540 cal BC

Final comment: see GrA23178

Laboratory comment: English Heritage, chronological modelling indicates that the skeleton dates to *3655–3625 cal BC (81% probability)* or *3560–3535 cal BC (14% probability*; table 1, Bayliss *et al* 2007c).

OxA–13201 4827 ±38 BP

$\delta^{13}C$: -20.6‰
$\delta^{15}N$ *(diet):* +9.5‰
C/N ratio: 3.1

Sample: WK15, submitted on 18 December 2000 by A Whittle

Material: human bone (0.50–1g) (proximal phalange of big toe, adolescent *c* 10 to 14 years old) (M Wysocki 2000)

Initial comment: from the floor of the south-west chamber, sealed beneath the secondary filling. The skeleton was disarticulated and incomplete, however, sufficient elements survived to indicate that this material was not intrusive or residual. It may be a secondary burial (ie first excarnated then buried). On the basis of clear age-related changes in the postcranial skeleton, the sample is certainly from skeleton SW I.

Objectives: together with other specimens from the primary burials it will establish the span of use of the monument and the south-west chamber for primary burials. A re-dating of the sample for OxA-10467 which was withdrawn.

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3700–3520 cal BC

Final comment: see OxA-12284

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3655–3620 cal BC (80% probability)* or *3560–3535 cal BC (15% probability*; table 1, Bayliss *et al* 2007c).

OxA–13202 3934 ±36 BP

$\delta^{13}C$: -23.3‰
$\delta^{15}N$ *(diet):* +5.4‰
C/N ratio: 3.1

Sample: WK17, submitted on 18 December 2000 by A Whittle

Material: animal bone: *Capra* sp., left tibia of immature goat (0.50–1g) (M Wysocki 2000)

Initial comment: the sample is from a largely complete and partially articulated goat skeleton; from the secondary filling of the north-west chamber, marked as context 90 and 2' below datum. On the basis of the site notebooks, this must be layer 3 (pers. comm. Dr A Sheridan, National Museum of Scotland). Articulation indicates that the goat is contemporary with the deposition of this layer.

Objectives: because the sample is from an articulated goat it should provide an absolute date for the deposition of layer 3 of the secondary fill. Together with dates from WK1 (which is stratigraphically below WK17, albeit from another chamber) and other specimens from the secondary fill, this sample should establish with some accuracy the date(s) of the secondary filling episode(s). A re-dating of the sample for OxA-10491 which was withdrawn.

Calibrated date: *1σ:* 2480–2350 cal BC
2σ: 2570–2290 cal BC

Final comment: A Bayliss (2007), this is the only dated sample from the secondary deposits within the north-west chamber. This, the latest date so far obtained from the West Kennet long barrow, is not inconsistent with the currency of Beakers nationally but, given the continuing uncertainties about Beaker sequences and chronology, an open mind is required, as the date of the final infilling here could in fact be a little later than the death of the goat.

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *2570–2515 cal BC 20% probability)* or *2500–2335 cal BC (75% probability*; table 1, Bayliss *et al* 2007c).

OxA–13241 4806 ±36 BP

$\delta^{13}C$: -21.7‰
$\delta^{15}N$ *(diet):* +9.5‰
C/N ratio: 3.1

Sample: WK3, submitted on 18 December 2000 by A Whittle

Material: human bone (0.50–1g) (left femur, child *c* 3.5 to 4.5 years old) (M Wysocki 2000)

Initial comment: a primary inhumation deposit from the south-east chamber. The skeleton was disarticulated, but enough material was recovered (skull, mandible, and postcranial bones) to strongly suggest that it was articulated. There were no taphonomic traces (eg subaerial weathering, animal tooth marks) to indicate excarnation or long-term exposure. The bones were recovered from the soil floor of the chamber (old land surface).

Objectives: to establish the span of use of the monument and the south-east chamber. It will also clarify the relationship between the adult and child burials in this chamber. A re-dating of the sample for OxA-10400 which was withdrawn).

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3660–3520 cal BC

Final comment: see GrA-23178

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3655–3620 cal BC (79% probability)* or *3565–3530 cal BC (16% probability*; table 1, Bayliss *et al* 2007c).

OxA–13242 4506 ±37 BP

$\delta^{13}C$: -20.1‰
$\delta^{15}N$ *(diet):* +11.5‰
C/N ratio: 3.1

Sample: WK7, submitted on 18 December 2000 by A Whittle

Material: human bone (0.50–1g) (rib from foetus, *c* seven months *in utero*) (M Wysocki 2000)

Initial comment: from clean chalk from the secondary fill of the south-east chamber, overlying the primary burials. The rib is from the partial skeleton of a foetus (cranial vault/temporal, maxilla, mandible, scapula, ribs, right humerus, left and right femora and left ulna present). Sufficient material remains to indicate very likely articulation at the time of deposition.

Objectives: as OxA-13182. A re-dating of the sample for OxA-10490 which was withdrawn.

Calibrated date: *1σ:* 3350–3090 cal BC
2σ: 3370–3020 cal BC

Final comment: see OxA-13181

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3300–3085 cal BC (91% probability)* or *3060–3030 cal BC (4% probability*; table 1, Bayliss *et al* 2007c).

OxA–13243 4583 ±45 BP

$\delta^{13}C$: -20.9‰
$\delta^{15}N$ *(diet):* +13.7‰
C/N ratio: 3.1

Sample: WK10, submitted on 18 December 2000 by A Whittle

Material: human bone (0.50–1g) (distal humerus, infant *c* 6 to 10 months old) (M Wysocki 2000)

Initial comment: this is from the upper secondary filling in the north-east chamber. Most of the skeleton was present, indicating articulation at the time of deposition.

Objectives: provides a *terminus ante quem* for the primary burials in this chamber with sample WK1, and establishes the date and span of time of filling of the chamber with secondary deposits. A re-dating of the sample for OxA-10406 which was withdrawn.

Calibrated date: *1σ:* 3490–3340 cal BC
2σ: 3500–3110 cal BC

Final comment: A Bayliss (2007), this is the only dated skeleton from the secondary infilling of the north-east chamber.

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3495–3455 cal BC (4% probability) or 3380–3260 cal BC (34% probability)* or *3250–3095 cal BC (57% probability*; table 1, Bayliss *et al* 2007c).

OxA–13331 4746 ±31 BP

$\delta^{13}C$: -21.1‰
$\delta^{15}N$ *(diet):* +10.4‰
C/N ratio: 3.1

Sample: WK23, submitted on 14 March 2002 by A Whittle

Material: human bone (left femur) (M Wysocki 2002)

Initial comment: the sample is from disarticulated specimen from a previously undated individual from the south-east chamber.

Objectives: as OxA-13188. A re-dating of the sample for OxA-11384 which was withdrawn.

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: see GrA-23178

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3650–3610 cal BC (79% probability)* or *3570–3530 cal BC (16% probability*; table 1, Bayliss *et al* 2007c).

OxA–13332 4788 ±31 BP

$\delta^{13}C$: -21.1‰
$\delta^{15}N$ *(diet):* +9.8‰
C/N ratio: 3.1

Sample: WK25, submitted on 14 March 2002 by A Whittle

Material: human bone (right humerus) (M Wysocki 2002)

Initial comment: the sample is from disarticulated specimen from a previously undated individual from the south-west chamber.

Objectives: as OxA-12284. A re-dating of the sample for OxA-11385 which was withdrawn.

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3650–3510 cal BC

Final comment: see OxA-12284

Laboratory comment: English Heritage (2007), chronological modelling indicates that the skeleton dates to *3655–3615 cal BC (79% probability)* or *3565–3530 cal BC (16% probability*; table 1, Bayliss *et al* 2007c).

Lundenwic, City of London

Location: TQ 30358105
Lat. 51.30.48 N; Long. 00.07.22 W

Project manager: R Cowie and G Malcolm (Museum of London Archaeology Service), 1987–2000

Description: in 1984 the site of the middle Saxon trading port of London (Lundenwic) was finally identified as lying on the north bank of the Thames less than a kilometre upstream from the former Roman town of Londinium. Documentary and archaeological evidence suggests that between the late seventh century and the early-to-mid ninth century AD, Lundenwic was part of an international network of trading centres in north-west Europe. Fieldwork was undertaken between 1987 and 2000 at 18 sites within the area.

Objectives: to refine/confirm the date of the introduction of Ipswich ware into Lundenwic; to refine the dating of certain seventh-century grave types (eg BOB91 buckle set); and to date the start of the settlement at Lundenwic.

Final comment: R Cowie and L Blackmore (2012), the radiocarbon results suggest that Lundenwic developed very rapidly across most of the study area, probably in the last third of the seventh century AD, which would accord with the earliest known reference to the port in AD 672–4. There appears, therefore, to have been little or no hiatus between the final use of the cemetery and the development of Lundenwic. Furthermore, it would seem that the settlement did not grow gradually in an uncoordinated fashion, but that its development was prompted and controlled by a central authority.

Laboratory comment: English Heritage (2012), chronological modelling of the radiocarbon results indicate that the use of Ipswich ware in London began in *cal AD 720–40 (at 68% probability; start_Ipswich ware*; fig 185; Cowie and Blackmore 2012). This removes any uncertainty regarding the use of the dividing *terminus* of AD 730 in phasing the Royal Opera House site. More importantly, the results of the programme date the beginning of Lundenwic to *cal AD 610–70 (at 95% probability; start;* fig 184), seemingly coinciding with interments at sites H and J and the Royal Opera House and Jubilee Hall, although it was clear from the stratigraphy at these sites that the burials pre-dated middle Saxon occupation in those areas.

References: Cowie *et al* 1988
Cowie and Blackmore 2012
Malcolm *et al* 2003

Lundenwic: Royal Opera House: pre- and post-Ipswich Ware occupation deposits, City of London

Location: TQ 30358105
Lat. 51.30.48 N; Long. 00.07.22 W

Project manager: R Cowie and G Malcolm (Museum of London Archaeology Service), 1989–99

Archival body: Museum of London

Description: samples from features in middle Saxon buildings dated by artefacts and other means to the periods before and after the introduction of Ipswich Ware.

Objectives: to obtain absolute dating for the use of Ipswich ware in Lundenwic, which will help to refine the 'ceramic chronology' for the settlement and for other middle Saxon sites in England.

Final comment: R Cowie (14 July 2013), the radiocarbon results appear to be consistent with the putative date of about AD 730 for the first use of Ipswich Ware in London. As Ipswich Ware is frequently found during excavations on the site of Lundenwic it is a particularly important chronological marker. Therefore, any confirmation or refinement of its chronology is of great value.

References: Malcolm *et al* 2003

OxA–12348 1288 ±24 BP

$\delta^{13}C$: -26.6 ±0.2‰

Sample: BRU 92 (795) <194> A, submitted in November 2002 by R Cowie

Material: charcoal: Salicaceae (R Gale 2002)

Initial comment: the sample was taken from the fill [795] of a pit [796] dated to *c* the mid-seventh to mid-eighth century. The pit was cut successively by pit [798] (dated to the same period) and pit [770] dated to *c* mid-eighth to mid-ninth century AD. The pit cut a 'disturbed' layer overlying weathered natural brickearth.

Objectives: to refine the ceramic chronology of the middle Saxon trading port of Lundenwic.

Calibrated date: *1σ:* cal AD 670–770
2σ: cal AD 660–775

Final comment: R Cowie (14 July 2013), the charcoal used for the sample came from the fill of a middle Saxon pit that sequentially pre-dated strata containing Ipswich Ware. The radiocarbon date fits well with the putative dating of pre-Ipswich ware occupation of Lundenwic, which is thought to have been between the late seventh century and *c* AD 730.

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 655–730 (95% probability*; table 62; Cowie and Blackmore 2012). The two samples from fill [795] of pit [796] (OxA-12348–9) are statistically consistent (T′=0.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–12349 1319 ±24 BP

$\delta^{13}C$: -27.4 ±0.2‰

Sample: BRU 92 (795) <194> B, submitted in November 2002 by R Cowie

Material: charcoal: *Corylus* sp. (R Gale 2002)

Initial comment: as OxA-12348

Objectives: as OxA-12348

Calibrated date: *1σ:* cal AD 660–690
2σ: cal AD 655–770

Final comment: see OxA-12348

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 650–715 (95% probability*; table 62; Cowie and Blackmore 2012).

OxA–12350 1289 ±24 BP

$\delta^{13}C$: -23.6 ±0.2‰

Sample: BRU 92 (797) <193>, submitted in November 2002 by R Cowie

Material: charcoal: *Prunus* sp. (R Gale 2002)

Initial comment: the sample was taken from the fill [797] of pit [798] dated to *c* AD 650–750. The pit cut another pit dated to the same period, and was cut by another dated to *c* AD 730–850.

Objectives: as OxA-12348

Calibrated date: *1σ:* cal AD 670–770
2σ: cal AD 660–775

Final comment: R Cowie (14 July 2013), the charcoal used for the sample came from the fill of a middle Saxon rubbish pit [798] that sequentially pre-dated strata containing Ipswich Ware. The radiocarbon date broadly agrees with the generally accepted dating of pre-Ipswich Ware occupation of Lundenwic, which is thought to have been begun in the late seventh century. Its range extends beyond the putative date of *c* AD 730 for the introduction of Ipswich Ware in London, but mainly falls within the pre-Ipswich Ware phase. The respective radiocarbon dates for inter-cutting pits [798] and [796] (*see* OxA-12348 and OxA-12349) suggests that [798] is slightly later, which accords with the stratigraphy.

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 675–770 (95% probability*; table 62; Cowie and Blackmore 2012).

OxA–12351 1309 ±24 BP

$\delta^{13}C$: -25.5 ±0.2‰

Sample: BRU 92 (710) <152> A, submitted in November 2002 by R Cowie

Material: charcoal: Salicaceae (R Gale 2002)

Initial comment: the sample was taken from the primary fill [710] of pit [723] dated to *c* AD 650–850. It was cut by another pit [806], which was dated to the same period.

Objectives: as OxA-12348

Calibrated date: *1σ:* cal AD 665–765
2σ: cal AD 655–770

Final comment: R Cowie (14 July 2013), the charcoal used for the sample came from the fill of a middle Saxon pit that sequentially pre-dated strata containing Ipswich Ware. The radiocarbon date fits well with the putative dating of pre-Ipswich Ware occupation of Lundenwic, which is thought to have been between the late seventh century and *c* AD 730.

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 655–715 (95% probability*; table 62; Cowie and Blackmore 2012). The two samples (OxA-12351–2) from fill [710] of pit [723] are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–12352 1313 ±25 BP

$\delta^{13}C$: -24.6 ±0.2‰

Sample: BRU 92 (710) <152> B, submitted in November 2002 by R Cowie

Material: charcoal: Salicaceae (R Gale 2002)

Initial comment: the sample was taken from the primary fill [710] of pit [723] dated to *c* AD 650–850. It was cut by another pit [806], which was dated to the same period.

Objectives: as OxA-12348

Calibrated date: *1σ:* cal AD 660–760
2σ: cal AD 650–770

Final comment: R Cowie (14 July 2013), the charcoal used for the sample came from the same pit fill as that cited above (*see* OxA-12351) and produced an entirely consistent radiocarbon date.

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 655–715 (95% probability*; table 62; Cowie and Blackmore 2012). *See* OxA-12351.

OxA–12353 1222 ±26 BP

$\delta^{13}C$: -23.2 ±0.2‰

Sample: BRU 92 (801) <192> A, submitted in 2002 by R Cowie

Material: grain: indeterminate cereal (R Gale 2002)

Initial comment: this sample was taken from the primary fill [801] of a pit [806] dated to *c* AD 650–850. The pit cut another pit dated to the same period and was sealed by dark earth.

Objectives: as OxA-12348

Calibrated date: *1σ:* cal AD 720–870
2σ: cal AD 690–890

Final comment: R Cowie (14 July 2013), the charcoal used for the sample came from the fill of a middle Saxon pit that sequentially pre-dated strata containing Ipswich Ware. The range of the radiocarbon date overlaps putative date of *c* AD 730 for the introduction of Ipswich Ware in London, but mainly falls within the pre-Ipswich ware phase. The respective radiocarbon dates for inter-cutting pits [[806] and [723] (*see* OxA-12351 and OxA-12352) suggests that [806] is later, which accords with the stratigraphy.

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 680–780 (95% probability*; table 62; Cowie and Blackmore 2012). The two samples from primary fill [801] of this pit are statistically consistent (T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–12354 1241 ±25 BP

δ*13C:* -23.2 ±0.2‰

Sample: BRU 92 (801) <192> B, submitted in November 2002 by R Cowie

Material: grain: indeterminate cereal (R Gale 2002)

Initial comment: as OxA-12353

Objectives: as OxA-12348

Calibrated date: *1σ:* cal AD 710–780
2σ: cal AD 680–880

Final comment: R Cowie (14 July 2013), the cereal grain used for the sample came from the same pit fill as that cited above and produced an entirely consistent radiocarbon date to OxA-12353 (above).

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 680–780 (95% probability*; table 62; Cowie and Blackmore 2012). *See* also OxA-12353.

OxA–12450 1289 ±27 BP

δ*13C:* -22.2 ±0.2‰

Sample: BRU 92 (506) <21> A, submitted in November 2002 by R Cowie

Material: carbonised plant macrofossil (seed) (R Gale 2002)

Initial comment: the sample was taken from the primary fill of a deep pit cut into the natural substrate. The lower fills of the pit contained pottery dated to AD 650–750 and a coin dated to *c* AD 690–725. The uppermost fill contained Ipswich ware dated to AD 730–850, but this may have been an overlying layer that had slumped into the pit.

Objectives: as OxA-12348

Calibrated date: *1σ:* cal AD 670–770
2σ: cal AD 660–780

Final comment: R Cowie (14 July 2013), the charred seed used for the sample came from the primary fill of a middle Saxon pit [345] that pre-dated strata containing Ipswich Ware. The range of the radiocarbon date extends beyond putative date of *c* AD 730 for the introduction of Ipswich Ware in London, but mainly falls within the pre-Ipswich Ware phase (*see* OxA-12559).

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 660–760 (95% probability*; table 62; Cowie and Blackmore 2012). The two samples from fill [506] of deep pit [345] (OxA-12450 and OxA-12559) are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The coin from the secondary fill provides a *terminus post quem* for its context of AD 725.

References: Ward and Wilson 1978

OxA–12451 1307 ±28 BP

δ*13C:* -25.5 ±0.2‰

Sample: DRY 90 (237) <116> A, submitted in November 2002 by R Cowie

Material: charcoal: *Corylus* sp. (R Gale 2002)

Initial comment: the fill of a posthole forming part of a 'pre-Ipswich Ware' building. The feature was cut into natural and was cut by an undated (probably middle Saxon) rubbish pit, therefore there is a small risk of contamination.

Objectives: as OxA-12348

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–770

Final comment: R Cowie (14 July 2013), the charcoal used for the sample came from the fill of a posthole of a middle Saxon building that had apparently burnt down and pre-dated strata containing Ipswich Ware. The range of the radiocarbon date extends beyond putative date of *c* AD 730 for the introduction of Ipswich ware in London, but mainly falls within the pre-Ipswich ware phase. Another sample (*see* OxA-12452) from the same posthole produced a radiocarbon date consistent with the putative pre-Ipswich Ware phase (below).

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 650–770 (95% probability*; table 62; Cowie and Blackmore 2012). Four samples came from two postholes of building 1; the two samples (OxA-12451–2) from fill [237] are statistically consistent (T′=0.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–12452 1340 ±28 BP

δ*13C:* -26.5 ±0.2‰

Sample: DRY 90 (237) <116> B, submitted in November 2002 by R Cowie

Material: charcoal: *Corylus* sp. (R Gale 2002)

Initial comment: as OxA-12451

Objectives: as OxA-12348

Calibrated date: *1σ:* cal AD 650–680
2σ: cal AD 640–770

Final comment: R Cowie (14 July 2013), the charcoal used for the sample came from the fill of a posthole of a middle Saxon building that had apparently burnt down and pre-dated strata containing Ipswich Ware. The radiocarbon date fits well with the putative pre-Ipswich Ware ceramic phase for Lundenwic, and is consistent with radiocarbon dates for other samples from the building (notably OxA-12453 and OxA-12454).

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 640–720 (95% probability*; table 62; Cowie and Blackmore 2012). *See* OxA-12451.

OxA–12453 1337 ±28 BP

$\delta^{13}C$: -25.1 ±0.2‰

Sample: DRY 90 (243) <119> A, submitted in November 2002 by R Cowie

Material: charcoal: *Corylus* sp. (R Gale 2002)

Initial comment: a posthole of a probably pre-Ipswich ware building cut into natural brickearth and sealed by a modern basement.

Objectives: as OxA-12348

Calibrated date: *1σ:* cal AD 650–680
2σ: cal AD 640–770

Final comment: R Cowie (14 July 2013), the charcoal used for the sample came from the fill of a posthole of a middle Saxon building that had apparently burnt down and pre-dated strata containing Ipswich Ware. The radiocarbon date fits well with the putative pre-Ipswich Ware ceramic phase for Lundenwic, and is consistent with radiocarbon dates for other samples from the building (notably OxA-12452 and OxA-12454).

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 640–720 (95% probability*; table 62; Cowie and Blackmore 2012). Four samples came from two postholes of building 1; the two samples (OxA-12453–4) from fill [243] are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

OxA–12454 1332 ±27 BP

$\delta^{13}C$: -25.8 ±0.2‰

Sample: DRY 90 (243) <119> B, submitted in November 2002 by R Cowie

Material: charcoal: *Corylus* sp. (R Gale 2002)

Initial comment: as OxA-12453

Objectives: as OxA-12348

Calibrated date: *1σ:* cal AD 650–690
2σ: cal AD 650–770

Final comment: R Cowie (14 July 2013), the charcoal used for the sample came from the fill of a posthole of a middle Saxon building that had apparently burnt down and pre-dated strata containing Ipswich Ware. The radiocarbon date fits well with the putative pre-Ipswich Ware ceramic phase for Lundenwic, and is consistent with radiocarbon dates for other samples from the building (notably OxA-12452 and OxA-12453).

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 655–730 (94% probability)* or *cal AD 750–760 (1% probability*; table 62; Cowie and Blackmore 2012). *See* also OxA-12453.

OxA–12559 1294 ±28 BP

$\delta^{13}C$: -20.6 ±0.2‰

Sample: BRU 92 (506) <21> B, submitted in November 2002 by R Cowie

Material: carbonised plant macrofossil (seed) (R Gale 2002)

Initial comment: from the fill of a deep pit [345]. The lower fills of the pit contained pottery dated to AD 650–750 and a coin dated to AD 690–725. The uppermost fill contained Ipswich Ware dated to AD 730–850, but this may have been an overlying layer that had slumped into the pit.

Objectives: as OxA-12348

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 660–780

Final comment: R Cowie (14 July 2013), the charred seed used for the sample came from the primary fill of a middle Saxon pit [345] that pre-dated strata containing Ipswich Ware. The range of the radiocarbon date extends slightly beyond putative date of *c* AD 730 for the introduction of Ipswich ware in London, but mainly falls within the pre-Ipswich Ware phase (*see* OxA-12450).

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 650–770 (95% probability*; table 62; Cowie and Blackmore 2012). *See* also OxA-12450.

Lundenwic: pre-Ipswich Ware burials, City of London

Location: TQ 30358105
Lat. 51.30.48 N; Long. 00.07.22 W

Project manager: R Cowie and G Malcolm (Museum of London Archaeology Service), 1989–99

Archival body: Museum of London

Description: all the burials are from the middle Saxon occupation sites forming part of Lundenwic, except skeletons from BOB91 and ROH90, which are thought to be from a seventh-century cemetery that preceded the main phase of occupation in Lundenwic.

Objectives: to refine the development and ceramic chronology of Lundenwic; and to refine the dating of graves and establish the period of use of the cemetery.

Final comment: R Cowie and L Blackmore (2012), hitherto, most radiocarbon dating in Lundenwic has been used to establish the date of inhumation burials in the seventh-century AD cemetery around the eastern half of Covent Garden and Long Acre. The dating of these burials has proved immensely useful in establishing when and how rapidly middle Saxon settlement developed in the area. All the burials pre-date middle Saxon occupation levels. Moreover, it seems unlikely that there was any major settlement nearby at the time of the interment, as the graves had been backfilled with clean brickearth containing no trace of occupation debris. Alone the radiocarbon dating suggests that the cemetery and settlement started almost simultaneously across the site of Lundenwic. However, the stratigraphy clearly indicates that the cemetery came first and was superseded by the settlement. Using the sequence of strata, artefactual evidence and radiocarbon dates together it seems likely that the cemetery ceased to be used in the late seventh century, when the rapid development of Lundenwic began. This would accord reasonably well with the earliest known reference to the port of London in AD 672–4.

References: Cowie and Blackmore 2012
Malcolm *et al* 2003

UB–4879 1326 ±18 BP

$\delta^{13}C$: -21.1 ±0.5‰
$\delta^{13}C$ (diet): -20.8 ±0.32‰
$\delta^{15}N$ *(diet):* +13.1 ±0.4‰
C/N ratio: 3.2

Sample: ROH 90 grave [31] sk[122], submitted in November 2002 by R Cowie

Material: human bone (300g) (right and left femurs) (A Grieve 2002)

Initial comment: a fully articulated skeleton; the upper and lower parts of which had been truncated when the grave was disturbed. However, most of the torso survived, together with the right arm, lower left arm, and thighs. A tibia was recovered from the spoil. The grave containing the burial had been cut into natural brickearth (silty to fine sandy clay), and had been truncated from above by a modern basement.

Objectives: to establish the period of use of the cemetery, which may have a bearing on the development of the middle Saxon trading port of Lundenic and its precursor.

Calibrated date: *1σ:* cal AD 660–685
2σ: cal AD 655–765

Final comment: R Cowie (14 July 2013), the human bone used for the sample came from a grave pre-dating middle Saxon occupation of the site. Given the problem outlined in the project comments (above) it seems that the date range indicated by radiocarbon dating should be narrowed slightly to the mid-to-late seventh century.

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 650–710 (95% probability*; table 62; Cowie and Blackmore 2012).

UB–4880 1318 ±18 BP

$\delta^{13}C$: -20.4 ±0.5‰
$\delta^{13}C$ (diet): -20.1 ±0.3‰
$\delta^{15}N$ *(diet):* +8.2 ±0.3‰
C/N ratio: 3.2

Sample: BOB 91 sk[586] = [30], submitted on 30 October 2002 by G Malcolm

Material: human bone (450g) (left tibia and right femur) B White 2002)

Initial comment: skeleton [586] = [30] in grave cut [588] = [28]. The grave cut the natural brickearth. An extended supine inhumation, dug on two occasions: during trial work [30] and during main excavation [586]. Associated metalwork included an *in situ* belt <1> buckle/set currently dated AD 640–670. It was sealed by dumped material [420], [14], [15], and the middle Saxon occupation sequence.

Objectives: to establish the period of use of the cemetery which pre-dates settlement activities in this part of Lundenwic; to establish a *terminus post quem* for the introduction of Ipswich ware pottery to Lundenwic; to establish a *terminus post quem* for the deposition of continental metalwork <1>; and for comparison with typological dating AD 640–670.

Calibrated date: *1σ:* cal AD 660–685
2σ: cal AD 655–765

Final comment: R Cowie (14 July 2013), the human bone used for the sample came from a grave pre-dating middle Saxon occupation of the site. Given the problem outlined in the project comments (above) and the date of the belt suite it seems that the date range indicated by radiocarbon dating should be narrowed to the late seventh century.

UB–4881 1396 ±21 BP

$\delta^{13}C$: -20.7 ±0.6‰

Sample: BOB 91 sk[611], submitted on 30 October 2002 by G Malcolm

Material: human bone (300g) (left humerus, radius and ulna, right humerus, radius and ulna, finger bones) (B White 2002)

Initial comment: skeleton [611] in grave cut [613]. The bone was poorly preserved, but the plan suggests the body was interred on its side (although the excavator noted the possibility of disturbance by the much later middle Saxon ditch [50]). Large parts of the torso and skull decayed *in situ* to leave a stain only. It was sealed by dumped material [420] and the rest of the middle Saxon occupation sequence.

Objectives: to establish the period of use of the cemetery, which pre-dates settlement activities in this part of Lundenwic; to establish a *terminus post quem* for the introduction of Ipswich Ware pottery to Lundenwic.

Calibrated date: *1σ:* cal AD 640–660
2σ: cal AD 610–665

Final comment: R Cowie (14 July 2013), the human bone used for the sample came from a grave pre-dating middle Saxon occupation of the site. The radiocarbon date fits well with the evidence for the use of the cemetery in the mid to late seventh century.

Laboratory comment: English Heritage (2012), chronological modelling of the results indicates the sample dates to *cal AD 635–670 (95% probability*; table 62; Cowie and Blackmore 2012).

March Hill, West Yorkshire

Location: SE 00761286
Lat. 53.36.43 N; Long. 01.58.19 W

Project manager: P Spikins (West Yorkshire Archaeological Service), 1994

Archival body: Tolson Memorial Museum, Huddersfield and West Yorkshire Archaeology Service

Description: March Hill was excavated as part of the West Yorkshire Mesolithic Project, which focuses on a series of Mesolithic sites in the Central Pennines. Many of these sites are threatened by erosion and destructive flint collection, and this project aimed both to understand the threat posed to the site and to record as much meaningful surviving evidence as possible.

Objectives: to estimate the age of use of a number of discrete features, and so to begin to understand the tempo of activity on the site. Also to estimate the age of diagnostic late Mesolithic rod microliths and scalene triangles which were recovered from some of the features.

Final comment: S Grifiths (15 October 2012), the dating programme was designed to investigate the nature of Mesolithic occupation on March Hill, specifically whether occupation represented repeated phases of activity, or could have been contemporaneous. In addition, the project was designed to estimate the cultural currency of scalene microtriangles and rod microliths. The associations between the negative features, the diagnostic Mesolithic material culture, and the radiocarbon results reported here are nationally important.

Laboratory comment: English Heritage (2013), 17 further samples were dated prior to 1998 and were published in Bayliss *et al* (2015, 109–12; OxA-6296–6306, GU-5635–6, and UB-4050–3).

References: Bayliss *et al* 2015
Griffiths 2011
Spikins 1999

OxA–9644 6020 ±55 BP

$\delta^{13}C$: -26.2‰

Sample: WYMP96/019/2/09(A), submitted on 8 March 1999 by D Berg

Material: charcoal: *Corylus* sp. (R Gale 1999)

Initial comment: from the fill of stakehole [10], cutting context (11) of shallow depression [12].

Objectives: this result will explore the chronology of occupation at the site.

Calibrated date: *1σ:* 5000–4830 cal BC
2σ: 5060–4780 cal BC

Final comment: S Griffiths (15 October 2012), the sample either dates the charred stake itself, or derives from occupation activity in the vicinity of the feature (Reynolds 1995; *see* OxA-9645, -10210, -10211, and OxA-9644).

Laboratory comment: English Heritage (15 October 2012), the four results from this feature (OxA-9644–5 and OxA-10210–1) are statistically consistent (T′=1.1; T′(5%)=7.8; ν=3; Ward and Wilson 1978). The two measurements on this charcoal fragment (OxA-9644 and OxA-10210) are statistically consistent (T′=0.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Their weighted mean (6050 ±35 BP) calibrates to 5050–4840 cal BC (95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004
Reynolds 1995
Ward and Wilson 1978

OxA–9645 6090 ±55 BP

$\delta^{13}C$: -25.6‰

Sample: WYMP96/019/2/09(B), submitted on 8 March 1999 by D Berg

Material: charcoal: unidentified, shrubby species; too degraded to identify (R Gale 1999)

Initial comment: as OxA-9644

Objectives: as OxA-9644

Calibrated date: *1σ:* 5200–4930 cal BC
2σ: 5220–4840 cal BC

Final comment: see OxA-9644

Laboratory comment: English Heritage (15 October 2012), the four results from this feature (OxA-9644–5 and OxA-10210–1) are statistically consistent (T′=1.1; T′(5%)=7.8; ν=3; Ward and Wilson 1978). The two measurements on this charcoal fragment (OxA-9645 and OxA-10211) are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Their weighted mean (6087 ±35 BP) calibrates to 5210–4850 cal BC (95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–10210 6070 ±45 BP

$\delta^{13}C$: -27.3‰

Sample: WMP96/019/2/09(A), submitted on 8 March 1999 by D Berg

Material: charcoal: *Corylus* sp. (R Gale 1999)

Initial comment: a replicate of OxA-9644.

Objectives: as OxA-9644

Calibrated date: *1σ:* 5040–4930 cal BC
2σ: 5210–4840 cal BC

Final comment: see OxA-9644

Laboratory comment: see OxA-9644

OxA–10211 6085 ±45 BP

$\delta^{13}C$: -26.4‰

Sample: WYMP96/019/2/09(B), submitted on 8 March 1999 by D Berg

Material: charcoal: unidentified, shrubby species; too degraded to identify (R Gale 1999)

Initial comment: a replicate of OxA-9645.

Objectives: as OxA-9644

Calibrated date: *1σ:* 5060–4940 cal BC
2σ: 5210–4840 cal BC

Final comment: see OxA-9644

Laboratory comment: see OxA-9645

Margery Hill, South Yorkshire

Location: SK 41893957
Lat. 52.57.07 N; Long. 01.22.40 W

Project manager: D Robinson (English Heritage), 1993–4

Archival body: English Heritage

Description: a gritstone cairn with a probable kerb of earthfast edge-set stone. The cairn lies on sulphide *Eriophorum* peat and has subsequently been covered by blanket peat. It is presumed to be Bronze Age but a Mesolithic date has also been suggested. The site was under threat from natural and man-made erosion.

Objectives: to obtain a date for the cairn before it is destroyed by erosion and to provide a broad chronological framework for palynological studies.

Final comment: P Marshall (20 July 2005), chronological modelling indicates good agreement between the radiocarbon dates and the stratigraphy ($A_{overall}$ =83.9%) and provides an estimate for the date of cairn construction of *1920–1780 cal BC (95% probability); Event cairn construction)*. The model suggests that peat growth prior to, and following, construction of the cairn was rapid, with 0.65m accumulating in *c* 100–150 years. The results provide a chronology for the pollen analysis and confirm that oak was growing at the site in the Bronze Age.

Laboratory comment: English Heritage (4 July 2014), two further samples were dated after 2003 (OxA-14230–1).

References: Tallis 1991
Williams and Switsur 1985

OxA–11785 3547 ±29 BP

$\delta^{13}C$: -27.7 ±0.2‰

Sample: MH3, submitted on 10 July 2002 by D Robinson

Material: plant macrofossils (*Calluna vulgaris* twig) (D Robinson 2002)

Initial comment: the sample was isolated from a small block of peat 1cm x 1cm x 2cm cut from the monolith at the level just over that of the monument (75–76cm below the peat surface) The *Calluna vulgaris* twig was *in situ* in well-humified peat which also contained occasional angular fragments of quartz.

Objectives: to provide a *terminus post quem* for the monument and contribute to the chronology for the pollen analysis.

Calibrated date: *1σ:* 1930–1870 cal BC
2σ: 1960–1770 cal BC

Final comment: P Marshall (6 January 2003), the four results on the plant macrofossils are statistically consistent (T′=0.1; T′(5%)=7.8; ν=3; Ward and Wilson 1978), suggesting the deposits accumulated extremely rapidly, and the radiocarbon dates are in good agreement with the stratigraphy (A=115.9%).

References: Ward and Wilson 1978

OxA–11808 3535 ±50 BP

$\delta^{13}C$: -27.9 ±0.2‰

Sample: MH2, submitted on 10 July 2002 by D Robinson

Material: plant macrofossils (*Calluna vulgaris* stem) (D Robinson 2002)

Initial comment: the sample was isolated from a small block of peat 1cm x 1cm x 2cm cut from the monolith at the level just over that of the monument (60–61cm below the peat surface).

Objectives: to provide a *terminus ante quem* for the monument and contribute to the chronology for the pollen analysis.

Calibrated date: *1σ:* 1940–1770 cal BC
2σ: 2020–1690 cal BC

Final comment: see OxA-11785

OxA–11815 3542 ±31 BP

$\delta^{13}C$: -26.1 ±0.2‰

Sample: MH1, submitted on 10 July 2002 by D Robinson

Material: plant macrofossils (*Eriophorum* leaf base) (D Robinson 2002)

Initial comment: the sample was isolated from a small block of peat 1cm x 1cm x 2cm cut from the top of the monolith at a level corresponding to 35–36cm below the peat surface. The *Eriophorum* leaf bases were *in situ* in *Eriophorum* peat containing a few modern shoots.

Objectives: to give a date for the top of the peat monolith prior to pollen analysis.

Calibrated date: *1σ:* 1930–1780 cal BC
2σ: 1960–1760 cal BC

Final comment: see OxA-11785

OxA–11816 3535 ±32 BP

$\delta^{13}C$: -24.4 ±0.2‰

Sample: MH4, submitted on 10 July 2002 by D Robinson

Material: plant macrofossils (*Eriophorum* leaf base) (D Robinson 2002)

Initial comment: the sample was isolated from a small block of peat 1cm x 1cm x 2cm cut from the monolith at the level just over that of the monument (100cm below the peat surface) The *Eriophorum* leaf base was *in situ* in *Eriophorum* peat.

Objectives: to provide a date for the base of the monolith prior to pollen analysis.

Calibrated date: *1σ:* 1920–1780 cal BC
2σ: 1950–1750 cal BC

Final comment: see OxA-11785

OxA–14230 3433 ±27 BP

$\delta^{13}C$: -24.4 ±0.2‰

Sample: MH WOOD 3, submitted on 11 June 2003 by D Robinson

Material: wood (waterlogged): *Quercus* sp., heartwood; wide roundwood (C Groves 2003)

Initial comment: the sample was removed from the outermost heartwood of a stump *in situ* (three of four). Its roots were growing through the stones of the cairn and the underlying peat. The relationship of the remaining part of the stump to the underlying roots suggested that only the sapwood and, at most the very outermost part of the heartwood, had been lost from the stump. The stump lies at *c* 550m OD.

Objectives: to establish when the tree was alive and relate this to the dates already obtained for peat below and above the level of the cairn (OxA-11785; OxA-11808; OxA-11815; and OxA-11816). The assumed date for the stump is Bronze Age although oak growing at *c* 550m at this time is an unusual phenomenon.

Calibrated date: *1σ:* 1760–1690 cal BC
2σ: 1880–1660 cal BC

Final comment: P Marshall (20 July 2005), the remains of a number of oak (*Quercus* sp) trees were found in association with the cairn, stratigraphically these are later than the *Eriphorum* peat but their relationship to the samples from blanket peat is unknown. Samples from two different trees were dated; (OxA-14230) comprised the outermost heartwood of an *in situ* stump, and OxA-14231 the outermost part of an *in situ* dead trunk. As an unknown amount of heartwood may have been lost from these samples they only provide a *terminus post quem* for the death of the trees. However, the results do show they were growing in the early Bronze Age.

OxA–14231 3541 ±29 BP

$\delta^{13}C$: -24.1 ±0.2‰

Sample: MH WOOD 4, submitted on 11 June 2003 by D Robinson

Material: wood (waterlogged): *Quercus* sp., heartwood; wide roundwood (C Groves 2003)

Initial comment: as OxA-14230

Objectives: as OxA-14230

Calibrated date: *1σ:* 1930–1820 cal BC
2σ: 1960–1770 cal BC

Final comment: see OxA-14230

Merrivale, Devon

Location: SX 553747
Lat. 50.33.13 N; Long. 04.02.34 W

Project manager: V Straker (English Heritage), 1996

Archival body: Dartmoor National Park

Description: blanket peat located between and surrounding the Merrivale stone rows and Great Western Reave. The sample was taken horizontally and placed in a tin measuring 50cm x 10cm x 10cm.

Objectives: to date the onset of blanket peat formation at one of the most important prehistoric sites on Dartmoor. It is assumed that the peat post-dates the stone rows traditionally thought to have been built between the late Neolithic and early Bronze Age, a period which there is very little environmental evidence on Dartmoor.

Laboratory comment: English Heritage (23 November 1999), the two results are statistically consistent (T′=1.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and so a weighted mean (1715 ±36 BP) can be taken before calibration (cal AD 230–420 at 2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GU–5773 1670 ±50 BP

$\delta^{13}C$: -28.7‰

Sample: MVALE1, submitted in March 1999 by V Straker

Material: peat (humin)

Initial comment: from the base of the blanket peat of *c* 20cm depth, between the Merrivale stone rows and *c* 8.8m to the west of the Great Western Reave. The sample was taken at 16–17cm.

Objectives: to date the onset of peat formation at one of the most important prehistoric sites on Dartmoor It is assumed that the peat post-dates the stone rows, thought to have been built between the late Neolithic and early Bronze Age. It may also post-date the Great Western Reave, which may be late Bronze Age in date but this is not yet certain. There is little environmental evidence from Dartmoor, which covers the Neolithic to late Bronze Age periods and this short sequence has the potential to fill a gap which is vital to the understanding of the landscape changes in one the most heavily visited parts of Dartmoor.

Calibrated date: *1σ:* cal AD 330–420
2σ: cal AD 240–540

Final comment: V Straker (2014), the dates lie in the Roman period, post-dating the postulated Bronze Age stone rows as expected.

GU–5774 1760 ±50 BP

$\delta^{13}C$: -28.9‰

Sample: MVALE1, submitted in March 1999 by V Straker

Material: peat (humic acid)

Initial comment: as GU-5773

Objectives: as GU-5773

Calibrated date: *1σ:* cal AD 220–350
2σ: cal AD 130–400

Final comment: see GU-5773

References: Bayliss et al 2015
Harding 1981
Passmore and Waddington 2009
Waddington 1997a
Waddington 1997b
Waddington 1999

Milfield Basin: Coupland enclosure, Northumberland

Location: NT 94053308
Lat. 55.35.29 N; Long. 02.05.40 W

Project manager: C Waddington (University of Newcastle), 1999

Archival body: Museum of Antiquities, Newcastle-upon-Tyne

Description: a crop-mark ovoid enclosure with inner ditch (and now destroyed outer bark) with two opposed entrances. Thought by some to be a henge but different to the Milfield henges - measures *c* 100m across and has early Neolithic settlement evidence on the site (cf Harding 1981; Waddington 1997a; 1997b; 1999).

Objectives: to acquire dating evidence from the pits that produced early prehistoric Grimstone Ware pottery and environmental residues (emmer, spelt and bread wheat represented). This is crucial as the finds are thought to be early Neolithic date and will therefore help date the earliest use of agriculture and pottery in this part of England.

Final comment: C Waddington (2001), a total of ten dates are now available for the Coupland enclosure. All the dates are associated with the early Neolithic occupation of the site with exception of one date from a feature cut into one of the secondary fills of the enclosure ditch, which is early Bronze Age. Of the nine early Neolithic dates, eight are statistically consistent and indicative of activity in the second quarter of the fourth millennium BC. Most of these dates are from good archaeological samples, usually hazelnut shell, and as such provide conclusive evidence for early Neolithic activity on this site associated with features consistent with settlement activity. The limited excavations could not demonstrate conclusively whether the ditch fill (065) (OxA-10636 and 10637) was a pre-existing or a contemporary feature with the west 'droveway' and thus the use of the monument complex. Although the excavated evidence did suggest the latter, the excavator advocates that further excavation of this monument is required. The dates are of critical importance to Neolithic studies, particularly in Northern Britain, as they provide the most comprehensive modern dating program of an early Neolithic site in northern England. The dating indicates the use of pottery belonging to the Grimstone Ware series together with the cultivation of cereals in the fist half of the fourth millennium BC. Furthermore, as many of these dates demonstrate the continued importance of gathered resources during the early Neolithic. The dates also date the four pit features which all had evidence of *in situ* heating, probably for cooking purposes. Such pits are relatively rare on early Neolithic sites, and therefore these dates are important for demonstrating that they probably have a utilitarian function, as well as a potential earth oven cooking method.

Laboratory comment: English Heritage (28 April 2010), two further dates (OxA-6832 and OxA-6833) were published in Bayliss *et al* 2015, 115.

OxA–10636 4895 ±45 BP

δ¹³C: -25.9‰

Sample: MFX95/065(a), submitted on 13 March 2001 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell (*Corylus avellana*)) (C Waddington 1995)

Initial comment: the sample came from a secondary fill inside the west droveway linear ditch [065]. It sat above and abutted the basal fill (053). It is thought to be an *in situ* burning/cooking deposit as the ground around the feature was fire reddened and fused and contained broken domestic pottery and many charred hazelnut shells and charcoal. Both fills were sealed by the upper ditch fill (011). The ploughsoil (001) overlay the ditch fill (011).

Objectives: the dates from this sample are particularly important as the two previous dates (Beta-96129, 5040 ±70 BP and Beta-96130, 4950 ±70 BP) were from charcoal (that was unidentified at the time) and has produced two very early dates that caused debates in Neolithic studies. Therefore it is crucial that these existing dates are corroborated by further dating of better dating material which in this case is charred hazelnut shell. In addition, these dates will act as a check for dating the Grimston ware pottery recovered from the same context and the residues of emmer chaff. This has important implications for establishing a chronological sequence for the early prehistoric pottery sequence in northern England and also for the timing for the onset of agriculture.

Calibrated date: *1σ:* 3710–3640 cal BC
2σ: 3780–3630 cal BC

Final comment: C Waddington (4 November 2001), these dates together indicate that early Neolithic activity dating to the second quarter of the first half of the fourth millennium BC took place on the Coupland enclosure site. Although it remains uncertain whether the *in situ* context from which the samples derived is earlier or later than the enclosure construction without further excavation, these dates demonstrate that activities associated with settlement occupation took place at this time. The dates also provide firm dating evidence for the use of pottery and the cultivation of cereals and thus, some of the earliest evidence for 'farming' in northern England.

Laboratory comment: English Heritage (4 November 2001), the four results from this context are statistically consistent (T′=3.9; T′(5%)=7.8; ν=1); (Ward and Wilson 1978). The consistency of the results suggests that the unidentified charcoal dated by Beta Analytic Inc probably consisted of short lived material. (Beta-96129; 5040 ±70 BP; 4000–3690 cal BC and Beta-96130; 4950 ±70 BP; 3960–3540 cal BC; 2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–10637 4895 ±40 BP

$\delta^{13}C$: -23.9‰

Sample: MFX95/065(b), submitted on 13 March 2001 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell (*Corylus avellana*)) (C Waddington 1995)

Initial comment: as OxA-10636

Objectives: as OxA-10636

Calibrated date: *1σ:* 3710–3640 cal BC
2σ: 3770–3630 cal BC

Final comment: see OxA-10636

Laboratory comment: see OxA-10636

OxA–10638 4880 ±45 BP

$\delta^{13}C$: -23.0‰

Sample: MFX95/019b, submitted on 13 March 2001 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell (*Corylus avellana*)) (C Waddington 1995)

Initial comment: the sample comes from the homogenous truncated pit fill (019), which was overlain by the ploughsoil (001). The edges of the pit were fire reddend and slightly fused. This indicated *in-situ* burning/heating within the pit and hence the hazelnut shell and associated pottery sherds are thought to be part of the cooking/waste debris and are likely to be residual components into the fill.

Objectives: this sample is of significance as it will provide a *terminus post quem* for the date/use of the cooking pit, and provide a date for the pottery and environmental residues which are poorly understood in chronological terms at the moment. This has particular significance for dating the earlier prehistoric pottery sequence in northern England and also for understanding the timing of the earliest agriculture in this area.

Calibrated date: *1σ:* 3700–3630 cal BC
2σ: 3760–3530 cal BC

Final comment: C Waddington (4 November 2001), the two dates from this pit indicate that it was used, probably for cooking, during the second quarter of the first half of the fourth millennium cal BC which corresponds with the dates from the occupation deposit (065) and from the outer pits (027) and (021).

Laboratory comment: Ancient Monuments Laboratory (4 November 2001), the two results from this pit are statistically consistent (T′=0.2; T′(5%)=3.8; ν=1; (Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–10692 4910 ±40 BP

$\delta^{13}C$: -22.7‰

Sample: MFX95/019A, submitted on 13 March 2001 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell (*Corylus avellana*)) (C Waddington 1995)

Initial comment: as OxA-10638

Objectives: as OxA-10638

Calibrated date: *1σ:* 3710–3640 cal BC
2σ: 3780–3630 cal BC

Final comment: see OxA-10638

Laboratory comment: see OxA-10638

OxA–10763 4635 ±70 BP

$\delta^{13}C$: -29.0‰

Sample: MFX95/027, submitted on 13 March 2001 by C Waddington

Material: carbonised residue

Initial comment: see details for (019) as the same, except it is a separate pit.

Objectives: this sample is particularly important, as it will provide a direct date from the Grimston Ware pottery and for when it was being used. This is extremely important, as it will act as a check against the date received from associated material in the same context, which would otherwise be used to date pottery.

Calibrated date: *1σ:* 3520–3350 cal BC
2σ: 3640–3110 cal BC

Final comment: C Waddington (4 November 2001), this date is slightly later than the date returned from charred hazelnut shell from the same pit OxA-10692, suggesting a date for the use of the pottery in the mid-to-late fourth millennium cal BC. Although this date is important as it directly dates the use of the pottery it is perhaps significant to note that of all the dates returned from the early Neolithic occupation deposits on the site (which total 11) this is the only one that is statistically significantly different. It remains possible, therefore, that this single date may be later due to an other reason.

Laboratory comment: (4 November 2001), this result is statistically significantly different (T′=24.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978) from the measurement on a hazelnut shell from the same pit (OxA-6832; 5090 ±60 BP, 4040–3710 cal BC; 95% at 2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

Milfield Basin: Ewart-Etal (River Till), Northumberland

Location: NT 97773258
Lat. 55.35.17 N; Long. 02.02.07 W

Project manager: D Passmore (University of Newcastle-Upon-Tyne), 2002

Archival body: University of Newcastle-Upon-Tyne

Description: below the confluence of the River Glen, the Holocene valley floor of the Till progressively narrows from a width of 1.4km to 0.36km at Milfield, and thereafter occupies a narrow (*c* 0.3km) entrenched valley downstream to a small alluvial basin at Etal. Several palaeochannel and floodplain depressions are evident on the Holocene alluvial surface north of the Till, opposite the confluence with the Glen. Two palaeochannel segments, Mil 171–5 and Mil 171–4, were investigated in detail.

Objectives: to establish the chronology of the paleochannel fills in order to better understand the valley floor development.

Final comment: P Marshall (August 2014), the dating suggests that both palaeochannels were abandonned and infilling sometime during the middle to late Bronze Age.

AA–53194 2830 ±45 BP

$\delta^{13}C$: -28.1‰

Sample: M1 Mil 171–4 88–90cm, submitted in October 2002 by D Passmore

Material: sediment (51g) (peaty clayey alluvial silt with freequent plant macrofossils (humic acid))

Initial comment: this sample is taken from core Mil 171–4, recovered from a silt and clay dominated sedimentary sequence, with a recorded depth of 2.5m infilling a palaeochannel of the River Till near Doddington. Sample M1 is from a depth of 88–90cm, representing the basal levels of a homogenous peaty clay alluvial silt deposit between 50–90cm depth. Sediments between 50–90cm contain frequent plant macrofossil inclusions, particularly in the lower levels between 90–75cm. The unit grades down-profile into slightly organic clayey silt, and is abruptly overlain by slightly organic silty clays that grade up-profile into a clayey alluvial soil. The sample represents the onset of slow or negligible rates of organic-rich sedimentation in a low-energy alluvial wetland environment. The sediments are undisturbed, with no evidence of root penetration. The sample came from 90cm below the surface of the palaeochannel depression inset into the alluvial terrace surface, *c* 1m above the mean low-flow water level of the River Till (located 250m to southwest).

Objectives: to date the onset of organic-rich sediment accumulation in core Mil 171–4, thereby establishing a chronology for the basal level of the sedimentary sequence selected for detailed pollen analysis between 35–85cm. This is one of four sediment cores selected for radiocarbon and pollen analysis on the north-east side of the River Till, in an area of the basin that is relatively remote from known prehistoric and early historic settlement sites. Other cores in the locality are Mil 8, 167–1 and 171–5; and 2. in conjunction with other dated sediment cores from the Milfield basin, to establish a chronology of palaeochannel, floodbasin and associated alluvial terrace development in the Milfield basin.

Calibrated date: *1σ:* 1050–910 cal BC
2σ: 1120–890 cal BC

Final comment: P Marshall (August 2014), the result provides an estimate for the deposition of organic-rich alluvial silts and clays in the infill sequence that was taking place in the Bronze Age.

Laboratory comment: English Heritage (28 April 2010), the two results are statistically consistent, according to the method of Ward and Wilson (1978) (T′=3.1; T′(5%)=3.8; ν=1); the best estimate of the sample's radiocarbon age is the weighted mean of the results (2893 ±28 BP), which calibrates to 1200–990 cal BC (2σ; Reimer *et al* 2004). The humic acid fraction was dated.

References: Reimer *et al* 2004
Ward and Wilson 1978

AA–53195 2930 ±35 BP

$\delta^{13}C$: -28.6‰

Sample: M1 Mil 171–4 88–90cm, submitted in October 2002 by D Passmore

Material: sediment (51g) (peaty clayey alluvium with frequent plant macrofossils; humin)

Initial comment: as AA-53194

Objectives: as AA-53194

Calibrated date: *1σ:* 1210–1050 cal BC
2σ: 1260–1010 cal BC

Final comment: see AA-53194

Laboratory comment: English Heritage (August 2014), *see* AA-53194. The humin fraction was dated.

AA–53196 3255 ±45 BP

$\delta^{13}C$: -28.1‰

Sample: M2 Mil 171–5 188–190cm, submitted in October 2002 by D Passmore

Material: sediment (54g) (organic-rich clayey alluvial silt with occasional plant macrofossils; humin)

Initial comment: this sample is taken from core Mil 171–5, recovered from a silt and clay dominated sedimentary sequence, with a recorded depth of 2.1m infilling a palaeochannel of the River Till near Doddington. This re-taken core was taken as a shallower sedimentary sequence to the original core, reflecting local variability in the palaeochannel/floodbasin bed morphology and infill history; the new core has a thicker accumulation of organic-rich sediment, which amply meets the project requirements. Sample M2 is from a depth of 188–190cm, representing the basal levels of organic-rich and peaty clay alluvial silts between 120–190cm depth. The sediment at 120–190cm contains occasional-frequent plant macrofossil inclusion, particularly in the upper levels at 120–145cm. The unit overlies inorganic clayey silt, and is abruptly overlain by slightly organic silty clay and clayey silt that grade up-profile into a clayey alluvial soil. Sample M2 represents the onset of slow or negligible rates of organic-rich sediment in a low-energy alluvial wetland environment. The sample is 190cm below the surface of a palaeochannel depression, inset into the alluvial terrace surface, *c* 1m above the mean low-flow water level of the River Till (located 100m to south).

Objectives: 1. to date the onset of organic-rich sediment accumulation in Core Mil 171–5, thereby establishing a chronology for the basal level of the sedimentary sequence selected for detailed pollen analysis at 120–190cm. This is one of four sediment cores selected for radiocarbon and pollen analysis on the north-east side of the River Till, in an area of the basin that is relatively remote from known prehistoric and early historic settlement sites. Other cores in the locality are Mil 8, 167–1 and 171–4; and 2. in conjunction with other dated sediment cores from the Milfield basin, to establish a chronology of palaeochannel, floodbasin and associated alluvial terrace development in the Milfield basin.

Calibrated date: *1σ:* 1610–1460 cal BC
2σ: 1630–1430 cal BC

Final comment: P Marshall (August 2014), *see* AA-53194. The humin fraction was dated.

Milfield Basin: Flodden Hill, Northumberland

Location: NT 92003610
Lat. 55.37.06 N; Long. 02.07.37 W

Project manager: C Waddington (University of Newcastle-upon-Tyne), 1999

Archival body: Museum of Antiquities, Newcastle-upon-Tyne

Description: a cropmark rectilinear enclosure thought to be of Romano-British date. It comprised a steep-sided ditch enclosure with an entrance to the east with a metalled track leading through the entrance to a cobbled area inside. The ditch had a waterlogged primary fill which contained macrofossils, pollen, and invertebrates, which have provided important palaeoenvironmental and climatic information.

Objectives: to date when the enclosure was occupied and to date the associated palaeoecological evidence, which has significant implications for understanding climatic history.

Final comment: C Waddington (2001), the dates from the preliminary ditch fill of this site are of particular significance on account of dating the construction and initial use of this shortlived site in the early Romano British period and an association with the Flavian advance. In addition, the dates are also important for the palaeological findings which include the presence of climatic indicator species suggesting temperatures around 2° above mid-twentieth century values.

References: Passmore and Waddington 2009

OxA–10632 2032 ±36 BP

$\delta^{13}C$: -26.2‰

Sample: MLF99.4 005 (a), submitted on 13 March 2001 by C Waddington

Material: wood (waterlogged): *Alnus* sp. (J Cotton 2000)

Initial comment: the sample was taken from the primary fill of the enclosure ditch [005], which was sealed by fill (004), which was overlain by upper fill (003) which had subsoil overlying it (002) and the topsoil (001) above that. The primary fill was 2.5m below the ground surface. It was waterlogged with the ditch being cut into clay-andesite till deposits, on the springline.

Objectives: this sample is important to date the occupation of the site, determine the length of time for the deposit to accumulate and date the associated palaeoecological evidence (invertebrates) which have important implications for climatic reconstruction.

Calibrated date: *1σ:* 90 cal BC–cal AD 20
2σ: 170 cal BC–cal AD 60

Final comment: C Waddington (2001), the date indicates a date for the construction and use of the site in the early Romano-British period. It should be noted that as the sample comes from an alder fragment it is likely to be several years, perhaps a decade, old when incorporated into the fill and therefore dates returned are certainly earlier, although probably only slightly, than the construction of the enclosure. Hence an early Romano-British rather than late Iron Age attribution is considered appropriate. In addition, the rectilinear enclosures of this form and size are well known to belong to the Romano-British period in this part of the British Isles. These dates are consistent with this although they do suggest an early date in the Flavian period.

Laboratory comment: English Heritage (2001), the two results on samples from this context (OxA-10632–3) are statistically consistent (T'=0.4; T'(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–10633 1999 ±34 BP

$\delta^{13}C$: -26.3‰

Sample: MLF99.4 005 (b), submitted on 13 March 2001 by C Waddington

Material: wood (waterlogged): *Alnus* sp. (J Cotton 2000)

Initial comment: as OxA-10632

Objectives: as OxA-10632

Calibrated date: *1σ:* 50 cal BC–cal AD 60
2σ: 90 cal BC–cal AD 80

Final comment: *see* OxA-10632

Laboratory comment: *see* OxA-10632

Milfield Basin: Milfield North, Northumberland

Location: NT 93303505
Lat. 55.36.32 N; Long. 02.06.23 W

Project manager: C Waddington (University of Newcastle-upon-Tyne), 1999

Archival body: Museum of Antiquities, Newcastle-upon-Tyne

Description: a cropmark linear boundary feature comprising a shallow ditch. The trench revealed two pits on one side of it, which may or may not be related. One of the pits produced an assemblage of lithics and Grooved Ware from its two fills. These features are in the same fields as the Milfield North Henge and the double pit alignment.

Objectives: to provide a *terminus post quem* for the pit and disclose whether it is broadly contemporary with the henge and pit complex; to provide a date on this pottery type which is currently very poorly dated in northern Britain; and to provide a date on the flint types which are also poorly understood chronologically in this part of the UK.

Final comment: C Waddington (2001), the two dates from the pit indicate a late Neolithic date of the mid-third millennium cal BC. This dating is important as it is statistically earlier than the dates previously returned from the Milfield North henge and double pit alignment and the Whitton Hill hengiform nearby. This indicates that the late Neolithic use of this part of the landscape for ritual activity has a longer duration than previously thought as well as providing dating control for the Grooved Ware pottery recovered from the site.

References: Passmore and Waddington 2009
Waddington 1999

OxA–10634 3997 ±38 BP

δ¹³C: -24.9‰

Sample: MLF99.5 009 (a), submitted on 13 March 2001 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell (*Corylus avellana*)) (J Cotton 2000)

Initial comment: the sample was obtained from the lower of the two pit fills (009) which was sealed by an upper fill (004) which in turn was sealed by the ploughsoil (001). Root penetration was observed in the upper fill (004) but was largely absent in the lower fill (009). The upper fill of the pit (004) had been truncated by ploughing.Most of the pottery and flints came from the lower deposit (009). The two fills are thought to have been deposited as part of the same event - there was no evidence of recutting or that the pit had been left open before infilling.

Objectives: by dating this sample it will allow the dating of the pit feature, the assemblage of Grooved Ware pottery from northern England and an assemblage of worked flints from northern England. In the case of the latter two objectives this partially important as there are currently very few dates associated with prehistoric pottery or flintwork in this part of the UK. These dates will assist in the production of a chronological and developmental framework for these types of material culture in northern England.

Calibrated date: *1σ:* 2580–2470 cal BC
2σ: 2620–2460 cal BC

Final comment: C Waddington (2001), the two dates from the Milfield North pit are the earliest dates associated with Grooved Ware in Northumberland with the exception of the unpublished dates from Thirlings (Miket 1987) which have very large standard deviations and come from charcoal that could be heart or sapwood. The dates indicate a mid third millennium date in what is conventionally regarded as the late Neolithic in northern Britain. The two dates were taken from charred hazelnut shell indicating that gathered resources continued to be collected in the Late Neolithic.

References: Miket 1987

OxA–10635 3955 ±38 BP

δ¹³C: -23.2‰

Sample: MILF99.5 009 (b), submitted on 13 March 2001 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell (*Corylus avellana*)) (J Cotton 2000)

Initial comment: as OxA-10635

Objectives: as OxA-10635

Calibrated date: *1σ:* 2550–2460 cal BC
2σ: 2570–2340 cal BC

Final comment: see OxA-10635

Laboratory comment: English Heritage (28 April 2010), the two results are statistically consistent (T′=0.6; T′(5%)=3.8; ν=1); (Ward and Wilson 1978).

References: Ward and Wilson 1978

Milfield Basin: Redscar 2 pit alignment, Northumberland

Location: NT 94703430
Lat. 55.36.08 N; Long. 02.05.03 W

Project manager: C Waddington (University of Newcastle-upon-Tyne), 1999

Archival body: Museum of Antiquities, Newcastle-upon-Tyne

Description: a cropmark site consisting of a linear alignment of pits running north-east/south-west for approximately 200m. The pit alignment is associated with another pit alignment set at right angles to it at its southwestern end.

Objectives: to date these types of cropmark. The date of these alignments in the Milfield Basin has been hotly contested (Miket 1981, Barber 1985, Waddington 1998) and establishing their date is an important priority, particularly as many continue to be truncated by ploughing.

Final comment: C Waddington (2001), all the dates from the pit alignment date to the first half of the first millennium AD with all but one date indicative of a Romano-British date, the other being medieval. These dates could indeed indicate a Romano-British date for this pit alignment complex, however, the potential for residual material to be incorporated into these fills remains being located bellow the ploughzone. However, as these are consistent with a first half of the first millennium AD and are from three separate pits this consistently is harder to explain as coincidental. Therefore, it is considered most likely that they indicate the actual date of the alignment. However, this contrasts markedly with the radiocarbon dated late Neolithic dates from the Milfield North alignment.

Laboratory comment: English Heritage (2001), the six results are statistically significantly different (T′=90.3; T′(5%)=11.1; ν=5); (Ward and Wilson 1978). Although the pairs from each pit are consistent (T′=3.5, OxA-10671 and OxA-10639; T′=1.4, OxA-10693 and OxA-10764; T′=1.4, OxA-10694–5; T′(5%)=3.8; ν=1; (Ward and Wilson 1978).

References: Barber 1985
Miket 1981
Passmore and Waddington 2009
Waddington 1998
Ward and Wilson 1978

OxA–10639 1519 ±35 BP

δ¹³C: -24.6‰

Sample: MILF99.3 006 (b), submitted on 13 March 2001 by C Waddington

Material: charcoal: *Rhamnus cathartica* sp., single whole grain (R Gale 2001)

Initial comment: pit [007] was located directly below the ploughzone [001], and had a single homogenous fill [006].

Objectives: to establish a *terminus post quem* for the construction of the pit alignment. There is currently debate concerning whether single pit alignments were constructed during the late Neolithic/early Bronze age or whether they are solely an Iron Age/Romano-British phenomenon (Miket 1981, Barber 1985, Waddington 1998).

Calibrated date: *1σ:* cal AD 530–600
2σ: cal AD 420–620

Final comment: C Waddington (2001), the date for this context indicates an early medieval date. This is the only unambiguously early medieval date from the pit alignment. For general discussion *see* series comments.

OxA–10671 1625 ±45 BP

δ¹³C: -24.4‰

Sample: MILF99.3 006 (a), submitted on 13 March 2001 by C Waddington

Material: charcoal: *Prunus* sp. (R Gale 2001)

Initial comment: as OxA-10639

Objectives: as OxA-10639

Calibrated date: *1σ:* cal AD 390–540
2σ: cal AD 330–550

Final comment: C Waddington (2001), this date indicates a Romano-British to early medieval date from a sample from pit (006). For general discussion *see* series comments.

OxA–10693 1833 ±36 BP

δ¹³C: -25.0‰

Sample: MILF99.3 008 (a), submitted on 13 March 2001 by C Waddington

Material: charcoal: Ericaceae (R Gale 2001)

Initial comment: pit [009] was located directly below the ploughzone [001] and had a single homogenous fill [008].

Objectives: as OxA-10639

Calibrated date: *1σ:* cal AD 120–240
2σ: cal AD 80–320

Final comment: C Waddington (2001), this result indicates a Romano-British date.

OxA–10694 1867 ±35 BP

δ¹³C: -27.4‰

Sample: MILF99.3 010 (a), submitted on 13 March 2001 by C Waddington

Material: charcoal: Ericaceae (R Gale 2001)

Initial comment: pit [011] was located directly beneath the ploughzone [001] and had a single gomogenous fill [010].

Objectives: as OxA-10639

Calibrated date: *1σ:* cal AD 80–220
2σ: cal AD 60–240

Final comment: see series comments

OxA–10695 1927 ±36 BP

δ¹³C: -24.7‰

Sample: MILF99.3 010 (b), submitted on 13 March 2001 by C Waddington

Material: charcoal: Ericaceae (R Gale 2001)

Initial comment: as OxA-10694

Objectives: as OxA-10639

Calibrated date: *1σ:* cal AD 30–130
2σ: cal AD 1–140

Final comment: see OxA-10694

OxA–10764 1765 ±45 BP

δ¹³C: -25.1‰

Sample: MILF99.3 008 (b), submitted on 13 March 2001 by R Gale

Material: charcoal: Ericaceae (R Gale 2001)

Initial comment: as OxA-10693

Objectives: as OxA-10639

Calibrated date: *1σ:* cal AD 220–340
2σ: cal AD 130–390

Final comment: see OxA-10693

Milfield Basin: River Glen, Northumberland

Location: NT 93973085
Lat. 55.34.20 N; Long. 02.05.44 W

Project manager: D Passmore (University of Newcastle-upon-Tyne), 2002

Archival body: University of Newcastle-Upon-Tyne

Description: the valley floor of the River Glen between Lanton and Akeld has shallow plaeochannel depressions with meandering platforms. The sediment cores in discrete channel depressions at sites M253-1, M253-3, M256-1, and M258-1 have fine-grained palaeochannel fill sediments. All the cores exhibit peaty and organic-rich fine sandy silts in their lower levels where they overlie coarse sandy gravels that represent former channel bed deposits.

Objectives: the four cores are being dated to establish a chronology for palaeochannel, floodplain, and alluvial terrace development in this part of the Milfield Basin.

Final comment: P Marshall (August 2014), the base of each channel fill sequence has provided dates that suggest all channels were abandonned shortly after the beginning of the fifteenth century AD.

AA–53197 440 ±40 BP

$\delta^{13}C$: -28.7‰

Sample: M3 Mil 253-1 93–95cm, submitted in October 2002 by D Passmore

Material: sediment (63g) (peaty fine sandy alluvial silt/clay (humic acid))

Initial comment: this sample is taken from core Mil 253-1, recovered from a silt and clay dominated sedimentary sequence with a recorded depth of 1m infilling a palaeochannel of the River Glen near Yeavering. Sample M3 is from a depth of 93–95cm, representing the basal levels of peat and peaty alluvial clay/silt at 70–95cm in depth. The unit directly overlies sandy gravel of the former channel bed, and grades up-profile into slightly organic silt and clay that is capped by a thin alluvial topsoil. Sample M3 represents the onset of slow or negligible rates of organic-rich sedimentation in a low-energy alluvial wetland environment, most probably beginning shortly after channel abandonment. The sediments are undisturbed with no evidence of root penetration. The sample is 95cm below the surface of the palaeochannel depression inset into the alluvial terrace surface, *c* 2m above the mean low-flow water level of the River Glen (located 500m to the north).

Objectives: 1. to date the onset of organic-rich sediment accumulation in core Mil 253-1, thereby establishing a chronology for the basal level of the sedimentary sequence selected for detailed pollen analysis between 70–90cm. This is one of four sediment cores selected for radiocarbon and pollen analysis on the fluvial terraces of the River Glen, in the vicinity of the Anglian settlement of Ad Gefrin. Other cores in the locality are Mil 253-3, 256-1, and 258-1; and 2. in conjunction with other dated sediment cores from the Milfield basin, to establish a chronology of palaeochannel, floodbasin and associated alluvial terrace development in the Milfield basin.

Calibrated date: *1σ:* cal AD 1430–1460
2σ: cal AD 1410–1620

Final comment: P Marshall (August 2014), the date suggests the channel was abandoned after the beginning of the fifteenth century AD.

Laboratory comment: English Heritage (2014), the humic acid fraction was dated.

AA–53198 285 ±40 BP

$\delta^{13}C$: -28.8‰

Sample: M4 Mil 253-3 68–70cm, submitted in October 2002 by D Passmore

Material: sediment (31g) (peaty clayey alluvial silt (humic acid))

Initial comment: this sample is taken from core Mil 253-3, recovered from a sand, silt and clay dominated sedimentary sequence with a recorded depth of 1.5m infilling a palaeochannel of the River Glen near Yeavering. Sample M4 is from a depth of 68–70cm, representing the basal levels of peaty alluvial silt between 50–70cm in depth. The unit directly overlies sandy gravels and coarse sands interpreted as the former channel bed and channel abandonment sediments, and is abruptly overlain by inorganic silty fine sand and clayey silt that is capped by a thin alluvial topsoil. Sample M4 represents the onset of slow or negligible rates of organic-rich sedimentation in a low-energy alluvial wetland environment, most probably beginning shortly after channel abandonment. The sediments are undisturbed with no evidence of root penetration. The sample is from 70cm below the surface of the palaeochannel depression inset into the alluvial terrace surface, *c* 2m above the mean low-flow water level of the River Glen (located 450m to the north).

Objectives: 1. to date the onset of organic-rich sediment accumulation in core Mil 253-3, thereby establishing a chronology for the basal level of the sedimentary sequence selected for detailed pollen analysis between 50–70cm. This is one of four sediment cores selected for radiocarbon and pollen analysis on the fluvial terraces of the River Glen, in the vicinity of the Anglian settlement of Ad Gefrin. Other cores in the locality are Mil 253-1, 256-1, and 258-1; and 2. in conjunction with other dated sediment cores from the Milfield basin, to establish a chronology of palaeochannel, floodbasin and associated alluvial terrace development in the Milfield basin.

Calibrated date: *1σ:* cal AD 1520–1660
2σ: cal AD 1480–1800

Final comment: P Marshall (August 2014), the date suggests the channel was abandoned some time after the sixteenth century AD.

Laboratory comment: English Heritage (August 2014), the humic acid fraction was dated.

AA–53199 365 ±40 BP

$\delta^{13}C$: -28.8‰

Sample: M5 Mil 258-1 100–102cm, submitted in October 2002 by D Passmore

Material: sediment (30g) (peaty clayey alluvial silt (humic acid))

Initial comment: this sample is taken from core Mil 258-1, recovered from a fine sand, silt and clay dominated sedimentary sequence with a recorded depth of 1.05m infilling a palaeochannel of the River Glen near Yeavering. Sample M5 is from a depth of 100–102cm, representing the basal levels of a fining-upward sequence of peaty clayey alluvial silt, peaty fine sandy clayey alluvial silt and organic silty clay between 50–102cm in depth. The unit directly overlies sandy gravels interpreted as the former channel bed and is abruptly overlain by slightly organic clayey silt and a thin alluvial topsoil. Sample M5 represents the onset of slow or negligible rates of organic-rich sedimentation in a low-energy alluvial wetland environment, most probably beginning shortly after channel abandonment. The sediments are undisturbed with no evidence of root penetration. The sample is from 100cm below the surface of the palaeochannel depression inset into the alluvial terrace surface, *c* 2.5m above mean low-flow water level of the River Glen (located 300m to the north).

Objectives: 1. to date the onset of organic-rich sediment accumulation in Core Mil 253-1, thereby establishing a chronology for the basal level of the sedimentary sequence selected for detailed pollen analysis between 50–100cm. This is one of four sediment cores selected for radiocarbon and pollen analysis on the fluvial terraces of the River Glen, in the vicinity of the Anglian settlement of Ad Gefrin. Other cores in the locality are Mil 253-1, 253-3, and 256-1; and 2. in conjunction with other dated sediment cores from the Milfield basin, to establish a chronology of palaeochannel, floodbasin and associated alluvial terrace development in the Milfield basin.

Calibrated date: *1σ:* cal AD 1450–1640
2σ: cal AD 1440–1650

Final comment: P Marshall (August 2014), the date suggests the channel was abandoned some time after the fifteenth century AD.

Laboratory comment: English Heritage (August 2014), the humic acid fraction was dated.

Milfield Basin: test pit 10,155, Northumberland

Location: NT 98306343
Lat. 55.51.51 N; Long. 02.01.38 W

Project manager: C Waddington (University of Newcastle-upon-Tyne), 1995

Archival body: Museum of Antiquities, Newcastle-upon-Tyne

Description: the site was a test pit (1m by 1m) located on a flat ploughed field within an artefact scatter (identified during fieldwalking) which contained lithics suggestive of early Neolithic or Mesolithic blade based traditions. The test pit uncovered a truncated stakehole feature at its base cut into the underlying fluvial deposits.

Objectives: to determine whether the remains of Mesolithic structures/occupation survive below the flint scatter site. It will also provide a date for which archaeological remains survive on this geomorphological landform surface - previously thought to be sterile of archaeology.

Final comment: C Waddington (2001), the dating results from the stakehole feature at the base of this test pit are of considerable interest. The dates indicate an early Neolithic date in the fourth millennium cal BC. This is the first radiocarbon dated archaeological feature to be identified on the floodplain of the Milfield Basin; an area previously thought to be sterile of archaeology. Furthermore, the feature is associated with a lithic scatter dominated by narrow blade forms typical of late Mesolithic/early Neolithic tradition. This area was originally selected for walking on the account of its landform and location as identified during the geomorphological mapping of the area. Subsequently, fieldwalking and test pitting has shown the potential of this part of the landscape to contain buried *in situ* archaeological deposits dating back to at least the early Mesolithic.

References: Waddington 1999

OxA–10696 4975 ±45 BP

δ[13]C: -26.1‰

Sample: MLF TP Feature 1 (a), submitted on 13 March 2001 by C Waddington

Material: charcoal: *Quercus* sp., heartwood (R Gale 2001)

Initial comment: the sample was taken from a truncated stakehole type feature uncovered at the base of a test pit. The stakehole fill had been overlain by the ploughsoil measuring 0.36m thick. A total of eight agat lithics (which may have been struck) had been recovered from the 1m of ploughsoil above this feature and a number of flints with Mesolithic affinities were picked up close to the test pit during fieldwalking.

Objectives: the sample is significant as it will provide a *terminus post quem* for a feature which could be related to the early prehistoric artefact scatter noted in the ploughsoil around the test pit. If it is of similar age there will be important implications for the future management of this part of the landscape, which is currently vulnerable to a variety of threats. As heartwood oak this sample could be several centuries (but almost certainly less than 500 years) older than the context from which it came. Even this level of precision however will provide vital management information.

Calibrated date: *1σ:* 3800–3700 cal BC
2σ: 3940–3650 cal BC

Final comment: C Waddington (2001), the dates indicate an early Neolithic date for this feature. The lithics from fieldwalking the same area of the field as the test pit are the product of a narrow blade industry typical of late Mesolithic and early Neolithic assemblages in the region. It was originally assumed that these blade based lithics were likely to be Mesolithic due to the presence of Mesolithic flints in the fieldwalking assemblages. However, the similarity of blade forms and retouched tools across the two periods is well known and therefore comes as no surprise that this feature has produces early Neolithic dates. If the samples are from the heartwood then it is possible that the feature may date to the fifth millennium; however a date from the late Mesolithic to early Neolithic remains consistent with the lithic types recovered from fieldwalking.

Laboratory comment: English Heritage (2001), the two results are statistically inconsistent (T′=9.4; T′(5%)=3.8; ν=1); (Ward and Wilson 1978). As these fragments of charcoal are almost certainly from the same piece of wood, it is likely that this difference is due to the fragments being from different parts of the tree.

References: Ward and Wilson 1978

OxA–10697 4780 ±45 BP

$\delta^{13}C$: -25.7‰

Sample: MLF TP Feature 1 (b), submitted on 13 March 2001 by C Waddington

Material: charcoal: *Quercus* sp., heartwood (R Gale 2001)

Initial comment: as OxA-10696

Objectives: as OxA-10696

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3660–3380 cal BC

Final comment: see OxA-10696

Laboratory comment: see OxA-10696

Milfield Basin: Threecorner Wood, Northumberland

Location: NT 94103575
Lat. 55.36.55 N; Long. 02.05.37 W

Project manager: C Waddington (University of Newcastle-upon-Tyne), 1999

Archival body: Museum of Antiquities, Newcastle-upon-Tyne

Description: a cropmark curvilinear enclosure comprising a timber palisade and outer ditch. Some waterlogged wood survived where it was sealed by the palisade ditch upcast. A type of enclosure usually thought to date to the first millennium cal BC based on the excavations by Burgess at Fenton Hill (Burgess 1984). The enclosure is *c* 50m diameter.

Objectives: to provide a *terminus post quem* for the construction of the enclosure.

Final comment: C Waddington (2001), these two dates are from the context stratigraphically predating the enclosure and as such provide a *terminus post quem* of the early Bronze Age. However, these types of enclosures usually belong to the first millennium BC and this must therefore remain the most likely date. However, these two widely different dates were taken from a palaeosol that was perennially waterlogged and it appears that they represent accumulations of organic material in a damp area conducive to the survival of woody material, which was later covered over by upcast from the construction trench of the enclosure.

References: Burgess 1984

OxA–10630 6875 ±45 BP

$\delta^{13}C$: -26.2‰

Sample: MILF99.2 028 (a), submitted on 13 March 2001 by C Waddington

Material: wood (waterlogged): bark (J Cotton 2000)

Initial comment: the context (028) is a sealed land surface overlain by the construction ditch upcast (027) which in turn is overlain by a subsoil and above this the topsoil (ploughed horizon). The soil is a gleyic brown sand over glaciolacusterine sands. The sample comes from acidic soils located on the interface of two geomorphic zones. The area where the glaciolacusterine clays abutt the sands was waterlogged due to impeded drainage by the clay.

Objectives: this sample should provide a *terminus post quem* for the construction of the enclosure. The sample is bark and shortlived material, however, it is not known how long this had been in the waterlogged context before the monument was constructed. It is not considered to have had a significant time lapse between the accumulation of the bark fragments and the construction of the monument.

Calibrated date: *1σ:* 5790–5710 cal BC
2σ: 5850–5660 cal BC

Final comment: C Waddington (2001), this date indicates a Late Mesolithic sample of waterlogged bark. This is certainly far too early for this enclosure and implies that it was collected from the damp area immediately outside the enclosure associated with the buried soil horizon.

Laboratory comment: English Heritage (2001), The two results are statistically significantly different (T'=2851.2; T'(5%)=3.8; ν=1; Ward and Wilson 1978). This suggests that the material in the context was waterlogged for a significant period of time and contains material of widely differing dates.

References: Ward and Wilson 1978

OxA–10631 3734 ±38 BP

$\delta^{13}C$: -28.7‰

Sample: MILF99.2 028 (b), submitted on 13 March 2001 by C Waddington

Material: wood (waterlogged): bark (J Cotton 2000)

Initial comment: as OxA-10630

Objectives: as OxA-10630

Calibrated date: *1σ:* 2200–2040 cal BC
2σ: 2280–2020 cal BC

Final comment: C Waddington (2001), the date indicates a late Neolithic/early Bronze Age sample of waterlogged bark. This is certainly too early for the enclosure and like with OxA-10630 it represents material accumulated in the lower part of the palaeosol associated with the damp area.

Laboratory comment: see OxA-10630

Milfield Basin: Weetwood-Ewart-Doddington, Northumberland

Location: NT 98193004
Lat. 55.33.54 N; Long. 02.01.43 W

Project manager: D Passmore (University of Newcastle-Upon-Tyne), 2002

Archival body: University of Newcastle-Upon-Tyne

Description: the River Tweed leaves its relatively confined valley floor at Weetwood and emerges into the broad expanse of Holocene alluvium infilling central parts of the Milfield Basin. Sedimentary sequences underlying the alluvial surface were investigated along two coring transects: MSH1 and MSH2.

Objectives: to establish a chronology of palaeochannel, floodplain, and associating alluvial terrace dvelopment in the Milfield Basin.

Final comment: P Marshall (August 2014), the results that span much of the prehistoric and early historic periods provide a chronology for the palaeoecological data and help to determine the chronology of palaeochannels in the central part of the Milfield Basin.

AA–53200 5105 ±45 BP

$\delta^{13}C$: -27.9‰

Sample: M6 Mil 119-9 248–250cm, submitted in October 2002 by D Passmore

Material: sediment (45g) (alluvial silty peat (humic acid))

Initial comment: this sample is taken from core Mill 119-9, recovered from a fine-grained sedimentary sequence with a recorded depth of 3.5m infilling a palaeochannel of River Till in the central part of the Milfield basin between Humbleton Burn and the River Glen. Sample M6 is from a depth of 248–250cm, representing the basal levels of alluvial silty peat and organic-rich silty clay between 175–250cm. This unit contains frequent plant macrofossils and occasional wood fragments; it is abruptly overlain by a fining-upward sequence of slightly organic and inorganic coarse sands, silts and clay and a thin alluvial topsoil, and overlies a similar fining-upward sequence of inorganic sands, silts and clays that are interpreted as glaciolacustrine sediments. Sample M6 represents the onset of a period of slow or negligible rates of organic-rich sedimentation in a low-energy alluvial wetland environment, most probably beginning shortly after channel abandonment.

Objectives: 1. to date the onset of organic-rich sediment accumulation in Core Mil 119-9, thereby establishing a chronology for the basal level of the sedimentary sequence selected for detailed pollen analysis between 175–250cm. This is one of four sediment cores selected for radiocarbon and pollen analysis on the fluvial terraces in central parts of the Milfield basin between Humbleton Burn and the River Glen that are relatively remote from known prehistoric and early historic settlement sites. Other cores in the locality are Mil 108-2 and Msh 1–19 and 1–21; and 2. in conjunction with other dated sediment cores from the Milfield basin, to establish a chronology of palaeochannel, floodbasin and associated alluvial terrace development in the Milfield basin.

Calibrated date: *1σ:* 3970–3800 cal BC
2σ: 3990–3780 cal BC

Final comment: P Marshall (August 2014), the date provides an estimate for the start of organic-rich sediment accumulation and a *terminus ante quem* for a small-scale clearance episode in the hazel-dominated woodland that may have been associated with early Neolithic human activity.

Laboratory comment: English Heritage (28 April 2010), the two results are statistically consistent, according to the method of Ward and Wilson (1978) ($T'=0.2, T'(5\%)=3.8, \nu=1$); the best estimate of the sample's radiocarbon age is the weighted mean of the results (5093 ±35 BP), which calibrates to 3980–3790 cal BC (2σ; Reimer *et al* 2004). The humic acid fraction was dated.

References: Reimer *et al* 2004
Ward and Wilson 1978

AA–53201 5075 ±55 BP

$\delta^{13}C$: -28.5‰

Sample: M6 Mil 119-9 248–250cm, submitted in October 2002 by D Passmore

Material: sediment (45g) (alluvial silty peat (humin))

Initial comment: as AA-53200

Objectives: as AA-53200

Calibrated date: *1σ:* 3960–3790 cal BC
2σ: 3980–3710 cal BC

Final comment: see AA-53200

Laboratory comment: English Heritage (August 2014), *see* AA-53200. The humin fraction was dated.

AA–53202 475 ±35 BP

$\delta^{13}C$: -28.7‰

Sample: M7 Mil 256-1 213–215cm, submitted in October 2002 by D Passmore

Material: sediment (82g) (peaty fine sandy clayey alluvial silt (humic acid))

Initial comment: this sample is taken from core Mill 256-1, recovered from a fine sand, silt and clay dominated sedimentary sequence with a recorded depth of 2.15mm infilling a palaeochannel of River Glen near Yeavering. This re-taken core has a deeper sedimentary sequence to the original core described in the UPD, reflecting local variability in the palaeochannel bed morphology and infill history; the new core has a thicker accumulation of organic-rich sediment, which better meets the project requirements. Sample M7 is from a depth of 213–215cm, representing the basal levels of peaty fine-sandy clayey alluvial silt at 123–215cm. This unit directly overlies sandy gravels interpreted as the former channel bed, and is abruptly overlain by slightly organic clayey silt and a thin alluvial topsoil. Sample M7 represents the onset of a period of slow or negligible rates of organic-rich sedimentation in a low-energy alluvial wetland environment, most probably beginning shortly after channel abandonment. The sediments are undisturbed with no evidence of root penetration. The sample is from 215cm below the surface of a palaeochannel depression inset into an alluvial terrace surface, *c* 2.5m above mean low-flow water level of the River Glen (located 270m to the north).

Objectives: 1. to date the onset of organic-rich sediment accumulation in Core Mil 256-1, thereby establishing a chronology for the basal level of the sedimentary sequence selected for detailed pollen analysis at 123–215cm. This is one of four sediment cores selected for radiocarbon and pollen analysis from fluvial terraces of the River Glen, in the vicinity of the Anglian settlement of Ad Gefrin. Other cores in the locality are Mil 253-1, 253–3, and 258-1; and 2. in conjunction with other dated sediment cores from the Milfield basin, to establish a chronology of palaeochannel, floodbasin and associated alluvial terrace development in the Milfield basin.

Calibrated date: *1σ:* cal AD 1420–1450
2σ: cal AD 1400–1460

Final comment: see AA-53199

Laboratory comment: English Heritage (August 2014), the humic acid fraction was dated.

SUERC–510 1850 ±65 BP

δ¹³C: -31.1 ±0.2‰

Sample: Mil 108-2 M111 217–218cm, submitted in February 2003 by D Passmore

Material: sediment (44g) (slightly organic alluvial fine sandy silty clay (humic acid))

Initial comment: this sample is taken from core Mil 108-2, recovered from a fine-grained sedimentary sequence with a recorded depth of 2.4m infilling a palaeochannel of the River Till in the central part of the Milfield basin between Humbleton Burn and the River Glen. Sample M11 is from a depth of 215–218cm, representing the basal levels of a fining-upward alluvial fine sandy silty clay and silty clay between 225–140cm. This unit contains occasional plant macrofossils, is overlain by inorganic alluvial clays and a thin alluvial topsoil, and overlies bedded silty coarse-fine sands that are interpreted as former channel bed sediments. Sample M11 represents the onset of a period of slow, slightly organic sedimentation in a low-energy alluvial wetland environment, most probably beginning shortly after channel abandonment.

Objectives: 1. to date the onset of fine-sediment accumulation of Core Mil 108-2, thereby establishing a chronology for the basal level of sedimentary sequence selected for detailed pollen analysis between 140–195cm. This is one of four sediment cores selected for radiocarbon dating and pollen analysis on fluvial terraces in central parts of the Milfield basin between Humbleton Burn and the River Glen that are relatively remote from known prehistoric and early historic settlement sites. Other cores in the locality are Mil 119-9 and Msh 1–19 and 1–21; and 2. in conjunction with other dated sediment cores from the Milfield basin, to establish a chronology of palaeochannel, floodbasin and associated alluvial terrace development in the Milfield basin.

Calibrated date: *1σ:* cal AD 70–250
2σ: cal AD 20–340

Final comment: P Marshall (August 2014), the date provides a maximum age for the pollen assemblage spanning 192–152cm (Passmore and Waddington 2009).

Laboratory comment: English Heritage (August 2014), the two results are statistically consistent, according to the method of Ward and Wilson (1978) (T′=0.2, T′(5%)=3.8, ν=1); the best estimate of the sample's radiocarbon age is the weighted mean (1826 ±37 BP), which calibrates to cal AD 80–320 (2σ; Reimer *et al* 2004). The humic acid fraction of this sample was dated.

References: Reimer *et al* 2004
Ward and Wilson 1978

SUERC–511 1815 ±45 BP

δ¹³C: -28.8 ±0.2‰

Sample: Mil 108-2 M11 217–218cm, submitted in February 2003 by D Passmore

Material: peat (44g) (slightly organic alluvial fine sandy silty clay (humin))

Initial comment: as SUERC-510

Objectives: as SUERC-510

Calibrated date: *1σ:* cal AD 130–250
2σ: cal AD 80–340

Final comment: see SUERC-510

Laboratory comment: English Heritage (August 2014), *see* SUERC-510. The humin fraction was dated.

SUERC–512 2185 ±45 BP

δ¹³C: -28.5 ±0.2‰

Sample: Mil 102-2 M8 238–240cm, submitted in February 2003 by D Passmore

Material: sediment (79g) (organic silty alluvial clay (humic acid))

Initial comment: this sample is taken from core Mil 102-2, recovered from a fine sand, silt and clay dominated sedimentary sequence with a recorded depth of 2.70m infilling palaeochannel of the River in the eastern part of the Milfield basin near the confluence of the Till and Wooler Water. Sample M8 is from a depth of 237–241cm, representing the basal levels of an organic-rich fine sandy clayey alluvial silt between 241–129cm. This unit has frequent thin sandy laminations and becomes less organic up-profile. The unit directly overlies inorganic sands and sandy gravels interpreted as the former channel bed, and is abruptly overlain by beds of fine medium sand, slightly organic clayey silt, and a thin alluvial topsoil. Sample M8 represents the onset of slow or negligible rates of sedimentation in a low-energy alluvial wetland environment, most probably beginning shortly after channel abandonment.

Objectives: 1. to date the onset of organic sediment accumulation in Core Mil 102-2, thereby establishing a chronology for the basal level of the sedimentary sequence selected for detailed pollen analysis between 120–220cm. This is one of three sediment cores selected for radiocarbon dating and pollen analysis on fluvial terraces of the River Till/Wooler Water in the vicinity of the confluence zone of these rivers. Other cores in the locality are Msh 2–22 and Mil 208-4; 2. in conjunction with other dated sediment cores from the Milfield basin, to establish a chronology of palaeochannel, floodbasin and associated alluvial terrace development in the Milfield basin.

Calibrated date: *1σ:* 360–170 cal BC
2σ: 390–100 cal BC

Final comment: P Marshall (August 2014), given the discrepancy bewteen the measurements on the humic acid and humin fractions, it is difficult to suggest when organic sediment accumulation began.

Laboratory comment: English Heritage (August 2014), the two results are statistically inconsistent, according to the method of Ward and Wilson (1978) (T′=1038.8, T′(5%)=3.8, ν=1), and cannot date the same event. As the depositional environment is acidic (pH=4.8), it is unlikely that humic acid was mobile within the sediment profile. The humic acid fraction of this sample was dated. The humin fraction, which gave the earlier date, may include some reworked ancient plant material.

References: Ward and Wilson 1978

SUERC–517 4545 ±60 BP

$\delta^{13}C$: -27.6 ±0.2‰

Sample: Mil 102-2 M8 238–240cm, submitted in February 2003 by D Passmore

Material: sediment (79g) (organic silty alluvial clay (humin))

Initial comment: as SUERC-512

Objectives: as SUERC-512

Calibrated date: *1σ:* 3370–3100 cal BC
2σ: 3500–3020 cal BC

Final comment: see SUERC-512

Laboratory comment: English Heritage (August 2014), *see* SUERC-512. The humin fraction was dated.

SUERC–518 5180 ±50 BP

$\delta^{13}C$: -29.9 ±0.2‰

Sample: MSH 1–19 M12 395–397cm, submitted in February 2003 by D Passmore

Material: sediment (33g) (organic-rich silty alluvial clay (humic acid))

Initial comment: this sample is taken from core Msh 1–19, recovered from a fine-grained floodplain sedimentary sequence with a recorded depth of 4m in the central part of the Milfield basin between Humbleton Burn and the River Glen. Sample M12 is from a depth of 393–397cm, representing the basal levels of an alluvial fine sandy silty clay and silty clay between 400–200cm. This unit contains occasional plant macrofossils and is overlain by inorganic alluvial clays and a thin alluvial topsoil; coring was halted at 400cm due to borehole failure. Sample M12 represents the onset of a period of slow, slightly organic sedimentation in a low-energy alluvial wetland environment, most probably in the context of a low-lying floodbasin or possibly palaeochannel depression (although there is no surface expression of such a depression).

Objectives: 1. to date the onset of fine organic-rich sediment accumulation in Core Msh 1–19, thereby establishing a chronology for the basal level of the sedimentary sequence selected for detailed pollen analysis between 220–350cm. This is one of four sediment cores selected for radiocarbon and pollen analysis on fluvial terraces in central parts of the Milfield basin between Humbleton Burn and the River Glen that are relatively remote from known prehistoric and early settlement sites. Other cores in the locality are Mil 119-9, Mil 108-2, and Msh 1–21; and 2. in conjunction with other dated sediment cores from the Milfield basin, to establish a chronology of palaeochannel, floodbasin, and associated alluvial terrace development in the Milfield basin.

Calibrated date: *1σ:* 4040–3950 cal BC
2σ: 4060–3810 cal BC

Final comment: P Marshall (August 2014), the date provides an early Neolithic age for the beginning of organic-rich sediment accumulation.

Laboratory comment: English Heritage, the two results are statistically consistent, according to the method of Ward and Wilson (1978) ($T'=0.0, T'(5\%)=3.8, \nu=1$); the best estimate of the sample's radiocarbon age is the weighted mean (5183 ±35 BP), which calibrates to 4050–3950 cal BC (2σ; Reimer *et al* 2004). The humic acid fraction was dated.

References: Reimer *et al* 2004
Ward and Wilson 1978

SUERC–519 5185 ±50 BP

$\delta^{13}C$: -29.4 ±0.2‰

Sample: MSH 1–19 M12 395–397, submitted in February 2003 by D Passmore

Material: sediment (33g) (organic-rich silty alluvial clay (humin))

Initial comment: as SUERC-518

Objectives: as SUERC-518

Calibrated date: *1σ:* 4040–3960 cal BC
2σ: 4150–3820 cal BC

Final comment: see SUERC-518

Laboratory comment: English Heritage (August 2014), *see* SUERC-518. The humin fraction was dated.

SUERC–520 1770 ±45 BP

$\delta^{13}C$: -30.6 ±0.2‰

Sample: MSH 2-22 M9 163–165cm, submitted in February 2003 by D Passmore

Material: sediment (40g) (clayey sedge alluvial peat (humic acid))

Initial comment: this sample is taken from core MSH 2-22, recovered from a fine sand, silt and clay dominated sedimentary sequence with a recorded depth of 2.30m infilling a poorly-defined palaeochannel of the River Till or Wooler Water in the eastern part of the Milfield basin near the confluence of the Till and Wooler Water. Sample M9 is from a depth of 161–165cm, representing the basal levels of a clayey sedge alluvial peat between 125–165cm. This unit has frequent charcoal, rootlets, and Cyperaceae fragments, and horizontally-bedded wood and twig fragments between 134–136cm and 146–147cm. The unit directly overlies inorganic fine gravelly sands interpreted as the former channel bed, and is abruptly overlain by inorganic clayey silt, fine sandy silt and a thin alluvial topsoil. Sample M9 represents the onset of slow or negligible rates of sedimentation in a low-energy alluvial wetland environment, most probably beginning shortly after channel abandonment.

Objectives: 1. to date the onset of organic sediment accumulation in core MSH 2-22, thereby establishing a chronology for the basal level of the sedimentary sequence selected for detailed pollen analysis between 120–165cm. This is one of three sediment cores selected for radiocarbon and pollen analysis on fluvial terraces of the River Till/Wooler Water in the vicinity of the confluence zone of these rivers. Other cores in the locality are Mil 102-2 and Mil 208-4; and 2. in conjunction with other dated sediment cores from the Milfield basin, to establish a chronology of palaeochannel, floodbasin, and associated alluvial terrace development in the Milfield basin.

Calibrated date: *1σ:* cal AD 220–340
2σ: cal AD 130–390

Final comment: P Marshall (August 2014), the result provides a date for the onset of organic sedimentation.

Laboratory comment: English Heritage (August 2014), the two results are statistically consistent, according to the method of Ward and Wilson (1978) (T′=3.6, T′(5%)=3.8, ν=1); the best estimate of the sample's radiocarbon age is the weighted mean (1711 ±32 BP), which calibrates to cal AD 240–420 (2σ; Reimer *et al* 2004). The humic acid fraction was dated.

References: Reimer *et al* 2004
Ward and Wilson 1978

SUERC–521 1650 ±45 BP

δ¹³C: -29.9 ±0.2‰

Sample: MSH 2-22 M9 163–165cm, submitted in February 2003 by D Passmore

Material: sediment (40g) clayey sedge alluvial peat (humin)

Initial comment: as SUERC-520

Objectives: as SUERC-520

Calibrated date: *1σ:* cal AD 340–430
2σ: cal AD 250–540

Final comment: see SUERC-520

Laboratory comment: English Heritage (August 2014), *see* SUERC-520. The humin fraction was dated.

SUERC–522 4700 ±55 BP

δ¹³C: -27.0 ±0.2‰

Sample: MSH 21 M13A 321–323cm, submitted in February 2003 by D Passmore

Material: waterlogged plant macrofossils

Initial comment: this sample is taken from core MSH 1–21, recovered from a fine-grained floodplain sedimentary sequence with a recorded depth of 4m in the central part of the Milfield basin between Humbleton Burn and the River Glen. Sample M13 is a wood sample from a depth of 286–292cm, representing the upper levels of a fining-upward alluvial organic silty clay and clayey silt at 270–350cm. This unit contains occasional plant macrofossils and wood fragments and is overlain by a fining upward sequence of laminated sands, silts and clays (between 140–270cm), inorganic clays and a thin alluvial topsoil. The unit buried inorganic fine sands and silty clays below 350cm, while coring was halted at 400cm due to borehole failure. Sample M13 lies within the upper levels of a deposit that represents the later part of a period of slow, organic sedimentation in a low-energy alluvial wetland environment. Most probably in the context of a low-lying floodbasin or possibly palaeochannel depression (although there is no surface expression of such a depression).

Objectives: 1. to date the later phases of fine organic sediment accumulation in Core MSH 1–21, thereby establishing a minimum age for the sedimentary sequence selected for detailed pollen analysis between 270–365cm. This is one of four sediment cores selected for radiocarbon dating and pollen analysis on fluvial terraces in central parts of the Milfield basin between Humbleton burn and the River Glen that are relatively remote from known prehistoric and early historic settlement sites. Other cores in the locality are Mil 119-9, Mil 108-2, and Msh 1–19; and 2. in conjunction with other dated sediment cores from the Milfield basin, to establish a chronology of palaeochannel, floodbasin and associated alluvial terrace development in the Milfield basin.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: P Marshall (August 2014), pollen from sediments between 310cm and 330cm are characterised by hazel-birch-juniper scrub (including the arctic-alpine dwarf-shrub *Betula nana* L.), grasses, and *Filipendula*, suggesting a very early Holocene date. The date is clearly erroneous and is believed to be the result of a contamination during coring.

North Peak Environmentally Sensitive Area, Derbyshire

Location: SE 021003 and SK 032999
Lat. 53.29.57 N; Long. 01.58.06 W,
Lat. 53.29.44 N; Long. 01.57.06 W

Project manager: D Garton (Trent and Peak Archaeological Trust), 1992

Description: the sites were located on high Pennine moorland, at 370m and 447m OD, on Kinderscout Gritstones with eroding peat cover. Two sites were sampled as part of an exercise to understand the effects of peat erosion on the Mesolithic archaeology. Dark peat/charcoal-rich horizons are common at the base of the peat above flint-scatters, and are often interpreted as the result of burning Mesolithic structures/camp fires or wider scale interference with the vegetation. However, the dates from the peat just above this horizon are late third to early second millennium cal BC (GU-5378–81; Bayliss *et al* forthcoming), and our evidence suggests a hiatus between flint deposition and peat growth from stratigraphic discontinuities in the pollen assemblages (*see* work by Livett and Tallis), and that the flint can be demonstrated to have been transported down the soil profile since deposition.The samples for dating of the peat were not taken at its base, but above the charcoal-rich horizon (because of the problems of contamination from mature wood). We cannot demonstrate from the pollen assemblages or from micromorphology (work by Canti) that there is a discontinuity between the peat and charcoal-rich horizon. The concentration of charcoal, and the relative lack of sediment within this horizon, might suggest that there was no significant time lag between its deposition and the growth of the peat.This suggestion raises questions on our interpretations of the processes and timing of the rate of change in these uplands, which previously has attributed one of the major causes of change to the impact of hunter gatherers. This suggests a longer timescale of change and manipulation by people, perhaps a lesser Mesolithic impact that has sometimes been supposed on the vegetation and soils, and more importantly, the previously unsuspected use of this environment to the turn of the third/second millennium cal BC.

Objectives: to date the burning episode represented by a charcoal-rich horizon at the base of the peat.

Final comment: D Garton (12 November 2013), four separate samples, each comprising one charcoal fragment, were dated. Three single fragments were sub-divided and dated twice. The charcoal fragments produced a variety of dates within the fourth and third millennia cal BC. None of the dated firing events relate to the Mesolithic assemblages, and they are also not directly related to the onset of peat formation, as the latest burning episode dated at both sites pre-dates this event by several centuries. A causal link between the firing events and peat formation is therefore untenable.

Laboratory comment: English Heritage (August 2014), four samples were dated prior to 1998 (GU-5378–81) and are published in Bayliss *et al* 2015, 117–8.

References:	Bayliss *et al* 2015
	Garton 2009

North Peak Environmentally Sensitive Area: Arnfield Clough, Derbyshire

Location:	SK 032999
	Lat. 53.29.44 N; Long. 01.57.06 W
Project manager:	D Garton (Trent and Peak Archaeological Trust), 1992
Archival body:	Buxton Museum

Description: Arnfield Clough at 447m OD, is a steeply incised V-shaped valley with massive peat erosion near the break of slope. Core MST 02.

Objectives: to date the burning episode represented by a charcoal-rich horizon at the base of the peat, in order to understand the effects of peat erosion on the Mesolithic archaeology.

Final comment: P Marshall (August 2014), the dated firing event does not relate to the Mesolithic flint assemblage, or the onset of peat formation.

Laboratory comment: English Heritage (August 2014), two further measurements were obtained on a peat sample from this site (GU-5378–9; Bayliss *et al* 2015; 117–8).

References:	Bayliss *et al* 2015
	Garton 2009

OxA–9538 4431 ±38 BP

$\delta^{13}C$: -26.5‰

Sample: MST 02-0010(A), submitted on 31 September 2000 by D Garton

Material: charcoal: Ericaceae (R Gale 2000)

Initial comment: this sample was taken at the base of the peat with its junction with the mineral soil (section MST 02). Here the peat was noticeably darker, crumbly, and charcoal-rich. It is suggested that this deposit is a result of clearance by burning, however, the soils were not disrupted too deeply as *in situ* flint-scatters survived in the unconsolidated, sandy, mineral soil just below this horizon. The samples came from immediately below dated samples GU-5378 (3610 ±50 BP) and GU-5379 (3880 ±50 BP).

Objectives: to date the burning episode represented by a charcoal-rich horizon at the base of the peat.

Calibrated date:	*1σ:* 3270–3010 cal BC
	2σ: 3340–2920 cal BC

Final comment: D Garton (12 November 2013), this does not relate to the Mesolithic assemblages, nor the onset of peat formation.

Laboratory comment: English Heritage (10 October 2000), the two measurements on this charcoal fragment (OxA-9538 and OxA-9539) are statistically consistent (T'=0.0; $T'(5\%)$=3.8; ν=1; Ward and Wilson 1978). The weighted mean (4434 ±27 BP) calibrates to 3330–2920 cal BC at 2σ (Reimer *et al* 2004). Measurements on four fragments of charcoal from MST 02-0010 (the weighted mean of OxA-9538–9, OxA-9540, OxA-9541, and OxA-9542) are not statistically consistent (T=47.2; $T'(5\%)$=7.8; ν=3; Ward and Wilson 1978), and clearly represent material of different ages.

References:	Reimer *et al* 2004
	Ward and Wilson 1978

OxA–9539 4438 ±39 BP

$\delta^{13}C$: -26.5‰

Sample: MST 02-00010(A), submitted in March 2000 by D Garton

Material: charcoal: Ericaceae (R Gale 2000)

Initial comment: a replicate of OxA-9538.

Objectives: as OxA-9538

Calibrated date:	*1σ:* 3270–3020 cal BC
	2σ: 3340–2920 cal BC

Final comment: see OxA-9538

Laboratory comment: see OxA-9538

OxA–9540 4500 ±40 BP

$\delta^{13}C$: -26.3‰

Sample: MST 02-0010(B), submitted in March 2000 by D Garton

Material: charcoal: Ericaceae (R Gale 2000)

Initial comment: as OxA-9538

Objectives: as OxA-9538

Calibrated date:	*1σ:* 3350–3090 cal BC
	2σ: 3370–3020 cal BC

Final comment: see OxA-9538

OxA–9541 4000 ±65 BP

δ[13]C: -27.3‰

Sample: MST 02-0010(C), submitted in March 2000 by D Garton

Material: charcoal: Ericaceae (R Gale 2000)

Initial comment: as OxA-9538

Objectives: as OxA-9538

Calibrated date: *1σ:* 2580–2460 cal BC
2σ: 2840–2330 cal BC

Final comment: see OxA-9538

OxA–9542 4331 ±40 BP

δ[13]C: -28.2‰

Sample: MST 02-0010(D), submitted in March 2000 by D Garton

Material: charcoal: Ericaceae (R Gale 2000)

Initial comment: as OxA-9538

Objectives: as OxA-9538

Calibrated date: *1σ:* 3010–2900 cal BC
2σ: 3090–2880 cal BC

Final comment: see OxA-9538

North Peak Environmentally Sensitive Area: Arnfield Flats, Derbyshire

Location: SE 021003
Lat. 53.29.57 N; Long. 01.58.06 W

Project manager: D Garton (Trent and Peak Archaeological Trust), 1992

Archival body: Buxton Museum

Description: in the valley bottom of arnfield Flats, at an altitude of 370m. arnfield Flats is a U-shaped valley with shallow peat on the valley floor, massive peat erosion onto stone on the valley sides, and deeper peat mostly intact on the high plateau. The valley sides are formed by a number of rock benches, each of which has a flattish area immediately behind the scarp step. Core MST 01.

Objectives: to date the burning episode represented by a charcoal-rich horizon at the base of the peat in order to understand the effects of peat erosion on the Mesolithic archaeology.

Final comment: D Garton (12 November 2013), the dated firing event does not relate to the Mesolithic flint assemblage or the onset of peat formation.

Laboratory comment: English Heritage (August 2014), two samples were dated prior to 1998 on a peat sample from this site (GU-5380–1) and are published in Bayliss *et al* 2015, 118.

References: Bayliss *et al* 2015
Garton 2009

OxA–9543 4651 ±38 BP

δ[13]C: -26.1‰

Sample: MST 01-0003(A), submitted in March 2000 by D Garton

Material: charcoal: *Ulex*/*Cytisus* sp. (R Gale 2000)

Initial comment: this sample was taken at the base of the peat with its junction with the mineral soil (section MST 01 0003). The samples come from immediately below dated samples GU-5380 (3560 ±50 BP) and GU-5381 (3630 ±50 BP).

Objectives: as OxA-9538

Calibrated date: *1σ:* 3510–3360 cal BC
2σ: 3630–3350 cal BC

Final comment: see OxA-9538

OxA–9544 3924 ±39 BP

δ[13]C: -25.3‰

Sample: MST 01-0003(B), submitted in March 2000 by D Garton

Material: charcoal: *Betula* sp. (R Gale 2000)

Initial comment: as OxA-9543

Objectives: as OxA-9538

Calibrated date: *1σ:* 2480–2340 cal BC
2σ: 2570–2290 cal BC

Final comment: see OxA-9538

Laboratory comment: English Heritage (August 2014), the measurements on this charcoal fragment (OxA-9544–5) are statistically consistent (T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Their weighted mean (3937 ±27 BP) calibrates to 2550–2340 cal BC (95% confidence; Reimer *et al* 2004). Measurements on four fragments of charcoal from MST 01-0003 (OxA-9543, the weighted mean of OxA-9544 and OxA-9545, and the weighted mean of OxA-9549603 and OxA-10212) are not statistically consistent (T=46.8; T′(5%)=7.8; ν=3; Ward and Wilson 1978), and clearly represent material of different ages and relates to different burning episodes.

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–9545 3953 ±38 BP

δ[13]C: -25.1‰

Sample: MST 01-0003(B), submitted in March 2000 by D Garton

Material: charcoal: *Betula* sp. (R Gale 2000)

Initial comment: a replicate of OxA-9544.

Objectives: as OxA-9538

Calibrated date: *1σ:* 2490–2460 cal BC
2σ: 2570–2340 cal BC

Final comment: see OxA-9538

OxA–9546 3987 ±36 BP

$\delta^{13}C$: -25.6‰

Sample: MST 01-0003(C), submitted in March 2000 by D Garton

Material: charcoal: *Betula* sp. (R Gale 2000)

Initial comment: as OxA-9543

Objectives: as OxA-9538

Calibrated date: *1σ:* 2570–2460 cal BC
2σ: 2580–2450 cal BC

Final comment: see OxA-9538

OxA–9603 3990 ±40 BP

$\delta^{13}C$: -24.1‰

Sample: MST 01-0003(D), submitted in March 2000 by D Garton

Material: charcoal: *Pinus* sp. (R Gale 2000)

Initial comment: as OxA-9543

Objectives: as OxA-9538

Calibrated date: *1σ:* 2570–2460 cal BC
2σ: 2620–2450 cal BC

Final comment: see OxA-9538

Laboratory comment: English Heritage (August 2014), the measurements on this charcoal fragment (OxA-9603 and OxA-10212) are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Their weighted mean (3993 ±28 BP) calibrates to 2580–2460 cal BC (95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–10212 3995 ±40 BP

$\delta^{13}C$: -24.4‰

Sample: MST 01-0003 (D), submitted in March 2000 by D Garton

Material: charcoal: *Pinus* sp. (R Gale 2000)

Initial comment: a replicate of OxA-9603.

Objectives: as OxA-9538

Calibrated date: *1σ:* 2580–2460 cal BC
2σ: 2620–2450 cal BC

Final comment: see OxA-9538

Padstow: Althea Library, Cornwall

Location: SY 91507543
Lat. 50.32.30 N; Long. 04.56.38 W

Project manager: P Stead (Exeter Archaeology), 2001

Archival body: Royal Cornwall Museum

Description: this site formed part of the rear garden of Althea Library on which a single bungalow was to be built. The site lies to the north of St Peter's churchyard, separated from it by Church Street. The site has been cultivated as a garden over an extended period resulting in the removal of all stratified deposits to the level of natural ground. Removal of deposits by machine over an area of approximately 18.5m by 8m, exposed a total of 17 graves all broadly aligned east-west within two rows set 0.5m apart. All graves were in the tradition of cist burials (ie slate-lined and capped).

Objectives: bones from four burials (skeletons 1001, 1003, 1004, and 1005) were submitted to date the burial ground and provide an indication of the period of use. This is of particular importance given the lack of scientific dating of cist-tradition burials within Cornwall.

Final comment: P Manning and P Stead (2006), the radiocarbon determinations indicate an eighth- or ninth-century date for the cemetery. The identification of an ordered burial ground of this date, and possibly earlier, so close to the site of the parish church, would support the currently prevailing view that the monastery associated with St Wethinoc (and the related origins of Padstow as a settlement) was located in the vicinity of the parish church.

References: Manning and Stead 2006

GrA–22419 1200 ±50 BP

$\delta^{13}C$: -19.9 ±0.1‰
$\delta^{15}N$ (diet): +7.3 ±0.2‰

Sample: 1004, submitted on 13 January 2003 by P Stead

Material: human bone (210g) (right femur) (H Gestsdottir 2002)

Initial comment: skeleton 1003 was located within slate-lined grave 538 (grave 14). The grave cut through the natural subsoil and into the underlying shale. All of the overlying deposits were disturbed by cultivation. The skeleton was articulated on its back with hands over the pelvis. The upper part of the body was poorly preserved, but the lower part and legs were generally in a good state of preservation. The slate capstones were still in place over the western half of the grave.

Objectives: this sample will be used, in conjunction with the other samples from this site, to provide an absolute date and period of use of this previously unknown graveyard.

Calibrated date: *1σ:* cal AD 720–900
2σ: cal AD 670–980

Final comment: K Cullen (15 October 2013), the date is consistent with the early Christian use of the site and cist-tradition burials in Cornwall; however, too few determinations exist to make meaningful chronological conclusions about the development of the cemetery or cist burial traditions.

GrA–22554 1270 ±40 BP

$\delta^{13}C$: -20.5 ±0.1‰
$\delta^{15}N$ (diet): +8.0 ±0.2‰

Sample: 1001, submitted on 13 January 2003 by P Stead

Material: human bone (10g) (left femur) (H Gestsdottir 2002)

Initial comment: skeleton 1001 was contained within a slate-lined grave 505. The grave cut through natural subsoil. The capstones over the upper body were previously disturbed allowing soil to enter. The capstones over the lower body are intact, with the long bones surviving in the void. The skeleton is articulated, and the remains of an infant (skeleton 1002) were located adjacent to the head and left shoulder of 1001. The poorly preserved remains have been identified as a male, aged 35–45.

Objectives: as GrA-22419

Calibrated date: *1σ:* cal AD 670–780
2σ: cal AD 660–880

Final comment: see GrA-22419

Laboratory comment: English Heritage (2006), the two results on skeleton 1001 are statistically consistent (T′=0.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and so a weighted mean (1286 ±33 BP) can be taken before calibration (cal AD 650–810; 95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GU–5921 1200 ±50 BP

$\delta^{13}C$: -19.9 ±0.2‰
$\delta^{13}C$ *(diet):* -20.3 ±0.2‰
$\delta^{15}N$ *(diet):* +9.7 ±0.2‰

Sample: 1004, submitted on 13 January 2003 by P Stead

Material: human bone (210g) (right femur) (H Gestsdottir 2002)

Initial comment: skeleton 1004 lay within slate-lined grave 551 (grave 17), which cut the natural shale. The skeleton was articulated, placed on its back with arms to the side. The upper body was in a very poor state of preservation, and the lower body fair. A further quantity of bone (1005) was recovered from a deposit of soil which overlay the collapsed capstone at the east of the grave. The material was very mixed but appeared to represent a single individual.

Objectives: as GrA-22419

Calibrated date: *1σ:* cal AD 720–900
2σ: cal AD 670–980

Final comment: see GrA-22419

GU–5923 1290 ±50 BP

$\delta^{13}C$: -20.3 ±0.2‰
$\delta^{13}C$ *(diet):* -20.3 ±0.2‰
$\delta^{15}N$ *(diet):* +9.7 ±0.2‰

Sample: 1005, submitted on 13 January 2003 by T van der Schriek

Material: human bone (500+g) (leg bones) (H Gestsdottir 2003)

Initial comment: skeleton 1005 was contained within grave soil 552 (grave 17) which overlay the collapsed gravestone of the grave that contained skeleton 1004. The skeletal material is very mixed, but represents a single male, aged 35–45.

Objectives: as GrA-22419

Calibrated date: *1σ:* cal AD 660–780
2σ: cal AD 650–880

Final comment: see GrA-22419

GU–5975 1320 ±60 BP

$\delta^{13}C$: -20.2 ±0.2‰
$\delta^{13}C$ *(diet):* -20.0 ±0.2‰
$\delta^{15}N$ *(diet):* +9.6 ±0.2‰

Sample: 1001, submitted on 13 January 2003 by P Stead

Material: human bone (340g) (left femur) (H Gestsdottir 2003)

Initial comment: as GrA-22554

Objectives: as GrA-22419

Calibrated date: *1σ:* cal AD 650–770
2σ: cal AD 610–860

Final comment: see GrA-22419

Laboratory comment: see GrA-22554

Richborough Roman fort, Kent

Location: TR 324602
Lat. 51.17.34 N; Long. 01.20.01 E

Project manager: D E Robinson (English Heritage), June 2002

Archival body: English Heritage

Description: marine/estuarine silts formed below the cliff, which constitutes the present day eastern boundary of the Richborough Roman fort/settlement and Saxon fort. Two cores were dated: core 3 and core 10.

Objectives: to establish the age of the sediments and the period over which they formed.

Final comment: D E Robinson (27 January 2002), the dates show that the deposition of marine/estuarine sands, silts and clays started in the late Middle Ages at the earliest. This strongly suggests that there was open water at the foot of the cliff prior to this. The divergence in the dates obtained for the material from sample 4 (OxA-11834 and NZA-16229) is worrying as the fragments of herbaceous root/rhizome used for both dates were picked out of the same washed sample. Several fragments were submitted for each date.

NZA–16229 505 ±40 BP

$\delta^{13}C$: -24.2‰

Sample: 10/62, submitted on 29 October 2002 by D E Robinson

Material: waterlogged plant macrofossils (herbaceous root/rhizome) (D E Robinson 2002)

Initial comment: plant material from core 10 compressed and stratified within stiff fine sand, well sorted at 0.62m OD.

Objectives: as OxA-11834

Calibrated date: *1σ:* cal AD 1400–1440
2σ: cal AD 1320–1450

Final comment: see series comments

OxA–11809 421 ±33 BP

$\delta^{13}C$: -25.2 ±0.2‰

Sample: 3/165-168, submitted on 27 September 2002 by D E Robinson

Material: waterlogged plant macrofossils: monocot, stem (D E Robinson 2002)

Initial comment: plant material from core 3. Embedded within silty clay - yellowish grey at 1.65–1.68m OD.

Objectives: to establish the age of the sediments and approximate period over which they formed. This sample should provide a date for the sediments halfway up in core 3.

Calibrated date: *1σ:* cal AD 1440–1470
2σ: cal AD 1420–1620

Final comment: see series comments

OxA–11810 149 ±34 BP

$\delta^{13}C$: -27.3‰

Sample: 10/187, submitted on 27 September 2002 by D E Robinson and J Heathcote

Material: wood (waterlogged): *Salix/Populus sp.* (G Campbell 2002)

Initial comment: three samples comprising *Salix/Populus* sp. wood (samples 2 and 3) and unidentified herbaceous root/Rhizome (sample 3) lying within marine/estuarine deposits at 187cm, 177cm, and 62cm OD respectively in core 10. This wood at 187cm was embedded in soft, loose fine sandy clay, unbedded, non-calcareous. The sample was extracted from sediments formed under brackish water at the edge of a channel.

Objectives: to establish the age of the sediments and approximate period over which they laid down. This sample should provide a date for the sediments halfway up the sequence.

Calibrated date: *1σ:* cal AD 1660–1950
2σ: cal AD 1660–1955*

Final comment: see series comments

OxA–11811 117 ±31 BP

$\delta^{13}C$: -27.1 ±0.2‰

Sample: 10/177, submitted on 23 September 2002 by D E Robinson

Material: wood (waterlogged): *Salix/Populus sp.* (G Campbell 2002)

Initial comment: wood embedded in soft, loose fine sandy clay, unbedded, non-calcareous. From hole/core 10 within the sediment at 1.77m OD. The sample was extracted from sediments formed under brackish water at the edge of a channel.

Objectives: as OxA-18810

Calibrated date: *1σ:* cal AD 1680–1930
2σ: cal AD 1670–1950

Final comment: see series comments

OxA–11834 208 ±27 BP

$\delta^{13}C$: -25.8 ±0.2‰

Sample: 10/62, submitted on 27 September 2002 by D E Robinson

Material: waterlogged plant macrofossils (herbaceous root/rhizome) (D E Robinson 2002)

Initial comment: plant material from core 10, compressed and stratified within stiff fine sand, well sorted at 0.62m OD.

Objectives: to establish the age of the sediments and approximate period over which they formed. This sample should provide a date for the basal sand.

Calibrated date: *1σ:* cal AD 1650–1955*
2σ: cal AD 1640–1955*

Final comment: see sereis comments

Rivenhall Churchyard, Essex

Location: TL 8283617795
Lat. 51.49.42 N; Long. 00.39.13 E

Project manager: R Clarke (Field Archaeology Unit, Essex County Council), 1999–2000

Archival body: Braintree Museum, St Mary and All Saints Church, Rivenhall, and Braintree Museum

Description: excavation in the east part of Churchyard (in advance of new burials), uncovered a stratified sequence dating from the Roman to post-medieval periods. Most significant aspects were the Saxo-Norman burials and features associated with several phases of a medieval priest's house. The site is adjacent to the areas excavated in the 1970s by the Rodwells, now a Scheduled Ancient Monument (No. 24867). Eight skeletons were submitted for dating. Two of the samples (1307 and 1415) act as controls as they are from stratigraphically later burials. No evidence of coffins was found and the bone preservation was generally poor, although a group in the north-west corner of the site had survived better.

Objectives: the graves did not contain reliable dating evidence and it is crucial to establish the period of use of the cemetery as this will also enable other aspects of the development and chronology to be understood, or refined, especially when integrating this evidence with that recorded by the

Rodwells'. To confirm the late Saxon, but pre-Conquest, date indicated by an initial reappraisal of the radiocarbon dates from the Rodwell's cemetery and check whether these dates are representative of those in the recently excavated part of the cemetery. To then establish the period of use and estimate the date when this part of the cemetery was abandoned, with the later burials (1415 and 1307) acting as restraints.

Final comment: R Clarke (8 January 2003), the dating series was successful and has indicated that the cemetery was late ninth century in origin and that burial ceased in the north of the site by the early thirteenth century, but may have continued for slightly longer in the south. The dates fit in well with the broad site stratigraphy and has enabled a more comprehensive understanding of the overall site chronology and development in the churchyard, particularly in relation to the Saxo-Norman and medieval phases. The results have been particularly helpful in regard to re-assessing the Rodwells' excavation, especially in terms of the date of the cemetery, structure 1 (thought to be middle Saxon) and dispelling the theory that there were two separate cemeteries at Rivenhall.

Laboratory comment: English Heritage (30 January 2009), a further nine dates HAR-2015–21, -2326, -2404, and -2427 were published in Jordan *et al* (1994, 143–4). A further measurement on grave 204 was undertaken on a skeleton showing possible evidence on teponemal disease (TQ-8315; 550 ±60 BP; cal AD 1290–1450) (Stuiver *et al* 1998; Mays *et al* 2002).

References: Clarke 2004
Jordan *et al* 1994
Mays *et al* 2002
Rodwell and Rodwell 1985
Rodwell and Rodwell 1993

GU–5857 890 ±50 BP

$\delta^{13}C$*:* -21.3‰
$\delta^{15}N$ *(diet):* +12.7‰

Sample: 1243, submitted on 27 March 2001 by R Clarke

Material: human bone (375g) (fragments of femora, tibiae and fibulae) (S Mays 2001)

Initial comment: the skeleton 1243 in grave 1241 (fill 1224) was sealed beneath medieval layers and cut through ?Roman yard surface 1536.

Objectives: this sample will help to establish the period of use of this part of the cemetery to the east of the church and check whether the burials dated in the 1980s from Rodwell's excavations are also representative of this part of the burial ground.

Calibrated date: *1σ:* cal AD 1040–1220
2σ: cal AD 1020–1260

Final comment: R Clarke (8 January 2003), the radiocarbon date for this sample has helped to establish the Saxo-Norman/medieval date of this part of the cemetery. It links in well with the re-calibrated date from the Rodwell's excavations, as well as to a lesser degree with the site stratigraphy, which is fairly broad here.

GU–5858 680 ±70 BP

$\delta^{13}C$*:* -20.7‰
$\delta^{15}N$ *(diet):* +13.2‰

Sample: 1307, submitted on 27 March 2001 by R Clarke

Material: human bone (190g) (skull) (S Mays 2001)

Initial comment: the skeleton 1307 in grave 1305 (fill 1306) cut through 1338 (a medieval or later deposit which seals other graves eg 1443, (which is also physically clipped by 1305).

Objectives: this sample will help establish the period of use of the cemetery to the east of the church and specifically act as a restraint for estimating the date when this part of the cemetery was abandoned.

Calibrated date: *1σ:* cal AD 1270–1390
2σ: cal AD 1220–1420

Final comment: R Clarke (8 January 2003), the date of this sample is particularly useful as it acts as a 'control' for the abandonment of this part of the cemetery as it is the youngest of all the burials sampled. This fits in well with the stratigraphic relationship with earlier burial 1443, which returned an earlier date range.

GU–5859 760 ±50 BP

$\delta^{13}C$*:* -20.8‰
$\delta^{15}N$ *(diet):* +11.0‰

Sample: 1308, submitted on 27 March 2001 by R Clarke

Material: human bone (345g) (fragments of tibiae, femora, and other unidentified leg fragments) (S Mays 2001)

Initial comment: the skeleton 1308 in grave 1261 (fill 1262); the grave is cut by shallow medieval ditch 1545 and cut through remnants of Roman yard surface 1536.

Objectives: as GU-5857

Calibrated date: *1σ:* cal AD 1220–1290
2σ: cal AD 1180–1300

Final comment: R Clarke (8 January 2003), the radiocarbon date of this sample has helped to establish the Saxo-Norman/medieval date of the cemetery in this part of the cemetery, and is possibly more significant as it is located in the last row at the easternmost edge of the cemetery. The date ties in well with the dates of other graves in this area as well as with those from the Rodwells' excavations, and suggests that burial continued for longer into the medieval period in this part of the churchyard that was initially thought at the assessment stage.

GU–5860 990 ±50 BP

$\delta^{13}C$*:* -19.3‰
$\delta^{15}N$ *(diet):* +10.1‰

Sample: 1327, submitted on 27 March 2001 by R Clarke

Material: human bone (270g) (radii, ulnae, and humeri) (S Mays 2001)

Initial comment: the skeleton 1327 in grave 1328 (fill 1406) was sealed below the medieval deposits and cut through Roman yard surface 1536.

Objectives: as GU-5857

Calibrated date: *1σ:* cal AD 990–1150
2σ: cal AD 970–1170

Final comment: R Clarke (8 January 2003), as with the other samples, the radiocarbon date of this sample has confirmed the Saxo-Norman date of this burial, which is similar to that of grave 1369 to the south and some of those in the Rodwells' Area C2. The dates broadly support the overall interpretation of site development, which indicates that this part of the cemetery became part of the curtilage of the Priest's house in the twelfth or earlier thirteenth century.

GU–5861 970 ±50 BP

$\delta^{13}C$: -19.4‰
$\delta^{15}N$ *(diet):* +10.5‰

Sample: 1389, submitted on 26 March 2001 by R Clarke

Material: human bone (380g) (femora) (S Mays 2001)

Initial comment: the skeleton 1389 in grave 1282 (fill 1281), which is clipped on the southern edge by the medieval ditch 1533 (late thirteenth to fourteenth century), and cuts Roman yard surface 1536.

Objectives: as GU-5857

Calibrated date: *1σ:* cal AD 1010–1160
2σ: cal AD 980–1170

Final comment: R Clarke (8 January 2003), the radiocarbon date from this sample has confirmed the Saxo-Norman date of this burial, which is similar to that of skeleton 1327 to the immediate north, as well as those in the Rodwells' Area C2. The dates may indicate that the burials in the North Area of the site are slightly older than those in the South, which fits in fairly well with overall site development.

GU–5862 880 ±50 BP

$\delta^{13}C$: -19.3‰
$\delta^{15}N$ *(diet):* +12.4‰

Sample: 1415, submitted on 27 March 2001 by R Clarke

Material: human bone (275g) (skull vault) (S Mays 2001)

Initial comment: the skeleton 1415 in grave 1399 (fill 1398) cut through medieval or later deposits (1338) and was sealed by late medieval/post-medieval layers. The grave cut is deeper and much more regular in shape, possibly a coffined inhumation, and although no trace of the coffin was found, it also could have been a charcoal burial.

Objectives: as GU-5858, and is of particular interest as it may be a charcoal burial.

Calibrated date: *1σ:* cal AD 1040–1220
2σ: cal AD 1020–1270

Final comment: R Clarke (8 January 2003), the radiocarbon date indicates that this burial is Saxo-Norman or medieval, which is of a similar date range from the earliest phase of graves in the south area, as well as those excavated by the Rodwells', close to the church. This date and others in the south area, indicates a slight north-south progression to the cemetery in this part of the churchyard. This might be a charcoal burial and the date is not inconsistent with other known examples, which appear to fall into the date range of eleventh century to perhaps late-twelfth/early-thirteenth century.

GU–5863 880 ±80 BP

$\delta^{13}C$: -20.7‰
$\delta^{15}N$ *(diet):* +13.4‰

Sample: 1443, submitted on 27 March 2001 by R Clarke

Material: human bone (735g) (skull and unidentifiable long bone fragments) (S Mays 2001)

Initial comment: the skeleton 1443 in grave 1212 (fill 1213); sealed by medieval deposits and cut through the remnants of Roman yard surface 1536, and may be clipped on the southern edge by a later grave cut 1305, skeleton (1307) (GU-5858).

Objectives: as GU-5857

Calibrated date: *1σ:* cal AD 1030–1260
2σ: cal AD 990–1280

Final comment: R Clarke (8 January 2003), the radiocarbon date has confirmed the Saxo-Norman/early medieval date of this burial, and supports the stratigraphic relationship with the later grave 1307, which appears to be the latest burial in this part of the churchyard.

GU–5864 1190 ±50 BP

$\delta^{13}C$: -19.2‰
$\delta^{15}N$ *(diet):* +11.0‰

Sample: 1479, submitted on 27 March 2001 by R Clarke

Material: human bone (515g) (femora) (S Mays 2001)

Initial comment: the skeleton 1479 in grave 1480 (fill 1478); the grave was very truncated by medieval ditch 1533, but the skeleton was fully articulated, removing any possibility of disturbance.

Objectives: as GU-5857

Calibrated date: *1σ:* cal AD 770–940
2σ: cal AD 680–980

Final comment: R Clarke (8 January 2003), the radiocarbon date for this burial was surprisingly early compared with those sampled in rows to the west, especially as this is a grave in the last row of the cemetery. This may indicate that there was not a clear chronological progression in the rows of graves and that burial extended further away from the church soon after it was established in the tenth century.

Shapwick Heath, Somerset

Location: ST 419401
Lat. 51.09.24 N; Long. 02.49.51 W

Project manager: H Tinsley and V Straker (The Shapwick Project), 1998

Archival body: Somerset County Council

Description: in 1998, as part of the Shapwick Project, an auger borehole survey examined the detailed stratigraphy of the sediments in the area of Shapwick Heath closes to the dry land. The stratigrpahy along the transect clearly demonstrated two zones of peat accumulation (the lower and upper peat), separated by grey laminated clay-silts. After examination of these cores, the site at borehole A was chosen for further investigation. Borehole A at Shapwick Heath penetrated sediments which have accumulated between the Burtle Island and the Nidan Hills. The establishment of a dated early-mid Holocene environmental record was an important element in the project.

Objectives: to establish the age of the lower peat (never previously dated); to provide an environmental context for the Mesolithic flints from the adjacent Burtle Island (lower peat); and to establish whether the upper peat provides an environmental context for the historical development of the Shapwick settlements.

References: Tinsley 2007
Wilkinson 1998

OxA–11230 6700 ±45 BP

δ¹³C: -28.8‰

Sample: Shap 98/1, submitted in November 2001 by V Straker

Material: waterlogged plant macrofossil: unidentified, twig and stem fragments, probably monocotyledon (V Straker 2001)

Initial comment: the sample came from a 2cm thick slice of peat, at a depth of 6.94m from the surface. It comes from close to the junction of the Lower Somerset Levels peat with the underlying clay. The lower peat is undisturbed. A pollen diagram has been constructed for the lower peat. The environment at this time was oak-elm-hazel woodland, with very open ground.

Objectives: the existence of the lower peat on the Somerset Levels has been known for some time, but it has not been dated before.

Calibrated date: *1σ:* 5650–5560 cal BC
2σ: 5710–5540 cal BC

Final comment: H Tinsley (2007), this sample provides a date for the lower peat at BHA and provides a chronological framework for the pollen diagram (fig. 21.3; Gerrard and Aston 2007).

References: Gerrard and Aston 2007
Tinsley 2007

OxA–11231 6580 ±50 BP

δ¹³C: -28.4‰

Sample: Shap98/2, submitted in November 2001 by V Straker

Material: waterlogged plant macrofossil: *Alnus glutinosa*, cone (V Straker 2001)

Initial comment: as OxA-11230. This sample came from a 2cm thick slice of peat, at a depth of 6.36–6.38m from the surface. It comes from a point in the pollen diagram where pollen of alder has risen to 50% TLP.

Objectives: as OxA-11230

Calibrated date: *1σ:* 5610–5480 cal BC
2σ: 5630–5470 cal BC

Final comment: see OxA-11230

OxA–11232 6075 ±45 BP

δ¹³C: -29.0‰

Sample: Shap98/3, submitted in November 2001 by V Straker

Material: wood (waterlogged): bark (R Gale 2001)

Initial comment: the sample came from a 2cm thick slice of peat, at a depth of 5.67–5.69m from the surface. It comes from just below the junction of the inner peat with overlying intertidal or marine clays.

Objectives: the age of the marine transgression, which buried it is not known precisely (other than it is pre-Neolithic). The pollen data suggest that the contact between the peat and the overlying clay in not an erosive one. Therefore this date may provide a relative sea-level index point.

Calibrated date: *1σ:* 5050–4930 cal BC
2σ: 5210–4840 cal BC

Final comment: see OxA-11230

OxA–11233 5745 ±45 BP

δ¹³C: -25.6‰

Sample: Shap98/4, submitted in November 2001 by V Straker

Material: waterlogged plant macrofossil (stem fragments, probably from a monocotledon, not *Phragmites*, posibly sedge) (V Straker 2001)

Initial comment: the sample came from a 2cm thick slice of peat, at a depth of 2.98–3.00m from the surface. It comes from a point in the pollen record, which appears to be pre-elm decline, above the junction with the underlying marine clays. Pollen analysis of the sample suggests an environment of oak, elm, and hazel woodland, but with considerable grass pollen. This suggests a reed swamp, which had developed on marine clays.

Objectives: the project brief requires the dating of the lower boundary of the upper peat. This will allow it to be related to the other nearby dated sites (eg Sweet Track).

Calibrated date: *1σ:* 4690–4530 cal BC
2σ: 4720–4460 cal BC

Final comment: H Tinsley (2007), this sample provides a date for the lower boundary of the upper peat at BHA and provides a chronological framework for the pollen diagram (fig. 21.4; Gerrard and Aston 2007).

References: Gerrard and Aston 2007
Tinsley 2007

OxA–11234 3363 ±36 BP

$\delta^{13}C$: -26.4‰

Sample: Shap98/5, submitted in November 2001 by V Straker

Material: waterlogged plant macrofossil (stem fragments, probably monocotyledon, not *Phragmites*, possibly from sedge) (V Straker 2001)

Initial comment: the sample came from a 2cm thick slice of peat, at a depth of 0.36–0.38m from the surface. It comes from a point in the pollen record, which appears to be post-elm decline. Pollen analysis of the sample suggests an environment, which is largely wooded, dominated by alder and hazel. Anthropogenic indicators are few. This peat appears to be undisturbed, but above it from 0.30m to the surface there is evidence of bioturbation.

Objectives: the history of peat cutting in this part of Shapwick Heath, close to the junction with the Polden Hills, is not known. It is possible that some peat relating to the last 2000 years or so may survive. The low percentages of anthropogenic indicators in the pollen from this sample suggest that the upper peat may not extend into historic times, this date will clarify the situation.

Calibrated date: *1σ:* 1700–1610 cal BC
2σ: 1750–1530 cal BC

Final comment: H Tinsely (2007), this sample provides a date for the top of the upper peat pollen diagram sequence (fig. 21.4; Gerrard and Aston 2007). This Bronze Age date indicates considerable loss of peat from the surface, in contrast with the radiocarbon date of the most recent age for peat from the Somerset Levels of the tenth-century AD on Godney Moor (Straker *et al* 2002).

References: Straker *et al* 2002
Tinsley 2007

Shapwick, Old Church Field, Somerset

Location: ST 437387
Lat. 51.08.38 N; Long. 02.48.17 W

Project manager: C Gerrard (University of Durham), 1999

Archival body: Somerset Record Office, Taunton Museum

Description: Shapwick lies on the north-facing slope of the Polden Hills and has been the subject of a major landscape archaeology project since 1989. Site 73/99/4016 was a shallow 25m by 25m trench to the east of the church abandoned in AD 1329. The site lay near the spring to the west of Bearway Farm and included prehistoric, Roman, and early medieval deposits. The site produced many structures including wooden buildings, stone buildings, two lime kilns, a mixing pit, and boundary ditches.

Objectives: to date the wooden structure; to date the lime kiln and thus provide a *terminus post quem* for the stone structure which overlies it; to date the animal bones which fill a second abandoned lime kiln 15m to the south and provide a *terminus ante quem* for the use of the structure.

Final comment: P Marshall (2007), the nine measurements on charcoal from the postholes of the wooden building are not statistically consistent (T′=5276; T′(5%)=15.5; ν=8; Ward and Wilson 1978) and thus the fuel debris clearly originates from a number of separate phases of activity. The material submitted for analysis from posthole fill 159 (22A; OxA-11474–5 and 22B; OxA-11476) was not statistically consistent (T′=1467.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Of these nine measurements, three are clearly recognisable as being significantly earlier than the expected date for activity on the site. OxA-11462, -11473, and -11476 are statistically consistent (T′=2.5; T′(5%)=6; ν=2; Ward and Wilson 1978), and relate to some unknown activity in the Bronze Age. The close proximity of the three postholes from which these samples came suggests they cut an unrecognised Bronze Age feature, from which material was incorporated into the posthole fills. The other six measurements are not statistically consistent (T′=20.4; T′(5%)=11.1; ν=5; Ward and Wilson 1978), and therefore relate to use of the building over a considerable period of time. However, the three measurements on samples 159 (OxA-11474–5), 191A (OxA-11930), and 173 (OxA-11931) are statistically consistent, as are the three measurements on 192 (OxA-11461), 191B (OxA-11873), and 95 (OxA-11874), suggesting that these samples could be the result of two separate episodes of activity. This is possible; however, it is more probable that it is a product of the calibration curve for this period, the first group of samples fall on a very steep part of the curve, while the second fall on a plateau from the late-eighth to late-ninth century cal AD.

Following the end of use of the wooden building, a lime kiln was constructed: sample OxA-11933 represents fuel from the use of the kiln, and OxA-11932 from posthole 161 is interpreted as kiln fuel that was incorporated into the posthole. These measurements are statistically consistent (T′=3.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and could thus be of the same actual age. The consistency of the results adds weight to the interpretation that fuel would have been cut specifically for use in the kiln. There is no reason why it would have required seasoning, and it is most likely that the lime kiln would have been used once for a specific purpose, ie the construction of a nearby building.

The four measurements from the two lime kilns are not statistically consistent (T′=10.4; T′(5%)=7.8; ν=3; Ward and Wilson 1978), and thus represent two distinct episodes of activity. This means that they will probably have been built for the construction of two buildings.

Overlying the lime kiln is a stone building that seems to respect the alignment and dimensions of the earlier wooden structure, and thus may be a replacement of it.

Chronological modelling shows good agreement between the stratigraphy and the radiocarbon dates (Aoverall=93.8%). It provides an estimate for the start of use of the wooden building of *cal AD 540–760 (95% probability)* or *cal AD 610–720 (68% probability)*. However, there is an *86% probability* that the wooden building dates to before AD 705. This is significant as it is argued that the land unit later known as Shapwick was granted by King Ine to the Abbey at Glastonbury in AD 705. An estimate for the end of use of the building is *cal AD 810–980 (95% probability)*. The building would thus seem to have been in use for almost 400 years! The small number of dates available is, however, likely to mean that the estimate tends to suggest activity continued for longer than it really did. The end of activity and thus the *terminus post quem* for the stone building is estimated at *cal AD 1050–1350 (95% probability)* or *cal AD 1090–1250 (68% probability)*. An estimate for when the lime kiln was constructed is estimated as *cal AD 860–1110 (95% probability)* or *cal AD 910–1060 (68% probability)* (Marshall *et al* 2007, 1187–91).

References: Aston and Gerrard 1999
Gerrard 1995
Gerrard and Aston 2007
Marshall *et al* 2007
Ward and Wilson 1978

GU–5898 940 ±50 BP

$\delta^{13}C$: -20.3‰

Sample: 73/99/4016/R/Sample 1, submitted on 1 March 2002 by C Gerrard

Material: animal bone: *Bos* sp., right tibia, proximal end unfused (248.60g) (L Gidney 2002)

Initial comment: a fully articulated animal skeleton in the firing chamber of the abandoned lime kiln. One of several skeletons labelled as context 36. Six, probably seven, individual cattle are represented. Some are young adults, others mature.

Objectives: to establish a date for the animal skeletons. These bodies provide an opportunity, unique among the 12 sites excavated at Shapwick, for examining the age and sex composition of what would have been the live, working composition of the deliberately slaughtered population. The opportunity to compare the intact metrical and ageing data from these complete bodies with contemporary refuse that has been subjected to human processing should not be wasted. Also, to establish a *terminus post quem* for the lime kiln.

Calibrated date: *1σ:* cal AD 1020–1170
2σ: cal AD 990–1220

Final comment: P Marshall (2007), the two measurements are statistically consistent ($T'=2.4$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978) and could be of the same actual age. Given that the skeletons seem to represent a single act of deposition (eg as the result of some catastrophic event) it is justifiable, in this case, to take a weighted mean of the two results (996 ±35 BP), which calibrates to cal AD 980–1160 (95% confidence; Reimer *et al* 2004), although the probability distribution shows it is much more likely that the cattle died in the first half of the eleventh century cal AD.

References: Reimer *et al* 2004
Ward and Wilson 1978

GU–5899 1050 ±50 BP

$\delta^{13}C$: -20.3‰

Sample: 73/99/4016/R Sample 2, submitted on 1 March 2002 by C Gerrard

Material: animal bone: *Bos* sp., right tibia, proximal and distal ends fused (217.50g) (L Gidney 2002)

Initial comment: as GU-5898

Objectives: as GU-5898

Calibrated date: *1σ:* cal AD 960–1030
2σ: cal AD 880–1120

Final comment: see GU-5898

OxA–11461 1156 ±32 BP

$\delta^{13}C$: -25.3‰

Sample: 73/99/4016/R 192, submitted on 1 March 2002 by C Gerrard

Material: charcoal: Pomoideae (R Gale 2002)

Initial comment: the sample material is recovered from one of series of 35 postholes which make up the plan of wooden building. The building maybe contemporary with, or post-date, a substantial lime kiln, most probably the latter.

Objectives: to establish a date for the fuel debris represented by the mixed species charcoal samples. This will date the lime kiln; to establish a *terminus post quem* for the timber building; and to establish a *terminus post quem* for the stone building which was constructed in similar dimensions and orientation to its timber predecessor.

Calibrated date: *1σ:* cal AD 770–950
2σ: cal AD 770–980

Final comment: see series comments

OxA–11462 2771 ±34 BP

$\delta^{13}C$: -24.5‰

Sample: 73/99/4016/R 138 14, submitted on 1 March 2002 by C Gerrard

Material: charcoal: *Prunus spinosa* (<5g) (R Gale 2002)

Initial comment: as OxA-11461

Objectives: as OxA-11461

Calibrated date: *1σ:* 980–850 cal BC
2σ: 1010–830 cal BC

Final comment: see series comments

OxA–11473 2845 ±33 BP

$\delta^{13}C$: -24.6‰

Sample: 73/99/4016/R 154 20, submitted on 1 March 2002 by C Gerrard

Material: charcoal: Pomoideae (<5g) (R Gale 2002)

Initial comment: as OxA-11461

Objectives: as OxA-11461

Calibrated date: *1σ:* 1050–930 cal BC
2σ: 1120–910 cal BC

Final comment: see series comments

OxA–11474 1251 ±32 BP

$\delta^{13}C$: -25.7‰

Sample: 73/99/4016/R 159 22 A, submitted on 1 March 2002 by C Gerrard

Material: charcoal: Salicaceae (R Gale 2002)

Initial comment: as OxA-11461

Objectives: as OxA-11461

Calibrated date: *1σ:* cal AD 680–780
2σ: cal AD 670–880

Final comment: see series comments

Laboratory comment: English Heritage (2007), the two measurements (OxA-11474 and -11475 are statistically consistent (T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (1264 ±22 BP) calibrates to cal AD 670–810 (95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–11475 1277 ±31 BP

$\delta^{13}C$: -25.6‰

Sample: 73/99/4016/R 159 22 A, submitted on 1 March 2002 by C Gerrard

Material: charcoal: Salicaceae (R Gale 2002)

Initial comment: an autoduplicate of OxA-11474.

Objectives: as OxA-11461

Calibrated date: *1σ:* cal AD 670–770
2σ: cal AD 660–780

Final comment: see series comments

Laboratory comment: see OxA-11474

OxA–11476 2820 ±36 BP

$\delta^{13}C$: -25.0‰

Sample: 73/99/4016/R 159 22 B, submitted on 1 March 2002 by C Gerrard

Material: charcoal: *Prunus spinosa* (R Gale 2002)

Initial comment: as OxA-11461

Objectives: as OxA-11461

Calibrated date: *1σ:* 1020–910 cal BC
2σ: 1060–890 cal BC

Final comment: see series comments

OxA–11873 1189 ±30 BP

$\delta^{13}C$: -23.6 ±0.2‰

Sample: 73/99/4016R/191 B, submitted on 1 November 2002 by C Gerrard

Material: charcoal: *Prunus* sp. (R Gale 2002)

Initial comment: as OxA-11461

Objectives: as OxA-11461

Calibrated date: *1σ:* cal AD 770–890
2σ: cal AD 720–950

Final comment: see series comments

OxA–11874 1196 ±30 BP

$\delta^{13}C$: -24.6 ±0.2‰

Sample: 73/99/4016/R95, submitted on 1 November 2002 by C Gerrard

Material: charcoal: *Prunus* sp. (R Gale 2002)

Initial comment: as OxA-11461

Objectives: as OxA-11461

Calibrated date: *1σ:* cal AD 770–890
2σ: cal AD 710–950

Final comment: see series comments

OxA–11930 1277 ±27 BP

$\delta^{13}C$: -23.7 ±0.2‰

Sample: 73/99/4016R/191 A, submitted on 1 November 2002 by C Gerrard

Material: charcoal: *Prunus* sp. (R Gale 2002)

Initial comment: as OxA-11461

Objectives: as OxA-11461

Calibrated date: *1σ:* cal AD 670–770
2σ: cal AD 660–780

Final comment: see series comments

OxA–11931 1301 ±26 BP

$\delta^{13}C$: -27.6 ±0.2‰

Sample: 73/99/4016/R 173, submitted on 1 November 2002 by C Gerrard

Material: charcoal: *Alnus* sp. (R Gale 2002)

Initial comment: as OxA-11461

Objectives: as OxA-11461

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–770

Final comment: see series comments

OxA–11932 880 ±24 BP

$\delta^{13}C$: -26.3 ±0.2‰

Sample: 73/99/4016/R 59, submitted on 1 November 2002 by C Gerrard

Material: charcoal: Rosaceae, sub-family Pomoideae (R Gale 2002)

Initial comment: as OxA-11461

Objectives: as OxA-11461

Calibrated date: *1σ:* cal AD 1155–1210
2σ: cal AD 1045–1220

Final comment: see series comments

OxA–11933 942 ±25 BP

δ¹³C: -25.5 ±0.2‰

Sample: 73/99/4016 R 153, submitted on 1 November 2002 by C Gerrard

Material: charcoal: *Quercus* sp., sapwood (R Gale 2002)

Initial comment: charcoal recovered from the base of a kiln within the stone building, *c* 0.3m from the surface of the ploughsoil.

Objectives: as OxA-11461

Calibrated date: *1σ:* cal AD 1030–1160
2σ: cal AD 1020–1170

Final comment: see series comments

Shoeburyness: The Danish Camp, Essex

Location: TQ 93808460
Lat. 51.31.35 N; Long. 00.47.39 E

Project manager: P Owen (Gifford and Partners), 1998

Archival body: Southend Museum

Description: two surviving sections of a rampart and ditch enclosure, the original extent of which is unknown. It was heavily remodelled by the military in the nineteenth century.

Objectives: to date the initial construction of the monument and inform future management strategies.

Final comment: P Owen (14 March 2013), the Scheduled Monument known as the 'Danish Camp' was, at the time of scheduling, presumed to have been constructed in the late-ninth century AD as a refuge for retreating Viking forces following their defeat by Alfred at the battle of Benfleet in AD 894. However, excavations in the interior of the monument identified extensive evidence for occupation during the middle Iron Age. It was therefore decided, under funding from English Heritage, to excavate a trench through each of the two surviving sections of rampart in order to investigate their construction and, hopefully, provide evidence for the date of their construction. Trench 1 was excavated through the western section of rampart and provided a quantity of diagnostic pottery sherds. A recut in the base of the ditch contained two sherds of late Neolithic Grooved Ware, whilst a slot for a timber palisade or revetment identified beneath the rampart contained numerous sherds of middle Bronze Age pottery, including sherds from a Deverel-Rimbury bucket urn. A deposit that had accumulated behind the rampart contained sherds of pottery dating from the fifth to eleventh centurys AD. Trench 2, excavated through the southern section of rampart, produced no readily datable evidence but quantities of waterlogged plant material were identified in the fill of the ditch. Samples of this material were taken, and from this waterlogged seeds and a single charred grain of wheat we isolated for AMS dating. The evidence provided by the AMS dating has shown that the monument has much earlier origins than first thought, and that it was occupied (possible not continuously) from at least the late Neolithic to the early medieval period.

Laboratory comment: English Heritage (2000), the two measurements (OxA-9746 and OxA-9535) are not statistically consistent (T′=130.1; ν=1; T′(5%)=3.8; Ward and Wilson 1978). This means that the basal fill (context 32) of the ditch in trench 2 contains material of two separate ages. OxA-9746 comprised waterlogged seeds, thus it is unlikely that this material is residual, and although it is possible that the single charred *Triticum* sp. seed (OxA-9535) is intrusive we have no actual evidence to support this. For these reasons we cannot be sure of the date of the monument, it could be either Roman or Saxon. The only way to resolve the question of the date of the monument would be to submit more samples for radiocarbon analysis and given the lack of suitable sample this would undoubtedly require further excavation.

References: Ward and Wilson 1978

OxA–9535 1119 ±32 BP

δ¹³C: -21.0‰

Sample: Shoe-2, submitted on 9 December 1999 by P Owen

Material: grain: *Triticum* sp., charred (J Greig 1999)

Initial comment: from the primary waterlogged basal fill (context 32) of a shallow 'U'-shaped ditch cut into gravel to a depth of 3.2m. The rampart runs directly to the north east of the ditch.

Objectives: to date the rampart and ditch that do not have any associated artefacts.

Calibrated date: *1σ:* cal AD 880–980
2σ: cal AD 770–1000

Final comment: P Owen (14 March 2013), the single grain of charred wheat that has produced a date of circa AD 900, is the only evidence (aside from the reference in the Anglo-Saxon Chronicles) for occupation of the Danish Camp during its presumed date of construction.

OxA–9746 1830 ±55 BP

δ¹³C: -26.0‰

Sample: Shoe-1, submitted on 9 December 1999 by P Owen

Material: waterlogged plant macrofossils (seeds (*Urtica dioica*, *Chenopodium* sp., *Montia fontana*, *Rumex acetosella*, *Viola* sp. *Prunus*/*Crataegus* thorn, *Sonchus asper*, *Carex* sect *Carex*, *Onopordum acanthium*)) (J Greig 1999)

Initial comment: as OxA-9535

Objectives: as OxA-9535

Calibrated date: *1σ:* cal AD 90–250
2σ: cal AD 60–340

Final comment: P Owen (14 March 2013), the date produced by the waterlogged seeds recovered from the fill of the ditch falls within the later Roman period, and whilst not conclusive proof of occupation during this period, is an indication that the the rampart and ditch were in existence.

Silbury Hill, Wiltshire

Location: SU 09976854
Lat. 51.24.55 N; Long. 01.51.24 W

Project manager: A Whittle (Cardiff University), 1968–9

Archival body: Alexander Keiller Museum

Description: the monumental mound at Silbury. A central feature of the later Neolithic complex around Avebury. These samples derive from the 1968–9 tunnel dug by R J C Atkinson in the BBC-sponsored excavation.

Objectives: to provide a date for activity associated with construction at the summit of Silbury Hill.

Final comment: A Bayliss (2007), these radiocarbon dates were incorporated into a chronological model along with other dates from Silbury Hill, and indicate that the raising of the primary mound occurred in the twenty-fourth or twenty-third century cal BC (Bayliss *et al* 2007).

Laboratory comment: English Heritage (24 June 2014), 27 further samples from this site were dated after 2003 (GrA-27331–2, -27335–6, -28466, -28555, OxA-14640–3, -17470–4, -20805–9, SUERC-24081–2, -24086–91, -24828–9, and -27238–41).

References: Bayliss *et al* 2007a
Marshall *et al* 2013
Whittle 1997

OxA–13210 3401 ±36 BP

$\delta^{13}C$: -22.1‰

Sample: Sample 1, submitted on 1 February 2002 by A Whittle

Material: antler: *Cervus elaphus*, probable red deer tine (12g) (P Baker 2002)

Initial comment: this sample is from the early part of the tunnel excavation of April 1968. it is therefore not far into the tunnel, but had not been given a precise location other than 'e side of chalk block wall'. There are chalk block walls around rings 11–13/14 on both sides of the tunnel (Whittle 1997, figs 10–11) about 14–18m into the mound, in the makeup of the chalk mound, and the sample should belong here.

Objectives: to date the construction of the secondary mound. The sample is a fragment of antler tine probably broken from a pick during the quarrying of the chalk making up the mound. This sample should date the completion of the secondary mound (phase III in Atkinson's terms).

Calibrated date: *1σ:* 1750–1640 cal BC
2σ: 1870–1610 cal BC

Final comment: A Bayliss (2007), Sample 1 was excluded from subsequent chronological modelling (Bayliss *et al* 2007) on the grounds that its location within the outer chalk mound was not precisely located, that it is statistically significantly later than the other two samples from the chalk mound, and that it may therefore relate to later, peripheral modification of the mound. On the basis of this date further modification of the outermost parts of the mound is indicated as lasting into the early second millennium cal BC.

Laboratory comment: English Heritage (2007), a replicate of this sample was subsequently dated (GrA-27336; 3390 ±40 BP) and the two results are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). A weighted mean (3396 ±27 BP) can therefore be taken before calibration (1750–1620 cal BC at 95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–13211 2792 ±34 BP

$\delta^{13}C$: -20.4‰

Sample: Sample 4, submitted on 1 February 2002 by A Whittle

Material: animal bone: unidentifiable, sheep/goat size (6g) (P Baker 2002)

Initial comment: from the tunnel at 0.87E, 1.31N–1.26N on the old land surface at the eastern edge of 'pit' or disconformity in layers at the base of the primary mound (Whittle 1997, 20). Dated 1/8/69, it was initially thought during the excavation to be a pit.

Objectives: this sample provides a *terminus post quem* for the construction of the primary mound.

Calibrated date: *1σ:* 1000–900 cal BC
2σ: 1020–840 cal BC

Final comment: A Bayliss (2007), the chronological model (Bayliss *et al* 2007; fig. 4) which incorporates the recorded stratigraphic sequence of all these samples is infinitely improbable. The most dramatic disconformity is between sample 4 (OxA-13211) and its recorded position as being from the old land surface beneath the primary mound. This date is at least a millennium later than the replicated samples of moss fragments from the turves forming the primary mound: from the stratigraphy an unimpeachably later context. The survival of uncharred mosses and grasses on the surface of these turves strongly indicates that the mound cannot be of late Bronze Age date, as such material would not survive in aerobic conditions for an entire millennium. There is no obvious explanation for this result, but it is just possible that younger material was inadvertently introduced (on the soles of footwear for example) into the centre of the mound either during the eighteenth-century vertical tunnel or the nineteenth-century horizontal tunnel, or in the subsequent individual and unauthorised explorations of the collapsing 1849 tunnel after 1915, as recorded in correspondence with Richard Atkinson (Whittle 1997, 10), or indeed during the 1968–9 excavations. An alternative is that the very small sample in question had been mis-recorded during the excavations.

OxA–13333 3916 ±28 BP

$\delta^{13}C$: -20.8‰

Sample: Sample 5, submitted on 1 February 2002 by A Whittle

Material: animal bone: *Sus* sp., proximal radius (left) (13g) (P Baker 2002)

Initial comment: from the old land surface at ring 4 of the western lateral tunnel in the area of the primary mound (Whittle 1997, fig 12).

Objectives: as OxA-13211

Calibrated date: *1σ:* 2470–2340 cal BC
2σ: 2480–2290 cal BC

Final comment: A Bayliss (2007), chronological modelling of the radiocarbon dates from Silbury Hill indicates that this sample dates to *2495–2460 cal BC (95% probability*; Bayliss *et al* 2007).

Laboratory comment: English Heritage (2007), a replicate of this sample was subsequently dated (GrA-27332; 4015 ±45 BP) and the two results are statistically consistent (T′=3.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978). A weighted mean (3944 ±24 BP) can therefore be taken before calibration (2250–2345 cal BC at 95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

Stonea Camp, Wimblington, Cambridgeshire

Location: TL 448931
Lat. 52.30.58 N; Long. 00.08.03 E

Project manager: T Malim (Archaeology Section, Cambridgeshire County Council), 1993

Archival body: English Heritage

Description: a multi-vallate Iron Age Fort whose outermost defences enclose 24 acres. It is situated on the very edge of a fen island, at 2m OD. In concept and scale Stonea Camp is similar to the hillforts of southern and western England, whilst unparalleled in Cambridgeshire and largely unlike any forts in the surrounding region. However, there is little evidence to suggest much occupation of the site, and instead when viewed in the light of the greater landscape Stonea Camp should be seen as a focal point for the surrounding Iron Age communities, evidence of whose settlement can be found elsewhere in the locality.

Objectives: a soil monolith was taken to complement the samples already obtained from the basal deposits of the forts ditches; OxA-3620, OxA-4064, GU-5331, and GU-5332. The monolith came from natural deposits adjacent to the fort and therefore will give a valuable control to the results from the infill of the ditches, providing a better general context for the environment into which the Camp was constructed than that so far established from the previous samples.

Final comment: P Wiltshire (14 June 1999), these samples were obtained from an area some distance from the feature where palynological assessment and macrofossil analysis had indicated a wooded environment in the Iron Age. It was hoped that the sediments from the monolith WIMSC 93 would provide information on spatial heterogeneity of the Iron Age vegetation at the site. Bronze Age dates indicated that Iron Age deposits had been lost. The apparent inversion in the radiocarbon estimations might be explained by the upper sediments having been contaminated by unwashed soil containing humus of older age than the sediments themselves.

Laboratory comment: English Heritage (8 June 2010), samples obtained from the basal deposits of the fort's ditches (OxA-3620, OxA-4064, GU-5331, and GU-5332), were published in Bayliss *et al* 2013, 186–7).

References: Bayliss *et al* 2013, 186–7
Malim 2005

OxA–8427 3415 ±55 BP

$\delta^{13}C$: -29.0‰

Sample: WIMSC93 34, submitted on 24 April 1998 by P Wiltshire

Material: peat (fen organic silty peat) (P Wiltshire 1995)

Initial comment: from 34cm from the top of a monolith 0.5m in depth, taken through the natural sequence of Fen deposits adjacent to Stonea Camp Iron Age Fort. The sequence runs from basal (Jurassic) clay through at least two episodes of peat formation and terminating in a clay sealing layer. This layer is in turn covered by increasingly coarse silty clay until a fine sand deposit precedes topsoil, although these latter layers (silty clay and sand) were not included in the monolith. These undisturbed deposits were subjected to a fluctuating watertable in recent decades. It is unlikely that there has been any root disturbance at this depth as landuse was pasture for 2000 years before being ploughed for arable *c* 35 years ago. The base of the monolith is 0.06 OD.

Objectives: to date the beginning and end of the peat sequence together with OxA-8445 (WIMSC93/1:20 16) in order to provide a chronological framework for pollen analysis of the peat, and to relate this analysis to other dated sediments. This particular sample will date the base of the monolith and therefore the beginning of the peat sequence.

Calibrated date: *1σ:* 1770–1630 cal BC
2σ: 1890–1610 cal BC

Final comment: P Wiltshire (14 June 1999), this sample was one of two taken from a feature thought to have been at the edge of the settlement. It was hoped that palynological analysis might fire additional information on the Iron Age landscape and heterogeneity within the local vegetation. However, this result indicates that the sediment formed in the Bronze Age and is therefore not related to the pertinent archaeology. It would seem that the Iron Age deposits were lost from the features.

OxA–8445 3645 ±55 BP

$\delta^{13}C$: -28.6‰

Sample: WIMSC93 16, submitted on 24 April 1998 by P Wiltshire

Material: peat (fen silty peat) (P Wiltshire 1995)

Initial comment: as OxA-8427. From 16cm from the top of a monolith.

Objectives: as OxA-8427. This particular sample will date the top of the monolith and therefore the end of the peat sequence.

Calibrated date: *1σ:* 2130–1930 cal BC
2σ: 2200–1880 cal BC

Final comment: P Wiltshire (14 June 1999), this sample was taken from a feature a little distance away from a ditch where human remains had been found. It was hoped that palynological analysis might fire information on spatial heterogeneity of repetition at the site in the Iron Age. However, the deposits were of Bronze Age date and not strictly relevant to the archaeology. It is supposed that Iron Age deposits, which accumulated above this sediment, were lost.

Stonehenge: burial by Y Hole 9, Wiltshire

Location:	SU 12254219 Lat. 51.10.42 N; Long. 01.49.29 W
Project manager:	W Hawley (Office of Works), 1923
Archival body:	Natural History Museum

Description: from a grave pit close to Y Hole 9. Most of a human skeleton excavated at Stonehenge in 1923, believed destroyed by bombing in 1941, was relocated in the Natural History Museum in 1999. A new study of the bones showed them to represent a man of Anglo-Saxon date (not Neolithic or Roman as previously suggested) aged 28–32, born in central southern England. He had been beheaded, probably with a sword.

Objectives: the man was radiocarbon dated in 2001 by two samples to cal AD 600–690 (Pitts *et al* 2002) by the Oxford Radiocarbon Accelerator Unit.Given the importance of this date, and recent improvements in pretreatment methods for bone (see Bronk Ramsey *et al* 2004), English Heritage and the Oxford Radiocarbon Accelerator Unit decided to retest these samples. The method in use when these samples were originally dated (Bronk Ramsey *et al* 2000) could give ages that were too old, especially where collagen yields from the chemical pretreatment were very low. In this instance, one of the original dates (OxA-9921) was performed on only 2.8mg collagen.

Final comment: D Hamilton, M Pitts, and A Reynolds (3 August 2006), the new date, OxA-13193 is indeed younger than the original dates (OxA-9361 and OxA-9921), by about 200 years in the case of the very low collagen sample and about 100 years for the other. While this brings forward the likely era in which the man died by 60–200 years, we do not feel this affects the discussion of the circumstances of that event (Pitts *et al* 2002): if anything, a slightly more recent date provides a better context for judicial execution by decapitation rather than hanging. The burial is still at least 240 years older than any known historical reference to Stonehenge (Pitts *et al* 2007).

References:	Bronk Ramsey *et al* 2000 Bronk Ramsey *et al* 2004b Pitts *et al* 2002 Pitts *et al* 2007

OxA–13193 1258 ±34 BP

$\delta^{13}C$*:* -19.5 ±0.3‰
$\delta^{15}N$ *(diet):* +8.6‰
C/N ratio: 3.3

Sample: Skeleton 4.10.4, submitted in 1999 by M Pitts

Material: human bone

Initial comment: the excavation of this fully articulated skeleton is well described in Hawley's diary. It was published with reference to anatomical comment from Arthur Keith. A shallow pit (26" below ground level) was dug into chalk (64" long, width 17–24") apparently expressly for the body. There were no associated finds.

Objectives: this is one of only three complete skeletons found at Stonehenge. The Beaker-age burial found in 1978 is well dated by five determinations to 2400–2140 cal BC (weighted mean 3819 ±28 BP; OxA-4886, 3960 ±60 BP; OxA-5044, 3785 ±87 BP; OxA-5045, 3825 ±60 BP; OxA-5046 ±55 BP; BM-1582, 3715 ±70 BP; T′=8.7; T′(5%)=9.5; ν=4; Ward and Wilson 1978) (Cleal *et al* 1995). Both the 1923 and 1926 skeletons have been given suggested dates by archaeologists ranging from Neolithic to Roman. The dating of this skeleton is intrinsically important to our understanding of Stonehenge.

Calibrated date:	*1σ:* cal AD 680–780 *2σ:* cal AD 660–880

Final comment: M Pitts (7 October 2004), the archaeology and historical context for the dated burial were fully described with the earlier radiocarbon dates in Pitts *et al* 2002. The new date has no impact on the interpretation presented there, namely that the burial was likely related to an early judicial execution at a remote location close to hundred boundaries. Its further interest lies in this being the oldest indication that Stonehenge possessed cultural significance in historical times. Also noted is that this replacement ^{14}C date is indistinguishable from an earlier (all but undocumented) result from the same skeleton obtained by Harwell in 1976 (no laboratory number) for Wystan Peach: 1190 ±80 BP (Pitts 2001, 318).

References:	Allen and Bayliss 1995 Pitts 2001

Sutton Common: peat bog pollen, South Yorkshire

Location:	SE 56701220 Lat. 53.36.11 N; Long. 01.08.35 W
Project manager:	J E Schofield (University of Hull), 1998
Archival body:	Doncaster Museum

Description: two Iron Age enclosures separated by a palaeochannel. Rough pasture on site is bordered to the east by a shallow basin supporting a variety of wetland (mire) species, Shirley Wood and Shirley Pool.

Objectives: to provide a chronological framework for a pollen diagram which provides evidence for human impact on the vegetation surrounding Sutton Common by prehistoric peoples. Dating is necessary in order to gain a wider understanding of the character and timing of human utilisation of the site, especially during the period the enclosures were constructed and occupied.

Final comment: J E Schofield (30 September 1999), the series consisted of five radiocarbon samples for AMS dating taken at depths of 44cm, 128cm, 215cm, 465cm, and 775cm for which biostratigraphical (ie pollen) data already exists. Each comes from an 8m (50mm diameter) core recovered from the edge of Shirley Wood using a modified Stitz Piston Corer. Samples were macrofossils sieved and removed from sediment that is predominantly fen peat. Additionally a 1cm slice of sediment was also included from the topmost and basal sample depths (ie 44cm and 775cm).The dating programme provides a chronology for the vegetational history of Sutton Common spanning approximately 5500 calendar years (4000 radiocarbon years) from the late Mesolithic to the late Iron Age. Replicate samples from the base of the sequence (OxA-8602, OxA-8603, OxA-8674, OxA-8675) suggest peat formation began just prior to *c* 4800 BC, with dense *Alnus glutinosa* fen carr replacing *Tilia* woodlands. An age-estimate for the *Ulmus* decline compares favourably with dates from other sites across the British Isles (5040 ±45 BP; OxA-8676) (5025 ±45 BP; OxA-8677). However there is little further evidence for human activity in the environmental record until the Bronze Age. Samples OxA-8678 and OxA-8679 indicate that after *c* 2100 cal BC a depositional change of silty peats occurred which may reflect increased catchment disturbance and soil instability, although corroborative evidence for woodland clearance within the palynological record is limited. Samples OxA-8680 and OxA-8681 suggest that by *c* 1700 cal BC the site had become wetter, with increased pollen frequencies for *Alnus*, *Salix*, and Sparganiaceae replacing *Quercus and Corylus avellana*-type. Shortly after *c* 270 cal BC the fen carr environment is replaced by open grassland and sedge-fen communities. Similar changes are witnessed in pollen diagrams from ditch deposits that post-date the construction of the prehistoric enclosures. It is unclear as to whether the carr woodlands were purposefully felled to provide agricultural land, though there is tentative evidence within the pollen record for both pastoral and arable agriculture following these vegetation changes. Unfortunately, the replicate samples taken from the top of the sequence (OxA-8604, OxA-8636, OxA-8683, and OxA-8682) provide significantly different dates which prevents an accurate chronological reconstruction for vegetational changes over the late Holocene period that the enclosures were apparently occupied.

References: Bronk Ramsey *et al* 2000
Van de Noort and Chapman 1999

OxA–8602 6180 ±65 BP

δ¹³C: -28.1‰

Sample: SC1 775cm A, submitted on 16 March 1999 by J Schofield

Material: peat (10g) (humin)

Initial comment: recovered from a well-humified dark brown amorphous peat containing woody fragments at a depth of 7.75m. This lay immediately above a diffuse stratigraphic boundary onto (basal) silts and clays at 7.77m. Closer examination of the sediment matrix revealed root-wood. This was removed from the sample where possible using forceps. Palynological data from this depth indicates an increasingly wet environment in which closed woodland dominated by lime trees and pine was replaced by oak, hazel, and especially alder. *See* also samples OxA-8603, OxA-8674, and OxA-8675.

Objectives: to establish the onset of peat formation, providing a basal date for core SC1.

Calibrated date: *1σ:* 5220–5030 cal BC
2σ: 5310–4940 cal BC

Final comment: J Schofield (24 January 2000), the pollen diagram at OxA-8602 shows a change from *Tilia*-dominated dry woodlands to *Alnus glutinosa* fen carr associated with paludification at the site. Peat initiation on the Humberhead Levels has principally been seen as a response to rising postglacial sea-levels, raising water tables and impeding freshwater runoff (Buckland and Sadler 1985; Buckland and Dinnin 1997; Dinnin 1997). The basal date from Sutton Common reinforces the suggestion that peat initiation across the region was time-transgressive for it is somewhat earlier than dates obtained by Smith (2002) for the base of surviving peatlands at nearby Hatfield Moors *c* 2880 BC (CAR-168; 4180 ±70 BP, 2920–2500 cal BC at 2σ: and CAR-254; 4335 ±75 BP, 3310–2710 cal BC at 2σ) and Thorne Moors *c* 2150 BC (CAR-221; 4545 ±75 BP, 3510–2970 cal BC at 95% at 2σ: and CAR-180; 3060 ±65 BP, 1490–1120 cal BC at 2σ; Reimer *et al* 2004).

Laboratory comment: English Heritage (August 2014), the four measurements from 775cm (OxA-8602–3; -8674–5) are statistically significantly different (T′=133.1; T′(5%)=7.8; ν=3; Ward and Wilson 1978). There seems to be some older organic material in this deposit, a significant amount of which has become incorporated with OxA-8603. The two measurements on the humin fraction (OxA-8602–3) are also statistically significantly different (T′=38.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Buckland and Dinnin 1997
Buckland and Sadler 1985
Dinnin 1997
Smith 2002
Ward and Wilson 1978

OxA–8603 6750 ±65 BP

δ¹³C: -28.3‰

Sample: SC1 775cm A, submitted on 16 March 1999 by J Schofield

Material: peat (10g) (humin)

Initial comment: a replicate of OxA-8602.

Objectives: as OxA-8602

Calibrated date: *1σ:* 5720–5620 cal BC
2σ: 5750–5550 cal BC

Final comment: J Schofield (24 January 2000), it should be noted that OxA-8603 provided a date that was significantly older than replicate samples OxA-8602, OxA-8674 and OxA-8675. This implies that some older organic material may have become incorporated within the sample and that the age-estimate thus provided by OxA-8603 should be treated with some caution. *See* also OxA-8602.

Laboratory comment: *see* OxA0–8602

OxA–8604 2875 ±55 BP

$\delta^{13}C$*:* -28.5‰

Sample: SC1 44cm A, submitted on 16 March 1999 by J Schofield

Material: waterlogged plant macrofossil: twig

Initial comment: recovered from a unit of well humified dark brown silty wood peat at a depth of 44cm. The sample is located approximately 10cm below a very diffuse contact onto dry black oxidised peat. Palynological data suggests the local environment consisted of an alder-carr surrounded by mostly open cleared areas on the drier soils.

Objectives: to establish the date just prior to the alder decline and clearance of the wetland (which occurs at *c* 30cm but is probably unsuitable for dating due to oxidation and rootlet penetration of sediment above 40cm). This will provide a date for a second phase of deforestation at Sutton Common in which a determined effort was apparently made to clear the carr.

Calibrated date: *1σ:* 1130–940 cal BC
2σ: 1220–900 cal BC

Final comment: J Schofiled (24 January 2000), this late Bronze Age date should be treated with caution. In an earlier archaeological investigation of the site, Parker Pearson and Sydes (1997) concluded that all dated occupation of the prehistoric enclosures at Sutton Common probably occurred after 500 cal BC and before 200 cal BC. OxA-8604 thus provides a date prior to the construction of the enclosures. However palynological results associated with OxA-8604 closely correspond with the 'on-site' pollen record reconstructed from ditch-fill deposits that post-date the construction of the earthworks, ie they were deposited following phase 2 of the site occupation (Van de Noort and Chapman 1999). Furthermore, a replicate AMS plant macrofossil date, OxA-8683, from the same depth as OxA-8604 provided a substantially younger date which falls within Parker Pearson and Sydes (1997) date-range for occupation of the site. The implication, therefore, is that the date provided by OxA-8604 may be erroneous ie too old. Why this should be so is uncertain, although one possible explanation could be that the taphonomic history of the macrofossil used to provide date OxA-8604 involved erosion and subsequent redeposition within a deposit of a younger age. Consequently the precise chronology of late Bronze Age and Iron Age vegetational changes and their relationship to the occupation of the prehistoric enclosures at Sutton Common remains somewhat uncertain.

Laboratory comment: English Heritage (August 2014), the four measurements from 44cm (OxA-8604, -8636, -8682–3) are statistically significantly different (T′=104.8; T′(5%)=7.8; ν=3; Ward and Wilson 1978). The measurements on the two twigs (OxA-8604 and -8683) are themselves statistically significantly different (T′=31.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and both are significantly older than the results of the humin fraction (OxA-8636 and -8682).

References: Parker Pearson and Sydes 1997
Van de Noort and Chapman 1999
Ward and Wilson 1978

OxA–8636 2235 ±45 BP

$\delta^{13}C$*:* -27.6‰

Sample: SC1 44cm C, submitted on 16 March 1999 by J Schofield

Material: peat (10g) (humin)

Initial comment: as OxA-8604

Objectives: as OxA-8604

Calibrated date: *1σ:* 390–200 cal BC
2σ: 400–180 cal BC

Final comment: J Schofield (24 January 2000), in an earlier archaeological investigation of the site, Parker Pearson and Sydes (1997) concluded that all dated occupation of the prehistoric enclosures at Sutton Common probably occurred after 500 cal BC and before 200 cal BC. OxA-8636 falls within this range suggesting vegetational changes that can be observed from core SC1 around OxA-8636 can be considered contemporary with Iron Age site occupation. Palynological results from SC1 closely correspond with the 'on-site' pollen record constructed from ditch-fill deposits that post-date the construction of the earthworks (ie deposited following phase 2 of site occupation (Van de Noort and Chapman 1999). Essentially two local pollen assemblage zones can be recognized for this period; a lower alder and tree-pollen dominated zone, and an upper zone characterized by grasses, sedges, and a variety of ruderal herbaceous types (eg Brassicaceae, Asteraceae (Lactuceae), *Plantago lanceolata*). Cereal-type pollen grains also increase in frequency and a single grain of *Secale cereale* is recorded. This implies change from a predominantly wooded to open agricultural landscape at Sutton Common by the end of the Iron Age. However, the date provided by OxA-8682 should be treated with some caution. Replicate AMS dating conducted on individual plant macrofossils (OxA-8683 and OxA-8604) from the same depth as OxA-8636 provided substantially older dates. A plausible explanation for these anomalous results may be that the peat sample used to provide OxA-8636 was contaminated with younger carbon, possible intrusive rootlets, since the peat was obtained from a depth of just 50cm below the modern surface. As a consequence precise dating of the vegetational changes associated with the prehistoric occupation of Sutton Common is still somewhat uncertain.

Laboratory comment: English Heritage (August 2014), *see* OxA-8604. The measurements on the humin fraction are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Parker Pearson and Sydes 1997
Van de Noort and Chapman 1999
Ward and Wilson 1978

OxA–8674 5985 ±50 BP

$\delta^{13}C$*:* -27.2‰

Sample: SC1 775cm B, submitted on 16 March 1999 by J Schofield

Material: waterlogged plant macrofossil: twig (A Bayliss 1999)

Initial comment: as OxA-8602

Objectives: as OxA-8602

Calibrated date: *1σ:* 4950–4790 cal BC
2σ: 5000–4720 cal BC

Final comment: see OxA-8602

Laboratory comment: see OxA-8602

OxA–8675 5895 ±40 BP

$\delta^{13}C$: -29.2‰

Sample: SC1 775cm C, submitted on 16 March 1999 by J Schofield

Material: waterlogged plant macrofossil: twig (A Bayliss 1999)

Initial comment: as OxA-8602

Objectives: as OxA-8602

Calibrated date: *1σ:* 4800–4710 cal BC
2σ: 4850–4680 cal BC

Final comment: see OxA-8602

Laboratory comment: see OxA-8602

OxA–8676 5040 ±45 BP

$\delta^{13}C$: -29.2‰

Sample: SC1 465cm A, submitted on 16 March 1999 by J Schofield

Material: waterlogged plant macrofossil: twig (A Bayliss 1999)

Initial comment: from a fen wood peat containing abundant leaves, twigs, some seeds and moss at a depth of 465cm. The sediment displayed a certain amount of stratification - it had a tendency to split horizontally to reveal a matrix built up from leaf litter. Palynological data indicates a local environment of dense fen woodland dominated by oak and alder with hazel at this time.

Objectives: to establish a date for the elm-decline and thus the Mesolithic/Neolithic transition. The elm-decline marks the first event in the palynological record for Sutton Common where a human impact on the local vegetation is suggested.

Calibrated date: *1σ:* 3950–3770 cal BC
2σ: 3970–3700 cal BC

Final comment: J Schofield (24 January 2000), although *Ulmus* pollen is never well represented in the pollen record at the site, rarely exceeding 4% TLP (total land pollen), above 465cm *Ulmus* pollen frequencies fall consistently below 1% TLP and never recover. OxA-8676 provides an age-estimate that compares favourably with the mid-Holocene *Ulmus* decline registered in numerous pollen diagrams from sites across the British Isles (eg Peglar 1993). Neolithic agriculture, pathogen attack, or a combination of these two factors acting selectively upon elm trees is now the favoured explanation for the decline in *Ulmus* populations. At Sutton Common there is little within the pollen record to suggest woodland clearance and agriculture at this time. The most notable feature accompanying the *Ulmus* decline is a steady rise in the frequencies of *Corylus avellana*-type pollen. Similar increases in *C. avellana*-type following the *Ulmus* decline have been observed in the Brede and Pannel Valleys, East Sussex (Waller 1987), and Fenland (Waller 1994). In each case the explanation given for the increase in *Corylus* pollen was that flowering of this species might be expected to rise in response to openings in the woodland canopy (caused by the death of *Ulmus* trees) if *Corylus* were present within these woodlands principally as understorey shrubs.

Laboratory comment: English Heritage (August 2014), the pair of measurements (OxA-8676–7) on twigs from 465cm are statistically consistent (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Peglar 1993
Waller 1987
Waller 1994
Ward and Wilson 1978

OxA–8677 5025 ±45 BP

$\delta^{13}C$: -28.6‰

Sample: SC1 465cm B, submitted on 16 March 1999 by J Schofield

Material: waterlogged plant macrofossil: twig (A Bayliss 1999)

Initial comment: as OxA-8676

Objectives: as OxA-8676

Calibrated date: *1σ:* 3940–3710 cal BC
2σ: 3960–3700 cal BC

Final comment: see OxA-8676

Laboratory comment: see OxA-8676

OxA–8678 3715 ±45 BP

$\delta^{13}C$: -27.7‰

Sample: SC1 215cm A, submitted on 16 March 1999 by J Schofield

Material: waterlogged plant macrofossil: bark (A Bayliss 1999)

Initial comment: from a fen wood peat containing twigs, bark, and some roots at a depth of 215cm. The sample underlies a contact onto a silty grey peat at 207cm. Palynological data suggests a rather open fen woodland of alder and oak dominated the site, with a ground covering of ferns.

Objectives: to establish a date for the onset of deforestation at Sutton Common. Palynological data suggests clearance of trees favouring drier soils may have begun at this time (curves for oak, hazel, and ash all show some decline, whereas pollen from herbs such as grasses increases). There is also an increase in inorganic input (potentially slopewash) to the deposit at this depth. This date may correlate with the first major phase of occupation of the enclosures at the site.

Calibrated date: *1σ:* 2200–2030 cal BC
2σ: 2280–1970 cal BC

Final comment: J Schofield (24 January 2000), above 215cm the peat incorporates an increasing amount of silt suggesting local slope instability and soil erosion may have occurred from this point in time. Soil erosion often results from woodland clearance and the conversion of natural ecosystems to agricultural land. Smith (1985) argues that relatively small-scale clearances are apparent in the pollen records from Thorne and Hatfield Moors between *c* 1800–2100 BC, dates that compare favourable with OxA-8678. Evidence of clearance in the Sutton Common pollen diagram at this time is limited, although both the *Quercus* and *Corylus avellana*-type pollen curves do register temporary falls and there is a small increase in grasses and ferns. It is possible that the apparently dense nature of the fen carr woodlands around the sampling site may have acted as a buffer to pollen transport from all but the most immediate local sources, and as a consequence any small-scale human disturbances to the vegetational cover during this period may have passed undetected in the pollen record.

Laboratory comment: English Heritage (August 2014), the pair of measurements (OxA-8678–9) on twigs from 215cm are statistically consistent (T′=0.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Smith 2002
Ward and Wilson 1978

OxA–8679 3755 ±45 BP

δ[13]C: -29.3‰

Sample: SC1 215cm B, submitted on 16 March 1999 by J Schofield

Material: waterlogged plant macrofossil: twig (A Bayliss 1999)

Initial comment: as OxA-8678

Objectives: as OxA-8678

Calibrated date: *1σ:* 2280–2050 cal BC
2σ: 2300–2030 cal BC

Final comment: see OxA-8678

Laboratory comment: see OxA-8678

OxA–8680 3435 ±40 BP

δ[13]C: -27.4‰

Sample: SC1 128cm A, submitted on 16 March 1999 by J Schofield

Material: waterlogged plant macrofossil: bark (1.80g) (A Bayliss 1999)

Initial comment: from a well-humified dark brown silty wood peat containing roots at a depth of 128cm. Palynological data suggests an expansion of the wetland to a late-Holocene maximum at this time. The environment comprised tall reed swamp surrounded by alder-willow carr, with increasingly open oak-hazel woodland on the drier soils beyond this.

Objectives: to establish a date for the maximum of wetland expansion at the site, potentially associated with its Iron Age occupation and continued deforestation of the remaining drier soils.

Calibrated date: *1σ:* 1870–1680 cal BC
2σ: 1890–1630 cal BC

Final comment: J Schofield (24 January 2000), this sample was submitted to provide an age-estimate for what appears to be a hydrological change at the site towards wetter conditions. At this point the pollen record suggests that trees and shrubs of wet or waterlogged soils increased in numbers at the expense of taxa that favour drier edaphic conditions. In particular pollen frequencies of *Alnus, Salix,* Cyperaceae, Poaceae, and Sparganiaceae rise whilst *Quercus, Tilia*, and *Corylus avellana*-type frequencies decline. The underlying cause for these changes is uncertain. However, since OxA-8680 returns a middle Bronze Age date this suggests that the event was not connected with the construction and occupation of the adjacent prehistoric enclosures, which almost certainly date to the Iron Age (Parker Pearson and Sydes 1997).

Laboratory comment: English Heritage (August 2014), the pair of measurements (OxA-8680–1) on material from 128cm are statistically consistent (T′=2.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Parker Pearson and Sydes 1997
Ward and Wilson 1978

OxA–8681 3335 ±45 BP

δ[13]C: -26.4‰

Sample: SC1 128cm B, submitted on 16 March 1999 by J Schofield

Material: waterlogged plant macrofossil: twig (1.80g) (A Bayliss 1999)

Initial comment: as OxA-8680

Objectives: as OxA-8680

Calibrated date: *1σ:* 1690–1530 cal BC
2σ: 1750–1500 cal BC

Final comment: see OxA-8680

Laboratory comment: see OxA-8680

OxA–8682 2260 ±40 BP

δ[13]C: -27.2‰

Sample: SC1 44cm C, submitted on 16 March 1999 by J Schofield

Material: peat (humin)

Initial comment: a replicate of OxA-8636.

Objectives: as OxA-8636

Calibrated date: *1σ:* 400–230 cal BC
2σ: 410–200 cal BC

Final comment: see OxA-8636

Laboratory comment: see OxA-8601 and OxA-8636

OxA–8683 2495 ±40 BP

δ¹³C: -27.5‰

Sample: SC1 44cm B, submitted on 16 March 1999 by J Schofield

Material: waterlogged plant macrofossil: twig (A Bayliss 1999)

Initial comment: as OxA-8604

Objectives: as OxA-8604

Calibrated date: *1σ:* 780–540 cal BC
2σ: 800–410 cal BC

Final comment: J Schofield (24 January 2000), dating (OxA-8636, OxA-8682) conducted on individual plant macrofossils from the same depth as OxA-8683 provided substantially younger dates, whilst date OxA-8604 on another plant macrofossil from the same horizon provided an older date. It is possible that the younger dates provided by the peat (OxA-8636 and OxA-8682) may reflect contamination of those samples by intrusive macrofossils, possibly plant rootlets, since the sample was taken from just 50cm below the modern surface. Why there should also be such a significant difference in the dates provided by the macrofossils (OxA-8683 and OxA-8604) is also uncertain, though one possible explanation might be that the taphonomic history of the older macrofossil (OxA-8604) involved erosion and redeposition. Consequently, the precise chronology of late Bronze Age and Iron Age vegetational changes and their relationship to the occupation of the prehistoric enclosures at Sutton Common remains somewhat uncertain.

Laboratory comment: see OxA-8604

Swalecliffe: wiggle-match, Kent

Location: TR 134674
Lat. 51.21.58 N; Long. 01.03.54 E

Project manager: R Masefield (RPS Consultants), 2000

Archival body: Canterbury Museum

Description: a series of timbers was revealed during excavations at Swalecliffe Waste Water Treatment Works, near Whitstable, Kent. The timbers were associated with archaeological features of late Bronze Age and/or early Iron Age date: 17 pits within a hollowed area, 14 waterlogged features, 10 with stake and/or wattle lining as revetment, one with a platform of stoves on its base. Four pits have plank steps. One produced an oak yoke. A wax-lined pottery bucket was also found. The waterlogging, lining, and yoke suggested the features were wells.

Objectives: to produce a lengthy middle/later Bronze Age dendro sequence to close a gap in the current sequence, useful for dating future sites; and to produce an accurate site chronology which will enable detailed interpretation of the sites economy (based on environmental data) through its duration.

Final comment: R Masefield (28 October 2003), the final date is later than that anticipated by the phasing presented in table 8 of Masefield, Branch *et al*, Goodbum *et al* and Tyers (2003). The implication is that well 5015 (from which step plank 5054F was cross dated by wiggle-match with the SWALCLF 2 sequence) dates to the mid-late eighth century BC or more precisely 761–733 BC. This places the well in phase 7 (early eighth-seventh century BC) of the Swalecliffe site chronology. It suggests that well 5015 is later than the 1020–800 cal BC date from well 5033 (independent radiocarbon date, Beta-168708; 1000–820 cal BC, from base of 5033). Wood from the upper fill of 5033 (5125), cross-matched by plank 5054F from well 5015, must therefore be intrusive.That this might be the case was stated in the 2003 publication, although the considerable time lag between the construction of well 5033 in phase 6 and the deposition of wood 5125 (possibly during the construction of well 5015) is longer than expected.This has an impact on the date attributed to the complete pot within well 5015 (tenth–ninth century BC). This pot now clearly dated to the *c* 761–733 cal BC period for the end of SWALCLF2 dendrochronological sequence. The dating evidence should not affect the date attributed to the complete vessel on the base of well 5033 (sealed by silt containing seeds dated 1020–800 cal BC).

Laboratory comment: English Heritage (6 October 2003), rings 24–143 of the 163 year floating tree-ring chronology SWALCLF2 (Tyers 2001) were submitted for high-precision radiocarbon dating. Sequential bi-decal samples were dated and subsequently wiggle-matched, using OxCal v3.5 (Bronk Ramsey 1995; 1998; 2001), data from Stuvier *et al* (1998), and the methodology of Christen and Litton (1995). The tree-ring sequence runs from *891–863 cal BC (95% probability)* to *728–700 cal BC (95% probability)*.

References: Bronk Ramsey 1998
Bronk Ramsey 2001
Christen and Litton 1995
Masefield *et al* 2004
Masefield 2003
Stuiver *et al* 1998
Tyers 2001

UB–4721 2467 ±20 BP

δ¹³C: -26.7 ±0.2‰

Sample: S1 Rings 124–143, submitted on 14 September 2001 by A Bayliss

Material: wood (waterlogged): *Quercus* sp. (I Tyers 2001)

Initial comment: rounded pit (*c* 1.62m diameter) with evidence of a hurdle revetment in the form of vertical stakes on the north side, and with a surviving wooden plank step supported by a stake on the east side. A complete late Bronze Age jar was placed upside down on the base (votive?). The pot was lined with beeswax for suspension for that probable bucket. The pot was 1.5m in fill depth with organic fills. A probable well/waterhole, likely the earlier pit in the complex.

Objectives: to determine the absolute date of the floating tree-ring sequence SWALCLF2 (Tyers 2001).

Calibrated date: *1σ:* 750–535 cal BC
2σ: 765–430 cal BC

Final comment: R Masefield (28 October 2003), this date forms part of a sequence used for wiggle-matching.

Laboratory comment: English Heritage (6 October 2003), the wiggle-match suggests that these rings date to *748–720 cal BC (95% probability)*.

References: Tyers 2001

UB–4722 2534 ±20 BP

$\delta^{13}C$: -26.7 ±0.2‰

Sample: S2 Rings 104–123, submitted on 14 September 2001 by A Bayliss

Material: wood (waterlogged): *Quercus* sp. (*c* 200g) (I Tyers 2001)

Initial comment: as UB-4721

Objectives: as UB-4721

Calibrated date: *1σ:* 790–760 cal BC
2σ: 795–555 cal BC

Final comment: see UB-4721

Laboratory comment: English Heritage (6 October 2003), the wiggle-match suggests that these rings date to *768–740 cal BC (95% probability)*.

UB–4723 2476 ±20 BP

$\delta^{13}C$: -27.1 ±0.2‰

Sample: S3 Rings 84–103, submitted on 14 September 2001 by A Bayliss

Material: wood (waterlogged): *Quercus* sp. (*c* 200g) (I Tyers 2001)

Initial comment: as UB-4721

Objectives: as UB-4721

Calibrated date: *1σ:* 755–535 cal BC
2σ: 770–510 cal BC

Final comment: see UB-4721

Laboratory comment: English Heritage (6 October 2003), the wiggle-match suggests that these rings date to *785–760 cal BC (95% probability)*.

UB–4724 2585 ±20 BP

$\delta^{13}C$: -26.9 ±0.2‰

Sample: S4 Rings 64–83, submitted on 14 September 2001 by A Bayliss

Material: wood (waterlogged): *Quercus* sp. (*c* 200g) (I Tyers 2001)

Initial comment: as UB-4721

Objectives: as UB-4721

Calibrated date: *1σ:* 800–785 cal BC
2σ: 805–770 cal BC

Final comment: see UB-4721

Laboratory comment: English Heritage (6 October 2003), the wiggle-match suggests that these rings date to *808–780 cal BC (95% probability)*.

UB–4725 2679 ±21 BP

$\delta^{13}C$: -26.4 ±0.2‰

Sample: S5 Rings 44–63, submitted on 14 September 2001 by A Bayliss

Material: wood (waterlogged): *Quercus* sp. (*c* 200g) (I Tyers 2001)

Initial comment: as UB-4721

Objectives: as UB-4721

Calibrated date: *1σ:* 835–805 cal BC
2σ: 895–800 cal BC

Final comment: see UB-4721

Laboratory comment: English Heritage (6 October 2003), the wiggle-match suggests that these rings date to *828–800 cal BC (95% probability)*.

UB–4726 2682 ±21 BP

$\delta^{13}C$: -27.2 ±0.2‰

Sample: S6 Rings 24–43, submitted on 14 September 2001 by A Bayliss

Material: wood (waterlogged): *Quercus* sp. (*c* 200g) (I Tyers 2001)

Initial comment: as UB-4721

Objectives: as UB-4721

Calibrated date: *1σ:* 835–805 cal BC
2σ: 895–800 cal BC

Final comment: see UB-4721

Laboratory comment: English Heritage (6 October 2003), the wiggle-match suggests that these rings date to *848–820 cal BC (95% probability)*.

Tarrant Hinton, Dorset

Location: ST 92651180
Lat. 50.54.18 N; Long. 02.06.16 W

Project manager: R G Tanner and A G Giles (Wimborne Archaeological Group), 1978

Archival body: Wimborne Priest House Museum

Description: a multi-period prehistoric and Roman site in Cranbourne Chase. It was excavated by Wimborne Archaeological Group in 1967–85. The burial exhibiting signs of tuberculosis was a crouched inhumation in a pit on the Iron Age settlement at the site. The individual was a male aged about 30–40 years, and had signs of the disease on two lumbar vertebrae, which had been virtually destroyed by the disease.

Objectives: to date the example of tuberculosis; previously the earliest example of tuberculosis in the UK was second-fourth century AD.

Laboratory comment: English Heritage (17 June 2004), burial 7 (sample AB2) from Tarrant Hinton, Dorset, England was radiocarbon dated in 2001 and the results (OxA-10864–5) were published (Mays and Michael Taylor 2003). Given the importance of this date, and recent improvements in pretreatment methods for bone (*see* Bronk Ramsey *et al* 2004), English Heritage and the Oxford Radiocarbon Accelerator Unit decided to retest the samples. The method in use when these samples were originally dated (Bronk Ramsey *et al* 2000) could give ages that were too old, especially where collagen yields from the chemical pretreatment were very low. In this instance, the new date is in good agreement with the previous ones. However, given that the sample has now been dated using an improved method the previous results have been withdrawn. The new measurement for burial 7 should now be quoted.

References: Bronk Ramsey *et al* 2000
Bronk Ramsey *et al* 2004a
Graham 2006
Mays and Michael Taylor 2003

OxA–13209 2294 ±34 BP

$\delta^{13}C$: -19.7 ±0.2‰
$\delta^{15}N$ *(diet):* +8.3 ±0.3‰
C/N ratio: 3.1

Sample: Bartons Field AB2, submitted in 2004 by S Mays

Material: human bone (right femur) (S Mays 2001)

Initial comment: an articulated skeleton in a tightly flexed position in a small pit cut into the chalk bedrock and lying beneath in fills of a late Iron Age ditch. The cranium has been lost into the ditch, probably cut away.

Objectives: the individual being dated shows clear signs of tuberculosis. This burial is likely to be the earliest case of tuberculosis from Britain. A radiocarbon date is needed to confirm this and provide a more precise date than that available through stratigraphical and cultural evidence, which places it as Bronze Age/Iron Age.

Calibrated date: *1σ:* 400–360 cal BC
2σ: 410–230 cal BC

Final comment: S Mays (24 January 2002), a sprinkling of cases of tuberculosis are known from Romano-British contexts, the earliest of which is archaeologically dated to the first century AD. The Tarrant Hinton case provides the first demonstration that the disease was present in Britain prior to the Roman invasion. It would appear that tuberculosis was transmitted to British populations from continental Europe as a result of trading or other contacts.

Laboratory comment: English Heritage (17 June 2004), the probability distribution of this calibrated date is strongly bi-modal; however, it is unlikely that the skeleton dates to the second half of the fourth century cal BC. The $\delta^{13}C$ and $\delta^{15}N$ values of -19.7 ±0.3‰ and +8.3 ±0.5‰, respectively, suggest a largely terrestrial diet which is not likely to affect the radiocarbon dating (Chisholm *et al* 1982; Schoeninger *et al* 1983). The C:N ratio of 3:1 suggests that bone preservation was sufficiently good to have confidence in the radiocarbon determination (Masters 1987; Tuross *et al* 1988).

References: Chisolm *et al* 1982
Masters 1987
Tuross *et al* 1988

Thames Foreshore Survey: Chelsea Foreshore, Greater London

Location: TQ 77402680
Lat. 51.00.45 N; Long. 00.51.45 E

Project manager: F Haughey (Institute of Archaeology, London), October 2001

Archival body: Museum of London

Description: Chelsea foreshore, adjacent to Cheyne Walk, part of the Foreshore survey project.

Objectives: to establish whether the skull was Neolithic or not.

OxA–11086 3373 ±39 BP

$\delta^{13}C$: -20.4‰
$\delta^{15}N$ *(diet):* +11.3‰
C/N ratio: 3.3

Sample: Chelsea Skull, submitted on 16 October 2001 by J Sidell

Material: human bone (parietal) (F Haughey 2001)

Initial comment: buried within the intertidal peat (wood peat) on the Thames foreshore above organic mud. The skull is trepanned and there is no evidence of metal toolmarks.

Objectives: is it Neolithic or later? The peat it came from has previously been dated to the Neolithic, as has a wooden 'beater' from the peat.

Calibrated date: *1σ:* 1740–1620 cal BC
2σ: 1750–1540 cal BC

Final comment: J Sidell (18 June 2002), the result, although unexpected, is extremely interesting. The skull was thought to be Neolithic on the basis of a previous date from the peat it was in and the Chelsea 'beater' recovered from nearby. Nevertheless, a mid Bronze Age date is more consistent with human remains, particularly skulls in the Thames (Bradley and Gordon 1988) and generally the level of archaeology in the area. Recent discoveries have been made of vertebra in the area and these will be brought in soon so the location can be checked. If associated, these could indicate burial of an intact body in the Chelsea peat.

Laboratory comment: English Heritage (18 June 2002), the replicate measurements on the skull are not statistically significantly different (T′=0.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and so a weighted mean can be taken before calibration (3392 ±28 BP, 1750–1610 cal BC at 2σ; Reimer *et al* 2004).

References: Bradley and Gordon 1988
Reimer *et al* 2004
Ward and Wilson 1978

OxA–11087 3412 ±40 BP

$\delta^{13}C$: -20.3‰
$\delta^{15}N$ *(diet):* +11.5‰

Sample: Chelsea Skull, submitted on 16 October 2001 by J Sidell

Material: human bone (parietal) (F Haughey 2001)

Initial comment: as OxA-11086

Objectives: as OxA-11086

Calibrated date: *1σ:* 1750–1660 cal BC
2σ: 1880–1620 cal BC

Final comment: see OxA-11086

Laboratory comment: see OxA-11086

Thetford: Mill Lane, Norfolk

Location: TL 890835
Lat. 52.24.59 N; Long. 00.46.46 E

Project manager: J Greig (University of Birmingham), April 1995

Archival body: Norfolk Archaeological Unit

Description: a peat bed lies alongside the river Little Ouse close by the Saxon archaeological site. This series of samples are from 1cm slices of pollen monolith from which seeds have been extracted.

Objectives: to correlate the biological remains with the chronology of the Saxon site.

Final comment: P Marshall (August 2014), the results suggest that the sampled sequence spans the Bronze Age to medieval periods, with deposits above 20cm broadly contemporary with the excavated settlement evidence at Mill Lane. The top of the peat layer is post-Conquest in date.

References: Wallis 2004

OxA–8374 815 ±55 BP

$\delta^{13}C$: -25.8‰

Sample: THD 0,0–1cm, submitted in April 1998 by J Greig

Material: waterlogged plant macrofossil: *Sambucus nigra*, seeds (0.08g) (J Greig 1998)

Initial comment: the samples are taken from pollen monolith tins which consists of a 75cm section going from the top of the peat where it was merging with the sandy topsoil (9.97m OD), down to the deepest that could be reached in the flooding pit. A further *c* 25cm of peat was seen but could not be sampled, and the machine excavation did not reach the base of the peat layer. When the monolith boxes were dug away, a sherd of Samian ware was revealed at 9.69m OD (about 33cm on the pollen diagram). OxA-8374 is from a depth of 0–1cm of the 75cm section.

Objectives: to provide a chronological framework for interpreting the palaeoenvironmental record.

Calibrated date: *1σ:* cal AD 1160–1270
2σ: cal AD 1040–1290

Final comment: J Greig (2001), the result in combination with the palaeoenvironmental evidence suggests that the early medieval period saw a reduction in agricultural activities within the vicinity of Mill Lane.

OxA–8375 1050 ±130 BP

$\delta^{13}C$: -25.5‰

Sample: THD 5, 5–6cm, submitted in April 1998 by J Greig

Material: waterlogged plant macrofossil: *Sambucus nigra*, seeds (0.07g) (J Greig 1998)

Initial comment: as OxA-8374, but from a depth of 5–6cm of the 75cm section.

Objectives: as OxA-8374

Calibrated date: *1σ:* cal AD 780–1160
2σ: cal AD 670–1260

Final comment: J Greig (2001), the inversion of this date with OxA-8376 causes a serious problem in interpreting the sequence. It is possible that OxA-8375 dates older material which was washed into the sequence at 5–6cm. Modelling suggests that the probability that OxA-8375 is not residual is only 4%. However, since the horizons with an inversion occur at the top of the sequence, it is perhaps more likely that OxA-8376 is intrusive material, especially as seeds of *Raphanus raphanistrum* of the same date as the level from which they were recovered are demonstrably present elsewhere in the core.

OxA–8376 770 ±55 BP

$\delta^{13}C$: -28.0‰

Sample: THD 10, 10–11cm, submitted in April 1998 by J Greig

Material: waterlogged plant macrofossil (0.11g) (*Raphanus raphanistrum*, seeds) (J Greig 1998)

Initial comment: as OxA-8374, but from a depth of 10–11cm of the 75cm section.

Objectives: as OxA-8374

Calibrated date: *1σ:* cal AD 1210–1290
2σ: cal AD 1160–1300

Final comment: J Greig (2001), the inversion of this date with OxA-8376 causes a serious problem in interpreting the sequence. Modelling shows that the index of agreement for OxA-8376 (A=28.7%) is too low for this sample to be of the same date as the stratigraphic position from which it was recovered. If the sample is considered to be intrusive, then the overall agreement for the model improves (Aoverall=102.1%) and the probability that OxA-8376 actually dates the level at 10–11cm is only 2.1%. It is perhaps more likely that OxA-8376 is intrusive material, rather than OxA-8375, especially as seeds of *Sambucus nigra* of the same date as the level from which they were recovered are demonstrably present elsewhere in the core.

OxA–8377 1095 ±55 BP

$\delta^{13}C$: -25.3‰

Sample: THD 15, 15–16cm, submitted in April 1998 by J Greig

Material: waterlogged plant macrofossil: *Sambucus nigra*, seeds (0.10g) (J Greig 1998)

Initial comment: as OxA-8374, but from a depth of 15–16cm of the 75cm section.

Objectives: as OxA-8374

Calibrated date: *1σ:* cal AD 890–1020
2σ: cal AD 770–1030

Final comment: J Greig (2001), high values of cereal pollen in the pollen diagram at this level seem to coincide with the later Saxon expansion of Thetford, and the Mill lane site. This period of expansion was probably fairly localised, as some sites to the north of the river such as St Nicholas (Fryer and Murphy 1999) have little evidence of this expansion.

References: Fryer and Murphy 1999

OxA–8378 1365 ±75 BP

$\delta^{13}C$: -27.1‰

Sample: THD 20, 20–21cm, submitted in April 1998 by J Greig

Material: waterlogged plant macrofossils: *Potentilla* sp., *erecta*, seeds (J Greig 1998)

Initial comment: as OxA-8374, but from a depth of 20–21cm of the 75cm section.

Objectives: as OxA-8374

Calibrated date: *1σ:* cal AD 610–690
2σ: cal AD 550–780

Final comment: J Greig (2001), from immediately prior to major expansion of cereal pollen. This event seems to coincide with the later Saxon expansion of Thetford and the Mill Lane site. This period of expansion was probably fairly localised, as some sites to the north of the river such as St Nicholas (Fryer and Murphy 1999) have little evidence of this expansion.

References: Fryer and Murphy 1999

OxA–8379 1850 ±55 BP

$\delta^{13}C$: -27.1‰

Sample: THD 30, 30–31cm, submitted in April 1998 by J Greig

Material: waterlogged plant macrofossils (0.20g) (charred seeds, various) (J Greig 1998)

Initial comment: as OxA-8374, but from a depth of 30–31cm of the 75cm section.

Objectives: as OxA-8374

Calibrated date: *1σ:* cal AD 80–240
2σ: cal AD 30–330

Final comment: J Greig (2001), this result together with the palynological evidence suggests an increased use of land with Roman farming, resulting in more meadow and less woodland and heath.

OxA–8380 2370 ±60 BP

$\delta^{13}C$: -26.6‰

Sample: THD 45, 45–46cm, submitted in April 1998 by J Greig

Material: waterlogged plant macrofossils (0.20g) (various seeds; including *Ranunculus sceleratus, Urtica dioica, Mentha ?aquatica*) (J Greig 1998)

Initial comment: as OxA-8374, but from a depth of 45–46cm of the 75cm section.

Objectives: as OxA-8374

Calibrated date: *1σ:* 520–390 cal BC
2σ: 750–360 cal BC

Final comment: J Greig (2001), a middle Iron age date associated with a reduction in tree pollen and increase grasses suggesting an opening of the woodland cover.

OxA–8402 2815 ±55 BP

$\delta^{13}C$: -27.7‰

Sample: THD 60, 60–61cm, submitted in April 1998 by J Greig

Material: waterlogged plant macrofossils (J Greig 1998)

Initial comment: as OxA-8374, but from a depth of 60–61cm of the 75cm section.

Objectives: as OxA-8374

Calibrated date: *1σ:* 1030–900 cal BC
2σ: 1130–830 cal BC

Final comment: J Greig (2001), the result from a horizon that shows slightly more cereal pollen and *Rumex*, probably reflects an increase in late Bronze Age agricultural activities in the vicinity of the site.

OxA–8414 3000 ±45 BP

$\delta^{13}C$: -27.3‰

Sample: THD 75, 74–75cm, submitted in April 1998 by J Greig

Material: waterlogged plant macrofossils (various seeds; including *Eleocharis* sp. and *Mentha* sp.) (J Greig 1998)

Initial comment: as OxA-8374, but from a depth of 74–75cm of the 75cm section.

Objectives: as OxA-8374

Calibrated date: *1σ:* 1290–1130 cal BC
2σ: 1400–1110 cal BC

Final comment: J Greig (2001), the date from the basal part of the sequence shows that sediments began to accumulate at some time in the middle to late Bronze Age.

Tintagel Castle, Cornwall

Location: SX 05158920
Lat. 50.40.09 N; Long. 04.45.28 W

Project manager: R Barrowman (University of Glasgow), 1999

Archival body: Royal Cornwall Museum and English Heritage

Description: excavations in 1999 on site T (T01 and T01 extension), Tintagel.

Objectives: due to the nature of the deposits around the great ditch, ie acid soil and lack of waterlogged deposits, only charred plant remains were available for dating from the primary silts. It is difficult to determine the taphonomy of this material. Consequently, a number of single-entity samples were taken from the lowest primary silt in the hope that the latest of these would provide a *terminus post quem* for the final maintenance of the ditch.

Final comment: R Barrowman (12 February 2002), the dating series has been crucial in confirming a post-Roman/ sub-Roman date for the 'mainland Ward' area at Tintagel Castle. OxA-10388 and OxA-10389 have confirmed activity at the site in the early medieval glass. OxA-10390 and OxA-10482–6 have provided the first dating evidence, other than finds of abundant post-Roman pottery, of post-Roman date in the Great Ditch - a huge defensive feature, which defines the extent of this nationally important site in the fifth-sixth centuries AD.

References: Barrowman *et al* 2007

OxA–10388 1667 ±39 BP

$\delta^{13}C$: -25.9‰

Sample: TTG99 T01 EXT 1135(A), submitted on 16 December 2000 by R Barrowman

Material: charcoal: *Corylus* sp. (R Gale 2000)

Initial comment: samples taken from a deposit of shillet with slate inclusions (1135) arranged horizontally in a cut feature (1136). The deposit also contained charcoal, burnt clay, bloomery slag, early medieval glass, and imported pottery (B ware and ARSW). The feature was sealed by a deposit of blue clay (1132), which in turn lay below a deposit of Radford's (probably AD 1955) backfill (1083). The clay layer was the limit of Radford's cutting. The remainder of the deposit was unexcavated so it is unknown how far the deposit lies above the slate bedrock.

Objectives: it has long been suggested that the Norman (probably thirteenth century AD) castle at Tintagel was built upon on earlier fifth/sixth centuries AD stronghold. There is abundant evidence (and a good series of radiocarbon dates (Bayliss and Harry 1997) for fifth/sixth century AD occupation and trade of Tintagel 'Island' but less from the 'mainland' (Hartgroves and Walker 1988). Excavations by Glasgow University in 1999 have found undisturbed deposits with associated fifth/sixth century pottery below the extent of Radford's excavations in the Lower Ward (trench T01 ext) and also in the bottom of the Great Ditch (trench T01). One of these intact deposits (1135) is to be dated as it is sealed by a blue clay cap (1132) below Radford's disturbance inside the Lower Ward in the trench T01 extension.

Calibrated date: *1σ:* cal AD 340–420
2σ: cal AD 250–530

Final comment: R Barrowman (12 December 2002), excavations by C A R Radford in the Lower Ward at Tintagel Castle in 1938 and 1955 remain unpublished and few records of his findings have survived. Excavations by Glasgow University in 1999 were undertaken to assess Radford's excavations and examine to condition and nature of the deposits in the Lower Ward, below the Norman Castle. Evidence of post-Roman occupation was recovered in the form of imported pottery and glass, but the radiocarbon dating allowed for the first time a tighter dating of the deposits and material, dating them clearly to the sub-Roman/post-Roman period. This addresses the primary objective of the excavations - to assess whether the 'mainland ward' at Tintagel Castle was also used in the post-Roman period.

Laboratory comment: English Heritage (12 December 2002), the two measurements on short-lived charcoal from this feature are statistically consistent (T'=0.8; T' (5%)=3.8; ν=1; Ward and Wilson 1978).

References: Bayliss and Harry 1997
Hartgroves and Walker 1988
Ward and Wilson 1978

OxA–10389 1620 ±37 BP

$\delta^{13}C$: -25.5‰

Sample: TTG99 T01 EXT 1135(B), submitted on 16 December 2000 by R Barrowman

Material: charcoal: *Corylus* sp. (R Gale 2000)

Initial comment: as OxA-10388

Objectives: as OxA-10388

Calibrated date: *1σ:* cal AD 390–530
2σ: cal AD 340–550

Final comment: see OxA-10388

OxA–10390 1607 ±37 BP

$\delta^{13}C$: -24.3‰

Sample: TTG99 T01 1161A, submitted on 14 December 2000 by R Barrowman

Material: charcoal: *Corylus/Alnus* sp. (R Gale 2000)

Initial comment: (1161) is a primary ditch fill layer, over bedrock. The layer is an undisturbed primary silt layer, below another undisturbed archaeological layer, (1157).

Objectives: this sample is from a series of layers from the basal fill of the 'Great Ditch' at the outer limit of the Lower Ward of Tintagel Castle (of Norman, probably thirteenth-century construction). However, there have been ongoing debates as to the possibility of a fifth/sixth stronghold below that of the Norman Castle, as suggested by the finds of fifth/sixth century AD material below the Lower Ward (*see*

OxA-10388 and 10389). Tintagel is the largest stronghold in Britain (Europe?) from this period and obviously an extremely important site at the time.

Calibrated date: *1σ:* cal AD 400–540
2σ: cal AD 380–550

Final comment: R Barrowman (12 December 2002), the main objective of the excavations in trench T01, after the assessment of C A R Radford's excavations was to determine whether the 'Great Ditch', which extends across the narrow neck of land leading to Tintagel Castle was used or modified in the post-Roman period. The Great Ditch is a defensive feature clearly defining the site of the Norman Castle. Radford suggests it also defended the post-Roman site at Tintagel, but with no evidence from his excavations, this was difficult to assess. Glasgow University's excavations in 1999 uncovered thin layers of silt in the bottom of the ditch, which contained fragments of very decorated post-Roman pottery and dansol. The latter was dated and has provided for the first time, tangible evidence of modification of the ditch in the post-Roman period. This confirms that the site at Tintagel at this time covered a huge area - the largest post-Roman defended citadel in Europe so far excavated.

OxA–10482 1715 ±55 BP

δ¹³C: -24.5‰

Sample: TTG99 T01 1161B, submitted on 14 December 2000 by R Barrowman

Material: charcoal: *Corylus/Alnus* sp. (R Gale 2000)

Initial comment: as OxA-10390

Objectives: as OxA-10390

Calibrated date: *1σ:* cal AD 240–400
2σ: cal AD 170–430

Final comment: see OxA-10390

OxA–10483 1450 ±45 BP

δ¹³C: -25.4‰

Sample: TTG99 TOI 1161C, submitted on 14 December 2000 by R Barrowman

Material: charcoal: *Corylus/Alnus* sp. (R Gale 2000)

Initial comment: as OxA-10390

Objectives: as OxA-10390

Calibrated date: *1σ:* cal AD 570–650
2σ: cal AD 540–670

Final comment: see OxA-10390

OxA–10484 1985 ±45 BP

δ¹³C: -24.9‰

Sample: TTG99 T01 1161D, submitted on 14 December 2000 by R Barrowman

Material: charcoal: Rosaceae (R Gale 2000)

Initial comment: as OxA-10390

Objectives: as OxA-10390

Calibrated date: *1σ:* 50 cal BC–cal AD 70
2σ: 100 cal BC–cal AD 130

Final comment: see OxA-10390

OxA–10485 1710 ±45 BP

δ¹³C: -23.8‰

Sample: TTG99 TOI 1161E, submitted on 14 December 2000 by R Barrowman

Material: charcoal: *Corylus/Alnus* sp. (R Gale 2000)

Initial comment: as OxA-10390

Objectives: as OxA-10390

Calibrated date: *1σ:* cal AD 250–400
2σ: cal AD 230–430

Final comment: see OxA-10390

OxA–10486 1675 ±45 BP

δ¹³C: -26.6‰

Sample: TTG99 T01 1161F, submitted on 14 December 2000 by R Barrowman

Material: charcoal: *Betula* sp. (R Gale 2000)

Initial comment: as OxA-10390

Objectives: as OxA-10390

Calibrated date: *1σ:* cal AD 330–420
2σ: cal AD 240–530

Final comment: see OxA-10390

Waterden Hoard, Norfolk

Location: TF 88783543
Lat. 52.52.58 N; Long. 00.48.21 E

Project manager: A Rogerson and S Bridgford (Norfolk Landscape Archaeology), 1994

Archival body: Norfolk Museums and Archaeology Service

Description: a large spread of late Bronze Age sword and spearhead pieces, measuring circa 45m east/west and 30m north-south. They were found in ploughsoil, the original land surface had eroded. The hoard contains swords of Ewart Park type, some with early features, and late Bronze Age spearheads, some of Wilburton type. It marks the introduction of the Ewart Park types to Norfolk. No dates from this area are available. Those found at Blackmoor in Hampshire were dated to *c* 1000 BC (Needham 1997; Colquhoun 1979).

Objectives: to establish the dating of this very large, typologically tight, hoard which straddles both the typological switch from both Wilburton to Wilburton area. An early date would support the northern origin of the Ewart Park traditions and extend their origin back into the second millennium BC.

Final comment: S Bridgford (29 May 2013), the degree of joining across the metalwork finds is adequate evidence that this was a hoard, indicating that the two dates should be very close, though some differences in manufacture date and age of wood used may be expected.

Laboratory comment: English Heritage (2002), the two measurements are not statistically different (T′=0.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and so both spear shafts could be of the same actual date.

References: Colquhoun 1979
Needham *et al* 1997
Ward and Wilson 1978

OxA–8761 2920 ±40 BP

$\delta^{13}C$: -25.1‰

Sample: SP16, submitted in November 1998 by A Rogerson

Material: wood (carbonised): *Fraxinus* sp., sapwood (R Gale 1998)

Initial comment: the original find (in 1952) of part of the hoard (reported in 1964) was said to be 'in a round container which disintegrated on removal'. The later finds lay within an almost imperceptible dip in the field surface just below the crest of the south-south-west facing slope. The dip coincides with an area of sandy soil, noticeably lighter than surrounding soils. Localised variation in ground surface may have been caused by erosion. The probable old turf line adjacent to the scatter indicates that the valley slope was once steeper. The ground surface was removed mechanically in three spits, each *c* 0.1m deep, and finds were mostly detector-located in the lowest part of the ploughsoil.

Objectives: the sample comes from a spearhead socket and was part of the spear shaft at the time of deposition. Although plough scattered, the hoard was clearly deposited as one event. Many of the broken pieces found, including the 1952 finds, match up with others, often to produce the entire weapon. The weapons' typologies show that the hoard belongs to the period when the Wilburton tradition crossed over into the Ewart Park type in Norfolk. This area would
be the first area with a strong Wilburton tradition to encounter Ewart Park types, if as is generally accepted (Colquhoun and Burgess 1988, 68). Ewart Park types developed further north.

Calibrated date: *1σ:* 1210–1040 cal BC
2σ: 1260–1000 cal BC

Final comment: S Bridgford (29 May 2013), the calibrated dates appear to be earlier than expected and could support the view that Ewart Park and Wilburton metalworking traditions co-existed for rather longer than expected, at least within this area.

OxA–8762 2975 ±40 BP

$\delta^{13}C$: -25.0‰

Sample: SP29, submitted in November 1998 by A Rogerson

Material: wood (carbonised): *Fraxinus* sp., sapwood (R Gale 1998)

Initial comment: as OxA-8761

Objectives: as OxA-8761

Calibrated date: *1σ:* 1270–1120 cal BC
2σ: 1380–1050 cal BC

Final comment: see OxA-8761

West Heslerton, Yorkshire (East Riding)

Location: SE 917765
Lat. 54.10.33 N; Long. 00.35.42 W

Project manager: D Powlesland (Landscape Research Centre), 1978–82, 1985, 1987, 1989–92, 1995

Description: West Heslerton and its hinterland have been the subject of continued archaeological research for more than three decades, including major excavations at Cook's Quarry, West Heslerton (site 1), which started as a rescue excavation between 1978 and 1982 and currently are continuing as the quarry continues to expand. Site 1 proved to be most important on account of the presence of extensive deposits of blown sand sealing evidence dating from the late Mesolithic to early medieval periods, with the key phases including a late Neolithic and early Bronze Age barrow cemetery, parts of a late Bronze Age settlement, and early Anglo-Saxon or Anglian cemetery. Following the publication of the excavations at site 1, excavation continued covering sites 2, 6, and 8, between 1984 and 1986, examining most of the remainder of the Anglian cemetery which had been superimposed on a late Neolithic and early Bronze Age monument complex. Small-scale evaluation excavations at sites 20 and 21 in 1984 were concerned with the sampling within a crop-mark complex, interpreted as a 'ladder settlemenT′ dating from the middle Iron Age to post-Roman period. From 1986 until the end of 1995 work was concentrated on the rescue excavation of an Anglian settlement (sites 2, 11, 12, and 13), associated with the previously excavated cemetery but occupied from the fifth to ninth centuries, a longer duration than the cemetery which ceased to be used by the mid-seventh century. The evidence gathered both from excavation and very intensive aerial and ground-based survey has revealed the most detailed picture of an archaeological landscape for its scale in Britain; providing context for the excavations and an unparalleled insight into the evolution of settlement covering several thousand hectares.

Objectives: the excavations and the associated dating programmes at West Heslerton have covered an important period in the development of radiocarbon dating and its application to excavated datasets. During the early years of the project the objectives were simply to secure dates for material where we were unsure of the date or to assist in defining the overall chronological sequence. As the precision of the dates returned has increased and the size of the samples required has reduced the dating programmes have been much more precisely targeted. Recently the dating programme has been directed towards two main objectives, the dating of the important prehistoric ceramic assemblage and the dating and sequencing of the vast excavation of the Anglian settlement.

References: Haughton and Powlesland 1999
Powlesland *et al* 1986
Powlesland 1998
Powlesland and Price 1988
Powlesland forthcoming

West Heslerton: Anglian cemetery, North Yorkshire

Location: SE 91567650
Lat. 54.10.34 N; Long. 00.35.50 W

Project manager: D Powlesland (Landscape Research Centre), 1977–87

Archival body: Hull Museum

Description: an Anglian cemetery was discovered at Cooks Quarry, West Heslerton in 1977. Rescue excavations funded by English Heritage were undertaken ahead of mineral extraction between 1977 and 1984. The site included multi-period and multi-function features extending over *c* 7.5ha. including a small part of the Anglian cemetery. In 1980, the Heslerton Parish Project was established, to provide a research framework for these rescue excavations. Attention was focused towards the almost total excavation of the remainder of the cemetery, which was completed in 1987. The excavations identified the cemetery was in use between the late fifth and early seventh centuries, utilising a prehistoric ritual site as its focus. In the region of 300 Anglian burials were recorded, both inhumations and cremations.

Objectives: four samples of articulated human bone from the cemetery were dated in the 1980s. The two samples (HAR-6516 and HAR-6907; published in Bayliss *et al* 2012, 298–9) for which sufficient material survived for high-precision dating were re-analysed in 2001. This series of dates addresses important issues regarding the dating not only of the skeletons, but the artefact assemblages associated with the burials. They will facilitate the re-interpretation of some of the published evidence as part of the ongoing and iterative programme of publication by the Landscape Research Centre.

Laboratory comment: English Heritage (21 May 2004), the best estimates for the dates of graves 71 and 72 are *cal AD 530–625 (95% probability)*, and *cal AD 535–625 (92% probability) or cal AD 630–640 (3% probablity)* respectively.

References: Bayliss *et al* 2012, 298–9
Haughton and Powlesland 1999
Powlesland 2003b

UB–4641 1510 ±19 BP

$\delta^{13}C$*:* -20.0 ±0.2‰
$\delta^{15}N$ *(diet):* +11.0‰
C/N ratio: 3.0

Sample: 002B 00055; Grave 71, submitted in February 2001 by D Powlesland

Material: human bone (200+g) (right lower leg and pelvis from large robust adoloscent male, probably 15–16 years old)

Initial comment: from a grave cutting pit alignment 2BA M130 in the centre of the cemetery. The crouched skeleton was well preserved due to the chalk gravel, which formed much of the backfill. The burial contained grave goods including a knife (between two of the vertebrae), buckle, belt mounts, and a possible bone bead.

Objectives: to obtain an improved high-precision date. The date HAR-6516 (1690 ±70 BP) was surprisingly early and needs to be refined to contribute towards an estimate for the date of the start of the Anglian settlement at West Heslerton.

Calibrated date: *1σ:* cal AD 540–585
2σ: cal AD 535–605

Final comment: D Powlesland (2004), this result is significantly later than the result produced in the 1980s, and is in accordance with the dating of the cemtery.

Laboratory comment: English Heritage (24 August 2004), this result is statically significantly different from previous measurement on this skeleton (HAR-6516; 1690 ±70 BP; Bayliss *et al* 2012, 298), suggesting that the Harwell measurement is slightly too old (T′=6.3; T′(5%)=3.8; ν=1) (Ward and Wilson, 1978). This bone was moderately poorly preserved (Class 4–5; Stafford *et al* 1988). The stable isotope values suggest a predominantly terrestrial diet (Mays 1998, fig 9.2).

References: Bayliss *et al* 2012
Mays 1998
Stafford *et al* 1988
Ward and Wilson 1978

UB–4642 1487 ±19 BP

$\delta^{13}C$*:* -19.9 ±0.2‰
$\delta^{15}N$ *(diet):* +10.1‰
C/N ratio: 2.8

Sample: 002B 00084; Grave 72, submitted in February 2001 by D Powlesland

Material: human bone (200+g) (lower vertebrae and pelvis, left shoulder blade and arm, right shoulder blade and arm; adult male, 25–30 years old)

Initial comment: from context 2B00084; one of a group of burials all accompanied by weapons, located at what is considered to be the heart of the cemetery. The skeleton lay in a flexed position and was buried with grave goods including a shield, two spears and a knife.

Objectives: to obtain an improved high precision date. The date HAR-6907 was surprisingly early and needs to be refined to contribute towards an estimate for the date of the start of the Anglian settlement at West Heslerton.

Calibrated date: *1σ:* cal AD 560–605
2σ: cal AD 540–625

Final comment: (28 August 2004) *see* UB-4641

Laboratory comment: English Heritage (28 August 2004), this result is statically significantly different from previous measurement on this skeleton (HAR-6907; 1840 ±90 BP;

Bayliss *et al* 2012, 299), suggesting that the Harwell measurement is significantly too old (T′=20.1; T′(5%)=3.8; ν=1) (Ward and Wilson, 1978). This bone was moderately poorly preserved (Class 4–5; Stafford *et al* 1988). The stable isotope values suggest a predominantly terrestrial diet (Mays 1998, fig 9.2).

References: Bayliss *et al* 2012, 299
Mays 1998
Stafford *et al* 1988
Ward and Wilson 1978

West Heslerton: Anglian settlement, North Yorkshire

Location: SE 917765
Lat. 54.10.33 N; Long. 00.35.42 E

Project manager: D Powlesland (Landscape Research Centre), 1989, 1991, and 1995

Archival body: Hull Museum

Description: in 1984, a muli-period settlement close to the Anglian cemetery was discovered. Evaluation showed that the archaeological deposits were being badly damaged by modern agricultural practices. This led to the decision to examine the settlement in its entirety. The need to explore such a large area was also supported by the need to explore the spatial and chronological development of such sites. The major period of use of the West Heslerton site dates to the early and mid Anglo-Saxon periods. It is clear that the Anglo-Saxon settlement was split into functional zones, divided in part by a natural stream. The late Roman cult site seems to have been deliberately left open, whilst clearly forming a focus for the later settlement. The site has produced abundant evidence for timber buildings, of both post-hole and *Grubenhaus* type, and provides an opportunity to study the structural details of these buildings and, in the case of the *Grubenhauser* the possibility to study in detail the history of the buildings subsequent to their disuse.

Objectives: to establish when the settlement started, how long it was in use for, how the settlement changed through time, and when it was abandoned. Furthermore, to interpret the *Grubenhauser*: how long did they take to fill up, was the rubbish derived from previous middens? To date the quarrying, granaries, pits, latrines, malting kiln, pottery fabrics, ditches, burning episodes, and shrine.

Final comment: D Powlesland (8 July 2014), when the excavation of the West Heslerton Anglo-Saxon settlement was initiated following its discovery in 1984, the potential for the application of radiocarbon dating for providing a secure chronology for the excavated evidence was effectively non-existent. Improvements in all aspects of the dating process, subsequent analysis, and returnable precision have radically changed that position. Although problems arising from contamination had generated some unexpectedly early but potentially engaging dates, the reprocessed dates, although with a slightly reduced precision, provide a good basis for appreciating the chronology of the settlement as well as highlighting the need for more intensive dating programmes should similar excavations be conducted in the future. The dates from the Roman 'shrine' imply that the structure had a far longer life than initially suggested and provides earlier than expected dates for some of the roman ceramics. The date range for the active use of the Anglian settlement fits with a relatively conventional chronology with a calibrated date range of *c* AD 450–850. With regard to the lesser questions regarding the duration within which the Grubenhauser filled, and the degree to which the contents were derived from clearing up midden deposits, the results are less clear but do give weight to the view that the conventional dating of the ceramics are less secure than we might normally accept with so called early Saxon fabrics apparently continuing in use into the middle Saxon period. The dating programme supports the view that the settlement as a whole does not conform with the gradually shifting settlement model proposed for the excavated settlement at Mucking in Essex, and that although there was some degree of reconfiguration of the overall plan of the settlement over time, this does not reflect a progressive shift of the settlement across the landscape. Whilst the number of Grubenhauser dated was more limited than we might have wished for, the dates we have seem to indicate two principal phases of structural replacement which has a bearing on the interpreted duration during which these structures were in use, which is considerably longer than past interpretations would allow. The dating of the latrine and malt kiln to the middle Saxon period supports the general interpretations established in the field. Although it was not possible to answer a number of the key questions posed, it is clear that these questions might have been answered had the improvements in radiocarbon methodologies been anticipated and appropriate sampling strategies been applied in the field. Any limitations in the dating program for West Heslerton reflect the duration and scale of the project the majority of which was completed before the recent changes in scientific techniques. The results that have been achieved indicate that any future projects of this kind should have comprehensive radiocarbon sampling programmes established at the soonest opportunity so that the limitations in stratigraphic and material culture evidence that characterise sites of this type can be overcome and much tighter chronologies established through scientific dating.

Laboratory comment: English Heritage (24 August 2004), processing the bone samples from this site coincided with a contamination problem in the Oxford Laboratory associated with this method, which caused approximately one third of the results to be significantly too old (Bronk Ramsey *et al* 2004). All affected samples were re-dated. There was sufficient excess gelatine from 30 of the bone samples originally processed at Oxford for re-purification from this stage. The contaminated material was re-processed, graphitised, and dated. Full details of this approach are provided in Bronk Ramsey *et al* forthcoming.

References: Bronk Ramsey *et al* 2004b
Bronk Ramsey *et al* forthcoming
Powlesland 1991
Powlesland 1998
Powlesland 2003b
Powlesland forthcoming

GrA–22412 1285 ±30 BP

$\delta^{13}C$: -21.9 ±0.2‰

Sample: 11 B D908 (32194), submitted on 6 March 2003 by D Powlesland

Material: animal bone (sheep/goat; articulating proximal radius) (J Richardson)

Initial comment: a replicate of OxA-12091. From a small, east/west aligned Grubenhaus in the east of area 11CD, immediately to the west of a series of enclosure ditches (11CD7026). It cut through a slot (11CD08053) on the south-east side, and appears to have two postholes. On stratigraphic grounds, this feature is likely to be middle Saxon. 5104 and 908 are equivalent contexts.

Objectives: to determine the length of time taken for a *Grubenhaus* to fill up after disuse. The articulated samples must have been deposited very soon after use and cannot have been residual. They will therefore provide dates for the accumulation of the contexts from which they were recovered. The dating of the *Grubenhaus* will also assist in determining whether the settlement consisted of a small number of units that shifted around the site or whether it shifted from north to south during the period of occupation on the site.

Calibrated date: *1σ:* cal AD 670–770
2σ: cal AD 660–780

Final comment: D Powlesland (8 July 2014), one of three samples from Grubenhaus 011CD07026 (*see* also OxA-13147 and OxA-12091). The calibrated dates indicate that the structure must have ceased to function by AD 660–771, a date range at the beginning of the middle Saxon period, but with the structure evidently out of use long before the settlement was abandoned. Limits in the granularity or resolution of the dates make it difficult to establish a reliable view regarding the time span in which the feature filled or to give a clear picture of residuality. If the fill duration is at the most extreme supported by the dates then a filling span in excess of 100 years is possible, a quarter of the occupation span of the settlement.

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with replicate measurement OxA-12091 (T′=0.4, T′(5%)=3.8, ν=1) (Ward and Wilson 1978). The weighted mean (1299 ±20 BP) calibrates to cal AD 660–778 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–22416 1260 ±30 BP

$\delta^{13}C$: -22.2 ±0.2‰

Sample: 12AC 9507/400A (WY178), submitted on 6 March 2003 by D Powlesland

Material: animal bone: *Bos* sp., articulated sacrum, pelvis fragment, and vertebrae (1000g) (J Richardson)

Initial comment: a replicate of UB-4565. from a large east/west aligned *Grubenhaus* in the north of area 11AC. The south side of the structure cut through ditch 012AC00060. Three postholes were recovered. The two from the short ends had chalk packing; that in the south side had no packing and may have been pile driven. The pit was cut into natural chalk and had some evidence for cess staining at its base. Seven fills were recognised in excavation. Over 5000 animal bone fragments were recovered from these.

Objectives: to determine and date when *Grubenhaus* 12AC9507 was backfilled. The articulated bones must be very close in date to the formation of the context from which they were recovered. Dating this *Grubenhaus* will help to assess whether the settlement shifted southwards through time. Comparison with the measurements on disarticulated animal bone from the same feature will help to assess the secondary or tertiary nature of this material.

Calibrated date: *1σ:* cal AD 680–780
2σ: cal AD 660–870

Final comment: D Powlesland (8 July 2014), Grubenhaus 012AC09507 was the subject of the most detailed excavation of any of these structures, and although the material culture and faunal material recovered only amounted to 314 objects and 493 identifiable animal bones, the total body of material recovered included an additional 5200 animal bone fragments which were not sufficiently complete to be clearly identified to species and part. The intensely detailed excavation of this feature made it an ideal example for testing our comprehension of the filling sequence, the nature of the material used to backfill the abandoned sub-structural cavity and to determine the date of its abandonment. Ten samples were dated from a range of deposits in this feature, and included articulating and non-articulating animal bone. The results of this exercise were highly consistent but at the same time reflect a calibrated date span of *c* 145 years which represents a third of the total duration of the life of the settlement. The calculated duration in which the feature filled is identified as between 40–145 years, however this makes assumptions which may not be correct and an alternative view is that the material introduced when the feature was backfilled incorporates material up to 145 years old. This is a crucial point as it appears that rather than being directly backfilled the large pits left when the Grubenhauser were abandoned were frequently filled with material that had been accumulated in a midden. There is no evidence from any of the Grubenhauser examined indicating long periods of stability within the fills which would suggest that they were filled in stages separated in time. This does not preclude the inclusion of articulated bone introduced during the filling process, or articulating bone fragments which may have been transferred from the midden. This depends largely on the mechanism by which material was transferred from the midden to the backfill. The dates indicate that this Grubenhaus was abandoned in the latter half of the seventh century. Amongst the questions asked through the dating of the Grubenhauser was whether they supported an interpretation of settlement development through gradual settlement shift over time. Although only 11 of these structures were dated, it appears that the settlement did not gradually shift across the landscape but perhaps more interestingly seems to have two principle phases of re-building which may help us to identify how long these structures stood. Certainly the distribution of the Grubenhaus dates does not support a view that these were short-lived structures, or that they reflect wholesale movement of the settlement rather than organic development within a defined space.

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with UB-4565 and OxA-12097 from the same cow (T′=0.4, T′(5%)=6.0; ν=2; Ward and Wilson 1978). The weighted mean (1276 ±13 BP) calibrates to cal AD 670–778 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–22550 1455 ±40 BP

$\delta^{13}C$: -22.9 ±0.2‰

Sample: 11BC 567B, submitted on 6 March 2003 by D Powlesland

Material: animal bone: *Equus* sp., articulated right calcaneus (J Richardson)

Initial comment: a replicate of OxA-12098. from the smaller, and later, of two *Grubenhauser* excavated under a single cut number in 11BC (11BC7018). The co-ordinates of the samples demonstrate that they are both from the same fill of the later *Grubenhaus*. The area had recently been used for cereal production. The feature was cut into chalk gravel, which appeared to have provided the source for a deposit partially filling an adjacent *Grubenhaus*.

Objectives: to determine the date of the disuse of the *Grubenhaus*. This will assist in determining whether there was a shift in the use of the housing zone from north to south during the life of the settlement or whether the settlement consisted of a small number of units, which shifted around the site over time. Dating this *Grubenhaus* will also contribute to determining whether the northern part of the site was abandoned in the middle Saxon period.

Calibrated date: *1σ:* cal AD 570–650
2σ: cal AD 540–660

Final comment: D Powlesland (8 July 2014), the five dates including replicates from the lower fill of Grubenhaus (011BC07018) context 011BC00567 indicate that this structure was abandoned relatively early during the life of the settlement in the late-fifth or sixth century AD. The dates may be used to suggest a filling date range of between 1 and 120 years. The articulated sheep/goat bones may represent a primary discard into the newly abandoned structure whilst the articulating bones from a horse may represent articulated bones within the fill of the Grubenhaus, or could possibly be derived from a midden deposit if it was not heavily re-worked. Whatever the case the dates do support the case for fairly rapid filling of the feature, which is what we would expect in an active domestic settlement environment. The backfilling of the Grubenhauser is unlikely to have taken place over a very long period and the mix of disarticulated and fragmentary bone with articulated and articulating bones may arise from a variety of different but broadly contemporary events. With ever improving returns from radiocarbon dating there is clear potential for addressing these issues in the future with more comprehensive approaches to newly excavated examples. The focus in the dating program here, upon articulated and articulating samples may have introduced an unintended bias into the interpretation of the nature and complexity of the filling process and the source of the fill material.

Laboratory comment: English Heritage (24 August 2004), the result is not statistically consistent at 95% at 2σ with the replicate measurement on the same bone (GrA-22562; T′=3.9 (5%)=3.8; ν=1; Ward and Wilson 1978), although both these measurements on the astragalus are statistically consistent with the two measurements on the calcaneum which was found articulated with it (OxA-12078 and GrA-22550; T′=4.0; T′(5%)=7.8; ν=3; Ward and Wilson 1978), so GrA-22562 may simply be a statistical outlier. The weighted mean (1467 ±15 BP) calibrates to cal AD 560–640 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–22562 1535 ±40 BP

$\delta^{13}C$: -22.8 ±0.2‰

Sample: 11BC567B, submitted on 6 March 2003 by D Powlesland

Material: animal bone: *Equus* sp., articulated right astragulus (J Richardson)

Initial comment: as GrA-22550; a replicate of OxA-12090.

Objectives: as GrA-22550

Calibrated date: *1σ:* cal AD 430–580
2σ: cal AD 410–620

Final comment: see GrA-22550

Laboratory comment: see GrA-22550

GrA–22624 1345 ±40 BP

$\delta^{13}C$: -22.2 ±0.2‰

Sample: 2 DB 232/233 (WY039), submitted in March 2000 by D Powesland

Material: animal bone: *Bos* sp., articulated 2nd and 3rd phalanges (J Richardson)

Initial comment: a replicate of OxA-13153. From a large, slightly irregularly shaped *Grubenhaus* in the north of area 2DB. Only the southern half of the feature was excavated, the rest being beyond the limit of excavation. Two postholes were recovered, one in the centre of the west side and one just south of the centre. Fill context 259 is stratigraphically earlier than fill context 233. *See* OxA-9749 (2DB232/233) for a further measurement.

Objectives: to determine the length of time taken for a *Grubenhaus* to fill up after use. The articulated samples must have been deposited very soon after use and cannot be residual. They will therefore provide dates from the accumulation of the contexts from which they were recovered. The dating of this *Grubenhaus* will also help to assess the longevity of use of the craft/industrial zone of the site and whether activity on the site shifted southwards through time.

Calibrated date: *1σ:* cal AD 650–690
2σ: cal AD 630–770

Final comment: D Powlesland (8 July 2014), Grubenhaus 002DB00232 situated in the northern portion of the settlement was only half excavated, the remainder left beneath a main baulk demarcating two major excavation areas. The sub-structure cavity was larger than most which has been considered to reflect a relatively late date, this has in fact proved to be the case, with the structure being abandoned during the late-seventh or eighth century AD. The three dates from material recovered from this structure appear to contradict the stratigraphic sequence of the excavated fills of the feature, this could indicate that the feature does incorporate material that was already old when deposited, or that the precision of the dates is such that the time span during which it was filled was not sufficiently great as to be readily identifiable using current methods and material. *See* also UB-4560.

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with OxA-13153, from the same cow (T′=1.9, T′(5%)=3.8, ν=1; Ward and Wilson 1978). The weighted mean (1387 ±27 BP) calibrates to cal AD 610–670 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–22821 1460 ±40 BP

$\delta^{13}C$: -22.1 ±0.2‰

Sample: 2DC 00032 (WY076)/159, submitted in 2003 by D Powesland

Material: animal bone (sheep/goat, articulated right hind and fore limbs) (J Richardson)

Initial comment: a replicate of OxA-13195. From a *Grubenhaus* cutting a series of seven quarry pits, which contained the skeletons of several articulated sheep (context 165/WY080 and WY079). Two fills of the *Grubenhaus* contained articulated animal bone in contexts stratigraphically later than 165. 159 is later than 165, and earlier than 158.

Objectives: to determine the length of time taken for a *Grubenhaus* to fill up after use. The articulated samples must have been deposited very soon after use and cannot be residual. They will therefore provide dates for the accumulation of the contexts from which they were recovered. The dating of this *Grubenhaus* will also refine the dating of the quarrying for red chalk and help to assess the longevity of use of the craft/industry zone of the site and whether activity on the site shifted southwards through time.

Calibrated date: *1σ:* cal AD 560–650
2σ: cal AD 540–660

Final comment: D Powlesland (8 July 2014), 11 radiocarbon dates were derived from samples associated with this *Grubenhaus*, which appeared to have cut away the tops of a series of earlier pits. These had probably been dug as quarry pits to extract Old Red Chalk, and clay which appears to have been a preferred material for the manufacture of hearths and ovens. This material is iron-enriched, and when fired sets very hard in contrast to the other clays found in association with the chalk which become friable when fired. Three articulated sheep had been deposited in the base of the *Grubenhaus* sealing the substantially filled pits. Large quantities of other bone fragments were also recovered from the fills of the abandoned structure. The maximum date span across all of these samples is about 200 years, although a maximum span of 100 years is represented in the combined results. In reality the dates are all highly consistent and suggest that we are dealing with a feature rapidly filled with broadly contemporary material. At its greatest range the filling timespan would cover about a quarter of the life of the settlement. There is no stratigraphic evidence of stabilisation layers or buried turf formations within the fills of this, and for that matter any of the *Grubenhauser* examined at West Heslerton, and we have to accept that the filling period must have been short, probably achieved over months rather than years. If there is any evidence for slower fillings, this may be indicated by the few examples where articulated animals are placed in the upper fill, which may well have slumped after deposition and decay of some of the organic content leaving a suitable dent for the discard of animal carcases. If the questions of filling duration and residuality of material within the material used to backfill these structures cannot be satisfactorily answered with the current evidence, what is very clear is that this Grubenhaus must have gone out of use in the seventh century AD, and that the quarry pits are likely to be considerably earlier, perhaps as much as one century.

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with OxA-13195, from the same sheep/goat (T′=1.2, T′(5%)=3.8, ν=1; Ward and Wilson 1978). The weighted mean (1494 ±26 BP) calibrates to cal AD 530–640 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–22822 1565 ±45 BP

$\delta^{13}C$: -22.0 ±0.2‰

Sample: 2CB29A 80824, submitted in March 2000 by D Powesland

Material: animal bone: *Bos* sp., articulating, 1st and 2nd phalanges (30g) (J Richardson)

Initial comment: as GrA-22550

Objectives: to determine the date of the disuse of the *Grubenhaus*. This will assist in determining whether there was a shift in the use of the housing zone from north to south during the life of the settlement or whether the settlement consisted of a small number of units, which shifted around the site over time. Dating this *Grubenhaus* will also contribute to determining whether the northern part of the site was abandoned in the middle Saxon period.

Calibrated date: *1σ:* cal AD 420–560
2σ: cal AD 390–600

Final comment: D Powlesland (8 July 2014), this Grubenhaus was situated in the northern central part of the settlement and it appears to have cut away the top of an earlier pit. The two dates returned are consistent with a maximum span of no more than 200 years with an earliest date probably in the second half of the fifth century AD. The two dates derived from the upper and lower fills of the Grubenhaus were effectively indistinguishable, indicating that the filling was quick, or that the material deposited in the fill was of a very similar date.

Laboratory comment: English Heritage (24 August 2004), two statistically consistent results were obtained on articulating animal bone samples from fill 29 of 002CB02447 (OxA-13233 and GrA-22822; T′=0.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–9626 1599 ±35 BP

$\delta^{13}C$: -26.9‰

Sample: 11BC504/1A 27625, submitted in March 2000 by D Powlesland

Material: charcoal: *Corylus* sp. (R Gale 2000)

Initial comment: from a sub-rectangular fire pit between *Grubenhauser* 011BC07014, 011BC07021, 011BC07015, and 011BC07019. The fills contained a large amount of charcoal, ash, and stones and some articulated cattle bones. This fire pit is very similar. The pit was cut into hill wash/sand *c* 5m to the south of a chalk knoll. The feature was well sealed by a thick >0.5m deposit of blown sand/hill wash.

Objectives: to determine whether firepits are early or middle Saxon in date. This result will also contribute to determining whether activity in the 'housing zone' shifted from north to south through time and also, more generally, whether activity on the site shifted to the south in the middle Saxon period.

Calibrated date: *1σ:* cal AD 400–540
2σ: cal AD 380–550

Final comment: D Powlesland (8 July 2014), five samples from charcoal from this feature, a fire- or cooking-pit, of a type which seem to be a characteristic of early Anglo-Saxon settlements, indicate an early date for this feature. Two samples from sedge seeds gave surprisingly early dates OxA-10052 and OxA-10053 with calibrated dates of AD 260–430 may be residual and could be derived from the use of peat as a fuel. Both the sedge seeds and short lived hazel twigs (OxA-9627) and articulated bone (UB-4562) had consistent results indicating a mid fifth- to sixth-century date and confirming that this class of feature does seem to be associated with early rather than middle or later Saxon activity. Its presence in the middle of the settlement contributes to the picture of a settlement which is largely static rather than migrating over time.

Laboratory comment: English Heritage (24 August 2004), the results on two single-entity samples of charcoal fragments from fire pit 011BC00504 are consistent (OxA-9626–7; T′=2.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978), but have not been combined before calibration as these measurements are independent. This sample, OxA-9627, and UB-4562 also produced statistically consistent results. This suggests that the short-lived charcoal was fuel from the process within the feature and contemporary with the final use of the structure. The context is therefore most reliably dated by this sample.

References: Ward and Wilson 1978

OxA–9627 1518 ±37 BP

$\delta^{13}C$: -26.9‰

Sample: 11BC504/1B 27625, submitted in March 2000 by D Powlesland

Material: charcoal: *Corylus* sp. (R Gale 2000)

Initial comment: as OxA-9626

Objectives: as OxA-9626

Calibrated date: *1σ:* cal AD 470–600
2σ: cal AD 420–630

Final comment: see OxA-9626

Laboratory comment: see OxA-9626

OxA–10052 1677 ±33 BP

$\delta^{13}C$: -25.7‰

Sample: 011BC00504/2 A, submitted on 28 June 2000 by D Powlesland

Material: plant macrofossils (sedge seeds) (W Carruthers 2000)

Initial comment: this sample was extracted through floatation and derives from burnt material on the burnt stones on the base of a well-sealed pit cut into chalk. The general environment was highly calcareous. The associated samples OxA-9626 and OxA-9627 (11BC504/1A and 1B should produce a date for the feature from charcoal.

Objectives: to test whether peat was used as a fuel in the early-middle Anglo-Saxon period and therefore give us insight into the use of the landscape and its natural resources. It is considered most likely that extensive blanket peats survived in the centre of the Vale of Pickering just 2km to the north of the site at the time of occupation.

Calibrated date: *1σ:* cal AD 330–410
2σ: cal AD 250–430

Final comment: D Powlesland (8 July 2014), the results from these samples appear to indicate that peat could have been used as a fuel source, but if this is the case it was not particularly old and might indicate the use of active growing and un-truncated peat deposits as a source of fuel. This is important in terms of landscape reconstruction and has reference to our understanding of the use of the wetlands situated 1–2km to the north of the settlement. *See* also OxA-9626.

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with OxA-10053 (T′=0.0, T′(5%)=3.8, ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–10053 1677 ±37 BP

$\delta^{13}C$: -26.3‰

Sample: 011BC00504/2 B, submitted on 28 June 2000 by D Powlesland

Material: plant macrofossils (sedge seeds) (W Carruthers 2000)

Initial comment: a replicate of OxA-10052.

Objectives: as OxA-10052

Calibrated date: *1σ:* cal AD 330–410
2σ: cal AD 250–430

Final comment: see OxA-10052

Laboratory comment: see OxA-10052

OxA–10054 1215 ±35 BP

$\delta^{13}C$: -22.6‰

Sample: 012AA00251 A, submitted on 28 June 2000 by D Powlesland

Material: grain: *Hordeum* sp., charred (W Carruthers 2001)

Initial comment: this sample, comprising plant macrofossil material derived from the floatation program, comes from one of two purpose built latrines found in the settlement. The feature that combines a four-post structural component and a latrine pit is cut through two slots, which are thought to be late-Roman at the earliest or early Saxon. It was well-sealed and on stratigraphic grounds should be middle Saxon in date. The latrine pit was cut into chalky hill wash and bedrock and silty cess-rich fills included both sand and clay components and in addition too small amounts of chalk.

Objectives: to test for continuity from Roman to Saxon and to refine the Roman dating sequence. To assist in dating the sequence of the enclosure features and therefore assist in the spatial reconstruction of the settlement and its boundary features. To test the hypothesis that dedicated latrine structures are not constructed in the early Saxon phase and that they are a characteristic feature of middle Saxon activity. Only two were discovered on the site and the other could be independently dated to the middle Saxon period.

Calibrated date: *1σ:* cal AD 720–890
2σ: cal AD 680–900

Final comment: D Powlesland (8 July 2014), two samples from this structure confirm the middle Saxon date for this feature, a latrine structure which had been argued during the excavation was most likely late. Prior to the middle Saxon period there was no evidence of built latrine structures of this type. Clearly the date which indicates this feature relates to the very last phase of activity in the settlement in the late-eighth or early-ninth centuries AD has no bearing on understanding the relationship with the possibe Roman enclosures that it cuts.

Laboratory comment: English Heritage (28 April 2004), the two independent measurements on charred plant remains from the latrine (012AA00251) are statistically consistent (OxA-10054 and OxA-10062; T′=1.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–10062 1155 ±50 BP

$\delta^{13}C$: -23.3‰

Sample: 012AA00251 B, submitted on 28 June 2000 by D Powlesland

Material: carbonised plant macrofossil (*Prunus* sp., fruit stone) (W Carruthers 2001)

Initial comment: as OxA-10054

Objectives: as OxA-10054

Calibrated date: *1σ:* cal AD 770–970
2σ: cal AD 720–1000

Final comment: see OxA-10054

Laboratory comment: see OxA-10054

OxA–12090 1441 ±26 BP

$\delta^{13}C$: -22.1‰

Sample: 11BC567B 55552, submitted in March 2000 by D Powlesland

Material: animal bone: *Equus* sp., articulated, horse, right astragulus (J Richardson)

Initial comment: a replicate of GrA-22562.

Objectives: as GrA-22562

Calibrated date: *1σ:* cal AD 600–650
2σ: cal AD 560–660

Final comment: see GrA-22562

Laboratory comment: see GrA-22562

OxA–12091 1309 ±26 BP

$\delta^{13}C$: -21.6‰

Sample: 11BD908 32194, submitted in March 2001 by D Powlesland

Material: animal bone (sheep/goat, articulating proximal radius) (J Richardson)

Initial comment: a replicate of GrA-22412.

Objectives: as GrA-22412

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–770

Final comment: D Powlesland (8 July 2014), one of three samples from Grubenhaus 011CD07026 (*see* also OxA-13147 and GrA-27412) dated to secure the date at which the structure went out of use, and to try an get insight into the duration of filling of the feature, and potentially the degree of residuality of the material used to backfill the sub-structure cavity. The calibrated dates indicate that the structure must have ceased to function by AD 660–771 a date range at the beginning of the middle Saxon period but with the structure evidently out of use long before the settlement was abandoned. Limits in the granularity or resolution of the dates make it difficult to establish a reliable view regarding the time span in which the feature filled or to give a clear picture of residuality. If the fill duration is at the most extreme supported by the dates then a filling span of up to 200 years covers more than a quarter of the occupation span of the settlement.

Laboratory comment: see GrA-22412

OxA–12097 1279 ±25 BP

$\delta^{13}C$: -21.6‰

Sample: 12AC 9507/400A (WY178) 092164, submitted in March 2001 by D Powlesland

Material: animal bone: *Bos* sp., sacrum, pelvis fragment, and vertebrae (J Richardson)

Initial comment: a replicate of GrA-22416 and UB-4565.

Objectives: as GrA-22416

Calibrated date: *1σ:* cal AD 670–770
2σ: cal AD 660–780

Final comment: see GrA-22416

Laboratory comment: see GrA-22416

OxA–12098 1469 ±25 BP

δ[13]C: -22.5‰

Sample: 11BC567B 50473, submitted in March 2001 by D Powlesland

Material: animal bone: *Equus* sp., articulated right calcaneum (J Richardson)

Initial comment: a replicate of GrA-22550.

Objectives: as GrA-22550

Calibrated date: *1σ:* cal AD 570–620
2σ: cal AD 540–650

Final comment: see GrA-22550

Laboratory comment: English Heritage (2004), this measurement is statistically consistent with the second measurement on this bone (GrA-22550; T′=0.1; T′(5%)=3.8; ν=1) (Ward and Wilson 1978). *See* also OxA-12090.

References: Ward and Wilson 1978

OxA–12136 1473 ±25 BP

δ[13]C: -20.7‰

Sample: 2DB8 (E), submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., right calcaneum (J Richardson)

Initial comment: this deposit was preserved beneath a thick deposit of blown sand. It survived as a small mound of bone over a pit, which contained further bone, clearly the same assemblage. An enhanced depth of topsoil relating to a medieval headland had assured survival. The deposit appears to represent a butchery waste dump.

Objectives: the primary objective is to determine whether the deposit is indicative of a long-lived localised site function or the result of a single event. In addition it will contribute further dates to help assess the longevity of use of the craft/industry zone on the site.

Calibrated date: *1σ:* cal AD 560–620
2σ: cal AD 540–650

Final comment: D Powlesland (8 July 2014), although the date ranges of the six individual samples examined from this deposit of butchery waste do vary, they are statistically very close and have been used to argue that the large deposit of animal bone in and overflowing a small pit buried by blown sand represents a single event with a date range of cal AD 560–645 (95% probability). As a single event it may, rather than represent a single deposit from a single moment, alternatively be a single deposit accrued over a short number of years, and be the by-product of butchery occurring in the north-western part of the settlement.

OxA–12239 1312 ±27 BP

δ[13]C: -22.0‰

Sample: 12AC 9507/400C 101740, submitted in March 2000 by D Powlesland

Material: animal bone (sheep/goat, disarticulated right astragalus) (J Richardson)

Initial comment: from a large east/west aligned *Grubenhaus* in the north of area 11AC. The south side of the structure cut through ditch 012AC00060. Three postholes were recovered. The two from the short ends had chalk packing; that in the south side had no packing and may have been pile driven. The pit was cut into natural chalk and had some evidence for cess staining at its base. Seven fills were recognised in excavation. Over 5000 animal bone fragments were recovered from these.

Objectives: to determine the derivation of the rubbish backfilling the *Grubenhaus*. Is it secondary rubbish or was it middened first and then deposited as a tertiary context in the *Grubenhaus*? The chronological consistency of the six disarticulated bones in comparison to the date of the articulated samples from the same feature should determine this.

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–770

Final comment: see GrA-22416

OxA–12240 1293 ±28 BP

δ[13]C: -21.7‰

Sample: 12AC 9507/395B 87505, submitted in March 2000 by D Powlesland

Material: animal bone (sheep/goat, disarticulated right astragalus) (J Richardson)

Initial comment: as OxA-12239

Objectives: as OxA-12239

Calibrated date: *1σ:* cal AD 670–770
2σ: cal AD 660–780

Final comment: see GrA-22416

OxA–12245 1302 ±25 BP

δ[13]C: -20.6‰

Sample: 012AD06008 (WY169) 116268, submitted on 23 February 2000 by D Powlesland

Material: animal bone: *Sus* sp., articulated skeleton (J Richardson)

Initial comment: this sample and OxA-13166 derive from a well sealed curvilinear ditch/slot. Although it contained quantities of Roman ceramics its date is likely to be middle Saxon on stratigraphic grounds. The upper fills included a reddish ?burnt daub rich matrix which has been identified broadly with the final phase of activity at the site.

Objectives: to refine the Anglo-Saxon dating sequence and in particular address the later phases of occupation and assist in dating the sequence of enclosure features and therefore assist in the spatial reconstruction of the settlement and its boundary features.

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–770

Final comment: D Powlesland (8 July 2014), the enclosure features and fence-settings in the settlement are notoriously difficult to date, and it is important that these dates establish a late-seventh or eighth century AD date for a slot which seems to be part of a phase of enclosure that occurs at the begining of the middle Saxon period, when it appears there are significant changes occurring in the settlement and others such as at nearby Sherburn and East Heslerton.

OxA–12246 1224 ±27 BP

$\delta^{13}C$: -22.3‰

Sample: 011AB00807 (WY093) 70735, submitted on 28 June 2000 by D Powlesland

Material: animal bone: *Equus* sp., articulated skeleton (J Richardson)

Initial comment: this sample, with sample OxA-13238 (011AB00150), derives from the primary fill of a sub-rectangular ditched enclosure. The enclosure, which incorporates three main phases of construction represented by three ditches/slots to the west and two to the north and south, was cut into chalk and chalk gravel. The two samples submitted here are both from what has been seen as the middle phase of construction. This is cut by the foundation trench of a middle Saxon building and maybe early Saxon in origin. A Roman date for the initial phase is likely on morphological grounds.

Objectives: to test for continuity from Roman to Saxon; refine the Roman dating sequence; and assist in dating the sequence of the enclosure features and therefore assist in the spatial reconstruction of the settlement and its boundary features.

Calibrated date: *1σ:* cal AD 720–870
2σ: cal AD 680–890

Final comment: D Powlesland (8 July 2014), the dates returned from this major enclosure ditch indicate a filling date in the eighth or early ninth century AD, they do not support any suggestion that this feature is Roman and imply that it belongs to the middle Saxon phase when enclosure networks seem to be established over much of the southern two thirds of the settlement.

Laboratory comment: English Heritage (24 August 2004), enclosure ditch 011AB10005 contained two articulated bone samples: a goose from a primary fill on the western side of the enclosure (150) and a partial horse skeleton from the single fill further south (807). These measurements are statistically consistent (OxA-13238 and OxA-12246; T′=0.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and the earlier provides a *terminus ante quem* for construction of the ditch.

References: Ward and Wilson 1978

OxA–12275 1521 ±26 BP

$\delta^{13}C$: -21.5‰

Sample: 2DB89/365 (WY054), submitted in March 2000 by D Powlesland

Material: animal bone: *Sus* sp., articulated right ulna and loose epiphysis, right radius and loose epiphysis, right distal humerus (J Richardson)

Initial comment: from a large east/west aligned *Grubenhaus* in the north of area 2DB. Thirteen fills and two postholes were identified. Context 365 is stratigraphically earlier than context 168, and earlier than 170 (which contained destruction debris from the malting kiln 2DB00339). *See* also OxA-9628 for a measurement from the same *Grubenhaus*.

Objectives: to determine the length of time taken for a *Grubenhaus* to fill up after use. The articulated samples must have been deposited very soon after use and cannot be residual. They will therefore provide dates for the accumulation of the contexts from which they were recovered. The dating of this *Grubenhaus* will also refine the dating of malt kiln (2DB00399) and contribute towards the assessment of the longevity of use of the craft/industry zone of the site and help determine whether activity on the site shifted southwards through time.

Calibrated date: *1σ:* cal AD 530–580
2σ: cal AD 430–610

Final comment: D Powlesland (8 July 2014), the two dates from this structure suggest the structure was abandoned in the late fifth or sixth century and that it could have taken from 1–155 years. In terms of site phasing this duration is problematic, and it is likely that it was filled relatively rapidly.

OxA–12276 1641 ±26 BP

$\delta^{13}C$: -21.5‰

Sample: 2CB 2323B 52978, submitted in March 2001 by D Powlesland

Material: animal bone: *Bos* sp., articulated, 2nd phalanx (J Richardson)

Initial comment: from fill 2323 of *Grubenhaus* CB1324, which was of two-post style and contained more objects than animal bones. See also OxA-13163 and OxA-13177 for replicate dates on the rearticulating 3rd phalanx.

Objectives: as GrA-22550

Calibrated date: *1σ:* cal AD 390–430
2σ: cal AD 340–530

Final comment: D Powlesland (8 July 2014), five dates including replicates suggest that this Grubenhaus was abandoned during the fifth or early-sixth century, making this one of the first examples to be abandoned. Whilst it does indicate early buildings in the northern portion of the settlement when compared with the other dated strcutures, it does not support the concept of gradual shift in the settlement as a whole.

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with OxA-13163 and OxA-13177 on the third phalanx of this articulating bone group (T′=0.8; T′(5%)=6.0; ν=2; Ward and Wilson 1978). The weighted mean (1622 ±16 BP) calibrates to cal AD 395–530 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–13142 1548 ±41 BP

δ[13]*C:* -21.1‰

Sample: 2DB8 (A), submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., right calcaneum (J Richardson)

Initial comment: as OxA-12136

Objectives: as OxA-12136

Calibrated date: *1σ:* cal AD 420–570
2σ: cal AD 410–610

Final comment: see OxA-12136

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2004), this sample may have been contaminated during filtration (Bronk Ramsey *et al* 2004), and so was re-processed and dated from gelatine. The quoted uncertainty accounts for the additional error associated with this process.

References: Bronk Ramsey *et al* 2004b

OxA–13143 1448 ±34 BP

δ[13]*C:* -20.9‰

Sample: 2DC 00032/31A 53518, submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., disarticulated right astragalus (J Richardson)

Initial comment: from fill of *Grubenhaus* 00032.

Objectives: as GrA-22550

Calibrated date: *1σ:* cal AD 580–650
2σ: cal AD 550–660

Final comment: see GrA-22821

Laboratory comment: see OxA-13142

OxA–13144 1443 ±34 BP

δ[13]*C:* -22.0‰

Sample: 2DC 00032/158 56499, submitted in March 2000 by D Powlesland

Material: animal bone (sheep/goat, disarticulated right astragalus) (J Richardson)

Initial comment: from fill 00158 of Grubenhaus 00032. *See* also UB-4561 (2DC00032(WY072)/158).

Objectives: as GrA-22550

Calibrated date: *1σ:* cal AD 590–650
2σ: cal AD 550–660

Final comment: see GrA-22821

Laboratory comment: see OxA-13142

OxA–13145 1419 ±35 BP

δ[13]*C:* -21.4‰

Sample: 2DB 89/168, submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., articulating 2nd and 3rd phalanges (J Richardson)

Initial comment: from a large east/west aligned *Grubenhaus* in the north of area 2DB. Thirteen fills and two postholes were identified. Context 365 is stratigraphically earlier than context 168, and earlier than 170 (which contained destruction debris from the malting kiln 2DB00339).

Objectives: as OxA-12275

Calibrated date: *1σ:* cal AD 600–660
2σ: cal AD 570–670

Final comment: see OxA-12275

Laboratory comment: see OxA-13142

OxA–13146 1305 ±33 BP

δ[13]*C:* -21.3‰

Sample: 12AC 9507/400B 72489, submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., articulated ulna (J Richardson)

Initial comment: as OxA-12239

Objectives: to determine and date when *Grubenhaus* 12AC9507 was backfilled. The articulated bones must be very close in date to the formation of the context from which they were recovered. Dating this *Grubenhaus* will help to assess whether the settlement shifted southwards through time. Comparison with the measurements on disarticulated animal bone from the same feature will help to assess the secondary or tertiary nature of this material.

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–780

Final comment: see GrA-22416

Laboratory comment: see OxA-13142

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with OxA-13247, from the same cow (T′=0.2; T′(5%)=3.8; ν=1) (Ward and Wilson 1978). The weighted mean (1318 ±19 BP) calibrates to cal AD 655–770 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–13147 1280 ±33 BP

δ[13]*C:* -21.2‰

Sample: 11CD5104, submitted in March 2000 by D Powlesland

Material: animal bone (sheep/goat, articulating proximal radius and distal humerus) (J Richardson)

Initial comment: from a small, east/west aligned *Grubenhaus* in the east of area 11CD, immediately to the west of a series of enclosure ditches (11CD7026). It cut through a slot (11CD08053) on the south/east side, and appears to have two postholes. On stratigraphic grounds this feature is likely to be middle Saxon. 5104 and 908 are equivalent contexts.

Objectives: as GrA-22552

Calibrated date: *1σ:* cal AD 670–770
2σ: cal AD 660–780

Final comment: see OxA-12091

Laboratory comment: see OxA-13142

OxA–13151 1413 ±43 BP

$\delta^{13}C$: -21.6‰

Sample: 2DB8 (B), submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., right calcaneum (J Richardson)

Initial comment: as OxA-13142

Objectives: as OxA-13142

Calibrated date: *1σ:* cal AD 600–660
2σ: cal AD 560–680

Final comment: see OXA-12136

Laboratory comment: see OxA-13142

OxA–13152 1476 ±35 BP

$\delta^{13}C$: -21.1‰

Sample: 2DB8 (F), submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., right calcaneum (J Richardson)

Initial comment: as OxA-13142

Objectives: as OxA-13142

Calibrated date: *1σ:* cal AD 550–630
2σ: cal AD 530–650

Final comment: see OxA-12136

Laboratory comment: see OxA-13142

OxA–13153 1418 ±35 BP

$\delta^{13}C$: -21.1‰

Sample: 2DB 232/233 (WY039), submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., articulated 2nd and 3rd phalanges (J Richardson)

Initial comment: a replicate of GrA-22624.

Objectives: as GrA-22624

Calibrated date: *1σ:* cal AD 600–660
2σ: cal AD 570–670

Final comment: see UB-4650

Laboratory comment: see OxA-13142

Laboratory comment: English Heritage (24 August 2004), although OxA-13153 is statistically consistent with GrA-22624 (T'=1.9; $T'(5\%)$=3.8; ν=1; Ward and Wilson 1978), it is rather older and this may be a case when the re-filtration procedure has failed to remove all the contaminants. For this reason, GrA-22624 is preferred.

References: Ward and Wilson 1978

OxA–13154 1434 ±37 BP

$\delta^{13}C$: -21.3‰

Sample: 2DC 00032/31B 61922, submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., disarticulated right astragalus (J Richardson)

Initial comment: from fill 00031 of Grubenhaus 00032.

Objectives: as OxA-13144

Calibrated date: *1σ:* cal AD 590–660
2σ: cal AD 550–670

Final comment: see GrA-22821

Laboratory comment: see OxA-13142

OxA–13155 1522 ±34 BP

$\delta^{13}C$: -22.0‰

Sample: 2DC 00032/31C 53610, submitted in March 2000 by D Powlesland

Material: animal bone: *Equus* sp., disarticulated 2nd phalanx (J Richardson)

Initial comment: from fill 00031 of Grubenhaus 00032.

Objectives: as OxA-13144

Calibrated date: *1σ:* cal AD 470–590
2σ: cal AD 420–620

Final comment: see GrA-22821

Laboratory comment: see OxA-13142

OxA–13156 1503 ±38 BP

$\delta^{13}C$: -21.3‰

Sample: 2DC 00032/165, submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., disarticulated right astragalus (J Richardson)

Initial comment: from fill 00165 of Grubenhaus 00032. *See* also UB-4561 (2DC00032(WY072)/158).

Objectives: as OxA-13144

Calibrated date: *1σ:* cal AD 540–610
2σ: cal AD 420–650

Final comment: see GrA-22821

Laboratory comment: see OxA-13142

References: Bronk Ramsey *et al* 2004b

OxA–13157 1526 ±34 BP

$\delta^{13}C$: -21.6‰

Sample: 2DC 00032/131 59175, submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., disarticulated right astragalus (J Richardson)

Initial comment: from fill 00131 of Grubenhaus 00032. *See* also UB-4561 (2DC00032(WY072)/158).

Objectives: as OxA-13144

Calibrated date: *1σ:* cal AD 430–580
2σ: cal AD 420–610

Final comment: see GrA-22821

Laboratory comment: see OxA-13142

OxA–13158 1338 ±35 BP

$\delta^{13}C$: -21.7‰

Sample: 12AC 9507/400D 68735, submitted in March 2000 by D Powlesland

Material: animal bone (sheep/goat, disarticulated right astragalus) (J Richardson)

Initial comment: as OxA-12239

Objectives: as OxA-13144

Calibrated date: *1σ:* cal AD 650–690
2σ: cal AD 640–770

Final comment: see GrA-22416

Laboratory comment: see OxA-13142

OxA–13159 1295 ±34 BP

$\delta^{13}C$: -21.9‰

Sample: 12AC 9507/395A 36074, submitted in March 2000 by J Richardson

Material: animal bone (sheep/goat, disarticulated right astragalus) (J Richardson)

Initial comment: as OxA-12239

Objectives: as OxA-13144

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–780

Final comment: see GrA-22416

Laboratory comment: see OxA-13142

References: Bronk Ramsey *et al* 2004b

OxA–13160 1333 ±34 BP

$\delta^{13}C$: -21.6‰

Sample: 12AC 9507/401 93918, submitted in March 2000 by J Richardson

Material: animal bone (sheep/goat, disarticulated right astragalus) (J Richardson)

Initial comment: as OxA-12239

Objectives: as OxA-13144

Calibrated date: *1σ:* cal AD 650–690
2σ: cal AD 640–770

Final comment: see GrA-22416

Laboratory comment: see OxA-13142

OxA–13161 1576 ±37 BP

$\delta^{13}C$: -21.0‰

Sample: 11BC567A (WY145) 47645, submitted in March 2000 by D Powlesland

Material: animal bone (sheep/goat, articulated axis vertebra) (J Richardson)

Initial comment: as GrA-22550. A replicate of OxA-13249.

Objectives: as GrA-22550

Calibrated date: *1σ:* cal AD 420–550
2σ: cal AD 390–570

Final comment: see GrA-22550

Laboratory comment: see OxA-13142

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with OxA-13249 on the vertebrae which articulated with this sample (T′=3.4, T′(5%)=3.8, ν=1; Ward and Wilson 1978). The weighted mean (1524 ±24 BP) calibrates to cal AD 435–605 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–13162 1640 ±37 BP

$\delta^{13}C$: -21.3‰

Sample: 2CB 2323A (WY014) 65675, submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., articulated, 3rd phalanx (J Richardson)

Initial comment: a replicate of OxA-13172. From fill 2323 of *Grubenhaus* CB1324, which was of two-post style and contained more objects than animal bones.

Objectives: as GrA-22550

Calibrated date: *1σ:* cal AD 380–430
2σ: cal AD 330–540

Final comment: see OxA-12276

Laboratory comment: see OxA-13142

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with OxA-13172 on the sesamoid of this articulated bone group (T′=1.4, T′(5%)=3.8, ν=1; Ward and Wilson 1978). The weighted mean (1610 ±27 BP) calibrates to cal AD 390–540 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–13163 1614 ±34 BP

$\delta^{13}C$: -21.7‰

Sample: 2CB 2323B 86583, submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., articulated 3rd phalanx (J Richardson)

Initial comment: as OxA-12276

Objectives: as OxA-12276

Calibrated date: *1σ:* cal AD 400–540
2σ: cal AD 380–550

Final comment: see OxA-12276

Laboratory comment: see OxA-13142

Laboratory comment: English Heritage (24 August 2004), this result is statistically consistent both with the replicate measurement on the same bone (OxA-13177; T′=0.0; T′(5%)=3.8; ν=1) and with the result on the second phalanx from this articulating bone group (OxA-12276; T′(5%)=6.0; ν=2) (Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–13164 1314 ±34 BP

$\delta^{13}C$: -21.4‰

Sample: 011CD05446 (WY141), submitted on 28 June 2000 by D Powlesland

Material: animal bone (sheep/goat, articulated skeleton) (J Richardson)

Initial comment: one of a series of samples designed to add resolution to our understanding of the late Roman sequence towards the southern half of the settlement. This sample form components in what is currently viewed as the first or second phase of Roman enclosures situated to the west of a spring which is centrally located in the southern half of the settlement. The pottery derived from these two features is of late/very late Roman date and the form of the ditches with sharply cut V-shaped profiles is more likely to relate to Roman rather than Saxon activity.

Objectives: to test for continuity from Roman to Saxon; refine the Roman dating sequence; and assist in dating the sequence of the enclosure features and therefore assist in the spatial reconstruction of the settlement and its boundary features.

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–770

Final comment: D Powlesland (2001), this dates to the backfilling of a late recut within the roundhouse.

Laboratory comment: see OxA-13142

OxA–13166 1261 ±45 BP

$\delta^{13}C$: -20.7‰

Sample: 012 AD06067 (WY153) 115419, submitted on 23 February 2000 by D Powlesland

Material: animal bone: *Sus* sp., articulated skeleton (J Richardson)

Initial comment: as OxA-12245

Objectives: as OxA-12245

Calibrated date: *1σ:* cal AD 670–780
2σ: cal AD 660–890

Final comment: see OxA-12245

Laboratory comment: see OxA-13142

OxA–13172 1575 ±40 BP

$\delta^{13}C$: -21.4‰

Sample: 2CB 2323A (WY014) 65675, submitted in March 2001 by D Powlesland

Material: animal bone: *Bos* sp., articulated, sesamoid (J Richardson)

Initial comment: a replicate of OxA-13162.

Objectives: as OxA-13162

Calibrated date: *1σ:* cal AD 420–550
2σ: cal AD 390–580

Final comment: see OxA-12276

Laboratory comment: see OxA-13142

Laboratory comment: see OxA-13162

OxA–13177 1610 ±24 BP

$\delta^{13}C$: -21.5‰

Sample: 2CB 2323B 86583, submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., articulated 3rd phalanx (J Richardson)

Initial comment: a replicate of OxA-13163.

Objectives: as OxA-12276

Calibrated date: *1σ:* cal AD 405–530
2σ: cal AD 390–540

Final comment: see OxA-12276

Laboratory comment: see OxA-12276

OxA–13178 1205 ±30 BP

$\delta^{13}C$: -20.0‰
$\delta^{15}N$ *(diet):* +8.7‰
C/N ratio: 3.3

Sample: 012AD06010 (WY170) 115195, submitted on 28 June 2000 by D Powlesland

Material: animal bone: *Felis* sp., articulated skeleton (J Richardson)

Initial comment: from one of a series of enclosure ditches in the southern part of the settlement. This sample is one of two from the same enclosure master context 012AD07230.

Although it represents a relatively early component in a sequence of enclosures set in the base of a dry valley its relationship to a Grubenhaus indicates that it is probably of Saxon date despite the high frequency of Roman material in the fill.

Objectives: refine the Anglo-Saxon dating sequence and in particular address the later phases of occupation and assist in dating the sequence of enclosure features and therefore assist in the spatial reconstruction of the settlement and its boundary features.

Calibrated date: *1σ:* cal AD 770–890
2σ: cal AD 710–940

Final comment: D Powlesland (8 July 2014), this single sample with a date range running into the tenth century AD is amongst the latest dates from the site and is most likely to fall in the mid-late ninth century AD, and may relate to a deposit made at about the time the settlement was abandoned.

OxA–13195 1518 ±34 BP

δ^{13}C: -21.4‰

Sample: 2DC 00032 (WY076)/159, submitted in March 2000 by J Richardson

Material: animal bone (sheep/goat, articulated right hind and fore limbs) (J Richardson)

Initial comment: a replicate of GrA-22821.

Objectives: as GrA-22821

Calibrated date: *1σ:* cal AD 530–600
2σ: cal AD 420–620

Final comment: see GrA-22821

Laboratory comment: see OxA-13142

Laboratory comment: see GrA-22821

OxA–13197 1336 ±29 BP

δ^{13}C: -21.7‰

Sample: 012AD05791, submitted on 23 February 2000 by D Powlesland

Material: animal bone: *Bos* sp., articulating astragalus and calcaneum (J Richardson)

Initial comment: from a roughly north-south aligned linear feature in the base of the dry valley that dominates the southern part of the settlement. It appears to have a relationship with the foundations of a very late Roman structure defined by a series of rubble post pads. The ditch itself was cut down onto a pebble surface relating to earlier Roman activity. A coin of Arcadius from the filling gives a useful *terminus post quem* of about AD 400 and it appears that this feature is cut by at least two Saxon slots and may relate to the latest Roman/sub-Roman phase of activity.

Objectives: as OxA-13164

Calibrated date: *1σ:* cal AD 650–680
2σ: cal AD 640–770

Final comment: D Powlesland (2001), this sample comes from ditch 012AD06249 and appears to date the possible construction of a fence within the cut.

OxA–13204 1342 ±33 BP

δ^{13}C: -22.1‰

Sample: 11BA 221 60845, submitted in March 2001 by D Powlesland

Material: animal bone: *Equus* sp., articulated 3rd phalanx (J Richardson)

Initial comment: a replicate of OxA-13234. From an irregular, sub-square *Grubenhaus* (11BA7005) in the south of area 11BA. The structure cut through the west side of curvilinear enclosure 011BA07130 and was cut by east/west ditch 011BA00630. One large posthole in the east side was recovered during excavation. Fill 221 is stratigraphically later than fill 508.

Objectives: as GrA-22412

Calibrated date: *1σ:* cal AD 650–680
2σ: cal AD 640–770

Final comment: D Powlesland (8 July 2014), four dates, including two replicates from this *Grubenhaus,* produce a date in the late-seventh or early eighth century AD for the abandonment of this structure, which cut through part of a major enclosure ditch and was itself cut by a smaller slot or fence trench. The stratigraphic relationship between the deposits from which the samples were collected suggests a sequence which is impossible to detect within the dates which are consistent and effectively the same, this supports a view that the feature was rapidly filled.

Laboratory comment: see OxA-13142

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with OxA-13234 (1321 ±19 BP; T′=0.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Bronk Ramsey *et al* 2004b
Ward and Wilson 1978

OxA–13231 1422 ±24 BP

δ^{13}C: -21.2‰

Sample: 2DB8 (C), submitted in March 2000 by J Richardson

Material: animal bone: *Bos* sp., cattle right calcaneum (J Richardson)

Initial comment: as OxA-13142

Objectives: as OxA-13142

Calibrated date: *1σ:* cal AD 610–655
2σ: cal AD 595–660

Final comment: see OxA-12136

OxA–13232 1468 ±24 BP

$\delta^{13}C$: -20.7‰

Sample: 2DB8 (D), submitted in March 2000 by D Powlesland

Material: animal bone: *Bos* sp., right calcaneum (J Richardson)

Initial comment: as OxA-13142

Objectives: as OxA-13142

Calibrated date: *1σ:* cal AD 570–625
2σ: cal AD 545–645

Final comment: see OxA-12136

OxA–13233 1531 ±25 BP

$\delta^{13}C$: -20.7‰

Sample: 2CB29B 81626, submitted in March 2000 by D Powlesland

Material: animal bone (sheep/goat, articulating right astragalus and calcaneum) (J Richardson)

Initial comment: as GrA-22822

Objectives: as GrA-22822

Calibrated date: *1σ:* cal AD 470–570
2σ: cal AD 420–600

Final comment: see GrA-22822

Laboratory comment: see GrA-22822

OxA–13234 1310 ±24 BP

$\delta^{13}C$: -21.8‰

Sample: 11BA 221 60845, submitted in March 2000 by D Powlesland

Material: animal bone: *Equus* sp., articulated 2nd phalanx (J Richardson)

Initial comment: a replicate of OxA-13204.

Objectives: as OxA-13204

Calibrated date: *1σ:* cal AD 665–765
2σ: cal AD 655–770

Final comment: see OxA-13204

Laboratory comment: see OxA-13204

OxA–13235 1299 ±23 BP

$\delta^{13}C$: -21.8‰

Sample: 11BA508 48147, submitted in March 2000 by D Powlesland

Material: animal bone: *Equus* sp., articulated 2nd phalanx (J Richardson)

Initial comment: from an irregular, sub-square *Grubenhaus* (11BA7005) in the south of area 11BA. The structure cut through the west side of curvilinear enclosure 011BA07130 and was cut by east/west ditch 011BA00630. One large posthole in the east side was recovered during excavation. Fill 221 is stratigraphically later than fill 508.

Objectives: as GrA-22412

Calibrated date: *1σ:* cal AD 665–765
2σ: cal AD 660–770

Final comment: see OxA-13204

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with OxA-13248 on the first phalanx of this articulating group (T'=0.2, $T'(5\%)$=3.8, ν=1; Ward and Wilson 1978). The weighted mean (1294 ±18 BP) calibrates to cal AD 665–775 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–13236 1316 ±25 BP

$\delta^{13}C$: -20.8‰

Sample: 012AD00801, submitted on 28 June 2000 by D Powlesland

Material: animal bone: *Bos* sp., articulated phalanges II and III (J Richardson)

Initial comment: from one of a series of enclosure ditches in the southern part of the settlement. This sample is from the same enclosure master context 012AD07230. Although it represents a relatively early component in a sequence of enclosures set in the base of a dry valley its relationship to a *Grubenhaus* indicates that it is probably of Saxon date despite the high frequency of Roman material in the fill.

Objectives: as OxA-13178

Calibrated date: *1σ:* cal AD 660–690
2σ: cal AD 650–770

Final comment: D Powlesland (8 July 2014), this date supports the supposition made in the field that this enclosure ditch is indeed middle Saxon, of late-seventh or early-eighth century AD date and appears to be part of a major phase of enclosure definition that characterises the begining of the middle Saxon period. This may have something to do with changes in the stock management regime.

OxA–13238 1244 ±33 BP

$\delta^{13}C$: -20.5‰

Sample: 011AB00150 (WY123), submitted on 28 June 2000 by D Powlesland

Material: animal bone (domestic goose, articulated skeleton) (J Richardson)

Initial comment: as OxA-12246

Objectives: as OxA-12246

Calibrated date: *1σ:* cal AD 690–780
2σ: cal AD 670–890

Final comment: D Powlesland (2001), this date provides a *terminus ante quem* for the construction of the ditch. *See* also OxA-12246.

Laboratory comment: see OxA-13142

Laboratory comment: see OxA-12246

OxA–13247 1325 ±23 BP

$\delta^{13}C$: -20.7‰

Sample: 12AC 9507/400B 95288, submitted in March 2001 by D Powlesland

Material: animal bone: *Bos* sp., articulated right radius (J Richardson)

Initial comment: a replicate of OxA-13146.

Objectives: as OxA-13146

Calibrated date: *1σ:* cal AD 660–685
2σ: cal AD 655–765

Final comment: see GrA-22416

Laboratory comment: see OxA-13146

OxA–13248 1284 ±31 BP

$\delta^{13}C$: -22.1‰

Sample: 11BA508 49646, submitted in March 2001 by D Powlesland

Material: animal bone: *Equus* sp., articulated 1st phalanx (J Richardson)

Initial comment: as OxA-13235

Objectives: as OxA-13235

Calibrated date: *1σ:* cal AD 670–770
2σ: cal AD 660–780

Final comment: see OxA-13204

Laboratory comment: see OxA-13142

Laboratory comment: see OxA-13235

OxA–13249 1487 ±31 BP

$\delta^{13}C$: -21.1‰

Sample: 11BC567A (WY145) 47645, submitted in March 2001 by D Powlesland

Material: animal bone (sheep/goat, articulated 3rd cervical vertebra) (J Richardson)

Initial comment: a replicate of OxA-13161.

Objectives: as GrA-22550

Calibrated date: *1σ:* cal AD 550–610
2σ: cal AD 530–650

Final comment: see GrA-22550

Laboratory comment: see OxA-13142

Laboratory comment: see OxA-13161

OxA–13273 1292 ±32 BP

$\delta^{13}C$: -19.9‰

Sample: 012AD06081 (WY171), submitted on 28 June 2000 by D Powesland

Material: animal bone: *Sus* sp., articulated skeleton (J Richardson)

Initial comment: from a slot of fence trench segment in the centre of the dry valley that dominates the southern part of the settlement. It was well sealed and cut into earlier occupation deposits/surfaces, which probably relates to Roman activity. This feature which may have supported a fence or some sort of blocking in the centre of the valley is not independently dated but is thought to relate to the middle Saxon activity on the site. Its relationship with a series of other ditches and slots immediately to the south was unclear. The feature was cut into chalky occupation deposits of probably Roman date.

Objectives: one of a group of samples designed to refine the regional dating of the prehistoric ceramic series.

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–780

Final comment: D Powlesland (2001), this probably dates the backfilling of the ditch and fence construction.

Laboratory comment: see OxA-13142

References: Bronk Ramsey *et al* 2004b

UB–4556 1506 ±22 BP

$\delta^{13}C$: -22.1 ±0.2‰

Sample: 2DC165/WY079, submitted in March 2000 by D Powesland

Material: animal bone: *Ovis* sp., articulated adult (J Richardson)

Initial comment: fill of a quarry pit cut by *Grubenhaus* 002DC00033. These pits were dug into iron enriched red chalk. Their purpose appears to have been to gather this material which was a preferred material in the construction of furnaces. The deposit was well-sealed and may give a very good date for the disuse of a *Grubenhaus*, he pit of which incorporated the quarry pits. *See* UB-4557 for a further measurement.

Objectives: to determine whether the quarry for red chalk (and associated furnaces) are early or middle Saxon in date. This result will also contribute to the interpretation of this area of the site as an early craft/industrial area and help to assess whether activity on the site shifted southwards through time.

Calibrated date: *1σ:* cal AD 540–595
2σ: cal AD 475–610

Final comment: see GrA-22821

UB–4557 1444 ±22 BP

$\delta^{13}C$: -21.8 ±0.2‰

Sample: 2DC165/WY080, submitted in March 2000 by D Powesland

Material: animal bone: *Ovis* sp., articulated adult (J Richardson)

Initial comment: as UB-4556

Objectives: as UB-4556

Calibrated date: *1σ:* cal AD 600–645
2σ: cal AD 570–655

Final comment: see GrA-22821

UB–4558 1208 ±18 BP

$\delta^{13}C$: -24.4 ±0.2‰

Sample: HP002DB00339/1, submitted in March 2000 by D Powesland

Material: grain: *Hordeum* sp. (S Mrozowski)

Initial comment: from malt kiln 339 in the north of area 2DB. The structure overlay a deep buried soil. The flue of the structure consisted of a clay base over a layer of large chalk blocks, which provided the heat from the west. This feature was a surface mounted structure constructed on the old land surface, which in this area comprised of sand with small quantities of chalk gravel. The feature had survived beneath a medieval headland and was sealed by *c* 5cm of blown sand with a modern plough-soil above. *See* UB-4559 for a further measurement.

Objectives: to determine whether the malting activity is early or middle Saxon in date. This result will also contribute to the interpretation of this area of the site as an early craft/industrial area and help to assess whether activity on the site shifted southwards through time.

Calibrated date: *1σ:* cal AD 770–880
2σ: cal AD 725–890

Final comment: D Powlesland (8 July 2014), the dates from this feature give a secure date in the eighth or ninth century for the last firing of this malt kiln situated in the northern third of the settlement, and confirming extensive use in this area even at the end of the life of the settlement.

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with replicate measurement UB-4559 (T′=0.0, T′(5%)=3.8, ν=1; Ward and Wilson 1978). The weighted mean (1208 ±13 BP) calibrates to cal AD 770–890 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

UB–4559 1207 ±18 BP

$\delta^{13}C$: -24.5 ±0.2‰

Sample: HP002DB00339/2, submitted in March 2000 by D Powesland

Material: grain (S Mrozowski)

Initial comment: a replicate of UB-4558.

Objectives: as UB-4558

Calibrated date: *1σ:* cal AD 770–880
2σ: cal AD 725–890

Final comment: see UB-4558

Laboratory comment: see UB-4558

UB–4560 1299 ±21 BP

$\delta^{13}C$: -21.9 ±0.2‰

Sample: 2DB232/259 (WY190), submitted in March 2000 by D Powesland

Material: animal bone: *Bos* sp., partial skeleton (J Richardson)

Initial comment: from a large, slightly irregularly shaped *Grubenhaus* in the north of area 2DB. Only the southern half of the feature was excavated, the rest being beyond the limit of excavation. Two postholes were recovered, one in the centre of the west side and one just south of the centre. Fill context 259 is stratigraphically earlier than fill context 233.

Objectives: to determine the length of time taken for a *Grubenhaus* to fill up after use. The articulated samples must have been deposited very soon after use and cannot be residual. They will therefore provide dates from the accumulation of the contexts from which they were recovered. The dating of this *Grubenhaus* will also help to assess the longevity of use of the craft/industrial zone of the site and whether activity on the site shifted southwards through time.

Calibrated date: *1σ:* cal AD 670–765
2σ: cal AD 660–770

Final comment: D Powlesland (2001), this sample provides the *terminus ante quem* for the construction of the Grubenhaus. The difference between the dates provides us with a minimum estimate of the period of infilling. This feature situated in the northern part of the settlement and abandoned in the late-seventh or eighth century AD contradicts any interpretation of shifting settlement.

UB–4561 1465 ±22 BP

$\delta^{13}C$: -22.3 ±0.2‰

Sample: 2DC00032 (WY072)/158 60204, submitted in March 2000 by D Powesland

Material: animal bone: *Bos* sp., articulated partial vertebral column and sacrum (J Richardson)

Initial comment: from a *Grubenhaus* cutting a series of seven quarry pits, which contained the skeletons of several articulated sheep (context 165/WY080 and WY079). Two fills of the *Grubenhaus* contained articulated animal bone in contexts stratigraphically later than 165. 159 is later than 165, and earlier than 158.

Objectives: as GrA-22821

Calibrated date: *1σ:* cal AD 575–625
2σ: cal AD 555–645

Final comment: see GrA-22821

UB–4562 1574 ±19 BP

$\delta^{13}C$: -22.1 ±0.2‰

Sample: 11BC/504/2 (WY107) 47416, submitted in March 2000 by D Powesland

Material: animal bone: *Bos* sp., articulated partial skeleton, right fore limb, right hind limb, probably female (J Richardson)

Initial comment: as OxA-9626

Objectives: as OxA-9626

Calibrated date: *1σ:* cal AD 425–540
2σ: cal AD 415–545

Final comment: see OxA-9626

Laboratory comment: see OxA-9626

UB–4563 1557 ±22 BP

$\delta^{13}C$: -26.4 ±0.2‰

Sample: 11BB00003/1, submitted in March 2000 by D Powesland

Material: charcoal: Pomoideae (5g); Ericaceae (1.20g); *Prunus spinosa* (6.10g) (R Gale 2000)

Initial comment: from an even, sub-rectangular pit cut into natural red chalk. The pit (011BB00003) had vertical sides and a flat base. It contained large amounts of charcoal, burnt stone, bone and pottery. The majority of the pottery sherds are early Saxon in date. The stones appear to have tumbled in from the south-east corner and spread across the floor of the pit. The base contained large pieces of charcoal, with intact wood grain. The pit cut directly into solid chalk bedrock.

Objectives: to determine whether firepits are early or middle Saxon in date. This result will also contribute to determining whether activity on the site shifted to the south over time.

Calibrated date: *1σ:* cal AD 425–545
2σ: cal AD 420–565

Final comment: D Powlesland (8 July 2014), the samples were derived from a fire-pit which suggest that these are a feature of early rather than later Saxon activity, which in this case appears to sit in the mid-late fifth century AD and thus amongst the earliest Anglian features dated.

Laboratory comment: English Heritage (24 August 2004), the result is statistically consistent with replicate measurement UB-4564 (T′=1.3, T′(5%)=3.8, ν=1; Ward and Wilson 1978). The weighted mean (1557 ±22 BP) calibrates to cal AD 425–565 (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

UB–4564 1593 ±22 BP

$\delta^{13}C$: -24.2 ±0.2‰

Sample: 11BB00003/2, submitted in March 2000 by D Powesland

Material: charcoal: *Quercus* sp., sapwood (2.10g); *Sambucus* sp. (10.40g); *Corylus* sp. (1.60g) (R Gale 2000)

Initial comment: a replicate of UB-4563.

Objectives: as UB-4563

Calibrated date: *1σ:* cal AD 415–535
2σ: cal AD 400–545

Final comment: see UB-4563

Laboratory comment: see UB-4563

UB–4565 1280 ±17 BP

$\delta^{13}C$: -22.2 ±0.2‰

Sample: 12AC 9507/400A (WY178) 092164, submitted in March 2000 by D Powesland

Material: animal bone: *Bos* sp., articulated sacrum, pelvis fragment, and vertebrae (J Richardson)

Initial comment: a replicate of GrA-22416 and OxA-12097.

Objectives: as GrA-22416

Calibrated date: *1σ:* cal AD 680–770
2σ: cal AD 670–775

Final comment: see GrA-22416

Laboratory comment: see GrA-22416

UB–4576 1457 ±19 BP

$\delta^{13}C$: -20.9 ±0.2‰

Sample: 002CB00229 (WY012) 69679, submitted on 28 June 2000 by D Powlesland

Material: animal bone: *Canis* sp., articulated skeleton (J Richardson)

Initial comment: from a well-sealed east-west aligned ditch/fence slot which either provides a northern boundary to the early Anglo Saxon settlement or alternatively forms part of a Roman field boundary. The feature situated immediately to the north of a chalk outcrop upon which a number of early Anglo-Saxon posthole buildings were constructed is unlikely to have been effected by problems of residuality, situated as it is more than 100m to the north of the main area of Roman activity.

Objectives: to test for continuity from Roman to Saxon; refine the Roman dating sequence; and assist in dating the sequence of the enclosure features and therefore assist in the spatial reconstruction of the settlement and its boundary features.

Calibrated date: *1σ:* cal AD 590–640
2σ: cal AD 565–650

Final comment: D Powlesland (2001), this probably dates the backfilling of the ditch and fence construction. A date in the late-sixth or early seventh century AD for this feature on the northern boundary of the settlement may reflect the start of the enclosure phase which culminates in the southern two thirds of the settlement with the construction of extensive enclosure and fence networks, most likely associated with stock management.

UB–4577 1217 ±18 BP

$\delta^{13}C$: -21.4 ±0.2‰

Sample: 012AD05045 (WY151) 33019, submitted on 28 June 2000 by D Powlesland

Material: animal bone: *Bos* sp., articulated skeleton (J Richardson)

Initial comment: from a well-sealed linear ditch containing a wrist clasp of early Anglo-Saxon date, which is likely to relate to the middle Saxon phase of activity. The feature was cut into calcareous hill wash, chalk bedrock and active Anglo-Saxon/Roman deposits on the side of a dry valley and filled with a calcareous fill.

Objectives: to refine the Anglo-Saxon dating sequence and in particular address the later phases of occupation and assist in dating the sequence of enclosure features and therefore assist in the spatial reconstruction of the settlement and its boundary features.

Calibrated date: *1σ:* cal AD 770–865
2σ: cal AD 715–885

Final comment: D Powlesland (8 July 2014), this sample provides a *terminus post quem* for the construction of the enclosure ditch. The date in the late-eighth or early-ninth century AD confirms the picture indicating thet the enclosure networks are a feature of the middle Saxon rather than early Saxon phase of activity.

West Heslerton: pre-Anglian Settlement, North Yorkshire

Location: SE 917765
Lat. 54.10.33 N; Long. 00.35.42 E

Project manager: D Powlesland (Landscape Research Centre), 1989, 1991, and 1995

Archival body: Hull Museum

Description: the southern half of the area of late Roman and Anglian activity was dominated by a series of overlapping and re-cut enclosures, comprising slots probably used for light-weight fencing, and larger ditches which may have had associated hedge banks. There is good stratigraphic evidence to suggest continuity of occupation/actvity from the Roman into the Saxon periods. The discovery of what appears to be a late Roman shrine and associated features may provide a context for the adoption of this site for early Anglo-Saxon settlement. Coins found indicate a construction in the late fourth century, and utilisation through into the beginning of the fifth century.

Objectives: to add resolution to the dating and sequencing of the enclosures and shrine.

Final comment: D Powlesland (8 July 2014), the realisation that the Anglian Settlement at West Heslerton had followed on from a Roman complex occurred towards the end of the excavation when the southern portion was examined in the mid 1990s. The evidence indicates that Roman activity was limited in scale, but unusual as it appeared to relate to ritual activity including a shrine and walkway that linked the shine to a spring lower down the dry valley that became the southern focus of the Anglo-Saxon activity. The dating programme could neither prove nor disprove continuity of population on the site, but on balance the lack of distinctive deposits that might hint at a break in the sequence suggests that there is a high degree of continuity. The dating programme raised a number of issues about the date range of some of the ceramics and has greatly informed our view of Roman activity in the Vale of Pickering.

Laboratory comment: English Heritage (24 August 2004), dating the bone samples from this site (011CE00587) coincided with a contamination problem in the Oxford Laboratory associated with this method, which caused approximately one third of the results to be significantly too old (Bronk Ramsey *et al* 2004). All affected samples were re-dated. Sufficient excess gelatine was available from (WY137) for re-purification from this stage, graphitisation, and dating (OxA-13237). Full details of this approach are provided in Bronk Ramsey *et al* (forthcoming).

References: Bronk Ramsey *et al* 2004b
Bronk Ramsey *et al* forthcoming
Powlesland and Price 1988

GrA–22606 1745 ±40 BP

$\delta^{13}C$: -21.6 ±0.2‰

Sample: 011CE00587 (WY137) 206782, submitted in 2003 by D Powlesland

Material: animal bone: *Ovis* sp., articulated skeleton (J Richardson)

Initial comment: a replicate of OxA-13237. This sample is one of a series designed to add resolution to our understanding of the late Roman sequence towards the southern half of the settlement. This sample and sample 011CD05446 form components in what is currently viewed as the first or second phase of the Roman enclosures situated to the west of a spring which is centrally located in the southern half of the settlement. The pottery derived from these features is of late-/very late-Roman date, and the form of the ditches with sharply cut V-shaped profiles is more likely to relate to Roman rather than Saxon activity.

Objectives: to test for continuity from Roman to Saxon; to refine the Roman dating sequence; to assist in dating the sequence of the enclosure features, and therefore assist in the spatial reconstruction of the settlement and its boundary features.

Calibrated date: *1σ:* cal AD 240–350
2σ: cal AD 170–400

Final comment: D Powlesland (8 July 2014), the realisation that the settlement superseded Roman activity was only discovered towards the end of the excavations. With the discovery initially of a single roundhouse and a series of rectilinear enclosures, this sample was submitted to see if it could be confirmed that the ditch apparently enclosing the roundhouse was of Roman date. This has been confirmed with a date from the late-third to the middle of the fourth century AD.

Laboratory comment: English Heritage (24 August 2004), this measurement is statistically consistent with a replicate measurement OxA-13237 on the same sheep (T'=0.0; T'(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (1750 ±26 BP) calibrates to cal AD 230–390 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–9629 1728 ±26 BP

$\delta^{13}C$: -24.7‰

Sample: HP012AD 05103 86168, submitted in March 2000 by D Powlesland

Material: wood (*Prunus* sp. or Pomoideae, twig with 3 growth rings and *in situ* bark) (R Gale 2000)

Initial comment: a replicate of OxA-10213. Collected from the base of a possible kiln sealed beneath *c* 5m of hill wash/blown sand and *c* 3m of topsoil. The basal fill of the pit contained large quantities of burnt and oxidised ceramics with charcoal. The pit had cut away parts of two ditches, which contained no charcoal or similar material and it appears that the sample is from a primary and uncontaminated deposit.

Objectives: the pit appears to relate to the production of oxidised calcite gritted wares which appear on stratigraphical and quality grounds to represent either an exceptionally late roman product or a post-Roman, pre-Saxon deposit. A date is required to test the relevance of this material in relation to the continuity from Roman to Saxon.

Calibrated date: *1σ:* cal AD 250–380
2σ: cal AD 240–400

Final comment: D Powlesland (8 July 2014), amongst the features within the area of roman activity was a possible kiln containing very crude but probably Roman ceramics. This date from a secure context confirms that the kiln was Roman and with a potential last use date between AD 250–410.

Laboratory comment: English Heritage (24 August 2004), the measurements on the same twig are statistically consistent (T′=0.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (1719 ±21 BP) calibrates to cal AD 245–395 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–9747 1880 ±80 BP

δ*13C:* -28.7‰

Sample: HP 012AF 00010, submitted in March 2000 by D Powlesland

Material: carbonised residue

Initial comment: a replicate of OxA-9984. From a squatted deposit post-dating the use of the late Roman shrine but stratigraphically earlier than the destruction rubble from the robbing of the walls. The sample is derived from a sandy/ashy deposit sealed by *c* 1m of hill wash but cut into a sandy chalk.

Objectives: this sample satisfies two objectives, to date the oxidised calcite gritted ceramics that appear to relate to the Roman/Saxon transition and to help date the sequence of construction/use/destruction of the shrine. This remains one of the most important questions regarding the site sequence and potentially function and continuity of ritual space from Roman-Saxon.

Calibrated date: *1σ:* cal AD 50–240
2σ: 50 cal BC–cal AD 340

Final comment: D Powlesland (8 July 2014), the discovery of an unusual double-apsed building in the dry valley extending to the south of the settlement was unanticipated. The structure has been interpreted as a shrine of some sort. It poses interesting problems from a chronological view as the base of the robbed foundations contained a late fourth-century coin, and in the area immediately outside the structure late coinage including early fifth-century examples point to very late Roman activity. Did the coin arrive in the footings during construction or robbing? In the interior of the robbed building beneath the remains of the robbed floor, quantities of exceptionally crude pottery were recovered could these bay very late Roman? The series of seven dates included two, one a replicate from the residues on the pottery giving an unanticipated date range between cal AD 80–240. The remaining material from a number of bone samples recovered from the destruction rubble show a date range that is earlier than the coin in the footings of the building. It is possible that this material which spans the period cal AD 130–390 may derive from material intoduced as build-up beneath the floor of the structure, or that the active life of shrine spanned a long period finally going out of use in the late fourth century AD.

Laboratory comment: English Heritage (24 August 2004), the two measurements on this residue are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (1894 ±31 BP) calibrates to cal AD 30–220 (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–9984 1897 ±34 BP

δ*13C:* -28.8‰

Sample: HP 012 AF 00010, submitted in March 2000 by D Powlesland

Material: carbonised residue

Initial comment: a replicate of OxA-9747.

Objectives: as OxA-9747

Calibrated date: *1σ:* cal AD 60–140
2σ: cal AD 20–220

Final comment: see OxA-9747

Laboratory comment: see OxA-9747

OxA–10213 1701 ±36 BP

δ*13C:* -25.0‰

Sample: HP 12AD5103, submitted in March 2000 by D Powlesland

Material: wood: *Prunus* sp., or *Pomoideae*; twig with 3 growth rings and *in situ* bark (R Gale 2000)

Initial comment: a replicate of OxA-9629.

Objectives: as OxA-9629

Calibrated date: *1σ:* cal AD 260–400
2σ: cal AD 240–420

Final comment: see OxA-9629

Laboratory comment: see OxA-9629

OxA–12241 1755 ±26 BP

δ*13C:* -21.7‰

Sample: 012AF00136 91039, submitted on 28 June 2000 by D Powlesland

Material: animal bone: *Bos* sp., right distal radius (35g) (J Richardson)

Initial comment: from the interior of the structure, and from the interface between the floor and the destruction rubble remaining following the robbing of the building stone. It is intended to give a date for the last use or destruction of this building.

Objectives: to refine the Roman/Saxon dating sequence and in particular address the degree to which the shrine may have continued in use in the fifth century and later; to assist in dating the ceramic sequence; to provide a date sequence that tests the degree of continuity from Roman to Saxon; and to identify to what extent this structure may have been part of the Saxon landscape.

Calibrated date: *1σ:* cal AD 240–340
2σ: cal AD 220–380

Final comment: D Powlesland (2001), although it was suspected that the building's destruction dated to *c* AD 400. The samples from the shrine all dated to well before its construction. Therefore they are either residual or they derive from earlier deposits either truncated by terracing for construction of the building or were imported as make-up for the floor. *See* also OxA-9747.

OxA–12242 1802 ±25 BP

$\delta^{13}C$: -21.9‰

Sample: 012AF00135 105391, submitted on 28 June 2000 by D Powlesland

Material: animal bone: *Equus* sp., right tibia (J Richardson)

Initial comment: from the interior of the structure.

Objectives: to give a date for the destruction of the building.

Calibrated date: *1σ:* cal AD 170–250
2σ: cal AD 130–330

Final comment: see OxA-12241 and OxA-9747

OxA–12243 1821 ±25 BP

$\delta^{13}C$: -21.2‰

Sample: 012AF00131 A 69518, submitted on 28 June 2000 by D Powlesland

Material: animal bone: *Bos* sp., right distal radius (J Richardson)

Initial comment: from the interior of the structure, from a dirty deposit containing a lot of pottery and charcoal flecks which directly sealed the destruction rubble remaining following the robbing of the building stone. The material was similar to that found in a more obvious deposit in hollow 12AF00054 and is intended to provide a date relating to post destruction activity. This deposit may have related to some sort of late or post Roman squatter activity.

Objectives: as OxA-12241

Calibrated date: *1σ:* cal AD 130–240
2σ: cal AD 120–260

Final comment: see OxA-12241 and OxA-9747

OxA–12244 1802 ±28 BP

$\delta^{13}C$: -20.9‰

Sample: 012AF00131 B 76989, submitted on 28 June 2000 by D Powlesland

Material: animal bone: *Sus* sp., right distal humerus (J Richardson)

Initial comment: as OxA-12243

Objectives: as OxA-12241

Calibrated date: *1σ:* cal AD 140–250
2σ: cal AD 130–330

Final comment: see OxA-12241 and OxA-9747

OxA–13196 1728 ±30 BP

$\delta^{13}C$: -21.5‰

Sample: 012AF00053 106301, submitted on 28 June 2000 by D Powlesland

Material: animal bone (sheep/goat, right radius) (J Richardson)

Initial comment: from the fill of a shallow hollow cut into the destruction rubble sealing the remains of this heavily robbed building. This feature was stratigraphically the latest feature in the 'shrine' sequence and may have been related to some sort of late or post-Roman squatter activity.

Objectives: as OxA-12241

Calibrated date: *1σ:* cal AD 250–380
2σ: cal AD 230–400

Final comment: see OxA-12241 and OxA-9747

OxA–13237 1753 ±34 BP

$\delta^{13}C$: -20.8‰

Sample: 011CE00587 (WY137) 206782, submitted on 28 June 2000 by D Powlesland

Material: animal bone: *Ovis* sp., articulated skeleton (J Richardson)

Initial comment: as GrA-22606

Objectives: as GrA-22606

Calibrated date: *1σ:* cal AD 230–340
2σ: cal AD 210–390

Final comment: D Powlesland (2001), it would appear that the sample was recovered from a deliberate backfill of the ditch 011CE20009 and therefore provides a *terminus ante quem* for the initial construction of the ditch, and a *terminus post quem* for the recut and the construction of the roundhouse 011CE20001. It is assumed that this enclosure is related to the roundhouse it contained and that thus it likely to have been present during the late-second to third centuries AD.

Laboratory comment: see GrA-22606

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2004), this sample may have been contaminated during the filtration (Bronk Ramsey *et al* 2004), and so was re-processed and dated from gelatine. The quoted uncertainty accounts for the additional error associated with this process.

References: Bronk Ramsey *et al* 2004b

UB–4578 1711 ±16 BP

δ¹³C: -21.0 ±0.2‰

Sample: 012AD08509/WY154 117650, submitted on 28 June 2000 by D Powlesland

Material: animal bone: *Canis* sp., articulated skeleton (J Richardson)

Initial comment: this sample and UB-4579 and are from two dog skeletons, both derived from the primary fills of what has been identified as the primary phase of enclosures in the south part of the site. Although the assemblage from the ditch includes quantities of early material including a late Iron Age coin, the ceramics assemblage is mostly late Roman. The samples derived from articulated animal bone, which have been identified as from two individuals (skeletons WY154 and WY174) by the bone specialist. The ditch was cut into chalk bedrock and sand and filled with calcareous sands. There is some risk of contamination from modern root action.

Objectives: to refine the Roman dating sequence and in particular address the later Roman phases of occupation, and assist in dating the sequence of the enclosure features and therefore in the spatial reconstruction of the settlement and its boundary features.

Calibrated date: *1σ:* cal AD 260–385
2σ: cal AD 255–395

Final comment: D Powlesland (2001), this sample provides a *terminus ante quem* for the ditch recut. This sample and UB-4579 span a very broad period during the Roman period, but confirm that the enclosure network which appears to relate to the use of the shrine may have started very early in the Roman period and continued until the end of the Roman period. More than anywhere else the dates of the two dog skeletons in this ditch may support arguments for a degree of continuity from the Roman to Saxon periods.

Laboratory comment: English Heritage (24 August 2004), two articulated dog skeletons, UB-4578 and UB-4579, were recovered from the same segment of ditch, cut 8510 and fill 8509. The two results are statistically significantly different (T′=5.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and so fill 8509 took some time to accumulate.

References: Ward and Wilson 1978

UB–4579 4579 ±19 BP

δ¹³C: -21.6 ±0.2‰

Sample: 012AD08509/WY174 117650, submitted on 28 June 2000 by D Powlesland

Material: animal bone: *Canis* sp., articulated dog skeleton (350g) (J Richardson)

Initial comment: as UB-4578

Objectives: as UB-4578

Calibrated date: *1σ:* 3365–3350 cal BC
2σ: 3370–3340 cal BC

Final comment: see UB-4578

Laboratory comment: see UB-4578

West Heslerton: prehistoric, North Yorkshire

Location: SE 9176(centred)
Lat. 54.10.18 N; Long. 00.36.21 W, (centred)

Project manager: D Powlesland (Landscape Research Centre), 1978–82 and 1985–7

Archival body: Hull and East Riding Museum

Description: the prehistoric sample series derive from a variety of contexts but essentially three groups; late Neolithic and early Bronze Age burials associated with Beakers and food vessels, carbonised hazelnut shells associated with a variety of late Neolithic ceramic types and residues on pottery, which on fabric alone could have been either middle Bronze Age or early Anglo-Saxon date. One of the samples was of charcoal from a carbonised wooden shovel, another also of charcoal from a pit associated with Staple Howe type ceramics and a group of cattle ribs associated with a pottery vessel for which the fabric could be either Iron Age or Anglo-Saxon from Heslerton site 28.

Objectives: excavations were carried out at West Heslerton between 1978 and 2001 on a variety of sites covering more than 28ha. This has involved the examination of a number of major prehistoric monuments including two barrow cemeteries, two hengiform enclosures, post-circles avenues, and pit groups incorporating the complete range of prehistoric ceramics known from eastern Yorkshire. Although a small number of radiocarbon dates were submitted to Harwell during the early years of the excavation programme their precision was relatively low. Following the excavation of further prehistoric features during the late 1980s and 1990s, it was decided to attempt to develop the prehistoric data series to allow the monument and ceramic series to be dated more precisely than had previously been possible. In addition to refining the date series for the prehistoric ceramic series, the date set is also intended to assist in developing our understanding of the construction and use of the excavated barrows and other features in the broader landscape.

Final comment: D Powlesland (22 July 2014), the sequence of prehistoric dates from West Heslerton contributes towards an improved national and regional understanding of the chronology relating to the late Neolithic and early Bronze Ages in particular; contributing to our understanding of the chronology of late Neolithic and Bronze Age ceramics, and the far longer active life-spans of the excavated round barrows than we might have anticipated. At a regional level, these dates are particularly important as they provide chronologies that can be linked to the vast collections of Beakers and Food vessels recovered by Mortimer, Greenwell, and others from barrows on the Yorkshire Wolds in the late nineteenth and early twentieth centuries, which have underpinned the importance of the region during later prehistory. They reflect the importance of the prehistoric evidence from West Heslerton which is often overlooked in favour of the early medieval evidence. Dates from the Iron Age also cast some light upon the pre-Roman activity which is most dramatically represented by the ladder settlements identified both from the air and through ground-based geophysics following the southern fen edge of the Vale of Pickering.

Laboratory comment: English Heritage, two further samples failed (HAR-3539; WH79.F9 and HAR-8412; HP 00009C).

Laboratory comment: English Heritage (8 July 2013), 12 further samples were dated prior to 1998 and were published in Bayliss *et al* (2012, 300–6; HAR-6617, -6630–1, -6690, 8241, -8325–6, and -8412–7).

References: Bayliss *et al* 2012, 300–6
Haughton and Powlesland 1999
Powlesland *et al* 1986

OxA–9474 4370 ±45 BP

δ^{13}C: -22.5‰

Sample: HPP 002CC273 (A), submitted on 23 February 2000 by D Powlesland

Material: carbonised plant macrofossil (hazelnut shell) (A Bayliss 2000)

Initial comment: from an oval pit (dimensions *c* 126cm x 97cm x 38cm) with substantial amounts of charcoal, Neolithic pottery, and hazelnut shells. Fragments of at least four distinct Grooved Ware vessels were noted during excavation, all have different decorative techniques. Two pig bones were found on the base of the feature (a radius and ulna). *See* sample 002CC273(B) (OxA-9475) for a further measurement.

Objectives: this represents one of a group of samples designed to refine the regional dating of the prehistoric ceramic series which have only a very limited number of absolute dates. This sample is important given the extensive assemblage of Grooved Ware that was recovered from the pit, there are only very few Grooved Ware dates from the north of England. So this sample, like the others in this submission offers the opportunity to help redress the dating imbalance between East Yorkshire and Wessex.

Calibrated date: *1σ:* 3090–2910 cal BC
2σ: 3270–2890 cal BC

Final comment: D Powlesland (22 July 2014), the two dates from this feature, described on site as the 'Pork & Hazelnut Stuffing Pit' on account of the presence of a substantial pig bone and many carbonised hazelnut shells and on the basis that it might be used to argue for continuity from the Neolithic to contemporary Sunday lunch in the Dawney Arms, West Heslerton. It contained a range of very highly decorated ceramics including a substantial body of Grooved Ware. The pit was also known as the 'Art College Pit' as the ceramics incorporated the full range of decorative techniques and motifs found in late Neolithic ceramics in northern Britain. The dates from this feature contribute to the regional dating framework for prehistoric ceramics.

Laboratory comment: English Heritage (2 June 2004), two hazelnut shell fragments were dated from each of three prehistoric pits, one of which contained Peterborough Ware (002BB00249), and two of which contained Grooved Ware (002CC01831 and 002CC00273). Each pair of measurements are statistically consistent (HP002 BB249, OxA-9477 and OxA-10370, T′=0.1; HPP002 CC273, OxA-9474 and OxA-9475, T′=0.2; and HPP002 CC1831, OxA-9480 and OxA-10369, T′=2.2; T′(5%)=3.8, ν=1; Ward and Wilson 1978), and so it is likely that this material was fresh when deposited and the radiocarbon measurements reliably date the context from which they come.

References: Ward and Wilson 1978

OxA–9475 4400 ±40 BP

δ^{13}C: -22.5‰

Sample: HPP 002CC273 (B), submitted on 23 February 2000 by D Powlesland

Material: carbonised plant macrofossil (hazelnut shell) (A Bayliss 2000)

Initial comment: as OxA-9474

Objectives: as OxA-9474

Calibrated date: *1σ:* 3100–2920 cal BC
2σ: 3310–2900 cal BC

Final comment: see OxA-9474

Laboratory comment: see OxA-9474

OxA–9477 4490 ±45 BP

δ^{13}C: -27.1‰

Sample: HPP 002BB249 (A), submitted on 23 February 2000 by D Powlesland

Material: carbonised plant macrofossil (hazelnut shell) (A Bayliss 2000)

Initial comment: from one of a group of pits in area 2BB containing Peterborough Ware in association with carbonised hazelnut shells. This group of features appears to relate to domestic activity associated with the nearby hengiform enclosure. *See* sample 002BB249(B) for a further measurement.

Objectives: dating of the prehistoric ceramic series which have only a very limited number of absolute dates. This sample is important given the extensive assemblage of Peterborough Ware that was recovered from this part of the site. There are only very few Peterborough Ware dates from the north of England and so this sample, like the others in this submission, offers the opportunity to help redress the dating imbalance between East Yorkshire and the south of England. The frequent occurrence of Peterborough/Fengate pits with hazelnut shells is significant phenomenon in the late Neolithic, perhaps related to short term food storage. It is unfortunate that we have been unable to provide more samples for this material, however, this may be an area deserving priority treatment in the future.

Calibrated date: *1σ:* 3350–3090 cal BC
2σ: 3370–3020 cal BC

Final comment: D Powlesland (22 July 2014), Peterborough Ware forms one of the most distinctive ceramic types found in the region and this date is important as it indicates that Peterborough Ware was broadly contemporary with Grooved Ware, which together reflect the diversity of decoration and form within late Neolithic ceramics.

Laboratory comment: see OxA-9474

OxA–9479 4625 ±45 BP

$\delta^{13}C$: -20.1‰

Sample: HPP 002DC00156 (A), submitted on 23 February 2000 by D Powlesland

Material: carbonised plant macrofossil (hazelnut shell) (A Bayliss 2000)

Initial comment: from a well-sealed small pit cut into chalk bedrock and probably truncated by ploughing, although its situation between two medieval furrows will have reduced the degree of ancient plough damage the pit being protected by the 'rig'. *See* sample 002DC00156(B) (OxA-9560–1) for further measurements.

Objectives: this represents one of a group of samples designed to refine the regional dating of the prehistoric ceramic series which have only a very limited number of absolute dates. This sample is particularly important as it represents a rare incidence of what appears to be a domestic Beaker deposit the only such example excavated in the very extensive excavations at Heslerton.

Calibrated date: *1σ:* 3500–3350 cal BC
2σ: 3520–3340 cal BC

Final comment: D Powlesland (22 July 2014), this date is significantly too early for a Beaker date from the middle of the late Neolithic, two other samples OxA-9560 and OxA-9561 gave much more likely dates for domestic Beaker material. One is tempted to simply reject this date as incorrect, however, the well-sealed nature of this feature and the very good survival of carbonised hazelnut shells, which are indicative of human activity from the Mesolithic onwards, might arguably be used to suggest that this sample is residual. This experience and a similar one elsewhere indicates that we should, when using hazel nut shells, always date multiple shells to reduce the chance of residual shells returning false results.

OxA–9480 4290 ±50 BP

$\delta^{13}C$: -22.8‰

Sample: HPP 002CC1831 (A), submitted on 23 February 2000 by D Powlesland

Material: carbonised plant macrofossil (hazelnut shell) (A Bayliss 2000)

Initial comment: from an oval pit (dimensions *c* 100cm x 50cm x 60cm) with substantial amounts of worked flint, Grooved Ware, and some carbonised hazelnut shells. The pit situated in the northern part of area 2CC was isolated and not evidently associated with any other features.

Objectives: as OxA-9474

Calibrated date: *1σ:* 2920–2880 cal BC
2σ: 3020–2870 cal BC

Final comment: D Powlesland (22 July 2014), this date contributes to the regional assemblage of dates for the regional Neolithic and Bronze Age ceramics series and is a valued addition to the regional dating of Grooved Ware.

Laboratory comment: see OxA-9474

OxA–9560 3761 ±37 BP

$\delta^{13}C$: -22.4‰

Sample: HPP 002DC00156 (B), submitted on 23 February 2000 by D Powlesland

Material: carbonised plant macrofossil (hazelnut shell) (A Bayliss 2000)

Initial comment: as OxA-9479

Objectives: as OxA-9479

Calibrated date: *1σ:* 2280–2130 cal BC
2σ: 2290–2030 cal BC

Final comment: see OxA-9479

Laboratory comment: English Heritage (2 June 2004), the two measurements from hazelnut shells from a pit containing domestic Beaker (002CC00273), are statistically significantly different (T′=284.0; T′(5%)=6.0; ν=2; Ward and Wilson 1978). OxA-9474 is obviously residual, and so the weighted mean of OxA-9560–1 provides a more accurate indication of the date of the pit. However, strictly this must be regarded as a *terminus post quem* for its digging as the context demonstrably contains residual material. The two measurements on the hazelnut are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (3766 ±27 BP) calibrates to 2290–2050 cal BC (2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–9561 3771 ±38 BP

$\delta^{13}C$: -26.4‰

Sample: HPP 002DC00156 (B), submitted on 23 February 2000 by D Powlesland

Material: carbonised plant macrofossil (hazelnut shell) (A Bayliss 2000)

Initial comment: a replicate of OxA-9560.

Objectives: as OxA-9560

Calibrated date: *1σ:* 2280–2130 cal BC
2σ: 2300–2040 cal BC

Final comment: see OxA-9479

Laboratory comment: see OxA-9560

OxA–9700 3286 ±36 BP

$\delta^{13}C$: -26.9‰

Sample: HPP 012AC00104AQ, submitted on 23 February 2000 by D Powlesland

Material: carbonised residue

Initial comment: from a well-sealed pit pair of Bronze Age date, which had been partially cut away by later Roman/early Saxon features. The prehistoric pits were only slightly impacted by these later features as a thick deposit of hill wash had buried the pits prior to the later occupation. There is a slight possibility that this pair of pits may be the remnants of a firing pit. A more likely interpretation is that they relate to domestic activity which may have been more extensive in the area, but could not be identified as a result of the large areas of hillwash that sealed these features. It is unlikely that they would have been encountered had they been further down the slop of the chalk bedrock knoll into which they were cut.

Objectives: this represents one of a group of samples designed to refine the regional dating of the prehistoric ceramic series which have only a very limited number of absolute dates. This sample relates to the only group of this material discovered at Heslerton.

Calibrated date: *1σ:* 1620–1500 cal BC
2σ: 1650–1460 cal BC

Final comment: D Powlesland (22 July 2014), this sample and OxA-9922 give important dates for the dating of middle Bronze Age ceramics recovered from what appears to be a domestic context. The location is relatively isolated with regard to other contemporary evidence within the Anglo-Saxon settlement excavation but reflects the continuous use of the landscape for domestic activity right through from the Neolithic. It is just possible that this pit pair has some relationship with evidence of round houses found some 350m to the north, but the relative remoteness is perhaps too great.

OxA–9922 3260 ±60 BP

$\delta^{13}C$: -26.5‰

Sample: HPP 012AC00104BD, submitted on 23 February 2000 by D Powlesland

Material: carbonised residue

Initial comment: as OxA-9700

Objectives: as OxA-9700

Calibrated date: *1σ:* 1620–1450 cal BC
2σ: 1690–1410 cal BC

Final comment: see OxA-9700

OxA–10369 4385 ±40 BP

$\delta^{13}C$: -22.8‰

Sample: HPP 002CC1831 (B), submitted on 23 February 2000 by D Powlesland

Material: carbonised plant macrofossil (hazelnut shell) (A Bayliss 2000)

Initial comment: as OxA-9480

Objectives: as OxA-9480

Calibrated date: *1σ:* 3090–2910 cal BC
2σ: 3270–2900 cal BC

Final comment: see OxA-9480

Laboratory comment: see OxA-9474

OxA–10370 4510 ±40 BP

$\delta^{13}C$: -23.5‰

Sample: HPP 002BB249 (B), submitted on 23 February 2000 by D Powlesland

Material: carbonised plant macrofossil (hazelnut shell) (A Bayliss 2000)

Initial comment: a replicate of OxA-9477.

Objectives: as OxA-9477

Calibrated date: *1σ:* 3350–3090 cal BC
2σ: 3370–3020 cal BC

Final comment: see OxA-9477

Laboratory comment: see OxA-9474

OxA–10567 2897 ±38 BP

$\delta^{13}C$: -26.0‰

Sample: 11AE 348BG/65785, submitted in February 2001 by D Powlesland

Material: carbonised residue (J Tipper)

Initial comment: fill of pit 011AE 00357 located in the central area of the settlement. The subcircular shaped pit 190cm in diameter and 52cm deep cut into windblown sand. The pit apparently cut through an earlier human burial and a linear feature. Fill 348 was characterised as brown silt.

Objectives: to determine the date of the carbonised residue on the pottery. A very large assemblage of this pottery was recovered from this pit and from other features in the immediate vicinity of it, forming a distinct group by form and fabric. There is some uncertainty however, whether or not this pottery is middle Saxon or prehistoric (Bronze Age). The date of this pottery has not been determined with certainty by stratigraphic relationships or by association with other diagnostic material.

Calibrated date: *1σ:* 1130–1010 cal BC
2σ: 1220–940 cal BC

Final comment: D Powlesland (22 July 2014), this date gives a secure date for ceramics and domestic activity which was not readily obvious. The material was considered to be either Bronze Age or perhaps middle Saxon; the date returned confirms a late Bronze age date for this material.

OxA–10568 2869 ±38 BP

$\delta^{13}C$: -28.2‰

Sample: 11AA 133CN/24918, submitted in February 2001 by D Powlesland

Material: carbonised residue (J Tipper)

Initial comment: upper fill of a discrete sub - circular pit 011AA00034 in the central area of the site. The upper fill was 133 sealed two lower fills (178 and182). The pit has been cut into the natural chalk.

Objectives: as OxA-10567

Calibrated date: *1σ:* 1120–990 cal BC
2σ: 1200–920 cal BC

Final comment: see OxA-10567

OxA–12132 3711 ±28 BP

$\delta^{13}C$: -21.4‰
$\delta^{15}N$ *(diet):* +10.2‰
C/N ratio: 3.1

Sample: HPP 002BA00229, submitted on 23 February 2000 by D Powlesland

Material: human bone (right leg)

Initial comment: from a well-sealed flat grave pit situated to the south east of barrow 2BA179 in barrow cemetery 2. This monument had been constructed in the centre of a hengiform enclosure. The inhumation, that of an unaged adult, was accompanied by a Beaker to type CLARKE S1(W), and a V-perforated jet button.

Objectives: one of a group of samples designed to refine the regional dating of prehistoric ceramic series.

Calibrated date: *1σ:* 2190–2030 cal BC
2σ: 2200–2020 cal BC

Final comment: D Powlesland (22 July 2014), this date adds to the regional assemblage of dated Neolithic and Bronze Age ceramics adding to the Beaker dates in particlular.

OxA–12285 2467 ±27 BP

$\delta^{13}C$: -21.1‰

Sample: Site 28AA 02800046AH, submitted on 14 March 2001 by D Powlesland

Material: animal bone: *Bos* sp., rib bone (D Powlesland 2001)

Initial comment: this sample derived from a small pit only *c* 30cm in diameter, in which a series of large rib fragments had been placed vertically to form a sort of inverted tripod or cradle on the top of which a pottery vessel had been placed. Most of the vessel survived.

Objectives: the sample is intended to date a pottery fabric. It is of Iron Age type, although the form is very similar to that of early Anglo-Saxon vessels, given that this feature was within 2m of an Anglo-Saxon Grubenhaus, a date is required to determine whether this is an Iron Age or Saxon feature. If it is indeed early Anglo-Saxon, then this has a bearing on the identification of the Iron Age Ceramics from this site. The peculiar nature of the deposit has much in common with other deliberate faunal deposits in Iron Age contexts. If the sample is Iron Age then this indicated much more extensive Iron Age activity on this site when the main Iron Age activity focus lies some 250m to the north of this feature.

Calibrated date: *1σ:* 760–510 cal BC
2σ: 770–410 cal BC

Final comment: D Powlesland (22 July 2014), this date provides an important date relating to the mid-to-late Iron Age settlement along the southern margins of the Vale of Pickering. The curious nature of the deposit from which the date derives is unusual and this date also helps improve our ability to distinguish mid to late Iron Age ceramics from Anglo-Saxon ones.

Laboratory comment: English Heritage (2 June 2004), vessel 02800046AH is dated to the early Iron Age on the basis of two statistically consistent measurements (T'=0.0; $T'(5\%)$=3.8, ν=1; Ward and Wilson 1978) from cattle ribs which lined the small pit from which it was recovered (028AA00046; OxA-12285–6).

References: Ward and Wilson 1978

OxA–12286 2462 ±27 BP

$\delta^{13}C$: -21.0‰

Sample: Site 28AA 02800046AH, submitted on 14 March 2001 by D Powlesland

Material: animal bone: *Bos* sp., rib bone (D Powlesland 2001)

Initial comment: as OxA-12285

Objectives: as OxA-12285

Calibrated date: *1σ:* 750–510 cal BC
2σ: 770–410 cal BC

Final comment: see OxA-12285

Laboratory comment: see OxA-12285

OxA–13148 3697 ±39 BP

$\delta^{13}C$: -20.5‰
$\delta^{15}N$ *(diet):* +10.9‰
C/N ratio: 3.3

Sample: HPP 002BA00241, submitted on 23 February 2000 by D Powlesland

Material: human bone (left tibia, fibula, and femur (young adult *c* 25–35 years old))

Initial comment: from a well-sealed and deep (>1.5m) grave pit in a primary position within a small barrow, HPP2BA174. This monument appears to be stratigraphically later than the Hengiform enclosure within which it was constructed and is considered broadly contemporary with an adjacent barrow of similar morphology. The burial was accompanied by a food vessel of type 4.

Objectives: as OxA-12132

Calibrated date: *1σ:* 2140–2020 cal BC
2σ: 2210–1950 cal BC

Final comment: D Powlesland (22 July 2014), this date adds to the regional list of Food Vessel dates reflecting the overlap between Beaker and Food Vessel ceramics.

OxA–13149 3725 ±38 BP

$\delta^{13}C$: -20.1‰
$\delta^{15}N$ *(diet):* +11.1‰
C/N ratio: 3.4

Sample: HPP 002BA00589, submitted on 23 February 2000 by D Powlesland

Material: human bone (right arm)

Initial comment: from a well-sealed and deep grave pit situated between two small ditched barrows in barrow cemetery 2. The inhumation is unaged and is associated with a food vessel of Type 1A.

Objectives: as OxA-10366, one of a group of samples designed to refine the regional dating of the prehistoric ceramic series.

Calibrated date: *1σ:* 2200–2030 cal BC
2σ: 2280–2020 cal BC

Final comment: see OxA-13148

OxA–13150 3665 ±39 BP

$\delta^{13}C$: -20.9‰
$\delta^{15}N$ *(diet):* +11.0‰
C/N ratio: 3.3

Sample: HPP 001R 00224, submitted on 23 February 2000 by D Powlesland

Material: human bone (skull)

Initial comment: 1R198 was a small ovate cut on the northern side of the barrow, located between the inner ring-gully and the butt end of the period 6 ditch 1R919, which contained a second smaller sub-rectangular cut 1R223 in the base. This lower cut, which was well defined, appeared to represent a primary grave, the top of which had subsequently been entirely cut away by 1R198. It contained fragments of bone, 1R224, including most of the skull of a small child aged 3–6 years. The burial was accompanied by an upright food vessel (1R224 AK) positioned at the eastern end of the cut. 1R198 above, contained a few small fragments of bone including teeth apparently derived from the lower feature. No other bone was recovered. It did, however, contain an inverted food vessel (1R199 AF) positioned above and slightly to the south of the vessel in 1R223 below. It is arguable that this cut could have contained a child burial and that the upper grave was cut to the level of the lower food vessel at which point the second burial was inserted causing only slight disturbance of the grave below. The generally poor levels of bone preservation mean that it is impossible to confirm or discount the suggested sequence.

Objectives: one of a group of samples designed to refine the regional dating of the prehistoric ceramic series which have only a very limited number of absolute dates. This sample will provide an important addition to the dated food vessel series and will add new data to allow a more detailed appraisal of this monument, which is currently being reinterpreted as part of a wider appraisal of the prehistoric landscape. Five samples have already been processed from this monument: HAR-8415 (3470 ±60 BP, which calibrates to cal BC 1940–1620 at 2σ), HAR-8325 (3640 ±40 BP, which calibrates to cal BC 2140–1880 at 2σ), HAR-8414 (2980 ±80 BP which calibrates to cal BC 1420–930 at 2σ), HAR-6631 (3510 ±80 BP, which calibrates to cal BC 2110–1620 at 2σ), and HAR-6630 (4060 ±80 BP, which calibrates to cal BC 2880–2350 at 2σ; Reimer *et al* 2004).

Calibrated date: *1σ:* 2140–1970 cal BC
2σ: 2200–1930 cal BC

Final comment: D Powlesland (22 July 2014), this date adds to the regional list of Beaker dates and is significantly more precise than the Harwell dates secured earlier.

References: Reimer *et al* 2004

OxA–13194 3731 ±36 BP

$\delta^{13}C$: -20.3‰
$\delta^{15}N$ *(diet):* +12.2‰
C/N ratio: 3.2

Sample: HPP 002BA283, submitted on 23 February 2000 by D Powlesland

Material: human bone (left tibia, fibula, and femur)

Initial comment: from one of two primary graves in a small round barrow in Heslerton barrow cemetery 2. The grave was 1m deep cut into sand and chalk gravel and backfilled with similar material.

Objectives: this represents one of a group of samples designed to refine the regional dating of the prehistoric ceramic series which have only a very limited number of absolute dates. This sample will provide an important addition to the dated food vessel series and will add new data to allow a more detailed appraisal of this monument. With the other samples in this submission, this material will provide important comparative dates for the two excavated barrow cemeteries.

Calibrated date: *1σ:* 2200–2040 cal BC
2σ: 2280–2020 cal BC

Final comment: see OxA-12132

West London Landscape: Cranford Lane, Greater London

Location: TQ 09527736
Lat. 51.29.03 N; Long. 00.25.21 W

Project manager: N Elden (Museum of London), 1994–5

Description: a Mesolithic rod microlith was recovered from a secondary context. The earliest features were three pits containing assemblages of earlier Neolithic Plain Bowl, and flintwork. A rectangular posthole and beam-slot structure is probably of late Bronze Age date, although a possible Neolithic date had been considered at the time of excavation. A possible cremation producing Peterborough Ware was the only feature which might date to the late Neolithic. A group of 'cooking pits' and other pits around a well appear to pre-date the extensive late Bronze Age field system, which may have a middle Bronze Age origin. The field system includes at least two settlement sites containing perhaps five roundhouses and numerous four-post structures. Human bone has currently been identified from seven possible cremations. Fragments of crucibles and spear- or sword-blade moulds were recovered from one of two wells flanking an entrance to the field system. Occupation may have continued into the early Iron Age when alluvium was deposited over the end of the site close to the river Crane. The site was re-occupied after AD 270, perhaps after AD 350, when a complex of enclosures surrounded a central occupation site, although no direct evidence for buildings has survived. A pit contained a hoard of metalwork, including an unusual lead ring with iron rods through it. Late medieval/post medieval ridge and furrow cultivation extended across the site.

Objectives: to provide absolute dating for the pottery sequence and to compare these with those from the surrounding region; to date the establishment of the settlement and field system as well as its evolution and disuse; to determine whether or not the activity outside of the enclosure is contemporary with that within the field system; to determine the date of un-urned cremations; to provide absolute dating for the bronze casting activity at Cranford Lane.

References: Cotton and Elsden in prep

West London Landscape: Cranford Lane, activity east of the field system, Greater London

Location: TQ 09527736
Lat. 51.29.03 N; Long. 00.25.21 W

Project manager: N Elsden (Museum of London), 1994–5

Archival body: Museum of London

Description: there are two small clusters of activity outside of the enclosed later Bronze Age field system, but which were probably contemporary with its use. The northern group, which includes [2492], consists of two pits and a possible hearth; one of the pits contained a sequence of fills characterised by burnt material and pottery eg [2492]. The southern group is also characterised by pits with burnt material; including a possible 'cooking pit' filled with charcoal and burnt flint [2397].

Objectives: to date the activity of the late Bronze Age enclosure system, which currently appears to be late Bronze Age or early Iron Age in date, and to relate this to the dating of the enclosure system to the west.

Final comment: N Elsden (2 February 2007), broadly contemporary with burial K[745] was pit K[2398], which provided two statistically consistent radiocarbon determinations on fragments of short-lived charcoal (T′=0.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978) dating the pit to the eighteenth or nineteenth century cal BC (OxA-11465–6). A second pit nearby is rather later, producing two statistically consistent radiocarbon determinations on fragments of short-lived charcoal (T′=0.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978) dating the pit to the later eighteenth or seventeenth century cal BC (OxA-11464 and OxA-11530).This deposit contained grog-tempered sherds which may come from the base of a single early Bronze Age vessel. These two pits do not provide a useful *terminus ante quem* for the alluviation in the Crane Valley as they are earlier than the later Bronze Age field system also sealed by the alluvium.

References: Cotton and Elsden in prep
Ward and Wilson 1978

OxA–11464 3383 ±35 BP

$\delta^{13}C$: -25.4‰

Sample: [2492] 379 B, submitted in March 2002 by N Elsden

Material: charcoal: *Alnus glutinosa*, single fragment (R Gale 2002)

Initial comment: a discrete single cut feature, neither cutting nor cut by another feature with a sequence of nine fills, of which [2492] is the second, comprised of clayey silt with charcoal and what may be decomposed ash, as well as pot, burnt flint, and burnt animal bone. No sign of burning *in situ*, this is probably refuse from a nearby hearth eg [2514].

Objectives: to date the activity outside of the later Bronze Age enclosure system and relate it to that system. Is this of similar or different date to the activity to the south, specifically [2397]? To provide a *terminus post quem* for the alluviation.

Calibrated date: *1σ:* 1740–1620 cal BC
2σ: 1760–1610 cal BC

Final comment: N Elsden (20 February 2014), this radiocarbon date places the pit in the early Bronze Age, and so does not help with understanding the later Bronze Age field system or dating the alluviation.

Laboratory comment: English Heritage (2 February 2007), the two radiocarbon determinations on fragments of short-lived charcoal from this pit are statistically consistent (T′=0.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978) (OxA-11464 and OxA-11530).

References: Ward and Wilson 1978

OxA–11465 3507 ±38 BP

$\delta^{13}C$: -28.1‰

Sample: [2397] 351 A, submitted in March 2002 by N Elsden

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2002)

Initial comment: a discrete single cut feature, neither cutting nor cut by another feature. Single fill of shallow (0.08m) pit filled with a mixture of sandy silt, charcoal, and burnt flint.

Objectives: to date the activity outside of the later Bronze Age enclosure system and relate it to that system. Is this of similar or different date to the activity to the south, specifically [2492]? To provide a *terminus post quem* for the alluviation.

Calibrated date: *1σ:* 1900–1750 cal BC
2σ: 1940–1690 cal BC

Final comment: N Elsden (20 February 2014), this result indicates that the pit was broadly contemporary with the unurned cremation K[745; OxA-12669–7), and that both features are early Bronze Age in date.

Laboratory comment: English Heritage (2 February 2007), the two radiocarbon determinations on fragments of short-lived charcoal from this pit are statistically consistent (T′=0.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978) (OxA-11465–6).

References: Ward and Wilson 1978

OxA–11466 3464 ±35 BP

$\delta^{13}C$: -28.8‰

Sample: [2397] 351 B, submitted in March 2002 by N Elsden

Material: charcoal: Pomoideae, single fragment (R Gale 2002)

Initial comment: as OxA-11465

Objectives: as OxA-11465

Calibrated date: *1σ:* 1880–1690 cal BC
2σ: 1890–1680 cal BC

Final comment: see OxA-11465

Laboratory comment: see OxA-11465

OxA–11530 3360 ±40 BP

$\delta^{13}C$: -25.4‰

Sample: [2492] 379 A, submitted in March 2002 by N Elsden

Material: charcoal: *Alnus glutinosa*, single fragment (R Gale 2002)

Initial comment: as OxA-11464

Objectives: as OxA-11464

Calibrated date: *1σ:* 1700–1610 cal BC
2σ: 1750–1530 cal BC

Final comment: see OxA-11464

Laboratory comment: see OxA-11464

West London Landscape: Cranford Lane, cremations, Greater London

Location: TQ 09527736
Lat. 51.29.03 N; Long. 00.25.21 W

Project manager: N Elsden (Museum of London), 1994–5

Archival body: Museum of London

Description: a possible un-urned cremation cemetery distributed across the ?middle-late Bronze Age field and settlement system. These small cut features contained charcoal and small quantities of calcified bone; they might be token cremations, pyre debris, or other forms of disposal of human remains. Eight deposits were originally definitely identified as containing human bone at assessment with a further seven excavated from the site.

Objectives: at what date were the un-urned ?cremations (or pyre debris etc) deposited?

Final comment: N Elsden (2 February 2007), two measurements were made on each of three deposits of burnt bone and charcoal, interpreted as pyre debris or un-urned token cremation burials, out of a total of fifteen such features excavated at the site (K[1856], K[1860], and K[2150]). All samples were single fragments of short-lived charcoal thought to be from the funerary pyre and deposited with the burnt bone. All of these paired measurements are statistically consistent, suggesting that the deposition of the pyre debris or token cremations was intentional, not a gradual accumulation in refuse pits or postholes. Chronological modelling of the results (Cotton and Elsden in prep) indicates cremations K[1856] and K[1860] appear to be contemporary, dating to the fourteenth century cal BC. Cremation K[2150] is rather later, dating to the thirteenth or twelfth centuries cal BC. Taken with the early Bronze Age cremation K[746], these dates suggest that there was funerary activity at Cranford Lane throughout the second millennium cal BC, and that its inception preceded the foundation of the field system.

References: Cotton and Elsden in prep

OxA–11467 3086 ±34 BP

$\delta^{13}C$: -26.5‰

Sample: [1855] S281 A, submitted in March 2002 by N Elsden

Material: charcoal: Pomoideae, single fragment (R Gale 2002)

Initial comment: a single discrete cut feature, 0.13m deep, contained charcoal and a small quantity of calcined human bone. The location of this feature at the northern margin of the site, close to a pit with Iron Age pottery as well as part of the (later) Bronze Age field system, suggest this might be of Iron Age rather than Bronze Age date.

Objectives: to date the deposition of the un-urned cremations.

Calibrated date: *1σ:* 1420–1290 cal BC
2σ: 1440–1260 cal BC

Final comment: N Elsden (20 February 2014), the radiocarbon dates identified this feature (interpreted as fuel from the cremation pyre) to be of Bronze Age date.

Laboratory comment: English Heritage (1 May 2014), the two results (OxA-11467 and OxA-11531) on different fragments of charcoal from this cremation are statistically consistent (T'=0.0; $T'(5\%)$=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–11468 3073 ±34 BP

$\delta^{13}C$: -27.4‰

Sample: [1859] S283 B, submitted in March 2002 by N Elsden

Material: charcoal: ?*Prunus* sp., single fragment (R Gale 2002)

Initial comment: as OxA-11467

Objectives: as OxA-11467

Calibrated date: *1σ:* 1410–1270 cal BC
2σ: 1430–1220 cal BC

Final comment: see OxA-11467

Laboratory comment: see OxA-11467

OxA–11531 3087 ±24 BP

$\delta^{13}C$: -25.7‰

Sample: [1855] S281 B, submitted in March 2002 by N Elsden

Material: charcoal: *Prunus spinosa* (R Gale 2002)

Initial comment: as OxA-11467

Objectives: as OxA-11467

Calibrated date: *1σ:* 1410–1300 cal BC
2σ: 1425–1275 cal BC

Final comment: see OxA-11467

Laboratory comment: see OxA-11467

OxA–11532 2920 ±37 BP

$\delta^{13}C$: -26.0‰

Sample: [2149] 327 A, submitted in March 2002 by N Elsden

Material: charcoal: Pomoideae, single fragment (R Gale 2002)

Initial comment: a single discrete cut feature, 0.1m deep, which contained charcoal and a small quantity of calcined human bone.

Objectives: as OxA-11467

Calibrated date: *1σ:* 1210–1040 cal BC
2σ: 1230–1000 cal BC

Final comment: see OxA-11467

Laboratory comment: English Heritage (1 May 2014), the two results (OxA-11532 and OxA-11554) on different fragments of charcoal from this cremation are statistically consistent (T′=1.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–11553 3073 ±39 BP

$\delta^{13}C$: -27.0‰

Sample: [1859] 5283 A, submitted in March 2002 by N Elsden

Material: charcoal: Salicaceae, single fragment (R Gale 2002)

Initial comment: a single discrete cut feature, 0.08m deep, which contained charcoal and a small quantity of calcined human and 'sheep-sized' bone.

Objectives: as OxA-11467

Calibrated date: *1σ:* 1410–1270 cal BC
2σ: 1430–1220 cal BC

Final comment: see OxA-11467

Laboratory comment: see OxA-11468

OxA–11554 2973 ±36 BP

$\delta^{13}C$: -26.8‰

Sample: [2149] 327 B, submitted in March 2002 by N Elsden

Material: charcoal: Pomoideae, single fragment (R Gale 2002)

Initial comment: as OxA-11532

Objectives: as OxA-11467

Calibrated date: *1σ:* 1260–1120 cal BC
2σ: 1370–1050 cal BC

Final comment: see OxA-11467

Laboratory comment: see OxA-11532

OxA–12696 3474 ±30 BP

$\delta^{13}C$: -23.1‰

Sample: 745A, submitted in March 2002 by N Elsden

Material: cremated human bone (2g) (calcined) (B White 2002)

Initial comment: a single discrete cut feature, neither cutting nor cut by another feature; cut into natural brickearth. The feature contained charcoal and small quantity of calcined human bone. 0.15m deep, cut into thin brickearth covering Taplow terrace gravels, sealed beneath *c* 0.5m of topsoil/subsoil.

Objectives: to date the deposition of the un-urned cremations. Are they contemporary with the middle Bronze Age-early Iron Age field settlement system? Do they differ in date across the site/field system?

Calibrated date: *1σ:* 1880–1740 cal BC
2σ: 1890–1690 cal BC

Final comment: N Elsden (20 February 2004), this feature was dated to the early Bronze Age, and is significantly earlier than the other three features also identified as pyre debris or cremations (OxA-11467–8, -11531–2, and -11553–4).

Laboratory comment: English Heritage (1 May 2014), the two results on different fragments of calcined bone from this cremation are statistically significantly different (T′=102.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–12697 3537 ±31 BP

$\delta^{13}C$: -22.7‰

Sample: 745B, submitted in March 2002 by N Elsden

Material: cremated human bone (calcined) (B White 2002)

Initial comment: as OxA-12696

Objectives: as OxA-12696

Calibrated date: *1σ:* 1920–1780 cal BC
2σ: 1960–1760 cal BC

Final comment: see OxA-12696

Laboratory comment: see OxA-12696

West London Landscape: Cranford Lane, earlier Neolithic pottery, Greater London

Location: TQ 09527736
Lat. 51.29.03 N; Long. 00.25.21 W

Project manager: N Elsden (Museum of London), 1994–5

Archival body: Museum of London

Description: food residues on pottery; Plain Bowl from a pit with hearth-rakings, and residually in a middle-late Bronze Age ditch.

Objectives: to refine local dating for Plain Bowl pottery. Indirectly, to date the Neolithic activity at Cranford Lane which is characterised by this pottery tradition. Comparison of these dates with that for Peterborough Ware from the other West London sites.

Final comment: N Elsden (20 February 2014), a number of Neolithic features were identified at Cranford Lane, in addition to the Bronze Age field system and associated features.

References: Cotton and Elsden in prep

OxA–12290 4897 ±32 BP

$\delta^{13}C$: -26.3 ±0.2‰

Sample: [1957], submitted in December 2002 by N Elsden

Material: carbonised residue

Initial comment: from a shallow pit (0.3m deep) with frequent charcoal and occasional burnt flint that contained 89 sherds of Plain Bowl.

Objectives: to refine the dates at which Plain Bowl pottery was used in the study area. To date the earlier Neolithic activity at Cranford Lane. To compare these dates with those for other Neolithic pottery traditions in West London.

Calibrated date: *1σ:* 3710–3640 cal BC
2σ: 3720–3630 cal BC

Final comment: N Elsden (2 February 2007), this date on the carbonised residue adhering to the interior surface of a sherd of Plain Bowl from pit K[1958] (OxA-12290) is in accord with other scientific dates available from Plain Bowl nationally.

OxA–12632 2894 ±39 BP

$\delta^{13}C$: -29.0 ±0.2‰

Sample: [1422], submitted in December 2002 by N Elsden

Material: carbonised residue

Initial comment: from the fill of ditch K[1421], a later sub-division of the enclosure system.

Objectives: as OxA-12290

Calibrated date: *1σ:* 1130–1010 cal BC
2σ: 1220–930 cal BC

Final comment: N Elsden (2 February 2007), initially thought to be Neolithic in date, this date on the carbonised residue adhering to a flint-tempered sherd forms a *terminus post quem* for the penultimate phase of modification of the field system, period 10 (and less usefully, a *terminus ante quem* for the Neolithic building 1).

Laboratory comment: English Heritage (2 February 2007), residues from two other sherds of FLIN 2 have also been dated (OxA-12398 and -11655), the three producing statistically consistent measurements (T′=0.1; T′(5%)=6.0; ν=2; Ward and Wilson 1978).

References: Ward and Wilson 1978

West London Landscape: Cranford Lane, field system, Greater London

Location: TQ 09527736
Lat. 51.29.03 N; Long. 00.25.21 W

Project manager: N Elsden (Museum of London), 1994–5

Archival body: Museum of London

Description: a series of mostly co-axial sub-rectangular enclosures extending over more than 400m x 300m, and containing around three occupation sites, current thought to be of middle Bronze Age to early Iron Age date. Some of the residues from dating pottery residues between these dates are also relevant to this series.

Objectives: to date the lifespan of the field system (and therefore associated activity and occupation). If possible, to date a major change in alignment where a droveway suppresses part of a settlement enclosure. Where the determinations have been taken from wells and ‘sumps’ (waterholes), do these differ in date across the enclosure system; do the different water sources differ in date as well as form?

Final comment: N Elsden (2 February 2007), the dates have provided a limited chronology for understanding the development of the field system and its associated features.

References: Cotton and Elsden in prep

OxA–12263 3216 ±28 BP

$\delta^{13}C$: -27.2 ±0.2‰

Sample: [2087]A, submitted in 2003 by N Elsden

Material: charcoal: Pomoideae, single fragment (R Gale 2003)

Initial comment: the primary fill of a well (containing three large sherds of Deverel-Rimbury pottery - provisional identification) which forms the focus of a cluster of pits and ‘cooking pits’.

Objectives: to establish the date at which this well was in use, and thus that of the cluster of activity which appears to precede the ?middle Bronze Age to early Iron Age enclosure/field system. The date from this well fill should be considered along with 'cooking pit' fill [1936] to form a *terminus post quem* for the construction of this part, at least, of the field/enclosure system.

Calibrated date: *1σ:* 1510–1440 cal BC
2σ: 1600–1420 cal BC

Final comment: N Elsden (20 February 2014), this radiocarbon date suggests that the associated Deverel-Rimbury Bucket Urn (fabric FLIN7) dates to the mid second millennium cal BC.

Laboratory comment: the two determinations on charcoal from K[2087] are statistically consistent (T′=2.2; T′(5%)=3.8; ν=1; Ward an dWilson 1978).

References: Ward and Wilson 1978

OxA–12264 3280 ±33 BP

$\delta^{13}C$: -26.6 ±0.2‰

Sample: [2087] B, submitted in 2003 by R Gale

Material: charcoal: Pomoideae, single fragment (R Gale 2003)

Initial comment: as OxA-12263

Objectives: as OxA-12263

Calibrated date: *1σ:* 1620–1500 cal BC
2σ: 1640–1460 cal BC

Final comment: see OxA-12263

Laboratory comment: see OxA-12263

OxA–12265 3326 ±32 BP

$\delta^{13}C$: -26.6 ±0.2‰

Sample: [1936] A, submitted in 2003 by N Elsden

Material: charcoal: *Prunus spinosa* (R Gale 2003)

Initial comment: a 'cooking pit', ie a shallow pit filled with burnt flint, charcoal, and what appeared to be ash. This is one of a cluster of pits and 'cooking pits' around a well, which appear to pre-date the Bronze Age field system.

Objectives: to date the cluster of pits around a well, and thereby establish *terminus post quem* for the construction of the eastern part, at least, of the ?middle Bronze Age to early Iron Age enclosure/field system. The date of well fill [2087] should be considered with that from this context.

Calibrated date: *1σ:* 1650–1540 cal BC
2σ: 1690–1510 cal BC

Final comment: N Elsden (20 February 2014), this result suggests that this feature is earlier than the field system, and this sample may be residual as the two results from the well were statistically consistent.

Laboratory comment: English Heritage (2 February 2007), the two determinations on charcoal from K[1937] are not statistically consistent (T′=4.0; T′(5%)=3.8; ν=1; Ward an dWilson 1978).

References: Ward and Wilson 1978

OxA–12266 3231 ±35 BP

$\delta^{13}C$: -25.1 ±0.2‰

Sample: [1936] B, submitted in 2003 by N Elsden

Material: charcoal: *Prunus spinosa* (R Gale 2003)

Initial comment: as OxA-12265

Objectives: as OxA-12265

Calibrated date: *1σ:* 1530–1450 cal BC
2σ: 1620–1420 cal BC

Final comment: N Elsden (20 February 2014), *see* OxA-12265. This result provides the most accurate date for this feature, being the latest of the two samples.

Laboratory comment: see OxA-12265

West London Landscape: Cranford Lane, pottery residues, Greater London

Location: TQ 09527736
Lat. 51.29.03 N; Long. 00.25.21 W

Project manager: N Elsden (Museum of London), 1994–5

Archival body: Museum of London

Description: a series of flint-tempered and shell-tempered sherds of late Bronze Age/early Iron Age date, all with internal carbonised residues. Recovered from a variety of features, [2412] is the earliest fill of a well, one of a pair flanking the entrance in the eastern side of the later Bronze Age field system. This produced fragments of crucible and spear or sword moulds. [1518] and [1600] are fills of a well on the northern edge of the site, currently thought to be part of a later phase of activity. [1305] is the fill of a ditch, part of the field system.

Objectives: to obtain a number of closely associated dates from post Deverel-Rimbury Plain Ware and Decorated assemblages and to date the introduction of shell-tempered fabric. In addition, [2412] will date the deposition of the material associated with Bronze casting, and [1518] and [1600] will provide closer dating than currently available for what currently appears to be a later phase of activity.

Final comment: N Elsden (2 February 2007), the results obtained from dating carbonised residues adhering to ceramic sherds have provided direct dating for the use of pottery vessels, and have also contributed to understanding the chronology of the features from which they were obtained.

References: Cotton and Elsden in prep

OxA–11463 2584 ±33 BP

$\delta^{13}C$: -27.9‰

Sample: [1600], submitted in March 2002 by N Elsden

Material: carbonised residue

Initial comment: from a fill in well K[1498].

Objectives: to establish dating for late Bronze Age-early Iron Age assemblages in this part of London and to establish the date of introduction/use of shell-tempered fabrics. In addition, to date the activity on the northern edge of the site, currently thought to be a later phase of the late Bronze Age occupation.

Calibrated date: *1σ:* 810–770 cal BC
2σ: 810–760 cal BC

Final comment: N Elsden (20 February 2014), this result helps to date the latest use of the field system to the early Iron Age.

Laboratory comment: English Heritage (August 2014), the two determinations on sherds from well K[1498] are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–11528 2573 ±33 BP

$\delta^{13}C$: -27.8‰

Sample: [1518], submitted in March 2002 by N Elsden

Material: carbonised residue

Initial comment: as OxA-11463

Objectives: as OxA-11463

Calibrated date: *1σ:* 800–770 cal BC
2σ: 810–590 cal BC

Final comment: see OxA-11463

Laboratory comment: see OxA-11463

OxA–11529 3277 ±36 BP

$\delta^{13}C$: -26.2‰

Sample: [2412] A, submitted in March 2002 by N Elsden

Material: carbonised residue

Initial comment: from a fill in well K[2412]. Pottery from the earliest silting in well [2412], which also produced fragments of crucible and spear or sword mould, as well as a decayed wooden object, provisionally identified as a 'trough'.

Objectives: to establish the date for the flint-tempered late Bronze Age Plain Wares in this part of London. In addition, to date the deposition of the Bronze-casting remains.

Calibrated date: *1σ:* 1620–1500 cal BC
2σ: 1640–1450 cal BC

Final comment: N Elsden (20 February 2014), this sherd is thought to be residual within its context.

Laboratory comment: English Heritage (2 February 2007), two replicate measurements were obtained on this sherd (OxA-11529 and OxA-12883). The results are not statistically consistent (T′=4.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978), although this difference is comparatively slight and so a weighted mean (3329 ±27 BP) can be taken before calibration, which calibrates to 1690–1520 cal BC (2σ; Reimer *et al* 2004)

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–11655 2880 ±50 BP

$\delta^{13}C$: -27.6‰

Sample: [1305], submitted in March 2002 by N Elsden

Material: carbonised residue

Initial comment: from a deposit seen in cross-section where recut ditch [1286] cuts water-collection 'sump' [1290]. Both are parts of the later Bronze Age field system.

Objectives: to establish the date for the flint-tempered late Bronze Age plain wares in this part of London and to establish a date of use for associated perforated clay slabs. Whilst this material may provide additional information about the date of the later Bronze Age field system, this is somewhat reduced by the possibility of residuality. It belongs to neither the earliest nor the latest phase of construction.

Calibrated date: *1σ:* 1130–990 cal BC
2σ: 1220–910 cal BC

Final comment: N Elsden (20 February 2014), this sherd is from another feature presumed to date to the main Bronze Age field system activity.

Laboratory comment: English Heritage (2 February 2007), this sample is statistically consistent with K[2412]C and K[2412]D (OxA-12398 and OxA-12515; T′=0.1; T′(5%)=6.0; ν=2; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–11656 3055 ±55 BP

$\delta^{13}C$: -29.0‰

Sample: [2412] B, submitted in March 2002 by N Elsden

Material: carbonised residue

Initial comment: as OxA-11529

Objectives: as OxA-11529

Calibrated date: *1σ:* 1410–1220 cal BC
2σ: 1440–1120 cal BC

Final comment: N Elsden (20 February 2014), this sherd is not considered to be residual, but to date to the early use of the well, with samples K[2412]C and K[2412]D (OxA-12398 and OxA-12515) representing the slow infilling of the well. This assists in suggesting a likely date for the construction of this phase of the field system.

OxA–12398 2881 ±40 BP

$\delta^{13}C$: -29.9 ±0.2‰

Sample: [2412] C, submitted on 7 January 2003 by N Elsden

Material: carbonised residue

Initial comment: pottery from earliest silting in well [2412], which also produced fragments of crucible and spear or sword mould, as well as a delayed wooden object, provisionally identified as a 'trough'.

Objectives: to establish the date of use for flint-tempered late Bronze Age Plain Wares in this part of London. In addition, to date the deposition of the Bronze-casting remains.

Calibrated date: *1σ:* 1120–1000 cal BC
2σ: 1210–920 cal BC

Final comment: N Elsden (20 February 2014), this radiocarbon date helps to date the infilling of the well, and therefore the casting remains, to the early Bronze Age. The date also agrees with the other sherds of this fabric type (FLIN2).

OxA–12515 2892 ±35 BP

δ[13]C: -24.5‰

Sample: [2412] D, submitted in March 2002 by N Elsden

Material: carbonised residue

Initial comment: as OxA-12398

Objectives: as OxA-12398

Calibrated date: *1σ:* 1130–1010 cal BC
2σ: 1210–940 cal BC

Final comment: N Elsden (20 February 2014), this sherd represents the infilling of the well, and by association the main Bronze Age field system activity.

OxA–12883 3385 ±38 BP

δ[13]C: -26.9‰

Sample: [2412] A, submitted in March 2002 by N Elsden

Material: carbonised residue

Initial comment: a replicate of OxA-11529.

Objectives: as OxA-11529

Calibrated date: *1σ:* 1740–1620 cal BC
2σ: 1760–1610 cal BC

Final comment: *see* OxA-11529

Laboratory comment: *see* OxA-11529

West London Landscape: Holloway Lane, Harmondsworth, Greater London

Location: TQ 06507805
Lat. 51.29.27 N; Long. 00.27.57 W

Project manager: N Elsden (Museum of London), 1984

Archival body: Museum of London

Description: a number of Neolithic pits, producing Grooved Ware were scattered across the site, some including apparently 'placed' deposits of stacked Grooved Ware fragments, flintwork, and in one pit carbonised food remains. Mid-to-late Bronze Age activity survived only as a limited number of ditches and pits.

Objectives: to refine or confirm the dating of Grooved Ware locally and to date the 'placed' deposits.

Final comment: N Elsden (2 February 2007), the radiocarbon results on hazelnuts from HL80 B[3003] are statistically consistent with those from HL80 B[4004] (T′=6.1; T′(5%)=7.8; ν=3; Ward and Wilson 1978), and so they may both relate to the same phase of Neolithic hazelnut charring. In this case, the samples from HL80 B[4004] may also be residual, and not date the associated artefact assemblage. Conversely, the hazelnuts shells in B[3003] might have been redeposited from material derived from the same source as B[4004], although the two pits are separated by more than 400m. Alternatively, there may be a problem of chemical contamination with the carbonised residues on the Grooved Ware (*see* above), and the deposition in the pit could perhaps be a single episode in the last quarter of fourth millennium cal BC. This, however, would be an exceptionally early assemblage of Grooved Ware for southern Britain (Garwood 1999).

References: Cotton and Elsden in prep
Garwood 1999
Ward and Wilson 1978

OxA–11534 3824 ±37 BP

δ[13]C: -28.0‰

Sample: [3], submitted in March 2002 by N Elsden

Material: carbonised residue (adhering to a Durrington Walls sub-style sherd)

Initial comment: pit B[3003] contained a 'stacked' assemblage of Grooved Ware sherds and about 50 fragments of hazelnut shells.

Objectives: to refine or confirm the dating of Grooved Ware in the locality (ie London); to date the 'placed' deposits of Grooved Ware, flintwork, and food remains.

Calibrated date: *1σ:* 2340–2200 cal BC
2σ: 2460–2140 cal BC

Final comment: N Elsden (20 February 2014), this sherd came from a Grooved Ware vessel. Due to the incoherence of the radiocarbon results on other samples from this feature, the result is difficult to interpret. It is possible that the sherds represent curated items, and the feature in fact dates to the third quarter of the third millennium cal BC (the latest date provided by OxA-12255).

Laboratory comment: English Heritage (August 2014), the measurements on the residues from the two Grooved Ware vessels are not statistically sonsistent (T′=19.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–12255 4037 ±31 BP

δ[13]C: -28.0‰

Sample: [3] A, submitted in March 2002 by N Elsden

Material: carbonised residue

Initial comment: as OxA-11534

Objectives: to refine or confirm the dating of Grooved Ware in the locality (ie London); to date the 'placed' deposits of Grooved Ware, flintwork, and food remains. In particular, to refine the previous radiocarbon date from this context from food residue - comparison of the dates should show if the pot had been 'curated' for a significant length of time.

Calibrated date: *1σ:* 2580–2490 cal BC
2σ: 2830–2470 cal BC

Final comment: see OxA-11534

Laboratory comment: see OxA-11534

OxA–12256 4355 ±30 BP

$\delta^{13}C$: -24.3‰

Sample: [4] A, submitted in March 2002 by N Elsden

Material: carbonised plant macrofossil (hazelnut shell (*Corylus* sp.); single fragment) (J Giorgi 2002)

Initial comment: pit B[4004] contained a Grooved Ware bowl in the Woodlands sub-style, three transverse arrowheads, two scrapers, and a fragment of a polished axe.

Objectives: to refine or confirm the dating of Grooved Ware in the locality (ie London); to date the 'placed' deposits of Grooved Ware, flintwork, and food remains.

Calibrated date: *1σ:* 3020–2910 cal BC
2σ: 3090–2900 cal BC

Final comment: N Elsden (20 February 2014), the hazelnut shells probably date to the 30th century cal BC. The consistency of the radiocarbon results on the hazelnuts may suggest that they are not redposited. If so, these dates are unusually early for this sub-style of Grooved Ware (Garwood 1999).

Laboratory comment: English Heritage (August 2014), the two measuremetns (OxA-12256 and OxA-12319) are statistically consistent (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–12318 4423 ±31 BP

$\delta^{13}C$: -25.7‰

Sample: [3] B, submitted in March 2002 by N Elsden

Material: carbonised plant macrofossil (hazelnut shell (*Corylus* sp.); single fragment) (J Giorgi 2002)

Initial comment: as OxA-11534

Objectives: as OxA-12255

Calibrated date: *1σ:* 3100–3010 cal BC
2σ: 3320–2920 cal BC

Final comment: N Elsden (20 February 2014), *see* OxA-11534. The results on the hazelnut shells for this pit are statistically consistent, but several centuries earlier than the Grooved Ware vessels. The hazelnut shells may therefore be residual.

Laboratory comment: see OxA-11534

OxA–12319 4345 ±31 BP

$\delta^{13}C$: -25.0‰

Sample: [4] B, submitted in March 2002 by N Elsden

Material: carbonised plant macrofossil (hazelnut shell (*Corylus* sp.); single fragment) (J Giorgi 2002)

Initial comment: as OxA-12256

Objectives: as OxA-12256

Calibrated date: *1σ:* 3010–2900 cal BC
2σ: 3090–2890 cal BC

Final comment: see OxA-12256

Laboratory comment: see OxA-12256

OxA–12345 4428 ±31 BP

$\delta^{13}C$: -25.7‰

Sample: [3]C, submitted in March 2002 by N Elsden

Material: carbonised plant macrofossil (hazelnut shell (*Corylus* sp.); single fragment) (J Giorgi 2002)

Initial comment: as OxA-12318

Objectives: as OxA-12318

Calibrated date: *1σ:* 3270–3010 cal BC
2σ: 3330–2920 cal BC

Final comment: see OxA-12318

West London Landscape: Stockley Park, Greater London

Location: TQ 08378037
Lat. 51.30.41 N; Long. 00.26.17 W

Project manager: N Elsden (Museum of London), 1985

Description: an unclosed settlement of early to middle Iron Age date, located on the Boyn Hill Terrace, *c* 4km to the north of Heathrow airport. The settlement consists of 4 roundhouses, represented by eaves drip gullies, postholes, and *c* 15 four-post structures. These are laid out on two main alignments/orientations the elements of which are incompatible. There is a minimal evidence for earlier activity: six features of late Neolithic to late Bronze Age date, and no evidence for later activity. Little evidence for contemporary settlement exists in the locality of the site, but it can be contrasted with the enclosed settlement at Caesar's Camp and the recently excavated settlement at Perry Oaks (Terminal 5), both within Heathrow airport on the Taplow terrace to the south.

Objectives: to date when the settlement was first occupied; to date when the major realignment of buildings occurred; to determine for how long the site was occupied; to provide absolute dates for the pottery chronology; and to enable the occupation of this site to be placed in a regional settlement pattern.

Final comment: N Elsden (2 February 2007), chronological modelling of the results suggests that the excavated settlement at Stockley Park was founded in *495–420 cal BC (95% probability)*, probably in *465–430 cal BC (68%*

probability). Occupation ended in *375–335 cal BC (95% probability)*, probably in *370–345 cal BC (68% probability)*. Overall, the settlement at Stockley Park was inhabited for *50–150 years (95% probability)*, probably for *65–115 years (68% probability)* - perhaps for three or four generations.

References: Cotton and Elsden in prep

West London Landscape: Stockley Park, building 10, Greater London

Location: TQ 08378037
Lat. 51.30.41 N; Long. 00.26.17 W

Project manager: N Elsden (Museum of London), 1985

Archival body: Museum of London

Description: a four post structure, probably a grain store, *c* 2.5m square. The postholes were 0.3–0.5m in diameter, 0.20–0.35m deep, and contained middle Iron Age pottery with vessel sherd links between three of the postholes. These also produced two fragments of loom weight, emmer/spelt, and free-threshing wheat grains. The emmer/spelt from posthole fill 215 was the largest grain assemblage from the site, consisting of several hundred grains. This was one of five four-post structures aligned with the entrance of the roundhouse.

Objectives: to date when building 10 was in use; to date when the settlement was modified; to ascertain the date of the emmer/spelt and free-threshing wheat grains and therefore the cultivation of these cereals at this time; and to provide dating for middle Iron Age pottery.

Final comment: N Elsden (2 February 2007), the results confirm that the four-post structure dates to the middle Iron Age.

Laboratory comment: English Heritage (2 February 2007), two samples were also dated from each of two postholes in four-post structure S10, in both cases the results were statistically consistent (OxA-11430–1, T′=1.0; T′(5%)=3.8; ν=1; OxA- 11432–3, T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Cotton and Elsden in prep
Ward and Wilson 1978

OxA–11430 2507 ±35 BP

$\delta^{13}C$: -22.3‰

Sample: [215] A, submitted in March 2002 by N Elsden

Material: grain: *Triticum* sp., single grain (J Giorgi 2002)

Initial comment: from posthole [215] of the four-post structure 10.

Objectives: to establish the date of the four-post structure and contribute to an understanding of the overall chronology of the settlement. This posthole forms part of a four-post structure which displays one of the two main alignments/orientation on the site shared by the entrance and internal structures of a further building. This can be compared and hopefully contrasted with other structures on a differing orientation.

Calibrated date: *1σ:* 780–540 cal BC
2σ: 800–510 cal BC

Final comment: N Elsden (20 February 2014), this result conforms to the middle Iron Age date of this four-post structure.

Laboratory comment: see series comments

OxA–11431 2458 ±35 BP

$\delta^{13}C$: -22.6‰

Sample: [215] B, submitted in March 2002 by N Elsden

Material: grain: *Triticum* sp., single grain (J Giorgi 2002)

Initial comment: as OxA-11430

Objectives: as OxA-11430

Calibrated date: *1σ:* 760–480 cal BC
2σ: 770–400 cal BC

Final comment: see OxA-11430

Laboratory comment: see series comments

OxA–11432 2404 ±34 BP

$\delta^{13}C$: -22.0‰

Sample: [201] A, submitted in March 2002 by N Elsden

Material: grain: *Triticum* sp., single grain (J Giorgi 2002)

Initial comment: from posthole [201] of the four-post structure 10.

Objectives: as OxA-11430

Calibrated date: *1σ:* 540–400 cal BC
2σ: 740–390 cal BC

Final comment: see OxA-11430

Laboratory comment: see series comments

OxA–11433 2432 ±35 BP

$\delta^{13}C$: -22.3‰

Sample: [201] B, submitted in March 2002 by N Elsden

Material: grain (free-threshing) (J Giorgi 2002)

Initial comment: as OxA-11432

Objectives: as OxA-11430

Calibrated date: *1σ:* 740–400 cal BC
2σ: 760–400 cal BC

Final comment: see OxA-11430

Laboratory comment: see series comments

West London Landscape: Stockley Park, building 6, Greater London

Location: TQ 08378037
Lat. 51.30.41 N; Long. 00.26.17 W

Project manager: N Elsden (Museum of London), 1985

Archival body: Museum of London

Description: three post holes representing major structural elements within roundhouse building 6: 998 is one of only two or three posts from the external wall to survive; 616 and 694 are parts of a central structure(s) within the roundhouse. The orientation of the entrance and central structure form part of one of the two main alignments in the settlement, which includes at least two four-post structures.

Objectives: to date when building 6 was in use and contribute to understanding when the settlement was laid out and modified.

Final comment: N Elsden (2 February 2007), seven samples were dated from four features in roundhouse B6: a carbonised residue from the eaves-drip gully and three pairs of samples from each of three postholes. Each of these pairs of samples is statistically consistent (OxA-11391 and -11440, T′=0.2; T′(5%)=3.8; ν=1; OxA-11441–2, T′=0.0;T′(5%)=3.8; ν=1; OxA-11443–4, T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Cotton and Elsden in prep
Ward and Wilson 1978

OxA–11391 2395 ±45 BP

$\delta^{13}C$: -25.9‰

Sample: [616] B, submitted in March 2002 by N Elsden

Material: charcoal: *Corylus* sp., single fragment (R Gale 2002)

Initial comment: a discrete individual posthole [616] neither cutting nor cut by another feature.

Objectives: to establish when building 6 was in use and contribute to understanding the dates at which the settlement originated, and at which it was modified.

Calibrated date: *1σ:* 540–400 cal BC
2σ: 750–390 cal BC

Final comment: N Elsden (20 February 2014), this result is compatible with the other sample from a posthole in this building (OxA-11440), dating to the middle Iron Age.

Laboratory comment: see series comments

OxA–11440 2418 ±34 BP

$\delta^{13}C$: -25.0‰

Sample: [616] A, submitted in March 2002 by N Elsden

Material: charcoal: *Corylus* sp., single fragment (R Gale 2002)

Initial comment: as OxA-11391

Objectives: as OxA-11391

Calibrated date: *1σ:* 730–400 cal BC
2σ: 750–400 cal BC

Final comment: see OxA-11391

Laboratory comment: see series comments

OxA–11441 2449 ±35 BP

$\delta^{13}C$: -24.0‰

Sample: [694] A, submitted in March 2002 by N Elsden

Material: charcoal: *Acer campestre*, single fragment (R Gale 2002)

Initial comment: a discrete individual posthole [694] which formed part of a central structure(s) within the roundhouse.

Objectives: as OxA-11391

Calibrated date: *1σ:* 750–410 cal BC
2σ: 770–400 cal BC

Final comment: N Elsden (20 February 2014), this result is in compatible with the other sample from this posthole (OxA-11442), dating the building to the middle Iron Age.

Laboratory comment: see series comments

OxA–11442 2459 ±35 BP

$\delta^{13}C$: -25.1‰

Sample: [694] B, submitted in March 2002 by N Elsden

Material: charcoal: *Prunus spinosa* (R Gale 2002)

Initial comment: as OxA-11441

Objectives: as OxA-11391

Calibrated date: *1σ:* 760–480 cal BC
2σ: 780–400 cal BC

Final comment: see OxA-11441

Laboratory comment: see series comments

OxA–11443 2271 ±34 BP

$\delta^{13}C$: -26.3‰

Sample: [998] A, submitted in March 2002 by N Elsden

Material: charcoal: *Corylus* sp., single fragment (R Gale 2002)

Initial comment: a discrete individual posthole [998], only one of two or three posts from the external wall to survive.

Objectives: as OxA-11391

Calibrated date: *1σ:* 400–250 cal BC
2σ: 410–200 cal BC

Final comment: N Elsden (20 February 2014), this result is compatible with the other sample from this posthole (OxA-11444), dating the building to the middle Iron Age.

Laboratory comment: see series comments

OxA–11444 2245 ±34 BP

$\delta^{13}C$: -25.6‰

Sample: [998] B, submitted in March 2002 by N Elsden

Material: charcoal: *Corylus* sp., single fragment (R Gale 2002)

Initial comment: as OxA-11443

Objectives: as OxA-11391

Calibrated date: *1σ:* 390–210 cal BC
2σ: 400–200 cal BC

Final comment: see OxA-11443

Laboratory comment: see series comments

OxA–12297 2425 ±32 BP

$\delta^{13}C$: -29.1 ±0.2‰

Sample: [640], submitted on 7 January 2003 by N Elsden

Material: carbonised residue

Initial comment: from the eaves drip gully around the 'porch' structure at entrance of building 6. It shares an orientation with the four-post structure.

Objectives: to refine the Iron Age local pottery dating and examine the relationship between dating and fabric types; to refine the dating for the overall lifespan of the Iron Age settlement at Stockley Park; and to establish, if possible, the dates at which the settlement layout was established and modified.

Calibrated date: *1σ:* 730–400 cal BC
2σ: 750–400 cal BC

Final comment: N Elsden (20 February 2014), the result on this sherd supports the middle Iron Age date for this structure.

Laboratory comment: see series comments

West London Landscape: Stockley Park, building 7, Greater London

Location: TQ 08378037
Lat. 51.30.41 N; Long. 00.26.17 W

Project manager: N Elsden (Museum of London), 1985

Archival body: Museum of London

Description: three postholes representing major structural elements within roundhouse building 7: central supports 744 and 829 and a structure within the entrance 706. These contained middle Iron Age pottery. The orientations of these structures form part of one of the two main alignments/orientations on the site, which includes at least five four-post structures.

Objectives: to date when building 7 was in use and contribute to understanding when the settlement was laid out and when it was modified; to date the middle Iron Age pottery types.

Final comment: N Elsden (2 February 2007), two samples were dated from each of three postholes from round house B7. Two pairs of results are statistically consistent (OxA-11436–7, T′=1.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978); OxA-11438–9, T′=0.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978), but the third pair are significantly different (OxA-11434–5, T′=17.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978). OxA-11435 appears to be residual and was excluded from the chronological modelling. Four further samples were dated from roundhouse B7, carbonised residues on pottery sherds from different vessels from the eaves drip gully.

References: Cotton and Elsden in prep
Ward and Wilson 1978

OxA–11434 2214 ±36 BP

$\delta^{13}C$: -25.6‰

Sample: [706] A, submitted in March 2002 by N Elsden

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2002)

Initial comment: a 0.3m diameter posthole [706], 0.10m deep. It partially cut posthole [703] (which contained no material suitable for dating). But both posts could have been in use at the same time, rather than a replacement during the life of the building.

Objectives: to estimate when building 7 was in use, the dates at which the settlement originated, and at which the layout was modified. The posthole is part of the main internal structures within the building, which display one of the two main orientations/alignments of the settlement, shared by at least five four-post structures. This can be compared with another building which displays a differing orientation.

Calibrated date: *1σ:* 370–200 cal BC
2σ: 390–170 cal BC

Final comment: N Elsden (20 February 2014), this result helps date the building to the middle Iron Age.

Laboratory comment: see series comments

OxA–11435 2429 ±37 BP

$\delta^{13}C$: -24.5‰

Sample: [706] B, submitted in March 2002 by N Elsden

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2002)

Initial comment: as OxA-11434

Objectives: as OxA-11434

Calibrated date: *1σ:* 740–400 cal BC
2σ: 760–400 cal BC

Final comment: N Elsden (20 February 2014), this result is statistically significantly different to OxA-11434 from the same context (and also to the other samples from this building), and is therefore considered to be residual.

Laboratory comment: see series comments

OxA–11436 2270 ±35 BP

$\delta^{13}C$: -27.0‰

Sample: [744] A, submitted in March 2002 by N Elsden

Material: charcoal: *Acer campestre*, single fragment (R Gale 2002)

Initial comment: a sub-square posthole [744], 0.31m in diameter and 0.19m deep.

Objectives: as OxA-11434

Calibrated date: *1σ:* 400–250 cal BC
2σ: 410–200 cal BC

Final comment: N Elsden (20 February 2014), this result conforms to the other dated samples from this building, falling in the middle Iron Age.

Laboratory comment: see series comments

OxA–11437 2321 ±37 BP

$\delta^{13}C$: -25.7‰

Sample: [744] B, submitted in March 2002 by N Elsden

Material: charcoal: Pomoideae, single fragment (R Gale 2002)

Initial comment: as OxA-11436

Objectives: as OxA-11434

Calibrated date: *1σ:* 410–380 cal BC
2σ: 420–360 cal BC

Final comment: see OxA-11436

Laboratory comment: see series comments

OxA–11438 2279 ±35 BP

$\delta^{13}C$: -26.3‰

Sample: [829] A, submitted in March 2002 by N Elsden

Material: charcoal: *Corylus* sp., single fragment (R Gale 2002)

Initial comment: a double post-setting [829], a discrete individual feature with no stratigraphic relationships.

Objectives: as OxA-11434

Calibrated date: *1σ:* 400–360 cal BC
2σ: 410–210 cal BC

Final comment: see OxA-11436

Laboratory comment: see series comments

OxA–11439 2238 ±34 BP

$\delta^{13}C$: -24.8‰

Sample: [829] B, submitted in March 2002 by N Elsden

Material: charcoal: *Corylus* sp., single fragment (R Gale 2002)

Initial comment: as OxA-11438

Objectives: as OxA-11434

Calibrated date: *1σ:* 380–200 cal BC
2σ: 400–200 cal BC

Final comment: see OxA-11436

Laboratory comment: see series comments

OxA–12251 2289 ±29 BP

$\delta^{13}C$: -27.1 ±0.2‰

Sample: [799], submitted in December 2002 by N Elsden

Material: carbonised residue

Initial comment: an eaves drip gully around the building measuring 0.15–0.35m deep and 0.15–0.60m wide. [799] was the primary fill of the gully, at a point where four separate fills could be discerned.

Objectives: to refine the Iron Age local pottery dating and examine the relationship between dating and fabric types; to refine the dating for the overall lifespan of the Iron Age settlement at Stockley Park; and to establish, if possible, the dates at which the settlement layout was established and modified. It displays two main alignments.

Calibrated date: *1σ:* 400–360 cal BC
2σ: 410–230 cal BC

Final comment: N Elsden (20 February 2014), this sherd comes from roundhouse B7 which dates to the first half of the fourth century cal BC.

Laboratory comment: see series comments

OxA–12252 2261 ±30 BP

$\delta^{13}C$: -27.2 ±0.2‰

Sample: [269 V], submitted in December 2002 by N Elsden

Material: carbonised residue

Initial comment: an eaves drip gully around the building measuring 0.15m-0.35m deep and 0.15–0.60m wide. [269] was the latest of four surviving fills of the gully.

Objectives: as OxA-12251

Calibrated date: *1σ:* 390–230 cal BC
2σ: 400–200 cal BC

Final comment: see OxA-12251

Laboratory comment: see series comments

OxA–12253 2351 ±27 BP

$\delta^{13}C$: -27.1 ±0.2‰

Sample: [699]A, submitted in December 2002 by N Elsden

Material: carbonised residue

Initial comment: an eaves drip gully around the building 7 measuring 0.10–0.20m deep and 0.20–0.40m wide. [699] is actually the cut number - pottery should have been labelled as fill [700].

Objectives: as OxA-12251

Calibrated date: *1σ:* 410–390 cal BC
2σ: 420–380 cal BC

Final comment: see OxA-12251

Laboratory comment: see series comments

OxA–12316 2225 ±28 BP

$\delta^{13}C$: -27.3 ±0.2‰

Sample: [699]B, submitted in December 2002 by N Elsden

Material: carbonised residue

Initial comment: as OxA-12253

Objectives: as OxA-12251

Calibrated date: *1σ:* 370–200 cal BC
2σ: 390–190 cal BC

Final comment: see OxA-12251

Laboratory comment: see series comments

West London Landscape: Stockley Park, structure 11, Greater London

Location: TQ 08378037
Lat. 51.30.41 N; Long. 00.26.17 W

Project manager: N Elsden (Museum of London), 1985

Archival body: Museum of London

Description: one of two four-post structures, conventionally interpreted as grain stores, but exhibiting differing orientations.

Objectives: to date the use of structure 11 and to refine the overall dating of the Iron Age activity on the site.

Final comment: N Elsden (20 February 2014), four samples were dated from two postholes belonging to structure 11, one pair of results is statistically consistent (OxA-12314–5, T′=0.5; T′(5%)=3.8; ν=1); but one pair is statistically significantly different (OxA-12287 and 12317, T′=7.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Cotton and Elsden in prep
Ward and Wilson 1978

OxA–12287 2530 ±27 BP

$\delta^{13}C$: -22.2 ±0.2‰

Sample: [185] B, submitted in December 2002 by N Elsden

Material: grain: *Triticum spelta*, single grain (J Giorgi 2002)

Initial comment: posthole [185] measured 0.55m in diameter and 0.25m deep. Part of four-post structure, building 11.

Objectives: as OxA-12259

Calibrated date: *1σ:* 790–590 cal BC
2σ: 800–540 cal BC

Final comment: N Elsden (20 February 2014), this grain appears to be residual in its context as it is significantly earlier than the measurement on the emmer grain from the same posthole (OxA-12317).

OxA–12314 2435 ±27 BP

$\delta^{13}C$: -23.6 ±0.2‰

Sample: [253]A, submitted in December 2002 by N Elsden

Material: grain: *Triticum* sp., emmer/spelt; single grain (J Giorgi 2002)

Initial comment: posthole [253] measured 0.53m in diameter and 0.27m deep. Part of a four-post structure, building 11.

Objectives: as OxA-12287

Calibrated date: *1σ:* 740–410 cal BC
2σ: 760–400 cal BC

Final comment: see OxA-12287

OxA–12315 2462 ±27 BP

$\delta^{13}C$: -22.6 ±0.2‰

Sample: [253] B, submitted in December 2002 by N Elsden

Material: grain: *Triticum* sp., emmer/spelt; single grain (J Giorgi 2002)

Initial comment: as OxA-12314

Objectives: as OxA-12287

Calibrated date: *1σ:* 750–510 cal BC
2σ: 770–410 cal BC

Final comment: see OxA-12287

OxA–12317 2422 ±28 BP

$\delta^{13}C$: -23.1 ±0.2‰

Sample: [185] A, submitted in December 2002 by N Elsden

Material: grain: *Triticum dicoccum* , single grain (J Giorgi 2002)

Initial comment: as OxA-12287

Objectives: as OxA-12259

Calibrated date: *1σ:* 710–400 cal BC
2σ: 750–400 cal BC

Final comment: N Elsden (20 February 2014), this result is significantly later than the other sample from this posthole, and is thought to be the most accurate date for the context as it is compatible with the results from the other postholes from this structure.

West London Landscape: Stockley Park, structure 19, Greater London

Location: TQ 08378037
Lat. 51.30.41 N; Long. 00.26.17 W

Project manager: N Elsden (Museum of London), 1985

Archival body: Museum of London

Description: a four-post structure, conventionally interpreted as a grain store but exhibiting different orientation, which relates to the two main orientations of structures on this site.

Objectives: to date the use of structure 19; do the two orientations on the site represent differing phases of activity, and at what date(s)? Also, to refine the overall date of the Iron Age activity on the site.

Final comment: N Elsden (2 February 2007), four samples were dated from two postholes belonging to structure 19, each pair of results is statistically consistent (OxA-12259–60, T′=1.6; T′(5%)=3.8; ν=1); OxA-12261–2, T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Cotton and Elsden in prep
Ward and Wilson 1978

OxA–12259 2274 ±27 BP

$\delta^{13}C$: -22.7 ±0.2‰

Sample: [1325]A, submitted in December 2002 by N Elsden

Material: charcoal: *Quercus* sp., sapwood; single fragment (R Gale 2003)

Initial comment: posthole [1325] was 0.48m in diameter and 0.33m deep. Part of four-post structure 19. [1324] appears to be the disturbance caused by the removal of the post set in [1318].

Objectives: to refine the local Iron Age pottery dating; to refine the dating for the overall lifespan of the settlement; to establish, if possible, the date at which the settlement layout was established and modified; to provide a date for the use of structure 19.

Calibrated date: *1σ:* 400–360 cal BC
2σ: 400–230 cal BC

Final comment: N Elsden (20 February 2014), this result confirms the middle Iron Age date of this structure.

OxA–12260 2225 ±27 BP

$\delta^{13}C$: -24.4 ±0.2‰

Sample: [1325] B, submitted in December 2002 by N Elsden

Material: grain: *Hordeum* sp., single grain (J Giorgi 2002)

Initial comment: as OxA-12259

Objectives: as OxA-12259

Calibrated date: *1σ:* 370–200 cal BC
2σ: 390–200 cal BC

Final comment: see OxA-12259

Laboratory comment: see series comments

OxA–12261 2271 ±26 BP

$\delta^{13}C$: -24.2 ±0.2‰

Sample: [1476] A, submitted in December 2002 by N Elsden

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2003)

Initial comment: posthole [1476] measured 0.70m in diameter and 0.23m deep. Part of four-post structure 19.

Objectives: as OxA-12259

Calibrated date: *1σ:* 400–360 cal BC
2σ: 400–210 cal BC

Final comment: see OxA-12259

Laboratory comment: see series comments

OxA–12262 2261 ±26 BP

$\delta^{13}C$: -24.2 ±0.2‰

Sample: [1476]B, submitted in December 2002 by N Elsden

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2003)

Initial comment: as OxA-12261

Objectives: as OxA-12259

Calibrated date: *1σ:* 390–250 cal BC
2σ: 400–200 cal BC

Final comment: see OxA-12259

Laboratory comment: see series comments

West London Landscape: Wall Garden Farm, Sipson, Greater London

Location: TQ 07757840
Lat. 51.29.38 N; Long. 00.26.52 W

Project manager: N Elsden (Museum of London), 1984

Archival body: Museum of London

Description: a Bout Coup

Objectives: to refine/confirm the dating of the Deverel-Rimbury, Plain Ware, and Peterborough Ware pottery; to ascertain whether there is truly a transitional group; and to refine the dating of the middle Bronze Age activity.

Final comment: N Elsden (27 March 2007), the dates from the enclosure ditch (group 2.21) have confirmed the middle Bronze Age activity in this part of the site. The dates will also contribute to understanding the currency of Deverel-Rimbury pottery in London. The measurements on a carbonised residue adhering to the interior of a Peterbrough Ware sherd are at odds with the accepted currency for this style of pottery in England.

Laboratory comment: English Heritage (27 March 2007), three radiocarbon determinations were obtained from the fill (A[1005]) of a large pit at Wall Garden Farm. This feature contained a large assemblage of Bronze Age pottery, including a fragment of globular urn. The three results are statistically significantly different (T′=14.5; T′(5%)=6.0; ν=2; Ward and Wilson 1978), with a sample of bulk unidentified charcoal dated by the British Museum in 1986 providing the earliest measurement (BM-2439; 3090 ±50 BP, 1460–1210 cal BC at 2σ; Reimer *et al* 2004). This may suffer from an old-wood offset. The two measurements on samples of short-lived charcoal are, however, also statistically inconsistent (T′=6.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). This suggests that the context included material of a range of actual dates, and the most reliable indication of the date of its deposition is provided by the latest dated material within it: 1200–930 cal BC (2σ; OxA-11470).

References: Cotton and Elsden in prep
Reimer *et al* 2004
Ward and Wilson 1978

OxA–11469 2996 ±35 BP

$\delta^{13}C$: -24.5‰

Sample: WGF84 Group 2.22 [5L] II (A), submitted in March 2002 by N Elsden

Material: charcoal: *Prunus spinosa* (R Gale 2002)

Initial comment: context sheets for this feature are not present in the archive; it is likely that the samples from this feature are from the latest fill, as there is a note that BM-2439 was taken from that fill, context [5L].

Objectives: to establish a date for this occurrence of Deverel-Rimbury pottery alongside hooked-rim jar plain types. These are traditionally regarded as the post Deverel-Rimbury ceramic tradition, so the date of co-occurrence/transition is important.

Calibrated date: *1σ:* 1280–1130 cal BC
2σ: 1390–1110 cal BC

Final comment: N Elsden (20 February 2014), the result is at odds with those on other samples from this context. The latest date (provided by OxA-11470) is taken to provide the most accurate date for this feature.

OxA–11470 2875 ±33 BP

$\delta^{13}C$: -23.2‰

Sample: WGF84 Group 2.22 [5L] II (B), submitted in March 2002 by N Elsden

Material: charcoal: *Prunus spinosa* (R Gale 2002)

Initial comment: as OxA-11469

Objectives: as OxA-11469

Calibrated date: *1σ:* 1120–1000 cal BC
2σ: 1190–930 cal BC

Final comment: see OxA-11469

OxA–11533 2964 ±37 BP

$\delta^{13}C$: -28.1‰

Sample: WGF80 Group 2.21 [180], submitted in March 2002 by N Elsden

Material: carbonised residue

Initial comment: a carbonised residue from an undiagnostic flint-tempered base sherd (FLIN1) from ditch A[120]. This feature contained a medium-sized assemblage of coarsely flint-tempered Bronze Age pottery, including a number of sherds with plain, flat rims. The sherd came from a discrete single feature, a V-profile ditch *c* 1m wide traced over *c* 52m, and measuring 0.50–0.85m deep.

Objectives: as OxA-11469

Calibrated date: *1σ:* 1260–1110 cal BC
2σ: 1290–1040 cal BC

Final comment: see OxA-11469

OxA–12288 6367 ±34 BP

$\delta^{13}C$: -26.9 ±0.2‰

Sample: WGF81 [142], submitted in December 2002 by N Elsden

Material: carbonised residue

Initial comment: from a pit containing charcoal, flintwork, and pottery - a discrete single feature. There are vessel links between [142] and [145]. Adhering to the interior of a Peterborough Ware Mortlake sub-style sherd.

Objectives: to refine the local dating of Peterborough Ware; to refine the date of the pits with Peterborough Ware from Wall Garden Farm; and to compare with the date from the possible cremation containing Peterborough Ware at CFL94 [2233]2.

Calibrated date: *1σ:* 5370–5310 cal BC
2σ: 5470–5300 cal BC

Final comment: N Elsden (20 February 2014), two statistically consistent radiocarbon measurements were obtained on this carbonised residue from a sherd of Peterborough Ware in the Mortlake sub-style. Although consistent, these measurements calibrate to the sixth millennium cal BC - considerably before the appearance of ceramics in Britain. It is probable therefore that this residue was contaminated by old carbon during burial, and that this has not been removed during laboratory processing (Hedges *et al* 1989; 1992).

Laboratory comment: English Heritage (2004), the two measurements on this sample are statistically consistent (T'=0.2; T'(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (6358 ±26 BP) calibrates to 5370–5310 cal BC at 68% confidence and 5470–5300 cal BC at 2σ (Reimer *et al* 2004).

References: Hedges *et al* 1989
Hedges *et al* 1992
Reimer *et al* 2004
Ward and Wilson 1978

OxA–12289 6347 ±37 BP

$\delta^{13}C$: -27.3 ±0.2‰

Sample: WGF81 [142], submitted in December 2002 by N Elsden

Material: carbonised residue

Initial comment: an autoduplicate of OxA-12288.

Objectives: as OxA-12288

Calibrated date: *1σ:* 5370–5300 cal BC
2σ: 5470–5220 cal BC

Final comment: see OxA-12288

Laboratory comment: see OxA-12288

Whitwell Quarry Long Cairn, Derbyshire

Location:	SK 532748 Lat. 53.16.02 N; Long. 01.12.08 W
Project manager:	I Wall (Cresswell Heritage Trust) A Chamberlain (University of Sheffield), 1989
Archival body:	Creswell Heritage Trust

Description: a damaged Neolithic trapezoidal long cairn enclosing two mortuary structures: one structure houses a single inhumation (subsequently enclosed by a circular cairn), while the other linear mortuary structure contains the disarticulated skeletal remains of about 15 individuals.

Objectives: the determinations OxA-4176, -4177, and -4326 were submitted as part one of a two-part dating strategy and established a very early date for the inhumations at this site. The further samples were submitted as part two to establish the period of use of the linear mortuary deposit; to establish the chronological relationship of the single inhumation and the linear mortuary deposit; and to establish the start and end date of funerary activity at the site.

Final comment: B Vyner and I Wall (2011), seven phases of activity were identified which extended over a period of between 120 and 270 years in the middle part of the fourth millennium cal BC, with subsequent disturbance to the cairn some 1500 years later in the early Bronze Age. The Neolithic finds comprised the remains of 17 individuals together with Carinated Bowl pottery and lithics which include a notable series of arrowheads found with the skeletal material.

Laboratory comment: English Heritage (2011), three human bone samples were dated at the Oxford Radiocarbon Accelerator Unit in 1993 (OxA-4176–7 and OxA-4326). The dating of PVA treated (OxA-4177) and untreated (OxA-4176 and OxA-4326; Bayliss *et al* 2013, 223–4) samples acted as a pilot study to determine whether contamination by water-soluble PVA could be removed successfully by the dating process. In the light of the re-dating of these samples, we believe these determinations (OxA-4176–7 and OxA-4326) should be considered unreliable.

In 2000–5, a further series of 17 samples was submitted for AMS radiocarbon dating. Following the identification of a problem with the ultrafiltration procedures undertaken as part of bone pre-treatment at Oxford in October 2002 (*see* Bronk Ramsey *et al* 2004a), samples were also submitted to the Centre for Isotope Research, Rijksuniversiteit Groningen. In 2004, the three samples originally submitted in 1993 were re-sampled and processed at both the ORAU and Rijksuniversiteit Groningen.

Laboratory comment: English Heritage (24 June 2014), six further samples from this site were dated after 2003 (GrA-27513, -27515, -27519, and OxA-14493–5).

References:	Bayliss *et al* 2013, 223–4 Chamberlain *et al* 1992 Vyner and Wall 2011

GrA–22551 4700 ±45 BP

δ^{13}C: -22.2 ±0.2‰

Sample: WQ-9 363, submitted on 6 March 2003 by A Chamberlain

Material: human bone (juvenile right femur) (A Chamberlain)

Initial comment: skeleton 363 from the centre of the collective inhumation area (linear mortuary deposit), but ‘floating’, ie not in a known stratigraphical relationship with other portions of the skeletal assemblage.

Objectives: the sample is a right femur, one of the bones from which the minimum number of individuals in the assemblage has been established. The sample is therefore of an individual distinct from other samples included in the analysis, and the radiocarbon determination will therefore assist in determining the period of use of the collective mortuary structure.

Calibrated date:	*1σ:* 3630–3370 cal BC *2σ:* 3640–3360 cal BC

Final comment: B Vyner and I Wall (2011), this sample helps to date the ‘floating’ people within the linear mortuary deposit.

GrA–22564 4905 ±45 BP

δ^{13}C: -21.6 ±0.2‰

Sample: WQ-9 456, submitted on 6 March 2003 by A Chamberlain

Material: human bone (adult right femur) (A Chamberlain)

Initial comment: from the centre of the linear mortuary deposit underneath slab 1.

Objectives: this sample is from phase 1 of the linear mortuary deposit and will therefore help to refine the dating precision when analysed statistically together with samples from phase 2 of the deposit.

Calibrated date:	*1σ:* 3710–3640 cal BC *2σ:* 3780–3630 cal BC

Final comment: B Vyner and I Wall (2011), this sample helps to date the linear mortuary deposit and mortuary structure 1.

GrA–27513 4875 ±40 BP

δ^{13}C: -21.1 ±0.2‰
δ^{15}N (diet): +10.0 ±0.2‰

Sample: W92A 957, submitted in 2004 by I Wall

Material: human bone (2g) (femur) (A Chamberlain 1993)

Initial comment: skeleton W92A 957 from the central inhumation in the oval cairn.

Objectives: the sample will date the mortuary deposit in the ±0.2 circular cairn. One previous date has been obtained on the skeleton: OxA-4177 provided a date of 5190 ±100 BP (4310–3770 cal BC at 2σ; Reimer *et al* 2004), is now considered to be unreliable.

Calibrated date: *1σ:* 3700–3630 cal BC
2σ: 3710–3540 cal BC

Final comment: B Vyner and I Wall (2011), this sample accurately represents the date of this skeleton, and therefore the date of the oval cairn.

Laboratory comment: English Heritage (2011), in addition to a sample of the femur from this woman (OxA-4177, OxA-14494, and GrA-27513), a bone fragment from the soil surrounding the inhumation (OxA-12763) was also chosen because it had not been treated with PVA and should thus act as a check on the effectiveness of the PVA removal. The four measurements are not statistically consistent (T′=9.6; T′(5%)=7.8; ν=3; Ward and Wilson 1978) suggesting that PVA contamination has not been completely removed. The measurements obtained in 2003 and 2005 are statistically consistent (T′=2.8; T′(5%)=6.0; ν=2; Ward and Wilson 1978) giving confidence in the removal of the PVA, their weighted mean (4927 ±21 BP) calibrates to 3765–3650 cal BC (2σ; Reimer *et al* 2004). This suggests the original measurement (OxA-4177) is inaccurate as the pretreatment failed to remove all the contamination. Chronological modelling of these results indicates this skeleton dates to *3760–3650 cal BC (95% probability;* fig 13; Vyner and Wall 2011).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–27515 4825 ±40 BP

δ*13C:* -21.4 ±0.2‰
δ*15N (diet):* +8.9 ±0.2‰

Sample: Burial 982, submitted in 2004 by I Wall

Material: human bone (2g) (femur) (A Chamberlain 1993)

Initial comment: from the linear mortuary deposit in phase IV or earlier, sealed by a trapezoidal cairn, although not by the slabs. The bone was probably exposed before burial.

Objectives: the sample will date the mortuary deposit and confirm the accuracy or otherwise of the previous measurement. The previous date obtained on the skeleton (OxA-4326) provided a date of 5115 ±70 BP (4050–3710 cal BC at 95% at 2σ; Reimer *et al* 2004), is now considered to be unreliable.

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3700–3520 cal BC

Final comment: B Vyner and I Wall (2011), this sample accurately represents the date of this skeleton, and therefore the date of the linear deposit.

Laboratory comment: English Heritage (2011), the measurements on the tibia (OxA-4326, OxA-14495, and GrA-27515) are not statistically consistent (T′=13.6; T′(5%)=6.0; ν=2; Ward and Wilson 1978), although this skeleton was not treated with PVA so this is not the reason for the inaccurate result. The measurements obtained in 2005 are statistically consistent (T′=1.1; T′(5%)=6.0; ν=1; Ward and Wilson 1978) giving confidence in their accuracy, their weighted mean (4858 ±25 BP) calibrates to 3695–3635 cal BC (2σ; Reimer *et al* 2004). This suggests the original measurement (OxA-4326) is inaccurate. Chronological modelling of these results indicates this skeleton dates to *3700–3630 cal BC (95% probability;* fig 13; Vyner and Wall 2011).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–27519 4985 ±40 BP

δ*13C:* -21.3 ±0.2‰
δ*15N (diet):* +9.2 ±0.2‰

Sample: Burial 659, submitted in 2004 by I Wall

Material: human bone (1.92g) (tibia) (A Chamberlain 1993)

Initial comment: from the linear mortuary deposit in phase IV or earlier, sealed by a trapezoidal cairn, although not by the slabs. The bone was probably exposed before burial.

Objectives: the sample will date the mortuary deposit and confirm the accuracy or otherwise of the previous measurement. The previous date obtained on the skeleton (OxA-4176) provided a date of 5380 ±90 BP (4370–3980 cal BC at 2σ; Reimer *et al* 2004), is now considered to be unreliable.

Calibrated date: *1σ:* 3800–3700 cal BC
2σ: 3940–3650 cal BC

Final comment: B Vyner and I Wall (2011), this sample accurately represents the date of this skeleton, and therefore the date of the linear deposit.

Laboratory comment: English Heritage (2011), the measurements on the tibia (OxA-4176, OxA-14493, and GrA-27519) are not statistically consistent (T′=21.6; T′(5%)=6.0; ν=2; Ward and Wilson 1978), although this skeleton was not treated with PVA so this is not the reason for the inaccurate result. The measurements obtained in 2005 are statistically consistent (T′=0.6; T′(5%)=6.0; ν=1; Ward and Wilson 1978) giving confidence in their accuracy, their weighted mean (4961 ±25 BP) calibrates to 3795–3660 cal BC (2σ; Reimer *et al* 2004). This suggests the original measurement (OxA-4176) is inaccurate. Chronological modelling of these results indicates this skeleton dates to *3780–3680 cal BC (95% probability;* fig 13; Vyner and Wall 2011).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–9646 4890 ±55 BP

δ*13C:* -24.8‰

Sample: WQ-9 SP187(a), submitted on 24 November 1999 by I Wall

Material: carbonised plant macrofossil (*Corylus* sp., hazelnut shell fragments) (I Tyers 1999)

Initial comment: from within a shallow feature in the passage which leads down to the linear mortuary deposit. The sample is from the primary context sealed by large limestone slabs as part of the structural sealing of the mortuary area. *See* OxA-9647 for a further measurement on another hazelnut shell from the same feature.

Objectives: within the passage leading to the linear mortuary deposit were two shallow circular cut features approximately 0.3m diameter and 0.2m deep. Both contained carbonised remains. This sample, the burnt residue from Feature 177, was more extensive. This sample provides an opportunity to date the phase of activity associated with the use of the passage and the later phase of burial within the linear mortuary deposit.

Calibrated date: *1σ:* 3710–3630 cal BC
2σ: 3790–3530 cal BC

Final comment: B Vyner and I Wall (2011), this sample helps to date mortuary structure 2.

Laboratory comment: English Heritage (2011), the replicate measurements on this sample are not statistically consistent (T′=4.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (4986 ±32 BP) calibrates to 3940–3660 cal BC at 2σ (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–9647 4960 ±50 BP

$\delta^{13}C$: -24.1‰

Sample: WQ-9 SP187(b), submitted on 24 November 1999 by I Wall

Material: carbonised plant macrofossil (*Corylus* sp., hazelnut shell fragments) (I Tyers 1999)

Initial comment: as OxA-9646

Objectives: as OxA-9646

Calibrated date: *1σ:* 3790–3660 cal BC
2σ: 3940–3640 cal BC

Final comment: see OxA-9646

Laboratory comment: English Heritage (2011), the replicate measurements on this sample are statistically consistent (T′=0.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (4974 ±42 BP) calibrates to 3940–3650 cal BC at 2σ (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–9648 4950 ±55 BP

$\delta^{13}C$: -26.0‰

Sample: WQ-9 SP42,58,190,179,192(a), submitted on 24 November 1999 by I Wall

Material: carbonised plant macrofossil (*Corylus* sp., hazelnut shell fragment) (I Tyers 1999)

Initial comment: from a series of floated samples (SP 42, 58, 190, 179, 192), recovered from the base of a pit which defined the eastern end of the linear mortuary deposit. The pit was sealed by slabs of limestone reducing the risk of intrusive charcoal from higher levels. *See* OxA-9649 for a further measurement on another hazelnut shell from the same pit.

Objectives: the charcoal was floated from samples recovered from the same deposit at the base of the pit to the east of linear mortuary deposit. Structural analysis demonstrated that there was modification to the linear mortuary structure where access to the burial area changed from the sides to the eastern end, the eastern access arrangements following the passage constructed as part of the rectangular cairn. As part of this change in access it is suggested that the timber was removed and the pit filled and sealed. The charcoal will provide a *terminus post quem* for the pit deposits and therefore an indication when access to the burial area followed the rectangular cairn passage.

Calibrated date: *1σ:* 3790–3650 cal BC
2σ: 3940–3640 cal BC

Final comment: B Vyner and I Wall (2011), this sample helps to date the pit sealed by limestone slabs at the eastern end of the mortuary structure.

Laboratory comment: English Heritage (2011), the replicate measurements on this sample are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (4947 ±32 BP) calibrates to 3940–3660 cal BC at 2σ (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–9649 4960 ±55 BP

$\delta^{13}C$: -26.4‰

Sample: WQ-9 SP42,58,190,179,192(b), submitted on 24 November 1999 by I Wall

Material: carbonised plant macrofossil (*Corylus* sp., hazelnut shell fragments) (I Tyers 1999)

Initial comment: as OxA-9648

Objectives: as OxA-9648

Calibrated date: *1σ:* 3800–3650 cal BC
2σ: 3940–3640 cal BC

Final comment: see OxA-9648

Laboratory comment: English Heritage (2011), the replicate measurements on this sample are statistically consistent (T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (4984 ±35 BP) calibrates to 3940–3660 cal BC at 2σ (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–10214 5035 ±40 BP

$\delta^{13}C$: -23.5‰

Sample: SP 187 (a), submitted on 24 November 1999 by I Wall

Material: carbonised plant macrofossil (*Corylus* sp.; hazelnut shell fragments) (I Tyers 1999)

Initial comment: a replicate of OxA-9646.

Objectives: as OxA-9646

Calibrated date: *1σ:* 3950–3770 cal BC
2σ: 3960–3700 cal BC

Final comment: see OxA-9646

Laboratory comment: see OxA-9646

OxA–10215 4945 ±40 BP

$\delta^{13}C$: -26.7‰

Sample: SP42, 58, 190, 179, 192 (a), submitted on 24 November 1999 by I Wall

Material: carbonised plant macrofossil (*Corylus* sp.; hazelnut shell fragments) (I Tyers 1999)

Initial comment: a replicate of OxA-9648.

Objectives: as OxA-9648

Calibrated date: *1σ:* 3780–3650 cal BC
2σ: 3800–3640 cal BC

Final comment: see OxA-9648

Laboratory comment: see OxA-9648

OxA–10216 5000 ±45 BP

$\delta^{13}C$: -27.2‰

Sample: SP 42, 58, 190, 179, 192 (b), submitted on 24 November 1999 by I Wall

Material: carbonised plant macrofossil (*Corylus* sp.; hazelnut shell fragments) (I Tyers 1999)

Initial comment: a replicate of OxA-9649.

Objectives: as OxA-9648

Calibrated date: *1σ:* 3910–3700 cal BC
2σ: 3950–3660 cal BC

Final comment: see OxA-9648

Laboratory comment: see OxA-9648

OxA–10219 5005 ±75 BP

$\delta^{13}C$: -24.1‰

Sample: SP 187 (b), submitted on 24 November 1999 by I Wall

Material: carbonised plant macrofossil (*Corylus* sp.; hazelnut shell fragments) (I Tyers 1999)

Initial comment: a replicate of OxA-9647.

Objectives: as OxA-9646

Calibrated date: *1σ:* 3950–3700 cal BC
2σ: 3970–3640 cal BC

Final comment: see OxA-9646

Laboratory comment: see OxA-9647

OxA–12133 4770 ±27 BP

$\delta^{13}C$: -21.0‰
$\delta^{15}N$ *(diet):* +10.3‰
C/N ratio: 3.5

Sample: WQ-9 ?270, submitted on 1 August 1999 by A Chamberlain

Material: human bone (adult, right femur) (A Chamberlain 1999)

Initial comment: as GrA-22551

Objectives: as GrA-22551

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3640–3380 cal BC

Final comment: see GrA-22551

OxA–12134 4931 ±28 BP

$\delta^{13}C$: -21.1‰
$\delta^{15}N$ *(diet):* +10.1‰
C/N ratio: 3.3

Sample: WQ-9 394, submitted on 7 August 1999 by A Chamberlain

Material: human bone (tooth enamel and dentine, crowns of human developing permanent upper and lower teeth) (A Chamberlain 1999)

Initial comment: from the western end of the collective inhumation area, and in phase 1 of the deposit as the sample is from below slab 4.

Objectives: the sample is from phase 1 of the linear mortuary deposit and will therefore help to refine the dating precision when analysed statistically together with samples from phase 2 of the deposit.

Calibrated date: *1σ:* 3710–3650 cal BC
2σ: 3780–3640 cal BC

Final comment: B Vyner and I Wall (2011), this sample has helped to date the western end of the linear mortuary deposit under slab 4, and mortuary structure 1.

OxA–12135 4984 ±28 BP

$\delta^{13}C$: -21.0‰
$\delta^{15}N$ *(diet):* +9.7‰
C/N ratio: 3.3

Sample: WQ-9 778, submitted on 1 August 1999 by A Chamberlain

Material: human bone (adult, right femur) (A Chamberlain 1999)

Initial comment: skeleton 778 from the centre of the collective inhumation area, and in phase 1 of the deposit as the sample is from below slab 2.

Objectives: as OxA-12134

Calibrated date: *1σ:* 3800–3700 cal BC
2σ: 3910–3690 cal BC

Final comment: B Vyner and I Wall (2011), this sample has helped to date the western end of the linear mortuary deposit under slab 2, and mortuary structure 1.

OxA–12758 3677 ±31 BP

$\delta^{13}C$: -20.9‰

Sample: WQ-9 865, submitted on 1 August 1999 by A Chamberlain

Material: animal bone: *Sus* sp., *scrofa* (left or right ulna) (P Collins 1999)

Initial comment: from the matrix infill of the trapezoidal cairn, adjacent to the outer kerb of the circular cairn. *See* OxA-12759 for a further measurement from the same pig.

Objectives: this sample is from a well-stratified position within the matrix fill of the cairn, and is also presumed to post date the mortuary deposit in the circular cairn. Thus the sample will date the final phase of completion of the cairn structures.

Calibrated date: *1σ:* 2140–1980 cal BC
2σ: 2200–1950 cal BC

Final comment: B Vyner and I Wall (2011), the pig bones represent later Bronze Age activity on the site.

Laboratory comment: English Heritage (2011), the two measurements on this pig are statistically consistent (T′=1.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and so a weighted mean (3756 ±29 BP) can be taken before calibration (2140–1970 cal BC at 2σ; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–12759 3673 ±38 BP

δ¹³C: -19.4‰

Sample: WQ-9 865, submitted on 1 August 1999 by A Chamberlain

Material: animal bone: *Sus* sp., left or right ulna of *Sus scrofa* (P Collins 1999)

Initial comment: as OxA-12758

Objectives: as OxA-12758

Calibrated date: *1σ:* 2140–1970 cal BC
2σ: 2200–1940 cal BC

Final comment: see OxA-12758

Laboratory comment: see OxA-12758

OxA–12760 4725 ±33 BP

δ¹³C: -20.7‰
δ¹⁵N (diet): +10.2‰
C/N ratio: 3.4

Sample: WQ-9 214, submitted on 1 August 1999 by A Chamberlain

Material: human bone (adult, right femur) (A Chamberlain 1999)

Initial comment: from the eastern end of the collective inhumation area, but 'floating', ie not in a known stratigraphical relationship with other portions of the skeletal assemblage.

Objectives: as GrA-22551

Calibrated date: *1σ:* 3630–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: see GrA-22551

OxA–12761 4933 ±33 BP

δ¹³C: -20.8‰
δ¹⁵N (diet): +9.2‰
C/N ratio: 3.3

Sample: WQ-9 374, submitted on 1 August 1999 by A Chamberlain

Material: human bone (adult, right femur) (A Chamberlain 1999)

Initial comment: skeleton 374 from the western end of the collective inhumation area, but 'floating'.

Objectives: to determine the period of use of the collective mortuary structure.

Calibrated date: *1σ:* 3750–3650 cal BC
2σ: 3790–3640 cal BC

Final comment: see GrA-22551

OxA–12762 4894 ±33 BP

δ¹³C: -20.8‰
δ¹⁵N (diet): +9.7‰
C/N ratio: 3.3

Sample: WQ-9 430, submitted on 1 August 1999 by A Chamberlain

Material: human bone (adult, right femur) (A Chamberlain 1999)

Initial comment: as OxA-12761. The surface of the bone shows considerable exfoliation and/or weathering (possible chemically-induced) and is therefore possible that the bone was exposed to surface weathering prior to burial.

Objectives: as OxA-12761

Calibrated date: *1σ:* 3710–3640 cal BC
2σ: 3720–3630 cal BC

Final comment: see GrA-22551

OxA–12763 4925 ±38 BP

δ¹³C: -20.4‰

Sample: WQ-9 957, submitted on 1 August 1999 by A Chamberlain

Material: human bone (undiagnostic fragments, presumed to be human bone because of their proximity to human skeleton) (A Chamberlain 1999)

Initial comment: as GrA-27513

Objectives: as GrA-27513

Calibrated date: *1σ:* 3720–3650 cal BC
2σ: 3790–3640 cal BC

Final comment: see GrA-27513

Laboratory comment: English Heritage (2011), in addition to a sample of the femur from this woman (OxA-4177, OxA-14494, and GrA-27513), a bone fragment from the soil surrounding the inhumation (OxA-12763) was also chosen because it had not been treated with PVA and should thus act as a check on the effectiveness of the PVA removal. The four measurements are not statistically consistent (T′=9.6; T′(5%)=7.8; ν=3; Ward and Wilson 1978) suggesting that PVA contamination has not been completely removed. The measurements obtained in 2003 and 2005 are statistically consistent (T′=2.8; T′(5%)=6.0; ν=2; Ward and Wilson 1978) giving confidence in the removal of the PVA, their weighted mean (4927 ±21 BP) calibrates to 3765–3650 cal BC (2σ; Reimer *et al* 2004). This suggests the original measurement (OxA-4177) is inaccurate as the pretreatment failed to remove all the contamination. Chronological modelling of these results indicates this skeleton dates to *3760–3650 cal BC (95% probability;* fig 13; Vyner and Wall 2011).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–12764 4966 ±50 BP

δ¹³C: -21.0‰
δ¹⁵N (diet): +8.2‰
C/N ratio: 3.3

Sample: WQ-9 755, submitted on 1 August 1999 by A Chamberlain

Material: human bone (juvenile, right femur) (A Chamberlain 1999)

Initial comment: as OxA-12135, but underneath slab 1.

Objectives: as OxA-12134

Calibrated date: *1σ:* 3800–3660 cal BC
2σ: 3940–3640 cal BC

Final comment: see GrA-22564

OxA–12765 4961 ±31 BP

δ¹³C: -20.6‰
δ¹⁵N (diet): +9.4‰
C/N ratio: 3.2

Sample: WQ-9 701, submitted on 1 August 1999 by A Chamberlain

Material: human bone (adult, right femur) (A Chamberlain 1999)

Initial comment: from the centre of the collective inhumation area, and in phase 1 of the deposit as the sample is from below slab 1.

Objectives: to help refine the dating precision when analysed statistically together with samples from phase 2 of the deposit. The sample is a right femur, one of the bones from which the minimum number of individuals in the assemblage has been established. The sample is therefore of an individual distinct from other samples included in the analysis, and the radiocarbon determination will therefore assist in determining the period of use of the collective mortuary structure.

Calibrated date: *1σ:* 3780–3700 cal BC
2σ: 3800–3650 cal BC

Final comment: see GrA-22564

OxA–12766 4747 ±34 BP

δ¹³C: -20.9‰
δ¹⁵N (diet): +8.8‰
C/N ratio: 3.2

Sample: WQ-9 229, submitted on 1 August 1999 by A Chamberlain

Material: human bone (adult, right femur) (A Chamberlain 1999)

Initial comment: skeleton 229 from the centre of the collective inhumation area, and in phase 2 of the linear mortuary deposit above slab 1.

Objectives: this sample is from phase 2 of the linear mortuary deposit and will therefore help to refine the dating precision when analysed statistically together with samples from phase 1 of the deposit.

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: B Vyner and I Wall (2011), continued deposition of skeletal remains continued after the construction of the trapezoidal cairn. A total of 122 bone fragments can be securely related to this later funerary phase (mortuary structure 2), and it is dated by this skeleton 229 and skeleton 330 (OxA-12767).

OxA–12767 4965 ±32 BP

δ¹³C: -20.6‰
δ¹⁵N (diet): +9.7‰
C/N ratio: 3.3

Sample: WQ-9 330, submitted on 1 August 1999 by A Chamberlain

Material: human bone (juvenile or young adult, right femur) (A Chamberlain 1999)

Initial comment: skeleton 330 from the centre of the collective inhumation area, and in phase 2 of the linear mortuary deposit above slab 1.

Objectives: as OxA-12766

Calibrated date: *1σ:* 3780–3700 cal BC
2σ: 3900–3650 cal BC

Final comment: see OxA-12766

OxA–14493 4946 ±0 BP

δ¹³C: -20.7 ±0.2‰
δ¹⁵N (diet): +9.8 ±0.3‰
C/N ratio: 3.3

Sample: Burial 659, submitted in 2004 by I Wall

Material: human bone (tibia) (A Chamberlain 1993)

Initial comment: from the linear mortuary deposit in phase IV or earlier, sealed by a trapezoidal cairn, although not by the slabs. The bone was probably exposed before burial.

Objectives: the sample will date the mortuary deposit and confirm the accuracy or otherwise of the previous measurement. The previous date obtained on the skeleton

(OxA-4176) provided a date of 5380 ±90 BP (4370–3980 cal BC at 2σ; Reimer *et al* 2004), is now considered to be unreliable.

Calibrated date: *1σ:* 3710–3700 cal BC
2σ: 3750–3695 cal BC

Final comment: B Vyner and I Wall (2011), this sample accurately represents the date of this skeleton, and therefore the date of the linear deposit.

Laboratory comment: English Heritage (2011), the measurements on the tibia (OxA-4176, OxA-14493, and GrA-27519) are not statistically consistent (T′=21.6; T′(5%)=6.0; ν=2; Ward and Wilson 1978), although this skeleton was not treated with PVA so this is not the reason for the inaccurate result. The measurements obtained in 2005 are statistically consistent (T′=0.6; T′(5%)=6.0; ν=1; Ward and Wilson 1978) giving confidence in their accuracy, their weighted mean (4961 ±25 BP) calibrates to 3795–3660 cal BC (2σ; Reimer *et al* 2004). This suggests the original measurement (OxA-4176) is inaccurate.

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–14494 4961 ±33 BP

$\delta^{13}C$*:* -20.2 ±0.2‰
$\delta^{15}N$ *(diet):* +11.0 ±0.3‰
C/N ratio: 3.3

Sample: W92A 957, submitted in 2004 by I Wall

Material: human bone (femur) (A Chamberlain 1993)

Initial comment: a replicate of GrA-27513. Skeleton W92A 957 from the central inhumation in the oval cairn.

Objectives: the sample will date the mortuary deposit in the circular cairn. One previous date has been obtained on the skeleton: OxA-4177 provided a date of 5190 ±100 BP (4310–3770 cal BC at 2σ; Reimer *et al* 2004), is now considered to be unreliable.

Calibrated date: *1σ:* 3780–3690 cal BC
2σ: 3900–3650 cal BC

Final comment: B Vyner and I Wall (2011), this sample accurately represents the date of this skeleton, and therefore the date of the oval cairn.

Laboratory comment: English Heritage (2011), in addition to a sample of the femur from this woman (OxA-4177, OxA-14494, and GrA-27513), a bone fragment from the soil surrounding the inhumation (OxA-12763) was also chosen because it had not been treated with PVA and should thus act as a check on the effectiveness of the PVA removal. The four measurements are not statistically consistent (T′=9.6; T′(5%)=7.8; ν=3; Ward and Wilson 1978) suggesting that PVA contamination has not been completely removed. The measurements obtained in 2003 and 2005 are statistically consistent (T′=2.8; T′(5%)=6.0; ν=2; Ward and Wilson 1978) giving confidence in the removal of the PVA, their weighted mean (4927 ±21 BP) calibrates to 3765–3650 cal BC (2σ; Reimer *et al* 2004). This suggests the original measurement (OxA-4177) is inaccurate as the pretreatment failed to remove all the contamination.

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–14495 4879 ±32 BP

$\delta^{13}C$*:* -20.2 ±0.2‰
$\delta^{15}N$ *(diet):* +9.8 ±0.3‰
C/N ratio: 3.3

Sample: Burial 982, submitted in 2004 by I Wall

Material: human bone (femur) (A Chamberlain 1993)

Initial comment: from the linear mortuary deposit in phase IV or earlier, sealed by a trapezoidal cairn, although not by the slabs. The bone was probably exposed before burial.

Objectives: the sample will date the mortuary deposit and confirm the accuracy or otherwise of the previous measurement. The previous date obtained on the skeleton (OxA-4326) provided a date of 5115 ±70 BP (4050–3710 cal BC at 2σ; Reimer *et al* 2004), is now considered to be unreliable.

Calibrated date: *1σ:* 3700–3640 cal BC
2σ: 3710–3630 cal BC

Final comment: B Vyner and I Wall (2011), this sample accurately represents the date of this skeleton, and therefore the date of the linear deposit.

Laboratory comment: English Heritage (2011), the measurements on the tibia (OxA-4326, OxA-14495, and GrA-27515) are not statistically consistent (T′=13.6; T′(5%)=6.0; ν=2; Ward and Wilson 1978), although this skeleton was not treated with PVA so this is not the reason for the inaccurate result. The measurements obtained in 2005 are statistically consistent (T′=1.1; T′(5%)=6.0; ν=1; Ward and Wilson 1978) giving confidence in their accuracy, their weighted mean (4858 ±25 BP) calibrates to 3695–3635 cal BC (95% at 2σ; Reimer *et al* 2004). This suggests the original measurement (OxA-4326) is inaccurate.

References: Reimer *et al* 2004
Ward and Wilson 1978

Yarnton: Iron Age and Roman, Oxfordshire

Location: *see* individual sites

Project manager: G Hey (Oxford Archaeology), 1989–98

Description: the Yarnton-Cassington project area is situated in the Upper Thames valley, 8km north of Oxford. It lies on the north bank of the Thames, on the floodplain and the higher second gravel terrace.

Objectives: the primary aim of the scientific dating programme was to date a group of crouched inhumations on the edge of the Iron Age settlement and to understand the sequence of deposits discovered on the adjacent floodplain in relation to the Iron Age and Roman settlement evidence and to landscape change in the area over this period of time.

Final comment: G Hey (12 October 2004), the series of radiocarbon dates for Iron Age and Roman Yarnton has fundamentally changed our perception of Yarnton in the Iron Age period. It has provided middle Iron Age dates for crouched inhumations in a cemetery near to the settlement, a date that could not really have been predicted given the rarity of cemeteries of this date in Britain. The series also demonstrated the extent of Iron Age use of the floodplain, with wooden and stone causeways being constructed, some associated with the ritual deposition of cattle and a small number of metal objects, one of which had been an heirloom since the middle Bronze Age period. In addition, the dates enable landscape and vegetation change to be reconstructed from 700 BC to AD 400.

References: Hey *et al* 1999
Hey *et al* 2011

Yarnton Iron Age and Roman: causeways, site 9, Oxfordshire

Location: SP 474109
Lat. 51.47.39 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeological Unit), 1998

Archival body: Oxford County Museums Service

Description: site 9, 0.5ha in size, was dug on the Yarnton floodplain across a river channel and on its north bank. It was excavated in order to examine channel crossings and associated features on the bank.

Objectives: to provide an absolute chronology for a sequence of channel crossings on this site, and relate them to the occupation sequence revealed on the settlement sites.

Final comment: G Hey (12 October 2004), the radiocarbon dating the results produced later dates (in the middle Iron Age) for the construction of a wooden crossing place, for a subsequent limestone causeway and associated deposition of animal bone. This is surprising considering the proximity of the causeways to Bronze Age activity and their distance (600m) from the Iron Age settlement site. It indicates the extent of middle Iron Age activity on the floodplain and possible ritual deposition in these locations. The middle Iron Age plug within the middle Bronze Age spearhead indicates the curation of artefacts of significance over a considerable period of time.

References: Hey *et al* 2011

GU–5852 2300 ±60 BP

$\delta^{13}C$: -27.1‰

Sample: YFPB98 18006 (W2/1), submitted on 7 March 2001 by G Hey

Material: wood (waterlogged): *Quercus* sp., post/plank: 82 rings including 25 sapwood rings (M Taylor)

Initial comment: the sample was a horizontal piece associated with a stone causeway. It probably came from a handrail or similar. It was located beneath organic silty sands, which had washed of a sand-and-gravel causeway and overlay the lowest organic sediments in the channel.

Objectives: the causeway structure across the channel on Yarnton floodplain was remarkable. It was constructed of tons of stone, which had been brought over a distance of more than 5 miles, and seems very unlikely to have had a mundane purpose. The wooden structures, which appear to be associated with it are of particular interest as they support the view of a special function for the causeway. It is important to be able to relate this evidence of activity to the significant body of settlement and landscape data from the Bronze Age to the Iron Age, which is emerging from the Yarnton Cassington Project.

Calibrated date: *1σ:* 410–260 cal BC
2σ: 490–200 cal BC

Final comment: G Hey (12 October 2004), the date of the wood associated with the stone causeway was later than anticipated, but indicates the extent of Iron Age use of the floodplain from the Iron Age settlement 600m away on the gravel terrace. It may help to date the longevity of ceremonial and ritual use of the floodplain.

GU–5853 2330 ±60 BP

$\delta^{13}C$: -25.7‰

Sample: YFPB98 18031 (W26), submitted on 7 March 2001 by G Hey

Material: wood (waterlogged): *Quercus* sp., post: 50 rings including 31 sapwood rings and bark (M Taylor)

Initial comment: the sample was an upright associated with a stone causeway, which was overlain by a horizontal timber (originally thought to be attached but later thought probably not). It probably came from a handrail or similar. It was located beneath organic silty sands, which had washed of a sand-and-gravel causeway and overlay the lowest organic sediments in the channel.

Objectives: as GU-5852

Calibrated date: *1σ:* 410–370 cal BC
2σ: 730–210 cal BC

Final comment: see GU-5852

GU–5883 2240 ±50 BP

$\delta^{13}C$: -26.7‰

Sample: YFPB98 18105 W36, submitted on 30 November 2001 by D Stansbie

Material: wood (waterlogged): *Quercus* sp., sapwood and bark (123g) (M Taylor)

Initial comment: the sample came from part of a timber post cutting a stone causeway over a palaeochannel. It was sealed by a layer of sand and gravel, which represented a later phase of the causeway.

Objectives: the dating of this sample will provide a construction date for the timber phase of the causeway and a *terminus post quem* for the sand and gravel phase. This information will help to date the wider sequence of channel deposits and structures found in the area.

Calibrated date: *1σ:* 390–200 cal BC
2σ: 410–170 cal BC

Final comment: G Hey (12 October 2004), the date of the wood associated with the stone causeway was later than anticipated, but indicates the extent of Iron Age use of the floodplain from the Iron Age settlement 600m away on the gravel terrace. It may help to date the longevity of ceremonial and ritual use of the floodplain.

OxA–8703 2175 ±35 BP

$\delta^{13}C$: -20.8‰

Sample: YFPB98 13263, submitted on 26 February 1999 by C Bell

Material: animal bone: *Bos* sp., cattle humerus shaft (S Davis)

Initial comment: the sample comprises a bone which was incorporated into the surface of stone causeway thought to be mid to late Bronze Age in date. The causeway lay buried beneath over a metre of Roman and medieval alluvium.

Objectives: to establish the date of this deposit of animal bone and of the chronology of the stone structure. This information would then also be used to provide evidence of the wider stratigraphic sequence of channel deposits and structures found in this area.

Calibrated date: *1σ:* 360–170 cal BC
2σ: 370–110 cal BC

Final comment: G Hey (12 October 2004), the date of the animal bone associated with the stone causeway is consistent with that of the wood and is later than anticipated. The unusual character of animal bone deposition, with the vast majority of bone coming from the right sides of cattle, indicates ceremonial and ritual use of the floodplain. The result provides a date for this activity in the middle Iron Age.

OxA–8704 2185 ±40 BP

$\delta^{13}C$: -21.2‰

Sample: YFPB98 13221, submitted on 26 February 1999 by C Bell

Material: animal bone: *Bos* sp., cattle radius (S Davis)

Initial comment: the sample comprises a bone taken from a dense concentration of animal bone which lay over the surface of a stone causeway thought to be mid to late Bronze Age in date.

Objectives: to establish the date of this deposit of animal bone and its chronological relationship with the stone causeway and settlement activity in this area. This information would then also be used to provide evidence of the wider stratigraphic sequence of channel deposits and structures found in this area.

Calibrated date: *1σ:* 360–180 cal BC
2σ: 380–110 cal BC

Final comment: see OxA-8703

OxA–9377 2275 ±50 BP

$\delta^{13}C$: -26.6‰

Sample: YFPB98 13266, submitted on 26 February 1999 by C Bell

Material: waterlogged plant macrofossils (M Robinson)

Initial comment: the sample comprises waterlogged plant material recovered from the socket of a bronze spearhead. The spearhead was found beneath a stone causeway thought to be mid to late Bronze Age in date.

Objectives: the date is required to define the date of this bronze implement in order to provide evidence of the chronology and typology Bronze Age metalwork in this region. This information would also be used to provide evidence relating to the date of construction of the stone causeway, which must post-date the deposition of this artefact.

Calibrated date: *1σ:* 400–230 cal BC
2σ: 410–200 cal BC

Final comment: G Hey (12 October 2004), the middle Iron Age date of the material in this spearhead is entirely consistent with the date of the construction of the stone causeway and supports the theory that the object was deposited as a foundation deposit. It is, however, an extraordinary result given the unequivocal early to mid Bronze Age date of the spearhead. This indicates that this object was kept as an heirloom for over 1,000 years, before an occasion arose for appropriate deposition in the ground.

OxA–10628 2256 ±35 BP

$\delta^{13}C$: -26.0‰

Sample: YFPB98: 8192 (a) W172, submitted on 26 February 1999 by C Bell

Material: wood (waterlogged): *Salix/Populus sp.*, immature (M Taylor)

Initial comment: the sample comprises fragments of brushwood debris, which were sealed beneath a stone causeway thought to be mid to late Bronze Age in date.

Objectives: the date is required to provide a *terminus post quem* for the construction of the stone causeway. This information would then also be used to provide evidence of the wider stratigraphic sequence of channel deposits and structures found in this area of the channel.

Calibrated date: *1σ:* 390–230 cal BC
2σ: 400–200 cal BC

Final comment: G Hey (12 October 2004), the result from this sample shows that the earliest surviving structure associated with the channel crossing is middle Iron Age in date, and that there may be only a short period of time between its use and the construction of the limestone causeway. This is later than anticipated.

OxA–10629 2198 ±35 BP

$\delta^{13}C$: -27.2‰

Sample: YFPB98 18136 W168, submitted on 26 February 1999 by C Bell

Material: wood (waterlogged): *Alnus glutinosa*, /*Corylus avellana* (M Taylor)

Initial comment: the sample comprises a wooden stake from a line of upright stakes running beneath a stone causeway thought to be mid to late Bronze Age in date. These stakes appeared to be part of an early wooden structure, which pre-dated the stone causeway. This structure laid buried beneath over a metre of Roman and medieval alluvium.

Objectives: the date is required to establish the date of this early wooden structure and also to provide evidence of its chronological relationship with the stone causeway and other wooden structures found in this channel. This information would then also be used to provide evidence of the wider stratigraphic sequence of deposits found in this area of the channel.

Calibrated date: *1σ:* 360–190 cal BC
2σ: 380–160 cal BC

Final comment: see OxA-10628

Yarnton Iron Age and Roman: floodplain section A, Oxfordshire

Location: SP 478110
Lat. 51.47.43 N; Long. 01.18.25 W

Project manager: G Hey (Oxford Archaeology)

Archival body: Oxford County Museums Service

Description: an area 20m x 20m was excavated across a palaeochannel to the south of a Bronze Age settlement site on the floodplain (Hey 2004, fig. 11.4), revealing a sequence of deposits which dated from the early Holocene to the medieval period. These included channel sediments, wooden structures, and dumps of woodworking debris.

Objectives: the aim of the programme was to date the sequence of deposits in order to understand the chronological relationship between the wooden structures and nearby settlement, and to reconstruct the landscape development of the site as revealed by environmental analysis.

Final comment: G Hey (12 October 2004), although the radiocarbon dates provide support for the hypothesis that there was activity in the adjacent river channel during the life of the middle and late Bronze Age settlement, it is apparent that most of the wooden structures and wood working debris recovered were early Iron Age in date. This is a surprising result, but demonstrates the extensive use of the floodplain during the Iron Age by the inhabitants of the settlement 400m away on the gravel terrace. A useful date was provided for cessation of this activity in this area by the mid to late Iron Age and before the onset of alluviation.

Laboratory comment: English Heritage (21 May 2014), one further radiocarbon date was obtained prior to 1993 and is published in Bayliss *et al* (2013, 235–6; OxA-3644). Five further dates were published in Bayliss *et al* (2015, 237–8; GU-5715–8 and UB-4060).

References:
Bayliss *et al* 2013, 235–6
Bayliss *et al* 2015
Hey *et al* 2011
Hey 2004

OxA–10711 2098 ±39 BP

$\delta^{13}C$: -25.8‰

Sample: YFP92A 37, submitted on 7 March 2001 by G Hey

Material: waterlogged plant macrofossils (seeds: *Carex* spp., *Iris pseudacorius, Rumex maritimus,* and *Polyonum persicaria*) (M Robinson)

Initial comment: the sample came from the upper layer of organic sediment within a palaeochannel on Yarnton floodplain (section A, context 37). The material was deposited with silt in the slow-moving channel, which cut through calcareous gravel.

Objectives: the sediment from which this sample derives is part of a sequence of deposits, which provide valuable evidence for the surrounding environment during the prehistoric period, and overlies episodes of woodworking and river-crossing activity. It is important to be able this evidence to the significant body of settlement and landscape data from the Bronze Age to the Iron Age, which is emerging from the Yarnton Cassington Project.

Calibrated date: *1σ:* 180–40 cal BC
2σ: 350 cal BC–cal AD 1

Final comment: G Hey (12 October 2004), this mid to late Iron Age result provides a very useful date at the end of the use of the wooden structures in the channel and the deposition of woodworking debris, and the onset of alluviation.

UB–4676 2424 ±16 BP

$\delta^{13}C$: -27.7 ±0.2‰

Sample: YFP92 112 (W64), submitted on 7 March 2001 by G Hey

Material: wood (waterlogged): *Quercus* sp., (split) roundwood, including sapwood (M Taylor)

Initial comment: the sample came from a wooden structure, which crossed the palaeochannel at section A (structure 112).

Objectives: the structure is one of the latest events relating to human use of this channel. Other timbers from this structure have already been dated. It is important to be able to relate this evidence of activity to the significant body of settlement and landscape data from the Bronze Age to the Iron Age, which is emerging from the Yarnton Cassington Project.

Calibrated date: *1σ:* 540–410 cal BC
2σ: 730–405 cal BC

Final comment: G Hey (12 October 2004), this result in combination with UB-4060 (2465 ±18 BP), and its stratigraphic position, suggests that the wooden structure is early Iron Age in date. The result is surprising, given the proximity of Bronze Age settlement, and suggests that the structure was associated with the Iron Age settlement 400m away on the gravel terrace.

Laboratory comment: English Heritage (2002), structure 112 was driven through silts and has produced four statistically inconsistent radiocarbon determinations (OxA-3644, UB-4060, UB-4676, and UB-4677; T′=116.9; T′(5%)=7.8; ν=3; Ward and Wilson 1978). OxA-3644 is slightly earlier than UB-4060 (2465 ±18 BP, 760–415 cal BC at 2σ) and UB-

4677 (2654 ±16 BP, 830–795 cal BC at English Heritage; Reimer *et al* 2004), which are statistically consistent (T′=2.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978), and this may also be reused, although there could be an old-wood offset as the part of the oak tree dated is not known. UB-4677 is significantly earlier than the other three posts and is in poor agreement with its stratigraphic position (A=0.0%); it was also probably reused. The structure appears to be early Iron Age in date.

References: Reimer *et al* 2004
Ward and Wilson 1978

UB–4677 2654 ±16 BP

$\delta^{13}C$: -26.6 ±0.2‰

Sample: YFP92 112 (W70), submitted on 7 March 2001 by G Hey

Material: wood (waterlogged): *Quercus* sp., (split), roundwood including sapwood (M Taylor)

Initial comment: as UB-4676

Objectives: as UB-4676

Calibrated date: *1σ:* 815–800 cal BC
2σ: 830–795 cal BC

Final comment: G Hey (12 October 2004), this result was in line with expectations, but given the other results from timbers which form part of the structure, it is probable that it was a re-used timber. The early Iron Age result provided by other samples and the stratigraphic position is surprising, given the proximity of Bronze Age settlement, and suggests that the structure was associated with the Iron Age settlement 400m away on the gravel terrace.

Laboratory comment: see UB-4676

Yarnton Iron Age and Roman: floodplain section B, Oxfordshire

Location: SP 47361084
Lat. 51.47.38 N; Long. 01.18.48 W

Project manager: G Hey (Oxford Archaeological Unit), 1992

Archival body: Oxfordshire County Museum Service

Description: this was a section excavated through a palaeochannel on the floodplain between two sites with Neolithic and Bronze Age features. The channel was once an open watercourse; part of the braided river system of the Thames, but it silted up gradually through time.

Objectives: the objectives of the scientific dating programme for the floodplain channel were: 1. to date the evidence of landscape change which had been retrieved from the sedimentary sequence. 2. to relate this evidence of landscape change to the settlement evidence from the gravel terrace; 3. as part of a post-graduate research programme at Oxford University, to validate the accuracy of OSL dates against an independent archaeological sequence and an independent series of radiocarbon measurements (Rees-Jones 1995).

Final comment: G Hey (12 October 2004), the results show that organic sediment began to be deposited in this part of the old river channel from the middle Iron Age and continued to accumulate into the early Roman period. More inorganic sediment was deposited in the later Roman period. These dates are inconsistent with those retrieved from Section A, further downstream and indicate the complexity of channel incision and deposition at Yarnton. At section A, middle Bronze Age dates were obtained from early sediment, and wooden structures and woodworking debris were preserved from the late Bronze Age and into the Iron Age period. This may be associated with a build up of debris from the adjacent settlement and the Iron Age channel crossings. It can be suggested that the channel at section B was more active and the channel here was scoured out into the Iron Age.

References: Hey *et al* 2011
Rees-Jones 1995

OxA–10691 2257 ±37 BP

$\delta^{13}C$: -25.8‰

Sample: YFP92 B/9, submitted on 7 March 2001 by G Hey

Material: waterlogged plant macrofossils (seeds, mixed aerial species) (M Robinson)

Initial comment: the sample came from the lowest layer of organic sediment within a palaeochannel on Yarnton floodplain (section B, context 9). The material was deposited with silt in the slow moving channel, which cut through calcareous gravel.

Objectives: the sediment from which this sample derives provides valuable evidence for the surrounding environment during the prehistoric period. It is important to be able to relate this evidence to the significant body of settlement and landscape data from the Bronze Age to the Iron Age, which is emerging from the Yarnton Cassington Project. Its date will also enable an assessment of the period at which the water table began to rise on the Thames floodplain, and from which sediment began to be deposited within the channels. This has implications for understanding the effect of human interference in the landscape and the impact that a changing environment had on settlement and land use patterns.

Calibrated date: *1σ:* 390–230 cal BC
2σ: 400–200 cal BC

Final comment: G Hey (12 October 2004), the result shows that organic sediment began to accumulate in this part of the channel in the middle Iron Age, somewhat later than anticipated. This indicates the complexity of channel incision and deposition at Yarnton. Bronze Age dates have been obtained from early sediment further along this same channel in section A, and wooden structures and woodworking debris dating from the late Bronze Age have been preserved. It can be suggested that the channel at section B was more active and scoured out the channel to a more recent date. Accumulating deposits in section A, may be the result of the presence of debris associated with adjacent settlement and the Iron Age channel crossings.

Yarnton Iron Age and Roman: Oxey Mead channel, Oxfordshire

Location: SP 478110
Lat. 51.47.43 N; Long. 01.18.25 W

Project manager: G Hey (Oxford Archaeological Unit), 1990

Archival body: Oxfordshire County Museums Service

Description: four sections were excavated through a palaeochannel on the floodplain north of Oxey Mead, a famous hay meadow on the banks of the Thames. The channel was once an open watercourse, part of the braided river system of the Thames, but silted up gradually through time.

Objectives: to date the introduction of hay meadow in this area, as evidenced by invertebrate remains recovered from the sedimentary sequence; and to relate the landscape change to the settlement evidence from the gravel terrace.

Laboratory comment: English Heritage (8 July 2013), one further sample was submitted for dating prior to 1998 and was published in Bayliss *et al* (2015, 238–9; OxA-7360).

References: Bayliss *et al* 2015
Hey *et al* 2011

OxA–10690 2082 ±37 BP

δ¹³C: -25.9‰

Sample: YOM90 3/8, submitted on 7 March 2001 by G Hey

Material: waterlogged plant macrofossils (seeds: *Carex* spp., *Ranunculus* cf. *repens, Rumex maritimus,* and *Prunella vulgaris*) (M Robinson)

Initial comment: the sample came from the lowest layer of organic sediment within a palaeochannel on Oxey Mead (layer 3/8). The material was deposited with silt in the slow-moving channel, which cut through calcareous gravel.

Objectives: as OxA-10691

Calibrated date: *1σ:* 170–40 cal BC
2σ: 200 cal BC–cal AD 10

Final comment: G Hey (12 October 2004), this result from the lowest organic sediments here provides a much later date than anticipated, and indicates the variation that exists in organic deposition across the Yarnton floodplain. Water in the Oxey Mead channel derives from two separate palaeochannels upstream, and this may have resulted in more fast-flowing water that would have flushed out channel sediments for a longer period of time than occurred upstream. The date of the inset of alluviation in the mid to late Roman period is as expected, indicating increasing arable cultivation in the Thames catchment upstream.

Yarnton Iron Age and Roman: trench 37, Oxfordshire

Location: SP 474106
Lat. 51.47.30 N; Long. 01.18.38 W

Project manager: G Hey (Oxford Archaeological Unit)

Archival body: Oxford County Museums Service

Description: this site was a trench 30m x 2m examined during the 1993 field evaluation and then extended during excavation of an adjacent area (site 25) in 1997. It lay on the Cossington floodplain in the west of the study area and was situated just to the north of a palaeochannel. A boundary ditch was exposed which appeared to have a similar depositional sequence, and provided a similar landscape pattern to well-dated middle Bronze Age ditches further east. Archaeomagnetic dates suggested that the earliest deposits were Iron Age in date.

Objectives: to provide a date for waterlogged material in the ditch in order to date the environmental evidence from it, and to shed light on the event that was dated by archaeomagnetic means.

References: Hey *et al* 2011

OxA–10707 2120 ±45 BP

δ¹³C: -27.4‰

Sample: YCE93 37/7, submitted on 7 March 2001 by G Hey

Material: waterlogged plant macrofossils (seeds: *Carex* spp., *Rumex conglomeratus*, *Leontodon* sp., and *Atriplex* sp.) (M Robinson)

Initial comment: the sample came from the layer above the lowest layer of organic sediment within a boundary ditch on the west side of the Yarnton/Cassington floodplain (layer 7).

Objectives: the sediment from which this sample derives provides useful evidence for the surrounding environment during the prehistoric period. It is important to be able to relate this evidence to the significant body of settlement and landscape data from the Bronze Age to the Iron Age, which is emerging from the Yarnton Cassington project. The ditch is one of the earliest boundaries found on this site and a radiocarbon determination will help to establish the date at which the landscape became divided and settled on a permanent basis. Results of archaeomagnetic dating within this ditch suggest that they relate to the date at which the ditch became oxygen-free, rather than the original silting (225–80 BC at 95% confidence). A radiocarbon determination from these layers will enable a comparison to be made, and will shed light on the event that has been dated by archaeomagnetic means, which will have relevance to the application of this technique.

Calibrated date: *1σ:* 210–50 cal BC
2σ: 360–40 cal BC

Final comment: G Hey (12 October 2004), this result suggests that deposits accumulated in the first recut of the ditch in the middle Iron Age, and that the greigite dated by archaeomagnetic means formed when the ditch became completely de-oxygenated in the mid to late Iron Age. The result also shows the presence of damp grazed grassland in this area at that time.

OxA–10708 2180 ±45 BP

$\delta^{13}C$: -27.1‰

Sample: YCE93 37/8, submitted on 7 March 2001 by G Hey

Material: waterlogged plant macrofossils (seeds: *Cirsium* spp., *Rumex conglomeratus*, *Polygonum persicaria,* and *Potentialla anserina*) (M Robinson)

Initial comment: the sample came from the lowest layer within a boundary ditch on the west side of the Yarnton/Cassington floodplain (layer 8).

Objectives: as OxA-10707

Calibrated date: *1σ:* 360–170 cal BC
2σ: 380–90 cal BC

Final comment: see OxA-10707

Yarnton Neolithic and Bronze Age, Oxfordshire

Location: SP 470110
Lat. 51.47.41 N; Long. 01.19.07 W

Project manager: G Hey (Oxford Archaeology), 1989–2006

Description: the Yarnton Project provided a unique opportunity to trace the development of settlement and landscape change in a major river valley setting over the entire span of the Neolithic and Bronze Age (*c* 4000–750 cal BC). Scientific dating has been integral to the production of an absolute chronological sequence, providing the framework for understanding the changes observed over this period of time. A total of 127 radiocarbon determinations have been obtained on samples of Neolithic and Bronze Age date from Yarnton. Of these, 110 results were produced by the Oxford Radiocarbon Accelerator Unit between 1994 and 2005; 74 on samples of charred plant remains, 29 on waterlogged plant macrofossils, five on animal and human bone from the second gravel terrace, and two on calcined human bone. Two further samples of calcined human bone and six samples of charred plant remains were dated using Accelerator Mass Spectrometry (AMS) by the Scottish Universities Environmental Research Centre between 2003 and 2005. Six samples of waterlogged wood were dated at East Kilbride by Liquid Scintillation Spectrometry between 1998 and 2001. Two samples of waterlogged wood were also dated conventionally by the Queen's University Belfast Radiocarbon Dating Laboratory in 1996. Finally, a single sample of carbonised bread was dated using AMS by the Rafter Radiocarbon Laboratory, New Zealand in 1998. Two optically-stimulated luminescence measurements of earlier prehistoric date were also produced by the Oxford University Research Laboratory in 1992.

Objectives: to establish the earliest date of Neolithic activity at Yarnton, and assess whether use of the Yarnton landscape was persistent or intermittent throughout the Neolithic and Bronze Age periods; to ascertain the date at which different parts of the Yarnton floodplain were first cleared and used; to assist in the identification of contemporary feature groups, especially in relation to domestic activity; to date the structures recovered, determine periods when they are present/absent, and chart changes in form and use; to date monuments in the landscape and assess the period of time over which they remained significant; to date human burials, thus charting changes in burial practices over time. Particularly, to ascertain the period of time over which unmarked inhumed and cremated individuals were buried in the wider landscape, and the dates at which small quantities of human bone were deposited and mixed human and animal deposits were made. Also, to establish the chronological relationship between human burials and potentially associated monuments and structures; to date special or 'votive' activity; to trace environmental change across the landscape, and chart changing land-use strategies and farming practices through time; to understand the period at which different crafts and 'industrial' processes were undertaken and date other activity away from settlement; to establish the chronological relationships of major pottery styles; and to identify periods at which long-distance exchange networks are in evidence.

Final comment: A Bayliss and G Hey (28 November 2012), the scientific dating programme for Neolithic and Bronze Age remains at Yarnton has made a vital contribution to understanding the development of settlement and landscape change in the study area. The radiocarbon programme was severely restricted by the scarcity of datable material and by the spatially discrete character of many of the archaeological features. Thus, formal Bayesian modelling enabling greater chronological precision could be not be undertaken, except in a small number of cases. Nonetheless, the results acquired through scientific techniques have enabled us to compare developments in different parts of the landscape and construct a meaningful narrative of change through time from the fourth to the mid-first millennia cal BC. Without scientific methods, features would have remained undated or would have been misattributed, for example the small circular early Neolithic roundhouse, 5816, which was initially believed to be late Bronze Age in date. The results have demonstrated human activity in the Yarnton study area from the early fourth millennium to the mid-first millennium cal BC, and the repeated use of this landscape over this period of time. A particular contribution has been made to the understanding of the date of early Neolithic activity and the diversity of the evidence present for this period, including structures, burials, and cereal production. The hypothesis that there was little evidence for house building in this area over the course of the second half of the fourth millennium and throughout the third millennium cal BC was supported by the results, but deposition within pits over this period of time was clearly demonstrated, with one possible exception.

An explosion of activity in the early-to-mid Bronze Age, principally in the fifteenth and fourteenth centuries cal BC, is suggested by the dating programme, including the start of a long tradition of roundhouse construction and evidence for a range of domestic activities including the digging of waterholes, the creation of burnt stone pits, and evidence for craft activities. Evidence is present for cremation burial from the earliest Neolithic period through into the later Bronze

Age at Yarnton. The scientific dating provided conclusive evidence for the longevity of use of the area around the Neolithic long enclosure for acts of formal deposition, especially those associated with human remains, and the importance of this place from the fourth to the end of the second millennium cal BC. The long-lived significance of a U-shaped enclosure on the second gravel terrace at Cresswell Field may similarly be demonstrated by the presence of three late-second millennium inhumation burials surrounding the monument.The dating programme has provided a time-frame for landscape change and, in particular, the increasing extent of grazed grassland at the expense of tree cover on many parts of the floodplain in the fifteenth century cal BC, and a sharp rise in the water table at this period of time. The dating of features containing charred food remains has also been of great interest. In general terms, the results confirm the hypothesis that Neolithic assemblages are dominated by gathered plant foods, principally hazelnut shells, with few cereals present (Moffett *et al* 1989), and suggest that this pattern begins to be reversed in the first half of the second millennium cal BC. Cereals become more common in samples dating from the fifteenth century cal BC, and wild foods are very rare by this time. However, radiocarbon dating of features on the floodplain with comparatively large numbers of cereals showed, surprisingly, that a number of these were early Neolithic in date and, overall, it can be suggested that there was a period in the early fourth millennium when gathered foods were in use, but cereals were an important element of food assemblages.

References: Hey *et al* forthcoming
Moffett *et al* 1989

Yarnton Neolithic and Bronze Age: activity in area of Neolithic rectangular enclosure, Oxfordshire

Location: SP 474109
Lat. 51.47.39 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeology), 1995

Archival body: Oxfordshire County Museums Service

Description: a number of pits and burials were placed within and around a rectangular enclosure which is believed, on the basis of archaeological parallels, to be earlier Neolithic in date.

Objectives: the objective of the dating programme was to ascertain the period over which special deposits were placed around the rectangular enclosure and, hence, its longevity as a significant place in the landscape. At the same time, a *terminus ante quem* for the enclosure ditch could be obtained.

Final comment: G Hey (28 November 2012), the dates indicate that people placed deposits and human burials in this area over a considerable period of time, at least two millennia. They also indicated that the ditch was cut and partially filled before the later fourth millennium cal BC, when pit 9002 was dug.

Laboratory comment: English Heritage (2005), two samples were dated from each of six of these pits, in all cases producing pairs of measurements which are statistically consistent (T′=2.0; T′=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–8808 2900 ±55 BP

$\delta^{13}C$: -26.0‰

Sample: YFPB95 9453 9633a, submitted on 26 February 1999 by C Bell

Material: charcoal: Pomoideae (M Robinson)

Initial comment: from a cremation burial (9453) placed directly into pit 9452 with no container. The pit, which also contained burnt stone and was lined with clay, lay to the north of a Neolithic rectangular 'mortuary' enclosure and was sealed beneath Roman ploughsoil.

Objectives: to establish the date of this cremation burial for which there is no artefactual evidence. This information would then be used to examine its relationship to the adjacent funerary monument and other burials in this area. Once dated, the location and distribution of these deposits can be integrated with an important body of data on prehistoric burial and the varied locations in which these are found.

Calibrated date: *1σ:* 1200–1000 cal BC
2σ: 1260–920 cal BC

Final comment: G Hey and A Bayliss (28 November 2012), pit 9452 lay to the north of the rectangular enclosure, and contained a series of structured deposits with calcined human and animal bone. The dates indicate that this activity took place in the last quarter of the second millennium cal BC.

OxA–8809 2985 ±45 BP

$\delta^{13}C$: -25.5‰

Sample: YFPB95 9453 9633b, submitted on 26 February 1999 by C Bell

Material: charcoal: *Prunus* sp. (M Robinson)

Initial comment: as OxA-8808

Objectives: as OxA-8808

Calibrated date: *1σ:* 1280–1120 cal BC
2σ: 1390–1050 cal BC

Final comment: *see* OxA-8808

OxA–8810 4450 ±45 BP

$\delta^{13}C$: -24.8‰

Sample: YFPB95 9208 9053a, submitted on 26 February 1999 by C Bell

Material: charcoal: *Rhamnus cathartica* sp. (M Robinson)

Initial comment: from cremation burial 9208, placed directly into pit 9007 with no container. The feature lay adjacent to a Neolithic rectangular 'mortuary' enclosure and was sealed beneath Roman ploughsoil.

Objectives: as OxA-8808

Calibrated date: *1σ:* 3330–3020 cal BC
2σ: 3350–2920 cal BC

Final comment: G Hey (28 November 2012), pits 9002 and 9007, lying to the south of the enclosure and containing 533 sherds of Peterborough Ware in the Fengate sub-style and calcined human bone, date to the later fourth millennium cal BC and show that the area around the rectangular enclosure retained its significance through the middle Neolithic.

OxA–8811 4490 ±45 BP

δ¹³C: -24.0‰

Sample: YFPB95 9208 9053b, submitted on 26 February 1999 by C Bell

Material: carbonised plant macrofossil (*Corylus* sp., nut fragments) (M Robinson)

Initial comment: as OxA-8808

Objectives: as OxA-8810

Calibrated date: *1σ:* 3350–3090 cal BC
2σ: 3370–3020 cal BC

Final comment: see OxA-8810

OxA–8812 3160 ±45 BP

δ¹³C: -27.2‰

Sample: YFPB95 9053 9002a, submitted on 26 February 1999 by C Bell

Material: charcoal: *Alnus* sp. (M Robinson)

Initial comment: from cremation deposit 9053, placed directly into pit 9048 with no container. The feature lay within a Neolithic rectangular 'mortuary' enclosure and was sealed beneath Roman ploughsoil.

Objectives: as OxA-8808

Calibrated date: *1σ:* 1500–1400 cal BC
2σ: 1510–1300 cal BC

Final comment: G Hey (28 November 2012), two pits produced dates in the second half of the second millennium cal BC. The earlier of these, pit 9048, lay within the north-east of the enclosure. It also contained cremated human bone and a small quantity of redeposited Peterborough Ware.

OxA–8813 3115 ±40 BP

δ¹³C: -27.5‰

Sample: YFPB95 9053 9002b, submitted on 26 February 1999 by C Bell

Material: charcoal: Pomoideae (M Robinson)

Initial comment: as OxA-8812

Objectives: as OxA-8812

Calibrated date: *1σ:* 1430–1300 cal BC
2σ: 1500–1270 cal BC

Final comment: see OxA-8812

OxA–11454 4577 ±36 BP

δ¹³C: -23.8‰

Sample: YFPB95 9003 <9063>, submitted in March 2002 by C Chissell

Material: carbonised plant macrofossil (hazelnut shell, *Corylus* sp.) (M Robinson 2002)

Initial comment: from pit 9002, which contains a cremation deposit as well as some significant pottery deposits. Sample 9063 is from the cremation deposit fill 9003.

Objectives: the date is required to establish the date of this mixed animal and human cremation deposit within a pit containing special deposits of decorated pottery. This information would enable us to examine its relationship with the adjacent funerary monument and other burial deposits in the area in order to provide a more detailed understanding of prehistoric burial practices on the floodplain.

Calibrated date: *1σ:* 3370–3340 cal BC
2σ: 3500–3120 cal BC

Final comment: see OxA-8810

OxA–11455 4541 ±36 BP

δ¹³C: -26.3‰

Sample: YFPB95 9126 <9221>, submitted in March 2002 by C Chissell

Material: carbonised plant macrofossil (hazelnut shell, *Corylus* sp.) (M Robinson 2002)

Initial comment: from pit 9002 which contains a cremation deposit as well as some significant pottery deposits. Sample 9221 is from the lower fill 9126.

Objectives: as OxA-11454

Calibrated date: *1σ:* 3360–3120 cal BC
2σ: 3370–3090 cal BC

Final comment: see OxA-11454

OxA–11456 3702 ±35 BP

δ¹³C: -23.1‰

Sample: YFPB95 9012 9126A, submitted in March 2002 by C Chissell

Material: carbonised plant macrofossil (hazelnut shell, *Corylus* sp.) (M Robinson 2002)

Initial comment: the sample is derived from fill 9012, the upper fill of discrete pit 9011. This pit contained some deposits of calcined human and animal bone as well as some deposits of Beaker pottery and is situated to the south of the Neolithic long enclosure in the vicinity of other cremation deposits.

Objectives: establishing the date of this mixed animal and human cremation deposit would enable us to examine its relationship with the Neolithic 'mortuary' long enclosure directly to the north as well as the other burial deposits in the area. This would us with a more detailed understanding of prehistoric burial practices on the floodplain.

Calibrated date: *1σ:* 2150–2030 cal BC
2σ: 2210–1970 cal BC

Final comment: G Hey (28 November 2012), pit 9011, located to the south of the enclosure, contained just two sherds of Beaker pottery and 5g of calcined human bone. The radiocarbon dates from this feature fall in the last quarter of the third millennium cal BC, suggesting that this pottery is contemporary with the pit, and show that the area around the enclosure retained its significance until this period of time.

OxA–11457 3764 ±36 BP

$\delta^{13}C$: -25.5‰

Sample: YFPB95 9012 9126B, submitted in March 2002 by C Chissell

Material: carbonised plant macrofossil (hazelnut shell, *Corylus* sp.) (M Robinson 2002)

Initial comment: as OxA-11456

Objectives: as OxA-11456

Calibrated date: *1σ:* 2280–2130 cal BC
2σ: 2300–2030 cal BC

Final comment: see OxA-11456

OxA–11511 3286 ±40 BP

$\delta^{13}C$: -26.0‰

Sample: YFPB95 9040 <9039>A, submitted in March 2002 by C Chissell

Material: charcoal: Pomoideae (M Robinson 2002)

Initial comment: the sample is derived from 9040, the fill of pit 9039, which cuts the uppermost fill (9073) of the Neolithic enclosure ditch. The fill consists of large quantities of burnt material including calcined bone and is overlain by the Roman ploughsoil.

Objectives: the pit from which the sample is derived cuts the upper fills of the Neolithic rectangular enclosure. The date of this pit would clearly establish the latest possible date for the final silting up of the enclosure ditches and would enable us to estimate the date at which the monument went out of use. This information could also be used to examine the relationship between this cremation pit and other burials and cremations in the vicinity which would allow us to better understand the changing use of this early ceremonial landscape. The charcoal is likely to represent fuel from the cremation pyre and should be functionally related to the disposal of the body.

Calibrated date: *1σ:* 1620–1500 cal BC
2σ: 1670–1450 cal BC

Final comment: G Hey (28 November 2012), eleven sherds of Biconical Urn were recovered from pit 9039 which cut the top fill of the rectangular enclosure ditch. The radiocarbon dates from this feature fall in the second quarter of the second millennium cal BC, and demonstrate that the enclosure ditch had filled by that time. Nevertheless, the area still retained its significance, perhaps because the bank was still visible.

OxA–11574 3353 ±36 BP

$\delta^{13}C$: -26.1‰

Sample: YFPB95 9040 <9039> B, submitted in March 2002 by C Chissell

Material: charcoal: Pomoideae (M Robinson 2002)

Initial comment: as OxA-11511

Objectives: as OxA-11511

Calibrated date: *1σ:* 1690–1610 cal BC
2σ: 1750–1530 cal BC

Final comment: see OxA-11511

Yarnton Neolithic and Bronze Age: activity in early Neolithic rectangular structure 3871, Oxfordshire

Location: SP 474109
Lat. 51.47.39 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeology), 1996

Archival body: Oxfordshire County Museums Service

Description: an area of approximately 3ha was excavated on the Thames floodplain to the north of the A40 road between Yarnton and Cassington. The site consisted mainly of Neolithic and Bronze Age features cut into the natural gravels. These included a large Neolithic rectangular post-built structure, two waterholes, pit alignment, numerous small circular structures and fencelines, a ring-ditch, as well as a large number of scattered pits and postholes.

Objectives: to date the rectangular structure.

Final comment: G Hey and A Bayliss (28 November 2012), chronological modelling of the results suggests that the building was in use in the later part of the first quarter of the fourth millennium cal BC, probably in the 38th century (*c* 3800 cal BC). It should be noted, however, that material from the postholes of this structure was extremely scarce, and so our estimate for the dating of this building relies on only four measurements. The dates indicate that a cremation burial was placed in the top of a pit to the east of the structure some 100 years after it fell into disuse. Two further main phases of activity were evidenced in this area. Three radiocarbon results show that one of these later periods of activity took place in the first half of the third millennium cal BC. One sample is from a posthole, 4391, lying within the western side of rectangular structure 3871 (OxA-6773), and two are residual in an area of disturbance (4591) in the south-west of this building (OxA-11881; 4241 ±34 BP, 2910–2710 cal BC at 2σ; Reimer *et al* 2004, and OxA-11919; 4193 ±34 BP, 2900–2660 cal BC at 2σ; Reimer *et al* 2004). This is believed to be a tree-throw hole, in which a series of burning events took place in the last quarter of the third millennium cal BC (OxA-11877, 3703 ±34 BP, 2210–1970 cal BC; OxA-11880, 3737 ±34 BP, 2280–2030 cal BC; OxA-11934, 3673 ±29 BP, 2140–1950 cal BC; OxA-11935 3732 ±29 BP, 2270–2030 cal BC; and OxA-11920, 3779 ±33 BP, 2300–2050 cal BC; at 2σ; Reimer *et al* 2004).

Laboratory comment: English Heritage (2005), four samples from two postholes on the main wall lines of a rectangular structure on site 7 were dated. These produced statistically consistent radiocarbon results (T′=7.7; T′(5%)=7.8; ν=3; Ward and Wilson 1978), suggesting that this material probably does date to the construction and use of the building.

Laboratory comment: English Heritage (2014), two further radiocarbon measurements were obtained from this structure prior to 1998 and were published in Bayliss *et al* (2015, 243–4; OxA-6772–3). Two further samples were dated after 2003 (OxA-14479 and SUERC-5689).

References: Bayliss *et al* 2015
Hey *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

OxA–11460 4960 ±40 BP

$\delta^{13}C$: -26.5‰

Sample: YFPB96 4579 <5303>, submitted in March 2002 by C Chissell

Material: waterlogged plant macrofossil (1 tuber; onion couch grass) (M Robinson 2002)

Initial comment: from context 4579, a heavily burnt deposit and one of the lower fills of postpit 4580. The deposit containing ash, charcoal, and cremated bone appears to have been placed around an upright timber, part of structure 3872 as packing. The whole feature was overlain by Roman ploughsoil. Pit 4580 was cut directly into the natural calcareous gravel of the Thames floodplain. In the earlier prehistoric period this area would have been an island between two stream courses crossing the floodplain.

Objectives: fill 4579 is one of the primary packing fills around a large upright timber which formed part of a large, post-built, rectangular structure. Obtaining the date of this sample would provide a construction date for this important and unusual structure, the closet parallels for which lie in the early Neolithic. This date, in conjunction with the date already obtained for fill 4574 towards the top of the same pit, will provide us with a clear idea as to the longevity of use of this structure. This deposit appears to be a cremation and the tuber may have come from grass used as tinder from the pyre.

Calibrated date: *1σ:* 3790–3690 cal BC
2σ: 3910–3650 cal BC

Final comment: G Hey (28 November 2012), this result aided in the identification of this structure as being early Neolithic in date.

OxA–11875 5097 ±36 BP

$\delta^{13}C$: -23.2 ±0.2‰

Sample: YFPB96 3920 <5011> (a), submitted in October 2002 by C Chissell

Material: charcoal: *Quercus* sp., sapwood (M Robinson 2002)

Initial comment: this sample derives from fill 3920, which clearly forms the central postpipe of the large postpit 3923. It is believed that this feature contained a major load bearing timber as part of a large rectangular post-built structure at the centre of the site.

Objectives: posthole 3923 appears to have held a large upright timber, possibly a roof support, in the centre of the possible western wall of a large post built structure. One of the other postholes, 4580 has been dated to the early Neolithic (OxA-6772) and the closet parallels to this structure point to a similar date. However, later Neolithic features including a Peterborough Ware hearth and a Grooved Ware pit in the centre of the structure point to a considerable continuation of use. A date would therefore establish the phase of use to which this feature belonged and provide use with a clearer picture of the nature and date of this nationally important feature.

Calibrated date: *1σ:* 3970–3800 cal BC
2σ: 3980–3790 cal BC

Final comment: see OxA-11460

OxA–11876 5006 ±36 BP

$\delta^{13}C$: -23.4 ±0.2‰

Sample: YFPB96 3920 <5011> (b), submitted in October 2002 by C Chissell

Material: charcoal: *Quercus* sp., sapwood (M Robinson 2002)

Initial comment: as OxA-11875

Objectives: as OxA-11875

Calibrated date: *1σ:* 3910–3710 cal BC
2σ: 3950–3700 cal BC

Final comment: see OxA-11460

OxA–11877 3703 ±34 BP

$\delta^{13}C$: -28.7 ±0.2‰

Sample: YFPB96 4707 <5305> (b), submitted in October 2002 by C Chissell

Material: charcoal: (M Robinson 2002)

Initial comment: this sample derives from fill 4707, which forms one of the middle fills ion a series of burnt fills within hearth 4591, located in the south-west corner of the Neolithic rectangular building 3781. The hearth is cut though tree-throw pit 8232, as well as two earlier pits 4590 and 4592.

Objectives: the hearth situated in the south-west corner of a large square/rectangular post-built structure appears to truncate two pits/postholes, which may have formed part of an internal subdivision of an earlier phase of the building. A date for this hearth would therefore help to phase the features that it truncates and provide us with an idea as to which phase of the structure, if any, this feature belonged. This would allow us to examine in greater depth the character, function and continuity of use of this rare and nationally important structure.The hearth also contains calcined human and animal bone, which when dated can be considered with the other funerary evidence from the floodplain to provide a better understanding of the complex nature of early prehistoric burial practices.

Calibrated date: *1σ:* 2150–2030 cal BC
2σ: 2210–1970 cal BC

Final comment: G Hey (28 November 2012), reanalysis of the stratigraphy of this feature suggests that the tree-throw pit is the latest feature, and the charcoal that has been dated probably came from the burning of this tree in the late third millennium cal BC.

OxA–11880 3737 ±34 BP

$\delta^{13}C$: -23.6 ±0.2‰

Sample: YFPB96 4699 <5296> (a), submitted in October 2002 by C Chissell

Material: charcoal: Pomoideae (M Robinson 2002)

Initial comment: this sample derives from fill 4699, which forms one of the upper fills in a series of burnt fills within hearth 8226 (4591) located in the south west corner of the Neolithic rectangular building 3871. The hearth is cut through tree-throw pit 8232 as well as two earlier pits 4590 and 4592.

Objectives: as OxA-11877

Calibrated date: *1σ:* 2200–2040 cal BC
2σ: 2280–2030 cal BC

Final comment: see OxA-11877

OxA–11881 4241 ±34 BP

$\delta^{13}C$: -25.0 ±0.2‰

Sample: YFPB96 4583 <5550> (b), submitted in October 2002 by C Chissell

Material: charcoal: (R Gale 2002)

Initial comment: this sample derives from fill 4583, towards the base of hearth 4591, situated in the south-west part of the Neolithic rectangular building in the centre of the site. This fill is one of a series of burnt hearth fills. The hearth 4591 is cut through tree-throw pit 8232, as well as two earlier pits 4590 and 4592.

Objectives: as OxA-11877

Calibrated date: *1σ:* 2900–2870 cal BC
2σ: 2910–2710 cal BC

Final comment: G Hey (28 November 2012), this charcoal must relate to a period of activity around the area of the rectangular structure after it had gone into disuse. A pit containing Grooved Ware was also discovered with the ground plan of the house.

OxA–11919 4193 ±34 BP

$\delta^{13}C$: -24.3 ±0.2‰

Sample: YFPB96 4699 <5296> (b), submitted in October 2002 by C Chissell

Material: charcoal: *Corylus*/*Alnus* sp., (M Robinson 2002)

Initial comment: as OxA-11880

Objectives: as OxA-11877

Calibrated date: *1σ:* 2890–2700 cal BC
2σ: 2900–2660 cal BC

Final comment: see OxA-11881

OxA–11920 3779 ±33 BP

$\delta^{13}C$: -25.3 ±0.2‰

Sample: YFPB96 4583 <5550> (a), submitted in October 2002 by C Chissell

Material: charcoal: *Quercus* sp., sapwood (R Gale 2002)

Initial comment: as OxA-11881

Objectives: as OxA-11877

Calibrated date: *1σ:* 2280–2140 cal BC
2σ: 2300–2050 cal BC

Final comment: G Hey (28 November 2012), this charcoal must relate to a period of activity around the area of the rectangular structure after it had gone into disuse. It was created at around the time of the burning of the tree in the tree-throw pit.

OxA–11934 3673 ±29 BP

$\delta^{13}C$: -29.0 ±0.2‰

Sample: YFPB96 4707 <5305> (a), submitted in October 2002 by C Chissell

Material: charcoal: Pomoideae (M Robinson 2002)

Initial comment: as OxA-11877

Objectives: as OxA-11877

Calibrated date: *1σ:* 2140–1980 cal BC
2σ: 2140–1950 cal BC

Final comment: see OxA-11877

OxA–11935 3732 ±29 BP

$\delta^{13}C$: -30.1 ±0.2‰

Sample: YFPB96 4707 <5305> (b), submitted in October 2002 by C Chissell

Material: charcoal: Pomoideae (M Robinson 2002)

Initial comment: as OxA-11877

Objectives: as OxA-11877

Calibrated date: *1σ:* 2200–2040 cal BC
2σ: 2270–2030 cal BC

Final comment: see OxA-11877

Yarnton Neolithic and Bronze Age: Bronze Age activity on sites 4c, 4e, 9, and 10, Oxfordshire

Location: SP 474109
Lat. 51.47.38 N; Long. 01.18.46 W

Project manager: G Hey (Oxford Archaeology), 1998

Archival body: Oxfordshire County Museums Service

Description: an unusual bark vessel was found in clay-lined pit 13058 on site 9. An area of Bronze Age activity (sites 4c and 4e) was located on a small gravel island in the centre of the floodplain. A circular structure (16209) was found in the north of site 4c. Pit 25045, lying 85m to the east of structure 16209 on site 4e, originally contained a sizeable wooden post, part of which remained *in situ*. The pit was recut and a substantial deposit of charred grain, animal bone, worked flint, and Deverel-Rimbury pottery was placed in the top. Waterhole 16010 lay to the south-east of structure 16209. Other features indicated that flax retting was taking place at Yarnton in the Bronze Age. Small pit 14034 containing part of a cremated adult human body was found on the north bank of a palaeochannel, 120m south of structure 16209 and on the same gravel island (site 10).

Objectives: the objectives in dating this sequence of samples were to place the activity within the overall chronology of settlement at Yarnton, to date the first use of the areas on which these sites were set, and to date important changes in the surrounding vegetation and the rising water table that occurred in the middle Bronze Age.

Final comment: G Hey (28 November 2012), dated activity on this central gravel island appears to have occurred from *c* 1750 cal BC to the later Bronze Age, although the majority of dated features fall in the third quarter of the second millennium cal BC.

Laboratory comment: English Heritage (24 June 2014), 11 further samples were subsequently dated (OxA-12721–2, -12865–6, -12880, -12938, -12964–6, -14492, and SUERC-5695).

References: Hey *et al* forthcoming

OxA–8929 3415 ±40 BP

δ¹³C: -27.8‰

Sample: YFPB98 13189 W21, submitted on 26 February 1999 by C Bell

Material: wood (waterlogged): bark (M Taylor 1999)

Initial comment: from a bark object found in pit 13058 dug into the bank of a palaeochannel.

Objectives: to establish the date of this rare wooden object for which there was no other associated dating evidence. This information would then also be used to provide evidence of the chronology of Bronze Age woodworking technology and craft production. It will also assist in dating the good environmental data, which was recovered from this feature.

Calibrated date: *1σ:* 1760–1660 cal BC
2σ: 1880–1620 cal BC

Final comment: G Hey (28 November 2012), the sample from this bark vessel shows that it was early Bronze Age in date.

Yarnton Neolithic and Bronze Age: Bronze Age occupation on site 7, Oxfordshire

Location: SP 474109
Lat. 51.47.39 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeology), 1996

Archival body: Oxfordshire County Museums Service

Description: a small circular posthole structure (4517), located towards the eastern edge of excavation, a waterhole 4005, and tree-throw pit 3870.

Objectives: the structure is one of seven similar structures on the site, five of which were clustered in the south-east and produced some sherds of early Bronze Age pottery. A radiocarbon date form this structure would give us a firm date for one of these structures and allow us to place it within the context of the other Bronze Age domestic features as well as the funerary features within this landscape.

Final comment: G Hey (28 November 2012), the Bronze Age activity on this site occurred during the middle of the second millennium cal BC; none of the dated features appear to be contemporary.

References: Hey *et al* forthcoming

OxA–11458 3055 ±33 BP

δ¹³C: -26.3‰

Sample: YFPB96 4080 <5227>B, submitted in March 2002 by C Chissell

Material: wood (waterlogged): hawthorn type, twigs (M Robinson 2002)

Initial comment: the sample is derived from fill 4080, which lies towards the bottom of the large pit 4005, which has been interpreted as a well or waterhole. The pit lies to the north of the Neolithic rectangular, post-built structure and cuts two small postholes, 4932 and 4930. The pit is sealed by the Roman ploughsoil.

Objectives: obtaining a date for this lower layer of the probable well will allow us to put a date to one of the earliest phases of its use. It is hoped to obtain a series of dates from different depths within the feature in order to establish a date sequence for its use. It will then be possible to integrate this information with dates obtained from other types of feature across the floodplain in order to examine the changing ways in which the floodplain was used throughout early prehistory.

Calibrated date: *1σ:* 1400–1260 cal BC
2σ: 1420–1210 cal BC

Final comment: G Hey (28 November 2012), the three samples from the lower deposits indicate that the waterhole began to fill with sediment in the thirteenth century cal BC. A charred deposit was dumped near the top of the waterhole sometime later in the thirteenth or in the twelfth century cal BC. The environmental sequence from this feature probably spans little more than a century.

Laboratory comment: English Heritage (2005), the waterhole produced five statistically consistent radiocarbon measurements (T′=8.3; T′(5%)=9.5; ν=4; Ward and Wilson 1978), which also show good agreement with their relative stratigraphic positions.

References: Ward and Wilson 1978

OxA–11459 3009 ±32 BP

$\delta^{13}C$: -23.3‰

Sample: YFPB96 4082 <5226>, submitted in March 2002 by C Chissell

Material: wood (waterlogged): *Crataegus* sp., /*Prunus* sp., twigs (M Robinson 2002)

Initial comment: the sample is derived from fill 4082, which lies towards the bottom of the large pit 4005, which has been interpreted as a well/waterhole. The pit lies to the north of the Neolithic rectangular post-built structure and cuts two small postholes 4932 and 4930.

Objectives: as OxA-11458

Calibrated date: *1σ:* 1290–1210 cal BC
2σ: 1390–1120 cal BC

Final comment: see OxA-11458

Laboratory comment: see OxA-11458

OxA–11512 2917 ±40 BP

$\delta^{13}C$: -25.6‰

Sample: YFPB96 4080 <5227>A, submitted in March 2002 by C Chissell

Material: wood (waterlogged): hawthorn type, twigs (M Robinson 2002)

Initial comment: as OxA-11458

Objectives: as OxA-11458

Calibrated date: *1σ:* 1210–1040 cal BC
2σ: 1230–1000 cal BC

Final comment: see OxA-11458

Laboratory comment: see OxA-11458

OxA–11515 2967 ±38 BP

$\delta^{13}C$: -25.7‰

Sample: YFPB96 4075 <5223>A, submitted in March 2002 by C Chissell

Material: charcoal: *Prunus* sp. (M Robinson 2002)

Initial comment: this sample is derived from the charcoal rich fill 4075, which lies towards the top of the large pit 4005, which has been interpreted as a well/waterhole. This charcoal appears to have been part of an ash-rich deposit dumped in the top of the waterhole. The pit lies to the north of the Neolithic rectangular post-built structure and cuts two small postholes 4932 and 4930.

Objectives: as OxA-11458

Calibrated date: *1σ:* 1260–1120 cal BC
2σ: 1370–1050 cal BC

Final comment: see OxA-11458

Laboratory comment: see OxA-11458

OxA–11516 3026 ±39 BP

$\delta^{13}C$: -24.6‰

Sample: YFPB96 4075 <5223>B, submitted in March 2002 by C Chissell

Material: charcoal: *Prunus* sp. (M Robinson 2002)

Initial comment: as OxA-11515

Objectives: as OxA-11515

Calibrated date: *1σ:* 1380–1210 cal BC
2σ: 1410–1120 cal BC

Final comment: see OxA-11458

Laboratory comment: see OxA-11458

OxA–11878 3293 ±33 BP

$\delta^{13}C$: -23.6 ±0.2‰

Sample: YFPB96 4513 <5206> (a), submitted in October 2002 by C Chissell

Material: charcoal: *Corylus* sp. (M Robinson 2002)

Initial comment: this sample is derived from deposit 4513, which comprises the post-pipe of the posthole 4472, part of the circular posthole structure 4517 located in the north-east of the site.

Objectives: the circular structure 4517 is one of seven similar structures on site 7, five of which are located in a cluster in the south east corner and appear to be related to fencelines and a pit alignment. A few sherds of early Bronze Age and middle Bronze Age pottery were found within two postholes in this group but material for radiocarbon dating has only been found within structure 4517 to the north. A date from this sample will therefore allow us to firmly place this structure within the context of the other Bronze Age domestic features as well as the funerary features in this landscape.

Calibrated date: *1σ:* 1620–1510 cal BC
2σ: 1660–1490 cal BC

Final comment: G Hey (28 November 2012), this result indicates that the structure fell into disuse in the middle Bronze Age.

Laboratory comment: English Heritage (2005), a number of small, circular post-built structures were examined on site 7. Only building 4517 yielded sufficient material for radiocarbon dating. Samples from this structure, which lay on the eastern edge of the site, produced three statistically-consistent radiocarbon measurements (T′=3.4; T′(5%)=6.0; ν=1; Ward and Wilson 1978), which indicate that it was in use during the second quarter of the second millennium cal BC.

OxA–12038 3312 ±27 BP

δ^{13}*C:* -24.5 ±0.2‰

Sample: YFPB96 4514 <5208> (a), submitted in October 2002 by C Chissell

Material: charcoal: *Prunus* sp. (M Robinson 2002)

Initial comment: this sample derives from fill 4514, which comprises the postpipe of posthole 4481, part of the circular structure 4571 located towards the east of the site.

Objectives: as OxA-11878

Calibrated date: *1σ:* 1630–1530 cal BC
2σ: 1670–1500 cal BC

Final comment: see OxA-11878

Laboratory comment: see OxA-11878

OxA–12039 3367 ±28 BP

δ^{13}*C:* -24.8 ±0.2‰

Sample: YFPB96 4514 <5208> (b), submitted in October 2002 by C Chissell

Material: charcoal: *Prunus* sp. (M Robinson 2002)

Initial comment: as OxA-12038

Objectives: as OxA-12038

Calibrated date: *1σ:* 1690–1620 cal BC
2σ: 1750–1610 cal BC

Final comment: see OxA-11878

Laboratory comment: see OxA-11878

OxA–12126 3229 ±29 BP

δ^{13}*C:* -28.0 ±0.2‰

Sample: YFPB96 3869, submitted in September 2002 by C Chissell

Material: carbonised residue (interior)

Initial comment: from a Deverel-Rimbury pottery sherd within the fill 3869 in tree-throw pit 3870. This sherd came from a substantial deposit of pottery in the uppermost and largest fill if the tree-throw pit. This feature appeared to have been reused as a hearth as this fill contained large quantities of burnt local stone, moderate quantities of oak charcoal, as well as the pottery sherds, many of which had charred residues.

Objectives: to confirm the date of the pottery, and also to assist in the dating of particular pottery fabrics.

Calibrated date: *1σ:* 1520–1450 cal BC
2σ: 1610–1430 cal BC

Final comment: G Hey (28 November 2012), the result provided a useful date for Deverel-Rimbury pottery in the sixteenth or earlier fifteenth century cal BC. It assists with establishing the longevity of use of this area.

Yarnton Neolithic and Bronze Age: early and middle Neolithic pits, Oxfordshire

Location: SP 474109
Lat. 51.47.39 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeology), 1992

Archival body: Oxfordshire County Museums Service

Description: of the widespread scatter of pits across the Yarnton landscape, four have been dated by radiocarbon to the early and middle Neolithic.

Objectives: this series of measurements will hopefully provide dates for the individual features and help to establish whether this group of pits is genuinely contemporary and whether the Neolithic occupation on the site represents a single phase of occupation or several separately defined phases.

Final comment: G Hey (28 November 2012), the dating of pits across the floodplain provided important information on the period over which the Yarnton floodplain was occupied, the dates at which different parts of this area were brought into use, and the persistence of this activity.

Laboratory comment: English Heritage (19 June 2014), six further samples from this series were dated prior to 1998 and were published in Bayliss *et al* (2015, 249–50; OxA-4661–2, -6412–3, -7716, and NZA-8679). One further sample was dated after 2003 (SUERC-5686).

References: Bayliss *et al* 2015
Hey *et al* forthcoming

OxA–11513 4440 ±45 BP

δ^{13}*C:* -22.9‰

Sample: YFPB96 3206 4040A, submitted in March 2002 by C Chissell

Material: carbonised plant macrofossil (*Corylus* sp., nutshell) (M Robinson)

Initial comment: from the lower fill of pit 3207. A number of charred hazelnut shells were found in the pit, along with a single grain of free-threshing wheat. It also contained 594 sherds of Peterborough Ware in the Mortlake sub-style, and several retouched flints and small amounts of calcined bone. The pit is one of a pair of discrete features containing special deposits in the south-west of the site, north of the ring-ditch. The feature is very shallow so may have been truncated in the Roman period. The pit is cutting the natural calcareous gravel of the Thames floodplain and is overlain by Roman ploughsoil.

Objectives: to obtain a date for the unusual deposits within pit 3207, including mixed animal and human calcined bones, within the context of the Neolithic and Bronze Age domestic and funerary activities on site 7. It would help us to understand the changing funerary and ritual practices that were being carried out through these periods. The charred nutshell was part of a discrete deposit, apparently deliberately placed at the base of the pit.

Calibrated date: *1σ:* 3320–3010 cal BC
2σ: 3350–2910 cal BC

Final comment: G Hey (28 November 2012), the date is consistent with the presence of Mortlake Ware in the pit and helps to form an understanding of the longevity of practice and changing character of pits with placed deposits, and the periods during which this activity took place on different parts of the floodplain. It also indicates the period over which the use of cremated human remains was appropriate in such contexts.

Laboratory comment: English Heritage (2005), the two measurements obtained from the base of one of a pair of finds-rich pits on the Yarnton floodplain (site 7) are statistically consistent (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978), suggesting that this deposit was made in the last third of the fourth millennium cal BC.

References: Ward and Wilson 1978

OxA–11514 4460 ±45 BP

$\delta^{13}C$: -23.9‰

Sample: YFPB96 3206 4040B, submitted in March 2002 by C Chissell

Material: carbonised plant macrofossil (*Corylus* sp., nutshell) (M Robinson)

Initial comment: as OxA-11513

Objectives: as OxA-11513

Calibrated date: *1σ:* 3330–3020 cal BC
2σ: 3360–2920 cal BC

Final comment: see OxA-11513

Laboratory comment: see OxA-11513

Yarnton Neolithic and Bronze Age: inhumations around U-shaped enclosure, Cresswell Field, Oxfordshire

Location: SP 47001058
Lat. 51.47.28 N; Long. 01.19.07 W

Project manager: G Hey (Oxford Archaeology), 1995

Archival body: Oxfordshire County Museums Service

Description: a U-shaped ditched enclosure (8539) on Cresswell Field, thought to be Neolithic in date on the basis of dated similar examples. There were three inhumations (8633, 8784, and 8772) buried around the enclosure, one lying within its entrance.

Objectives: to date the burials and, by association, the enclosure which failed to yield material suitable for dating.

Final comment: G Hey (28 November 2012), the results supported the hypothesis that the three inhumations were buried around an earlier U-shaped ditched enclosure in the Beaker period.

Laboratory comment: English Heritage (2005), the three burials produced statistically-consistent radiocarbon measurements (T′=1.8; T′(5%)=3.8; ν=2; ward and Wilson 1978), falling towards the end of the third millennium cal BC. Statistically, it is possible that all three individuals were buried within a relatively short period, around 2200 cal BC.

References: Hey *et al* forthcoming
Ward and Wilson 1978

OxA–8806 3785 ±40 BP

$\delta^{13}C$: -20.7‰
$\delta^{15}N$ *(diet)*: +10.9‰
C/N ratio: 3.2

Sample: YCF95 8633, submitted on 26 February 1999 by C Bell

Material: human bone (left femur) (A Boyle)

Initial comment: from an infant inhumation, skeleton 8633 from grave 8620. The grave lay within a U-shaped ditched enclosure of probable late Neolithic/early Bronze Age date. A large grave containing an adult inhumation lay nearby.

Objectives: to establish the date of this burial for which there is no artefactual evidence. This information would then be used to examine its chronological relationship with other burials associated with this monument and those excavated on the floodplain.

Calibrated date: *1σ:* 2290–2140 cal BC
2σ: 2340–2040 cal BC

Final comment: G Hey (28 November 2012), the result has a wide error term, but supports the hypothesis that this burial, which is otherwise undated, formed part of a group of Beaker burials and pits around the earlier U-shaped enclosure.

OxA–8807 3815 ±40 BP

$\delta^{13}C$: -21.1‰
$\delta^{15}N$ *(diet)*: +10.3‰
C/N ratio: 3.4

Sample: YCF95 8784, submitted on 26 February 1999 by C Bell

Material: human bone (right radius) (A Boyle)

Initial comment: from an adult inhumation, skeleton 8784 from grave 8785. The grave lay to the south of a U-shaped ditched enclosure of probable late Neolithic/early Bronze Age date. Another adult inhumation and an infant inhumation lay within the enclosure.

Objectives: as OxA-8806

Calibrated date: *1σ:* 2330–2150 cal BC
2σ: 2460–2130 cal BC

Final comment: see OxA-8806

OxA–8868 3740 ±40 BP

$\delta^{13}C$: -20.6‰
$\delta^{15}N$ *(diet)*: +10.4‰
C/N ratio: 3.2

Sample: YCF95 8772, submitted on 26 February 1999 by C Bell

Material: human bone (right tibia) (A Boyle)

Initial comment: from an adult inhumation, skeleton 8772; grave 8775. The grave lay within the entrance of a U-shaped ditched enclosure of probably late Neolithic/early Bronze Age date. Staining around the body suggested that it had been placed in a log coffin.

Objectives: as OxA-8806

Calibrated date: *1σ:* 2210–2040 cal BC
2σ: 2290–2020 cal BC

Final comment: G Hey (28 November 2012), the style of this burial was typical of the Beaker period, and a sherd of Beaker pottery was recovered from the grave fill. The result was, therefore, in line with expectations and consistent with the dates of the other burials.

Yarnton Neolithic and Bronze Age: later Neolithic and Beaker pits, Oxfordshire

Location: SP 474109
Lat. 51.47.39 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeology), 1991, 1992, and 1996

Archival body: Oxfordshire County Museum Service

Description: a widespread scatter of pits across the Yarnton landscape; three have been dated to the late Neolithic and Beaker periods. This included one on the second gravel terrace on the Yarnton, Worton Rectory Farm site, one on floodplain site 3, and one in an alignment of eight pits running north-east to south-west in the north-west corner of site 7.

Objectives: to establish the longevity of the practice of formalised deposition within pits across the landscape, assess how the materials placed within these pits changed through time, and to show how the pit alignment fitted into the developing framework of settlement and specialised activity on the floodplain.

Final comment: G Hey (28 November 2012), the dates span the late Neolithic and early Bronze Age and demonstrate the repeated use of the Yarnton floodplain and adjacent gravel terrace over this period of time, and the range of deposits that were placed within pits (cremated animals and humans and charred wild foods).

Laboratory comment: English Heritage (19 June 2014), five further samples were submitted for dating prior to 1998 and were published in Bayliss *et al* (2015, 251–3; OxA-4663–5, -6619, and -6774).

References: Bayliss *et al* 2015
Hey *et al* forthcoming

OxA–12040 3645 ±28 BP

$\delta^{13}C$: -23.3 ±0.2‰

Sample: YFPB96 4438 <5171>, submitted in October 2002 by C Chissell

Material: charcoal: *Quercus* sp., sapwood (<2g) (M Robinson 2002)

Initial comment: sample 5172 derived from cremation deposit 4439, and sample 5171 derived from the upper fill 4438, both within pit 4437. This pit formed part of a south-west to north-east pit alignment in the north-west corner of the site.

Objectives: this feature contains cremation deposit found on this part of the floodplain totalling over 2600g of calcined human bone. It is also one of only three large deposits consisting entirely of human bone as opposed to mixed human and animal bone. Obtaining a date for this cremation will help us to understand the funerary practices within the predominantly domestic landscape of site 7 and to relate these with the varied funerary activities found to the east.

Calibrated date: *1σ:* 2040–1950 cal BC
2σ: 2140–1930 cal BC

Final comment: G Hey (28 November 2012), this date is consistent with the recovery of a little Beaker pottery in two other pits on this alignment.

Laboratory comment: English Heritage (2005), this pit dated to the last quarter of the third millennium, and may be contemporary with the dated inhumation burials (8633, 8784, and 8772) clustered around the U-shaped enclosure on Cresswell Field, and also with the tree disturbance within the area of the Neolithic longhouse.

OxA–12110 3540 ±100 BP

$\delta^{13}C$: -25.5 ±0.2‰

Sample: YFPB96 4439 <5172>, submitted in October 2002 by C Chissell

Material: charcoal: *Quercus* sp., sapwood (M Robinson)

Initial comment: as OxA-12040

Objectives: as OxA-12040

Calibrated date: *1σ:* 2030–1740 cal BC
2σ: 2200–1620 cal BC

Final comment: see OxA-12040

Laboratory comment: see OxA-12040

Yarnton Neolithic and Bronze Age: the channel, floodplain section A, Oxfordshire

Location: SP 478110
Lat. 51.47.41 N; Long. 01.18.25 W

Project manager: G Hey (Oxford Archaeology), 1991–2

Archival body: Oxfordshire County Museums Service

Description: a Bronze Age occupation site was uncovered on site 1 in the east of the Yarnton floodplain, with six post-built structures, pits, some with placed deposits, and a waterhole (*see* above). A section was also excavated across a palaeochannel which ran on the south edge of the site. It had its origins in the Devensian but its most intensive use was associated with dumps of wood debris and wooden structures, believed to be associated with the occupation site.

Objectives: to date the sequence found within the channel in order to understand its relationship to the Bronze Age settlement and other activity at Yarnton, and provide a better chronology of landscape change in this area throughout the Holocene.

Final comment: A Bayliss and G Hey (28 November 2012), inorganic sediment filling the early Holocene channel to the south of site 1 on the Yarnton floodplain yielded a small wooden revetment on the south side of the channel (structure 116), which is dated to *800–760 cal BC (95% probability; UB-4062)*, on the basis of the later of two posts (W125 and W126) sampled from this structure. The other post (W126) produced a late Neolithic/early Bronze Age date (UB-4061) and must be reused in this context. However, its presence indicates that the water level in the channel was sufficiently high at the end of the third millennium cal BC for wood to become waterlogged and survive within it for over 1000 years.

Laboratory comment: English Heritage (19 June 2014), two further radiocarbon measurements from this series were obtained prior to 1998 and are published in Bayliss *et al* (2015, 253–4; UB-4061–2).

References: Bayliss *et al* 2015
Hey *et al* forthcoming

GU–5850 2970 ±50 BP

$\delta^{13}C$: -26.3‰

Sample: YFP92 109 (W99), submitted on 7 March 2001 by G Hey

Material: wood (waterlogged): *Quercus* sp., (split) bark/sapwood (M Taylor)

Initial comment: the sample came from woodworking debris found in a palaeochannel at section A (layer 109). It lay between two phases of structural activity within the channel.

Objectives: the woodworking deposit lay between two phases of structural activity within the channel, and will help to date these episodes. It is important to relate this evidence of activity to the significant body of settlement and landscape data from the Bronze Age to the Iron Age, which is emerging from the Yarnton Cassington Project. It will also date a period at which coppicing provides evidence of woodland management.

Calibrated date: *1σ:* 1270–1110 cal BC
2σ: 1390–1010 cal BC

Final comment: G Hey (12 October 2004), the wood that was dated appeared to be contemporary with middle Bronze Age settlement in the adjacent area, and supports the hypothesis that there was use of the river channel at that time. However, its position in the channel shows that it was residual material and must have been reworked.

GU–5855 3340 ±50 BP

$\delta^{13}C$: -26.2‰

Sample: YFP92 109 (W39), submitted on 7 March 2001 by G Hey

Material: wood (waterlogged): *Quercus* sp., heartwood, probably centre of short-lived tree (21 heartwood rings), with sapwood trimmed or eroded (M Taylor)

Initial comment: as GU-5850

Objectives: as GU-5850

Calibrated date: *1σ:* 1690–1530 cal BC
2σ: 1750–1500 cal BC

Final comment: see GU-5850

OxA–10709 2995 ±45 BP

$\delta^{13}C$: -26.4‰

Sample: YFP92A 32a, submitted on 7 March 2001 by G Hey

Material: waterlogged plant macrofossils: *Alnus glutinosa*, catkins (M Robinson)

Initial comment: the sample came from within the lowest layer of organic sediment in the palaeochannel on the Yarnton floodplain (section A, context 32). The material was deposited with silt in a slow-moving channel. It lay at a depth of *c* 2.5m.

Objectives: the sediment from which this sample derives provides valuable evidence for the surrounding environment during the prehistoric period. It is important to be able to relate this evidence to the significant body of settlement and landscape data from the Bronze Age to the Iron Age which is emerging from the Yarnton Cassington project. Its date will also enable an assessment of the period at which the water table began to rise on the Thames floodplain, and from which sediment began to be deposited within the channels. This has implications for understanding the effect of human interference in the landscape and the impact that changing environment had on settlement and landuse patterns.

Calibrated date: *1σ:* 1290–1120 cal BC
2σ: 1400–1050 cal BC

Final comment: G Hey (28 November 2005), this material came from the lowest organic sediment in the channel and shows that the watertable was sufficiently high and the flow sufficiently low for organic sediment to accumulate from the middle Bronze Age.

Laboratory comment: English Heritage (2005), inorganic sediment filling the early Holocene channel to the south of site 1 on the Yarnton Floodplain yielded an OSL age of 9450–6850 BC (at 95% confidence; 866d; fig 14.9). This shows that the channel was active in the early Mesolithic period. The watercourse had filled and dried sufficiently by the fifth millennium cal BC (OxA-10713) for alder trees to grow on the channel bed. This environment prevailed until at least the mid third millennium cal BC (OxA-10739). The earliest organic silts within the channel began to accumulate in the second half of the second millennium cal BC, in the middle Bronze Age (fig 14.10; *start_A*; Hey *et al* forthcoming).

OxA–10710 3145 ±45 BP

δ^{13}*C:* -26.0‰

Sample: YFP92A 32b, submitted on 7 March 2001 by G Hey

Material: waterlogged plant macrofossils (seeds*: Alnus glutinosa, Carex* spp.*, Corylus avellana, Cornus sanguinea, Polygoronum hydropiper,* and *Prunus*/*Cratagus* sp., thorns) (M Robinson 2001)

Initial comment: as OxA-10709

Objectives: as OxA-10709

Calibrated date: *1σ:* 1490–1390 cal BC
2σ: 1510–1290 cal BC

Final comment: see OxA-10709

Laboratory comment: see OxA-10709

OxA–10713 5535 ±50 BP

δ^{13}*C:* -27.6‰

Sample: YFP92A 42b, submitted on 7 March 2001 by G Hey

Material: wood (waterlogged): *Alnus glutinosa*, roots (M Robinson 2001)

Initial comment: the sample came from within generally inorganic late Devensian silts of a palaeochannel on the Yarnton floodplain (section A, context 42). It was roots from a tree, which grew in the channel bed, and lay at a depth of *c* 2.8m.

Objectives: the tree to which the roots belonged grew within the channel at a time when the water table was very low and little or no tree clearance had begun in the area. Its date will provide important information for the period at which such an environment prevailed and a *terminus post quem* for early human presence on the site.

Calibrated date: *1σ:* 4450–4330 cal BC
2σ: 4460–4270 cal BC

Final comment: G Hey (28 November 2012), the alder tree was growing in the dry channel at the very end of the Mesolithic period.

Laboratory comment: English Heritage (2005), inorganic sediment filling the early Holocene channel to the south of site 1 on the Yarnton Floodplain yielded an OSL age of 9450–6850 BC (at 95% confidence; 866d; fig 14.9; Hey *et al* forthcoming). This shows that the channel was active in the early Mesolithic period. The watercourse had filled and dried sufficiently by the fifth millennium cal BC (OxA-10713) for alder trees to grow on the channel bed.

OxA–10739 3995 ±45 BP

δ^{13}*C:* -27.9‰

Sample: YFP92A 42a, submitted on 7 March 2001 by G Hey

Material: wood (waterlogged): *Alnus glutinosa*, roots (M Robinson)

Initial comment: as OxA-10713

Objectives: as OxA-10713

Calibrated date: *1σ:* 2580–2460 cal BC
2σ: 2630–2450 cal BC

Final comment: G Hey (28 November 2012), the sample shows that the watercourse continued to be sufficiently dry for alder trees to grow on the channel bed until at least the mid third millennium cal BC.

Laboratory comment: see OxA-10713

Yarnton Neolithic and Bronze Age: waterholes and burnt stone features, sites 17 and 21, Oxfordshire

Location: SP 474109
Lat. 51.47.39 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeology), 1998

Archival body: Oxfordshire County Museums Service

Description: features uncovered on site 21 revealed a variety of activity taking place during the early Bronze Age. A waterhole, 15014, was dug into the base of the channel and must pre-date the reactivation of this channel. An important deposit of worked wood was dumped into the top of the waterhole after it went out of use, which included a log ladder and a wooden bowl, both made of alder. North of the waterhole was a spread of burnt stone and a pit packed with burnt stone and charcoal. Another waterhole, 15072, was dug on the bank of the channel. A waterhole, 10159, a square-sided pit filled with burnt stone and charcoal, 10022, and spreads of burnt stone were found on the north bank of a palaeochannel on site 17.

Objectives: the objectives in dating this sequence of samples were to place the activity within the overall chronology of settlement at Yarnton, to date the first use of the areas on which these sites were set, to date a series of unusual artefacts, to date important changes in the surrounding vegetation and the rising water table that occurred in the middle Bronze Age.

Final comment: G Hey (28 November 2012), activity on site 17 probably began in the fifteenth century cal BC, overlapping in date with the later features on site 21.

Laboratory comment: English Heritage (6 October 2014), 12 further samples were dated after 2002 (OxA-12838–41, OxA-12862–4, OxA-12885–8, and SUERC-1146).

References: Hey *et al* forthcoming

OxA–8673 3365 ±40 BP

δ^{13}*C:* -26.5‰

Sample: YFPB98 15039 W74, submitted on 26 February 1999 by C Bell

Material: wood (waterlogged): *Corylus*/*Alnus* sp. (M Taylor)

Initial comment: from a log ladder found in waterhole 15014, dug into the base of a shallow palaeochannel.

Objectives: to establish the date of this rare wooden object for which there was no other associated dating evidence. This information would then also be used to provide evidence of the chronology of Bronze Age woodworking technology. It will also assist in dating the good environmental data, which was recovered from this feature.

Calibrated date: *1σ:* 1740–1610 cal BC
2σ: 1750–1530 cal BC

Final comment: G Hey (28 November 2012), the date of this ladder places the waterhole at the beginning of the middle Bronze Age period. This is of additional interest because the water table at this time was still sufficiently low for a waterhole to be dug in the base of a shallow palaeochannel.

Laboratory comment: English Heritage (2005), the log ladder and wooden bowl provide statistically consistent radiocarbon results (T′=3.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978), which suggest that the feature was backfilled in the sixteenth century cal BC.

References: Ward and Wilson 1978

OxA–9779 3258 ±39 BP

$\delta^{13}C$: -25.2‰

Sample: YFPB98 15039 W110, submitted on 26 February 1999 by C Bell

Material: wood (waterlogged): *Alnus* sp. (M Taylor)

Initial comment: the sample is from a wooden bowl from a waterhole dug into the base of a shallow palaeochannel.

Objectives: as OxA-8673

Calibrated date: *1σ:* 1610–1490 cal BC
2σ: 1630–1430 cal BC

Final comment: G Hey (28 November 2012), the wooden bowl produced a good middle Bronze Age date. The date is also of interest because the water table at this time was still sufficiently low for a waterhole to be dug in the base of a shallow palaeochannel.

Laboratory comment: see OxA-8673

Yarnton Saxon and medieval, Oxfordshire

Location: SP 4711 centred on
Lat. 54.47.52 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeological Unit), 1990–6

Description: the Oxford Archaeological Unit excavated a series of sites and landscape features of Saxon and medieval date in the ARC Cassington Pit, in the parishes of Yarnton and Cassington between 1990 and 1996. Saxon settlement was found on the three sites on the higher gravel terrace, at Yarnton, Cresswell Field, Yarnton, and at Worton. At Yarnton, small-scale settlement of earlier Saxon date comprised sunken-featured buildings with associated pits and one possible post-built structure which suggested a shifting settlement pattern. This was replaced in the late-seventh or early-eighth century AD by occupation with a variety of structure types (timber hall buildings, sunken-featured buildings, a possible granary, and dovecote) organised within a defined area with enclosures, fences, tracks, and paddocks. This settlement appears to have been occupied into the later Saxon period. Only 500m west of the Yarnton middle Saxon settlement, in Cresswell Field, a Saxon timber hall, several sunken-featured buildings, pits, and fencelines were located amongst the features of a densely-occupied Iron Age site. Excavation at Worton, 1.5km west of Yarnton along the gravel terrace, has been much more small-scale and is largely based on evaluation evidence, but elements of early Saxon settlement in the form of sunken-featured buildings and pottery, and middle Saxon settlement (a post-in-trench building) have been found.

Objectives: The main objectives of the excavations were to: 1. investigate the period of transition from the late Roman to the Saxon period; 2. understand the choice of Saxon settlement location, its development and changing settlement patterns, and comparing contemporary adjacent sites. Extensive investigation rather than detailed excavation was used to examine these aspects of the archaeological record; 3. reconstruct the landscape in which these settlements were established, understand changing land use strategies from the end of the Roman into the medieval period and assess human impact on the environment. The chronological relationships of different elements of the settlements and landscape were of critical importance in this context, especially given the paucity of pottery and other datable artefacts.

References: Hey 2004

Yarnton Saxon and medieval: causeways, Oxfordshire

Location: SP 474109
Lat. 51.47.39 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeological Unit), 1998

Archival body: Oxfordshire County Museums Service

Description: a number of samples from the causeway at site 22.

Objectives: to date the causeway and assist in dating the sequence at this location.

References: Hey 2004

GU–5771 1270 ±50 BP

$\delta^{13}C$: -28.8‰

Sample: YFPB98 20001a W87, submitted on 26 February 1999 by C Bell

Material: wood (waterlogged): *Corylus*/*Alnus* sp. (M Taylor)

Initial comment: the sample comprises fragments of brushwood debris associated with an early wooden trackway represented by a linear concentration of stakes and brushwood extending across a palaeochannel. A small assemblage of middle Bronze Age pottery was found in association with this trackway.

Objectives: to establish the date of this early wooden trackway and its relationship to adjacent settlement activity. This information would then also be used to provide evidence of the wider stratigraphic sequence of channel deposits and structures found in this area of the channel.

Calibrated date: *1σ:* cal AD 670–780
2σ: cal AD 650–890

Final comment:, this sample is substantially later than the trackway with which it as thought to be associated.

GU–5851 1130 ±50 BP

δ*[13]C:* -28.1‰

Sample: YFPB97 11042, submitted on 7 March 2001 by G Hey

Material: wood (waterlogged): *Corylus* sp., roundwood (M Taylor)

Initial comment: the roundwood was found in organic sediment above a causeway in a palaeochannel on Yarnton floodplain (site 22, context 11042). It was deposited at the top edge of the causeway, post-dating its construction.

Objectives: the roundwood will provide a *terminus ante quem* for the causeway and will assist in dating the sequence, which is providing valuable evidence for the surrounding environment during the prehistoric period. It is important to be able to relate this evidence to the significant body of settlement and landscape date from the Bronze Age to the Iron Age, which is emerging from the Yarnton Cassington Project.

Calibrated date: *1σ:* cal AD 780–990
2σ: cal AD 770–1020

Final comment:, the wood dates to the early medieval rather than Iron Age period as expected.

GU–5854 1250 ±50 BP

δ*[13]C:* -26.8‰

Sample: YFPB98 18115 (W125), submitted on 7 March 2001 by G Hey

Material: wood (waterlogged): *Quercus* sp., roundwood (coppice heel) (M Taylor)

Initial comment: an upright which formed part of a double row of posts on the west side of an Iron Age stone causeway 13012.

Objectives: as GU-5851

Calibrated date: *1σ:* cal AD 680–860
2σ: cal AD 660–900

Final comment: see GU-5851

OxA–10712 1170 ±40 BP

δ*[13]C:* -25.8‰

Sample: YFPB97 11041, submitted on 7 March 2001 by G Hey

Material: waterlogged plant macrofossils (seeds, *Carex spp., Aethusa cynapium, Ranunculus cf. repens,* and *Iris pseudacorius*) (M Robinson)

Initial comment: the sample came from organic sediment beneath a causeway in a palaeochannel on Yarnton floodplain (site 22, context 11041). The material was deposited with silt in the slow moving channel, which cut through calcareous gravel.

Objectives: the sediment from which this sample derives provides valuable evidence for the surrounding environment during the prehistoric period. It is important to be able to relate this evidence to the significant body of settlement and landscape date from the Bronze Age to the Iron Age, which is emerging from the Yarnton Cassington Project. The date will also enable an assessment of the period at which the water table began to rise on the Thames floodplain, and form which sediment began to be deposited within the channels. This has implications for understanding the effect of human interference in the landscape and the impact that a changing environment had on settlement and land use patterns.

Calibrated date: *1σ:* cal AD 770–950
2σ: cal AD 720–980

Final comment: see GU-5851

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RADIOCARBON DATES

This volume holds a datelist of 1195 radiocarbon determinations carried out between 1998 and 2003 on behalf of the Centre for Archaeology of English Heritage. It contains supporting information about the samples and the sites producing them, a comprehensive bibliography, and two indexes for reference and analysis. An introduction provides discussion of the character and taphonomy of the dated samples and information about the methods used for the analyses reported and their calibration.

The datelist has been collated from information provided by the submitters of the samples and the dating laboratories. Many of the sites and projects from which dates have been obtained are now published, although developments in statistical methodologies for the interpretation of radiocarbon dates since these measurements were made may allow revised chronological models to be constructed on the basis of these dates. The purpose of this volume is to provide easy access to the raw scientific and contextual data which may be used in further research.

Front cover: Sunrise at Holme Next The Sea, Norfolk
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Back cover: Isolating carbonised plant remains for radiocarbon dating
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