RADIOCARBON DATES

from samples funded by English Heritage between 1993 and 1998

Alex Bayliss, Christopher Bronk Ramsey, Gordon Cook, Gerry McCormac, and Peter Marshall

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Radiocarbon Dates funded by English Heritage between 1993 and 1998

Introduction

This volume presents a detailed catalogue of the radiocarbon dates funded by English Heritage between April 1993 and March 1998[1]. In total, details of 1063 determinations are provided.

Only samples from sites in which English Heritage had a formal interest were eligible for dating through the Ancient Monuments Laboratory. 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, 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, 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). Many samples were also submitted from the large-scale archaeological surveys of wetlands – in the Humber, the counties of the North-West, and in the East Anglian Fens – which were undertaken at this time. Others came from threatened sites or unexpected discoveries on the foreshore.

A major focus of research during these years, however, was the post-excavation analysis of sites that had been excavated with funding from English Heritage and its predecessors before the implementation of PPG16 (1990). This volume covers the period when a number of large-scale post-excavation programmes were underway. These covered all periods of English archaeology, from important evidence for hunter-gatherers in the late glacial and early Holocene at Three Ways Wharf, Uxbridge, Middlesex (Lewis with Rackham 2011), to long-running research into the early Neolithic monument complex on Hambledon Hill, Dorset (Mercer and Healy 2008), to large-scale Saxon and medieval evidence that had been recovered by excavations that had been undertaken in advance of the development of Castle Mall, Norwich, Norfolk (Fig 1; Shepherd Popescu 2009a).

Fig 1. *Excavation at Castle Mall, Norwich (© NPS Archaeology)*

This volume covers a period of transition in the use of radiocarbon dating in archaeology. Although the first papers introducing a Bayesian approach to the interpretation of radiocarbon dates had already appeared (Naylor and Smith 1988; Buck *et al* 1991; 1992), the technique could only be applied on a routine basis once software was available for its implementation. The release of the first version of OxCal in August 1993 (Bronk Ramsey 1994; 1995) thus changed everything.

This is not to say that the Bayesian process as it has since developed (Bayliss and Bronk 2004; Bayliss 2009) sprung into being fully formed. The need to employ statistical distributions to counteract the scatter on a group of radiocarbon dates was not always fully appreciated at this time (Bayliss 1995; Bayliss *et al* 1996; Steier and Rom 2000; Bronk Ramsey 2000). Methods of statistical simulation to aid sample selection were primitive (Bayliss and Orton 1994), and above all the consequences of chronological modelling for the types of archaeological materials that should be submitted for dating had still to be elicited through experience.

But Bayesian statistical modelling was now routine practice on projects funded by English Heritage: all sites that merited the approach were sampled and dated with a Bayesian framework. Chronological models were not grafted on to suites of existing radiocarbon dates, rather the archaeological problem was addressed from a Bayesian perspective from the outset. At this time about two-thirds of projects funded by English Heritage had radiocarbon dating programmes that were designed within a Bayesian framework, although its implementation was uneven with around 85% of samples from excavations being selected in this way, but only 10% of samples from archaeological surveys (Bayliss and Bronk Ramsey 2004, fig 1).

The impact on the precision of dating that could be provided for archaeological sites was immediately apparent, nowhere more visibly than at Stonehenge, Wiltshire (Fig 2), where radiocarbon dating and chronological modelling was undertaken as part of a landmark programme of post-excavation and analysis which led to the publication of the twentieth-century excavations (Cleal *et al* 1995).

Between 1993 and 1998 English Heritage maintained collaborative research arrangements with three radiocarbon dating facilities (Fig 3). Conventional radiocarbon dating was provided by the laboratory at the Scottish Universities Research and Reactor Centre (SURRC) using liquid scintillation counting (LSC), with high-precision measurements, also undertaken using liquid scintillation spectrometry, provided by the laboratory of the Queen's University, Belfast. The Oxford Radiocarbon Accelerator Unit continued to provide measurements by accelerator mass spectrometry (AMS). Occasionally a sample submitted for conventional dating provided insufficient carbon for measurement by liquid scintillation counting, and so the combusted carbon dioxide would be graphitised and dated by accelerator mass spectrometry (at the NSF-Arizona AMS Facility, University of Arizona, USA). Occasionally a replicate measurement might be required on an AMS sample, in which case a second sample was sent to the Rafter Radiocarbon Laboratory, New Zealand.

Between 1993 and 1998, the proportion of radiocarbon measurements that were measured by AMS increased to almost half (Fig 4). Not only had AMS dating become more widely available as new facilities were established around the world, but the precision of measurements made by AMS had improved. The median quoted error on AMS determinations reported in this volume, for example, is ±50 BP. This is the same as the median error term quoted on conventional radiocarbon dates from SURRC. Both are, however, considerably higher than the median error term quoted for measurements obtained by high-precision liquid scintillation counting (which is ±20 BP).

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

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).

Fig 2. *The sarsen circle at Stonehenge [AA042086] (© Historic England)*

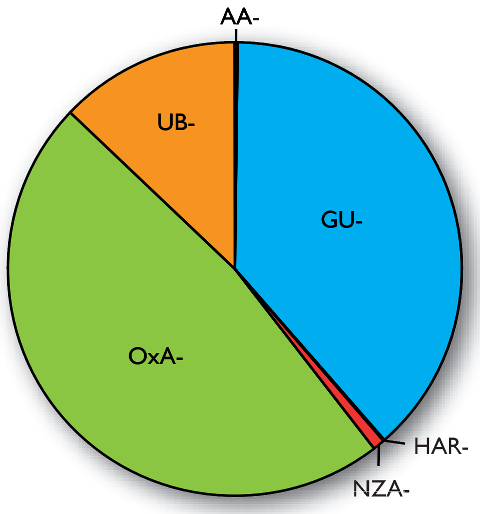

Fig 3. *Proportion of radiocarbon measurements included in this volume processed by each collaborating facility (AA-, NSF Arizona AMS Facility; GU-, Scottish Universities Research and Reactor Centre; HAR-, AERE Harwell; NZA- Rafter Radiocarbon Laboratory; OxA-, Oxford Radiocarbon Accelerator Unit; UB-, The Queen's University, Belfast Radiocarbon Dating Laboratory).*

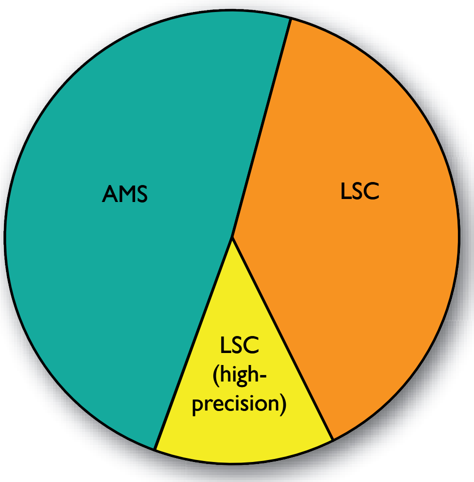

Fig 4. *Techniques of radiocarbon dating used for the measurements reported in this volume (LSC, liquid scintillation counting; LSC (high-precision), high-precision liquid scintillation counting; AMS, accelerator mass spectrometry).*

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, at the time the measurements in this datelist were produced, calibration of the radiocarbon timescale had only recently been extended back to 9440 BC (Pearson *et al* 1993; Kronmer and Becker 1993). Thus, although all the comments were made on calibrated dates, this was within a framework of archaeological understanding that was often based on the corpus of existing uncalibrated radiocarbon measurements. Many interpretations were based on suites of dates that had been interpreted with the aid of Bayesian statistical models. But 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* 2012). 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 is 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 many of the measurements made at the Oxford Radiocarbon Accelerator Unit (Hedges *et al* 1994–8; Bronk Ramsey *et al* 1999, 2000a–b, 2002).

Sampling strategies

As the availability and 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 required, but generally the question was not whether sufficient datable samples could be found, but rather which samples should be dated from the many thousands of organic items recovered on a particular site.

Table 1. Typical quantities of material required for different radiocarbon measurement techniques in 1993–8.

Material	LSC	LSC high-precision	AMS
Charcoal	10g	25g+	1 fragment
Wood (wet)	100g	200g+	1g
Peat (wet)	200g	400g+	2g
Bone and antler	200g	800g+	2g

Initial attempts at applying formal statistical approaches to sampling (Bayliss and Orton 1994; Buck and Christen 1998), tended to flounder in the face of the realities of sample taphonomy and radiocarbon measurement. It soon became apparent that what was needed was a pragmatic mix of statistical, scientific, and archaeological criteria.

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, multiple samples were submitted from the initial ditch fills and bank make-up of Fleam Dyke (see below, p00) on the basis that the latest of the disarticulated bones would provide the closest indication of the date when the earthwork was constructed.

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. With the reduction in the need for very large samples, however, random replication was increasingly feasible.

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 turn-around times between sampling submission and the reporting of results were typically six months or more.

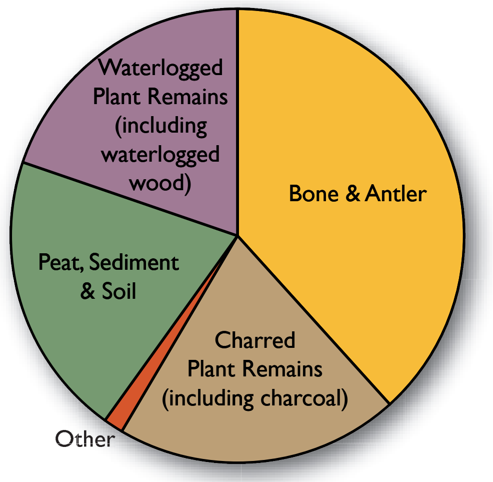

Fig 5. *Types of material dated*

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 5), bone and antler (38%), charcoal and other charred plant remains (20%), peat and other sediments (20%), and waterlogged plant remains (20%) constituted the majority of samples, whilst charred residues on pottery sherds, marine shell, soot-blackened thatch, and unspecified organic matter (in this case waterlogged horse dung from St Aldates, Oxford, see below p136) were dated only occasionally. During the period when these measurements were undertaken, charred and calcined bone could not be dated reliably using radiocarbon.

As sample size became less of a constraint on sample selection, the majority of samples (66%) consisted of material which originally derived from a single organism. Around a third of the dated samples, however, consisted of bulked material which originally derived from different living organisms. As highlighted by Ashmore (1999), this runs the risk that the sample will include fragments of various ages, giving a radiocarbon measurement that is the mean of all and the age of none. On the premise that a context will always date to the latest material within it, however, such samples should at the very least provide reliable *termini post quos* for the contexts from which they were recovered.

In some circumstances, however, bulk material may provide the best (or only) means of dating particular deposits (Fig 6). 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. Such samples comprise almost two-thirds (64%) of all bulk samples included in this volume. Another substantial category of bulk samples (15%) 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 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

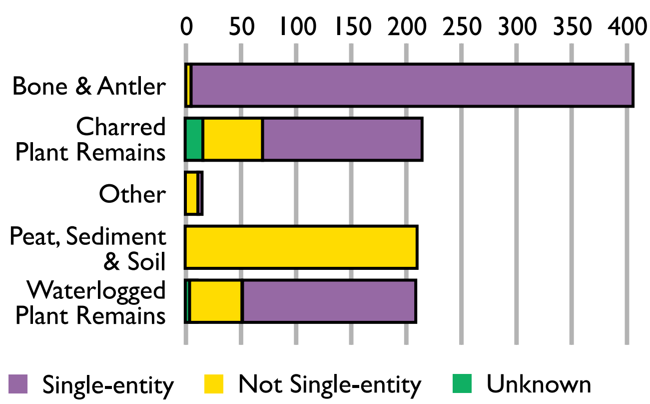

Fig 6. *Single-entity and bulk samples by material type.*

Fig 7. *Wattle panel found on the foreshore at Hartlepool, Carr House Sands, Cleveland (© Historic England and Durham University, photograph by Jennifer Jones).*

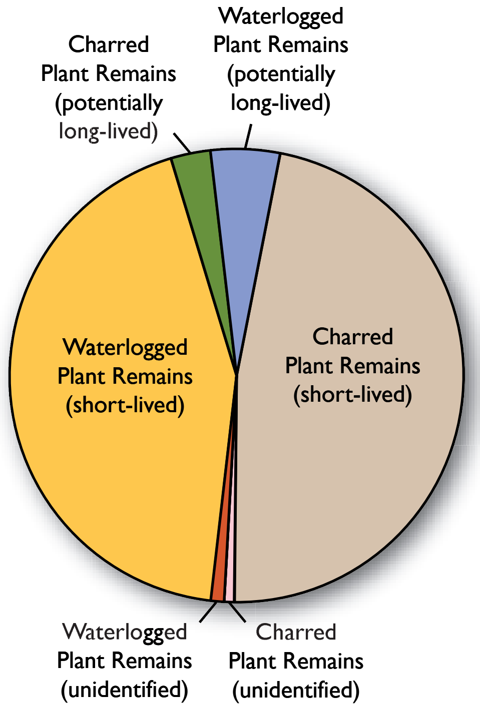

Fig 8. *Identification of samples of charred and waterlogged plant remains (including charcoal and waterlogged wood).*

material that was interpreted as functionally associated with a discrete archaeological episode, such as the firing of a hearth or the construction of a structure. Examples include bulked charcoal of short-lived species from a series of early medieval hearths at Tintagel Castle, Camelford, Cornwall (see below, p186–9) or waterlogged hazel withies from a Neolithic wattle panel found on the foreshore at Hartlepool, Carr House Sands, Cleveland (see below, p75; Fig 7). In a number of cases, replicate measurements on a series of single-entity short-lived fragments from the same deposits suggest that the bulking of material in this type of situation can be justified archaeologically (Bayliss and Harry 1997; Bayliss 1999; Crowson and Bayliss 1999).

All but seven of the samples reported in this volume (three of charcoal and four of waterlogged wood), 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 roundwood), 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 33 samples of charcoal or waterlogged wood consisted of a species of tree which lives to some age (eg oak or ash), or contained a component of such a species (Fig 8). These samples could have an old-wood offset of several centuries, if wood from the centre of a mature tree was sampled. Not all such samples will have an appreciable offset, however, as a sapling or branch or sapwood may have been dated and for conventional samples, even when a mature tree was dated, the majority of the wood would have derived from the later rings, rather than the centre pith. 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 majority of the reported samples (Fig 5). Almost two thirds of these samples are of human bone, which formed the material for 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* 2004b).

Although, in areas such as Britain that are largely 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.

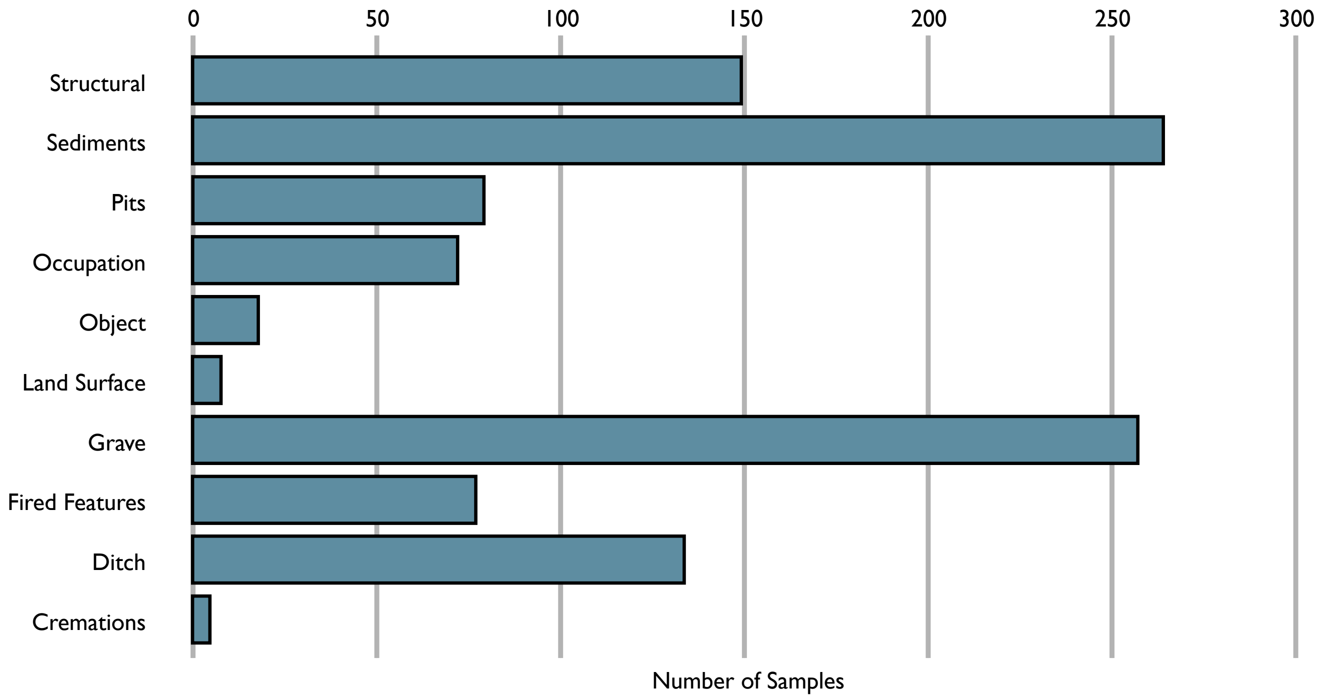

Fig 9. *Contexts of dated samples.*

Fig 10. *Tip of an antler pick found embedded in the chalk at the base of the phase 1 ditch at Stonehenge.*

From the start of 1996, however, $\delta^{15}N$ values were obtained on most of the 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, and so act as a warning that the resultant chronologies should be interpreted with an appropriate degree of caution. Only more recently has it become possible to attempt to account for mixed dietary sources in the calibration process (Bronk Ramsey 2001).

Peat, sediment, and soil constitute the last type of sample that was frequently dated (Fig 5). 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 9. The largest group is provided by sedimentary units, which produced a quarter of the material dated. In the majority of cases (82%) the bulk organic content of a 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 or charcoal were isolated from a deposit and dated. Even when dating 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 forming deposit, 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).

Pits and ditches make up just over 20% of sampled contexts (Fig 9), with most samples being composed of short-lived charred plant remains or animal bone and antler. The association of these samples with the construction and filling of the pits and ditches concerned is of variable security. Samples such as the articulating cattle acetabulum and femur from a lower fill of the Stepleton inner outwork at Hambledon Hill, Dorset (UB-4135; see below p69) must be contemporary with their deposition. Antler tools, such as those from the base of the phase 1 ditch at Stonehenge, Wiltshire (UB-3787–94, see below p166–9), may be functionally associated with construction (Fig 10). Charred plant remains may be similarly functionally associated with these contexts, for example the charred Maloideae thought to have been part of the burned Stepleton inner outwork at Hambledon Hill (OxA-7030, see below p70). In other cases the taphonomy of the dated material is much less certain. For example, it is unclear how the disarticulated sheep/goat metatarsal from an early fill of Fleam Dyke, Cambridgeshire (OxA-5351, see below p19–21) came to be in this context. Similar taphonomic considerations apply to samples from occupation deposits, such as middens, which make up another 7% of samples included in this datelist.

Almost all radiocarbon dates on human bone reported in this datelist come from graves containing articulated human skeletons. Here the articulation of the bones provides good evidence that the individual had recently died when their body was buried, and so the radiocarbon date should be close in age to that of the burial. Short-lived charred plant remains were dated from cremation deposits. The dated material in these contexts was probably derived from fuel used in the cremation process, and so is again functionally related to the deposit from which the dated material was recovered. These funerary contexts furnished a quarter of the samples included in this volume.

Similar functional arguments relate to short-lived charred material recovered from fired-features, such as hearths and kilns, which provide another 7% of samples.

A further 14% derive from structural contexts (Fig 9). 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. Although 85% of these samples consisted of short-life material, and so avoid the potential for an old-wood offset, complications can still 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 again 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.

A small number of samples were dated from old land surfaces (Fig 9). Here the objective was usually to provide a *terminus post quem* for the construction of an overlying earthwork (eg OxA-5080–3 from the Long Mynd, Shropshire, see below p108–9), rather than to date the activity on the old land surface itself.

The final class of material that was submitted for dating comprises those samples which are of intrinsic interest. In these cases, the context of the find is irrelevant. Such material includes finds such as a beaver bone from a potentially Saxon context at West Cotton, Northamptonshire (OxA-4740, see below p151).

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), combusted to carbon dioxide,

Fig 11. *Robert Anderson synthesising benzene at the Scottish Universities Research and Reactor Centre. (© Historic England, photography by Amanda Grieve)*

converted to benzene using a chromium-activated catalyst (Fig 11), 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 samples underwent an acid-alkali-alkali-acid pretreatment protocol (Olsson 1979). For charred and waterlogged plant remains the alkali- and acid-insoluble fraction was dated. Wood samples underwent an additional stage of bleaching with a hypochlorite solution before combustion. For peats 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), the acid- and alkali-insoluble 'humin' fraction, or all three of these fractions combined (the 'acid-washed' fraction). The chemical fraction selected for dating for each peat sample dated at the Scottish Research and Reactor Centre is noted in the datelist. The shell sample was scrubbed with an abrasive and cleaned in a sonic bath for 30 minutes, before a further abrasive scrub. It was then hydrolysed with sufficient hydrochloric acid (2M) to remove the outer 20% of the shell. The remaining material was then hydrolysed under vacuum using further hydrochloric acid. The resultant carbon dioxide was then purified and converted to benzene as described by Stenhouse and Baxter (1983).

Two samples, following pre-treatment and combustion for conventional dating, produced insufficient carbon dioxide for benzene synthesis. Sub-samples of carbon dioxide were sent to the NSF-Arizona AMS Facility (AA-11769–70, see p193–4), where they were graphitised and dated by accelerator mass spectrometry as described by Slota *et al* (1987) and Linick *et al* (1986).

At the Oxford Radiocarbon Accelerator Unit, samples of charcoal and carbonised plant macrofossils, were usually pretreated using the acid-alkali-acid protocol described by Hedges *et al* (1989; pre-treatment code ZR in Brock *et al* (2010, table 1)). Where samples were so fragile that they would not withstand the alkali step, the alkali step was omitted (pre-treatment code RR in Brock *et al* (2010, table 1)); in such cases there is an increased chance of humic contaminants remaining in the dated material. Where this is the case this is indicated by a laboratory comment in the datelist. This was also the method used for pretreatment of carbonised residues on pottery sherds with laboratory numbers below OxA-7927; residues with laboratory numbers above this were pretreated using an alkali step (Brock *et al* (2010, table 1 (RR and ZR)).

Bone and antler samples in this datelist with laboratory numbers below OxA-7000 were pretreated as described by Hedges *et al* (1989), and the extracted protein purified using the ion exchange protocol outlined in Hedges and Law (1989) and Law and Hedges (1989)(pre-treatment code AI). Protein was extracted from the other bone and antler samples dated at Oxford during this period using the method described by Bronk Ramsey *et al* (2000b) and Brock *et al* (2010), table 1 pre-treatment code AG). Two samples, OxA-9352 and OxA-9667 from Binchester: syphilitic burial were gelatinised and ultra-filtered as described by Bronk Ramsey *et al* (2000a). Although this method was subsequently replaced by an improved version, since the original protocol could on occasion produce measurements which were slightly too old, the consistency of the replicate measurments on this burial suggests that these measurements are accurate and were not affected by the laboratory issue subsequently identified (Bronk Ramsey *et al* 2004).

Waterlogged wood, plant remains, and peat 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 particularly fragile samples, the bleaching step was omitted (Hedges *et al* 1989, and see Brock *et al* 2010, table 1 (VV or WW)), and very occasionally the alkali step as well (Brock *et al* 2010, 108 (RR). Where the bleaching step has been omitted, this is indicated by a laboratory comment in the datelist. Other organic sediments were pretreated using an acid-alkali-acid protocol, with a solvent extraction (acetone or chloroform) after the first acid step (pre-treatment code SS), although, exceptionally, OxA-7161–2 from Wootton-Quarr: Ranalagh Spit, Ryde, 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). The acid- and alkali-insoluble, 'humin', fraction was selected for dating.

Samples were then combusted to carbon dioxide (Hedges *et al* 1992). Those with laboratory numbers below OxA-6293 were measured by accelerator mass spectrometry using the carbon dioxide ion-source (Bronk and Hedges 1990). The other Oxford measurements in this volume were made using a hybrid carbon dioxide and graphite ion source (Bronk Ramsey and Hedges 1997; Fig 12). During the period when the measurements reported in this volume were made, 40% of samples were dated by introducing carbon dioxide into the hybrid ion-source and 60% using graphite targets. Graphitisation was undertaken as described by Dee and Bronk Ramsey (2000).

At the Belfast Radiocarbon Dating Laboratory samples of charcoal, carbonised plant remains, and waterlogged wood were pretreated using an acid-alkali-acid protocol (Mook and 1985). Some samples of waterlogged wood were also bleached to de-lignify and extract holocellulose as described by Green

Fig 12. *The hybrid ion source at the Oxford Radiocarbon Accelerator Unit (© Oxford Radiocarbon Accelerator Unit, photography by Christopher Ramsey)*

Fig 13. *Loading a sample into a Liquid Scintillation Counter for radiocarbon dating at the Queen's University, Belfast (© Historic England, photography by Amanda Grieve)*

(1963). Laboratory comments in the datelist indicate samples processed in this way. 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 (pH 2) demineralised water, heated to 90ºC 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), and dated by liquid scintillation spectrometry (Pearson 1984; McCormac 1992; McCormac *et al* 1993; Fig 13). Some samples were combusted and converted to benzene using the small sample system described by Wilson *et al* (1996). These samples are indicated by laboratory comments in the datelist.

The sample dated at AERE Harwell was pretreated using the standard acid-base-acid protocol (Otlet and Slade 1974). It was then combusted to carbon dioxide (Switsur 1972; Switsur *et al* 1974) and synthesised to benzene using a method similar to that initially described by Tamers (1965) and a vanadium based catalyst (Otlet 1977). Procedures for liquid scintillation counting and error calculation are described by Otlet (1979) and Otlet and Warchal (1978).

Samples dated at the Rafter radiocarbon laboratory were processed and dated 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. One sample (OxA-7897, from the Thames Foreshore at Richmond, see below p179) dates to after AD 1950. The radiocarbon content of this sample 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 Oxford Radiocarbon Accelerator Unit.

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; 2009), and the dataset for terrestrial samples from the Northern hemisphere published by Reimer *et al* (2013). The single modern result (OxA-7897) has 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 result, 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 UB-3794, a determination on an antler rake found on the bottom of the phase 1 ditch at Stonehenge, Wiltshire (see below p169). This measurement (4432 ±22 BP) calibrates to 3310–2945 cal BC (at 2σ) and 3260–3020 cal BC (at 1σ) using the maximum intercept method. The calibration of this sample using the probability method (Stuiver and Reimer 1993) is shown in Figure 14. It can be seen that some parts of the calibrated range are more probable than others: it is, for example, much more probable that this sample dates to the 31st century cal BC than that it dates to the 32nd century cal BC. 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

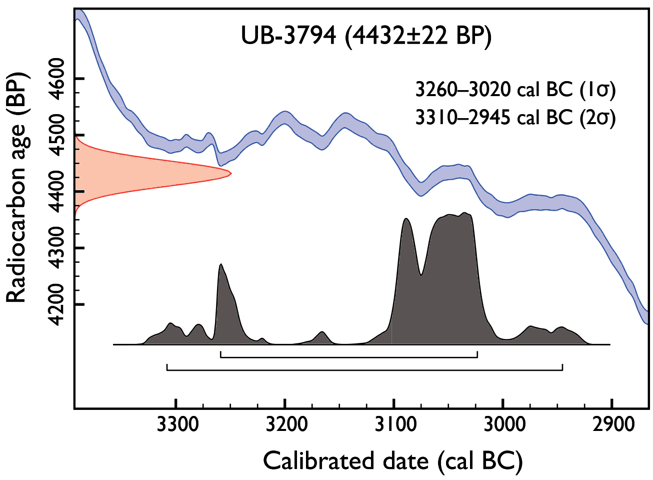

Fig 14. *Calibrated radiocarbon date for UB-3794.*

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).

A two-stage Third International Radiocarbon Inter-comparison study (TIRI) was carried out between 1991 and 1994. All the laboratories whose measurements are reported in this datelist paticipated in the first stage of this project, with the Oxford Radiocarbon Accelerator Unit and the Scottish Universities Research and Reactor Centre also processing the optional samples that formed stage 2 (Scott 2003, tables 3.1 and 4.1).

In common with subsequent international inter-comparison exercises, only the anonymised analysis of the reported results has been published (Scott 2003). 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, although anomalous observations were found, there was no evidence that these occurred on a frequent basis. Fifty-five of the 69 participating laboratories were found to have no significant bias in their results. There was, however, some evidence that quoted errors were often slight under-estimates of actual errors (Scott 2003, 327). 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 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. The results of a series of known-age tree-rings measured with the samples dated from Stonehenge, Wiltshire (see below, p165–76), however, have been reported (Allen and Bayliss 1995, 516–7). These results can be compared with the consensus values of TIRI samples B and D, and with the measured values of these calendar dates used in the calibration curve. No significant differences were found.

One of the principal methods for assessing the reproducibility of a dating laboratory is to consider the variation in replicate measurements made on the same material. There are 90 sets of replicate measurements relevant to dated samples reported in this volume, with eight samples having more than two measurements. These results are listed in Table 2. The differences between pairs of measurements on the same material are illustrated in Figure 15.

Some of these replicate measurements were undertaken at the time the original results were produced as part of the internal quality assurance procedures of the collaborating laboratories, and some were undertaken on a random basis as part of the quality assurance procedures for the radiocarbon dating funded by English Heritage. Many, however, were undertaken either to explore the dating of different fractions of a sample or to validate results which were unexpected. Some are replicate measurements that have been undertaken on these samples subsequently, as part of later studies.

There are a total of 86 measurements on 39 bone and antler samples, including three 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 four or five 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, six 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 (GU-5503 and GU-5682 from Wharram Percy: cemetery (replicates), UB-4138 and OxA-7041 from Hambledon Hill: Stepleton enclosure, and the group of nine measurements on the syphilitic skeleton from Binchester; Table 2). In the three other cases, one measurement in the group is clearly problematic. GU-5281, from a burial beneath Lichfield Cathedral, Staffordshire (see below, p106) was re-measured because it was clearly anomalously early. This laboratory problem was eventually traced to an oxygen cylinder that was contaminated with dead carbon dioxide. OxA-6792 from Ipswich, Buttermarket/St Stephen's Lane, Suffolk (see below, p96–7) is clearly anomalously recent, since the other four measurements on this skeleton are statistically consistent (T'=3.0; T'(5%)=7.8; =3), and OxA-6828 on a bone comb from Yarnton Saxon and medieval: Cresswell Field settlement, Oxfordshire (see below, p256) is probably anomalously old, since this date does not agree with the typological dating of this type of artefact or with the other dates from the settlement.

Table 2. Replicate radiocarbon measurements for samples included in this datelist; entries in red are statistically significantly different at 95% confidence (Ward and Wilson 1978). LSC = 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)
Amble: Bondicarr	human bone	OxA-5553	3615±45	AMS	T'=0.0; T'(5%)=3.8; v=1
		OxA-5554	3630±55	AMS	
Amble: Bondicarr	human bone	OxA-5555	3410±55	AMS	T'=0.1; T'(5%)=3.8; v=1
		OxA-5556	3430±55	AMS	
Askham Bog	waterlogged plant macrofossils	OxA-6974	350±35	AMS	T'=0.6; T'(5%)=3.8; v=1
		OxA-6975	385±30	AMS	
Binchester: syphilitic burial	human bone	NZA-7779	1279±86	AMS	T'=18.2; T'(5%)=15.5; v=8
		NZA-7780	1196±67	AMS	
		NZA-7781	1133±85	AMS	
		NZA-7840	1282±74	AMS	
		NZA-7841	1352±67	AMS	
		NZA-7843	1054±79	AMS	
		OxA-7639	1350±40	AMS	
		OxA-9532	1315±34	AMS	
		OxA-9667	1315±30	AMS	
Bodmin Moor Pollen Project: Rough Tor South	peat (humic acid)	GU-5608	1630±50	LSC	T'=4.5; T'(5%)=3.8; v=1
	peat (humin)	GU-5607	1390±100	LSC	
Brighton Bypass: Downsview	charcoal	GU-5432	2980±70	LSC	T'=0.2; T'(5%)=3.8; v=1
		GU-5433	3020±60	LSC	
Brighton Bypass: Downsview	charcoal	UB-3783	3201±28	HP	T'=1.5; T'(5%)=7.8; v=3
		UB-3784	3175±25	HP	
		UB-3785	3199±27	HP	
		UB-3786	3220±27	HP	
Castle Hill: Ring-Ditches	human bone	OxA-4807	3675±65	AMS	T'=0.1; T'(5%)=3.8; v=1
		OxA-4808	3645±55	AMS	
Creeton Quarry	charcoal	UB-4093	1912±20	HP	T'=0.4; T'(5%)=3.8; v=1
		UB-4094	1930±20	HP	
Deeping St Nicholas	human bone	GU-5342	3440±60	LSC	T'=0.3; T'(5%)=3.8; v=1
		GU-5343	3500±100	LSC	
Deeping St Nicholas	human bone	GU-5344	3350±70	LSC	T'=0.1; T'(5%)=3.8; v=1

Site	Material	Laboratory Number	Radiocarbon Age (BP)	Method	Ward and Wilson (1978)
		GU-5345	3380±60	LSC	
Deeping St Nicholas	human bone	GU-5355	3540±60	LSC	T'=0.3; T'(5%)=3.8; v=1
		GU-5358	3570±50	LSC	
Duckpool	charcoal	OxA-5067	1120±50	AMS	T'=1.6; T'(5%)=3.8; v=1
		OxA-5068	1210±50	AMS	
Fenland Management Project: Downham West	peat (humic acid)	GU-5520	3070±50	LSC	T'=0.0; T'(5%)=3.8; v=1
	peat (humin)	GU-5521	3080±50	LSC	
Fenland Management Project: Feltwell Anchor	human bone	GU-5571	3540±60	LSC	T'=2.3; T'(5%)=3.8; v=1
		GU-5572	3670±60	LSC	
Fenland Management Project:	peat (humic acid)	GU-5518	2330±50	LSC	T'=3.4; T'(5%)=3.8; v=1
London Lode Farm, Nordelph	peat (humin)	GU-5519	2460±50	LSC	
Fenland Management Project: Market Deeping	waterlogged wood	UB-4112	2342±19	HP	T'=21.0; T'(5%)=3.8; v=1
		UB-4300	2453±15	HP	
Fenland Management Project:	charcoal	UB-4100	3706±21	HP	T'=8.1; T'(5%)=9.5; v=4
Northwold burnt mound	charcoal	OxA-6626	3750±55	AMS	
	charcoal	OxA-6726	3770±55	AMS	
	charcoal	OxA-6823	3840±55	AMS	
	charcoal	OxA-6846	3650±55	AMS	
Fenland Management Project:	charcoal	UB-4101	3746±22	HP	T'=1.1; T'(5%)=9.5; v=4
Northwold burnt mound	charcoal	OxA-6847	3730±60	AMS	
	charcoal	OxA-6848	3700±50	AMS	
	charcoal	OxA-6849	3765±45	AMS	
	charcoal	OxA-6850	3755±45	AMS	
Hambledon Hill: main enclosure 1	animal bone	OxA-7097	4855±60	AMS	T'=0.0; T'(5%)=3.8; v=1
		OxA-7098	4870±40	AMS	
Hambledon Hill: main enclosure 2	animal bone	OxA-7019	4725±60	AMS	T'=1.5; T'(5%)=3.8; v=1
		OxA-7058	4625±55	AMS	
Hambledon Hill: main enclosure 2	animal bone	OxA-7020	4800±65	AMS	T'=0.0; T'(5%)=3.8; v=1
		OxA-7021	4800±65	AMS	
Hambledon Hill: main enclosure 2	animal bone	OxA-7022	4835±55	AMS	T'=2.5; T'(5%)=3.8; v=1
		OxA-7023	4700±65	AMS	
Hambledon Hill: main enclosure 2	human bone	OxA-7039	4550±60	AMS	T'=0.0; T'(5%)=3.8; v=1
		OxA-7040	4565±60	AMS	
Hambledon Hill: main enclosure 2	human bone	OxA-7068	4810±45	AMS	T'=0.0; T'(5%)=3.8; v=1
		OxA-7069	4795±50	AMS	
Hambledon Hill: main enclosure 3	animal bone	OxA-7773	4765±45	AMS	T'=0.4; T'(5%)=3.8; v=1
		OxA-7774	4725±40	AMS	
Hambledon Hill: Shroton Spur	animal bone	OxA-7037	4710±55	AMS	T'=0.5; T'(5%)=3.8; v=1
		OxA-7038	4770±60	AMS	
Hambledon Hill: Stepleton enclosure	animal bone	OxA-7041	4485±60	AMS	T'=6.5; T'(5%)=3.8; v=1
		UB-4138	4648±21	HP	
Hambledon Hill: Stepleton enclosure	carbonised residue	OxA-7844	4685±55	AMS	T'=6.9; T'(5%)=3.8; v=1
		OxA-7926	4845±50	AMS	
Hambledon Hill: Stepleton enclosure	charcoal	OxA-7048	4670±40	AMS	T'=1.5; T'(5%)=3.8; v=1
		OxA-7049	4740±45	AMS	
Hambledon Hill: Stepleton inner outwork	animal bone	OxA-7026	4820±60	AMS	T'=3.6; T'(5%)=3.8; v=1
		OxA-7059	4660±60	AMS	
Hambledon Hill: Stepleton inner outwork	human bone	OxA-7044	4560±55	AMS	T'=1.1; T'(5%)=3.8; v=1
		OxA-7045	4645±60	AMS	
Hambledon Hill: Stepleton middle outwork	animal bone	OxA-7035	4820±55	AMS	T'=0.1; T'(5%)=3.8; v=1
		OxA-7036	4845±60	AMS	
Hambledon Hill: Stepleton, discrete	human bone	OxA-7818	4715±40	AMS	T'=0.6; T'(5%)=3.8; v=1
features on spur		UB-4311	4751±23	HP	
Humber Wetlands Project: Ancholme,	peat (humin)	OxA-7051	4475±40	AMS	T'=0.6; T'(5%)=3.8; v=1
Redbourne	peat (humin)	OxA-7064	4525±50	AMS	

Site	Material	Laboratory Number	Radiocarbon Age (BP)	Method	Ward and Wilson (1978)
Humber Wetlands Project: Barmston Drain	peat (humic acid)	GU-5448	10190±110	LSC	T'=11.6; T'(5%)=3.8; v=1
	peat (humin)	GU-5449	10720±110	LSC	
Humber Wetlands Project: Keyingham Drain	peat (humic acid)	GU-5471	9440±120	LSC	T'=7.9; T'(5%)=3.8; v=1
	peat (humin)	GU-5472	9880±100	LSC	
Humber Wetlands Project: Keyingham Drain	peat (humic acid)	GU-5473	9590±90	LSC	T'=4.2; T'(5%)=3.8; v=1
	peat (humin)	GU-5474	9880±110	LSC	
Humber Wetlands Project: Keyingham Drain	peat (humic acid)	GU-5475	4240±50	LSC	T'=1.6; T'(5%)=3.8; v=1
	peat (humin)	GU-5476	4150±50	LSC	
Humber Wetlands Project: Keyingham Drain	peat (humic acid)	GU-5477	5080±60	LSC	T'=2.0; T'(5%)=3.8; v=1
	peat (humin)	GU-5478	5200±60	LSC	
Humber Wetlands Project: Keyingham Drain	peat (humic acid)	GU-5480	2370±50	LSC	T'=5.8; T'(5%)=3.8; v=1
	peat (humin)	GU-5481	2520±50	LSC	
Humber Wetlands Project: Keyingham Drain	peat (humic acid)	GU-5483	5010±70	LSC	T'=1.3; T'(5%)=3.8; v=1
	peat (humin)	GU-5484	5140±90	LSC	
Humber Wetlands Project: Keyingham Drain	peat (humic acid)	GU-5485	2580±50	LSC	T'=1.6; T'(5%)=3.8; v=1
	peat (humin)	GU-5486	2670±50	LSC	
Humber Wetlands Project: Keyingham Drain	peat (humic acid)	GU-5487	2510±60	LSC	T'=0.6; T'(5%)=3.8; v=1
	peat (humin)	GU-5488	2450±50	LSC	
Humber Wetlands Project: Keyingham Drain	peat (humic acid)	GU-5489	2420±50	LSC	T'=5.8; T'(5%)=3.8; v=1
	peat (humin)	GU-5490	2590±50	LSC	
Humber Wetlands Project: Humberhead Levels, Scaftworth Roman Road	waterlogged plant macrofossils	OxA-6354	2170±60	AMS	T'=1.6; T'(5%)=3.8; v=1
	waterlogged plant macrofossils	OxA-6552	2050±75	AMS	
Ipswich: Buttermarket/St Stephen's Lane	human bone	UB-4044	1413±21	HP	T'=25.2; T'(5%)=9.5; v=4
		OxA-6792	1200±40	AMS	
		OxA-6793	1355±45	AMS	
		OxA-7859	1365±40	AMS	
		OxA-7860	1415±40	AMS	
Kilnsea Boat	waterlogged wood	OxA-6939	3455±35	AMS	T'=4.7; T'(5%)=3.8; v=1
		OxA-6940	3340±40	AMS	
Lichfield Cathedral	human bone	GU-5434	960±60	LSC	T'=329.4; T'(5%)=3.8; v=1
		GU-5281	2140±50	LSC	
March Hill	peat (humic acid)	GU-5635	3320±50	LSC	T'=0.0; T'(5%)=3.8; v=1
	peat (humin)	GU-5636	3310±50	LSC	
March Hill	charcoal	UB-4050	5813±22	HP	T'=0.3; T'(5%)=3.8; v=1
		OxA-6296	5790±35	AMS	
March Hill	charcoal	UB-4051	5824±28	HP	T'=0.1; T'(5%)=3.8; v=1
		OxA-6297	5835±35	AMS	
March Hill	charcoal	UB-4052	5796±29	HP	T'=1.3; T'(5%)=3.8; v=1
	charcoal	OxA-6298	5745±35	AMS	
March Hill	charcoal	UB-4053	5271±24	HP	T'=13.3; T'(5%)=12.6; v=6
	charcoal	OxA-6301	5310±45	AMS	
	charcoal	OxA-6302	5315±35	AMS	
	charcoal	OxA-6303	5255±30	AMS	
	charcoal	OxA-6304	5180±30	AMS	
	charcoal	OxA-6305	5270±45	AMS	
	charcoal	OxA-6306	5190±45	AMS	
North Ferriby Foreshore	waterlogged wood	OxA-5398	3045±45	AMS	T'=0.3; T'(5%)=3.8; v=1
		OxA-5399	3080±45	AMS	
North Peak Environmentally Sensitive Area	peat (humic acid)	GU-5376	5370±50	LSC	T'=0.8; T'(5%)=3.8; v=1
	peat (humin)	GU-5377	5440±60	LSC	
North Peak Environmentally Sensitive Area	peat (humic acid)	GU-5378	3610±50	LSC	T'=14.6; T'(5%)=3.8; v=1
	peat (humin)	GU-5379	3880±50	LSC	
North Peak Environmentally Sensitive Area	peat (humic acid)	GU-5380	3560±50	LSC	T'=1.0; T'(5%)=3.8; v=1
	peat (humin)	GU-5381	3630±50	LSC	
Norwich Castle Mall: Timberhill	human bone	OxA-6371	950±90	AMS	T'=0.0; T'(5%)=6.0; v2

Site	Material	Laboratory Number	Radiocarbon Age (BP)	Method	Ward and Wilson (1978)
		OxA-6881	930±40	AMS	
Pontefract Castle	charcoal	GU-5752	990±50	LSC	T'=0.2; T'(5%)=3.8; v=1
		GU-5753	960±50	LSC	
Raunds Prehistoric: Stanwick, Redlands Farm	human bone	OxA-5543	3645±45	AMS	T'=2.2; T'(5%)=3.8; v=1
		OxA-5544	3750±55	AMS	
Raunds Prehistoric: Stanwick, Redlands Farm	human bone	OxA-5545	3690±40	AMS	T'=1.5; T'(5%)=3.8; v=1
		OxA-5546	3615±45	AMS	
Raunds Prehistoric: Stanwick, Redlands Farm	human bone	OxA-5547	3495±40	AMS	T'=0.0; T'(5%)=3.8; v=1
		OxA-5548	3500±70	AMS	
Raunds Prehistoric: Stanwick, Redlands Farm	human bone	OxA-5632	4825±65	AMS	T'=0.0; T'(5%)=3.8; v=1
		OxA-5633	4820±80	AMS	
Raunds Prehistoric: West Cotton, turf mound	charcoal	OxA-7947	3870±30	AMS	T'=1.4; T'(5%)=3.8; v=1
		OxA-8017	3920±30	AMS	
Salisbury Plain Project: Warren Hill	animal bone	GU-5441	2130±60	LSC	T'=1.4; T'(5%)=3.8; v=1
		GU-5442	2230±50	LSC	
Shapwick Burtle	peat (humic acid)	GU-5388	4970±70	LSC	T'=0.3; T'(5%)=3.8; v=1
	peat (humin)	GU-5389	5020±60	LSC	
Shapwick Burtle	peat (humic acid)	GU-5390	5600±50	LSC	T'=0.0; T'(5%)=3.8; v=1
	peat (humin)	GU-5391	5610±70	LSC	
Sherborne: Old Castle	human bone	GU-5416	1270±60	LSC	T'=0.4; T'(5%)=3.8; v=1
		GU-5417	1330±80	LSC	
Stonehenge 20th Century: Phase 3	human bone	BM-1582	3715±70	LSC	T'=8.7; T'(5%)=9.5; v=4
		OxA-4886	3960±60	AMS	
		OxA-5044	3785±70	AMS	
		OxA-5045	3825±60	AMS	
		OxA-5046	3775±55	AMS	
Thatch Project	soot-blackened cereal straw	UB-4057	363±20	HP	T'=95.3; T'(5%)=3.8; v=1
		UB-4058	646±21	HP	
Tintagel Castle, Camelford	charcoal	UB-3795	1617±18	HP	T'=0.2; T'(5%)=3.8; v=1
		UB-3796	1605±20	HP	
Tintagel Castle, Camelford	charcoal	UB-3797	1569±18	HP	T'=2.0; T'(5%)=3.8; v=1
		UB-3798	1607±20	HP	
Tintagel Castle, Camelford	charcoal	UB-3795	1617±18	HP	T'=25.0; T'(5%)=11.1; v=5
		OxA-6002	1490±50	AMS	
		OxA-6003	1550±45	AMS	
		OxA-6004	1430±45	AMS	
		OxA-6005	1705±50	AMS	
		OxA-6006	1565±45	AMS	
Westhampnett	peat (humic acid)	AA-11770	8620±105	AMS	T'=18.0; T'(5%)=3.8; v=1
	peat (humic acid)	GU-5310	9210±90	LSC	
Wharram Percy: cemetery (replicates)	human bone	GU-5503	1080±70	LSC	T'=5.2; T'(5%)=3.8; v=1
		GU-5682	870±50	LSC	
Wharram Percy: cemetery (replicates)	human bone	GU-5511	1080±70	LSC	T'=0.0; T'(5%)=3.8; v=1
		GU-5683	1070±80	LSC	
Wharram Percy: cemetery (replicates)	human bone	GU-5517	860±70	LSC	T'=0.3; T'(5%)=3.8; v=1
		GU-5678	810±50	LSC	
Wharram Percy: cemetery (replicates)	human bone	GU-5557	770±50	LSC	T'=1.1; T'(5%)=3.8; v=1
		GU-5680	850±60	LSC	
Wharram Percy: cemetery (replicates)	human bone	GU-5647	1150±70	LSC	T'=1.5; T'(5%)=3.8; v=1
		GU-5681	1020±80	LSC	
Wharram Percy: cemetery (replicates)	human bone	GU-5650	1050±80	LSC	T'=0.2; T'(5%)=3.8; v=1
		GU-5679	1000±70	LSC	
Wharram Percy: cemetery (replicates)	human bone	GU-5657	1050±50	LSC	T'=0.2; T'(5%)=3.8; v=1
		GU-5677	1020±50	LSC	
Wootton Quarr: 94A	waterlogged wood	GU-5412	3560±50	LSC	T'=0.6; T'(5%)=3.8; v=1

Site	Material	Laboratory Number	Radiocarbon Age (BP)	Method	Ward and Wilson (1978)
		GrN-32296	3520±20	GPC	
Wootton Quarr: 95A	waterlogged wood	GU-5596	4790±50	LSC	T'=1.2; T'(5%)=3.8; v=1
		GrN-32297	4855±30	GPC	
Wootton Quarr: 95A	waterlogged wood	GU-5601	3480±50	LSC	T'=2.4; T'(5%)=3.8; v=1
		GrN-32295	3575±35	GPC	
Wootton Quarr: 95A	charcoal	OxA-5483	3715±55	AMS	T'=0.8; T'(5%)=3.8; v=1
		OxA-5484	3640±65	AMS	
Wootton Quarr: 95A	charcoal	OxA-5485	2860±50	AMS	T'=0.0; T'(5%)=3.8; v=1
		OxA-5486	2860±50	AMS	
Yarnton Neolithic and Bronze Age: early and middle Neolithic pits	carbonised plant macrofossil	NZA-8679	4672±57	AMS	T'=0.0; T'(5%)=3.8; v=1
		OxA-6412	4675±70	AMS	
Yarnton Saxon and medieval: Cresswell Field settlement	antler	OxA-6828	1555±55	AMS	T'=11.3; T'(5%)=3.8; v=1
		OxA-7372	1305±50	AMS	
Yarnton Saxon and medieval: foodplain channel	waterlogged plant macrofossils	OxA-7361	1640±50	AMS	T'=1.6; T'(5%)=3.8; v=1

Overall, with the exception of the three results which are clearly anomalous, all the other replicate measurements on bone and antler samples reported in this volume are within statistical expectation and appear to be accurate within the precision quoted.

The single pair of replicate measurements from a carbonised residue on a pottery sherd from Hambledon Hill: Stepleton enclosure are statistically inconsistent at more than 99% confidence (OxA-7844 and OxA-7926; Table 2), although their weighted mean has good agreement in the chronological model for this enclosure (Bayliss *et al* 2008, fig 4.5).

Nineteen replicate groups of measurements are available on samples of charcoal and other carbonised plant remains. In only four cases are the replicates on single-entity samples, where the same twig or carbonised stake was dated more than once. In all these cases, the results are statistically consistent at 95% confidence (Table 2). Eight replicate groups consist of

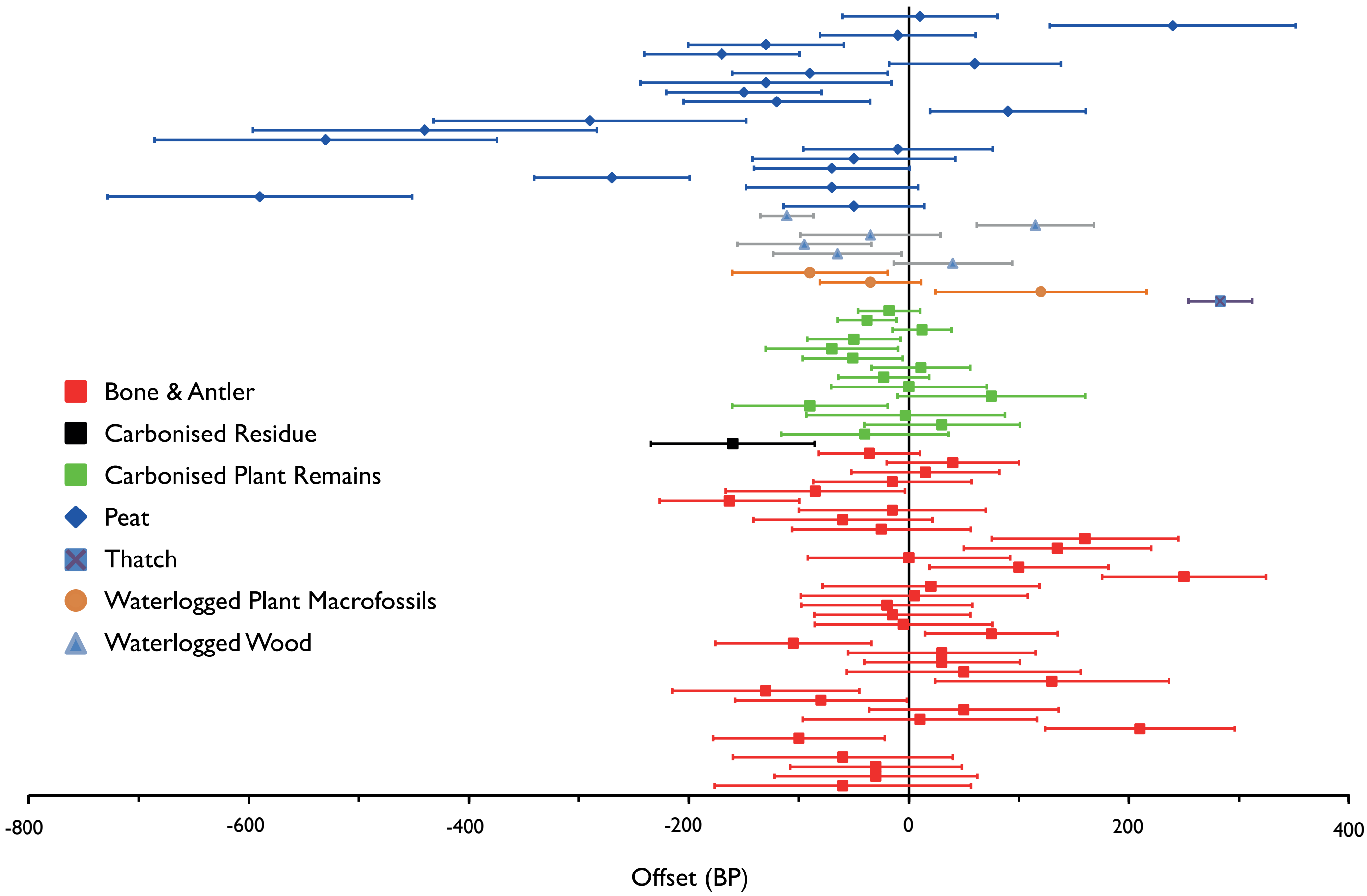

Fig 15. *Offsets between replicate pairs of radiocarbon measurements on the same sample (all replicate measurements, including those where there are more than two results on a sample, are listed in Table 2).*

bulk samples, which were divided and dated more than once. Again, in all cases, the results are statistically consistent at 95% confidence, which suggests that the dated material was reasonably homogenous. This is unsurprising in the case of the large samples used for conventional dating (between 10g and 50g of charred material), but also appears to be true of the two small bulk samples that were dated by AMS.

These measurements suggest that the results on carbonised plant material reported in this volume are also accurate within the precision quoted.

The remaining seven replicate groups of measurements on carbonised plant remains consist of an original measurement on a bulk sample, replicated by one or more measurements on single-entity samples from the same deposit. These replicate groups were an attempt to quantify the risks inherent in dating bulk samples from deposits where the archaeological context or character and quantity of the charred plant material suggested a strong functional relationship between the dated material and the context from which it was recovered (Bayliss 1999). As pointed out by Ashmore (1999), the danger in dating bulk samples is that they consist of material of diverse ages, and so the resultant radiocarbon date is a meaningless average. This risk has to be balanced against the risk that the tiny single-entity samples of charred remains that can be dated by AMS may be of uncertain taphonomy (Prendergast 2000). In fact, five of the replicate groups are statistically consistent at 95% confidence, with another consistent at 99% confidence (Table 2). The final sample, that dated by UB-3795 among others from Tintagel Castle, Camelford, contains material of more diverse ages, although this group is again consistent at 99% confidence if OxA-6004 is omitted as intrusive.

Overall, only 1 of the 20 single-entity samples of charred plant remains included these replicate groups appears to be intrusive and/or residual. It must be emphasised that this consistency has been measured on, and only applies to, samples of charred plant remains that are functionally related to their parent contexts (for example, from a hearth or other fired feature).

Experimental measurements attempted to date soot-blackened thatch that sometimes survives as a base layer on thatched medieval buildings in England (see below, p185–6). Here the straw itself is not carbonised, but has been preserved by sooting from open fires over the centuries of the buildings' use. Initial attempts to isolate the (later) sooting from the (original) straw by chemical means were obviously insufficient (UB-4057–8; Table 2).

Three sets of replicate measurements were made on bulk samples of waterlogged plant remains isolated from sediment samples. All of these are statistically consistent at 95% confidence, and suggest that the measurements reported on this sample type in this volume are accurate within the precision quoted (Table 2).

Six replicate pairs of measurements are available on waterlogged wood (Fig 15), four of which are statistically consistent at 95% confidence, and one of which is statistically consistent at 99% confidence (Table 2). The divergent pair from the Fenland Management Project: Market Deeping (UB-4112 and UB-4300) is unexplained, although difficulties in dating waterlogged wood from this site was not confined to this sample (Bayliss *et al* 2010), and similar difficulties have been encountered on other material from the region (Bayliss and Pryor 2001). Generally, however, results on samples of waterlogged wood in this volume appear to be accurate within statistical expectation.

Finally, 21 pairs of replicate measurements are available on a variety of chemical fractions of bulk samples of organic sediment (Fig 15). All but one of these samples was dated by liquid scintillation spectrometry, and thus consisted of several hundred grams of peat (Table 1). Four of the pairs of measurements are statistically significantly different at more than 99% confidence (Table 2). In each of these cases, the samples are Pre-Boreal or earlier in date and in all cases the alkali-soluble (humic acid) fraction is earlier than the alkali- and acid-insoluble (humin) fraction. Of the other 17 replicate groups, 14 are statistically consistent at 95% confidence and the other three are consistent at 99% confidence. In the latter three cases, the humic acid fraction is again younger than the humin fraction. This variability is slightly more than would be expected simply on statistical grounds, and appears to relate to the downward penetration of small components of later compounds into the humic acid fraction of the dated material. This appears to be usually only of practical significance for samples older than one half-life.

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 burial EE20 from Wharram Percy: cemetery (GU-5511 and GU-5683; Table 2, see also below p208 and p205) is 1076 ±53 BP, which calibrates to cal AD 780–1040 (2σ) or cal AD 890–1020 (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

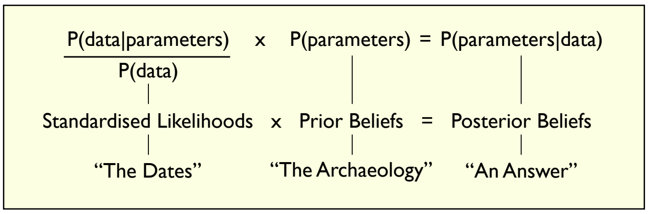

Fig 16. *Bayes' theorem as applied to chronological modelling in archaeology*

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 16).

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 sequence where age-depth modelling is required.

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 results (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 χ^2 test), however, the radiocarbon result 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 phasing and the radiocarbon results. 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.

As mentioned above, the availability of OxCal v.1.3 from August 1993 made it possible to interpret suites of radiocarbon dates within a Bayesian statistical framework routinely. Overall, 64% of radiocarbon dates in this volume were selected and interpreted using Bayesian statistics, although implementation was uneven, with 87% of samples from excavations but only 14% of samples from wetland and foreshore surveys interpreted in this way.

At this time, most models addressed the chronology of single sites. There were examples of hunter-gatherer camps of post-glacial and late Mesolithic date at Uxbridge: Three Ways Wharf, Middlesex (Lewis and Rackham 2011) and March Hill, West Yorkshire (Spikins 1999; Griffiths 2011) respectively.

The development of Neolithic monument complexes was a particular focus of attention, with major programmes of dating undertaken not just at Stonehenge, Wiltshire (Allen and Bayliss 1995), but also at Hambledon Hill, Dorset (Bayliss *et al* 2008; Fig 17), Godmanchester: Rectory Farm,

Fig 17. *Early Neolithic crouched burial from Hambledon Hill, Dorset (© Historic England, photography by Roger Mercer)*

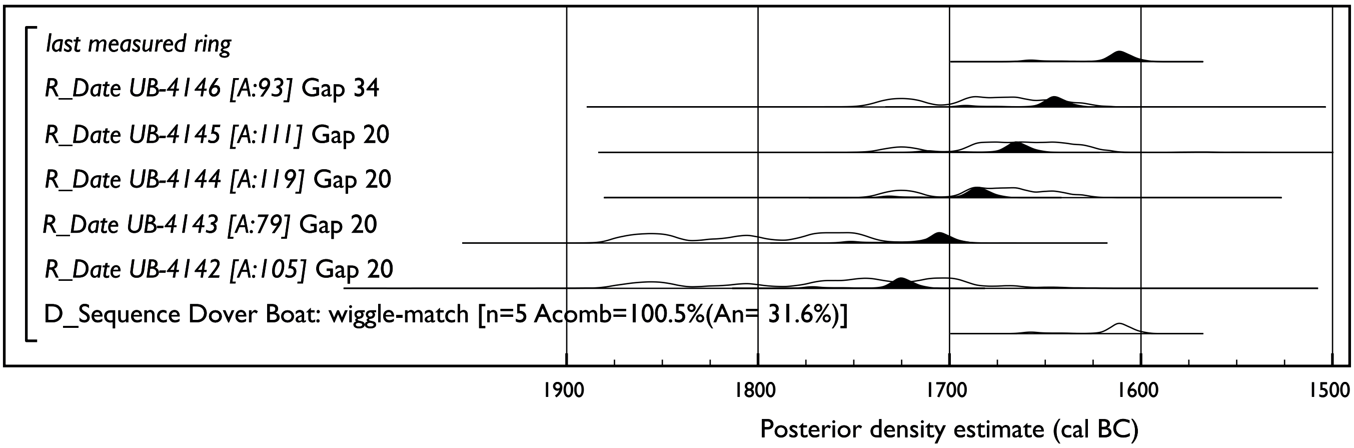

Fig 18. *Probability distributions of dates from the Dover Boat tree-ring sequence. Each distribution represents the relative probability that an event occurs at a particular time. For each of the dates, two distributions have been plotted: one in outline, which is the result of simple radiocarbon calibration, and a solid one, based on the wiggle-match sequence. Distributions other than those relating to particular samples correspond to aspects of the model. For example, the distribution 'last measured ring' is the estimated date for the last measured ring of the tree-ring series. The large square brackets down the left-hand side along with the OxCal keywords define the overall model exactly.*

Cambridgeshire (Whittle *et al* 2011, 278–93), and in the landscape around Raunds, Northamptonshire (Healy *et al* 2007). On a more modest scale, a chronology was also suggested for the Coupland enclosure in the Millfield Basin (Waddington 1997a).

Neolithic applications that currently await final publication include a chronology for the Neolithic landscape at Yarnton, Oxfordshire (Bayliss and Hey forthcoming), and a sediment sequence adjacent to the Sweet Track at Shapwick Burtle, Somerset.

A series of Bronze Age sites were dated as part of a programme of excavations in advance of the Brighton Bypass, East Sussex (Bayliss *et al* 2002), and an enclosure and related settlement dated from excavations on the site of Eynsham Abbey, Oxfordshire (Bayliss *et al* 2001). Precise dating was also provided for a burnt mound at Northwold, Norfolk, excavated as part of the Fenland Management Project (Crowson and Bayliss 1999). An attempt to date a series of late Bronze Age and Iron Age structures through a palaeochannel at Market Deeping, also part of the Fenland Management Project, was less successful (Bayliss *et al* 2010).

Wiggle-matching was undertaken on a series of five high-precision measurements on bi-decadal samples of waterlogged wood from known positions within the floating dendrochronological master sequence produced for the Dover Boat (see below, p29–32; Bayliss *et al* 2004c). Wiggle-matching of this sequence using the methodology of Christen and Litton (1995) and IntCal13 (Reimer *et al* 2013), produces an estimated date for the last ring of this sequence of *1660–1640 cal BC (12% probability)* or *1625–1595 cal BC (83% probability*; Fig 18), probably of *1620–1600 cal BC (68% probability)*. This analysis is not compatible with the ending date for this sequence of 1589 BC tentatively proposed from a combination of tree-ring analysis and the original wiggle-matching (using this methodology, but the calibration curve of Stuiver *et al* 1998). Since this portion of the calibration curve contains no new data points, this difference must arise from the alternative statistical methods used for curve construction (Stuiver *et al* 1998; Niu *et al* 2013).

Two early Bronze Age barrows were dated at this time. Deeping St Nicholas, Lincolnshire was analysed before Bayesian statistics could be routinely applied (Cook and Bayliss 1994), and Wilsford Barrows, Wiltshire await final publication.

Further chronological modelling explored the Bronze Age development of the Flag Fen basin (Bayliss and Pryor 2001).

Few applications explored the chronology of Iron Age sites, as the technique was at this time considered to be of limited use in this period (Haselgrove *et al* 2001). The identification and dating of a small middle Iron Age cemetery at Yarnton, Oxfordshire was thus exceptional (Hey *et al* 1999; Bayliss and Hey 2011).

Radiocarbon dating and Bayesian modelling were, however, able to contribute to the recognition and dating of sub-Roman activity. Settlements at Duckpool, Morwenstow and Tintagel Castle, Cornwall were dated to this period (Bayliss 1995; Bayliss and Harry 1997), and a series of dykes in Cambridgeshire attributed to this period (Bayliss *et al* 1996).

At Ipswich, Buttermarket (St Stephen's Lane), high-precision radiocarbon dating and Bayesian modelling provided a generational chronology for the mid-to-late seventh century cemetery (Scull and Bayliss 1999a–b; Bayliss *et al* 2009). Slightly later burial grounds were identified and dated at Binchester, Co Durham (Marshall *et al* 2010), Sherborne Abbey, Dorset (Bayliss 2005), Sherborne: Old Castle, Dorset (Cook and White 2015, 49 and fn179), Stratton, Bedfordshire (awaiting final publication), and Yarnton, Oxfordshire (Bayliss and Hey 2004). Middle Saxon settlement activity was also dated at Yarnton, and at Market Lavington, Wiltshire a sedimentary profile was dated to within the timeframe of the adjacent middle Saxon settlement (Wiltshire and Bayliss 2006).

Fig 19. *Foot bones showing signs of leprosy from the cemetery at Norwich Castle Mall: Timberhill (©NPS Archaeology)*

In the later Saxon period, cemeteries were dated from what was probably a pre-Conquest leper colony at Norwich Castle Mall: Timberhill (Fig 19), and the partially contemporary graveyard at Norwich Castle Mall: Farmer's Avenue (Shepherd Popescu 2009a; Bayliss *et al* 2004b). At Wharram Percy, North Yorkshire, an extensive programme of radiocarbon dating and chronological modelling enabled the development of the cemetery to be traced, and the important skeletal assemblage phased (Bayliss *et al* 2007c).

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, OxA- is the code for the Oxford Radiocarbon Accelerator Unit, and OxA-7930 was the 7,930th measurement produced by the laboratory. This code is the internationally agreed identifier by which every radiocarbon determination can be traced. OxA-7930 refers to the result produced on a carbonised residue on the base of a pottery sherd from Eynsham Abbey, Oxfordshire, 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 Robin Taylor. 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. Henriette Granlund Marsden kindly proof-read this volume.

I am particularly indebted to Christopher Bronk Ramsey, Gordon Cook, and Stephen Hoper, 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, James McDonald, and Michelle Thompson for processing and dating the samples at the Queen's University, Belfast, to Robert Anderson and Philip Naysmith for similarly processing and dating samples dated at the Scottish Universities Research and Reactor Centre, and to Angela Bowles, Angie Bryan (née Stoker), John Foreman, Teddy Hall, Gill Handford, Robert Hedges, Martin Humm, Philip Leach, Clare Owen, Paul Pettitt, and Gert Jaap van Klinken for undertaking the measurements at the Oxford Radiocarbon Accelerator Unit.

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A30: Sourton Down, Devon

Location: SX 544917
Lat. 50.42.21 N; Long. 04.03.42 W

Project manager: S Reed and B Kerr (Exeter City Museum and Central Archaeology Service), 1986 and 1991

Description: excavation, field survey, and palaeoenvironmental sampling were carried out at Sourton Down, near Okehampton in 1986 and 1991, in advance of improvements to the A30 Trunk Road between the Okehampton Bypass and Launceston Bypass. Excavations in 1986 focussed on a suspected prehistoric enclosure, a section of Roman road or trackway, a Scheduled Ancient Monument identified as a possible Roman signal station or Civil War fortification, and a deserted medieval settlement.

Objectives: to provide a chronological framework for the sites in the absence of other dating evidence, and for the peat sequence recorded outside the proposed route corridor. The radiocarbon dating of the peat sequence was intended to allow the correlation between the excavated sites and environmental changes to be determined.

References: Balkwill and Silvester 1976, 86–9
Weddell and Reed 1997, 39–48

A30: Sourton Down, pollen sequence, Devon

Location: SX 540910
Lat. 50.41.59 N; Long. 04.04.03 W

Project manager: V Straker (University of Bristol), 1991

Archival body: Plymouth Museum

Description: a series of excavations in the last ten years by the Central Archaeological Service (CAS) and Exeter Archaeological Field Unit revealed the presence of prehistoric and medieval landscapes on Sourton Down. The peat sampled in this series had accumulated in a narrow valley *c* 500m west of the excavation of the medieval hamlet and 200m north of the Roman Road at Sourton Down.

Objectives: dated pollen analyses of the valley peat will allow a rural medieval settlement to be placed in its landscape setting, which is an important priority for south-west England. The peat was sampled for pollen, plant macrofossil analyses, and radiocarbon dating.

Final comment: V Straker (3 June 1996), this series is from a small peat deposit of *c* 1.5m depth along the route of the A30 dual carriageway. It was close to a sequence of roads of Roman to post-medieval date and an enclosed farmstead dated loosely by pottery to AD 1270–1450. Prehistoric activity, (mostly Bronze Age), was also evident from earlier work carried out when the Okehampton Bypass was constructed. It was hoped that a dated palaeoenvironmental sequence would allow the phases of activity and farming to be placed in their archaeological context. This has proved possible to some extent.

Laboratory comment: Ancient Monuments Laboratory (1995), the calibrated date ranges marked in italics are calculated by a mathematical model which takes the stratigraphic order of the samples into consideration. This is done by 'Gibbs sampling' (Bronk Ramsey 1994; Gelfand and Smith 1990). These ranges are not absolute, they can and will change as more data (eg further radiocarbon results) are fed into the model. These ranges are, however, our best estimate of the date of the archaeological events of interest, given the data presently available.

Laboratory comment: English Heritage (2013), seven further dates were funded prior to 1993 and were published in Bayliss *et al* (2013, 1–3; OxA-3621–2, OxA-3390, and GU-5793–6).

References: Bayliss *et al* 2013, 1–3
Bronk Ramsey 1994, 1
Gelfand and Smith 1990
Weddell and Reed 1997, 39–147

GU–5385 460 ±50 BP

$\delta^{13}C$: -29.2‰

Sample: SDPT1, submitted on 14 February 1994 by V Straker

Material: peat (humic acid; fibrous, with occasional *Carex* fruits, pH 7.16 (204.5g)) (V Straker 1991)

Initial comment: the upper sample of peat taken from a depth of 40–41cm. The top 40cm shared a degree of modern disturbance and was not considered suitable for dating.

Objectives: to establish whether the lower levels of the peat accumulated in the prehistoric period. If this proves to be the case, the pollen sequence will also provide a history of the local vegetation contemporary with the prehistoric features excavated on Sourton Down.

Calibrated date: *1σ:* cal AD 1420–1460
2σ: cal AD 1400–1620

Final comment: V Straker (3 June 1996), at *87% probability GU-5385* provides and estimated date of *cal AD 1420–1530* (Weddell and Reed 1997, 93; see figure) and therefore probably post-dates the medieval farmstead at Sourton Down. The pollen analysis shows that there had been some regeneration of local *Alnus* fen in an otherwise essentially open damp grassland with trees restricted to low percentages of *Betula* sp., *Quercus* sp., and *Corylus* sp.

Laboratory comment: SURRC (1994): the humic acid fraction of this sample was dated.

GU–5386 5130 ±50 BP

$\delta^{13}C$: -29.2‰

Sample: SDPT2, submitted on 14 February 1994 by V Straker

Material: peat (humic acid; fibrous, with fine stems and roots and occasional small fragments of *Betula* sp. pH 6.768 (200.5g)) (V Straker 1991)

Initial comment: from a depth of 80–81cm.

Objectives: as GU-5385

Calibrated date: *1σ:* 3980–3810 cal BC
2σ: 4040–3790 cal BC

Final comment: V Straker (3 June 1996), this sample provided a late Neolithic or early Mesolithic date. Apart from the local growth of *Alnus* fen, the surrounding environment is dominated by open woodland, characterised by *Corylus* sp., *Quercus* sp., *Betula* sp., and traces of *Ulnus* sp., *Tilia* sp., *Fraxinus* sp., and *Salix* sp.

Laboratory comment: *see* GU-5385

GU–5387 7480 ±70 BP

δ¹³C: -29.0‰

Sample: SDPT3, submitted on 14 February 1994 by V Straker

Material: peat (humic acid; silty amorphous, with monocot, stems and occasional fragments of charcoal *c* 2mm in size, pH 4.17 (210g)) (V Straker 1991)

Initial comment: from a depth of 131–132cm at the peat and clay interface.

Objectives: as GU-5385

Calibrated date: *1σ:* 6430–6240 cal BC
2σ: 6470–6220 cal BC

Final comment: V Straker (3 June 1996), this was the earliest dated level in the peat sequence and at 95% confidence calibrates to around the first half of the seventh millennium cal BC. The environment is similar to that for the sample above (GU-5386), with the exception that at this level the peak in *Betula* sp. to 40% total land pollen sum is evident. The importance of this sequence is that, as well as being associated with a range of archaeological sites in close vicinity, it provides a well-dated chronology of vegetation change close to, but at a lower altitude to those studied on Dartmoor where the Neolithic in particular is poorly understood.

Laboratory comment: *see* GU-5385

OxA–5997 405 ±50 BP

δ¹³C: -27.3‰

Sample: SDPT4, submitted on 18 August 1995 by V Straker

Material: peat (humin; fibrous, pH 5.3 (62.9g, wet)) (V Straker 1991)

Initial comment: from a depth of 32–33cm from the top of the section.

Objectives: to clarify the chronology of development of the open ground vegetation in the post-medieval period, putting the excavation of the road sequence into an environmental context. It was not possible to submit a sample from higher up the profile owing to modern root contamination. The date is expected to be post-medieval as the sample at 40-41cm (GU-5385) dated to cal AD 1400-1620 at 95% confidence.

Calibrated date: *1σ:* cal AD 1440–1620
2σ: cal AD 1420–1640

Final comment: V Straker (3 June 1996), OxA-5997, together with the three below it, GU-5385, OxA-5998, and OxA-5999, suggest that the upper 60cm of peat accumulated between the fourteenth and seventeenth centuries cal AD, and is certainly post-Black Death. OxA-5997 post-dates the medieval settlement at Sourton.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1995): the humin fraction of this sample was dated.

References: Bronk Ramsey *et al* 2000a, 471

OxA–5998 390 ±45 BP

δ¹³C: -28.0‰

Sample: SDPT5, submitted on 18 August 1995 by V Straker

Material: peat (humin; semi-fibrous, pH 6.1 (65.9g, wet)) (V Straker)

Initial comment: from a depth of 48–49cm.

Objectives: the three dates obtained in 1994 (GU-5385–7) show that the peat preserves a vegetation history of the Sourton area from the Mesolithic to the present day. This will allow the prehistoric and medieval landscapes to be placed in their environmental settings and establish the nature of human impact on the surrounding environment. Further dates are needed (OxA-5998–6001) to interpret the slow accumulation of peat between 40–80cm (the fifteenth century cal AD and the fifth millennium cal BC), as well as to establish whether there was an episode of peat removal or cessation in growth between these dates which cover much of the archaeological evidence from the excavations.

Calibrated date: *1σ:* cal AD 1440–1620
2σ: cal AD 1430–1650

Final comment: V Straker (3 June 1996), the best estimate *cal AD 1410–1510 (95% probability;* Weddell and Reed 1997, 93; see figure) suggests peat accumulation post-dates the medieval farmstead settlement at Sourton Down. At this level, the pollen analysis shows a marked drop in *Alnus* sp., which is more likely to be the result of human activity than natural phenomena as the samples above and below are rich in *Alnus* sp. pollen. A rise in sedges accompanies the *Alnus* sp. decline. As other tree pollen is also scarce, it is possible that the wood was collected for fuel or building.

Laboratory comment: *see* OxA-5997

References: Bronk Ramsey *et al* 2000a, 471

OxA–5999 500 ±45 BP

δ¹³C: -28.0‰

Sample: SDPT6, submitted on 18 August 1995 by V Straker

Material: peat (humin; pH 5.95 (61.75g, wet)) (V Straker)

Initial comment: from the top of the section at a depth of 59–60cm.

Objectives: as OxA-5998. A date at this level is important as from this point upwards cereal-type pollen occurs and there is a slight rise in heather pollen.

Calibrated date: *1σ:* cal AD 1400–1450
2σ: cal AD 1320–1460

Final comment: V Straker (6 March 96), the best estimate, *cal AD 1380–1460 (81% probability*; Weddell and Reed 1997, 93; see figure), may just overlap with the end of the occupation of the medieval farmstead, and the pollen from this level depicts an environment where a reduction in tree and shrub cover is underway and this is being replaced by an open landscape dominated by herb rich grassland and heathland.

Laboratory comment: *see* OxA-5997

References: Bronk Ramsey *et al* 2000a, 471

OxA–6000 2025 ±45 BP

δ¹³C: -28.1‰

Sample: SDPT7, submitted on 18 August 1995 by V Straker

Material: peat (humin; pH 5.7 (77.92g, wet)) (V Straker)

Initial comment: from the top of the section at a depth of 65–66cm.

Objectives: as OxA-5998. This sample is at the base of a band of organic silty clay within the peat. From this point the evidence for the opening up of the landscape is clear, with an increase in pollen of sedges, grasses and other herbaceous taxa.

Calibrated date: *1σ:* 90 cal BC–cal AD 30
2σ: 170 cal BC–cal AD 80

Final comment: V Straker (3 June 1996), although only 5cm below OxA-5999 dated to the fourteenth to fifteenth centuries cal AD, OxA-6000 is estimated to date to *120 cal BC–cal AD 70 (90% probability)* in the late Iron Age or early Roman period. This date suggests that either peat stopped growing for several hundred years, or much more likely, the medieval farming community cut peat as fuel, resulting in the loss of the environmental record contemporary with much of the life of the settlement. Woodland/scrub is extensive, dominated by *Corylus* sp., *Quercus* sp., and *Betula* sp.

Laboratory comment: *see* OxA-5997

References: Bronk Ramsey *et al* 2000a, 471

OxA–6001 7120 ±110 BP

δ¹³C: -29.4‰

Sample: SDPT8, submitted on 18 August 1995 by V Straker

Material: peat (humin; pH 3.6 (76.92g, wet)) (V Straker)

Initial comment: from the top section at a depth of 116–117cm.

Objectives: as OxA-5998. The pollen assessment shows that at or just below this level there is a peak in fern spores, and *Ulnus* sp. and *Quercus* sp. pollen, before the main rise in *Alnus* sp., indicating wet *Alnus* sp. fen conditions.

Calibrated date: *1σ:* 6080–5890 cal BC
2σ: 6230–5750 cal BC

Final comment: V Straker (3 June 1996), the date places the sample in the Mesolithic when *Quercus* sp. dominated woodland was established, with *Corylus* sp., *Betula* sp., *Ulnus* sp., and a very limited open ground flora. Other radiocarbon dates on charcoal from the subsoil beneath the Roman road about 200m from the peat bog are also from the sixth to seventh millennium cal BC but anthropogenic activity is only reflected in the peat sequence by minor traces of charcoal.

Laboratory comment: *see* OxA-5997

References: Bronk Ramsey *et al* 2000a, 471

Amble: Bondicarr, Northumberland

Location: NU 284018
Lat. 55.18.34 N; Long. 01.33.09 W

Project manager: C Bonsall (University of Edinburgh), 1983

Archival body: Edinburgh University

Description: in 1983, after a cist and an inhumation had been exposed by wind erosion to the south of Low Hauxley, the Archaeology Department of Edinburgh University carried out an excavation which revealed two Bronze Age cairns, cists, cremations, inhumations, and much earlier midden deposits containing shells of about 7000 BP, together with typical late Mesolithic flint artefacts, and mammalian remains (Bonsall 1984). Associated palaeoenvironmental studies were carried out between 1983 and 1988.

Objectives: the dates will provide a direct age estimate for a human burial, which cannot be dated by association with other artefacts or other datable material.

Final comment: P Marshall (25 September 2012), the weighted means for the two burials are not statistically consistent (T′=14.0; v=1; T′(5%)=3.8; Ward and Wilson 1978) suggesting cist burials at the site were taking place over a period of time.

References: Bonsall 1984
Frank 1982
Ward and Wilson 1978

OxA–5553 3615 ±45 BP

δ¹³C: -20.6‰

Sample: BCR/1a, submitted on 10 March 1995 by C Bonsall

Material: human bone (adult left femur) (K McSweeney 1995)

Initial comment: OxA-5553 and OxA-5554 are limb bones from the skeleton of an adult male buried in a cist beneath a large cairn (1) containing several inhumation and cremation burials. The cairn was associated with a palaeo-landsurface and (prior to exposure by marine erosion) had been buried beneath 3–4m of dune sand.

Objectives: this site is the only instance of a modern excavation of a late Neolithic/Bronze Age burial site in Northumberland. The date will provide a direct age estimate for a burial, which cannot be dated by association with artefacts or other datable material.

Calibrated date: *1σ:* 2040–1910 cal BC
2σ: 2140–1880 cal BC

Final comment: P Marshall (25 September 2012), the result shows that the burial in the cist is Bronze Age.

Laboratory comment: Ancient Monuments Laboratory (10 July 1995), the pairs or results for each skeleton are not statistically different at 95% confidence ((T′=0.0; v=1; T′(5%)=3.8; Ward and Wilson 1978). It is therefore possible to take a weighted mean of determinations before calibration. This has been done and gives a more precise estimate of the radiocarbon content of the skeletons. OxA-5553 and OxA-5554 give a weighted mean of 3621 ±34 BP (2120–1890 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–5554 3630 ±55 BP

δ¹³C: -20.8‰

Sample: BCR/1b, submitted on 10 March 1995 by C Bonsall

Material: human bone (adult right humerus) (K McSweeney 1995)

Initial comment: as OxA-5553

Objectives: as OxA-5553

Calibrated date: *1σ:* 2120–1920 cal BC
2σ: 2200–1880 cal BC

Final comment: see OxA-5553

Laboratory comment: see OxA-5553

OxA–5555 3410 ±55 BP

δ¹³C: -20.5‰

Sample: BCR/2a, submitted on 10 March 1995 by C Bonsall

Material: human bone (fragment of shaft of adult left femur) (K McSweeney 1995)

Initial comment: OxA-5555 and OxA-5556 are limb bones from the skeleton of an adult male buried beneath a small cairn (2). The cairn was associated with a palaeo-landsurface buried beneath 3–4m of dune sand.

Objectives: the date will provide a direct age estimate for a human burial unassociated with artefacts or other datable material.

Calibrated date: *1σ:* 1760–1630 cal BC
2σ: 1890–1560 cal BC

Final comment: see OxA-5553

Laboratory comment: Ancient Monuments Laboratory (10 July 1995), the two measurements on samples from inhumation BCR/2 (OxA-5555–6) are statistically consistent (T′=0.1; v=1; T′(5%)=3.8; Ward and Wilson 1978), the weighted mean is 3420 ±38 BP, giving a calibrated date range at 95% confidence of 1880–1620 cal BC (Reimer *et al* 2004).

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

OxA–5556 3430 ±55 BP

δ¹³C: -20.6‰

Sample: BCR/2b, submitted on 10 March 1995 by C Bonsall

Material: human bone (distal fragment of shaft of adult right humerus) (K McSweeney 1995)

Initial comment: as OxA-5555

Objectives: as OxA-5555

Calibrated date: *1σ:* 1870–1660 cal BC
2σ: 1890–1610 cal BC

Final comment: see OxA-5553

Laboratory comment: see OxA-5555

Askham Bog, North Yorkshire

Location: SE 570480
Lat. 53.55.29 N; Long. 01.07.55 W

Project manager: A R Hall (University of York), 1978

Archival body: University of York

Description: a nature reserve with a long Flandrian record preserved in lake muds and peats.

Objectives: to date a phase of presumed hemp-retting activity represented by hemp achenes within the upper metre of peat.

Laboratory comment: English Heritage (22 April 2004), four further dates from this site, HAR-2256 (AB1/50), HAR-2258 (AB2/35), HAR-2259 (AB1/25), and HAR-2614 (AB1/50), were funded prior to 1981 and were published in Jordan *et al* (1994, 7).

References: Bradshaw *et al* 1981
Gearey *et al* 2005
Jordan *et al* 1994

OxA–6974 350 ±35 BP

δ¹³C: -25.3‰

Sample: AB78-1, submitted on 27 January 1997 by A R Hall

Material: plant macrofossils (*Cannabis sativa* L., achenes) (A R Hall)

Initial comment: the abundant *Cannabis* achenes were found in a poorly humified *Scorpidium scorpioides–Sphagnum* peat at a depth of about 35–45cm, a layer underlying well-humified fen peat and overlying *Scorpidium.*

Objectives: to establish a date for the actual hemp-retting horizon these ‘seeds’ represent. The only existing dates for peats at this site are from whole peat samples and are likely to have younger roots/rhizomes penetrating from above.

Calibrated date: *1σ:* cal AD 1460–1640
2σ: cal AD 1440–1650

Final comment: A R Hall (1997), the results have exactly met the objective of providing a date for the material, and thereby a date for the episode of hemp processing.

Laboratory comment: Ancient Monuments Laboratory (1997), the two results (OxA-6974–5) are not statistically significantly different at 95% confidence (T′=0.6; T′(5%)=3.8; v=1; Ward and Wilson 1978), their weighted mean (370 ±22 BP) calibrates to cal AD 1445–1635 at 95% confidence (Reimer *et al* 2004).

References: Bronk Ramsey *et al* 2000a, 476
Reimer *et al* 2004

OxA–6975 385 ±30 BP

δ¹³C: -24.4‰

Sample: AB78-1, submitted on 27 January 1997 by A R Hall

Material: plant macrofossils (*Cannabis sativa L.*, achenes) (A R Hall)

Initial comment: a replicate of OxA-6974.

Objectives: as OxA-6974

Calibrated date: 1σ: cal AD 1450–1620
2σ: cal AD 1440–1640

Final comment: see OxA-6974

Laboratory comment: see OxA-6974

References: Bronk Ramsey *et al* 2000a, 476

Betchworth: Frank's Sandpit, Surrey

Location: TQ 209502
Lat. 51.14.15 N; Long. 00.16.05 W

Project manager: D Williams (Surrey Archaeological Society), 1995

Archival body: Surrey Archaeological Society and Museum of London

Description: the site lies on rising ground at the foot of the Downs: the transition from Gault Clay taking place just north of site 1. In the 1920s and 1930s, the initial sandpit (the 'Barley Mow' or 'Box Hill' sandpit) of which the present pit is the final eastwards extension, yielded a certain amount of material, mainly Neolithic (including a number of polished flint axes), middle Bronze Age and Roman, all from destroyed contexts.

Objectives: to obtain dates from all three phases of pits.

References: Needham 1991
Williams 2004

OxA–7698 3840 ±60 BP

$\delta^{13}C$: -26.8‰

Sample: BW95/6 Pit 219 A, submitted on 12 November 1997 by J Cotton and D Williams

Material: carbonised residue

Initial comment: residue on the interior of a Grooved Ware sherd. The sherds were recovered from a sand-filled pit containing much Grooved Ware.

Objectives: to date the activity represented by the sample which is closely associated to the Grooved Ware. There is a paucity of dates for Grooved Ware locally, regionally, and nationally.

Calibrated date: 1σ: 2460–2200 cal BC
2σ: 2480–2130 cal BC

Final comment: D Williams (May 2000), OxA-7698–7700, and -7710: these all suggest a date of *c* 2000 BC for the Grooved Ware pits, which was what was expected. This is the largest group of this type of pottery from the south-east, away from the Thames, so it is good to have these dates. It is a little odd, perhaps, that the two samples from pit 219 are a little apart and do not overlap. The later date of OxA-7698 could suggest later activity but it is doubtful it does.

OxA–7699 4080 ±80 BP

$\delta^{13}C$: -31.1‰

Sample: BW95/6 Pit 219 B, submitted on 12 November 1997 by J Cotton and D Williams

Material: carbonised residue

Initial comment: as OxA-7698

Objectives: as OxA-7698

Calibrated date: 1σ: 2870–2480 cal BC
2σ: 2890–2460 cal BC

Final comment: see OxA-7698

OxA–7700 4015 ±70 BP

$\delta^{13}C$: -31.3‰

Sample: BW95/6 Pit 2290, submitted on 12 November 1997 by J Cotton and D Williams

Material: carbonised residue

Initial comment: as OxA-7698

Objectives: as OxA-7698

Calibrated date: 1σ: 2620–2460 cal BC
2σ: 2860–2340 cal BC

Final comment: see OxA-7698

OxA–7701 1580 ±55 BP

$\delta^{13}C$: -20.1‰

Sample: 206 SECALE, submitted on 4 November 1997 by P Murphy

Material: grain: *Secale cereale*, charred (P Murphy 1997)

Initial comment: from one of a group of cremation pits characterised by black organic debris mixed with cremated human bone. The pit was dated by pot fragments and a spiral ring. The sample is from the last of three periods of pits of probably ritual purpose.

Objectives: by association the sample should provide a date for the context. The record of *Secale* is, however, of wider interest since there is only one other reliable record from the British Bronze Age, from Runnymede Bridge (Greig in Needham 1991).

Calibrated date: 1σ: cal AD 400–550
2σ: cal AD 350–610

Final comment: D Williams (May 2000), this appears to be early Saxon, we were hoping for a late Bronze Age date, which was albeit unlikely considering the species of grain involved. Nevertheless, it is difficult to account for this date as there is no other evidence for early Saxon activity from the site and it is most coincidental for such a charred grain to have found its way into such a localised pit containing other charred material.

References: Greig 1991

OxA–7710 4045 ±40 BP

δ¹³C: -29.5‰

Sample: BW95/6 Pit 204, submitted on 12 November 1997 by J Cotton and D Williams

Material: carbonised residue

Initial comment: as OxA-7698

Objectives: as OxA-7698

Calibrated date: *1σ:* 2620–2490 cal BC
2σ: 2840–2470 cal BC

Final comment: see OxA-7698

OxA–7711 2845 ±40 BP

δ¹³C: -25.6‰

Sample: 206 ARRHEN, submitted on 4 November 1997 by P Murphy

Material: carbonised plant macrofossil (charred tuber; *Arrenatherum elatius*) (P Murphy 1997)

Initial comment: as OxA-7701

Objectives: as OxA-7701

Calibrated date: *1σ:* 1060–930 cal BC
2σ: 1130–900 cal BC

Final comment: D Williams (May 2000), this date is as expected for the late Bronze Age cremations.

Binchester: syphilitic burial, Co. Durham

Location: NZ 215313
Lat. 54.40.34 N; Long. 01.40.00 W

Project manager: I Ferris (University of Birmingham), 1971

Archival body: Bowes Museum and Barnard Castle

Description: a skeleton which is believed to show evidence for congenital syphilis. The burial was excavated by J Rainbird in 1971. The records indicate that it came from a shallow grave within what became a garden area. Other dates on skeletons from the same group suggest a middle Saxon cemetery. In view of the significance of this discovery, samples from this skeleton were dated by both the Rafter and Oxford radiocarbon laboratories.

Objectives: to establish the date of a skeleton exhibiting evidence for congenital syphilis. A case of congenital syphilis from Anglo-Saxon Binchester would show conclusively that venereal syphilis was present in Britain long before it was originally assumed.

Laboratory comment: Rafter Radiocarbon Laboratory (11 August 1997), amino acid analysis of the three sub-samples was undertaken at the Wellington School of Medicine by the Renal Research Unit using the Stafford *et al* (1988) classification system to advise the selection of the most appropriate treatment for the bone, as well as an estimation of the probability of obtaining an accurate date. Nitrogen analysis on the bone gelatine gave an average of the six samples of %N: -12.32, and δ¹⁵N: +10.6. The analysis of the three sub-samples indicates very good to nearly modern preservation of the bone.

Laboratory comment: English Heritage (12 October 2012), the importance of dating what appeared to be the earliest example of congenital syphilis in Europe was recognised by the decision to send bone samples to two laboratories, Rafter and ORAU. Rafter obtained eight radiocarbon measurements from its sample, two of which (NZA-7842 and NZA-7846) were on insoluble residues from the demineralisation stage of pretreatment. These were designed to measure contamination of the mineral fraction by humic acid, not to date the burial. The other six measurements (NZA-7779–81, NZA-7840–1, and NZA-7843), on the collagen fraction, were deemed to be accurate measurements of the bone's radiocarbon age. These results are statistically consistent (T′=10.6, T′(5%)=11.0, ν=5; Ward and Wilson 1978), and allow a weighted mean to be calculated (1226 ±31 BP). The laboratory regarded the results as too dispersed and the pooled error term was therefore increased by the Birge (1932) factor to ±45 (R Sparks pers. comm.). Oxford obtained three results. One (OxA-7639) was on the other half of the pelvic bone dated at Rafter, while OxA-9532 and OxA-9667 were on a vertebra from the same individual. The ORAU results are statistically consistent (T′=0.5, T′(5%)=6.0, ν=2; Ward and Wilson 1978), and allow a weighted mean to be calculated (1325 ±22 BP). The weighted mean of the six Rafter results (1226 ±31 BP) is though not statistically consistent with the weighted mean of the three ORAU results (T′=6.8, T′(5%)=3.8, ν=1; Ward and Wilson 1978), even after the pooled error of the Rafter results is increased to ±45 (T′=4.0, T′(5%)=3.8, ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978
Birge 1932
Ferris 2010
Stafford *et al* 1988

NZA–7779 1279 ±86 BP

δ¹³C: -20.5‰
δ¹⁵N (diet): +10.2‰
%N: 12.0

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
89.9	48.7	82.7	117.6	328.2	122.6	48.7

Sample: VIN 71 (GO); A11, submitted on 5 June 1997 by S Norton

Material: human bone (juvenile pelvis) (S Norton 1997)

Initial comment: a child burial excavated in 1971 also appeared to belong to the Anglo-Saxon cemetery, yet the skeleton bore marks of congenital syphilis, which was not documented elsewhere in Europe before AD 1492.

Objectives: to establish the date of the burial.

Calibrated date: *1σ:* cal AD 650–870
2σ: cal AD 600–970

Final comment: P Marshall (12 October 2012), the posterior estimate for the calendar date of VIN71 GO is strongly bimodal with the 95% HPD region (Buck *et al* 1999) composed of two intervals *cal AD 670–725* and *cal AD 735–770*.

Laboratory comment: English Heritage (12 October 2012), *see* Marshall *et al* (2011) for a detailed description of the methodology used to provide the estimate for the date of this burial.

NZA–7780 1196 ±67 BP

δ¹³C: -20.5‰
δ¹⁵N (diet): +10.5‰
%N: 12.7

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
88.7	47.6	81.6	117.2	331.5	129.1	47.7

Sample: VIN 71 (GO); A12, submitted on 5 June 1997 by S Norton

Material: human bone (pelvis) (S Norton 1997)

Initial comment: as NZA-7779

Objectives: as NZA-7779

Calibrated date: *1σ:* cal AD 710–950
2σ: cal AD 660–990

Final comment: see NZA-7779

Laboratory comment: see NZA-7779

NZA–7781 1133 ±85 BP

δ¹³C: -20.5‰
δ¹⁵N (diet): +10.8‰
%N: 12.6

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
90.0	49.0	83.0	116.2	331.1	122.7	49.1

Sample: VIN 71 (GO); A13, submitted on 5 June 1997 by S Norton

Material: human bone (pelvis) (S Norton 1997)

Initial comment: as NZA-7779

Objectives: as NZA-7779

Calibrated date: *1σ:* cal AD 770–1000
2σ: cal AD 670–1040

Final comment: see NZA-7779

Laboratory comment: see NZA-7779

NZA–7840 1282 ±74 BP

δ¹³C: -20.5‰
δ¹⁵N (diet): +11.1‰
%N: 13.1

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
88.7	47.6	81.6	117.2	331.5	129.1	47.7

Sample: VIN 71 (GO); A12, submitted on 5 June 1997 by S Norton

Material: human bone (pelvis) (S Norton 1997)

Initial comment: as NZA-7779

Objectives: as NZA-7779

Calibrated date: *1σ:* cal AD 660–780
2σ: cal AD 630–950

Final comment: see NZA-7779

Laboratory comment: see NZA-7779

NZA–7841 1352 ±67 BP

δ¹³C: -20.5‰
δ¹⁵N (diet): +10.8‰
%N: 11.2

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
89.9	48.7	82.7	117.6	328.2	122.6	48.7

Sample: VIN 71 (GO); A11, submitted on 5 June 1997 by S Norton

Material: human bone (pelvis) (S Norton 1997)

Initial comment: as NZA-7779

Objectives: as NZA-7779

Calibrated date: *1σ:* cal AD 640–770
2σ: cal AD 570–780

Final comment: see NZA-7779

Laboratory comment: see NZA-7779

NZA–7842 2473 ±72 BP

δ¹³C: -22.3‰

Sample: VIN 71 (GO), submitted on 5 June 1997 by S Norton

Material: human bone (pelvis) (S Norton 1997)

Initial comment: as NZA-7779

Objectives: as NZA-7779

Calibrated date: *1σ:* 780–410 cal BC
2σ: 810–390 cal BC

Final comment: see NZA-7779

Laboratory comment: see NZA-7779

NZA–7843 1054 ±79 BP

δ¹³C: -20.5‰
δ¹⁵N (diet): +10.4‰
%N: 12.3

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
90.0	49.0	83.0	116.2	331.1	122.7	49.1

Sample: VIN 71 (GO); A13, submitted on 5 June 1997 by S Norton

Material: human bone (pelvis) (S Norton 1997)

Initial comment: as NZA-7779

Objectives: as NZA-7779

Calibrated date: *1σ:* cal AD 890–1030
2σ: cal AD 770–1160

Final comment: see NZA-7779

Laboratory comment: see NZA-7779

NZA–7846 1821 ±68 BP

δ¹³C: -22.3‰

Sample: VIN 71 (GO), submitted on 5 June 1997 by S Norton

Material: human bone (pelvis) (S Norton 1997)

Initial comment: as NZA-7779

Objectives: as NZA-7779

Calibrated date: *1σ:* cal AD 90–320
2σ: cal AD 50–390

Final comment: see NZA-7779

Laboratory comment: see NZA-7779

OxA–7639 1350 ±40 BP

δ¹³C: -21.7‰

Sample: VIN 71 (GO), submitted on 5 June 1997 by S Norton

Material: human bone (pelvis) (S Norton 1997)

Initial comment: as NZA-7779

Objectives: as NZA-7779

Calibrated date: *1σ:* cal AD 650–680
2σ: cal AD 630–770

Final comment: see NZA-7779

Laboratory comment: see NZA-7779

OxA–9532 1315 ±34 BP

δ¹³C: -19.9‰

Sample: VIN 71 (GO), submitted on 5 June 1997 by S Norton

Material: human bone (cervical vertebrae) (S Norton 1997)

Initial comment: as NZA-7779

Objectives: as NZA-7779

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–770

Final comment: see NZA-7779

Laboratory comment: see NZA-7779

OxA–9667 1315 ±30 BP

δ¹³C: -20.3‰
δ¹⁵N (diet): +11.4‰
C/N ratio: 3.4

Sample: VIN 71 (GO), submitted on 5 June 1997 by S Norton

Material: human bone (cervical vertebrae) (S Norton 1997)

Initial comment: as NZA-7779

Objectives: as NZA-7779

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–770

Final comment: see NZA-7779

Laboratory comment: see NZA-7779

Birstall Watermead Country Park, Leicestershire

Location: SK 605101
Lat. 52.41.05 N; Long. 01.06.18 W

Project manager: P Clay (University of Leicester), 1996

Archival body: Heritage Services, Leicester County Council

Description: a Bronze Age burnt mound. The site was excavated following the chance discovery of human bone in spoil during gravel extraction. In an attempt to establish how and where these human remains had been disposed of, a survey was completed of the exposed quarry face. This revealed an expansive silt peat deposit lying within what was thought to be an old course of the River Soar. Towards the southern end of the quarry two parallel rows of upright timber posts were observed, probably the remains of a simple bridge structure. On the banks of the channel, at the western extent of the bridge, a second stage of excavations revealed a further series of features. Column 2 was located *c* 60m north of the burnt muond.

Objectives: to date the human remains and peat deposits from which they were recovered; to provide a chronological framework for the pollen diagram, and thus if they are contemporary, an environmental context for the deposition of the human remains.

Final comment: P Clay (6 September 2004), the three results from the peat sequence are in stratigraphic sequence and date the peat deposit to the early Holocene, before the vertebra was deposited.

Laboratory comment: English Heritage (23 June 2014), a number of dates from this site were subsequently funded through the Aggregates Levy Sustainability Fund (ALSF) and were published in Bayliss *et al* (2007, 32–42).

References: Bayliss *et al* 2007a
Ripper 2004
Ripper and Beamish 2012

GU–5671 7790 ±80 BP

δ¹³C: -28.3‰

Sample: AS7 1996 31.1, submitted on 24 June 1996 by P Clay

Material: peat (humic acid; mainly fine detritus, some coarse detritus (mostly twig/bark fragments), fairly highly humified and formed in shallow water, probably pond water) (D Weir 1996)

Initial comment: from the upper peat deposit sealed beneath alluvium at a depth of *c* 1.75m.

Objectives: to provide a date for the upper peat formation and therefore the final exposure of the marsh/pond before being covered by alluvium. The three samples in this series, GU-5671–3, may provide a context for the possible ritual deposition of human skulls and for the pollen samples taken by J Greig.

Calibrated date: *1σ:* 6690–6500 cal BC
2σ: 6900–6460 cal BC

Final comment: P Clay (6 September 2004), pollen sparse at this level but showed a similar spectrum of developed woodland, and the date 7000–6420 cal BC seems somewhat early. This may also be because of dating bulk peat samples. The samples from this column show that this boggy area existed next to the palaeochannel when the burnt mound was constructed. The early Neolithic and later human bones *were found in this area.*

Laboratory comment: SURRC (1996): the humic acid fraction of this sample was dated.

GU–5672 9330 ±80 BP

δ¹³C: -29.0‰

Sample: AS7 1996 31.3, submitted on 24 June 1996 by P Clay

Material: peat (humic acid; mainly fine detritus, some coarse detritus (mostly twig/bark fragments), formed in shallow water, probably pond water) (D Weir 1996)

Initial comment: from the middle peat deposit sealed beneath alluvium and the upper peat deposit, at a depth of *c* 1.95m.

Objectives: as GU-5671. This sample should also provide a date for the middle peat formation during the existence of the marsh/pond.

Calibrated date: *1σ:* 8710–8470 cal BC
2σ: 8790–8310 cal BC

Final comment: P Clay (24 June 1996), pollen of Atlantic wild wood includes oak, elm, lime, alder, and hazel. There is only a trace of herb pollen. The date of 8840–8090 cal BC would seem to be early for such developed woodland. The material dated was bulk peat slices and perhaps the early date may be a result of inclusion of water plants in the material causing the hard water effect.

Laboratory comment: *see* GU-5671

GU–5673 9780 ±70 BP

δ¹³C: -30.0‰

Sample: AS7 1996 31.5, submitted on 24 June 1996 by P Clay

Material: peat (humic acid; mainly fine detritus, some coarse detritus (mostly twig/bark fragments), formed in shallow water, probably pond water) (D Weir 1996)

Initial comment: from the lower peat deposit sealed beneath alluvium and peat at a depth of *c* 2.15m.

Objectives: as GU-5671. This sample should also provide a date for initial peat formation within the marsh/pond.

Calibrated date: *1σ:* 9300–9220 cal BC
2σ: 9330–9150 cal BC

Final comment: P Clay (6 September 2004), a small pollen count was dominated by grasses, herbs, and sedges. Trees and shrubs included pine, birch, willow, and oak. This represented the time before the development of woodland, which is confirmed by the date obtained. A small rare beetle (*Eucrecosum brachyipterum)* which is nowadays found mainly at altitude was identified by D Smith at this level. It has been found in other post-glacial deposits in the Trent Valley.

Laboratory comment: *see* GU-5671

OxA–6831 2760 ±55 BP

δ¹³C: -20.4‰

Sample: AS7 1996 32, submitted on 24 June 1996 by P Clay

Material: human bone (atlas vertebra C1) (S Payne/S Chapman 1996)

Initial comment: although not recovered archaeologically, the vertebra is almost certainly from a peat deposit (as material still adheres), sealed beneath clay alluvia. This can be located to within 25m² adjacent to the column samples.

Objectives: the sample is from human skeletal material, which may have been part of a ritual deposit within a pond or marsh. Of note are the cut marks on the vertebra. Radiocarbon dating will show when this deposition took place within the context of the peat formation (GU-5671, GU-5672, and GU-5672).

Calibrated date: *1σ:* 980–830 cal BC
2σ: 1050–800 cal BC

Final comment: P Clay (6 September 2004), the date confirms the expected range. The cut marks were identified as having been made by a metal tool. Spatial proximity to burnt mound, which was expected to be of late Bronze Age date also suggested human remains may be late Bronze Age or early Iron Age, however, the burnt mound was found to be late Neolithic in date.

Bodmin Moor Pollen Project, Cornwall

Location: SX 2080
Lat. 50.35.29 N; Long. 04.32.36 W

Project manager: B Gearey (University of Plymouth), 1993–5

Description: Bodmin Moor is one of the most complete and best preserved upland prehistoric landscapes in Britain, and at around 200km² it is the largest granite upland area in Cornwall.

Objectives: to investigate the time and magnitude of human-induced environmental change on the moor during the Holocene, with particular emphasis on the prehistoric period. Data on archaeological sequences from the Bodmin Moor Survey (Johnson and Rose 1994) was utilised to identify areas of particular importance during the prehistoric settlement of the moor and to construct a set of hypotheses concerning environmental change and land-use.

References: Gearey *et al* 1994
Gearey *et al* 2000a
Gearey *et al* 2000b
Gearey 1996
Johnson and Rose 1994
Johnson and Rose 2008

Bodmin Moor Pollen Project: East Moor monolith, Cornwall

Location: SX 22807825
Lat. 50.34.35 N; Long. 04.30.11 W

Project manager: B Gearey (University of Plymouth), 1993–4

Archival body: University of Plymouth

Description: a peat bank on the northern edge of Redmoor Marsh.

Objectives: three sites have been investigated on the East Moor of Bodmin Moor. The archaeological sequences in this part of the moor, contrast with those at Rough Tor in terms of the apparent lack of temporal depth on the East Moor compared to Rough Tor. There are also some similarities between the sites, in that parallels have been drawn between the co-axial field system on East Moor and the block boundaries on the slopes of Rough Tor. The palaeoecological investigations at both sites aimed to examine whether different archaeological sequences produced different palaeocological 'signals'.

Final comment: B Gearey (1996), this series of dates supports the present interpretations of the largely unexcavated archaeological sequences. Human activity apparently began during the Neolithic on the East Moor and intensified in the Bronze Age. Later land-use (during the Romano-British period) probably involved use of the moors for seasonal grazing.

GU–5613 1440 ±50 BP

$\delta^{13}C$: -28.5‰

Sample: EMM 20cm (humic), submitted on 23 June 1995 by B Gearey

Material: peat (humic acid)

Initial comment: from a peat monolith from a peat deposit on the north side of Redmoor Marsh. The sample was taken at a depth of 20cm, from a modern peaty turf trending into black peat.

Objectives: one of three samples (*see* also GU-5614 and GU-5615) from a pollen sequence showing the vegetational history and human impact on the East Moor, Bodmin Moor. No previous radiocarbon dated pollen sequences are available for this area, and the dates will provide a picture of the timing of human impact during the Holocene which can be related to the extensive archaeological systems on this part of the moor. This sample will date a clearance episode in the pollen diagram.

Calibrated date: *1σ:* cal AD 570–660
2σ: cal AD 540–670

Final comment: B Gearey (July 1996), this date corresponds to palynological evidence for pastoral land-use and a final disappearance of trees on the East Moor plateau.

Laboratory comment: SURRC (1996): the humic acid fraction of this sample was dated.

GU–5614 4120 ±50 BP

$\delta^{13}C$: -28.7‰

Sample: EMM 55cm (humic), submitted on 23 June 1995 by B Gearey

Material: peat (humic acid)

Initial comment: as GU–5613; taken from a depth of 55cm from a modern peaty turf trending into black peat.

Objectives: to date an episode of intensive land-use/soil degradation. *See* also GU-5613.

Calibrated date: *1σ:* 2870–2570 cal BC
2σ: 2890–2490 cal BC

Final comment: B Gearey (July 1996), this date brackets a reduction in human activity in the East Moor monolith pollen diagram. This tentatively supports the hypothesis of a reduction in activity in the mid-late Neolithic on Bodmin Moor.

Laboratory comment: *see* GU-5613

GU–5615 5830 ±50 BP

$\delta^{13}C$: -28.5‰

Sample: EMM 80cm (humic), submitted on 23 June 1995 by B Gearey

Material: peat (humic acid)

Initial comment: as GU-5613; taken from a depth of 80cm from a layer of black, well humified peat, becoming increasingly damp and greasy.

Objectives: to date an episode of tree clearance in the pollen sequence. *See* also GU-5613.

Calibrated date: *1σ:* 4770–4610 cal BC
2σ: 4800–4540 cal BC

Final comment: B Gearey (July 1996), this date marks the first evidence of tree and shrub clearance in the diagram, and supports the hypothesis of early Neolithic activity on the East Moor plateau.

Laboratory comment: *see* GU-5613

Bodmin Moor Pollen Project: Rough Tor North, Cornwall

Location: SX 13908182
Lat. 50.36.21 N; Long. 04.37.49 W

Project manager: B Gearey (University of Plymouth), 1993

Archival body: University of Plymouth

Description: Rough Tor is situated in an area of coarse grained granite in the north-western part of Bodmin Moor. Monolith III was recovered from a peat bank at the base of the northern slopes of Rough Tor.

Objectives: to confirm the apparent temporal depth of the sediment sequence at Rough Tor, and to relate this environmental evidence to the block boundaries on the slopes of the Tor. No other palaeoenvironmental data is available from this area and the dates will show the timing of vegetational change and associated human impact. This can then be closely related to the archaeological sequences in this part of the moor.

Final comment: B Gearey (July 1996), this sequence of dates illustrates the effects of human activity on the vegetation of Rough Tor North over the last 5000 years. The dates show the effect of late prehistoric transhumance and the subsequent development of acid grassland following intensified pastoral land-use and cultivation during the medieval period.

GU–5609 Modern

δ¹³C: -28.9‰

Sample: RTM3 10cm (humic), submitted on 23 June 1995 by B Gearey

Material: peat (humic acid)

Initial comment: from a peat monolith obtained from Rough Tor north, north-west Bodmin Moor, from a topogeneous deposit at the base of Rough Tor. The sample was taken at a depth of 10cm from a layer of dark brown peat.

Objectives: this sample is one of three from a pollen sequence (*see* also GU-5610 and GU-5611) showing late prehistoric to modern vegetational history of the Rough Tor area.

Calibrated date: uncalibrated

Final comment: B Gearey (July 1996), this date confirmed that the sequence had not been curtailed by peat cutting.

Laboratory comment: SURRC (1996): the humic acid fraction of this sample was dated.

GU–5610 770 ±50 BP

δ¹³C: -28.9‰

Sample: RTM3 30cm (humic), submitted on 23 June 1995 by B Gearey

Material: peat (humic acid)

Initial comment: as GU-5609; taken from a depth of 28–32cm from a well humified peat layer.

Objectives: to date the rise in cereals. *See* also GU-5609.

Calibrated date: *1σ:* cal AD 1220–1280
2σ: cal AD 1160–1300

Final comment: B Gearey (July 1996), this date corresponds to archaeological evidence for the medieval colonisation of the Rough Tor Moors and dates the final demise of trees and shrubs on the moors and the appearance of cereal pollen.

Laboratory comment: see GU-5609

GU–5612 5600 ±80 BP

δ¹³C: -29.2‰

Sample: RTM3 68–78cm (humic), submitted on 23 June 1995 by B Gearey

Material: sediment (humic acid; buried soil?)

Initial comment: as GU-5609; taken from a depth of 68–78cm from a layer of dark brown structureless sediment with increasing quantities of gravel towards the base.

Objectives: as GU-5609

Calibrated date: *1σ:* 4510–4350 cal BC
2σ: 4610–4320 cal BC

Final comment: B Gearey (July 1996), this date may be slightly too old for the incorporated pollen spectra.

Laboratory comment: see GU-5609

Bodmin Moor Pollen Project: Rough Tor South, Cornwall

Location: SX 14208020
Lat. 50.35.29 N; Long. 04.37.31 W

Project manager: B Gearey (University of Plymouth), 1994

Archival body: University of Plymouth

Description: Rough Tor is situated in an area of coarse grained grainite in the north-western part of Bodmin Moor. The Rough Tor South monolith, at nearly 3m, is the longest sequence recovered not only from the Rough Tor area, but from the whole of Bodmin Moor.

Objectives: such a depth of undisturbed peat is highly unusual for Bodmin Moor. The pollen record suggests an early Holocene date for the beginning of sediment accumulation. It is the only sampling site at Rough Tor south, and its proximity to the prehistoric archaeological remains makes possible the close integration of archaeological and palaeoecological data. There is little chance of another sequence with such extensive temporal depth being recovered from close proximity to the archaeology in this part of the moor.

Final comment: B Gearey (July 1996), this series of dates provides a good framework for the interpretation of the largely un-excavated archaeological sequences in the area. Notwithstanding possible problems with the two lowest dates (OxA-6010 and OxA-6011) the results support the idea of Neolithic and extensive Bronze Age activity at Rough Tor, and a later prehistoric hiatus in activity on the moor.

References: Hedges *et al* 1997, 251

OxA–6007 1675 ±45 BP

δ¹³C: -29.3‰

Sample: RTS 115, submitted on 23 June 1995 by B Gearey

Material: peat (humin)

Initial comment: from a sediment core, extracted using a Russian corer; taken from a depth of 115cm, from a layer of black, dense well-humified peat.

Objectives: one of five samples (*see* also OxA-5008 and OxA-6008-11) charting the vegetational history and human impact at Rough Tor South. The proximity of the sequence to the archaeological sequences allows environmental changes in the palynological record to be tied closely to the evidence for human settlement. OxA-6007 dates a recovery in *Alnus* sp. and *Corylus* sp. in the pollen diagram.

Calibrated date: *1σ:* cal AD 330–420
2σ: cal AD 240–530

Final comment: B Gearey (July 1996), this date corresponds to evidence of tree and shrub regeneration. The calibrated range falls within the Romano-British period and is thus somewhat later than the late Bronze Age/Iron Age, which is usually, thought to mark the abandonment of settlement on Bodmin Moor.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1995): the humin fraction of this sample was dated.

Laboratory comment: ORAU (18 December 1995): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

OxA–6008 3275 ±50 BP

δ¹³C: -28.3‰

Sample: RTS 150, submitted on 23 June 1995 by B Gearey

Material: peat (humin)

Initial comment: as OxA-6007; taken from a depth of 150cm from a layer of well-humified black peat.

Objectives: to date maximum local burning and a cereals rise in the pollen sequence. *See* also OxA-6007.

Calibrated date: *1σ:* 1620–1490 cal BC
2σ: 1690–1430 cal BC

Final comment: B Gearey (July 1996), this date confirms a period of major tree and shrub clearance as falling within the Bronze Age.

Laboratory comment: see OxA-6007

Laboratory comment: ORAU (18 December 1995): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

OxA–6009 4710 ±80 BP

δ¹³C: -27.3‰

Sample: RTS 175, submitted on 23 June 1995 by B Gearey

Material: peat (humin)

Initial comment: as OxA-6007; taken from a depth of 175cm from a layer of well-humified black peat.

Objectives: to date increased clearance visible in the pollen sequence. *See* also OxA-6007.

Calibrated date: *1σ:* 3640–3370 cal BC
2σ: 3660–3340 cal BC

Final comment: B Gearey (July 1996), this corresponds to evidence for tree and shrub clearance and provides evidence for Neolithic activity at Rough Tor South.

Laboratory comment: see OxA-6007

Laboratory comment: ORAU (18 December 1995): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

OxA–6010 8410 ±90 BP

δ¹³C: -28.5‰

Sample: RTS 220, submitted on 23 June 1995 by B Gearey

Material: peat (humin)

Initial comment: as OxA-6007; taken from a depth of 220cm.

Objectives: to date a decline in arboreal pollen but an increase in *Alnus* sp. visible in the pollen record.

Calibrated date: *1σ:* 7580–7360 cal BC
2σ: 7600–7190 cal BC

Final comment: B Gearey (July 1996), this date is much earlier than anticipated. The *Alnus* sp. rise, which this date refers to, has been dated to 6451 ±65 BP (Q-1025; 5490–5240 cal BC at 95% confidence; Brown 1977) at Dozmary Pool. It is possible that this date is too old due to an inwash of older material from up-slope terrestrial environments.

Laboratory comment: see OxA-6007

Laboratory comment: ORAU (18 December 1995): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010
Brown 1977

OxA–6011 5945 ±65 BP

δ¹³C: -29.6‰

Sample: RTS base, submitted on 23 June 1995 by B Gearey

Material: peat (humin)

Initial comment: as OxA-6009; taken from the base of the core from a layer of structureless, greasy light brown sediment.

Objectives: to date the undisturbed forest visible at the base of the pollen sequence. *See* also OxA-6007.

Calibrated date: *1σ:* 4910–4720 cal BC
2σ: 5000–4680 cal BC

Final comment: B Gearey (July 1996), the basal date is younger than that above (OxA-6010) perhaps as a result of rootlet penetration. Alternatively, this date is correct and that from above in error. Further dating would be necessary to investigate both hypotheses.

Laboratory comment: see OxA-6007

Laboratory comment: ORAU (18 December 1995): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

Bodmin Moor Pollen Project: Watery Marsh, Cornwall

Location: SX 23417750
Lat. 50.34.12 N; Long. 04.29.38 W

Project manager: B Gearey (University of Plymouth), 1995

Archival body: University of Plymouth

Description: a valley mire on the edge of the East Moor plateau.

Objectives: to provide a date for peat initiation at this site.

Final comment: B Gearey (July 1996), these dates confirm a late date for peat accumulation at Watery Marsh. Earlier peats had possibly been stripped from the mire by tin streaming. If this hypothesis is accepted as correct, then tin streaming during the earlier Romano-British period may have been responsible.

Laboratory comment: Ancient Monuments Laboratory (11 February 2003), the replicate measurements on the humic acid and 'humin' fractions of the basal peat are not statistically consistent (T′=4.5; T′(5%)=3.8; v=1 Ward and Wilson 1978).

References: Ward and Wilson 1978

GU–5607 1390 ±100 BP

$\delta^{13}C$: -29.5‰

Sample: WM Base (humin), submitted on 23 June 1995 by B Gearey

Material: peat (humin)

Initial comment: from the base of a sediment core, taken at a depth of *c* 150cm from a brown well humified peat trending into a layer of gravel at the base of the core.

Objectives: to provide a date for peat initiation at this site. Earlier peat accumulations may have been removed by tin streaming activities in the later prehistoric period, and the date will demonstrate whether an early date for such activity can be supported.

Calibrated date: *1σ:* cal AD 570–690
2σ: cal AD 420–870

Final comment: B Gearey (July 1996), this sample was very small and may be earlier than GU-5608 as a result of rootlet penetration.

Laboratory comment: SURRC Radiocarbon Dating Laboratory (15 January 1996), the humin fraction was dated. Very small sample.

GU–5608 1630 ±50 BP

$\delta^{13}C$: -29.7‰

Sample: WM Base (humic), submitted on 23 June 1995 by B Gearey

Material: peat (humic acid)

Initial comment: a replicate sample of GU-5607, *see* above.

Objectives: as GU-5607

Calibrated date: *1σ:* cal AD 380–540
2σ: cal AD 260–550

Final comment: B Gearey (July 1996), this basal date indicates that earlier peat in the valley may have been removed in the first to second century cal AD. The corresponding pollen spectra suggests an open, health scrub land was present around the mire, following the removal of most of the woody elements in the Bronze Age.

Laboratory comment: SURRC Radiocarbon Dating Laboratory (15 January 1996), the humic acid fraction was dated.

Laboratory comment: Historic England (28 July 2015), the two fractions of this sample produced measurements that are not statistically consistent at 95% confidence, although they are consistent at 99% confidence (T′=4.5; T′(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

Brighton Bypass, East Sussex

Location: TQ 340084 central point
Lat. 50.51.31 N; Long. 00.05.47 W

Project manager: M Bennell (English Heritage), 1989–90

Description: a total of 41 radiocarbon age determinations were obtained on samples from the archaeological investigations along the line of the Brighton Bypass. Thirty samples were processed by the Oxford Radiocarbon Accelerator Unit between 1991 and 1995, four by the Queen's University of Belfast Radiocarbon Laboratory in 1994, and seven by the Scottish Universities Research and Reactor Centre at East Kilbride in 1993–4 and 1997 (Rudling 2002).

Objectives: six sites along the route of the bypass were subject to a programme of radiocarbon dating that was specific to each one: Downsview, Mile Oak, Redhill, Sweetpatch Bottom, Toadeshole Bottom East, and Toadeshole Bottom West.

Final comment: A Bayliss, G T Cook, F G McCormac and P Pettitt (2002), the Bronze Age settlement at Downsview probably starts rather earlier than the site at Mile Oak (84% confidence), but finishes slightly earlier too (75% confidence). However, there is almost certainly a substantial period of overlap when both sites were occupied, and so they can be regarded as, at least broadly, contemporary. Parts of the environmental sequences at Sweetpatch Valley Bottom and Toadeshole Bottom East also appear to be broadly contemporary with the settlement activity, although the dated part of the sequence at Toadeshole Bottom West appears to be slightly later. It is unclear whether any of the dated environmental sequences cover the earlier period represented by the activity at Redhill.

Laboratory comment: English Heritage (25 January 2012), 24 further samples from the Brighton Bypass were funded before 1993 and are published in Bayliss *et al* 2013 (37–45; GU-5269, -5675, OxA-3153–5, -3361–2, and OxA-3386 from Mile Oak; OxA-3246–8 from Red Hill; OxA-2991–5 from Sweetpatch Bottom; OxA-3077–80 from Toadhole Bottom East; and OxA-3081–3 from Toadhole Bottom West).

References: Bayliss *et al* 2013, 37–45
Rudling 2002

Brighton Bypass: Downsview, East Sussex

Location: TQ 32800935
Lat. 50.52.04 N; Long. 00.06.45 W

Project manager: D Rudling (South Eastern Archaeological Services), 1991

Archival body: Brighton Museum

Description: excavations in advance of the construction of the Brighton Bypass revealed a series of nine later Bronze Age terraced hut platforms, two dew ponds, and part of an enclosure ditch.

Objectives: to establish the end of use period of four roundhouses (out of a total of 9/10); and to ascertain whether the huts are contemporary with each other, and if the digging of the enclosure ditch is an original feature. There is no stratigraphic evidence for the relative chronological order of these structures.

Final comment: D Rudling (1996), the samples submitted from Downsview are very useful in helping to establish both the length of occupation of the site and the chronology of four of the house platforms (ie probable chronological order 4029, 2046, 2262, and 4065). The results correlate well with the pottery evidence, and both types of dating suggest a history of settlement activity shifting downslope. Radiocarbon date OxA-4810 is the first such date to be associated with a late Bronze Age Plain Ware pottery assemblage from Sussex.

References: Bronk Ramsey *et al* 2000b, 250

GU–5429 3140 ±80 BP

$\delta^{13}C$: -24.7‰

Sample: 2396, submitted on 13 February 1994 by D Rudling

Material: charcoal (38% subsample identified): *Quercus* sp., stem (4.20g, 98%); *Prunus* sp., stem (0.10g, 2%) (R Gale)

Initial comment: from the fill of posthole 2391 on hut terrace 2262; below the terrace fill posthole cut into the chalk. This is one of three samples from this hut, *see* also 2804 (GU-5430) and 2406 (OxA-4811).

Objectives: to date the usage/end of the roundhouse, which was well-sealed for a heavily ploughed site. There was a lack of good floor deposits/*in situ* artefacts. This sample is one of three samples from this hut (the others are 2804 and 2406). One of several samples from different roundhouses (four out of nine or ten), in order to find out which houses are contemporary with each/other features, eg enclosure ditch/'pounds'.

Calibrated date: *1σ:* 1500–1300 cal BC
2σ: 1620–1210 cal BC

Final comment: D Rudling (1996), the middle Bronze Age date obtained from this posthole (2391) correlates well with the dates obtained from two other postholes located on house platform 2262 (GU-5430 and OxA-4811). Additional dating evidence from this posthole includes sherds from a decorated fine ware globular urn of middle Bronze Age date.

GU–5430 3170 ±70 BP

$\delta^{13}C$: -24.7‰

Sample: 2804, submitted on 22 December 1993 by D Rudling

Material: charcoal (6% of sample identified): *Quercus* sp., stem (0.60g, 55%); *Fraxinus* sp., stem (0.40g, 36%); *Corylus* sp., stem (0.10g, 9%) (R Gale)

Initial comment: from the fill (including flints, iron and stone) of posthole 2802; well-sealed below 2803. The posthole was cut into the chalk and was part of roundhouse 2262.

Objectives: as GU-5429

Calibrated date: *1σ:* 1510–1390 cal BC
2σ: 1620–1260 cal BC

Final comment: D Rudling (1996), the middle Bronze Age date obtained from this posthole (2802) correlates well with the dates obtained from two other postholes located on house platform 2262 (GU-5429 and OxA-4811). Additional dating evidence from the associated postholes includes middle Bronze Age pottery sherds.

GU–5432 2980 ±70 BP

$\delta^{13}C$: -25.8‰

Sample: 4073, submitted on 22 December 1993 by D Rudling

Material: charcoal (17% subsample identified): Pomoideae/*Prunus* sp. (0.10g, 1%); *Fraxinus* sp., stem (0.60g, 6%); *Quercus* sp., stem (8.70g, 93%) (R Gale)

Initial comment: from the fill of posthole forming roundhouse 4065. The feature cut into the chalk. *See* also GU-5433 from the same roundhouse.

Objectives: as GU-5429

Calibrated date: *1σ:* 1370–1110 cal BC
2σ: 1420–1000 cal BC

Final comment: D Rudling (1996), GU-5432 and GU-5433 are from a posthole located on house platform 4065. Unfortunately no other associated dating evidence is available from this feature. Although some middle Bronze Age pottery was recovered from this house platform, the majority of the stratified pottery is late Bronze Age. In addition, adjacent feature 4066 produced a late Bronze Age radiocarbon date (OxA-4810). The radiocarbon dates from context 4073, the associated pottery, and other middle Bronze Age pottery from house platform 4065, suggest some original middle Bronze Age activity at this location.

Laboratory comment: English Heritage (23 June 2014), the two results on this charcoal are statistically consistent (T′=0.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and so a weighted mean can be taken (3003 ±46 BP), which calibrates to 1400–1010 cal BC at 95% confidence (Reimer *et al* 2004).

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

GU–5433 3020 ±60 BP

$\delta^{13}C$: -25.8‰

Sample: 4073, submitted on 22 December 1993 by D Rudling

Material: charcoal (17% subsample identified): Pomoideae/*Prunus* sp., 0.1; *Fraxinus* sp., stem (0.60g, 6%); *Quercus* sp., stem (8.70g, 93%) (R Gale)

Initial comment: from the same sample as GU-5432, see above.

Objectives: as GU-5429

Calibrated date: *1σ:* 1390–1130 cal BC
2σ: 1430–1050 cal BC

Final comment: see GU-5432

OxA–4809 3280 ±40 BP

$\delta^{13}C$: -27.2‰

Sample: 4029, submitted on 13 February 1994 by D Rudling

Material: charcoal (1.60g, 50%) (subsample unidentified): identified; cf Ericaceae, stem (0.10g, 12%); Pomoideae, stem (0.20g, 24%); *Cornus* sp. , stem (0.50g, 62%) (R Gale)

Initial comment: from the fill of fire pit 4029, found during topsoil stripping. This feature lay just to the north of the excavation trench and was cut into the chalk.

Objectives: as GU-5429

Calibrated date: *1σ:* 1620–1500 cal BC
2σ: 1660–1450 cal BC

Final comment: D Rudling (1996), this sample is the only dating evidence from a house platform to the north of the main excavation area. Although the date from this sample is the earliest from the site, it is consistent with the general middle Bronze Age phase of settlement activity.

References: Bronk Ramsey *et al* 2000b, 250

OxA–4810 2755 ±60 BP

$\delta^{13}C$: -26.6‰

Sample: 4066, submitted on 13 February 1994 by D Rudling

Material: charcoal: Rosaceae (R Gale)

Initial comment: from the fill of posthole 4066, part of house terrace 4065.

Objectives: to date the usage/end of the presumed roundhouse at this location. Another sample from this house is 4073. These two samples (4066 and 4073) are part of a group from four different round houses (four out of nine or ten), submitted to discover which huts were contemporary with each other/with other features (eg enclosure ditch/'ponds').

Calibrated date: *1σ:* 980–820 cal BC
2σ: 1050–800 cal BC

Final comment: D Rudling (1996), the late Bronze Age date obtained from this posthole correlates well with associated late Bronze Age dates for the majority of the stratified pottery from this house platform, including finds from the posthole itself. An adjacent feature (4073) however produced middle Bronze Age dates (GU-5432 and GU-5433), and there was also a limited amount of middle Bronze Age pottery from the rest of the house platform.

Laboratory comment: ORAU (27 June 1994): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Bronk Ramsey *et al* 2000b, 250

OxA–4811 3110 ±60 BP

$\delta^{13}C$: -26.1‰

Sample: 2407, submitted on 13 February 1994 by D Rudling

Material: charcoal (100% identified): *Quercus* sp., stem (2g, 100%) (R Gale)

Initial comment: from the fill of doorway posthole 2406, cut into the chalk; part of roundhouse 2262. *See* also samples 2396 (GU-5429), and 2804 (GU-5430) from roundhouse 2262.

Objectives: as GU-5429

Calibrated date: *1σ:* 1440–1280 cal BC
2σ: 1510–1210 cal BC

Final comment: D Rudling (1996), a middle Bronze Age date obtained from this posthole correlates well with the dates obtained from two other postholes (GU-5429 and GU-5430) located on house platform 2262. Additional dating evidence from this, and several other associated postholes includes middle Bronze Age pottery sherds.

References: Bronk Ramsey *et al* 2000b, 250

UB–3783 3201 ±28 BP

$\delta^{13}C$: -25.8 ±0.2‰

Sample: 2146, submitted on 22 December 1993 by D Rudling

Material: charcoal: *Cornus* sp./*Vibernum* sp., stem (0.40g, 1%); *Prunus* sp., stem (11.80g, 44%); *Corylus* sp., stem (14.70g, 55%) (R Gale)

Initial comment: the fill of fire pit (2143) from the centre of house terrace 2046. The sample was well-sealed in the chalk bedrock, the fire pit was cut into the chalk. There was much fire cracked flint and blackened soil.

Objectives: as GU-5429

Calibrated date: *1σ:* 1510–1430 cal BC
2σ: 1530–1410 cal BC

Final comment: D Rudling (1996), UB-3783, UB-3784, UB-3785, and UB-3786 are from a charcoal-rich fill of a fire pit (2143) inside house platform 2046. Unfortunately no other associated dating evidence is available from this feature. The only other dating evidence recovered from this platform is a late Bronze Age sherd and a ?Bronze Age stone mould from the upper terrace fill.

Laboratory comment: English Heritage (13 June 2012), the four radiocarbon determinations on the sample (UB-3873–6) are statistically consistent (T′=1.5; T′(5%)=7.8; v=3; Ward and Wilson 1978). The weighted mean (3198 ±14 BP) calibrates to 1500–1430 cal BC at 95% confidence (Reimer *et al* 2004).

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

UB–3784 3175 ±25 BP

δ¹³C: -25.9 ±0.2‰

Sample: 2146, submitted on 22 December 1993 by D Rudling

Material: charcoal: *Cornus* sp./*Vibernum* sp., stem (0.40g, 1%); *Prunus* sp., stem (11.80g, 44%); *Corylus* sp., stem (14.70g, 55%) (R Gale)

Initial comment: UB-3784, UB-3785 and UB-3786 are all from the same sample, from the fill of fire pit (2143) containing fire-cracked flint and blackened soil. The firepit was in the centre of house terrace 2046, and well-sealed below 2144/5.

Objectives: as UB-3783

Calibrated date: *1σ:* 1500–1420 cal BC
2σ: 1510–1400 cal BC

Final comment: see UB-3783

Laboratory comment: see UB-3783

UB–3785 3199 ±27 BP

δ¹³C: -26.0 ±0.2‰

Sample: 2146, submitted on 22 December 1993 by D Rudling

Material: charcoal (10% identified): *Cornus* sp./*Vibernum* sp., stem (0.40g, 1%); *Prunus* sp., stem (11.80g, 44%); *Corylus* sp., stem (14.70g, 55%) (R Gale)

Initial comment: as UB-3784

Objectives: as UB-3783

Calibrated date: *1σ:* 1500–1430 cal BC
2σ: 1520–1410 cal BC

Final comment: see UB-3783

Laboratory comment: see UB-3783

UB–3786 3220 ±27 BP

δ¹³C: -25.9 ±0.2‰

Sample: 2146, submitted on 22 December 1993 by D Rudling

Material: charcoal (10% identified): *Cornus* sp./*Vibernum* sp., stem (0.40g, 1%); *Prunus* sp., stem (11.80g, 44%); *Corylus* sp., stem (14.70g, 55%) (R Gale)

Initial comment: as UB-3784

Objectives: as UB-3783

Calibrated date: *1σ:* 1510–1440 cal BC
2σ: 1600–1430 cal BC

Final comment: see UB-3783

Laboratory comment: see UB-3783

Brighton Bypass: Mile Oak, East Sussex

Location: TQ 24450795 to TQ 25140788
Lat. 50.51.26 N; Long. 00.13.54 W, to 50.51.23 N; 00.13.19 W

Project manager: M Russell (Archaeology South East), 1988–90

Archival body: Brighton Museum

Description: excavations in advance of the proposed Brighton Bypass at Mile Oak Farm revealed a double-entranced oval enclosure, interpreted as a late Neolithic/early Bronze Age Class II henge monument, two areas of middle Bronze Age settlement, and an area of late Bronze Age activity associated with metalworking. The area investigated occupied a position on the southern margin of the South Downs, overlooking Mile Oak, Southwick, and Portslade.

Objectives: the dating programme for Mile Oak was conceived in 1990–1, before formal statistical modelling of chronological problems using radiocarbon dating and other information together was possible. For this reason, and because of the very partial nature of excavation which was possible on the site, the dating strategy was designed to address more limited aims than was the case at Downsview. In particular, it was hoped that the construction of the ditched enclosure (243/245/1557) could be dated, along with the burial thought to be associated with it (2707). The aim was to provide dates spanning the use of middle Bronze Age settlement, not to attempt to elucidate the sequence of the huts. In addition, the chronology of the late Bronze Age metalworking activity and mounds in area K were to be explored.

Final comment: M Russell (4 October 1995), thirteen samples were taken from the Mile Oak excavations. OxA-3153 represents material retrieved from the late Neolithic/early Bronze Age henge monument. Samples OxA-5106 to OxA-5109 all relate to the disuse of the henge and the establishment of a middle Bronze Age settlement. Samples OxA-3154, OxA-3155, and OxA-5110 relate to late Bronze Age settlement/industrial activity within trench K. GU-5269 and OxA-5105 relate to later prehistoric and post-medieval burials. OxA-3361, OxA-3362, and OxA-3386 are invalidated due to finds contamination.

References: Harding and Lee 1987
Hedges *et al* 1997, 254–5

OxA–5105 110 ±50 BP

δ¹³C: -20.9‰

Sample: MO10, submitted on 24 August 1994 by M Russell

Material: animal bone: *Ovis* sp., from at least 5 individuals (P Stevens)

Initial comment: from a sheep burial (one sheep and three lambs) inserted into a mound associated with late Bronze Age metalworking debris. Some Iron Age ritual activity was noted from the upper levels of the mounds. The sheep may therefore represent a deliberate secondary ritual deposit or later rapid burial, Iron Age to post-medieval in date.

Objectives: to establish whether the burial represents a prehistoric ritual deposit or the later disposal of dead/diseased stock.

Calibrated date: *1σ:* cal AD 1680–1940
2σ: cal AD 1660–1955*

Final comment: M Russell (4 October 1995), the determination suggests the deposit is of post-medieval/modern date.

OxA–5106 3250 ±60 BP

δ¹³C: -21.5‰

Sample: MO20, submitted on 24 August 1994 by M Russell

Material: animal bone (large ungulate tibia) (S Davis)

Initial comment: from the primary silt of a ditch interpreted as a Class II henge monument.

Objectives: the previous sample OxA-3153 suggests a henge interpretation is possible for the ditched enclosure. A second date is required to substantiate this.

Calibrated date: *1σ:* 1620–1440 cal BC
2σ: 1670–1410 cal BC

Final comment: M Russell (4 October 1995), this sample came from the secondary silts of trench 27 enclosure. Preliminary identification of the bone suggested it was human and may therefore relate to some form of exposure burial. Later analysis refuted human identification and the date appears to indicate a period of ditch infilling, possibly prior to the establishment of the trench 27 middle Bronze Age settlement.

OxA–5107 3260 ±65 BP

δ¹³C: -21.0‰

Sample: MO30, submitted on 24 August 1994 by M Russell

Material: animal bone: *Bos* sp., upper premolar, small artiodatctyl radius and distal end of the shaft of a humerus (S Davis)

Initial comment: a hut, dated from the pottery assemblage. The bone was from the outer edge of the fill of the posthole, and therefore probably packing, and possibly relates to the destruction of the hut by fire.

Objectives: to establish whether the hut is of middle or late Bronze Age date and to fit it into the established downland settlement chronology.

Calibrated date: *1σ:* 1620–1450 cal BC
2σ: 1690–1410 cal BC

Final comment: M Russell (4 October 1995), the date suggests a middle Bronze Age origin, earlier than deposits recorded from trench K and similar to dates established for Itford Hill and Blackpatch in East Sussex.

OxA–5108 2975 ±50 BP

δ¹³C: -21.6‰

Sample: MO60, submitted on 24 August 1994 by M Russell

Material: animal bone: *Bos* sp., teeth (S Davis)

Initial comment: from the lower fill of a large, oval cut in trench 27, to the south of middle Bronze Age hut II. The feature was possibly a pond or working hollow.

Objectives: to establish whether the feature can be related to any of the Bronze Age structural components recorded from the trench.

Calibrated date: *1σ:* 1270–1110 cal BC
2σ: 1390–1020 cal BC

Final comment: M Russell (4 October 1995), the result suggests a middle Bronze Age date, perhaps indicating that the cut maybe interpreted as a pond/working hollow roughly contemporary with the recorded middle Bronze Age settlement area.

OxA–5109 2975 ±50 BP

δ¹³C: -21.7‰

Sample: MO70, submitted on 24 August 1994 by M Russell

Material: animal bone: *Bos* sp., mandible (S Davis)

Initial comment: from a circular cut to the north-east of (and apparently unrelated to) middle Bronze Age hut II, trench 27, and to the east of stone hole 601 (on the central axis of the henge).

Objectives: to establish whether the cut is prehistoric in origin, and if so, whether it may be related to either of the defined periods of Bronze Age activity.

Calibrated date: *1σ:* 1270–1110 cal BC
2σ: 1390–1020 cal BC

Final comment: M Russell (4 October 1995), the result suggests that the cut may be equated with the middle Bronze Age settlement area.

OxA–5110 2820 ±50 BP

δ¹³C: -21.7‰

Sample: MO80, submitted on 24 August 1994 by M Russell

Material: animal bone: unidentifiable, fragment; *Bos* sp., humerus (S Davis)

Initial comment: from the make-up of charcoal mound KII, interpreted as a potential prehistoric metalworking furnace.

Objectives: to establish the date of the mound deposits.

Calibrated date: *1σ:* 1030–910 cal BC
2σ: 1120–840 cal BC

Final comment: M Russell (4 October 1995), the result indicates a late Bronze Age date consistent with the material assemblage, and with samples OxA-3154 (3050 ±80 BP, 1500–1050 cal BC at 95% confidence) and OxA-3155 (2950 ±100 BP, 1430–900 cal BC at 95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004

Cadbury Castle, Somerset

Location: ST 627252
Lat. 51.21.08 N; Long. 02.31.55 W

Project manager: J Barrett (University of Glasgow), 1966–70

Archival body: University of Glasgow, Somerset County Museum

Description: the multivallate hillfort of Cadbury Castle sits on a free-standing and steeply scarped hill at the eastern border of the county of Somerset. The steepness of the hill contributes substantially to the impressiveness of the earthworks. The inner bank encloses a domed hilltop 7.5ha in area, which rises to a plateau elevated some 76m above the surrounding countryside.

Objectives: samples were taken in the attempt to elucidate the evolution of the hilltop defences and events in the gateway.

Final comment: J C Barrett (2000), radiocarbon dating has been minimal at Cadbury for a site of its standing.The two samples, selected from material collected in 1969, have sought to confirm archaeological evidence at the later period of Cadbury's use.

References: Alcock 1972
Alcock 1980
Alcock 1995
Barrett *et al* 2000
Campbell *et al* 1979
Rahtz 1992
Tabor 2008

GU–5437 2120 ±80 BP

$\delta^{13}C$: -23.9‰

Sample: N663B, submitted on 11 July 1994 by J C Barrett

Material: animal bone: *Bos* sp. (S Davis)

Initial comment: GU-5437 and GU-5438 came from one of a group of calf burials located in a shallow pit which cut into the top of occupation levels which overlay a calcareous limestone.

Objectives: a number of animal burials were located in one area in the centre of the hillfort. They lay near a supposed shrine dated to the late Iron Age. The excavator claimed that these burials were votive. Dates of these burials are required to either confirm or disprove their claimed Iron Age date.

Calibrated date: *1σ:* 360–40 cal BC
2σ: 390 cal BC–cal AD 60

Final comment: J C Barrett (2000), from the stratigraphic relationship by which some of the animal burials post-date the palisade, along with the two radiocarbon dates and the late dating of N5, all the material clearly represents a long period of activity, which may have extended over two centuries.

Laboratory comment: English Heritage (13 June 2014), the two radiocarbon determinations on calf burials are statistically consistent (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978) and they could therefore be of the same actual age.

References: Ward and Wilson 1978

GU–5438 2090 ±60 BP

$\delta^{13}C$: -25.9‰

Sample: N031, submitted on 11 July 1994 by J C Barrett

Material: animal bone: *Bos* sp. (S Davis)

Initial comment: as GU-5437

Objectives: as GU-5437

Calibrated date: *1σ:* 200–40 cal BC
2σ: 360 cal BC–cal AD 60

Final comment: see GU-5437

Laboratory comment: see GU-5437

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), four further dates were subsequently funded by English Heritage after 1998 (OxA-9065–8).

References: Ames 1975
Biddle *et al* 1982
Biddle *et al* 2001
Bronk Ramsey *et al* 1999, 200
Elson 1990
Locker *et al* 1997

OxA–7533 325 ±45 BP

δ¹³C: -20.6‰
δ¹⁵N (diet): +6.3‰

Sample: PR# 279 WB, submitted on 28 July 1997 by S Davis

Material: animal bone: *Oryctolagus cuniculus* (S Davis 1997)

Initial comment: rabbit bones found associated with other animal bones such as cattle, sheep etc., within archaeological levels inside Camber Castle courtyard and bastions on alluvium.

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 1480–1650
2σ: cal AD 1440–1660

Final comment: S Davis (1999), these two dates, OxA-7533 and OxA-7534, one contemporary with the castle's occupation and the other modern, unfortunately do not help to solve the question of the origin or origins of the large amounts of rabbit (*Oryctolagus cuniculus*) bones at Camber Castle. Clearly more dates will be required.

OxA–7534 30 ±45 BP

δ¹³C: -20.8‰
δ¹⁵N (diet): +4.9‰

Sample: PR# 295, submitted on 28 July 1997 by S Davis

Material: animal bone: *Oryctolagus cuniculus*, humerus (S Davis 1997)

Initial comment: as OxA-7533

Objectives: as OxA-7533

Calibrated date: *1σ:* cal AD 1890–1910
2σ: cal AD 1690–1920

Final comment: see OxA-7533

Cambridgeshire Dykes, Cambridgeshire

Location: TL 51454753 and TL 548 541
Lat. 52.06.18 N; Long. 00.12.42 E, and
Lat. 52.09.47 N Long. 00.15.48 E

Project manager: B Robinson (Cambridge Archaeological Unit), 1991–2

Description: a series of four linear earthworks (Devil's, Fleam, Brent, and Bran), which traverse the chalk plain of south Cambridgeshire. Each of the earthworks is comprised of a single bank and ditch running in a north-westerly to south-easterly direction. Traditionally, they were thought to be East Anglian defences built as a response to Mercian aggression in the mid seventh century.

Objectives: to establish a firm chronological framework for these monuments, presumed to be of Anglo-Saxon date.

Final comment: T Malim (1995), a sequence of well-stratified radiocarbon dates has extablished that the first phase of Fleam Dyke was most probably constructed in the fifth century AD. Ensuing phases, which produced the typical profile of the monument as it survives today, were sixth century or later in date, and, by analogy, the other three Cambridgeshire Dykes (Bran Ditch, Brent Ditch, and Devils Dyke) are assumed to be of similar date (Malim 1996).

References: Malim 1996

Cambridgeshire Dykes: Fleam Dyke, Cambridgeshire

Location: TL 548541
Lat. 52.09.47 N; Long. 00.15.48 E

Project manager: G Wait (Cambridge Archaeological Unit), 1991

Archival body: Cambridgeshire County Council

Description: a section across the Cambridgeshire Fleam Dyke Scheduled Ancient Monument (Cambridgeshire 6) was undertaken prior to the duelling of the A11 trunk road. The Fleam Dyke extends from the Fen edge between Fulbourn and Little Wilbraham towards the south-east, for a distance of about five miles. Thereafter, for a further two miles it is greatly diminished in size, appearing only as a large embanked hedge.

Objectives: to establish whether more than one construction phase could be identified and to date the dyke more accurately than post-third century to pre-tenth century.

Final comment: T Malim (1995), the seven dates received firmly establish an early Anglo-Saxon date for construction and use of the Fleam Dyke, mostly within the fifth and sixth centuries AD. The dates also demonstrate the longevity of the monument commensurate with its complex stratigraphic sequence and its division into at least three phases of construction; a period of between 130–340 years can be calculated for this use with a 95% probability. These results move debate on the origins and purpose of the Fleam, and other Cambridgeshire Dykes, to a more defined period, and one that is earlier than generally believed by scholars in the past. The dates emphasise the importance of establishing chronological sequences through our major monuments by use of absolute dating methods.

Laboratory comment: English Heritage (23 June 2014), two further samples were submitted for dating prior to 1994 (OxA-4065–6) and are published in Bayliss *et al* (2013, 48–8).

References: Bayliss *et al* 2013, 47–8
Hedges *et al* 1994, 364
Hedges *et al* 1997, 253-4
Wait 1991

OxA–5349 1530 ±50 BP

δ¹³C: -20.2‰

Sample: BALFD91(41), submitted in December 1994 by T Malim

Material: animal bone: *Bos* sp., mandible (U Albarella)

Initial comment: from a layer of fine silt and chalk rubble sealing the layers of phase II, and probably originating as upcast from ditch cleaning of the monument, thus forming the third phase to the build-up of the monument's bank/rampart.

Objectives: one of a series of seven samples submitted to establish the chronological development of Fleam Dyke. This sample forms the latest potential date in the sequence and therefore should give a *terminus ante quem* for the earlier phases of the bank.

Calibrated date: 1σ: cal AD 420–600
2σ: cal AD 410–640

Final comment: T Malim (1995), the fifth to sixth century AD date obtained gives a terminal date for the major episodes of construction for the Dyke. Although it could stretch into the early seventh century, the weight of evidence suggests an earlier final phase of construction, enhancing the value of the dates obtained for initial phases of construction and ditch infill, which show the Dyke to be of early Anglo-Saxon origin.

OxA–5350 1615 ±50 BP

δ¹³C: -21.2‰

Sample: BALFD91(30), submitted in December 1994 by T Malim

Material: animal bone (sheep/goat radius and ulna, probably butchered) (U Albarella)

Initial comment: from a compact silty layer which is part of the second phase bank. It forms one of the first dumped layers, overlying the top of the first phase bank, and is sealed by succeeding layers of the phase II bank, and phase III.

Objectives: this sample constitutes the mid-late part of the sequence (*see* OxA-5349).

Calibrated date: 1σ: cal AD 390–540
2σ: cal AD 330–560

Final comment: T Malim (1995), this fifth to early sixth century AD date fits snugly between the dates obtained for the first and third major episodes of bank construction. It demonstrates continued use of the monument throughout the fifth and sixth centuries AD, with recutting for a more substantial ditch leading to dumped material being deposited on the back of the first phase bank.

OxA–5351 1430 ±55 BP

δ¹³C: -21.5‰

Sample: BALFD91(62)-1, submitted in December 1994 by T Malim

Material: animal bone (sheep/goat metatarsal) (U Albarella)

Initial comment: from the fill of the first phase ditch; layer 62. The compact silt of the layer is not the initial fill, but the secondary fill, and may derive from weathering and slippage of material from phase I. OxA-5352 comes from the same deposit.

Objectives: as OxA-5349

Calibrated date: 1σ: cal AD 580–660
2σ: cal AD 540–680

Final comment: T Malim (1995), this date would seem a little late in comparison to dates from the banks. However, summation of the four dates obtained from the infill of the phase I ditch (OxA-5351 to OxA-5354), gives a date range of fifth to sixth century AD with 95% probability which corresponds well with the result from the banks.

OxA–5352 1535 ±50 BP

δ¹³C: -21.2‰

Sample: BALFD91(62)-2, submitted in December 1994 by T Malim

Material: animal bone (small ruminant femur) (U Albarella)

Initial comment: from the same layer as OxA-5351.

Objectives: as OxA-5349

Calibrated date: 1σ: cal AD 420–590
2σ: cal AD 400–640

Final comment: T Malim (1995), this sample dates the fills of the first phase ditch to the same period as the construction and use of the first phase bank. Summation with the other three samples from the fills of the phase I ditch confirm a fifth to sixth century AD date range overall.

OxA–5353 1390 ±45 BP

δ¹³C: -22.1‰

Sample: BALFD91(63)-1, submitted in December 1994 by T Malim

Material: animal bone (small ruminant radius) (U Albarella)

Initial comment: found within the initial fill of the first phase ditch of Fleam Dyke. This compact silty layer contained a large element of chalky rubble inclusions and represents rapid early filling of the ditch. It is sealed by layer 62 from which two other samples have been submitted (OxA-5351 and OxA-5352).

Objectives: this is the first in a pair of samples from this layer (*see* OxA-5354 below) which is one of the most definite early deposits associated with Fleam Dyke Monument. It forms part of a series of seven samples that have been selected to examine the chronological development of the site.

Calibrated date: 1σ: cal AD 630–670
2σ: cal AD 580–690

Final comment: T Malim (August 1995), this sample came from the primary fills of the first phase ditch of Fleam Dyke. The date appears to be sixth/seventh century, but when calculated with the three other dates obtained from the fills of this ditch a range within the fifth/sixth centuries AD is achieved which fits well with the dates obtained from the first and second phase banks.

OxA–5354 1510 ±45 BP

δ¹³C: -21.7‰

Sample: BALFD91(63)-1, submitted in December 1994 by T Malim

Material: animal bone (small ruminant humerus) (U Albarella)

Initial comment: as OxA-5353

Objectives: as OxA-5353

Calibrated date: *1σ:* cal AD 530–610
2σ: cal AD 420–650

Final comment: T Malim (August 1995), the fifth/sixth century AD date obtained corresponds well with the chronological sequence achieved by radiocarbon dating for the construction of the banks. When included with the other three dates from the fills of the phase I ditch an overall calculation shows a fifth/sixth century AD range for the infill.

Castle Hill: Ring-Ditches, Kent

Location: TR 214377
Lat. 51.05.43 N; Long. 01.09.44 E

Project manager: A Hutcheson (Canterbury Archaeological Trust), 1992

Archival body: Canterbury Museums

Description: a group of three ring-ditches set against the base of Castle Hill, Cheriton, part of the North Downs escarpment, between the 70m and 62m contours, it was excavated in advance of the construction of the A20 extension from the Cheriton terminal of the Channel Tunnel to Dover Western Docks.

Objectives: to aid in the construction of a chronology for the site.

Final comment: R Preece (1994), the ditch had cut into a sequence of late-glacial colluvial deposits which included a prominent buried soil - the so called 'Allerød soil'. OxA-4387 and OxA-4388 were measured on charcoal fragments from the top and bottom of this horizon in order to estimate the approximate direction of pedogenesis and to date important biostratigraphical changes in the molluscan succession. The dates of 10,790 ±130 BP and 12,030 ±150 BP are both the youngest and oldest dates yet obtained from the 'Allerød' soil in Britain. Other dates from the same horizon in Kent fall in the range 10,900–11,600 BP (Preece 1994) although Evans (1986) reported younger ages from the 'Pitstone Soil' at its type site in Buckinghamshire.

References: Evans 1986
Preece 1994

OxA–4387 10790 ±130 BP

δ¹³C: -27.1‰

Sample: CHRD 50–55cm (top), submitted in July 1993 by R C Preece

Material: charcoal: unidentified

Initial comment: from the top of the 'Allerød soil' horizon at a depth of 50–55cm. The ring-ditch cuts through the soil.

Objectives: to date the 'Allerød soil' from which the sample comes. The environmental episode which led to the deposition of this horizon (which occurs widely in Europe) is an important period of stability. OxA-4387 and OxA-4388 will date the duration of pedogenesis.

Calibrated date: *1σ:* 10810–10700 cal BC
2σ: 11020–10590 cal BC

Final comment: R Preece (1994), this sample dates charcoal extracted from the upper 5cm of the 'Allerød soil' exposed in the ring-ditch. The date was slightly younger than expected and relates to the last phase of pedogenesis before burial by slope deposits.

Laboratory comment: ORAU (21 October 1993): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Hedges *et al* 1994, 350–1

OxA–4388 12030 ±150 BP

δ¹³C: -27.7‰

Sample: CHRD 75–80cm (base), submitted in July 1993 by R C Preece

Material: charcoal: unidentified

Initial comment: from the base of the 'Allerød soil' horizon at a depth of 75–80cm. The ring-ditch cuts through the soil.

Objectives: as OxA-4387

Calibrated date: *1σ:* 12140–11780 cal BC
2σ: 12310–11600 cal BC

Final comment: R Preece (1994), this sample dates charcoal from the basal 5cm of the 'Allerød soil' and the level where *Trichia hispida* and *Abida secale* first appear. The date is slightly older than expected, in comparison to dates obtained from the neighbouring Hollywell Coombe.

Laboratory comment: ORAU (21 October 1993): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Hedges *et al* 1994, 350–1

OxA–4807 3675 ±65 BP

δ¹³C: -21.8‰

Sample: A Hutcheson, submitted on 7 March 1994 by Barrow G3

Material: human bone (diaphyseal, young adult female) (J Andrews)

Initial comment: from a skeleton found in a grave situated 2m south east of the centre of ring-ditch enclosure G3. The grave was cut into Coombe Rock, ie chalky solifluction gravels, and was backfilled with the same material. It was sealed by 0.6–0.7m of colluvium. OxA-4807 and OxA-4808 are replicates.

Objectives: ring-ditch G3 is thought to be the earliest of three ditches excavated. There was middle-to-late Neolithic pottery found within its ditch, though this may be residual. As this burial was situated very near the ditch centre it is thought to be the primary or initial burial and will therefore give an inception date for the barrow.

Calibrated date: *1σ:* 2190–1950 cal BC
2σ: 2280–1880 cal BC

Final comment: A Hutcheson (1997), both samples were taken from the burial at the centre of ploughed out barrow G3. There was no datable artefactual material with the skeleton and pottery found within the ring-ditch spanned a period between the middle Neolithic through to the middle Bronze Age. These dates therefore give a late Neolithic *terminus ante quem* for the construction of the monument.

Laboratory comment: Ancient Monuments Laboratory, the two radiocarbon determinations (OxA-4807 and OxA-4808) are statistically consistent (T′=0.1; T′(5%)=3.8; v=1; Ward and Wilson 1978). The weighted mean is 3658 ±42 BP, which calibrates to 2190–1890 cal BC at 95% confidence; Reimer *et al* 2004).

References: Hedges *et al* 1997, 255
Reimer *et al* 2004
Ward and Wilson 1978

OxA–4808 3645 ±55 BP

δ¹³C: -20.7‰

Sample: Barrow G3, submitted on 7 March 1994 by A Hutcheson

Material: human bone (diaphyseal (?or human maxillary teeth) young adult female) (J Andrews)

Initial comment: as OxA-4807

Objectives: as OxA-4807

Calibrated date: *1σ:* 2130–1930 cal BC
2σ: 2200–1880 cal BC

Final comment: see OxA-4807

Laboratory comment: see OxA-4807

References: Hedges *et al* 1997, 255

Cookley, Worcestershire

Location: SO 839805
Lat. 52.25.19 N; Long. 02.14.12 W

Project manager: S Limbrey (University of Birmingham), 1978

Archival body: University of Birmingham

Description: an unusually good sequence of sediments was exposed when a deep water pipeline trench was cut across the valley of the river Stour near Cookley. The sediments consisted of deep valley peat overlain and concealed by comparatively recent sands.

Objectives: the 180cm pollen sequence has been counted to an interval of 2cm, and an outline pollen diagram drawn up. The sequence starts with the early Holocene, shows the course of woodland development and the various subsequent stages of woodland clearance and farming up into the medieval period. Crops and weeds are especially well represented, and thus phases of intensified land use.

This is a rare opportunity to obtain results with enough detail and dating to provide archaeologically useful data over a long period of time, and particularly covering later periods such as the medieval period and the date of the rise in cornflower pollen. There are practically no detailed or dated pollen diagrams from this area, one of the few others being Stafford (King's Pool) more than 40km to the north. The Cookley work would provide evidence of landscape change with sufficient dating to be valuable for archaeological work in this area.

Final comment: J Greig (25 April 1996), the time of the lowest tree pollen seems to be in the Iron Age and the valley alluvium seems to have been a favoured spot further south along the Severn and in the Avon valley, for example sites such as Blackford and Bedford. The time of main woodland clearance is *c* 910-760 cal BC and therefore Bronze Age, often suspected but rarely proven. Other main woodland clearance phases are dated at 2850-2270 cal BC (GU-5535) and 3660-3300 cal BC (GU-5535), this last date also shows the start of the cereal pollen curve. This site should then provide a very detailed and dated picture of the phases of prehistoric woodland clearance and agricultural development. How far these pollen data can be extrapolated to the surroundings remains to be seen, but it is probable that useful comparisons can be made with other more isolated results from sites such as Bournville (Birmingham), Bidford upon Avon (Worcestershire), and Beckford (Worcestershire). The dating has shown the possibility of some very exciting results, which should be very useful archaeologically.

Laboratory comment: English Heritage (21 October 2009), one sample (CKL-140; HAR-3109) was published in Jordan *et al* 1994, 39–4; and a further sample was submitted for dating (CKL-205; HAR-3110), but was too small for the standard counter and was never dated.

References: Jordan *et al* 1994, 39–4

GU–5530 670 ±80 BP

δ¹³C: -25.8‰

Sample: CKL 70, 70–73cm, submitted in February 1995 by J Greig

Material: peat and organic silt (humic acid) (122g)

Initial comment: this sample is from the top of the diagram at a depth of 70–73 cm.

Objectives: to date the alluviation phase which covered the river valley.

Calibrated date: *1σ:* cal AD 1270–1400
2σ: cal AD 1210–1430

Final comment: J Greig (26 April 1996), this dates the top of the pollen diagram, and has rarity as there are no other known diagrams thus dated up into the medieval period, with other dates confirming that the date/depth curve is reasonable. It might be possible to detect signs of economic depression and Black Death.

Laboratory comment: SURRC (1995): the humic acid fraction of this sample was dated.

GU–5531 730 ±50 BP

δ13C: -29.3‰

Sample: CKL 85, 84–86cm, submitted in February 1995 by J Greig

Material: peat and organic silt (humic acid) (202g)

Initial comment: from a depth of 84–86 cm.

Objectives: to date a peak in *Centaurea cyanus* (cornflower) pollen.

Calibrated date: *1σ:* cal AD 1260–1290
2σ: cal AD 1210–1390

Final comment: J Greig (26 April 1996), GU-5531, together with GU-5532, provides a dating curve for the top part of the sequence, allowing any part of the diagram to be accurately dated within the limits of radiocarbon certainty. Within this part of the diagram are the first and second peaks of *Centaurea cyanus* pollen, dated to *c* cal AD 900–1050 and cal AD 110–1200. The first peak is earlier than expected from macrofossil finds, although the dating of most medieval sites is pretty loose. The arrival of *C. cyanus* has long been considered to be merely 'medieval' and it is high time to look into this, as here, and also consider whether there is any change in farming indicated. *C. cyanus* also coincides with reductions in *Quercus* sp. and *Alnus* pollen, signs of rather local clearance of wet woodland round the site, it would seem. This all adds up to a period of greater (or more local) human activity. The second larger peak at cal AD 1100–1200 is more as expected, and also coincides with the climatic optimum, and historical evidence of an increasing population.

Laboratory comment: English Heritage (13 June 2013), the two radiocarbon measurements (GU-5531 and GU-5534) are not statistically consistent (T′=19.8; T′(5%)=3.8; v=1; Ward and Wilson 1978).

Laboratory comment: see GU-5530

References: Ward and Wilson 1978

GU–5532 1020 ±50 BP

δ13C: -29.1‰

Sample: CKL 110, 109–111cm, submitted in February 1995 by J Greig

Material: sediment (138g) (humic acid; organic silt)

Initial comment: from a depth of 109-111cm.

Objectives: to date the start of the *Centaurea cyanus* (cornflower) curve, traditionally thought to be *c* AD 1200, but not well-dated elsewhere.

Calibrated date: *1σ:* cal AD 980–1040
2σ: cal AD 890–1160

Final comment: see GU-5531

Laboratory comment: see GU-5530

GU–5533 1380 ±50 BP

δ13C: -29.6‰

Sample: CKL 132, 130–132, submitted in February 1995 by J Greig

Material: peat

Initial comment: from a depth of 130–132cm.

Objectives: to date the rise in cereal pollen and woodland regeneration.

Calibrated date: *1σ:* cal AD 630–670
2σ: cal AD 580–770

Final comment: J Greig (26 April 1996), this fairly neatly dates a number of signs of woodland clearance, and also a huge increase in cereal pollen, and the indistinct start of the continuous Cannabis curve, and also a few records of *Vicia faba* (field bean). This means that much can then be said about the Saxon sequence of events, which seem to have had a considerable impact (Hooke 1981).

References: Hooke 1981

Laboratory comment: see GU-5530

GU–5534 2690 ±80 BP

δ13C: -29.5‰

Sample: CKL 164, 162–166cm, submitted in February 1995 by J Greig

Material: sediment (262g) (humic acid; organic silt)

Initial comment: from a depth of 162–166cm.

Objectives: to date the rise in *Plantago lanceolata* (plaintain) pollen and a fall in tree pollen indicating human impact.

Calibrated date: *1σ:* 920–790 cal BC
2σ: 1020–760 cal BC

Final comment: J Greig (26 April 1996), there is a change in sedimentation rate which makes date estimation less accurate; however there is the prospect of seeing the changing amounts of human impact during the Roman and hopefully the dark age; peaks in *Alnus*, *Salix* and *Corylus* hint, at least, at phases of less human impact but the certainty of the dating depends on collaboration with the dating specialists.

Laboratory comment: English Heritage (13 June 2014), the two radiocarbon measurements (GU-5534 and GU-5595) are statistically consistent (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978). The weighted mean (2676 ±43 BP) calibrates to 910–790 cal BC (95% confidence; Reimer *et al* 2004).

Laboratory comment: see GU-5530

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

GU–5535 3960 ±70 BP

δ13C: -26.6‰

Sample: CKL 180, 178–180cm, submitted in February 1995 by J Greig

Material: peat (humic acid) (146g)

Initial comment: from a depth of 178-180cm.

Objectives: to date the *Tilia* decline and an episode of woodland clearance.

Calibrated date: *1σ:* 2570–2340 cal BC
2σ: 2830–2210 cal BC

Final comment: J Greig (26 April 1996), this dates a woodland clearance phase that will contribute to a detailed and dated picture of the phases of woodland clearance and agricultural development.

Laboratory comment: see GU-5530

GU–5536 4640 ±50 BP

$\delta^{13}C$: -28.0‰

Sample: CKL 196, 195–197cm, submitted in February 1995 by J Greig

Material: peat (humic acid)

Initial comment: from a depth of 195–197cm.

Objectives: to date the earliest cereal pollen and therefore the earliest evidence of human activity on the site.

Calibrated date: *1σ:* 3510–3360 cal BC
2σ: 3630–3340 cal BC

Final comment: see GU-5534

Laboratory comment: see GU-5534

GU–5594 1100 ±70 BP

$\delta^{13}C$: -28.8‰

Sample: CKL 85, 84–86cm, submitted on 22 February 1995 by J Greig

Material: sediment (humin; organic silt)

Initial comment: as GU-5531

Objectives: as GU-5531

Calibrated date: *1σ:* cal AD 880–1020
2σ: cal AD 730–1040

Final comment: see GU-5531

Laboratory comment: see GU-5531

Laboratory comment: SURRC (1995): the humin fraction of this sample was dated.

GU–5595 2670 ±50 BP

$\delta^{13}C$: -30.5‰

Sample: CKL 164, 162–166cm, submitted on 22 February 1995 by J Greig

Material: sediment (262g) (humin; organic silt)

Initial comment: as GU-5534

Objectives: as GU-5534

Calibrated date: *1σ:* 850–800 cal BC
2σ: 920–790 cal BC

Final comment: see GU-5534

Laboratory comment: see GU-5594

Creeton Quarry, Lincolnshire

Location: SK 99972082
Lat. 52.46.31 N; Long. 00.31.04 W

Project manager: R Pannell (City of Lincoln Archaeology Unit), 1994

Archival body: Lincoln City and County Museum

Description: a Romano-British iron smelting site.

Objectives: there are very few iron smelting sites in Britain that are both dated and excavated. Although there was an intensive search for datable material (mainly ceramics) during the excavation only 22 sherds were recovered in total, 12 of which belong to two separate vessels. A date of early second to mid-third century AD has tentatively been given but this date is subjective and relies on a very few diagnostic sherds. The radiocarbon samples are the only means we have of confirming this date.

Final comment: J Cowgill (6 January 2003), partly due to an inability to resolve the complexity of the site stratigraphy, there are considerable problems with the dating of the site. There has been an assumption, probably misheld, that the smelting site was likely to have functioned for a relatively short period of time.The first two radiocarbon results suggest mid-late Iron Age dating for some activity on the site. The only pottery recovered from the recent excavations was 22 sherds of mid-late second century AD Roman pottery. The mid-first to second century radiocarbon dates do agree, however, with pottery recovered from the site in the 1950s. The evidence from Creeton, therefore suggests that the site was used for iron smelting for possible 100 years or more, although not necessarily continuously.

References: Burnham *et al* 1994
Cowgill and Trimble 1995

GU–5633 2110 ±50 BP

$\delta^{13}C$: -25.7‰

Sample: CRQ94 LCCM 93.94, (129) <10>, submitted on 29 February 1996 by J Cowgill

Material: charcoal: Pomoideae/*Prunus* sp. (8.60g); *Ilex* sp. (2.20g); Pomoideae (26.30g); Salicaceae (10.00g); *Corylus* sp. (19.80g); *Acer* sp. (21.90g) (R Gale 1995)

Initial comment: from a charcoal heap (129) sitting on the natural clays, surviving to a height of 140mm. The heap was totally encased by the slag heap and was composed almost purely of pieces of charcoal; very little soil had penetrated into it with a small amount of charcoal dust at the base.

Objectives: to determine the date of metal-working on the site.

Calibrated date: *1σ:* 200–50 cal BC
2σ: 360 cal BC–cal AD 10

Final comment: J Cowgill (6 January 2003), the initial two dates from charcoal spread 128, below the clay bank 170, and charcoal heap 129 suggest a middle/late Iron Age date for the features both of which sat on the natural clay.

GU–5634 2090 ±70 BP

$\delta^{13}C$: -25.1‰

Sample: CRQ94 LCCM 93.94 (128) <1>, submitted on 29 February 1996 by J Cowgill

Material: charcoal: *Quercus* sp., only bark submitted (R Gale 1995)

Initial comment: from a thin layer or scatter of charcoal 10-20mm thick, found underlying a clay bank adjacent to the ditch (132). The charcoal was well preserved and, despite the overlying clay, the structure had not suffered from intrusive silts. The total extent of the deposit is uncertain: it appeared to continue westwards towards the large heap of charcoal in context 165 but differences in the species content and dimensions of the roundwood suggested that these contexts were not connected. A group of heavily trampled furnaces (context 156) to the east of the deposit may have given rise to these deposits (perhaps as a charcoal store or fuel residues) which were subsequently buried during the construction of the ditch.

Objectives: as GU-5633

Calibrated date: *1σ:* 200 cal BC–cal AD 1
2σ: 360 cal BC–cal AD 60

Final comment: see GU-5633

UB–4092 1919 ±20 BP

$\delta^{13}C$: -24.3 ±0.2‰

Sample: CRQ94 LCCM93.94, (151) <9>, submitted on 29 February 1996 by J Cowgill

Material: charcoal: Pomoideae (8.40g); *Quercus* sp., sapwood (34.70g); *Acer* sp. (16.90g) (R Gale 1995)

Initial comment: from context 151, a hollow with a heat reddened base with an overlying primary fill of black sandy clay containing occasional charcoal flecks. It was in turn sealed by a 55m thick layer of soft heat–reddened clay containing some charcoal and occasional small ore fragments. The uppermost layer from which the sample was taken consisted of a mix of slag, ore, partially fired clay and charcoal. The interpretation of the feature is a problem. Originally it was suggested that it may have been a charcoal production 'hollow' but the oxidised nature of the basal clay argues against this so a tentative suggestion is that it was used for 'bonfiring' the ore to produce the oxidised fines.

Objectives: given that the site has generated a few sherds of Roman pottery it is extremely important to confirm the middle/late Iron Age dates produced by the first two samples (GU-5633 and GU-5634). There was a Roman site further down the hill from the smelting site but unfortunately it was removed *c* 1940 during quarrying and no one can remember how extensive it was or where exactly it was, only that there were a number of complete pots (now seemingly untraceable). It is possible that the Roman sherds were from this settlement, but a plausible reason for them being in the locality of the slag heap would still be needed if the Iron Age dates are confirmed.

Calibrated date: *1σ:* cal AD 60–125
2σ: cal AD 30–130

Final comment: J Cowgill (6 January 2003), the three precision dates from hollow 151 and charcoal spread 165, above clay bank 170, also form a consistent group. Although the date ranges span both the late Iron Age and early Romano-British periods, analysis of the probability distributions of the calibrated dates shows that the probability that both contexts post-date AD 43 is 85%. It is probable that these samples are mid-first to early-second century in date. This is different from both the suggested ceramic dating and the first radiocarbon measurements but compares well with the date of the pottery found at the quarry in 1954.

UB–4093 1912 ±20 BP

$\delta^{13}C$: -24.9 ±0.2‰

Sample: CRQ94 LCCM93.94, (165) <11> i, submitted on 26 February 1996 by J Cowgill

Material: charcoal: *Quercus* sp., sapwood (75g) (R Gale 1995)

Initial comment: from a sequence of deposits on the western part of the site consisting of ash, hammerscale, and charcoal in a matrix of clay. This sample was selected from the section through the upper part of the sequence.

Objectives: as UB-4092

Calibrated date: *1σ:* cal AD 65–125
2σ: cal AD 50–135

Final comment: see UB-4092

Laboratory comment: English Heritage (13 June 2014), the two radioacrbon determinations (UB-4093 and UB-4094) are statistically consistent (T′=0.4; T′(5%)=3.8; v=1; Ward and Wilson 1978). The weighted mean (1921 ±14 BP) calibrates to cal AD 30–120 at 95% confidence (Reimer *et al* 2004).

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

UB–4094 1930 ±20 BP

$\delta^{13}C$: -25.5 ±0.2‰

Sample: CRQ94 LCCM93.94, (165), <11> ii, submitted on 26 February 1996 by J Cowgill

Material: charcoal: Pomoideae (17.30g); *Acer* sp. (17.90g); *Corylus* sp. (19.50g) (R Gale 1995)

Initial comment: from the same deposit as UB-4093.

Objectives: as UB-4092

Calibrated date: *1σ:* cal AD 55–85
2σ: cal AD 25–130

Final comment: see UB-4092

Laboratory comment: see UB-4093

Crosby-on-Eden: bypass, Cumbria

Location: NY 452598
Lat. 54.55.47 N; Long. 02.51.19 W

Project manager: M McCarthy (Carlisle Archaeological Unit), June 1993

Archival body: Carlisle Archaeological Unit

Description: the site contained waterlogged material and structural features thought to be prehistoric in date. The majority of the settlement activity, which is exceptionally well-preserved, lies in the area of the waterlogged stream channel.

Objectives: because of the paucity of the artefactual assemblages the only means of confirming this is through radiocarbon dating. The aims are to clarify the broad timescale within which the site lies and to support the case for further investigation of the site.

GU–5352 2740 ±60 BP

δ¹³C: -28.4‰

Sample: CAR93 109, submitted on 7 June 1993 by M R McCarthy

Material: wood (waterlogged): *Alnus* sp. (J Huntley)

Initial comment: from a construction trench clearly belonging to a building. It was sealed by gleyed soils, which were in turn overlaid by hillwash of medieval date.

Objectives: the site contains waterlogged structural features thought to be prehistoric in date. Such sites are very rare in England, and the site will shortly be destroyed. The dates GU-5352 and GU-5353 are intended to clarify the broad timescale within which the site lies. Is it pre- or post-Roman? If it is pre-Roman, is it early Neolithic or late Iron Age? There are many pieces of wood but none are suitable for dendrochronology.

Calibrated date: *1σ:* 970–810 cal BC
2σ: 1020–800 cal BC

Final comment: M McCarthy (December 1993), the dates GU-5352 and GU-5353 proved to be Bronze Age. The dates are a little later than expected as there was Neolithic activity elsewhere in the same field. Although only two determinations have been made so far, the results are of great interest in demonstrating the continuing interest of this area in the later prehistoric periods. The earlier sample (GU-5353) can now be shown to have been a tree root of *Alnus* sp. and part of a woodland growing on the edge of a former watercourse in the early to middle Bronze Age. The second sample (GU-5352) probably belongs to a palisaded enclosure, which is, perhaps, late Bronze Age in date. Many other timbers were subsequently recovered from one of five more or less concentric palisades.

GU–5353 2910 ±100 BP

δ¹³C: -28.8‰

Sample: CAR93 102, submitted on 7 June 1993 by M McCarthy

Material: wood (waterlogged): *Salix/Populus sp.* (J Huntley)

Initial comment: from part of a structure, possibly a building, contained in sandy clays sealed below buried ground surfaces.

Objectives: as GU-5352

Calibrated date: *1σ:* 1260–930 cal BC
2σ: 1410–830 cal BC

Final comment: see GU-5352

Deeping St Nicholas, Lincolnshire

Location: TF 1744013135
Lat. 52.42.10 N; Long. 00.15.42 W

Project manager: C French (Heritage Lincolnshire), 1991

Archival body: Heritage Lincolnshire

Description: a gravel promontory on the lower Welland valley/fen edge interface of south Lincolnshire. The excavation revealed a complex sequence of early Bronze Age burial activity overlying evidence of Neolithic occupation and clearance activities.

Objectives: to establish a chronology for the site.

Final comment: C French (1 February 1995), this series of samples was taken in order to provide dates to accompany the clear stratigraphic sequence of at least four episodes of burial within the barrow complex. The dates received served to bolster and confirm the archaeological interpretations throughout. In general, the dates received were slightly older than had been expected, but were all within the Bronze Age as expected.

References: French 1991
French 1994

GU–5342 3440 ±60 BP

δ¹³C: -24.2‰

Sample: DEN 28/13-1, submitted on 19 February 1993 by C French

Material: human bone (young female) (C Osborne)

Initial comment: from context 54; a crouched inhumation within a pit beneath the primary barrow. The inhumation was possibly buried in a shroud.

Objectives: to provide a date for the inception of the barrow construction. This burial is believed to be interned immediately prior to the construction of the primary mound.

Calibrated date: *1σ:* 1880–1660 cal BC
2σ: 1910–1610 cal BC

Final comment: C French (1 February 1995), GU-5342 and GU-5343 represent the first features cut into the primary mound. The time period between GU-5355/GU-5358 and this date (as well as GU-5343) give an idea of when the first mound was built, and when burial activity and the first remodelling of the primary mound occurred.

Laboratory comment: English Heritage (13 June 2014), the two radiocarbon determinations (GU-5342 and GU-5343) are statistically consistent (T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (3456 ±52 BP) calibrates to 1920–1630 cal BC (95% confidence; Reimer *et al* 2004).

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

GU–5343 3500 ±100 BP

δ¹³C: -23.9‰

Sample: DEN 28/13-2, submitted on 19 February 1993 by C French

Material: human bone (young female) (C Osborne)

Initial comment: a replicate of GU-5342.

Objectives: as GU-5342

Calibrated date: *1σ:* 1950–1680 cal BC
2σ: 2140–1560 cal BC

Final comment: see GU-5342.

Laboratory comment: see GU-5342

GU–5344 3350 ±70 BP

δ¹³C: -23.5‰

Sample: DEN 28/14-1, submitted on 19 February 1993 by C French

Material: human bone (adult male) (C Osborne)

Initial comment: from context 74; a crouched inhumation within a pit cut into the remodelled primary mound; and possibly buried in a shroud.

Objectives: to provide a date for the last phase of use of the primary barrow. This burial is believed to have been interned during the remodelling and last phase of use of the primary mound.

Calibrated date: *1σ:* 1740–1530 cal BC
2σ: 1880–1460 cal BC

Final comment: C French (1 February 1995), GU-5344 and GU-5345 represent the second burial event within the primary barrow mound and are associated with a second and partial remodelling of the timber revetment to the primary mound. These dates were relatively close to GU-5342–3, and served to suggest that a relatively short time had elapsed between the two internments/remodelling of the primary barrow.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon determinations (GU-5344 and GU-5345) are statistically consistent (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (3367 ±46 BP) calibrates to 1760–1520 cal BC (95% confidence; Reimer *et al* 2004).

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

GU–5345 3380 ±60 BP

δ¹³C: -21.6‰

Sample: DEN 28/14-2, submitted on 19 February 1993 by C French

Material: human bone (adult male) (C Osborne)

Initial comment: a replicate of GU-5344.

Objectives: as GU-5344

Calibrated date: *1σ:* 1750–1610 cal BC
2σ: 1880–1510 cal BC

Final comment: see GU-5344

Laboratory comment: see GU-5344

GU–5346 2850 ±50 BP

δ¹³C: -29.0‰

Sample: DEN 28/10-1, submitted on 19 February 1993 by C French

Material: peat (humic acid)

Initial comment: from context 178; from the tertiary fill of the ditch of the secondary mound; and from the base of the profile taken for pollen analysis.

Objectives: to date the final burial of the barrow site and to date the basal contact of the pollen profile.

Calibrated date: *1σ:* 1110–920 cal BC
2σ: 1200–890 cal BC

Final comment: C French (1 February 1995), this provides a date for the burial of the whole monument complex by peat, and indicates the inception of true waterlogged conditions. It also provides a date for the base of the pollen profile analysed.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon determinations (GU-5346 and GU-5347) are statistically consistent (T′=2.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (2906 ±36 BP) calibrates to 1260–990 cal BC (95% confidence; Reimer *et al* 2004).

Laboratory comment: SURRC (1993): the humic acid fraction of this sample was dated.

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

GU–5347 2960 ±50 BP

δ¹³C: -28.6‰

Sample: DEN 28/10-2, submitted on 19 February 1993 by C French

Material: peat (humic acid)

Initial comment: a replicate of GU-5346.

Objectives: as GU-5346

Calibrated date: *1σ:* 1260–1110 cal BC
2σ: 1380–1010 cal BC

Final comment: see GU-5346

Laboratory comment: see GU-5346

GU–5348 2320 ±60 BP

δ¹³C: -30.0‰

Sample: DEN 28/11-1, submitted on 19 February 1993 by C French

Material: peat (humic acid)

Initial comment: from context 178; from the tertiary fill of a ditch in the secondary mound; and from the top of a profile taken for pollen analysis.

Objectives: to provide a comparative date to GU-5346 and GU-5347 and to date the upper contact of the pollen profile.

Calibrated date: *1σ:* 410–360 cal BC
2σ: 540–200 cal BC

Final comment: C French (1 February 1995), this provides a date for the top of the pollen profile analysed from the ditch. However it does not date the cessation of peat formation in this part of the Fens.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon determinations (GU-5348 and GU-5349) are statistically consistent (T′=0.3; T′(5%)=3.8; v=1; Ward and Wilson 1978). The weighted mean (2344 ±39 BP) calibrates to 510–370 cal BC (95% confidence; Reimer *et al* 2004).

Laboratory comment: see GU-5346

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

GU–5349 2360 ±50 BP

δ¹³C: -29.5‰

Sample: DEN 28/11-2, submitted on 19 February 1993 by C French

Material: peat (humic acid)

Initial comment: a replicate of GU-5348.

Objectives: as GU-5348

Calibrated date: *1σ:* 420–390 cal BC
2σ: 730–360 cal BC

Final comment: see GU-5358

Laboratory comment: see GU-5346

GU–5350 3570 ±50 BP

δ¹³C: -27.9‰

Sample: DEN 28/9, submitted on 19 February 1993 by C French

Material: wood (waterlogged): unidentified, woody stem fragments (R Gale 1993)

Initial comment: from context 646; from the primary fill of the outer/secondary barrow ditch and probably at the groundwater table since deposition.

Objectives: to date the inception of the secondary ditch/mound construction and to provide a comparable date to GU-5351.

Calibrated date: *1σ:* 2010–1880 cal BC
2σ: 2040–1750 cal BC

Final comment: C French (1 February 1995), this date is similar to GU-5358 obtained from the child inhumation beneath the first barrow. By comparison with GU-5351, it cannot be indicative of the date of the construction of the second barrow. It is much more probably a piece of wood thrown into this ditch that survived on site from an earlier episode of use (ie pre-mound activity).

GU–5351 3310 ±50 BP

δ¹³C: -27.0‰

Sample: DEN 28/6, submitted on 19 February 1993 by C French

Material: charcoal: cf *Corylus/Alnus* sp., occasional fragment; *Crataegus/Malus/Pyrus/Sorbus* sp., occasional fragments; *Quercus* sp. (R Gale 1993)

Initial comment: from context 623; from a cremation in a cist which is integral with the gravel revetment of the secondary mound.

Objectives: to compare with GU-5350.

Calibrated date: *1σ:* 1650–1510 cal BC
2σ: 1740–1450 cal BC

Final comment: C French (1 February 1995), the date obtained from this cist complex, integral within the gravel revetment of the secondary mound, provides an approximate date for the construction of the second barrow mound and ditch. It also provides complementary evidence for the associated Deverel-Rimbury bucket urns in the cist complex.

GU–5355 3540 ±60 BP

δ¹³C: -21.6‰

Sample: DEN 28/12 A, submitted on 26 October 1993 by C French

Material: human bone (child aged 3-5 years) (C Osborne 1991)

Initial comment: from context 483; from a crouched child inhumation contained within a wooden coffin placed in the base of a pit at the centre of a set of seven to nine concentric stake rings. This whole burial monument was sealed by an early Bronze Age earthen barrow.

Objectives: to date the first episode of burial on the site. The single grave good accompanying the inhumation is a leaf-shaped arrowhead, a typical Neolithic artefact type. It is crucial to determine whether this burial is late Neolithic in real age, or a late Neolithic burial tradition continuing into the early Bronze Age period. This date will complete the existing sequence of radiocarbon dates (currently being processed) for the site.

Calibrated date: *1σ:* 1950–1770 cal BC
2σ: 2040–1690 cal BC

Final comment: C French (1 February 1995), this inhumation was pre-first barrow, as for GU-5358. The date indicated that burial activity was initiated on this site in the very early Bronze Age of the Fenland region. It also complemented the relative date provided by the one grave good, a plano-convex knife.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon determinations (GU-5355 and GU-5358) are statistically consistent (T′=0.3; T′(5%)=3.8; v=1; Ward and Wilson 1978). The weighted mean (3558 ±39 BP) calibrates to 2030–1770 cal BC (95% confidence; Reimer *et al* 2004).

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

GU–5358 3570 ±50 BP

$\delta^{13}C$: -22.3‰

Sample: DEN 28/12 B, submitted on 26 October 1993 by C French

Material: human bone (C Osborne)

Initial comment: a replicate of GU-5355.

Objectives: as GU-5355

Calibrated date: *1σ:* 2010–1880 cal BC
2σ: 2040–1750 cal BC

Final comment: see GU-5355

Laboratory comment: see GU-5355

Ditchford: New Causeway, Northamptonshire

Location: SP 91956718
Lat. 52.17.41 N; Long. 00.39.06 W

Project manager: G D Keevill (Oxford Archaeological Unit), 1992

Archival body: Oxford Archaeological Unit

Description: Ditchford Pit lies on the north bank of the River Nene, approximately 3km east-south-east of Wellingborough. Irchester Roman town lies immediately to the south on the opposite side of the river, and Chester-on-the-Water deserted medieval hamlet lies to the east of the Roman town.

Objectives: to determine whether it was a Roman or medieval site. This in turn would define whether the feature was related to Irchester cemetery or to the medieval hamlet at Chester-on the-Water.

Final comment: G Keevill and M Robinson (20 March 1995), the samples were taken from below (GU-5439) and close to the top (GU-5440) of a limestone/metalled causeway and were intended to establish whether it was Roman or medieval. The latter date has been confirmed. The earlier date (a *terminus post quem* for construction) fits in well with evidence from West Cotton for the twelfth century AD onset of alluviation in the Nene valley. The later date refers to resurfacing. The lower end of the date range would fit well within the latter stages of alluviation in the valley, although the upper end of the range would be difficult to accept.

References: Keevill and Williams 1995

GU–5439 940 ±60 BP

$\delta^{13}C$: -27.5‰

Sample: WHDNC 92, SF 10, submitted on 18 January 1993 by G Keevill

Material: wood: Pomoideae (220g) (M Robinson)

Initial comment: a piece of worked wood recovered from the bottom of the make-up of a causeway in the floodplain of the River Nene. Dating of the structure is problematic: it could be associated with Irchester Roman town, or Chester-on-the-Water medieval hamlet.

Objectives: the dating of the causeway is crucial to the determination of its local and regional significance. The artefacts from the site consist largely of horseshoes and shoe nails. The sample has been submitted because of its stratigraphic position within the causeway make-up. It is hoped that it will determine whether the causeway is Roman or medieval.

Calibrated date: *1σ:* cal AD 1020–1170
2σ: cal AD 980–1230

Final comment: G Keevill and M Robinson (20 March 1995), the sample has served its purpose in establishing that the causeway was of medieval date rather than Roman.

GU–5440 640 ±50 BP

$\delta^{13}C$: -27.4‰

Sample: WHDNC 92, sample 3, submitted on 18 January 1993 by G Keevill

Material: wood: *Salix* sp. (260g) (M Robinson)

Initial comment: a fragment of unworked wood recovered from the causeway matrix on the north bank of the River Nene.

Objectives: as GU-5439

Calibrated date: *1σ:* cal AD 1280–1400
2σ: cal AD 1270–1420

Final comment: G Keevill and M Robinson (20 March 1995), the sample shows that the causeway was of medieval date rather than Roman. The date probably refers to refurbishment of the structure.

Dover Boat, Kent

Location: TR 32014128
Lat. 51.07.22 N; Long. 01.18.54 E

Project manager: M Bates (Canterbury Archaeological Trust), 1992

Description: the Bronze Age wooden boat was discovered in September 1992 while a major new road and sewer system was being developed in the old town of Dover. A team from Canterbury Archaeological Trust (CAT), funded by English Heritage, identified some timbers in a construction pit. An inspection revealed boat timbers and associated peats suggesting it could be prehistoric. The timbers extended for some 6m and were of a plank-sewn boat similiar to the prehistoric vessels found at North Ferriby.

The vessel was recorded *in situ* and then cut into ten sections which were lifted in early October 1992. The contractors then discovered a further 3.5m of the craft including either the stern or bow. This in turn was similiarly lifted in the middle of October. A total of 9.5m of vessel were lifted which was about a half to two thirds of the original vessel.

The boat had four bottom planks, the long central plank being replaced by two planks. Initial investigations revealed that she was a sea-going vessel that had been abandoned up a freshwater creek and was of middle Bronze Age date.The remains were shaped like a modern punt with a flat bottom, vertical sides, and a flat sloping south end. The lowest side plank was stitched with withies of yew to the outer edge of each bottom plank and curved upwards. The planks were initially made watertight with a cauking of moss laid on the inboard face of each seam. Tool marks indicate the vessel was fashioned using axes with curved blades.

Objectives: accurate dating is essential to realise the potential of the discovery for the history of early water transport in North West Europe, and its social and economic implications.

References: Clark 2004b
Owen and Frost 2000
Parfitt 1993

Dover Boat: environmental, Kent

Location: TR 320415
Lat. 51.07.30 N; Long. 01.18.57 E

Project manager: M Bates (Canterbury Archaeological Trust), 1992

Archival body: Dover Museum

Description: the Dover boat was deposited within a laminated sequence of tufa and silt, overlying peat and underlying thick bedded silts which had been cut into by an *in situ* Roman harbour revetment.

Objectives: to provide a chronological link between the sediments and the boat and provide a *terminus ante quem* for the deposition of the tufa silts surrounding the boat.

Final comment: A Bayliss (2004), the sediments are all earlier that the boat and have thus not been able to be used in answering the initial objectives.

References: Clark 2004a

OxA–7995 4195 ±60 BP

$\delta^{13}C$: -26.4‰

Sample: DS/T/1992-4901-3, submitted on 9 March 1998 by E Allison

Material: wood: *Alnus* sp., twigs (R Gale)

Initial comment: wood fragments from bedded silts 4901-3. OxA-7995 and OxA-7996 are both from this layer which was deposited earlier than layer 4901-2 from which OxA-7998 and OxA-7999 came. Layers 4901-3 and 4901-2 were bedded silts above the boat.

Objectives: to assess the chronological relationship between the environmental sequence and the boat.

Calibrated date: *1σ:* 2900–2670 cal BC
2σ: 2910–2570 cal BC

Final comment: A Bayliss (1994), on stratigraphic evidence, the bedded silts must be later than the boat although it is apparent from the date of the macrofossils contained within them, that earlier reworked material has been incorporated into them. It is likely that these macrofossils were derived either from earlier deposits upstream that were eroded and carried downstream by the river or from more local deposits reworked in the increasingly active riverine environment. They do not therefore provide a *terminus ante quem* for the deposition of the tufa silts surrounding the boat.

OxA–7996 3720 ±75 BP

$\delta^{13}C$: -27.1‰

Sample: DS/T/1992-4901-3, submitted on 9 March 1998 by E Allison

Material: wood: Pomoideae, twigs (R Gale)

Initial comment: as OxA-7995

Objectives: as OxA-7995

Calibrated date: *1σ:* 2270–1980 cal BC
2σ: 2350–1910 cal BC

Final comment: see OxA-7995

OxA–7997 3985 ±65 BP

$\delta^{13}C$: -28.8‰

Sample: DS/T/1992-peat-1, submitted on 9 March 1998 by E Allison

Material: wood (waterlogged): bark (R Gale)

Initial comment: from peat lying below the boat. The peat was very humified and rubbery. A piece of wood was present. The sample was taken from the top 3cm of the core.

Objectives: to date the peat deposit.

Calibrated date: *1σ:* 2580–2460 cal BC
2σ: 2840–2290 cal BC

Final comment: A Bayliss (2004), confirming the pollen assessment it is readily apparent that the surviving surface of the peat layer is considerably earlier than the boat.

OxA–7998 3420 ±65 BP

$\delta^{13}C$: -27.5‰

Sample: DS/T/1992-4901-2, submitted on 9 March 1998 by E Allison

Material: wood: *Alnus* sp. (R Gale)

Initial comment: wood fragments from bedded silts 4901-2. OxA-7998 and OxA-7999 are both from this layer which was deposited later than layer 4901-3 from which OxA-7995 and OxA-7996 came. Layers 4901-2 and 4901-3 were bedded silts above the boat.

Objectives: as OxA-7995

Calibrated date: *1σ:* 1870–1630 cal BC
2σ: 1900–1530 cal BC

Final comment: see OxA-7995

OxA–7999 4570 ±75 BP

δ¹³C: -29.2‰

Sample: DS/T/1992-4901-2, submitted on 9 March 1998 by E Allison

Material: wood: *Alnus* sp., bark (R Gale)

Initial comment: as OxA-7998

Objectives: as OxA-7995

Calibrated date: *1σ:* 3500–3110 cal BC
2σ: 3620–3020 cal BC

Final comment: see OxA-7995

Dover Boat: wiggle-matching, Kent

Location: TR 320415
Lat. 51.07.30 N; Long. 01.18.57 E

Project manager: P Clark (Canterbury Archaeological Trust), 1992

Archival body: Dover Museum

Description: the Dover boat was deposited within a laminated sequence of tufa and silt, overlying peat and underlying thick bedded silts, which had been cut into by an *in situ* Roman timber harbour revetment. It was recovered from a depth of 7m below the present ground level, and regularly inundated with fresh river water.

Objectives: technological similarities with the Ferriby boats suggest a date around the middle Bronze Age, though the construction of the boat is unparalleled in the ancient world. Its size and geographical position strongly suggests it was a sea-going vessel, if so one of the earliest examples in the world. Accurate dating is essential to realise the potential of the discovery for the history of early water transport in North West Europe and its social and economic implications.

Final comment: A Bayliss (2004), the combined analysis of the tree-ring and radiocarbon data demonstrates that the wigglematch sequence dates to 1742–1589 BC, adding the distribution of an appropriate sapwood estimate (Hillam *et al* 1987) to this sequence provides a *terminus post quem* for the boat as the tree-ring sequence has no heartwood-sapwood boundary. The weighted mean of the reliable measurements on the short-lived yew stitches and moss caulking (UB-4164; 3323 ±18 BP and Q-3242; 3205 ±60 BP) can then be constrained by this *terminus post quem* to provide an estimate for the date of the boat of *cal BC 1575-1520* (at 95% confidence).

Laboratory comment: English Heritage (2013), two further samples were submitted for dating prior to 1994 and were published in Bayliss *et al* (2013, 58–9; GU-5291–2).

Laboratory comment: English Heritage (26 January 2012), three further dates were funded by the University of Cambridge, Q-3240 (3285 ±50 BP; 1690–1440 cal BC at 95% confidence; Reimer *et al* 2004) and Q-3241 (3225 ±80 BP; 1690–1310 cal BC at 95% confidence; Reimer *et al* 2004), both on oak planking from the boat, and Q-3242 (3205 ±60 BP; 1620–1380 cal BC at 95% confidence; Reimer *et al* 2004) on moss caulking.

References: Bayliss *et al* 2004b
Bayliss *et al* 2013, 58–9
Bayliss and Orton 1994
Hillam *et al* 1987
Reimer *et al* 2004
Ward and Wilson 1978

UB–4142 3440 ±24 BP

δ¹³C: -26.9 ±0.2‰

Sample: Q9367 rings 21–40, submitted on 1 March 1997 by P Clark

Material: wood (waterlogged): *Quercus* sp. (C Groves)

Initial comment: from timber Q9397, rings 21–40.

Objectives: the relative age of samples UB-4142–6 is known. The dating of these rings will enable the precise dating of the timber in the boat by wiggle-matching.

Calibrated date: *1σ:* 1770–1690 cal BC
2σ: 1875–1685 cal BC

Final comment: see series comments

Laboratory comment: Ancient Monuments Laboratory (2004), the combined analysis of the tree-ring and radiocarbon data demonstrates that the sample dates to 1722–1703 BC. The radiocarbon measurement is in good agreement with this date (A=151.2%; Bayliss *et al* 2004b, fig 13.3).

Laboratory comment: Belfast (19 January 1998): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963

UB–4143 3464 ±24 BP

δ¹³C: -25.7 ±0.2‰

Sample: Q9397 rings 41–60 (2), submitted on 1 March 1997 by P Clark

Material: wood (waterlogged): *Quercus* sp. (C Groves)

Initial comment: from timber Q9397, rings 41–60.

Objectives: as UB-4142

Calibrated date: *1σ:* 1875–1700 cal BC
2σ: 1885–1690 cal BC

Final comment: see series comments

Laboratory comment: Ancient Monuments Laboratory (2004), the combined analysis of the tree-ring and radiocarbon data demonstrates that the sample dates to 1702–1683 BC. The radiocarbon measurement is in poor agreement with this date (A= 6.8%; Bayliss *et al* 2004b, fig 13.3).

Laboratory comment: Belfast (19 January 1998): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963

UB–4144 3386 ±19 BP

$\delta^{13}C$: -26.4 ±0.2‰

Sample: Q9397 rings 61–80 (3), submitted on 1 March 1997 by P Clark

Material: wood (waterlogged): *Quercus* sp. (C Groves)

Initial comment: from timber Q9397, rings 61–80.

Objectives: as UB-4142

Calibrated date: *1σ:* 1735–1640 cal BC
2σ: 1745–1625 cal BC

Final comment: see series comments

Laboratory comment: Ancient Monuments Laboratory, the combined analysis of the tree-ring and radiocarbon data demonstrates that the sample dates to 1682–1663 BC. The radiocarbon measurement is in good agreement with this date (A= 100.2%; Bayliss *et al* 2004b, fig 13.3).

Laboratory comment: Belfast (19 January 1998): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963

UB–4145 3386 ±19 BP

$\delta^{13}C$: -26.4 ±0.2‰

Sample: Q9367 rings 81–100 (4), submitted on 1 March 1997 by P Clark

Material: wood (waterlogged): *Quercus* sp. (C Groves)

Initial comment: from timber Q9397, rings 81–100.

Objectives: as UB-4142

Calibrated date: *1σ:* 1735–1640 cal BC
2σ: 1745–1625 cal BC

Final comment: see series comments.

Laboratory comment: Ancient Monuments Laboratory, the combined analysis of the tree-ring and radiocarbon data demonstrates that the sample dates to 1662–1643 BC. The radiocarbon measurement is in good agreement with this date (A= 146.4%; Bayliss *et al* 2004b, fig 13.3).

Laboratory comment: Belfast (19 January 1998): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963

UB–4146 3388 ±25 BP

$\delta^{13}C$: -25.7 ±0.2‰

Sample: Q9397 rings 101–20 (5), submitted on 1 March 1997 by P Clark

Material: wood (waterlogged): *Quercus* sp. (C Groves)

Initial comment: from timber Q9397, rings 101–120.

Objectives: as UB-4142

Calibrated date: *1σ:* 1740–1640 cal BC
2σ: 1750–1620 cal BC

Final comment: see series comments.

Laboratory comment: Ancient Monuments Laboratory, the combined analysis of the tree-ring and radiocarbon data demonstrates that the sample dates to 1642–1623 BC. The radiocarbon measurement is in reasonable agreement with this date (A= 40.1%; Bayliss *et al* 2004b, fig 13.3).

Laboratory comment: Belfast (19 January 1998): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963

UB–4164 3324 ±18 BP

$\delta^{13}C$: -23.8 ±0.2‰

Sample: DS/T/1992, submitted on 8 July 1997 by P Clark

Material: wood (waterlogged): *Taxus* sp. (P Clark)

Initial comment: fragments of broken withy stitching found in close association with the boat.

Objectives: the earlier wigglematch sample contained no sapwood/heartwood boundary. This sample is of short-lived yew twigs, which will provide a *terminus ante quem* for the earlier sample.

Calibrated date: *1σ:* 1630–1610 cal BC
2σ: 1660–1530 cal BC

Final comment: see series comments.

Laboratory comment: Ancient Monuments Laboratory, this result is statistically significantly different from GU-5292 (T′=49.0; T′(5%)=3.8; v=1; Ward and Wilson 1978), but is consistent with Q-3242 on a sample of moss caulking (T′=3.6; T′(5%)=3.8; v=1; Ward and Wilson 1978). The weighted mean of UB-4164 and Q-3242 (3314 ±17 BP; 1685–1520 cal BC at 95% confidence), however, provides the best estimate for the date of the boat and is in good agreement with the *terminus post quem* provided by the oak timbers of the boat (A=110.7%; Bayliss *et al* 2004b, fig 13.4).

Laboratory comment: Belfast (19 January 1998): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963
Ward and Wilson 1978

Duckpool, Cornwall

Location: SS 20091157
Lat. 50.52.30 N; Long. 04.33.27 W

Project manager: J Ratcliffe (Cornwall Archaeology Unit), 1992

Archival body: Cornwall Archaeological Unit

Description: Duckpool is located in the extreme north east of Cornwall, close to the border of Devon. It is situated in a small cove at the mouth of the Coombe Valley.

Objectives: to determine dates for the four main phases of the site.

Final comment: J Ratcliffe (1995), there are no problems with these dates in that they are all the right way round in terms of the relative stratigraphy of the sampled contexts. However, the early medieval dates for fill 44, hearth 2 (OxA-5065 and OxA-5066) and 49, hearth 1 (OxA-5067 and OxA-5068) were a bit of a surprise because of the almost virtual absence of any later finds it had been assumed that all the features on the site were Romano-British. The early-medieval hearth dates throw up the question as to what has happened to occupation layers of this date, presumably they had either already completely been eroded by the sea, or at least were partially surviving in an unexcavated part of the site. The dates extend considerably the chronology of the site and pose the question as to whether occupation was continuous or in two broken phases.

References: Hedges *et al* 1995, 423
Ratcliffe 1995

OxA–5065 975 ±50 BP

$\delta^{13}C$: -24.3‰

Sample: DKP92-44, submitted on 13 July 1994 by J Ratcliffe

Material: charcoal: *Ulex/Cytisus* sp. (R Gale 1994)

Initial comment: from the lowest fill (44) of a 0.4m deep hearth pit in context 2. It was well-sealed below three overlying fills.

Objectives: fill 44 represents the final firing of hearth 2, the most substantial feature excavated at Duckpool. Dating of the charcoal from the fill will indicate when this hearth was last in use and will also provide a date for one of the three main phases of activity identified during the excavation (the middle of the three).

Calibrated date: *1σ:* cal AD 1010–1160
2σ: cal AD 980–1170

Final comment: J Ratcliffe (1995), OxA-5065 and OxA-5066 were unexpected since they represent the date for the last use of hearth 2 which was assumed to be Romano-British. The early medieval date ranges were not expected because a total of only six unstratified medieval pot sherds have come from the site. No stratified deposits of this date were recognised during the excavation.

OxA–5066 1005 ±45 BP

$\delta^{13}C$: -26.0‰

Sample: DKP92-44, submitted on 13 July 1994 by J Ratcliffe

Material: charcoal: *Corylus* sp. (R Gale 1994)

Initial comment: from the same sample as OxA-5065, but a different species of wood charcoal.

Objectives: as OxA-5065

Calibrated date: *1σ:* cal AD 990–1040
2σ: cal AD 970–1160

Final comment: see OxA-5065

OxA–5067 1120 ±50 BP

$\delta^{13}C$: -26.0‰

Sample: DKP92-49, submitted on 14 September 1994 by J Ratcliffe

Material: charcoal: *Alnus* sp. (R Gale 1994)

Initial comment: from the lowest fill (49) of a shallow, 0.1m deep hearth pit in context 1. It was sealed below three thin overlying layers/fills.

Objectives: fill 49 represents the final firing of hearth 1. The dating of the charcoal from this fill will indicate when this hearth was last in use and whether it is broadly contemporary with hearth 2 or later or earlier than this feature.

Calibrated date: *1σ:* cal AD 880–990
2σ: cal AD 770–1020

Final comment: J Ratcliffe (1995), OxA-5067 and OxA-5068 were unexpectedly late since hearth 1, the last use of which they date, was assumed to be Romano-British. The early medieval dates were not expected since only six unstratified sherds of medieval pottery have come from the site and no stratified deposits of this date were recognised during the excavation.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon determinations (OxA-5067 and OxA-5068) are statistically consistent (T′=1.6; T′(5%)=3.8; v=1; Ward and Wilson 1978). The weighted mean (1165 ±36 BP) calibrates to cal AD 770–980 (95% confidence; Reimer *et al* 2004).

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

OxA–5068 1210 ±50 BP

$\delta^{13}C$: -26.2‰

Sample: DKP92-49, submitted on 14 September 1994 by J Ratcliffe

Material: charcoal: *Alnus* sp. (R Gale 1994)

Initial comment: a replicate of OxA-5067.

Objectives: as OxA-5067

Calibrated date: *1σ:* cal AD 710–890
2σ: cal AD 670–970

Final comment: see OxA-5068

Laboratory comment: see OxA-5067

OxA–5069 1760 ±60 BP

$\delta^{13}C$: -25.2‰

Sample: DKP92-50, submitted on 13 July 1994 by J Ratcliffe

Material: charcoal: *Salix* sp., /*Populus* sp. (R Gale 1994)

Initial comment: from the ash lining (context 50) of a pit which was only partially excavated but was at least 0.3m deep. Sample fill (50) was well sealed below an upper fill (54).

Objectives: dating of the charcoal from fill (50) will provide a date for the use of pit (60). It will also provide a date for the earliest of the three main phases of activity on the excavated site.

Calibrated date: *1σ:* cal AD 210–380
2σ: cal AD 120–410

Final comment: J Ratcliffe (1995), OxA-5069 and OxA-5070 are useful; as the earliest pair of radiocarbon dates they fit in well with the stratigraphic evidence indicating that pit 60 (the lowest fill of which has been dated) occupied the lowest stratigraphic position. The layer which seals pit 60 has been dated to the third/fourth century AD from pottery and coins contained within it, and the radiocarbon dates for fill 50 are, therefore, comfortably in agreement with this.

OxA–5070 1740 ±60 BP

$\delta^{13}C$: -24.3‰

Sample: DKP92-50, submitted on 13 July 1994 by J Ratcliffe

Material: charcoal: *Quercus* sp., sapwood; *Quercus* sp., sapwood (R Gale 1994)

Initial comment: from the same sample as OxA-5069, but a different species of wood charcoal.

Objectives: as OxA-5069

Calibrated date: *1σ:* cal AD 230–390
2σ: cal AD 130–420

Final comment: see OxA-5069

Eynsham Abbey, Oxfordshire

Location: SP 43300907
Lat. 51.46.41 N; Long. 01.22.20 W

Project manager: A Boyle (Oxford Archaeological Unit), 1990–2

Archival body: Oxfordshire Museums Service

Description: the village of Eynsham sits on the calcareous Second Gravel Terrace overlying Oxford Clay between the confluences of the river Evenlode and the Chil brook with the river Thames, some 9km west. An area of approximately 1800m² within the Inner Ward or Court of Eynsham Abbey was excavated during 1990–2.

Objectives: to date the activity on the site thereby allowing comparisons with other sites in the region, eg Ram's Hill and Wallingford.

Final comment: A Bayliss, C Bronk Ramsey, A Barclay, and A Boyle (2001), the sequence of radiocarbon determinations confirm the date of the deposits within the mid and upper part of the ditch and the occupation spread on the ground surface as belonging to the late second millennium cal BC. The dates obtained from these two areas are virtually indistinguishable indicating that the two areas of activity could be considered to have been broadly contemporary.

References: Barclay *et al* 2001
Hardy *et al* 2003
Hardy 2003

OxA–7858 2960 ±40 BP

$\delta^{13}C$: -20.9‰

Sample: 250/C/3, submitted on 3 November 1997 by A Boyle

Material: animal bone (articulated pig burial): *Sus* sp. (J Mulville 1997)

Initial comment: the sample derives from one of the fills of an enclosure ditch 250, it can be seen that the deposit derives from a well stratified layer within the sequence of ditch fills. It is associated with ceramics which are typologically 1200–800 BC.

Objectives: the sample is one of three from the fill of the enclosure ditch. A date will be provided for the enclosure ditch thereby allowing comparison with other relevant sites in the area such as Ram's Hill and Wallingford.

Calibrated date: *1σ:* 1260–1110 cal BC
2σ: 1290–1040 cal BC

Final comment: A Bayliss, C Bronk Ramsey, A Barclay and A Boyle (2001), the bone sample from 250/C/3 must be close in date to the context as it was an articulated pig burial. Context 250/C/3 is a ditch fill which is strategically later than context 250/C/4.

OxA–7928 2925 ±35 BP

$\delta^{13}C$: -26.6‰

Sample: 1: 250/C/3, submitted on 7 January 1998 by A Boyle

Material: carbonised residue (interior pottery sherd) (A Barclay 1998)

Initial comment: as OxA-7858

Objectives: the articulated remains of a pig and a dog were also recovered from this layer. These will also be dated and it is hoped may constrain the calibration of the dates on the burnt residues, thereby providing informative dates for the ceramics. A date for the ceramics will be provided and more specifically for the use of shell temper. If the date is late Bronze Age then it will demonstrate continuity of use of shell tempering from the middle Bronze Age through to the early Iron Age. The ditch will be dated thus allowing comparison with sites such as Ram's Hill and Wallingford.

Calibrated date: *1σ:* 1210–1050 cal BC
2σ: 1230–1000 cal BC

Final comment: A Bayliss, C Bronk Ramsey, A Barclay, and A Boyle (2001), this sample comes from a Plain Ware jar, of which 34 sherds were recovered, all from the same context. It is suggested that due to the pot being relatively intact when it reached the context it was not residual from elsewhere.

OxA–7929 2915 ±35 BP

$\delta^{13}C$: -26.8‰

Sample: 2: 250/C/4, submitted on 10 February 1998 by A Barclay

Material: carbonised residue (interior of pot sherd)

Initial comment: the sample (pot sherd base) is from one of the fills of an enclosure ditch 250. The base is just one sherd from a fragmentary jar. The fact that both parts of the rim and base survive and some old breaks refit indicate the material has not been redeposited and any disturbance (eg the insertion of a burial) may be localised within the limits of the silted ditch cut. The pottery is from a well-stratified layer within the sequence of ditch fills. Typologically the ceramics are likely to belong to the period 1200–800 cal BC and therefore the ditch could be of an earlier or comparable date.

Objectives: the sample is one of a series from the ditch fills of an enclosure. This sample will provide a direct date for the pottery and by association a date for the enclosure ditch. This will enable comparison to be made with other relevant sites in the region such as Ram's Hill and Wallingford.

Calibrated date: *1σ:* 1200–1040 cal BC
2σ: 1220–1000 cal BC

Final comment: A Bayliss, C Bronk Ramsey, A Barclay, and A Boyle (2001), sample 250/C/4 is from a ditch fill. However, crucially, there is evidence that the pot must be close in date to the context in which it was deposited. This is because the sampled sherd is from a fragmentary jar from which both the base and rim survive. Some old breaks also refit. This suggests that the pot was relatively intact when it reached the context and is not residual from elsewhere.

OxA–7930 2895 ±60 BP

δ^{13}C: -27.0‰

Sample: 3: (1678), submitted on 27 January 1998 by A Boyle

Material: carbonised residue (base interior pot sherd) (A Barclay 1998)

Initial comment: the sample derives from the old ground surface 1678, which is cut by the enclosure ditch and the features within the enclosure.

Objectives: it is expected that the old ground surface will prove to be slightly earlier in date than the enclosure ditch though within the same broad phase. A date for the ceramics will be provided, specifically a date for the use of shell-tempering. The date will all comparison with other similar sites in the region such as Ram's Hill and Wallingford.

Calibrated date: *1σ:* 1200–1000 cal BC
2σ: 1270–910 cal BC

Final comment: A Bayliss, C Bronk Ramsey, A Barclay, and A Boyle (2001), the sherds form 1678 (OxA-7930–2) must be earlier than the ditch fills since enclosure ditch 250 cut through the land surface.

OxA–7931 2950 ±40 BP

δ^{13}C: -26.6‰

Sample: 4: (1678), submitted on 27 January 1998 by A Boyle

Material: carbonised residue (base interior pot sherd) (A Barclay 1998)

Initial comment: as OxA-7930

Objectives: as OxA-7930

Calibrated date: *1σ:* 1230–1110 cal BC
2σ: 1280–1010 cal BC

Final comment: see OxA-7930

OxA–7932 2900 ±55 BP

δ^{13}C: -26.0‰

Sample: 5: 1678/-/1, submitted on 27 January 1998 by A Boyle

Material: carbonised residue (base interior pot sherd) (A Barclay 1998)

Initial comment: as OxA-7930

Objectives: as OxA-7930

Calibrated date: *1σ:* 1200–1000 cal BC
2σ: 1260–920 cal BC

Final comment: see OxA-7930

Fenland Management Project: Downham West, Norfolk

Location: TL 57600030
Lat. 51.40.43 N; Long. 00.16.45 E

Project manager: M Leah (Norfolk Archaeological Unit), 1992

Archival body: Norwich Castle Museum and Art Gallery

Description: the fen causeway crosses the Wash Fenlands from Peterborough in the west to Denver in the east. On both these sites, the main focus of the excavations was the routeways itself.

Objectives: to provide a *terminus post quem* for the road construction.

References: Lane and Morris 2001
Wallis 2002

GU–5520 3070 ±50 BP

δ^{13}C: -28.0‰

Sample: 4233DMW-LS6, submitted on 30 January 1995 by H Wallis

Material: peat (humic fraction acid; highly humified ?bryophyte) (D Weir)

Initial comment: from the contact between the Fenland Upper Peat and overlying marine silts and clays, on which the Roman Fen Causeway was constructed. The peat therefore was sealed. The overlying deposits were calcareous; pH 5.5.

Objectives: a date range of cal AD 210–410 has been established elsewhere in the Fens for the top contact of the Upper Peat. Additional dates would narrow this range, and provide a tighter *terminus post quem* for road construction.

Calibrated date: *1σ:* 1420–1260 cal BC
2σ: 1440–1200 cal BC

Final comment: A Crowson (8 February 1995), samples taken from peats immediately below the earliest silts on each site with Nordelph (GU-5518, -5519, -5520, and -5521) were unhelpful in establishing a starting point for salt winning, providing dates significantly earlier than the Roman occupation of the area.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon determinations (GU-5520 and GU-5521) are statistically consistent (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978). The weighted mean (3075 ±36 BP) calibrates to 1430–1260 cal BC (95% confidence; Reimer *et al* 2004).

Laboratory comment: SURRC (1995): the humic acid fraction of this sample was dated.

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

GU–5521 3080 ±50 BP

δ¹³C: -27.8‰

Sample: 4233DMW-LS6, submitted on 30 January 1995 by H Wallis

Material: peat (humin; highly huified, ?bryophyte) (D Weir)

Initial comment: as GU-5520

Objectives: as GU-5520

Calibrated date: *1σ:* 1420–1260 cal BC
2σ: 1450–1210 cal BC

Final comment: see GU-5520

Laboratory comment: see SURRC (1995): the humin fraction of this sample was dated.

Fenland Management Project: Feltwell Anchor, Norfolk

Location: TL 63208850
Lat. 52.28.11 N; Long. 00.24.10 E

Project manager: S Bates (Norfolk Archaeological Unit), 1992

Archival body: Norfolk Archaeological Unit, Norfolk Museums Service

Description: a excavated low mound of fragmented heat-affected flint and charcoal dating to the Bronze Age. The mound was the most prominent and substantial of the eight mounds identified in the Embayment during the Fenland Survey.

Objectives: to determine the date range of the activity on the site.

Final comment: S Bates (1996), the samples have provided a date range for activity on the site. The dates have potential for comparison with other Fenland burnt mound sites. The dating series has provided significantly different dates for the skeleton and burnt mound, and in the absence of clear stratigraphic evidence this was important in helping the archaeological interpretation of the site.

References: Bates 1992

GU–5571 3540 ±60 BP

δ¹³C: -21.9‰

Sample: 23650b, submitted on 3 March 1995 by S Bates

Material: human bone (tibia and fibula (left)) (R Luff)

Initial comment: from an inhumation in a pit sealed by a burnt mound and in the central area of the mound. The body may have been contained in a coffin or hollowed log. The skeleton was in an excellent state of preservation. A slightly sooty ?charcoal had adhered to the surface of the bones. The grave fill contained much burnt flint and lumps and flecks of wood, apparently collapsed into the grave from the mound, and the wood possibly represents the lid of a coffin.

Objectives: the only dateable evidence produced from the site are 14 sherds of Beaker pottery from within and beneath the mound. The samples from the series will provide a date range for activity on the site and will have potential for comparison with other Fenland burnt mound sites.

Calibrated date: *1σ:* 1950–1770 cal BC
2σ: 2040–1690 cal BC

Final comment: S Bates (1996), GU-5571 and GU-5572 date the first deliberately deposited burial to be scientifically dated to the early Bronze Age from the Norfolk peat fens. The dates obtained, relative to those from the mound itself, has helped the interpretation of the site in the absence of clear stratigraphic evidence.

Laboratory comment: English Heritage (25 June 2014), GU-5571 and GU-5572 are replicate measurements on the same skeleton, and these results are not statistically different at the 95% confidence (T′=2.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978); the weighted mean of the results is 3606 ±43 BP which calibrates to 2140–1880 cal BC at 95% confidence (Reimer *et al* 2004).

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

GU–5572 3670 ±60 BP

δ¹³C: -22.0‰

Sample: 23650a, submitted on 3 March 1995 by S Bates

Material: human bone (left femur) (R Luff)

Initial comment: as GU-5571

Objectives: as GU-5571

Calibrated date: *1σ:* 2140–1950 cal BC
2σ: 2210–1890 cal BC

Final comment: see GU-5571

Laboratory comment: see GU-5571

GU–5573 3720 ±80 BP

δ¹³C: -26.2‰

Sample: FWL 171, 109/208, submitted on 3 March 1995 by S Bates

Material: charcoal: *Alnus* sp. (R Gale)

Initial comment: the mound had been truncated by ploughing and was physically below the peaty ploughsoil, 0.45m thick. This sample was from the south-west quadrant of the mound, from the area of greatest charcoal concentration and probably from the area of focus of burning on the site.

Objectives: as GU-5571

Calibrated date: *1σ:* 2280–1980 cal BC
2σ: 2400–1890 cal BC

Final comment: S Bates (1996), GU-5573 and GU-5574 have contributed to providing a date range for activity on the site which will now have potential for comparison with other Fenland/burnt mound sites.

GU–5574 3770 ±50 BP

δ¹³C: -25.7‰

Sample: FWL 171, 109/212, submitted on 3 March 1995 by S Bates

Material: charcoal: *Alnus* sp. (R Gale)

Initial comment: from the central/west part of the mound, *c* 4m west of the burial at its centre, and at the north edge of the area of greatest charcoal concentration.

Objectives: as GU-5571

Calibrated date: *1σ:* 2290–2130 cal BC
2σ: 2350–2030 cal BC

Final comment: see GU-5573

Fenland Management Project: Lingwood Farm, Cambridgeshire

Location: TL 45157120
Lat. 52.19.08 N; Long. 00.07.46 E

Project manager: C Evans (Cambridge Archaeological Unit), 1992–3

Archival body: Cambridge Archaeological Unit

Description: Fenland Management Project sample investigation of Fen edge late Bronze Age settlement.

Objectives: to date an important post Deverel-Rimbury assemblage (well F, 1) including a rare tripartite disc wheel.

References: Evans 1994
Evans 1999
Murphy 1998

GU–5731 2490 ±60 BP

δ¹³C: -26.8‰

Sample: F.1 [022] 'A', submitted in February 1998 by C Evans

Material: wood (660g) (waterlogged; roundwood): *Fraxinus* sp.; *Prunus* sp.; *Corylus* sp. (C Evans 1998)

Initial comment: wood from primary/basal waterlogged fill in large well (F. 1); a rare tripartite disc wheel occurs in same context; *c* 1.2–1.4m deep from the surface; from a basal deposit in the large waterlogged well cut into gravel natural.

Objectives: to date the primary use of the large well, and by association, the tripartite disc wheel.

Calibrated date: *1σ:* 790–500 cal BC
2σ: 800–400 cal BC

Final comment: P Marshall (25 September 2012), the two measurements on samples from the fill of the well are statistically consistent (T′=0.0; v=1; T′(5%)=3.8; Ward and Wilson 1978) and could be of the same actual age. The result provides a *terminus post quem* for the important post Deverel-Rimbury assemblage including a rare tripartite disc wheel.

References: Ward and Wilson 1978

GU–5732 2480 ±50 BP

δ¹³C: -29.9‰

Sample: T5 7; Timber no. 5, submitted in February 1998 by C Evans

Material: wood (waterlogged; roundwood post): *Corylus* sp. (680g) (C Evans 1998)

Initial comment: a driven post in a primary basal waterlogged fill of a large well (F. 1); a rare tripartite disc wheel was recovered from same context. It was 1.2–1.4m deep from the surface; the basal deposit in a large waterlogged well cut into the natural gravel.

Objectives: as GU-5731

Calibrated date: *1σ:* 770–500 cal BC
2σ: 800–400 cal BC

Final comment: see GU-5731

Fenland Management Project: London Lode Farm, Nordelph, Norfolk

Location: TL 52389912
Lat. 52.34.05 N; Long. 00.14.55 E

Project manager: P Murphy (University of East Anglia), 1994

Archival body: Norwich Castle Museum and Art Gallery

Description: samples taken from Nordelph from layers of Roman briquetage underlying the Fen causeway.

Objectives: it is hoped that the results will support the hypothesis of peat-burning in the Roman period.

Final comment: P Murphy (1995), samples from layers of Roman briquetage beneath the Roman road at Nordelph produced charred plant material including nutlets of saw-sedge (*Cladium mariscus*). In view of the proximity of Roman turbaries, it seemed possible that these related to burning of sedge peat for brine evaporation, in which case a significantly pre-Roman date on these nutlets would be expected. The dates obtained confirm that the *Cladium* macrofossils came from the intercalated Iron Age peat of the area, and relate to peat burning.

References: Bronk Ramsey *et al* 2000b, 250–1
Crowson *et al* 2000
Lane and Morris 2001

GU–5518 2330 ±50 BP

δ¹³C: -28.3‰

Sample: 2976NDH-LS9, submitted on 30 January 1995 by H Wallis

Material: peat (humic acid; *Phragmites*) (P Murphy)

Initial comment: from the top 2cm of the Fenland Upper Peat at Nordelph. The earliest construction of the Roman Fen Causeway had been built on the peat. The sample thus came from well-sealed peat under road metalling and later marine silts. These latter included molluscs and foraminifera, so were calcareous.

Objectives: a date range of cal AD 210–410 has been established elsewhere in the Fens for the top contact of the Upper Peat. Additional dates would narrow this range, and provide a tighter *terminus post quem* for road construction.

Calibrated date: *1σ:* 410–380 cal BC
2σ: 520–230 cal BC

Final comment: A Crowson (8 February 1995), samples taken from peats immediately below the earliest silts on each site with Nordelph (GU-5518, -5519, -5520, and -5521) were unhelpful in establishing a starting point for salt winning, providing dates significantly earlier than the Roman occupation of the area.

Laboratory comment: English Heritage (8 February 1995), the pH had fallen to <2 after storage in a bag. This is due to Pyrite oxidation forming sulphuric acid; the $CaCo_3$ was dissolved and reprecipitated as $CaSo_4$.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon determinations (GU-5518 and GU-5519) are statistically consistent (T′=3.4; T′(5%)=3.8; v=1; Ward and Wilson 1978). The weighted mean (2396 ±36 BP) calibrates to 740–390 cal BC (95% confidence; Reimer *et al* 2004).

Laboratory comment: SURRC (1995): the humic acid fraction of this sample was dated.

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

GU–5519 2460 ±50 BP

δ¹³C: -25.9‰

Sample: 2976NDH-LS9, submitted on 30 January 1995 by H Wallis

Material: peat (humin; *Phragmites*) (P Murphy)

Initial comment: as GU-5518

Objectives: as GU-5518

Calibrated date: *1σ:* 770–410 cal BC
2σ: 790–400 cal BC

Final comment: as GU-5518

Laboratory comment: SURRC (1995): the humin fraction of this sample was dated.

OxA–5437 2225 ±50 BP

δ¹³C: -24.3‰

Sample: NDH38, submitted on 7 February 1995 by P Murphy

Material: carbonised plant macrofossil (charred nutlets, *Cladium mariscus*) (P Murphy 1994)

Initial comment: from a briquetage layer (38) underlying the Roman Fen Causeway at Nordelph. They were recovered by water flotation of soil samples in the laboratory.

Objectives: it has been argued that Roman peat pits in this area were dug to supply fuel for the salt industry. These nutlets could, therefore, be derived from peat and, if so, should be significantly pre-Roman in date. This would provide useful confirmation of the infrastructure of the industry.

Calibrated date: *1σ:* 390–200 cal BC
2σ: 400–160 cal BC

Final comment: P Murphy (1995), *see* series comments. This particular date provides information on an activity (peat cutting and burning) rather than on the context from which the material came.

References: Bronk Ramsey *et al* 2000b

OxA–5438 2540 ±55 BP

δ¹³C: -25.5‰

Sample: NDH40, submitted on 7 February 1995 by P Murphy

Material: carbonised plant macrofossil (charred nutlets, *Cladium mariscus*) (P Murphy 1994)

Initial comment: from layer 40, a similar context to NDH38 (OxA-5437), underlying the Fen Causeway.

Objectives: as OxA-5437

Calibrated date: *1σ:* 800–550 cal BC
2σ: 810–500 cal BC

Final comment: *see* series comments

References: Bronk Ramsey *et al* 2000a

Fenland Management Project: Market Deeping, Lincolnshire

Location: TF 15871154
Lat. 52.41.20 N; Long. 00.17.08 W

Project manager: T Lane (Heritage Lincolnshire), 1992

Archival body: Norfolk Museums and Archaeology Service

Description: the site lies on a slight ridge of presumed Devensian (Welland valley terrace) gravels about 1km to the north-east of Market Deeping and about 1km to the south-west of the contemporary fen-edge. A substantial relict river channel bounds the northern side of this gravel ridge.

Objectives: the principal aims of the dating programme were: to provide absolute dating for assemblage of Scored Ware from the channel; to provide absolute dating for the environmental sequence from the channel so that it can be related to settlement evidence recovered from elsewhere on the site; and, to date the wood-working activity at the base of the channel, and by association the occupation of the nearby site.

References: Bayliss *et al* 2010

OxA–6859 2235 ±65 BP

δ¹³C: -27.5‰

Sample: LS21 25cm(029), submitted on 5 October 1996 by T Lane

Material: sediment (humin; organic) (P Wiltshire 1992)

Initial comment: this sample lies near to the top of an infilled stream channel and was subject to minor drying out.

Objectives: this sample is part of a long sequence (*c* 400–500 years) through an excavated infilled palaeochannel with adjacent settlement. Evidence recovered from the deposits within the channel has provided detail of the local environment in relation to the settlement and the way that this changed through time. However, much of the pottery recovered was of a type that is poorly dated. If dated and related to typological variations in the ceramic assemblage, this stratified sequence of channel deposits can provide a chronological framework in which to consider not only the development of this site but for Iron Age pottery-bearing sites for the whole of the East Midlands, thus having a major impact on Iron Age Studies within the region.

Calibrated date: *1σ:* 400–200 cal BC
2σ: 410–110 cal BC

Final comment: P Marshall (2008), the radiocarbon dates on the sediment samples are entirely inconsistent with their relative dating from stratigraphy. The consistency of the replicated pairs and the on-going quality assurance programme at the Oxford laboratory, demonstrates the accuracy of the measurements. It is apparent that many of the dated levels contain material which is older than the time when the context was deposited. For example, layer 140, provides a date of 800–390 cal BC (at 90cm) and a date of 1920–1680 cal BC (at 95cm). It is possible that many of the dated sediment samples contain older organic material reworked from elsewhere. Positive evidence of this is shown by micromorphology in layer 052 and 043 (French and Becu 2010). For this reason, the radiocarbon dates from these layers are interpreted as *termini post quos* for the deposition of the contexts.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1996), the acid and alkali insoluble 'humin' fraction was dated.

References: French and Becu 2010

OxA–6860 1955 ±60 BP

δ¹³C: -25.8‰

Sample: LS21 35cm(043), submitted on 5 October 1996 by T Lane

Material: sediment (humin; organic) (P Wiltshire 1992)

Initial comment: from the infilled channel sequence. The deposit formed under waterlogged conditions but lies above the current water table.

Objectives: as OxA-6859

Calibrated date: *1σ:* 40 cal BC–cal AD 130
2σ: 100 cal BC–cal AD 220

Final comment: see OxA-6859

Laboratory comment: English Heritage (22 September 2008), the two measurements from this level (OxA-6860 and OxA-7936) are not statistically consistent (T′=4.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: see OxA-6589

References: Ward and Wilson 1978

OxA–6861 2275 ±65 BP

δ¹³C: -26.8‰

Sample: LS21 50cm(052), submitted on 5 October 1996 by T Lane

Material: sediment (humin; organic) (P Wiltshire 1992)

Initial comment: from an undisturbed deposit within the fill of the channel. Soil micromorphology suggests that it may have accumulated in wet conditions and that the organic sediment component may be eroded former peat.

Objectives: as OxA-6859

Calibrated date: *1σ:* 400–210 cal BC
2σ: 420–190 cal BC

Final comment: see OxA-6859

Laboratory comment: see OxA-6859

OxA–6862 2280 ±65 BP

δ¹³C: -26.0‰

Sample: LS21 62cm(129), submitted on 5 October 1996 by T Lane

Material: sediment (humin; organic) (P Wiltshire 1992)

Initial comment: from a context within the stream channel, formed in wet conditions and containing run-off midden material from the adjacent bank.

Objectives: as OxA-6859

Calibrated date: *1σ:* 410–210 cal BC
2σ: 430–190 cal BC

Final comment: see OxA-6859

Laboratory comment: see OxA-6859

OxA–6863 2395 ±60 BP

δ¹³C: -26.7‰

Sample: LS20 70cm(130), submitted on 5 October 1996 by T Lane

Material: sediment (humin; organic) (P Wiltshire 1992)

Initial comment: from a context within the infilled stream channel. Soil micormorphology suggests the deposit contained material from the adjacent midden material deposit.

Objectives: as OxA-6859

Calibrated date: *1σ:* 730–390 cal BC
2σ: 770–370 cal BC

Final comment: see OxA-6859

Laboratory comment: see OxA-6859

OxA–6864 2300 ±90 BP

δ¹³C: -27.2‰

Sample: LS20 78cm(137), submitted on 5 October 1996 by T Lane

Material: sediment (humin; organic) (P Wiltshire 1992)

Initial comment: from a deposit within the infilled stream channel.

Objectives: as OxA-6859

Calibrated date: *1σ:* 410–210 cal BC
2σ: 750–160 cal BC

Final comment: see OxA-6859

Laboratory comment: see OxA-6859

OxA–6865 2470 ±70 BP

δ¹³C: -25.6‰

Sample: LS20 90cm(140), submitted on 5 October 1996 by T Lane

Material: sediment (humin; organic) (P Wiltshire 1992)

Initial comment: from a deposit within the channel fill.

Objectives: as OxA-6859

Calibrated date: *1σ:* 780–410 cal BC
2σ: 800–390 cal BC

Final comment: see OxA-6859

Laboratory comment: see OxA-6859

OxA–6919 2210 ±45 BP

δ¹³C: -28.5‰

Sample: LS20 100cm(153), submitted on 5 October 1996 by T Lane

Material: sediment (humin; organic) (P Wiltshire 1992)

Initial comment: from a deposit of wood, stone, pot, and bone near to the base of the infilled stream channel.

Objectives: as OxA-6859

Calibrated date: *1σ:* 370–190 cal BC
2σ: 400–160 cal BC

Final comment: see OxA-6859

Laboratory comment: English Heritage (22 September 2008), the two measurements from this level (OxA-6919 and OxA-7901) are statistically consistent (T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: see OxA-6589

References: Ward and Wilson 1978

OxA–7900 2185 ±40 BP

δ¹³C: -26.6‰

Sample: 55cms(923), submitted in March 1998 by T Lane

Material: sediment (humin; organic)

Initial comment: from a deposit within the infilled palaeochannel adjacent to the settlement.

Objectives: material for dating is part of a long sequence associated with prolonged infilling of channel adjacent to iron Age settlement. It represents an almost unique opportunity to obtain a close dated type-series of 'Scored-ware' pottery, the most common style of ceramics in the East Midlands.

Calibrated date: *1σ:* 360–180 cal BC
2σ: 380–110 cal BC

Final comment: see OxA-6859

Laboratory comment: see OxA-6859

OxA–7901 2245 ±45 BP

δ¹³C: -28.1‰

Sample: LS20 100cms (153), submitted on 5 October 1996 by T Lane

Material: sediment (humin; organic) (P Wiltshire 1992)

Initial comment: as OxA-6919

Objectives: as OxA-6859

Calibrated date: *1σ:* 390–200 cal BC
2σ: 400–190 cal BC

Final comment: see OxA-6859

Laboratory comment: see OxA-6589

OxA–7933 2715 ±45 BP

δ¹³C: -26.7‰

Sample: 74cms (137), submitted in March 1998 by T Lane

Material: sediment (humin; organic)

Initial comment: the deposit was part of a sequence within an infilled palaeochannel adjacent to the settlement, with some possibility of redeposited finds. The sediment was near the base of the palaeochannel.

Objectives: to establish the date of the sequence of infilling and to relate those dated to the 'scored-ware' pottery within the infilled layers. This represents an almost unique opportunity to establish a close-dated type series of this type of pottery, which dominates the Iron Age ceramics in the East Midlands but is poorly dated.

Calibrated date: *1σ:* 910–810 cal BC
2σ: 980–800 cal BC

Final comment: see OxA-6859

Laboratory comment: see OxA-6859

OxA–7934 2685 ±55 BP

δ¹³C: -26.8‰

Sample: 67cms (130), submitted in March 1998 by T Lane

Material: sediment (humin; organic)

Initial comment: from a deposit forming part of a sequence within the infilled palaeochannel adjacent to the settlement.

Objectives: as OxA-6859

Calibrated date: *1σ:* 900–800 cal BC
2σ: 970–790 cal BC

Final comment: see OxA-6859

OxA–7935 2750 ±90 BP

δ¹³C: -28.0‰

Sample: 107cms (381), submitted in March 1998 by T Lane

Material: sediment (humin; organic)

Initial comment: the deposit was part of a sequence within an infilled palaeochannel adjacent to the settlement. It was a waterlogged deposit close to the base of the infilled palaeochannel, which contains abundant pot, wood, and bone.

Objectives: to establish the date of the sequence of deposits within the infilled palaeochannel and to relate these to the Scored Ware pottery of the region.

Calibrated date: *1σ:* 1010–800 cal BC
2σ: 1130–790 cal BC

Final comment: (22 September 1998) *see* OxA-6859

Laboratory comment: see OxA-6859

Laboratory comment: Oxford Radiocarbon Accelerator Unit (22 September 1998), the sample was only 300ug C.

OxA–7936 2110 ±40 BP

δ¹³C: -26.2‰

Sample: LS21 35cms (043), submitted on 5 October 1996 by T Lane

Material: sediment (humin; organic) (P Wiltshire 1992)

Initial comment: as OxA-6860

Objectives: as OxA-6860

Calibrated date: *1σ:* 200–50 cal BC
2σ: 350–40 cal BC

Final comment: see OxA-6860

Laboratory comment: see OxA-6589

OxA–7937 3485 ±40 BP

δ¹³C: -27.0‰

Sample: 95cms (140), submitted in April 1992 by T Lane

Material: sediment (humin; organic)

Initial comment: the deposit was part of a sequence within the infilled palaeochannel adjacent to the settlement, with some possibility of redeposited finds.

Objectives: as OxA-7933

Calibrated date: *1σ:* 1890–1740 cal BC
2σ: 1920–1690 cal BC

Final comment: see OxA-6859

Laboratory comment: see OxA-6859

OxA–7938 2615 ±40 BP

δ¹³C: -27.8‰

Sample: 103cms (157), submitted in March 1998 by T Lane

Material: sediment (humin;organic)

Initial comment: the deposit was part of a sequence within the infilled palaeochannel adjacent to the settlement.

Objectives: as OxA-7933

Calibrated date: *1σ:* 810–790 cal BC
2σ: 840–760 cal BC

Final comment: see OxA-6859

Laboratory comment: see OxA-6859

UB–4112 2342 ±19 BP

δ¹³C: -27.0‰

Sample: W/S <2178> C931, submitted on 5 October 1996 by T Lane

Material: wood: *Corylus* sp. (P Murphy 1992)

Initial comment: a piece of structural timber recovered *in situ* in the base of an infilled palaeochannel. It was sealed in a clay matrix below the water table. It had been driven into the bed of the channel as could be seen by the tilted smaller wood pieces in context 381.

Objectives: as OxA-6859

Calibrated date: *1σ:* 405–395 cal BC
2σ: 410–385 cal BC

Final comment: P Marshall (2008), the radiocarbon dates on these samples (UB-4298, UB-4303, UB-4112, and UB-4300) are earlier than those on the horizontally-lain wood (UB-4299, UB-4131, UB-4132, UB-4302, UB-4304, and UB-4305). The radiocarbon evidence therefore does not agree with the archaeological stratigraphy.

Laboratory comment: English Heritage (22 September 2008), the two measurements on vertical post <2178> 931 are true replicates (UB-4112 and UB-4300). These two measurements are statistically significantly different (T′=21.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). This difference is of such magnitude that it is unlikely to be simply a product of statistical scatter. The radiocarbon dates on the wood samples are entirely inconsistent with the model which incorporates the archaeological stratigraphy. This is difficult to explain on both archaeological and scientific grounds. The archaeological record is unequivocal in regard to the relative sequence of the dated samples. On-going quality assurance measurements at the Queen's University, Belfast laboratory suggest that the radiocarbon content of the samples was measured accurately. Other possibilities for these anomalous dates therefore need to be considered. The state of preservation of the wood, from rapidly deteriorating waterlogged contexts was poor. Additionally, there was a long period of storage between sample collection and dating (eight years). At the time of submission, it was noted that the bags were coated internally with iron depositions and that a strong smell of hydrogen sulphide was encountered on opening the bags. Both of these indicate significant microbial activity during storage. Wohlfarth *et al* (1998) conducted a study on the effect of microbial and fungal action on the radiocarbon dates of terrestrial plant macrofossils. They found that long periods of storage had a significant affect on the age determination. A similar process may be responsible for these results, although further research is required. This problem has been encountered elsewhere (Bayliss and Pryor 2001).

Laboratory comment: Belfast (23 March 1997): this sample was pre-treated to holocellulose (Green 1963).

References: Bayliss and Pryor 2001
Green 1963
Ward and Wilson 1978
Wohlfarth *et al* 1998

UB–4131 2015 ±30 BP

$\delta^{13}C$: -24.0 ±0.2‰

Sample: 2241 C381, submitted in April 1992 by T Lane

Material: wood (waterlogged): *Salix* sp., roundwood (130g) (R Darrah)

Initial comment: the wood is part of a layer consisting of both worked and unworked roundwood, worked wood offcuts, pottery and animal bone. The finds were sealed in a clay matrix below the water table in the bottom of the palaeochannel.

Objectives: as OxA-6859

Calibrated date: *1σ:* 50 cal BC–cal AD 30
2σ: 100 cal BC–cal AD 60

Final comment: P Marshall (2008), the horizontally-laid worked wood at the base of the channel (UB-4131–2, UB-4299, UB-4302, and UB-4304–5) does not provide a statistically consistent set of radiocarbon measurements (T'=104.9; T'(5%)=11.1; ν=5; Ward and Wilson 1978). All the material dated from this context was obtained from short-lived species of wood. The character of the sediments which sealed this deposit, and the general trend in the radiocarbon measurements of the sediments above, suggests that this material accumulated over a relatively short period of time. It is therefore surprising that the radiocarbon content of these wood samples is so varied.

Laboratory comment: see UB-4112

Laboratory comment: Belfast (21 July 1997): this sample was pre-treated to holocellulose (Green 1963) and combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Ward and Wilson 1978
Green 1963
Wilson *et al* 1996

UB–4132 2202 ±25 BP

$\delta^{13}C$: -26.8 ±0.2‰

Sample: 2234 C381, submitted in April 1992 by R Darrah

Material: wood (waterlogged): *Alnus* sp., roundwood (230g) (R Darrah 1992)

Initial comment: as UB-4131

Objectives: as OxA-6859

Calibrated date: *1σ:* 360–200 cal BC
2σ: 370–190 cal BC

Final comment: see UB-4131

Laboratory comment: see UB-4112

Laboratory comment: Belfast (21 July 1997): this sample was pre-treated to holocellulose (Green 1963) and combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Green 1963
Wilson *et al* 1996

UB–4298 2431 ±22 BP

$\delta^{13}C$: -27.9 ±0.2‰

Sample: MAD 91 2276, submitted in March 1998 by T Lane

Material: wood (waterlogged): *Alnus* sp., bark and sapwood surviving; 51mm roundwood (320g) (P Murphy 1992)

Initial comment: part of a line of stakes within the infilled palaeochannel. The line of stakes is on the same alignment as the palaeochannel and preserved within basal organic sediments, although these stakes appeared in the base of the channel. It is possible they were driven from a higher level. Buried within the organic sediments in the base of the palaeochannel beneath *c* 0.95m of overlying sediments, appeared with layer of pot, bone, and wood, but it is possible that the stake is much later than this layer.

Objectives: this stake is likely to have been part of a 'fence' within a palaeochannel adjacent to an Iron Age settlement. It is of some importance to establish how this 'fence' relates to the development of the settlement and how this relates to the other deposits within the palaeochannel.

Calibrated date: *1σ:* 730–410 cal BC
2σ: 745–405 cal BC

Final comment: see UB-4112

Laboratory comment: see UB-4112

UB–4299 1930 ±38 BP

$\delta^{13}C$: -26.6 ±0.2‰

Sample: MAD 91 2235 494, submitted in March 1998 by T Lane

Material: wood (waterlogged 'peg'): ?*Fraxinus* sp., with bark and sapwood (135g) (P Murphy 1992)

Initial comment: the sample was retrieved from a dense layer of wood, pottery, and bone in black waterlogged organic silt forming the basal fill of an infilled palaeochannel. Archaeological material is presumed to have been deposited from settlements located adjacent to the bank of the channel.

Objectives: to establish the date of deposition within the palaeochannel settlement. In particular, the whole palaeochannel sequence presents a unique opportunity to date the development of Scored Ware pottery.

Calibrated date: *1σ:* cal AD 20–130
2σ: 20 cal BC–cal AD 140

Final comment: see UB-4131

Laboratory comment: see UB-4112

UB–4300 2453 ±15 BP

δ¹³C: -26.9 ±0.2‰

Sample: MAD 91 2178 494, submitted in March 1998 by T Lane

Material: wood (waterlogged): *Corylus* sp., over 1kg (P Murphy 1992)

Initial comment: it appears to have been driven through the deposit containing abundant wood, pot, and bone, which is very close to the base of the palaeochannel. The post is sealed within waterlogged deposits and underneath *c* 0.95m of sediment. Although sealed by a sequence of later sediments, it is possible that the post was driven through some of these overlying deposits.

Objectives: to establish the date that the post was instated into the palaeochannel. The post is likely to have been part of a structure located within palaeochannel and it is of some importance to establish how this is related to the adjacent settlement.

Calibrated date: *1σ:* 735–510 cal BC
2σ: 750–415 cal BC

Final comment: see UB-4112

Laboratory comment: see UB-4112

UB–4301 2257 ±24 BP

δ¹³C: -29.0 ±0.2‰

Sample: MAD 91 2217 493, submitted in March 1998 by T Lane

Material: wood (waterlogged): *Fraxinus* sp., roundwood, chamfered end (P Murphy 1992)

Initial comment: the sample was collected from a waterlogged organic sediment within the infilled palaeochannel.

Objectives: as UB-4300

Calibrated date: *1σ:* 385–255 cal BC
2σ: 395–205 cal BC

Final comment: see UB-4131

Laboratory comment: see UB-4112

UB–4302 2228 ±36 BP

δ¹³C: -29.9 ±0.2‰

Sample: MAD 91 2260 546, submitted in March 1998 by T Lane

Material: wood (waterlogged): *Alnus* sp., worked (60g) (P Murphy 1992)

Initial comment: as UB-4299

Objectives: as UB-4299

Calibrated date: *1σ:* 380–200 cal BC
2σ: 400–190 cal BC

Final comment: see UB-4131

Laboratory comment: see UB-4112

UB–4303 2183 ±27 BP

δ¹³C: -29.7 ±0.2‰

Sample: MAD 91 2277, submitted in March 1992 by T Lane

Material: wood (waterlogged): *Alnus* sp., stake from fence (195g) (P Murphy 1992)

Initial comment: as UB-4298

Objectives: as UB-4298

Calibrated date: *1σ:* 360–190 cal BC
2σ: 370–160 cal BC

Final comment: see UB-4112

Laboratory comment: see UB-4112

UB–4304 2269 ±34 BP

δ¹³C: -28.6 ±0.2‰

Sample: MAD 91 2161 494, submitted in March 1998 by T Lane

Material: wood (waterlogged): *Alnus* sp. (165g) (P Murphy 1992)

Initial comment: as UB-4299

Objectives: as UB-4299

Calibrated date: *1σ:* 400–250 cal BC
2σ: 400–200 cal BC

Final comment: see UB-4131

Laboratory comment: see UB-4112

UB–4305 2269 ±18 BP

δ¹³C: -29.9 ±0.2‰

Sample: 2221 494, submitted in March 1998 by T Lane

Material: wood (waterlogged): *Salix* sp. (245g) (P Murphy 1992)

Initial comment: as UB-4299

Objectives: as UB-4299

Calibrated date: *1σ:* 390–360 cal BC
2σ: 395–230 cal BC

Final comment: see UB-4131

Laboratory comment: see UB-4112

Fenland Management Project: Northwold burnt mound, Norfolk

Location: TL 71419696
Lat. 52.32.35 N; Long. 00.31.41 E

Project manager: A Crowson (Norfolk Archaeological Unit), 1994

Archival body: Norfolk Museums Service

Description: a prehistoric burnt mound, situated within an area termed the Wissey Embayment on the northern slope of an emerging sand ridge in a former 'hummock and hollow' landscape.

Objectives: the two main objectives were firstly to provide precise dates for the period of use of the mound and the associated Beaker pottery, and secondly to investigate the chronological make-up of the mound, particularly with reference to possible spatial differences. A series of replicate measurements were also undertaken on single pieces of short-life charcoal isolated from two of the bulk charcoal samples dated as part of research to investigate the taphonomy of such samples (Crowson and Bayliss 1999).

Final comment: A Crowson (2 December 1999), all the radiocarbon results from the burnt mound are statistically indistinguishable (T′=9.9; T′(5%)=16.9; v=9; Ward and Wilson 1978). This suggests that there is no chronological variation in the make-up of the mound in different grid squares. The burnt mound itself was probably used in the first half of the 22nd century cal BC (eg *BS44*; Bayliss *et al* 2004a, fig 17).

References: Bayliss *et al* 2004a
Crowson *et al* 2000
Crowson and Bayliss 1999

OxA–6626 3750 ±55 BP

$\delta^{13}C$: -26.4‰

Sample: BS 44 (i), submitted on 9 October 1996 by A Crowson

Material: charcoal: *Corylus/Alnus* sp. (R Gale 1996)

Initial comment: a sample of material from the burnt mound.

Objectives: to date the activity of the burnt mound.

Calibrated date: *1σ:* 2280–2040 cal BC
2σ: 2340–1980 cal BC

Final comment: A Crowson (2 December 1999), the four measurements on short-life single entity samples from this deposit (OxA-6626, OxA-6726, OxA-6823, and OxA-6846) are statistically consistent with the measurement on a bulk sample of this material (UB-4100; T′=7.9; T′(5%)=9.5; v=4; Ward and Wilson 1978). This suggests that the interpretation of this material as fuel from the use of the burnt mound is plausible.

References: Ward and Wilson 1978

OxA–6726 3770 ±55 BP

$\delta^{13}C$: -26.4‰

Sample: BS 44 (ii), submitted on 9 October 1996 by A Crowson

Material: charcoal: *Corylus/Alnus* sp. (R Gale 1996)

Initial comment: as OxA-6626

Objectives: as OxA-6626

Calibrated date: *1σ:* 2290–2060 cal BC
2σ: 2400–2020 cal BC

Final comment: see OxA-6626

OxA–6823 3840 ±55 BP

$\delta^{13}C$: -26.1‰

Sample: BS 44 (iii), submitted on 9 October 1996 by A Crowson

Material: charcoal: *Corylus/Alnus* sp. (R Gale 1996)

Initial comment: as OxA-6626

Objectives: as OxA-6626

Calibrated date: *1σ:* 2460–2200 cal BC
2σ: 2470–2130 cal BC

Final comment: see OxA-6626

OxA–6846 3650 ±55 BP

$\delta^{13}C$: -26.5‰

Sample: BS 44 (iv), submitted on 9 October 1996 by A Crowson

Material: charcoal: *Corylus/Alnus* sp. (R Gale 1996)

Initial comment: as OxA-6626

Objectives: as OxA-6626

Calibrated date: *1σ:* 2140–1940 cal BC
2σ: 2200–1880 cal BC

Final comment: see OxA-6626

OxA–6847 3730 ±60 BP

$\delta^{13}C$: -28.0‰

Sample: BS 47 (i), submitted on 9 October 1996 by A Crowson

Material: charcoal: *Corylus/Alnus* sp. (R Gale 1996)

Initial comment: as OxA-6626

Objectives: as OxA-6626

Calibrated date: *1σ:* 2210–2030 cal BC
2σ: 2300–1950 cal BC

Final comment: A Crowson (2 December 1999), the four measuremetns on short-life single entity samples from this deposit (OxA-6847–50) are statistically consistent with the measurement on a bulk sample of this material (UB-4101; T′=1.1; T′(5%)=9.5; v=4; Ward and Wilson 1978). This suggests that the interpretation of this material as fuel from the use of the burnt mound is plausible.

References: Ward and Wilson 1978

OxA–6848 3700 ±50 BP

$\delta^{13}C$: -25.8‰

Sample: BS 47 (ii), submitted on 9 October 1996 by A Crowson

Material: charcoal: *Corylus/Alnus* sp. (R Gale 1996)

Initial comment: as OxA-6626

Objectives: as OxA-6626

Calibrated date: *1σ:* 2200–2020 cal BC
2σ: 2280–1940 cal BC

Final comment: see OxA-6847

OxA–6849 3765 ±45 BP

δ¹³C: -26.3‰

Sample: BS 47 (iii), submitted on 9 October 1996 by A Crowson

Material: charcoal: *Corylus/Alnus* sp. (R Gale 1996)

Initial comment: as OxA-6626

Objectives: as OxA-6626

Calibrated date: *1σ:* 2280–2130 cal BC
2σ: 2340–2030 cal BC

Final comment: see OxA-6847

OxA–6850 3755 ±45 BP

δ¹³C: -26.3‰

Sample: BS 47 (iv), submitted on 9 October 1996 by A Crowson

Material: charcoal: *Corylus/Alnus* sp. (R Gale 1996)

Initial comment: as OxA-6626

Objectives: as OxA-6626

Calibrated date: *1σ:* 2280–2050 cal BC
2σ: 2300–2030 cal BC

Final comment: see OxA-6847

OxA–6894 3730 ±45 BP

δ¹³C: -25.2‰

Sample: BS 62, submitted on 9 October 1996 by A Crowson

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: from the basal/primary fill of the water 'reservoir' pit [52].

Objectives: to date the infilling of the pit.

Calibrated date: *1σ:* 2210–2030 cal BC
2σ: 2290–1980 cal BC

Final comment: A Crowson (2 December 1999), this date is in good agreement (A=133.7%; Bayliss *et al* 2004a, fig 17) with the model for burnt mund use.

OxA–6895 3650 ±45 BP

δ¹³C: -28.6‰

Sample: BS 74, submitted on 9 October 1996 by A Crowson

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: from the primary fill of a pit. Cut by later feature [23] and thus pre-dating the use of the burnt mound.

Objectives: to date a feature assigned to the earliest phase of human activity on the site.

Calibrated date: *1σ:* 2130–1940 cal BC
2σ: 2200–1890 cal BC

Final comment: A Crowson (2 December 1999), this date has poor agreement (A=1.3%; Bayliss *et al* 2004a, fig 17) with its stratigraphic position, ie it is earlier than the burnt mound, and the fragment of charcoal dated was probably intrusive (from burnt mound use).

UB–4078 3682 ±20 BP

δ¹³C: -26.8 ±0.2‰

Sample: NWD-1 123, submitted on 18 September 1996 by A Crowson

Material: wood: *Quercus* sp., roundwood (P Murphy 1996)

Initial comment: from a layer of woody peat [32] infilling the pit cut through the centre of the burnt mound.

Objectives: the sample is from material [32] representing the onset of peat formation over the site following its abandonment. The sampled material seals the latest 'phaseable' cultural deposit/feature and should therefore indicate the end date/abandonment of human activity on the site.

Calibrated date: *1σ:* 2135–2025 cal BC
2σ: 2140–1980 cal BC

Final comment: A Crowson (2 December 1999), the date provides a *terminus ante quem* for the end of use of the burnt mound.

UB–4079 3692 ±20 BP

δ¹³C: -28.7 ±0.2‰

Sample: NWD-1 125, submitted on 18 September 1996 by A Crowson

Material: wood: *Alnus* sp., roundwood (85mm) (P Murphy 1996)

Initial comment: as UB-4078

Objectives: as UB-4078

Calibrated date: *1σ:* 2135–2030 cal BC
2σ: 2145–1980 cal BC

Final comment: see UB-4078

UB–4080 3682 ±20 BP

δ¹³C: -28.9 ±0.2‰

Sample: NWD-1 188, submitted on 18 September 1996 by A Crowson

Material: wood: *Alnus* sp. (A Crowson 1996)

Initial comment: a sample from a timber plank laid directly onto base of the pit cut through the burnt mound.

Objectives: the sample is from a board/plank deliberately placed on the base of pit [14] and is being dated to help elucidate the chronology of burnt mound activity.

Calibrated date: *1σ:* 2135–2025 cal BC
2σ: 2140–1980 cal BC

Final comment: A Crowson (2 December 1999), the date has good agreement (A=86.6%; Bayliss *et al* 2004a, fig 17) with the model for burnt mound activity.

UB–4081 3783 ±24 BP

δ^{13}C: -28.9 ±0.2‰

Sample: NWD-1 192, submitted on 18 September 1996 by A Crowson

Material: wood: *Alnus* sp. (P Murphy 1996)

Initial comment: as UB-4080

Objectives: as UB-4080

Calibrated date: *1σ:* 2280–2145 cal BC
2σ: 2290–2135 cal BC

Final comment: A Crowson (2 December 1999), the date has good agreement (A=80.3%; Bayliss *et al* 2004a, fig 17) with the model for burnt mound activity.

UB–4099 3692 ±20 BP

δ^{13}C: -30.2 ±0.2‰

Sample: NWD 176, submitted on 9 October 1996 by A Crowson

Material: wood: *Corylus* sp. (P Murphy 1996)

Initial comment: pointed stake from basal fill of waterlogged pit [52]. Pit fill somewhat calcareous, below the water table with no intrusions/disturbances.

Objectives: stake sample comes from primary fill of 'reservoir' pit associated with burnt mound. Excavation of pit pre-dates mound/use of pit is contemporary with the mound. Sample to date beginning of use/creation of burnt mound.

Calibrated date: *1σ:* 2135–2030 cal BC
2σ: 2145–1980 cal BC

Final comment: see OxA-6894

UB–4100 3706 ±21 BP

δ^{13}C: -27.9 ±0.2‰

Sample: NWD-1 BS44, submitted on 9 October 1996 by A Crowson

Material: charcoal: Pomoideae (0.70g); *Prunus* sp. (0.80g); *Corylus/Alnus* sp. (47.70g) (R Gale 1996)

Initial comment: as OxA-6626

Objectives: as OxA-6626

Calibrated date: *1σ:* 2140–2035 cal BC
2σ: 2195–2025 cal BC

Final comment: see OxA-6626

UB–4101 3746 ±22 BP

δ^{13}C: -27.7 ±0.2‰

Sample: NWD BS47, submitted on 9 October 1996 by A Crowson

Material: charcoal: *Corylus/Alnus* sp. (50g) (R Gale 1996)

Initial comment: as OxA-6626

Objectives: as OxA-6626

Calibrated date: *1σ:* 2200–2135 cal BC
2σ: 2270–2040 cal BC

Final comment: see OxA-6847

UB–4102 3751 ±22 BP

δ^{13}C: -27.5 ±0.2‰

Sample: NWD-1 BS 94, submitted on 9 October 1996 by A Crowson

Material: charcoal: *Corylus/Alnus* sp. (50.50g) (R Gale 1996)

Initial comment: a sample from fill [251] within pit [252], which was sealed by the burnt mound deposit.

Objectives: from a stratigraphically earlier feature than the burnt mound, it is hoped this sample will provide a *terminus post quem* for the burnt mound activity.

Calibrated date: *1σ:* 2205–2135 cal BC
2σ: 2275–2045 cal BC

Final comment: A Crowson (2 December 1999), the date has good agreement (A=73.0%; Bayliss *et al* 2004a, fig 17) with its stratigraphic position.

Fenland Management Project: Shouldham, Norfolk

Location: TF 69021122
Lat. 52.40.19 N; Long. 00.30.00 E

Project manager: P Murphy (Centre for East Anglian Studies, University of East Anglia), 1992

Archival body: Norfolk Museums Service

Description: the Mere Plot Drove lies isolated in the area of deepest peat within the parish, to the south of the former course of the Nar. The Shouldham parish occupies the gentle southern slopes and the fringing skirtland towards the eastern end of the survey area, and produced worked flint from virtually every field although rarely in obvious concentration.

Objectives: the site provides an unusual opportunity to examine palaeochannel sediments directly associated with a Neolithic artefact scatter and detailed analysis of sediments contemporary with the artefacts.

Final comment: A Bayliss (18 October 1997), the radicarbon dates are all earlier than expected.

References: Crowson *et al* 2000

OxA–6976 8390 ±50 BP

δ^{13}C: -27.6‰

Sample: SHDU6/1 215cm, submitted in November 1996 by P Murphy

Material: peat (humin)

Initial comment: sample from a palaeochannel adjacent to an early Neolithic site. Recovered by coring 215cm deep.

Objectives: the purpose of these dates is to bracket sediments spanning the Mesolithic/Neolithic transition. Investigation of which has been defined in an Fenland Management outline as a priority.

Calibrated date: 1σ: 7530–7380 cal BC
2σ: 7570–7340 cal BC

Final comment: P Marshall (25 September 2012), the three radiocarbon dates are in agreement with the stratigraphic sequence and indicate that peat was accumulating rapidly in the early post-glacial period (early Mesolithic). These results confirm the palynological assessment that suggests the vegetation was initially dominated by pine and birch.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1996): the humin fraction of this sample was dated.

OxA–6977 8835 ±50 BP

$\delta^{13}C$: -28.2‰

Sample: SHDU6/1 250cm, submitted in November 1996 by P Murphy

Material: peat (humin)

Initial comment: sample from a palaeochannel adjacent to a Neolithic site, 250cm deep.

Objectives: as OxA-6976

Calibrated date: 1σ: 8180–7810 cal BC
2σ: 8230–7730 cal BC

Final comment: see OxA-6976

OxA–6978 8855 ±55 BP

$\delta^{13}C$: -29.1‰

Sample: SHDU6/1 280cm, submitted in November 1996 by P Murphy

Material: peat (humin)

Initial comment: sample from a palaeochannel adjacent to an early Neolithic site. Recovered by coring 280cm deep.

Objectives: as OxA-6976

Calibrated date: 1σ: 8210–7830 cal BC
2σ: 8240–7740 cal BC

Final comment: see OxA-6976

Fenland Management Project: Tolbar Drove, Cowbit, Lincolnshire

Location: TF 25261812
Lat. 52.44.45 N; Long. 00.08.39 W

Project manager: T Lane (Heritage Lincolnshire), 1992

Archival body: Heritage Lincolnshire

Description: samples from the fills of a pair of shallow flues relating to a saltern hearth/oven.

Objectives: a date will provide an absolute date for the typology of the briquetage.

Laboratory comment: Ancient Monuments Laboratory, the weighted mean of UB-4026 and UB-4027 is 2098 ±15 BP which calibrates to 180-95 cal BC at 95% confidence.

References: Crowson *et al* 2000
Lane and Morris 2001

UB–4026 2078 ±19 BP

$\delta^{13}C$: -26.6 ±0.2‰

Sample: COW 92 191-2, 194, 196, submitted on 29 November 1995 by T Lane

Material: charcoal: *Alnus* sp., or *Salix* sp. (R Gale 1995)

Initial comment: from the upper fill of a pair of shallow flues of a hearth/oven. The charcoal probably relates either to fuel from firing or part of the frame of a collapsed superstructure.

Objectives: the briquetage within the hearth/oven is of a second phase of saltmaking on the site. This is the only dateable feature with nothing to date the earlier phase (except typology). We now have briquetage from over 300 sites in the Fens, many of which are parallels to this second phase at Cowbit. These results will therefore give more than site-specific information.

Calibrated date: 1σ: 160–45 cal BC
2σ: 175–40 cal BC

Final comment: A Bayliss, G McCormac, and P Pettit (2001), the results from Cowbit provide a rare and welcome absolute date for the activity on the site, and for the briquetage. The middle Iron Age date for this horizon is perhaps slightly earlier than expected from previous typological analysis.

UB–4027 2135 ±25 BP

$\delta^{13}C$: -24.9 ±0.2‰

Sample: COW 92 193, 195, 197-199 (lower fills), submitted on 29 November 1995 by T Lane

Material: charcoal (small subsample identified; mostly too small): *Salix* sp.; *Alnus* sp. (R Gale 1995)

Initial comment: as UB-4026 but from the lower fill of the flues.

Objectives: as UB-4026

Calibrated date: 1σ: 200–110 cal BC
2σ: 350–60 cal BC

Final comment: see UB-4026

Flag Fen, Cambridgeshire

Location: TL 227989
Lat. 52.34.25 N; Long. 00.11.21 W

Project manager: M Macklin (Fenland Archaeological Trust), 1990

Description: Flag Fen is on the south eastern limits of the city of Peterborough. The landscape is very low-lying, and prior to drainage in the seventeenth century, was characterised by large areas of freshwater with slightly brackish wetland surrounded by dried, flood-free, fen-edge plain. At present Flag Fen has yet to unearth any datable artefact that pre-dates the middle Bronze Age.

Objectives: radiocarbon dating remains the only method of dating local environmental sequences.

References: Pryor 1992a
Pryor 2001

Flag Fen: Fengate, Cambridgeshire

Location: TL 217991
Lat. 52.34.33 N; Long. 00.12.14 W

Project manager: R Scaife (University of Southampton), 1992

Archival body: Fenland Archaeological Trust

Description: Fengate and Flag Fen are part of the same landscape. At Fengate the earliest man-made features can be dated to the early Neolithic.

Objectives: to date the peat development and environment in Flag Fen Basin.

References: Pryor 1992a
Pryor 2001

GU–5619 2290 ±50 BP

$\delta^{13}C$: -28.6‰

Sample: Fengate (B) 46-55 (Humic), submitted on 10 July 1995 by R Scaife

Material: peat (humic acid; detrital)

Initial comment: located at the top of the peat sealed by alluvial silt layer on the margins of the Flag Fen Basin.

Objectives: this date will provide an age for the final alluvial inundation of the Flag Fen Basin (including the Platform structure. This was a major and yet undated event in the south west Fen area. This inundation had profound effects on local prehistoric habitation and wider implications of base level/eustatic changes.

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

Final comment: A Bayliss and F Pryor (2001), the date provides a *terminus post quem* for the earliest phase of alluviation.

Laboratory comment: SURRC (1996): the humic acid fraction of this sample was dated.

GU–5620 2840 ±50 BP

$\delta^{13}C$: -29.4‰

Sample: Fengate (B) 85-95 (Humic), submitted on 10 July 1995 by R Scaife

Material: wood and peat (humic acid; detrital fen peat with *Alnus* sp. wood fragments) (R Scaife)

Initial comment: a sample of basal peat from the Flag Fen Basin. Taken from the lateral margins of the Fen at Fengate and it will provide a date for the fen incursion onto the terrestrial landscape.

Objectives: this date will provide one in a series which will allow the palaeogeographical reconstruction of the Fen Basin during the Bronze age. It has a specific relevance to the asynchrony of peat bondation in the Flag Fen Basin.

Calibrated date: *1σ:* 1060–920 cal BC
2σ: 1190–890 cal BC

Final comment: P Marshall (25 September 2012), the date provides a *terminus ante quem* for the archaeological deposits that are sealed beneath it and a date for the incursion of fen deposits onto the dry-land landscape.

Laboratory comment: see GU-5619

Flag Fen: Northey Site, Cambridgeshire

Location: TL 227989
Lat. 52.34.25 N; Long. 00.11.21 W

Project manager: R Scaife (University of Southampton), 1993

Archival body: Fenland Archaeological Trust

Description: Northey is a northwesterly promontory of the natural 'island' of Whittlesey, which lies very much closer to the timber platform than Fengate.

Objectives: to date the peat development and environment in Flag Fen Basin.

References: Pryor 1992b

GU–5616 2180 ±60 BP

$\delta^{13}C$: -28.6‰

Sample: Northey 9-12 (humic), submitted on 10 July 1995 by R Scaife

Material: peat (humic acid)

Initial comment: a sample from the top levels of fen peat lying immediately below alluvial clays. This marks the last phases of peat alluviation in which the Flag Fen Platform (Bronze Age) was constructed.

Objectives: to examine the final phase of peat development and environment in the Flag Fen Basin. It will contribute to the palaeogeographical reconstruction of the Bronze Age South West Fen area and the Flag Fen Platform.

Calibrated date: *1σ:* 360–160 cal BC
2σ: 400–50 cal BC

Final comment: A Bayliss and F Pryor (2001), this date provides a *terminus post quem* for the earliest phase of alluviation.

Laboratory comment: SURRC (1996): the humic acid fraction of this sample was dated.

GU–5617 3130 ±60 BP

δ¹³C: -29.2‰

Sample: Northey 61-65 (humic), submitted on 10 July 1995 by R Scaife

Material: peat (humic acid)

Initial comment: the sample marks a major environmental phase of fen peat development. The date will provide an age for the first development of the sedge fen proper in which the Platform was constructed.

Objectives: as GU-5616

Calibrated date: *1σ:* 1490–1300 cal BC
2σ: 1510–1230 cal BC

Final comment: A Bayliss and F Pryor (2001), a date for peat formation directly below the timber platform.

Laboratory comment: see GU-5616

GU–5618 3500 ±60 BP

δ¹³C: -28.3‰

Sample: Northey 80-85 (Humic), submitted on 10 July 1995 by R Scaife

Material: peat (humic acid; monocot fen peat/detritus)

Initial comment: a sample of organic muds/fen peat laid down under a reed bed/shallow water environment in the deepest part of the Flag Fen Basin (at Northey). The sample is from the base of this stratigraphical unit and this represents the date of waterlogging/lake creation at Flag Fen.

Objectives: this date will provide an age for the first stages of fen creation in the deepest part of the Flag Fen basin. The date is fundamental to understanding the palaeogeographical development of the basin.

Calibrated date: *1σ:* 1910–1700 cal BC
2σ: 2010–1660 cal BC

Final comment: A Bayliss and F Pryor (2001), a date for the first formation of peat in the Flag Fen basin.

Laboratory comment: see GU-5616

Godmanchester: Rectory Farm, Cambridgeshire

Location: TL 258710
Lat. 52.19.21 N; Long. 00.09.20 W

Project manager: F McAvoy (Central Excavation Service), 1988–92

Archival body: English Heritage

Description: multi-period cropmarks, covering *c* 40ha in the Lower Ouse Valley, were investigated prior to mineral extraction.

Objectives: to establish a chronological framework through scientific dating for the origin and development of a new form of Neolithic 'enclosure' and its associated monuments and structures.

Laboratory comment: English Heritage (2013), 15 further dates were funded prior to 1994 and were published in Bayliss *et al* (2013, 74–7; AA-9658–9, GU-5213, -5266–8, OxA-2323, -3366–7, -3369–70, -3483, 3490–1, and -3646).

Laboratory comment: English Heritage (3 February 2012), three further bone samples 432-3530, 432-8501, and 432-8502 were submitted for dating but failed due to low collagen yield.

References: Bayliss *et al* 2013, 74–7
McAvoy 1991
Whittle *et al* 2011, 278–93

OxA–4360 4360 ±100 BP

δ¹³C: -21.7‰

Sample: 432-9205, submitted on 21 March 1993 by F McAvoy

Material: animal bone: *Bos* sp., limb bone (F McAvoy 1989)

Initial comment: this bone was found in the primary silt, which had formed around the cattle skulls, placed on the base of the ditch terminal of the Neolithic enclosure.

Objectives: early Neolithic dates have previously been obtained from charcoal associated with a post-series within the enclosure. The dating of cattle jawbones from the north-west terminal of the enclosure ditch has, however, suggested a late Neolithic date.

Calibrated date: *1σ:* 3270–2890 cal BC
2σ: 3360–2700 cal BC

Final comment: F McAvoy (19 July 1994), this date can be compared with AA-9569 (3740 ±55 BP, 2300–1970 cal BC at 95% confidence; Reimer *et al* 2004) obtained from animal bone found in a similar position within the other ditch terminal and with the results of determinations from samples of charcoal recovered from a series of posts, which were located around the interior of the enclosure.

References: Hedges *et al* 1995, 421
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 Flint Mines, Dorset

Location: ST 849122
Lat. 50.54.08 N; Long. 02.13.39 W

Project manager: R J Mercer (University of Edinburgh), 1982

Archival body: Dorset County Museum

Description: a number of irregular dark areas near the junction of Upper and Middle Chalk were identified from air photographs. Excavation of two on the Hanford spur of the hill showed each to be a complex of pits *c* 1m deep, connected by short 'galleries' at the level of a thin seam of poor quality tabular flint to which they were sunk. They were initially interpreted as flint mines, worked during the construction of the Hanford spur outworks.

Objectives: to establish a date for the feature because the age and precise function of the features remain uncertain. Interpretation as flint mines is questioned because: 1. the flint seam to which they were sunk is of abysmal quality and is insignificant in local industries; 2. there is little associated knapping debris; and 3. the chalk excavated from the features was removed along with the flint, since the apparently tipped backfill is essentially of soil.They appear to be quarries of unknown kind and date. The relatively small quantity of human and animal bone (the latter including exceptionally high proportions for the site of pig and wild species) and early/middle Neolithic artefacts recovered from them could have been either contemporary with backfilling or redeposited in the course of it.

Laboratory comment: English Heritage (2013), one further date was published in Bayliss *et al* (2012, 135; HAR-6037).

References: Bayliss *et al* 2012, 135
Mercer 1987

OxA–7833 3810 ±45 BP

$\delta^{13}C$: -22.7‰

Sample: HN82 744, submitted in December 1997 by F Healy

Material: antler: *Cervus elaphus*, with last three tines, one snapped, two very battered, probably anciently, rodent-gnawed (A Legge 1997)

Initial comment: from one of a group of interconnected features originally interpreted as flint mines (Mercer 1987). It lay near the entrance to an undercut leading to another comparable feature, in earthy backfill with chalk and flint. Archival reference: HN82 F644 layer 2.

Objectives: to establish a date for the feature. The location of the antler and the wear on it strongly suggest that it was used to excavate the feature in which it was found, in which case it can have been only slightly older than that feature.

Calibrated date: *1σ:* 2330–2150 cal BC
2σ: 2460–2130 cal BC

Final comment: F Healy (26 November 2006), the location of the sample and its apparent relationship to the original excavation of the complex mean that the 'mine' itself must date to the third millennium cal BC, and was unrelated to the Neolithic earthworks.

References: Mercer 1987

OxA–7834 4425 ±45 BP

$\delta^{13}C$: -22.8‰

Sample: HN82 774, submitted in December 1997 by F Healy

Material: animal bone: *Bos* sp., two caudal vertebrae, possibly articulating (A Legge 1997)

Initial comment: the sample came from the lowest layer of compact, earthy backfill with chalk and flint in one (HN82 F601) of a group of interconnected features originally interpreted as flint mines (Mercer 1987). A rabbit femur in the same mixed bone find (which also included caprine, fox, and bird) may reflect the burrowing habits of the species rather than an historical date for the sample. The relatively few artefacts from the ?flint mines? are earlier Neolithic. Archival reference: HN82 F601 layer 3.

Objectives: the possible articulation of the vertebrae means that the animal from which they came may have been only recently dead when they were deposited in their final context. Their age could be close to that of the feature.

Calibrated date: *1σ:* 3270–2930 cal BC
2σ: 3340–2910 cal BC

Final comment: F Healy (26 November 2006), 'HN82 F606, layer 3, from break-through running N from 'flint mine'. Since OxA-7833, which should date from the excavation of the feature, post-dates this sample, the charcoal is likely to have been introduced when the feature was backfilled after its initial excavation, which had taken place in an area of fourth millennium cal BC activity.

References: Mercer 1987

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.

References: Healy 2004

OxA–7845 8400 ±60 BP

δ¹³C: -24.9‰

Sample: HN82 C123, submitted in December 1997 by F Healy

Material: charcoal: *Pinus sylvestris* (P Austin)

Initial comment: from a layer of dark grey silt and ash with rare small chalk fragments which formed the lowest fill of a subcircular chalk-cut feature approximately 2m in diameter (HN82 F279) on the Hanford spur of Hambledon Hill. At the time of excavation the feature was thought to have been recut, the recut being filled with brown humic loam with large, angular chalk and flint lumps (layer 1). Alternatively the feature might be seen as the ploughed-down base of a large posthole, with the 'recut'? as a postpipe. There were no artefacts or food remains. Charcoal from all layers consisted of pine, with the addition of a very little *Corylus* sp. and ?Betulaceae in layer 1. Archival reference: HN82 F279 layer 4A.

Objectives: the composition of the charcoals from the feature is unique on the site and strongly suggestive of a Mesolithic date. The ploughed-down feature is of similar size and shape to the lower parts of postholes near Stonehenge dated to the eighth and ninth millennia cal BC (Cleal *et al* 1995, 43–56). If the date of the sample confirmed the presence of a comparably ancient feature here it would contribute to a growing picture of Mesolithic activity in microlith-free zones, including the chalk. Whatever the age of the charcoal, it would help define the periods in which pine was a part of the local vegetation.

Calibrated date: *1σ:* 7540–7380 cal BC
2σ: 7580–7330 cal BC

Final comment: P Marshall (25 September 2012), the two measurements on samples from feature HN82 F279 (OxA-7845–6) are statistically consistent (T′=1.0; v=1; T′(5%)=3.8; Ward and Wilson 1978) and could be of the same actual age. The date is consistent with the pine charcoal from the feature that may have been a ploughed down pit or posthole, or a may have been of natural origin.

Laboratory comment: ORAU (13 October 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Cleal *et al* 1995
Mercer and Healy 2008, 46, 457
Ward and Wilson 1978

OxA–7846 8480 ±55 BP

δ¹³C: -24.4‰

Sample: HN82 C115, submitted in December 1997 by F Healy

Material: charcoal: *Pinus sylvestris* (P Austin)

Initial comment: from a layer of dark grey-brown humic loam which formed the secondary fill of a subcircular chalk-cut feature *c* 2m in diameter (HN82 F279) on the Hanford spur of Hambledon Hill. At the time of excavation it was thought that this layer was truncated by a recut, filled with dark brown humic loam with large, angular chalk and flint lumps (layer 1). Alternatively, the feature might be seen as the ploughed-down base of a large posthole, with the recut as a postpipe. There were no artefacts or food remains. Charcoal from all layers consisted of pine, with a very little *Corylus* sp. and ?Betulaceae. Archival reference: HN82 F279 layer 3A.

Objectives: as OxA-7845

Calibrated date: *1σ:* 7590–7510 cal BC
2σ: 7600–7470 cal BC

Final comment: see OxA-7845

Laboratory comment: see OxA-7845

Laboratory comment: ORAU (13 October 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

Hambledon Hill: inner south cross dyke, Dorset

Location: ST 849122
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R J Mercer (University of Edinburgh), 1977, 1982

Archival body: Dorset County Museum

Description: the inner of two parallel segmented bank-and-ditch earthworks, separated from the south of the main enclosure circuit by the south long barrow and running the width of the neck of land between the main enclosure and the Stepleton-Hanford spur. The earthwork evidence indicates that they post-date the long barrow and pre-date the western outwork.

Objectives: to refine the date of the earthwork.

Laboratory comment: English Heritage (25 June 2014), one further sample from this series was dated in 1964 (NPL-76; 4740 ±90 BP, 3700–3350 cal BC at 95% confidence; Reimer *et al* 2004; Callow *et al* 1965, 158).

References: Callow *et al* 1965, 158
Reimer *et al* 2004

OxA–7825 4730 ±30 BP

$\delta^{13}C$: -21.5‰

Sample: HH77 1198, submitted in December 1997 by F Healy

Material: animal bone: *Bos* sp., one cervical and two thoracic vertebrae, articulating (A J Legge 1997)

Initial comment: the vertebrae were found together in a red/brown earthy layer with large flint nodules and a few chalk lumps filling a recut reaching to the base of the inner south cross-dyke. The recut cut through phase III chalk rubble fills and phase I primary fills and in turn was cut by a later recut (confined to the butt and not visible in the section attached here). Archival reference: HH77 site P2 XDI Layer 9.

Objectives: the articulation of the bones shows that they must have been deposited in their context shortly after the animal from which they came had died. Their location in a recut means that they provide a date for it and contribute to the chronology of the earthwork and of the site as a whole.

Calibrated date: *1σ:* 3630–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: F Healy (2006), Segment 1, layer 9. Found together close to the sample for OxA-7826. Both are in good agreement with their stratigraphic positions.

References: Mercer and Healy 2008, 128

OxA–7826 4560 ±30 BP

$\delta^{13}C$: -21.8‰

Sample: HH77 1291, submitted in December 1997 by F Healy

Material: animal bone: *Bos* sp., three articulating lumbar vertebrae (A J Legge 1997)

Initial comment: as OxA-7825

Objectives: as OxA-7825

Calibrated date: *1σ:* 3370–3190 cal BC
2σ: 3370–3110 cal BC

Final comment: see OxA-7825

References: Mercer and Healy 2008, 128

UB–4268 4708 ±26 BP

$\delta^{13}C$: -22.8 ±0.2‰

Sample: HH77 2123, submitted in December 1997 by F Healy

Material: animal bone: *Bos* sp., articulated tibia, astragalus, calcaneum, navicular-cuboid, laterial malledus, cuneiform (A J Legge 1997)

Initial comment: found articulated in a layer (2b) described as light brown wash with chalk lumps, at the base of the severely ploughed-down bank of the inner south cross-dyke. Layer 2b immediately overlay the natural chalk and was seen as the interface of bank material and the rotted surface of the chalk. It might equally have been the remnant of a pre-bank soil, especially as it was cut by a feature (site P2 F14) rich in earlier Neolithic artefacts. Archival reference: HH77 site P2 XDIB Layer 2B.

Objectives: the articulation of the bones shows that they must have reached their context shortly after the animal from which they came was butchered. Their position at the base of the bank means that they provide a close *terminus post quem* for the construction of the earthwork.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3630–3370 cal BC

Final comment: F Healy (2006), the date is consistent with the above interpretation.

Laboratory comment: Belfast (24 July 1998): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Mercer and Healy 2008, 122
Wilson *et al* 1996

UB–4273 4751 ±34 BP

$\delta^{13}C$: -23.9 ±0.2‰

Sample: WOWK82 C33, submitted in December 1997 by F Healy

Material: carbonised plant macrofossil (charred hazelnut shell (*Corylus* sp.)) (G Jones 1997)

Initial comment: from a layer of dark orange-brown clay silt with 'peagrit', small chalk lumps and occasional flint nodules, which filled a shallow, slot-like recut (layer 7, itself cut by a later recut) in the tertiary fills of the west 'butt of the inner south cross-dyke. The recut was *c* 0.3m deep *c* 1m wide. All the hazelnut shells were scattered through a *c* 1m length of it, which was rich in other food remains and early Neolithic artefacts. Further hazelnuts were found here in Desmond Bonney's trench E in 1960. Archival reference: WOWK82 area 4 layer 7.

Objectives: the concentration of hazelnut shells in this layer in this ditch butt stands out from the background scatter encountered over the site and suggests that they were placed here soon after they were burnt, as a part of the infilling of the slot in which they were found. Since burning is likely to have followed the shelling of fairly recently gathered nuts, their age should be close to that of the recut and will contribute to the chronology of the earthwork and of the site as a whole.

Calibrated date: *1σ:* 3640–3510 cal BC
2σ: 3640–3370 cal BC

Final comment: F Healy (2006), Segment 2, layer 7. The date is consistent with the above interpretation. WOWK area 3 included both a section of the western outwork and the adjacent west butt of the inner south cross-dyke.

References: Mercer and Healy 2008, 130, 474

Hambledon Hill: main enclosure 1, Dorset

Location: ST 849122
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1975

Archival body: Dorset County Museum

Description: segment 9 of the main enclosure. Next to the eastern entrance into the circuit and particularly rich in finds.

Objectives: to date this part of the enclosure as a step towards establishing the chronology of the whole site.

OxA–7015 4690 ±60 BP

δ¹³C: -21.0‰

Sample: HH75 1585, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., articulating radius-ulna, and radial, ulnar and intermediate metacarpals (A Legge)

Initial comment: found together in loose chalk rubble with a pronounced silt content which overlay the primary silts in the south of the segment. It also contained other animal bone including a crushed ox skull. Towards the south butt, this layer 8A graded into layers 13, 10A, and 12, all silty lenses derived from the causeway, while 8A seems to represent the beginning of the collapse of the internal bank and weathering of the ditch sides. Archival reference: main causewayed enclosure, site D1, new segment 9, layer 8A.

Objectives: the articulation of the bones and their close proximity when excavated indicate that the animal from which they came was butchered only shortly before the bones entered the ditch. This probably took place within a couple of years of the construction of the earthwork, unless the primary silt encounter in excavation formed after the ditch had been cleaned out. Their date will help establish the chronology of the construction and use of the main enclosure ditch and of the complex of which the enclosure is the centre.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3350 cal BC

Final comment: F Healy (26 November 2006), a replicate of OxA-7016. Segment 9, layer 8A. Consistent with dates from underlying layers.

Laboratory comment: Ancient Monuments Laboratory (2006), OxA-7015 and OxA-7016 are statistically consistent (T′=0.3; T′(5%)=3.8; v=1; Ward and Wilson 1978). Their weighted mean is 4712 ±42 BP which calibrates to 3640–3370 cal BC at 95% confidence (Reimer *et al* 2004).

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

OxA–7016 4735 ±60 BP

δ¹³C: -21.0‰

Sample: HH75 1585, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., articulating radius-ulna, and radial, ulnar and intermediate metacarpals (A Legge)

Initial comment: a replicate of OxA-7015.

Objectives: as OxA-7015

Calibrated date: *1σ:* 3640–3370 cal BC
2σ: 3650–3360 cal BC

Final comment: see OxA-7015

Laboratory comment: as OxA-7015

OxA–7027 4645 ±40 BP

δ¹³C: -25.3‰

Sample: HH75 1214, submitted in February 1997 by F Healy

Material: charcoal: *Corylus* sp., single fragment (P Austin)

Initial comment: from a single point within a localised lens of ashy grey silty soil with small chalk lumps and some charcoal. This deposit in layer 13 occupied an area approximately 2.8m × 1m, against the south butt of a causewayed ditch segment and directly overlay primary silt. The hazel charcoal has been extracted from a mixed sample in which it was dominant. Archival reference: main causewayed enclosure, site D1, new segment 9, layer 13.

Objectives: the powdery, ashy character of the layer indicates that its contents were rained on little, if at all, before being tipped into the ditch butt from the causeway. The date of the sample should provide a close *terminus ante quem* for the underlying primary silt and hence for the construction of the ditch and should help establish the chronology of the early use of the enclosure and of the construction and development of the complex of which the main causewayed enclosure is the centre.

Calibrated date: *1σ:* 3510–3360 cal BC
2σ: 3630–3350 cal BC

Final comment: F Healy (26 November 2006), Segment 9, layer 13. From same context as OxA-7824 and statistically consistent with it.

Laboratory comment: Ancient Monuments Laboratory (26 November 2006), the two results (OxA-7027 and OxA-7824) from this context are statistically consistent (T′=0.7; T′(5%)=3.8; v=1; Ward and Wilson 1978).

Laboratory comment: ORAU (14 August 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Ward and Wilson 1978

OxA–7028 4735 ±40 BP

δ¹³C: -26.0‰

Sample: HH751041, submitted in February 1997 by F Healy

Material: charcoal: *Corylus* sp., single fragment (P Austin)

Initial comment: from an area approximately 0.2m in diameter within a lens of ashy grey silty soil with small chalk lumps and some charcoal. This deposit, layer 12, occupied the south butt of a causewayed enclosure ditch segment, separated by a thin lens of fine silty chalk from the comparable but less extensive layer 13, which in turn overlay the primary silt. The hazel charcoal has been extracted from a mixed sample, in which it was dominant. Archival reference: main causewayed enclosure, site D1, new segment 9, layer 12.

Objectives: to provide a close *terminus ante quem* for the underlying layers and help establish the chronology of the early use of the enclosure and of the construction and development of the complex.

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: F Healy (26 November 2006), segment 9, layer 12. From the same context as HAR-1886 (4840 ±150 BP, 3970–3340 cal BC at 95% confidence; Reimer *et al* 2004; Jordan *et al* 1994, 69) and OxA-7029. It is not statistically consistent with OxA-7029 and HAR-1886 (T′=8.5; T′(5%)=6.0; v=2; Ward and Wilson 1978), and, being younger, is probably the best estimate of the age of the deposit.

References: Jordan *et al* 1994, 69
Reimer *et al* 2004
Ward and Wilson 1978

OxA–7029 4900 ±40 BP

δ¹³C: -25.9‰

Sample: HH75 1095, submitted in February 1997 by F Healy

Material: charcoal: *Corylus* sp., single fragment (P Austin)

Initial comment: as OxA-7028

Objectives: as OxA-7028

Calibrated date: *1σ:* 3710–3640 cal BC
2σ: 3770–3630 cal BC

Final comment: F Healy (26 November 2006), *see* OxA-7028. Being older than OxA-7028 and than the bone in the underlying primary silts, this sample must pre-date the deposit.

Laboratory comment: ORAU (14 August 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7097 4855 ±60 BP

δ¹³C: -21.5‰

Sample: HH75 932, submitted in January 1997 by F Healy

Material: animal bone: *Canis* sp., dog, articulating metacarpals and phalanx (A Legge)

Initial comment: from a layer of creamy grey stony wash, becoming blockier and less earthy with depth. The deposit is likely to represent the collapse and/or weathering of the bank and the outer edge of the ditch. Archival reference: main causewayed enclosure, site D1, new segment 9, layer 8.

Objectives: the date of the bones should indicate the period during which the bulk of the chalk rubble fill accumulated in the ditch, and also help establish the chronology of the complex.

Calibrated date: *1σ:* 3700–3540 cal BC
2σ: 3770–3520 cal BC

Final comment: F Healy (26 November 2006), Segment 9 layer 8. Replicate of OxA-7098. Older than material in underlying layers and may hence have been redeposited. It was impossible to tell how dispersed the phalanges had been, since they were extracted from a bulk bone find. Provides a terminus *post quem* for the layer.

Laboratory comment: Ancient Monuments Laboratory (2006), OxA-7097 and OxA-7098 are statistically consistent (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978). Their weighted mean is 4865 ±33 BP, which calibrates to 3710–3540 cal BC at 95% confidence (Reimer *et al* 2004).

OxA–7098 4870 ±40 BP

δ¹³C: -19.9‰

Sample: HH75 932, submitted in January 1997 by F Healy

Material: animal bone: *Canis* sp., dog, articulating metacarpals and phalanx (A Legge)

Initial comment: a replicate of OxA-7097.

Objectives: as OxA-7097

Calibrated date: *1σ:* 3700–3630 cal BC
2σ: 3710–3530 cal BC

Final comment: see OxA-7097

Laboratory comment: as OxA-7097

OxA–7770 4520 ±40 BP

δ¹³C: -22.1‰

Sample: HH75 749, submitted in December 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, radius fragments probably all from the same bone (A Legge)

Initial comment: from a pinkish silt with small, rounded chalk lumps at the edge of the bottom of a chalk-cut ditch segment. Archival reference: main causewayed enclosure, new segment 9, layer 9.

Objectives: to date layer 9. The location of the sample, in the primary silt near the ditch bottom, means that it provides a *terminus post quem* for the construction of the ditch. Combined with other dates from the same and overlying layers it will help to define the date of construction.

Calibrated date: *1σ:* 3360–3100 cal BC
2σ: 3370–3080 cal BC

Final comment: F Healy (26 November 2006), segment 9 layer 9. Although this sample was submitted as from the primary silt, it later transpired that 'layer 9' had been applied to relatively fine silts at more than one level, the uppermost of them encountered soon after the phase VI slot had been excavated. This sample was probably not from the primary silt, as the result is not in agreement with this stratigraphic position. It provides a *terminus post quem* for the slot (layer 6).

OxA–7771 4820 ±45 BP

δ¹³C: -20.6‰

Sample: HH75 895, submitted in December 1997 by F Healy

Material: animal bone: *Sus* sp., pig, distal femur fragment (A Legge)

Initial comment: from a fine pinkish silt with small, rounded chalk lumps at the edge of the bottom of a chalk-cut ditch segment. Archival reference: main causewayed enclosure, new segment 9, layer 10.

Objectives: to date layer 10. The location of the sample, in primary silt near the ditch bottom, means that it provides a *terminus post quem* for the construction of the ditch. Combined with other dates from the same and overlying layers it will help to define the date of construction.

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3700–3520 cal BC

Final comment: F Healy (26 November 2006), segment 9, layer 10. Consistent with OxA-7772 from layer 11.

OxA–7772 4735 ±40 BP

δ¹³C: -20.8‰

Sample: HH75 1067, submitted in December 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, horncore in fragments (A Legge)

Initial comment: from a dirty cream granular chalk silt with some small, rounded chalk lumps on the base of a chalk-cut ditch segment. Archival reference: main causewayed enclosure, new segment 9, layer 11.

Objectives: to date layer 11. The location of the sample, in primary silt near the ditch bottom, means that it provides a *terminus post quem* for the construction of the ditch. Combined with other dates from the same and overlying layers it will help to define the date of construction.

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: F Healy (26 November 2006), segment 9, layer 11. Consistent with OxA-7772 from layer 11.

OxA–7824 4695 ±45 BP

δ¹³C: -24.7‰

Sample: HH75 1214, submitted in February 1997 by F Healy

Material: charcoal: *Corylus* sp., single fragment (P Austin)

Initial comment: from a single point within a localised lens of ashy grey silty soil with small chalk lumps and some charcoal. This deposit, layer 13, occupied an area approximately 2.8m × 1m against the south butt of a causewayed ditch segment and directly overlay primary silt. The hazel charcoal has been extracted from a mixed sample, in which it was dominant. Archival reference: main causewayed enclosure, site D1, new segment 9, layer 13.

Objectives: to provide a close *terminus ante quem* for the underlying primary silt and hence for the construction of the ditch, and also to help establish the chronology of the complex.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: see OxA-7027

Laboratory comment: ORAU (13 October 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

Hambledon Hill: main enclosure 2, Dorset

Location: ST 84921226
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1976

Archival body: Dorset County Museum

Description: segments 16–19 of the main enclosure. A row of four contiguous segments in the north-west of the circuit, particularly rich in articulating animal bones.

Objectives: to date this part of the enclosure as a step towards establishing the chronology of the whole site.

References: Mercer and Healy 2008

OxA–7017 4790 ±60 BP

δ¹³C: -22.1‰

Sample: HH76 2861, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., articulating cattle phalanges (A Legge)

Initial comment: from a narrow, shallow, gully or ?slot cut along the midline of the largely silted ditch, post-dating the pit which contained HH76 1354 (OxA-7019 and OxA-7058) and HH76 2745 (OxA-7020 and OxA-7021). Archival reference: main causewayed enclosure, site G, new segment 17, quadrant a, layer 8A.

Objectives: the articulation of the bones suggests that the animal from which they came was butchered not long before the bones entered the ditch. Their age should be close to that of the cutting and filling of the possible slot in which they lay. Their date will help establish the chronology of the ditch's later use, and that of the construction and development of the complex of which the main causewayed enclosure is the centre.

Calibrated date: *1σ:* 3650–3520 cal BC
2σ: 3700–3370 cal BC

Final comment: F Healy (26 November 2006), segment 17, layer 8A. From the same context as OxA-7018 and, like it, in good agreement with the stratigraphy.

OxA–7018 4695 ±60 BP

δ¹³C: -20.3‰

Sample: HH76 2787, submitted in January 1997 by F Healy

Material: animal bone: *Sus* sp., articulating pig metatarsals, 3rd, 4th, navicular cuboid in two unfused parts (A Legge)

Initial comment: as OxA-7017. Archival reference: main causewayed enclosure, site G, new segment 17, quadrant a, layer 8A.

Objectives: as OxA-7017

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3350 cal BC

Final comment: F Healy (26 November 2006), segment 17, layer 8A. From the same context as OxA-7017 and, like it, in good agreement with the stratigraphy.

OxA–7019 4725 ±60 BP

δ¹³C: -21.7‰

Sample: HH76 1354, submitted in January 1997 by F Healy

Material: animal bone: *Cervus elaphus*, articulating phalanges (A Legge)

Initial comment: from grey, charcoal-stained powdery fill of a pit cut into the chalk rubble which filled much of the ditch. The main component of the fill seems to have been chalk-wash. Archival reference: main causewayed enclosure, site G, new segment 17, quadrant c, layer 9A.

Objectives: the articulation of the bones suggests that the animal from which they came was butchered not long before the bones entered the ditch. Their age should be close to that of the pit fill in which they were found. Their date will help establish the chronology of the ditch's construction and use, and that of the construction and development of the complex of which the main causewayed enclosure is the centre.

Calibrated date: *1σ:* 3640–3370 cal BC
2σ: 3650–3360 cal BC

Final comment: F Healy (26 November 2006), Segment 17 layer 9A. Replicate of OxA-7058. From the same context as HAR-2375, HAR-2377, OxA-7020, and OxA-7021. In good agreement with stratigraphic position.

Laboratory comment: Ancient Monuments Laboratory (2006), the two radiocarbon determinations (OxA-7019 and OxA-7058) are statistically consistent (T′=1.5; T′(5%)=3.8; v=1; ward and Wilson 1978). The weighted mean (4670 ±40 BP) calibrates to 3630–3360 cal BC at 95% confidence (Reimer *et al* 2004).

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

OxA–7020 4800 ±65 BP

δ¹³C: -21.1‰

Sample: HH76 2745, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, articulating right carpals (A Legge)

Initial comment: from the grey, charcoal-stained powdery fill of a pit cut into the chalk rubble which filled much of the ditch. The main component of the fill seems to have been chalk-wash. Archival reference: main causewayed enclosure, site G, new segment 17, quadrant d, layer 9A.

Objectives: the articulation of the bones suggests that the animal from which they came was butchered not long before the bones entered the ditch. Their age should be close to that of the pit fill in which they lay. Their date will help establish the chronology of the ditch's construction and use, and that of the construction and development of the complex of which the main causewayed enclosure is the centre.

Calibrated date: *1σ:* 3650–3520 cal BC
2σ: 3710–3370 cal BC

Final comment: F Healy (26 November 2006), segment 17, layer 9A. A replicate of OxA-7021. From the same context as HAR-2375, HAR-2377, OxA-7019, and OxA-7058. In good agreement with its stratigraphic position.

Laboratory comment: Ancient Monuments Laboratory (2006), the two radiocarbon determinations (OxA-70209 and OxA-7021) are statistically consistent (T′=0.0; T′(5%)=3.8; v=1; ward and Wilson 1978). The weighted mean (4800 ±45 BP) calibrates to 3660-3380 cal BC at 95% confidence (Reimer *et al* 2004).

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

OxA–7021 4800 ±65 BP

δ¹³C: -20.9‰

Sample: HH76 2745, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, articulating right carpals (A Legge)

Initial comment: a replicate of OxA-7020.

Objectives: as OxA-7020

Calibrated date: *1σ:* 3650–3520 cal BC
2σ: 3710–3370 cal BC

Final comment: see OxA-7020

Laboratory comment: see OxA-7020

OxA–7022 4835 ±55 BP

δ¹³C: -21.3‰

Sample: HH76 2808, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, articulating lumbar vertebra and sacrum (A Legge)

Initial comment: from vacuous chalk rubble with flint and layers of silt. Archival reference: main causewayed enclosure, site G, new segment 17, quadrant a, layer 10.

Objectives: the articulation of the bones suggests that the animal from which they came was butchered not long before the bones entered the ditch. Their age should fall within the period during which chalk rubble entered the ditch, from the collapse of the bank and/or the weathering of the sides. Their date will help establish the chronology of the ditch's construction and use, and that of the construction and development of the complex of which the main causewayed enclosure is the centre.

Calibrated date: *1σ:* 3660–3530 cal BC
2σ: 3710–3510 cal BC

Final comment: F Healy (26 November 2006), segment 17, layer 10. A replicate of OxA-7023. From the same context as OxA-7099. In good agreement with its stratigraphic position.

Laboratory comment: Ancient Monuments Laboratory (2006), the two radiocarbon determinations (OxA-7022 and OxA-7023) are statistically consistent (T′=2.5; T′(5%)=3.8; v=1; ward and Wilson 1978). The weighted mean (4778 ±41 BP) calibrates to 3650–3380 cal BC at 95% confidence (Reimer *et al* 2004).

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

OxA–7023 4700 ±65 BP

δ¹³C: -21.0‰

Sample: HH76 2808, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, articulating lumbar vertebra and sacrum (A Legge)

Initial comment: a replicate of OxA-7022.

Objectives: as OxA-7022

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3350 cal BC

Final comment: see OxA-7022

Laboratory comment: see OxA-7022

OxA–7039 4550 ±60 BP

δ¹³C: -20.8‰

Sample: HH76 3046, submitted in January 1997 by F Healy

Material: human bone (proximal end of right femur with metaphyses, immature) (J McKinley)

Initial comment: part of the articulated skeleton of an older infant/younger juvenile found in a hollow in the base of a segment of the main causewayed enclosure, towards the east butt. The skeleton lay on the chalk-cut base of the hollow and was covered by vacuous chalk rubble with flint and layers of silt. The skeleton was accompanied by two carved chalk objects. Archival reference: main causewayed enclosure, site G, new segment 17, quadrant b, base of ditch.

Objectives: the articulation of the skeleton and its position on the base of the hollow in the ditch butt indicate that there can have been only a very short interval between the death of the child and the construction of the ditch. The date of the sample will help establish the date at which the main causewayed enclosure was built and will contribute to the chronology of the construction and development of the complex of which the enclosure is the centre.

Calibrated date: *1σ:* 3370–3110 cal BC
2σ: 3500–3020 cal BC

Final comment: F Healy (26 November 2006), Segment 17, quadrant b, base of ditch. Replicate of OxA-7040. The lateness of the dates prompted a re-evaluation of the context. The burial in fact lay in a shallow segment butt, covered only by predominantly earthy fills, which made its stratigraphic relation to the rest of the segment unclear, as did its recovery in adverse weather conditions at the very end of the 1976 season of excavation. The measurements are in good agreement with it post-dating the 'slot' which was the context of OxA-7017 and OxA-7018.

Laboratory comment: Ancient Monuments Laboratory (2006), the two radiocarbon determinations (OxA-7039 and OxA-7040) are statistically consistent (T′=0.0; T′(5%)=3.8; v=1; ward and Wilson 1978). The weighted mean (4557 ±42 BP) calibrates to 3500–3090 cal BC at 95% confidence (Reimer *et al* 2004).

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

OxA–7040 4565 ±60 BP

δ¹³C: -20.7‰

Sample: HH76 3046, submitted in January 1997 by F Healy

Material: human bone (proximal end of right femur with metaphyses, immature) (J McKinley)

Initial comment: a replicate of OxA-7039.

Objectives: as OxA-7039

Calibrated date: *1σ:* 3490–3120 cal BC
2σ: 3510–3090 cal BC

Final comment: see OxA-7039

Laboratory comment: see OxA-7039

OxA–7058 4625 ±55 BP

δ¹³C: -22.2‰

Sample: HH76 1354, submitted in January 1997 by F Healy

Material: animal bone: *Cervus elaphus*, articulating phalanges (A Legge)

Initial comment: a replicate of OxA-7019.

Objectives: as OxA-7019

Calibrated date: *1σ:* 3500–3350 cal BC
2σ: 3630–3130 cal BC

Final comment: see OxA-7019

Laboratory comment: see OxA-7019

OxA–7099 4830 ±30 BP

δ¹³C: -21.1‰

Sample: HH76 2785, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, articulating phalanges (A Legge)

Initial comment: from vacuous chalk rubble with flint and layers of silt. Archival reference: main causewayed enclosure, site G, new segment 17, quadrant a, layer 10.

Objectives: as OxA-7022

Calibrated date: *1σ:* 3650–3630 cal BC
2σ: 3660–3530 cal BC

Final comment: F Healy (26 November 2006), segment 17, layer 10. In good agreement with its stratigraphic position.

References: Mercer and Healy 2008, 97

OxA–7765 4705 ±45 BP

δ¹³C: -21.9‰

Sample: HH76 2077A, submitted in December 1997 by F Healy

Material: animal bone: *Bos* sp., cattle radius (A Legge)

Initial comment: the sample lay in fine, chalky primary silt with occasional chalk lumps and flint fragments, at the inner edge of a causewayed enclosure ditch segment. Archival reference: main causewayed enclosure, new segment 19, layer 10.

Objectives: to provide a *terminus post quem* for the construction of the ditch. Combined with other dates from the circuit it will help to define the date of construction.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: F Healy (26 November 2006), segment 19, layer 10. From the same find as OxA-7766. Submitted as a sample from the primary silt. This layer number, however, proved to have been applied both to part of the primary silt and to the overlying chalk rubble fill. It is unclear from which the sample came. This date provides a *terminus post quem* for the rubble.

OxA–7766 4730 ±40 BP

δ¹³C: -20.0‰

Sample: HH76 2077B, submitted in December 1997 by F Healy

Material: animal bone: *Sus* sp., pig, distal end of right humerus and two unidentified bone scraps (A Legge)

Initial comment: as OxA-7765

Objectives: as OxA-7765

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: F Healy (26 November 2006), segment 19, layer 10. From the same find as OxA-7765. Submitted as a sample from the primary silt. This layer number, however, proved to have been applied both to part of the primary silt and to the overlying chalk rubble fill. It is unclear from which the sample came. This date provides a *terminus post quem* for the rubble.

OxA–7767 4735 ±40 BP

δ¹³C: -19.7‰

Sample: HH76 2144, submitted in December 1997 by F Healy

Material: animal bone: *Sus* sp., pig acetabulum and ilium fragments (A Legge)

Initial comment: from fine, chalky primary silt, near the base of a causewayed enclosure ditch segment. Archival reference: main causewayed enclosure, new segment 16, layer 11.

Objectives: as OxA-7765

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: F Healy (26 November 2006), segment 16, layer 11. Although disarticulated it may be close in age to the primary silts because it is consistent with the child burial dated by OxA-7768–9.

OxA–7768 4810 ±45 BP

δ¹³C: -21.6‰

Sample: HH76 1948, submitted in December 1997 by F Healy

Material: human bone (both femurs from the articulated skeleton of an older infant) (J McKinley)

Initial comment: from a pit cut into a chalk hump between two parts of a ditch segment. Three bone beads were found at the back of the head. The burial was immediately covered by chalk rubble and inexactly overlain by a flint cairn. Archival reference: main causewayed enclosure, new segment 18, quadrant 2d.

Objectives: dating the skeleton would help resolve its place in the ditch sequence. This and a comparable burial in the next segment were long thought to be some of the first events in the use of the monument. The children in both had prematurely fused cranial sutures which may indicate relationship. Unexpectedly late dates for the other burial of OxA-7039 and OxA-7040 (*see* main enclosure 2 above) prompted re-examination of the stratigraphic position of both, with the conclusion that they could have been inserted at a fairly late stage in silting because: 1. they lay at high points in the natural chalk, at the end and side of a segment in one case and a subsegment in the other; and 2. these locations meant that they were beyond the limits of the most clearly-defined layers in the sequence, in which cuts would easily have been recognised, and instead overlain only by varying combinations of chalk rubble and soil in which later intrusions would be more difficult to detect.

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3660–3510 cal BC

Final comment: F Healy (26 November 2006), segment 18, quadrant 2d, base of ditch. A replicate of OxA-7769. Possibly cut through the primary silt, but can be little removed in age from the original excavation of the ditch.

Laboratory comment: Ancient Monuments Laboratory (2006), the two radiocarbon determinations (OxA-7768 and OxA-7769) are statistically consistent (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978). Their weighted mean is 4803 ±33 BP, which calibrates to 3650–3520 cal BC at 95% confidence (Reimer *et al* 2004).

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

OxA–7769 4795 ±50 BP

δ¹³C: -21.2‰

Sample: HH76 1948, submitted in December 1997 by F Healy

Material: human bone (both femurs from the articulated skeleton of an older infant) (J McKinley)

Initial comment: a replicate of OxA-7768.

Objectives: as OxA-7768

Calibrated date: *1σ:* 3650–3520 cal BC
2σ: 3660–3380 cal BC

Final comment: see OxA-7768

Laboratory comment: see OxA-7768

UB–4269 4562 ±27 BP

δ¹³C: -22.4 ±0.2‰

Sample: HH76 2970, submitted in December 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, articulating distal tibia fragment, calcaneum, astragalus, navicular-cuboid, cuneiform, and lateral malledus (A Legge)

Initial comment: the sample lay with other bones probably from the same individual, in loose chalk and flint rubble banded with silt layers. This was the fill of a phase III recut, which had removed some of the primary silt of the segment. Archival reference: main causewayed enclosure, new segment 18, quadrant 2b, layer 10.

Objectives: the articulation of the sample shows that it must have been placed in the ditch soon after the death of the animal from which it came. Its position in the apparently rapidly accumulated fill provides a close *terminus ante quem* for the recut in which it was found.

Calibrated date: *1σ:* 3370–3340 cal BC
2σ: 3370–3120 cal BC

Final comment: F Healy (26 November 2006), segment 18, layer 10. Significantly later than the two articulating samples from segment 17 (OxA-7022–3, and OxA-7099) and than articulating samples stratified above them (OxA-7017–8, OxA-7020–1, OxA-7019, and OxA-7058). They may have come from an undetected recut.

Laboratory comment: Belfast (12 April 1999): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Mercer and Healy 2008, 102
Wilson *et al* 1996

Hambledon Hill: main enclosure 3, Dorset

Location: ST 84921226
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1975-6

Archival body: Dorset County Museum

Description: main causewayed enclosure segments 5, 6, and 7. A row of three contiguous segments in the south-east of the circuit.

Objectives: to date this part of the enclosure as a step towards establishing the chronology of the whole.

Laboratory comment: (2013), one further date was funded prior to 1993 and was published in Bayliss *et al* (2013, 86; HAR-9169).

References: Bayliss *et al* 2013, 86
Hardiman *et al* 1992, 53
Mercer and Healy 2008

OxA–7773 4765 ±45 BP

δ¹³C: -20.4‰

Sample: HH76 2625, submitted in December 1997 by F Healy

Material: human bone (lowermost lumbar vertebra (neural arch gnawed away) from articulated lower axial skeleton and femora of young adult male; the bones are dog-gnawed, the femurs have cut-marks) (J McKinley and A Legge 1997)

Initial comment: from under a diffuse spread of flint nodules on the surface of the phase II silts (which immediately overlay the primary silts) of a chalk-cut ditch segment. Archival reference: main causewayed enclosure, new segment 6.1, interface of layers 9 and 8.

Objectives: the articulation of the half-skeleton from which the sample comes means that it must have been placed in its context soon after the death of the individual. Since this occurred when only *c* 0.2m of silts had accumulated on the ditch bottom, the age of the sample should provide a close *terminus ante quem* for the excavation of the segment. Combined with other dates from elsewhere in the circuit, it will help to define the date of construction of the monument. Furthermore, the condition of the remains indicates that: 1. flesh had been cut from the femurs; 2. the corpse was exposed and accessible to dogs either after and/or during defleshing; and 3. either these processes took place in the ditch or the defleshed lower skeleton was placed in the ditch (whether carried by people or dragged by dogs) while it still held together.

Calibrated date: *1σ:* 3640–3510 cal BC
2σ: 3650–3370 cal BC

Final comment: F Healy (26 November 2006), segment 6.1, interface of layers 9 and 8. Replicate of OxA-7774. Provides a date for the end, in that segment, of the succession of silting, cleaning out, and occasional deposition which made up the earliest use of the enclosure.

Laboratory comment: Ancient Monuments Laboratory, the two radiocarbon determinations (OxA-7773 and OxA-7774) are statistically consistent (T′=0.4; T′(5%)=3.8; v=1; Ward and Wilson 1978). The weighted mean (4742 ±29 BP) calibrates to 3640–3370 cal BC at 95% confidence (Reimer *et al* 2004).

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

OxA–7774 4725 ±40 BP

δ¹³C: -20.5‰

Sample: HH76 2625, submitted in December 1997 by F Healy

Material: human bone (lowermost lumbar vertebra (neural arch gnawed away) from articulated lower axial skeleton and femora of young adult male; bones were dog-gnawed, the femurs had cut-marks) (J McKinley and A Legge 1997)

Initial comment: a replicate of OxA-7773.

Objectives: as OxA-7773

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3370 cal BC

Final comment: see OxA-7773

Laboratory comment: see OxA-7773

OxA–7775 4825 ±30 BP

δ¹³C: -21.6‰

Sample: HH762897, submitted in December 1997 by F Healy

Material: animal bone: *Bos* sp., articulating radius and ulna (A Legge 1997)

Initial comment: the sample lay in light-coloured, chalky primary silt with some chalk lumps at the inner edge of the base of the ditch segment. Archival reference: main causewayed enclosure, new segment 7, layer 9.

Objectives: the articulation of the sample means that it must have been deposited in the primary silts accumulating on the ditch bottom soon after the death of the animal from which the bones came. Its date should thus be close to that of the excavation of the segment. Combined with other dates from elsewhere in the circuit, it will help to define the date of construction of the monument.

Calibrated date: *1σ:* 3650–3540 cal BC
2σ: 3660–3530 cal BC

Final comment: F Healy (26 November 2006), segment 7, layer 9. Should date from soon after the cutting of the segment.

Hambledon Hill: north cross rampart, Dorset

Location: ST 849122
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1986

Archival body: Dorset County Museum

Description: a reduced and spread bank and ditch cutting off the northern part of the hillfort spur and perhaps forming a complete circuit beneath later ramparts. Long reccognised as the earliest element of the hillfort, and sometimes argued to be Neolithic.

Objectives: to determine the date of the earthwork.

OxA–7776 2450 ±35 BP

δ¹³C: -21.5‰

Sample: HH86 118, submitted in December 1997 by F Healy

Material: animal bone: unidentifiable, fragment (A Legge)

Initial comment: the sample lay in the interleaved chalk rubble and chalky silt fills of the otherwise sterile lower two-thirds of a chalk-cut ditch, in the fully-silted top of which was an early Iron Age hut floor. The ditch, which is pit-dug, forms part of the earliest earthwork on the northern (hillfort) spur of Hambledon Hill, pre-dating a complex sequence of Iron Age defences (RCHME 1997, 18–19).

Objectives: the ditch from which the sample came is arguably Neolithic, but not demonstrably so. Despite the excavation of a 5m wide section across the ditch, the sample is the only datable find from the *c* 2m of silts which had accumulated by the early Iron Age. The vacuous, angular chalk rubble and rain-washed silts of the lower fills in which it was found suggest rapid accumulation, over a few years at most. The bone fragment is thus likely to have entered the ditch shortly after its construction, and, since its age at the time is unknowable, provides a *terminus post quem* for that event, while the early Iron Age occupation in the ditch top provides a *terminus ante quem*. The date of the sample could put tighter limits on the date of the ditch, and hence its position in the history of the hill, than can be posited at present.

Calibrated date: *1σ:* 750–410 cal BC
2σ: 770–400 cal BC

Final comment: F Healy (26 November 2006), the sample was dated to test the hypothesis that the ditch sectioned in 1986 was a third Neolithic enclosure. The Iron Age date can be interpreted in two ways: combined with a pottery assemblage consistent with a fifth–sixth century BC date above the sample, the earthwork was constructed in the early first millennium, alternatively the bone fragment was intrusive.

References: RCHME 1997

Hambledon Hill: outer east cross dyke, Dorset

Location: ST 849122
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1975

Archival body: Dorset County Museum

Description: the outer 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.

UB–4267 4497 ±26 BP

δ¹³C: -23.3 ±0.2‰

Sample: HH75 2171, submitted in February 1998 by F Healy

Material: antler: *Cervus elaphus*, antler beam segment with trez tine, very battered (A Legge)

Initial comment: from the bottom of the chalk-cut outer east cross-dyke, in a segment butt, under and surrounded by chalky primary silt. Archival reference: HH75 site E2, XDII, segment 1, cutting 2, layer 10 (bottom).

Objectives: the wear on the antler and its position on the ditch floor indicate that it was used to dig the ditch. It should thus be very close in age to the construction of the outer cross-dyke of which the ditch segment forms a part. This particular earthwork is so far undated. Its age will contribute to the chronology of the development and use of the complex.

Calibrated date: *1σ:* 3340–3090 cal BC
2σ: 3360–3090 cal BC

Final comment: F Healy (26 November 2006), segment 4, cutting 2, layer 10. It is uncertain whether this relates to the construction of the whole earthwork or to an extension of the segment in which it was found, since the antler lay in a shallow 'tail' which extended from a deeper, bowl-like segment and was uncharacteristic of other excavated parts of the ditch. If it indeed relates to the whole earthwork the latter falls late in the sequence.

Laboratory comment: Belfast (30 September 1998): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Mercer and Healy 2008, 119

Hambledon Hill: 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: Ancient Monuments Laboratory (6 October 2003), one further sample (WOWK82 C36; HAR-6039), was submitted for dating in 1983 but failed to produce a result. Two further samples from this series were dated after 1998 (OxA-8861–2).

References: Healy 2004

OxA–7816 8725 ±55 BP

δ¹³C: -25.1‰

Sample: WOWK82 C31, submitted in December 1997 by F Healy

Material: charcoal: *Pinus sylvestris*, mature wood (P Austin 1997)

Initial comment: from a ploughed-down feature, perhaps a posthole base, approximately 0.6m in maximum dimension and surviving to 0.2m deep, filled with grey-brown clay silt with charcoal, small chalk lumps and burnt flint in an area of protected chalk marking the junction of the former banks of the western outwork and the inner south cross-dyke. Charcoal in other, smaller samples from the same feature is of *Pinus sylvestris*, *Fraxinus excelsior* and *Corylus*/*Alnus* sp. Archival reference: WOWK82 area 3 F4

Objectives: the location of this posthole is such that it might represent a timber substructure in either bank. A Neolithic date for the charcoal would indicate that there may have been such a timber sub-structure. Whatever the date, it would help to define the periods in which pine formed part of the local vegetation.

Calibrated date: *1σ:* 7820–7600 cal BC
2σ: 7960–7590 cal BC

Final comment: F Healy (26 November 2006), from the first of two successive sockets in a possible posthole within the protected chalk of the inner south cross dyke bank, the ash charcoal dated by OxA-8861 (4780 ±45 BP; 3660–3370 cal BC at 95% confidence; Reimer *et al* 2004) and OxA-8862 (4690 ±45 BP; 3640–3360 cal BC at 95% confidence; Reimer *et al* 2004) coming from the second. The possibility of the first socket's being Boreal is heightened by the absence of pine charcoal from any nearby contexts. The coincidence of two successive postholes millennia apart is rendered less implausible by the location, on a break of slope at the edge of the narrowest part of the neck of land between the central area and the Stepleton-Hanford spur. WOWK area 3 included both a section of the western outwork and the adjacent west butt of the inner south cross-dyke.

References: Reimer *et al* 2004

Hambledon Hill: Shroton Spur outwork, Dorset

Location: ST 855123
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1976

Archival body: Dorset County Museum

Description: the Shroton spur outwork consists of a causewayed ditch and a bank and lies 330m east of the east cross-dykes and runs for some 290m across the full width of the Shroton spur in an arc conforming to the contours, its ends obscured by the woods which grow on the north and south flanks. It remains visible as an earthwork, cut through near the centre of the spur by a presently-used track and a disused hollow way. The earthwork was sectioned by Bonney in 1960, and excavated more extensively on sites K/L and M by Mercer in 1976. Air photographs show two banks and ditches, an impression reinforced by survey in the 1950s and 1970s. Attempts to locate an outer ditch by excavation, have, however, met with mixed success.

Objectives: to date the earthwork as a step towards defining the chronology of the complex.

Laboratory comment: English Heritage (26 November 2006), five further dates from this site were funded prior to 1981 and were published in the first volume of *Radiocarbon Dates*: (HAR-2368, HAR-2371–2, and HAR-2378–9; Jordan *et al* 1994, 69–71).

References: Jordan *et al* 1994, 69–71
Mercer and Healy 2008

OxA–7037 4710 ±55 BP

δ¹³C: -19.9‰

Sample: HH76 2864, submitted in January 1997 by F Healy

Material: animal bone: *Canis* sp., dog (A Legge)

Initial comment: the skeleton was found crushed but articulated at the base of the chalk-cut ditch, covered by a grey/white wash with chalk blocks. Archival reference: Shroton Spur outwork, site K/L, K/L baulk, base of ditch.

Objectives: the articulation of the skeleton and its position on the base of the ditch show that it was placed there when very recently dead and when the ditch was very recently excavated. Its age should be very close to the construction of the earthwork. This sample will also help determine whether this and the outworks on the Stepleton spur were built as part of a single, contemporary system.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: F Healy (26 November 2006), segment 3, K/L baulk, base of ditch. Replicate of OxA-7038. The measurement is statistically consistent with radiocarbon determinations on three antler picks from the same context (UB-4148-50).

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon determinations (OxA-7037 and OxA-7038) are statistically consistent (T′=0.5; T′(5%)=3.8; v=1; Ward and Wilson 1978). Their weighted mean (4737 ±40 BP) calibrates to 3640–3370 cal BC at 95% confidence (Reimer *et al* 2004).

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

OxA–7038 4770 ±60 BP

δ¹³C: -20.1‰

Sample: HH76 2864, submitted in January 1997 by F Healy

Material: animal bone: *Canis* sp., dog (A Legge)

Initial comment: a replicate of OxA-7037.

Objectives: as OxA-7037

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3660–3370 cal BC

Final comment: see OxA-7037

Laboratory comment: see OxA-7037

OxA–7102 4890 ±35 BP

δ¹³C: -20.4‰

Sample: HH76 1968, submitted in January 1997 by F Healy

Material: human bone (right 1st metatarsal and right 1st phalang, adult) (J McKinley)

Initial comment: the bones lay loose in vacuous chalk rubble and flint nodules, apparently derived from the collapse of the internal bank into the ditch. The rubble was interspersed with areas and patches of burnt material. The bones formed part of a concentration of human remains from more than one individual which occupied an area approximately 1.30m × 1.00m. The bones in this sample were found together, apparently in articulation. Archival reference: Shroton Spur outwork, site L, layer 7.

Objectives: the date of the skeleton should be contemporary with the collapse of the bank as the bones were articulated. Their date will also establish the chronology of this earthwork and of the complex of which it forms a part. In particular, it will help determine how far this outwork and those on the Stepleton spur were contemporary.

Calibrated date: *1σ:* 3700–3640 cal BC
2σ: 3720–3630 cal BC

Final comment: F Healy (26 November 2006), segment 3, site L, layer 7. This sample is older than the samples from the base of the ditch and almost certainly pre-dates the construction of the earthwork. It provides a *terminus post quem* for the context.

OxA–7830 4705 ±35 BP

δ¹³C: -19.8‰

Sample: HH76 1608, submitted in January 1998 by F Healy

Material: animal bone: *Canis* sp., dog, rig fragments, and vertebrae (A Legge)

Initial comment: part of an articulated dog skeleton found in a patch of very dark grey wash at the inner edge of the Shroton Spur outwork ditch, in secondary silts abutting chalk rubble fills. It lay just below the interface between two silt layers, having perhaps died or been placed in accumulating silts. Most of the skeleton was left in the section. Archival reference: HH76 Shroton Spur outwork L layer 6.

Objectives: the articulation of the skeleton shows that there can be little difference between its age and that of the silts in which it lay. Its date, combined with those from primary contexts on the same site, will help define the chronology of this part of the earthwork complex.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3370 cal BC

Final comment: F Healy (26 November 2006), segment 3, site L, layer 6. In good agreement with its stratigraphic position.

OxA–7831 4660 ±45 BP

δ¹³C: -19.7‰

Sample: HH76 1904, submitted in January 1998 by F Healy

Material: animal bone: *Sus* sp., pig, fitting ulna and radius in two fragments, found together (A Legge)

Initial comment: from vacuous, angular chalk rubble overlying primary silt and underlying the layer containing HH76 2887 (OxA-7832), near the base of a segment butt of the Shroton Spur outwork. Archival reference: HH76 site M segment B, layer 8.

Objectives: the probably articulation of the bones indicates that the pig from which they came is unlikely to have been long dead when they were incorporated in their context. Their date will help define the chronology of this part of the earthwork complex.

Calibrated date: *1σ:* 3520–3360 cal BC
2σ: 3630–3350 cal BC

Final comment: F Healy (26 November 2006), segment 2, layer 8. In good agreement with its stratigraphic position.

OxA–7832 4625 ±45 BP

$\delta^{13}C$: -19.7‰

Sample: HH76 2887, submitted in January 1998 by F Healy

Material: animal bone: *Sus* sp., pig, fourth and fifth metacarpals from same animal (A Legge)

Initial comment: from small angular chalk rubble in which formed the upper part of the chalk rubble fills in a segment butt of the Shroton spur outwork, immediately overlying the layer containing HH76 1905 (OxA-7831). Archival reference: HH76 Shroton Spur outwork site M segment B, layer 7.

Objectives: to help establish a chronology for this part of the earthwork.

Calibrated date: *1σ:* 3500–3350 cal BC
2σ: 3520–3340 cal BC

Final comment: F Healy (26 November 2006), segment 2, layer 7. In good agreement with its stratigraphic position.

UB–4148 4753 ±27 BP

$\delta^{13}C$: -21.4 ±0.2‰

Sample: HH76 2895, submitted in January 1997 by F Healy

Material: antler: *Cervus elaphus*, antler pick, antler with crown, bez and trez tines, heavy wear on two crown tines (D Serjeantson)

Initial comment: from the ditch base overlain by a primary silt of grey/white wash with chalk blocks. Archival reference: Shroton Spur outwork, site L, base of ditch.

Objectives: the antler is likely to have been used to dig the ditch and its position on the ditch base indicates that it was placed there shortly after the earthwork was complete. It should be close in age to the construction of the earthwork. Its date will help establish the chronology of the construction of the Shroton Spur outwork and of the construction and development of the complex of which the outwork forms a part. In particular, it will help determine whether this and the outworks on the Stepleton spur were built at the same time.

Calibrated date: *1σ:* 3640–3510 cal BC
2σ: 3640–3380 cal BC

Final comment: F Healy (26 November 2006), segment 3, site L, base of ditch. Statistically consistent with dates on articulated dog skeleton (OxA-7037–8) and two other antler picks from the same context (UB-4149–50).

Laboratory comment: see OxA-7037

UB–4149 4756 ±20 BP

$\delta^{13}C$: -21.8 ±0.2‰

Sample: HH76 2650, submitted in January 1997 by F Healy

Material: antler: *Cervus elaphus*, antler pick, broken off below crown, bez and trez tines severely worn (D Serjeantson)

Initial comment: from a fine, chalky primary silt with some chalk lumps. Archival reference: Shroton Spur outwork, site K, layer 9.

Objectives: as UB-4148

Calibrated date: *1σ:* 3635–3520 cal BC
2σ: 3635–3385 cal BC

Final comment: F Healy (26 November 2006), segment 3, site K, layer 9. Statistically consistent with dates on articulated dog skeleton (OxA-7037-8) and two other antler picks from the same context (UB-4148 and UB-4150).

Laboratory comment: see OxA-7037

References: Mercer and Healy 2008, 199

UB–4150 4736 ±21 BP

$\delta^{13}C$: -22.3 ±0.2‰

Sample: HH76 1387, submitted in January 1997 by F Healy

Material: antler: *Cervus elaphus*, antler pick, mid-section, base of beam burnt, wear on trez tine (D Serjeantson)

Initial comment: the antler lay virtually on the ditch bottom according to the label, in a fine chalky primary silt with some chalk lumps, near the butt of the segment. Archival reference: Shroton Spur outwork, site K, layer 9.

Objectives: as UB-4148

Calibrated date: *1σ:* 3630–3385 cal BC
2σ: 3635–3380 cal BC

Final comment: F Healy (26 November 2006), segment 3, site K, layer 9. Statistically consistent with dates on articulated dog skeleton (OxA-7037–8) and two other antler picks from the same context (UB-4148–9).

Laboratory comment: see OxA-7037

References: Mercer and Healy 2008, 199

Hambledon Hill: Stepleton enclosure, Dorset

Location: ST 849122
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1979–81

Archival body: Dorset County Musem

Description: a single causewayed circuit with a maximum internal dimension of 120m, enclosing just under 1ha. The enclosure lies slightly off the apex of the southern spur of Hambledon Hill. It was slighted by the inner outwork in the south and east.

Objectives: to date the enclosure as a step to refining the chronology of the complex.

Laboratory comment: English Heritage (2013), three further dates were funded prior to 1993 and were published in Jordan *et al* (1994, 70; HAR-3058, -3060, and -3062). The result for HAR-3062 was printed erroneously and should be 4850 ±70 BP; 3700–3530 cal BC at 68% confidence, and 3780–3380 cal BC at 95% confidence; Reimer *et al* 2004).

References: Jordan *et al* 1994, 70

OxA–7041 4485 ±60 BP

$\delta^{13}C$: -20.4‰

Sample: ST80 1156, submitted in January 1997 by F Healy

Material: animal bone: *Canis* sp., dog (A Legge)

Initial comment: the skeleton was found articulated in a layer of medium-brown clayey silt with chalk lumps, which had entered the ditch from the exterior following an inrush of vacuous chalk rubble from the collapsed internal bank. Archival reference: Stepleton enclosure, new segment 3, unit 9D, layer 3B.

Objectives: since the dog was articulated when excavated, it must have been placed in the ditch when recently dead. Its age must lie within the silting episode which produced the layer in which it was found. Its date will indicate the period at which this particular enclosure was largely degraded as an earthwork but was still frequented and still the site of deposition of cultural material.

Calibrated date: *1σ:* 3350–3020 cal BC
2σ: 3370–2920 cal BC

Final comment: F Healy (26 November 2006), a replicate of OxA-7041. Segment 3, unit 9D, interface of layers 3B and 2. Further interrogation of the archive showed that the dog skeleton had lain on a stable surface, pre-dating the final, and richest, early Neolithic deposits in the ditch. The dates are in good agreement with its stratigraphic position.

Laboratory comment: English Heritage (14 June 2014), the weighted mean of UB-4138 and OxA-7041 is 4631 ±20 BP which calibrates to 3500–3360 cal BC at 95% confidence (Reimer *et al* 2004). However, the two results are statistically inconsistent (T′=6.5; T′(5%)=3.8; v=1; Ward and Wilson 1978).

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

OxA–7042 4735 ±60 BP

$\delta^{13}C$: -21.8‰

Sample: ST80 1886, submitted in January 1997 by F Healy

Material: antler: *Cervus elaphus*, antler pick, upper antler beam with one crown tine and stump of trez tine remaining, broken accidentally. Some wear on surviving tip (D Serjeantson)

Initial comment: found lying on the chalk-cut base of a segment of the Stepleton causewayed enclosure, covered by primary silt which consisted of light tan silt with chalk lumps. Archival reference: Stepleton enclosure, new segment 3, unit 13A, ditch base.

Objectives: the antler is likely to have been used to dig the ditch. If so, its age should be very close to the construction date of the enclosure. The date will help establish the chronology of the construction and use of the earthwork complex of which the enclosure is one of the earlier elements.

Calibrated date: *1σ:* 3640–3370 cal BC
2σ: 3650–3360 cal BC

Final comment: F Healy (26 November 2006), a replicate of OxA-7042 and -7043. Segment 3, unit 13A, ditch base. The dates are in good agreement with the above interpretation and the antler's stratigraphic position.

Laboratory comment: English Heritage (14 June 2014), the three radiocarbon measurements (UB-4152, and OxA-7042-3) are statistically consistent (T′=1.8; T′(5%)=6.0; v=2; Ward and Wilson 1978). Their weighted mean (4781 ±18 BP) calibrates to 3640–3520 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–7043 4720 ±65 BP

$\delta^{13}C$: -21.8‰

Sample: ST80 1886, submitted in January 1997 by F Healy

Material: antler: *Cervus elaphus*, antler pick, upper antler beam with 1 crown tine and stump of trez tine remaining, broken accidentally. Some wear on surviving tip (D Serjeantson)

Initial comment: a replicate sample of UB-4152 and OxA-7042.

Objectives: as OxA-7042

Calibrated date: *1σ:* 3640–3370 cal BC
2σ: 3650–3360 cal BC

Final comment: see OxA-7042

Laboratory comment: see OxA-7042

OxA–7048 4670 ±40 BP

$\delta^{13}C$: -24.9‰

Sample: ST80 C41, submitted in February 1997 by F Healy

Material: charcoal (*Maloideae*) (P Austin)

Initial comment: found in a localised patch of burnt, silty, vacuous chalk rubble with much charcoal, occupying an area approximately 0.9m in diameter and possibly forming the fill of a small, bowl-shaped pit cut into the slow ditch silts of layers 3A and 3B and (just) into the vacuous chalk rubble from the collapsed earthwork bank which underlay them. The deposit was in the north terminal of the segment. Maloideae charcoal has been extracted from a mixed sample in which it was dominant. Archival reference: Stepleton enclosure, new segment 3, U9B, layer 2A.

Objectives: together with OxA-7049 and OxA-7050, the sample seems to form part of the debris of a single episode of burning, placed in a small pit dug into the largely infilled ditch. These samples are stratigraphically later than the dog skeleton (UB-4138 and OxA-7041) and will help establish the chronology of the later use of the largely degraded earthwork, as well as contributing to the chronology of the construction and development of the complex of which the Stepleton enclosure forms a part.

Calibrated date: *1σ:* 3520–3360 cal BC
2σ: 3630–3360 cal BC

Final comment: F Healy (26 November 2006), segment 3, Unit 9B, layer 2A. This and the samples dated by OxA-7049 and -7050 have proved to be stratigraphically equivalent to the dog skeleton dated by UB-4138 and OxA-7041. They are in good agreement with their stratigraphic position

Laboratory comment: English Heritage (14 June 2014), the two measurements on fragments of Maloideae charcoal from this sample are statistically consistent (T′=1.5; T′(5%)=3.8; v=1; Ward and Wilson 1978).

Laboratory comment: ORAU (14 August 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Ward and Wilson 1978

OxA–7049 4740 ±45 BP

δ¹³C: -24.7‰

Sample: ST80 C41, submitted in February 1997 by F Healy

Material: charcoal (*Maloideae*) (P Austin)

Initial comment: a replicate of OxA-7048.

Objectives: as OxA-7048

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: see OxA-7048

Laboratory comment: see OxA-7048

Laboratory comment: ORAU (14 August 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7050 4730 ±40 BP

δ¹³C: -27.1‰

Sample: ST80 C32, submitted in February 1997 by F Healy

Material: charcoal (*Maloideae*) (P Austin)

Initial comment: as OxA-7048

Objectives: as OxA-7048

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: see OxA-7048

Laboratory comment: ORAU (14 August 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7814 4680 ±30 BP

δ¹³C: -21.1‰

Sample: ST81 3188, submitted in January 1998 by F Healy

Material: human bone (right humerus) (J McKinley)

Initial comment: most of the upper skeleton from which the sample comes was articulated, with some displacement of ribs and vertebrae. Parts had been gnawed, probably by rodents. It lay, apparently on a stable surface represented by a thin lens of silt and crushed chalk, at the interface of secondary and tertiary silts (both loamy matrices with varying frequencies of chalk and flint fragments), in a chalk-cut ditch segment. The skeleton may have been associated with quern fragments, animal bone, struck flint, and Neolithic bowl pottery, but it is impossible to be sure of this, since the overlying layer was rich in cultural material. Archival reference: ST81 area 4B, Stepleton enclosure ditch, new segment 10, U1/U2 baulk interface of layers 2 and 4.1.

Objectives: the condition of the upper skeleton shows that it was defleshed but not yet completely disarticulated when incorporated in the context. It can therefore pre-date that context by only a short interval. Its date, combined with others from the Stepleton enclosure, will define the period over which the enclosure remained in use, especially its later end. This will clarify the place and role of the enclosure in the larger monument complex. The date of the skeleton will also contribute to the overall chronology of Neolithic funerary practice, in which the role and frequency of single burials remain ill-understood.

Calibrated date: *1σ:* 3520–3370 cal BC
2σ: 3630–3360 cal BC

Final comment: F Healy (26 November 2006), segment 10, U1/U2 baulk, at interface of layers 2 and 4.1. The skeleton was at a comparable horizon to the dog skeleton dated by UB-4138 and OxA-7041. The date is in good agreement with this stratigraphic position.

OxA–7844 4685 ±35 BP

δ¹³C: -28.0‰

Sample: ST81 1228, submitted in January 1998 by F Healy

Material: carbonised residue (sherds with sooty residue, 38 plain body sherds from a single, flint-tempered Neolithic bowl (1228 includes 1 sherd/1g from another vessel but does not have a residue)) (R Seager Smith)

Initial comment: the sherds were found in two groups, 0.20m apart, in the tertiary fill (loam matrix with chalk and flint fragments and abundant earlier Neolithic cultural material) of a chalk-cut causewayed enclosure ditch segment, overlying layer 2A, the fill of a pit cut into the earlier fills. Archival reference: ST81, area 4A, new segment 7 U1, layer 2.

Objectives: the fact that so many sherds of the same vessel were found close together, and that visible, powdery residue survived on the interior of several indicates that the vessel from which they came was broken only shortly before it became incorporated in the ditch fill. The date of the residue should be close to that of the vessel's last use, and also to the date of the deposit in which they were found. The layer in question is particularly rich in cultural material around the whole circuit of the Stepleton enclosure and is the last surviving element in its earlier Neolithic use. It is so far undated, largely because no articulating animal bone samples have been identified among the large amount of animal bone recovered from it.

Calibrated date: *1σ:* 3520–3370 cal BC
2σ: 3630–3360 cal BC

Final comment: F Healy (26 November 2006), a replicate of OxA-7926. Segment 7 U1, layer 2. This vessel provides the only sample from the final, and richest, Neolithic level in the enclosure ditch, from which, although it contained abundant animal bone, no articulating samples could be found. Any estimate of when the original use of the enclosure ended thus depends on OxA-7844 and -7926.

Laboratory comment: Ancient Monuments Laboratory (26 November 2006), the two radiocarbon measurements (OxA-7844 and OxA-7926) are statistically significantly different at 95% confidence (T′=6.9; T′(5%)=3.8; v=1; Ward and Wilson 1978).

OxA–7926 4845 ±50 BP

$\delta^{13}C$: -29.9‰

Sample: ST81 1233, submitted in January 1998 by F Healy

Material: carbonised residue (sherds with sooty residue, 38 plain body sherds from a single, flint-tempered Neolithic bowl (1233 includes 2 rim sherds/6g from another vessel, but none of these have residue)) (R Seager Smith)

Initial comment: a replicate of OxA-7844.

Objectives: as OxA-7844

Calibrated date: *1σ:* 3660–3540 cal BC
2σ: 3710–3520 cal BC

Final comment: see OxA-7844

Laboratory comment: see OxA-7844

UB–4138 4648 ±21 BP

$\delta^{13}C$: -21.0 ±0.2‰

Sample: ST80 1156, submitted in January 1997 by F Healy

Material: animal bone: *Canis* sp., dog (A Legge)

Initial comment: a replicate of OxA-7041.

Objectives: as OxA-7041

Calibrated date: *1σ:* 3500–3365 cal BC
2σ: 3515–3360 cal BC

Final comment: see OxA-7041

Laboratory comment: see OxA-7041

UB–4151 4772 ±19 BP

$\delta^{13}C$: -22.6 ±0.2‰

Sample: ST80 1882, submitted in January 1997 by F Healy

Material: antler: *Cervus elaphus*, pick with brow tine anciently removed, some possible wear (D Serjeantson)

Initial comment: found near the base of a chalk-cut ditch segment, in primary silt of light tan silt with chalk lumps. Archival reference: Stepleton enclosure, new segment 3, unit 13A, layer 6.

Objectives: the antler may have been used to dig the ditch and must have been deposited soon after its construction. Its date will help establish the chronology of the construction and development of the earthwork complex of which the enclosure forms one of the earlier elements.

Calibrated date: *1σ:* 3635–3525 cal BC
2σ: 3640–3520 cal BC

Final comment: F Healy (26 November 2006), segment 3, unit 13A, layer 6. The date is in good agreement with the above interpretation and the antler's stratigraphic position.

UB–4152 4792 ±20 BP

$\delta^{13}C$: -22.5 ±0.2‰

Sample: ST80 1886, submitted in January 1997 by F Healy

Material: antler: *Cervus elaphus*, pick, upper antler beam with one crown tine and stump of trez tine remaining, broken accidentally. Some wear on surviving tip (D Serjeantson)

Initial comment: a replicate of OxA-7042 and OxA-7043.

Objectives: as OxA-7042

Calibrated date: *1σ:* 3640–3530 cal BC
2σ: 3640–3525 cal BC

Final comment: see OxA-7042

Laboratory comment: see OxA-7042

UB–4153 4740 ±19 BP

$\delta^{13}C$: -21.1 ±0.2‰

Sample: ST80 1881, submitted in January 1997 by F Healy

Material: antler: *Cervus elaphus*, antler 'rake', crown with 4 tines, smooth, worn break from beam (D Serjeantson)

Initial comment: found with two other antler implements in a recess in the chalk base of the ditch segment, near one of the butts. They were covered by a primary silt of light tan silt with chalk lumps. Archival reference: Stepleton enclosure, new segment 3, unit 13B, layer 6.

Objectives: the antler and the two others (UB-4151 and UB-4152) with which it was found were almost certainly used to dig the ditch and must have been deposited soon after its construction. Its date will help establish the chronology of the construction and development of the earthwork complex of which the enclosure forms one of the earlier elements.

Calibrated date: *1σ:* 3630–3515 cal BC
2σ: 3635–3380 cal BC

Final comment: F Healy (26 November 2006), segment 3, unit 13B, layer 6. The date is in good agreement with the above interpretation and the antler's stratigraphic position.

Laboratory comment: Belfast (4 November 1997): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Wilson *et al* 1996

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.

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). A further three samples were also subsequently dated after 1998 (OxA-8858–60).

References: Bayliss *et al* 2012, 136–7
Mercer and Healy 2008

OxA–7026 4820 ±60 BP

$\delta^{13}C$: -21.2‰

Sample: ST80 1098, submitted in January 1997 by F Healy

Material: animal bone: *Ovis* sp., femur shaft of sheep, articulated (A Legge)

Initial comment: from a layer of medium-brown silt with medium packed chalk lumps and pebbles which had entered the ditch from the exterior following an inrush of vacuous chalk rubble from the internal bank, and before the deposition of a Bronze Age midden in the almost silted ditch top. Archival reference: inner outwork, new segment 5, cutting 11S, layer 3B.

Objectives: the sheep must have been placed in the ditch in a fleshed state for so many of its bones to have been found together. Its age must fall the within the span during which the silts from which it was recovered accumulated.

Calibrated date: *1σ:* 3660–3530 cal BC
2σ: 3710–3380 cal BC

Final comment: F Healy (26 November 2006), a replicate of OxA-7059. 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. It was not clear whether this particular femur articulated, although the sheep humerus from the same deposit dated by OxA-8858 certainly did. 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.

Laboratory comment: Ancient Monuments Laboratory, the two radiocarbon measurements (OxA-7026 and OxA-7059) are statistically consistent at 95% confidence (T′=3.6; T′(5%)=3.8; v=1; Ward and Wilson 1978). Their weighted mean (4740 ±42 BP) calibrates to 3640–3380 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–7044 4560 ±55 BP

$\delta^{13}C$: -20.7‰

Sample: ST78 2755A, submitted in January 1997 by F Healy

Material: human bone (left femur of young male adult) (J McKinley)

Initial comment: the skeleton of which the sample forms a part was found prone in the vacuous chalk rubble which had fallen into the ditch when the earthwork bank collapsed. There was a leaf-shaped flint arrowhead in the chest area of the skeleton, and the remains of a young infant (ST78 2855B, OxA-7100) lay at the left shoulder. The young male was apparently killed during the event which resulted in the destruction of the earthwork. Archival reference: inner outwork, new segment 7, quadrant 4, layer 4.

Objectives: the skeleton of which the sample forms a part seems to be that of a casualty of a single event in which the earthwork was partly destroyed. The age of the sample and of the associated infant remains should indicate the date of this event.

Calibrated date: *1σ:* 3370–3120 cal BC
2σ: 3500–3090 cal BC

Final comment: F Healy (26 November 2006), a replicate of OxA-7045. Segment 7, quadrant 4, layer 4. Both dates are in good agreement with the skeleton's stratigraphic position. Association with the infant remains mentioned above is unlikely, since OxA-7100 is in poor agreement with this result. The infant was one of three whose partial remains were found in this layer, so that the apparent association may have been fortuitous.

Laboratory comment: Ancient Monuments Laboratory (26 November 2006), the two radiocarbon measurements (OxA-7044 and OxA-7045) are statistically consistent at 95% confidence (T′=1.1; T′(5%)=3.8; v=1; Ward and Wilson 1978). Their weighted mean (4598 ±40 BP) calibrates to 3500–3120 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–7045 4645 ±60 BP

δ¹³C: -20.5‰

Sample: ST78 2755A, submitted in January 1997 by F Healy

Material: human bone (left femur of young male adult) (J McKinley)

Initial comment: a replicate of OxA-7044.

Objectives: as OxA-7044

Calibrated date: *1σ:* 3520–3360 cal BC
2σ: 3630–3140 cal BC

Final comment: see OxA-7044

Laboratory comment: see OxA-7044

OxA–7059 4660 ±60 BP

δ¹³C: -21.4‰

Sample: ST80 1098, submitted in January 1997 by F Healy

Material: animal bone: *Ovis* sp., sheep, articulated femur (J McKinley)

Initial comment: a replicate of OxA-7026.

Objectives: as OxA-7026

Calibrated date: *1σ:* 3520–3360 cal BC
2σ: 3640–3340 cal BC

Final comment: see OxA-7026

Laboratory comment: see OxA-7026

OxA–7100 4770 ±30 BP

δ¹³C: -20.4‰

Sample: ST78 2755B, submitted in January 1997 by F Healy

Material: human bone (left side of occipital, infant) (J McKinley)

Initial comment: the infant remains of which the sample forms a part were found at the left shoulder of the skeleton of a young adult male (see sample HH78 2755A, OxA-7044 and OxA-7045) apparently shot by a flint-tipped arrow. Archival reference: inner outwork, new segment 7, quadrant 4, layer 4.

Objectives: the infant of whose remains the sample forms a part seems to have been a casualty of a single event in which the earthwork was partly destroyed. The age of the sample and of the associated adult skeleton should indicate the date of this event.

Calibrated date: *1σ:* 3640–3520 cal BC
2σ: 3640–3380 cal BC

Final comment: F Healy (26 November 2006), segment 7, quadrant 4, layer 4. Association with the young male dated OxA-7044 and OxA-7045 is unlikely, since OxA-7100 is in poor agreement with those results. This infant was one of three whose partial remains were found in this layer, so that the apparent association may have been fortuitous.

OxA–7101 4815 ±35 BP

δ¹³C: -20.8‰

Sample: ST79 2756, submitted in January 1997 by F Healy

Material: human bone (joining proximal and mid right femur fragments, with proximal metaphyses, neonate/young infant) (J McKinley)

Initial comment: the sample forms part of the articulated skeleton of a neonate or young infant found in a natural cleft in the chalk at the base of a butt of a ditch segment, covered by a primary silt of silty wash with chalk lumps. The inner outwork, to which the segment belonged, replaced the Stepleton enclosure along its south-east perimeter. Archival reference: inner outwork, new segment 9, sector 1, ditch base.

Objectives: the skeleton of which the sample forms a part must represent a body placed on the base of the ditch butt very soon after death, otherwise it would not have been found in articulation, and the small and fragile bones would not be so well preserved. It should be effectively of the same age as the construction of the earthwork.

Calibrated date: *1σ:* 3650–3530 cal BC
2σ: 3660–3520 cal BC

Final comment: F Healy (26 November 2006), the date is in good agreement with the stratigraphic position of the burial.

OxA–7835 4855 ±45 BP

δ¹³C: -20.4‰

Sample: ST79 2025, submitted in December 1997 by F Healy

Material: human bone (right femur shaft from robust articulated older mature/older adult skeleton) (J McKinley)

Initial comment: the skeleton from which the sample comes was extremely tightly contracted in a small, ploughed-down ovoid scoop, surviving to 0.08m deep, in a band of protected chalk which marked the line of the bank of the inner outwork on the Stepleton Spur of the hill. The feet and most of the skull had been ploughed away. It may have pre-dated the bank or, more probably, have been cut through it. Archival reference: ST79 area 2A F200.

Objectives: dating the sample would determine the place of the burial in the history of the hill and of prehistoric funerary practice. The burial is unlike any other on the hill, and has no associated artefacts. The extremely tight contraction of the skeleton suggests comparison with middle and late Bronze Age inhumations like those in the Down Farm ring-ditch in Cranborne Chase to the east (Barrett *et al* 1991, fig 5.45). There is evidence for middle Bronze Age activity on the hill and in a valley below it.

Calibrated date: *1σ:* 3660–3630 cal BC
2σ: 3710–3530 cal BC

Final comment: F Healy (26 November 2006), the date indicates that the burial was, contrary to expectation, Neolithic and pre-dated the bank.

References: Barrett *et al* 1991

UB–4135 4644 ±21 BP

δ¹³C: -22.5 ±0.2‰

Sample: ST79 2578, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, articulating acetabulum and femur (A Legge)

Initial comment: from a layer of medium brown silt with abundant chalk lumps and pebbles overlying primary silt and entering the ditch from the outer edge at the same time as chalk rubble from the collapsed bank entered it from the inner edge. The layer was rich in early/middle Neolithic cultural material. Archival reference: inner outwork, new segment 5, cutting 4S, layer 5A.

Objectives: the sample should be very close in age to the collapse of the earthwork bank.

Calibrated date: *1σ:* 3500–3365 cal BC
2σ: 3510–3360 cal BC

Final comment: F Healy (26 November 2006), segment 5, cutting 4S, layer 5A. The sample seems to have been in a localised recut and may date from later in the sequence than previously assumed. *See* OxA-7026.

Laboratory comment: Belfast (4 November 1997): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Wilson *et al* 1996

UB–4137 4732 ±21 BP

δ¹³C: -22.4 ±0.2‰

Sample: ST79 601, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, articulated vertebrae (A Legge)

Initial comment: from vacuous chalk rubble with some grey/tan silt. The rubble resulted from the collapse into the ditch of the earthwork bank. Archival reference: inner outwork, new segment 6, cutting 2N, layer 4.

Objectives: to establish the date of the collapse of the earthwork bank. The articulation of the vertebrae shows that they were very close in age to the collapse of the bank.

Calibrated date: *1σ:* 3630–3385 cal BC
2σ: 3635–3375 cal BC

Final comment: F Healy (26 November 2006), new segment 6, cutting 2N, layer 4. The date is in good agreement with its stratigraphic position.

Laboratory comment: Belfast (4 November 1997): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Wilson *et al* 1996

UB–4242 4738 ±28 BP

δ¹³C: -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.

Laboratory comment: Belfast (12 April 1999): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Wilson *et al* 1996

Hambledon Hill: Stepleton middle outwork, Dorset

Location: ST 849122
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1978–81

Archival body: Dorset County Museum

Description: a linear earthwork extending across the breadth of the Stepleton spur, outside the Stepleton enclosure, and continuing westward around the contour of the hill, parallel to the inner and outer Stepleton outworks. Air photographs suggest that its bank was cut by the inner Stepleton outwork.

Objectives: to date the earthwork as a step towards refining the chronology of the enclosure.

OxA–7024 4855 ±60 BP

δ¹³C: -21.0‰

Sample: ST80 2224, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, articulating astragalus and calcaneum, right, unfused (A Legge)

Initial comment: from the interface of layers 4A (grey ash/silt with some charcoal) and 3A (rounded chalk pebbles in a pale silty matrix). The latter seems to represent collapsed bank material, the former an episode of burning immediately preceding it. The bones seem to have been found in articulation. The sequence of burnt material and bank collapse may have resulted from the same episode as similar deposits in the inner outwork 6m to the north. Archival reference: middle outwork, new segment 5, unit 6, layer 4A/3A interface.

Objectives: the recovery of articulating bones from the same spot indicates that they cannot have been put in the ditch long after the butchery of the animal from which they came. They should be extremely close in age to the beginning of the collapse of the bank. Their date will help establish the synchroneity or otherwise of the three outwork ditches on the spur and will contribute to the overall chronology.

Calibrated date: *1σ:* 3700-3540 cal BC
2σ: 1 3770-3520 cal BC

Final comment: F Healy (26 November 2006), a replicate of OxA-7025. Segment 5, unit 6, layer 4A/3A interface. The dates are in good agreement with the sample's stratigraphic position. Any link between this deposit of burnt material and those near the base of the inner outwork now seems unlikely, not least because the charcoal from each is dominated by different taxa.

Laboratory comment: Ancient Monuments Laboratory (26 November 2006), the two radiocarbon measurements (OxA-7024 and OxA-7025) are statistically consistent at 95% confidence (T′=3.1; T′(5%)=3.8; v=1; Ward and Wilson 1978). Their weighted mean (4788 ±46 BP) calibrates to 3660–3380 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–7025 4685 ±75 BP

δ¹³C: -20.8‰

Sample: ST80 2224, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, articulating astragalus and calcaneum, right, unfused (A Legge)

Initial comment: a replicate of OxA-7024.

Objectives: as OxA-7024

Calibrated date: *1σ:* 3630–3360 cal BC
2σ: 3640–3340 cal BC

Final comment: see OxA-7024

Laboratory comment: see OxA-7024

OxA–7030 4660 ±45 BP

δ¹³C: -26.6‰

Sample: HH80 C53, submitted in February 1997 by F Healy

Material: charcoal (Maloideae) (P Austin)

Initial comment: part of a layer (4A) of grey silt/ash with chalk rubble and charcoal on the base of a chalk-cut ditch segment. Malaoideae charcoal has been extracted from a larger sample consisting mainly of oak. Archival reference: middle outwork, new segment 6, unit 7, layer 4A.

Objectives: the layer from which the charcoal came must have been deposited very soon after the excavation or total cleaning-out of the ditch. The ash and charcoal in it may derive from the burning of the timber substructure of the inner outwork some 15m to the north. The date of the sample may thus relate to an event which effected substantial destruction on adjacent earthworks. Whether it does or not, it will help establish the construction date of the ditch from which it came and will contribute to the overall chronology.

Calibrated date: *1σ:* 3520–3360 cal BC
2σ: 3630–3350 cal BC

Final comment: F Healy (26 November 2006), from the same deposit as OxA-7031 and -7927. Segment 6, unit 7, layer 4A. The dates are in good agreement with the sample's stratigraphic position. Any link between this deposit of burnt material and those near the base of the inner outwork now seems unlikely, not least because the charcoal from each is dominated by different taxa.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon measurements (OxA-7030 and OxA-7031) on Maloideae charcoal from this sample are statistically consistent at 95% confidence (T′=0.2; T′(5%)=3.8; v=1; Ward and Wilson 1978).

Laboratory comment: ORAU (14 August 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Ward and Wilson 1978

OxA–7031 4690 ±45 BP

δ¹³C: -25.9‰

Sample: HH80 C53, submitted in February 1997 by F Healy

Material: charcoal (Maloideae) (P Austin)

Initial comment: as OxA-7030

Objectives: as OxA-7030

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: see OxA-7030

Laboratory comment: ORAU (14 August 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7035 4820 ±55 BP

δ¹³C: -20.5‰

Sample: ST81 379, submitted in January 1997 by F Healy

Material: animal bone (ovicaprid, two articulating phalanges) (A Legge)

Initial comment: from a layer of light grey/brown silt with occasional chalk pebbles which overlay a chalkier primary silt and underlay vacuous chalk rubble apparently derived from the collapse of the internal bank of the earthwork. Archival reference: middle outwork, new segment 11, unit 3, layer 5.

Objectives: the articulation of the two phalanges indicates that they entered the ditch soon after the animal from which they came was butchered. Their age should fall within the span during which the silt in which they were found accumulated and should provide a *terminus post quem* for the overlying chalk rubble. Their date will help establish the synchroneity or otherwise of the three outwork ditches on the spur and will contribute to the overall chronology.

Calibrated date: *1σ:* 3660–3530 cal BC
2σ: 3710–3380 cal BC

Final comment: F Healy (26 November 2006), a replicate of OxA-7036. Segment 11, unit 3, layer 5. The dates are in good agreement with the sample's stratigraphic position.

Laboratory comment: Ancient Monuments Laboratory (26 November 2006), the two radiocarbon measurements (OxA-7035 and OxA-7036) are statistically consistent at 95% confidence (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Their weighted mean (4828 ±55 BP) calibrates to 3700–3520 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–7036 4845 ±60 BP

$\delta^{13}C$: -21.0‰

Sample: ST81 379, submitted in January 1997 by F Healy

Material: animal bone (ovicaprid, 2 articulating phalanges) (A Legge)

Initial comment: a replicate of OxA-7035

Objectives: as OxA-7035.

Calibrated date: *1σ:* 3690–3530 cal BC
2σ: 3750–3510 cal BC

Final comment: see OxA-7035.

Laboratory comment: see OxA-7035

OxA–7927 4725 ±50 BP

$\delta^{13}C$: -26.2‰

Sample: ST80 C53, submitted in February 1997 by F Healy

Material: charcoal (Maloideae) (P Austin)

Initial comment: the charcoal formed part of a layer (4A) of grey silt/ash with chalk rubble and charcoal on the base of a chalk-cut ditch segment. Maloideae charcoal has been extracted from a larger sample consisting mainly of oak. Archival reference: middle outwork, new segment 6, unit 7, layer 4A.

Objectives: as OxA-7030

Calibrated date: *1σ:* 3640–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: see OxA-7030

UB–4136 4598 ±22 BP

$\delta^{13}C$: -23.2 ±0.2‰

Sample: ST79 2152, submitted in January 1997 by F Healy

Material: animal bone: *Bos* sp., cattle, articulating cervical and thoracic vertebrae (A Legge)

Initial comment: from a layer of vacuous chalk rubble with much redeposited, precipitated chalk. This represented the collapse in the Middle outwork ditch of its internal bank. The vertebrae were articulated when excavated. Archival reference: middle outwork, new segment 6, cutting 1, layer 4.

Objectives: to date the collapse of the internal bank of the middle outwork ditch. Its date will also help establish the synchroneity or otherwise of the three outwork ditches on the spur.

Calibrated date: *1σ:* 3370–3355 cal BC
2σ: 3495–3345 cal BC

Final comment: F Healy (26 November 2006), Segment 6, cutting 1, layer 4. The date is in good agreement with the sample's stratigraphic position.

Laboratory comment: Belfast (4 November 1997): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Wilson *et al* 1996

Hambledon Hill: Stepleton outer outwork, Dorset

Location: ST 849122
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1977–81

Archival body: Dorset County Museum

Description: a linear earthwork extending across the breadth of the Stepleton Spur, outside the Stepleton enclosure, and continuing westward around the contour of the hill, parallel to and beyond the inner and middle Stepleton outworks.

Objectives: to date the earthwork as a step towards refining the chronology of the complex.

UB–4243 4679 ±27 BP

$\delta^{13}C$: -21.4 ±0.2‰

Sample: ST80 1875, submitted on 25 January 1997 by F Healy

Material: human bone (right femur of young/younger mature adult male) (J McKinley)

Initial comment: part of an articulated skeleton found in a natural recess inside of the butt of the ditch segment, at the base. The skeleton had been gnawed, and lay directly on the chalk base of the recess in which it was found. Archival reference: outer outwork, new segment 3, unit 1, layer 5.

Objectives: the sample should be close in age to the construction of the earthwork. Its date will contribute to establishing the chronology and development of the defensive earthwork complex of which this ditch forms a part.

Calibrated date: *1σ:* 3520–3370 cal BC
2σ: 3630–3360 cal BC

Final comment: F Healy (26 November 2006), the date indicates that the outer outwork was the latest of the earthworks on the spur.

Hambledon Hill: Stepleton, discrete features on spur, Dorset

Location: ST 856116
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1978-9 and 1981-2

Archival body: Dorset County Museum

Description: pits within and beyond the Stepleton enclosure.

Objectives: to determine the dates of particular deposits, including burials and concentrations of charred cereals.

OxA–7818 4715 ±40 BP

δ¹³C: -20.3‰

Sample: ST81 3181, submitted in December 1997 by F Healy

Material: human bone (young adult male, right femur from articulated skeleton) (J McKinley)

Initial comment: the skeleton from which the sample comes lay crouched on a layer of ashy-grey silt with burnt flint and charcoal in a chalk-cut grave pit which had been ploughed down to 0.20m deep. It lay within an arc formed of flint nodules and an Old Red Sandstone quern fragment, with burnt chalk lumps near the head and feet. The surrounding and overlying layers contained burnt clay, further burnt chalk, charcoal, charred hazelnuts, struck flint and sherds representing substantial parts of at least two early/middle Neolithic bowls. Archival reference: ST81 area 4B F712.

Objectives: the presence in the burial of burnt chalk and clay suggest that it may relate to an event dramatically represented some 80m to the south, where the timber-laced rampart of the inner outwork seems to have burnt and collapsed, entombing the body of a young man with a flint arrowhead in the chest area and the associated body of an infant. Dating the sample would determine whether the burial could have been that of a victim of the same incident, as has been surmised. It would also contribute to the overall chronology of Neolithic funerary practice, in which the role and frequency of single burials remain ill-understood.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3370 cal BC

Final comment: F Healy (26 November 2006), the burial almost certainly pre-dates the young man in the inner outwork ditch (dated by OxA-7044 and -7045), but could be contemporary with the collapse of the inner outwork rampart, which would have occurred soon after its construction, the date of which can be modelled as *3630-3500* cal BC. *See* also OxA-7843.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon measurements (OxA-7818 and UB-4311) are statistically consistent at 95% confidence (T′=0.6; T′(5%)=3.8; v=1; Ward and Wilson 1978). Their weighted mean (4742 ±20 BP) calibrates to 3640–3380 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–7836 4695 ±40 BP

δ¹³C: -21.2‰

Sample: ST78 964, submitted in December 1997 by F Healy

Material: human bone (fragmentary left femur from articulated skeleton of older infant) (J McKinley)

Initial comment: the skeleton from which the sample comes was buried at the centre of the Stepleton enclosure, crouched on the base of a ploughed-down pit in/under soil with flint and chalk lumps. The skull had suffered plough damage. Also present were one tooth from a younger infant, three flint flakes, one of them inside the damaged skull, and one plain body sherd with fossil shell inclusions, probably of Neolithic Bowl, which lay in the chest area. Archival reference: ST78 area 1A F70.

Objectives: dating the sample would determine whether the burial is Neolithic. This would help define its relation to the earlier Neolithic Stepleton enclosure, at the centre of which it lies and would contribute to the overall picture of Neolithic funerary practice, in which the role and frequency of often inconspicuous single burials remain ill-understood.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: F Healy (26 November 2006), the burial is indeed Neolithic and may relate to the construction or subsequent use of the enclosure.

OxA–7837 4725 ±40 BP

δ¹³C: -23.3‰

Sample: ST78 S17 A, submitted in December 1997 by F Healy

Material: carbonised plant macrofossil (charred cereal, single grain of barley) (G Jones)

Initial comment: part of an assemblage of 291 barley grains, 65 wheat grains, 77 indeterminate cereal grains, and some hazelnut shell and charcoal, concentrated at one point in a pit (ST78 area 1A F110) ploughed-down to only 0.25m deep. The dark brown soil fill also contained burnt flint, scattered sherds of a lugged earlier Neolithic cup, two flint flakes, and two now-discarded iron fragments (one described as a nail), which could have been introduced by ploughing or could indicate an Iron Age or later date for the pit. Archival reference: ST78 area 1A F110.

Objectives: the predominance of barley is unique among the Neolithic pits on the site. If it proves to be Neolithic it will expand the picture of contemporary cereal-use. Dating the sample would demonstrate whether the grain assemblage from which it comes and the pit in which it was found, are to be interpreted as an aspect of the substantial Neolithic use of the site or as the result of later activity.

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3370 cal BC

Final comment: F Healy (26 November 2006), the barley deposit is indeed Neolithic and relates to the use of the enclosure.

Laboratory comment: ORAU (13 October 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7838 4670 ±40 BP

δ¹³C: -23.1‰

Sample: ST78 S17 B, submitted in December 1997 by F Healy

Material: carbonised plant macrofossil (charred cereal, single grain of barley) (G Jones)

Initial comment: as OxA-7837

Objectives: as OxA-7837

Calibrated date: *1σ:* 3520–3360 cal BC
2σ: 3630–3360 cal BC

Final comment: see OxA-7837

Laboratory comment: ORAU (13 October 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7839 4750 ±40 BP

δ¹³C: -20.4‰

Sample: ST82 F39 A, submitted in December 1997 by F Healy

Material: carbonised plant macrofossil (charred cereal, emmer wheat) (G Jones)

Initial comment: part of a deposit of charred emmer spikelets, examination of a sample of which indicates a total of approximately 100,000 grains. The grain was tipped into one side of a ploughed-down pit (ST82 F39; surviving to 0.25m deep), onto a thin layer of silt and included small quantities of hazelnut shell, *Bromus* sp., charcoal and burnt flint. Clustered with it were fragments of animal bone and antler, some burnt, five flint flakes, and sherds of a lugged earlier Neolithic bowl, some with sooty residue. A small earlier Neolithic cup, apparently originally complete, was placed on top of it. It was covered by dark orange-brown clay silt with numerous chalk fragments and there was superficial root disturbance.

Objectives: the deposit is exceptional in its size and in consisting of not-yet-dehusked spikelets. Dating the sample will provide 100% certainty that the deposit is early or middle Neolithic, although the associated artefacts leave little doubt. It will help to locate the deposit and the husbandry and processing practices that it represents within the period, adding time-depth to comparison with smaller dated grain assemblages like those from Lismore Fields and Balbridie.

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: F Healy (26 November 2006), the emmer deposit is indeed Neolithic and relates to the use of the enclosure.

Laboratory comment: ORAU (13 October 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7840 4730 ±45 BP

δ¹³C: -21.0‰

Sample: ST82 F39 B, submitted in December 1997 by F Healy

Material: carbonised plant macrofossil (charred cereal, emmer wheat) (G Jones)

Initial comment: as OxA-7839

Objectives: as OxA-7839

Calibrated date: *1σ:* 3640–3370 cal BC
2σ: 3640–3370 cal BC

Final comment: see OxA-7839

Laboratory comment: ORAU (13 October 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7841 3315 ±45 BP

δ¹³C: -23.7‰

Sample: ST78 S81 A, submitted in December 1997 by F Healy

Material: carbonised plant macrofossil (charred cereal, emmer wheat) (G Jones)

Initial comment: part of an assemblage of 303 wheat grains, 25 barley grains, 74 indeterminate cereal grains, and some hazelnut shell, *Galium aparine* and charcoal from two pits (ST78 area 1A F227 and F239) joined by a gully the worn, rounded chalk base of which was burnt. The plan and the condition of the connecting gully, combined with a further area of burning on the base of F227, may suggest that the features were the base of a corn-dryer, with F227 as oven and F239 as stokehole. Other finds comprised an animal bone fragment, a small, plain flint-tempered body sherd, possibly of Neolithic Bowl, and 30 flint flakes. Archival Reference: ST78 area 1A F227.

Objectives: to determine (a) whether the possible corn-dryer may be interpreted as an exceptional aspect of Neolithic cereal use or as the result of later activity and (b) whether the grain from it is to be seen as part of the Neolithic collection from the site.

Calibrated date: *1σ:* 1650–1520 cal BC
2σ: 1740–1490 cal BC

Final comment: F Healy (26 November 2006), the grain, and by inference, the possible corn-dryer, form part of the middle Bronze occupation of the site.

OxA–7842 3255 ±40 BP

δ¹³C: -24.1‰

Sample: ST78 S81 B, submitted in December 1997 by F Healy

Material: carbonised plant macrofossil (charred cereal, emmer wheat) (G Jones)

Initial comment: as OxA-7841

Objectives: as OxA-7841

Calibrated date: 1σ: 1610–1490 cal BC
2σ: 1630–1430 cal BC

Final comment: see OxA-7841

OxA–7843 4700 ±45 BP

$\delta^{13}C$: -26.1‰

Sample: ST81 C326-7, submitted in December 1997 by F Healy

Material: carbonised plant macrofossil (charred nutshell, *Corylus* sp.) (G Jones)

Initial comment: several separate hazelnut shell finds were scattered through the uppermost surviving fill of a ploughed-down grave (ST81 area 4B F712), especially in the south-west quadrant, as were sherds of at least two early/middle Neolithic vessels, struck flint, burnt clay, burnt chalk, animal bone, and charcoal. This overlay a skeleton crouched on a layer of ashy-grey silt with burnt flint and charcoal within an arc formed of flint nodules and an Old Red Sandstone quern fragment, with burnt chalk lumps near the head and feet. Archival reference: ST81 area 4B F712 L1.

Objectives: the presence in the burial of burnt chalk and clay suggest that it may relate to an event dramatically represented some 80m to the south, where the timber-laced rampart of the inner outwork seems to have burnt and collapsed, entombing the body of a young man with a flint arrowhead in the chest area and the associated body of an infant. The hazelnuts seem to have been deposited when the grave was filled, and should thus be close in age to the burial. Dating them would help determine whether the burial could have been that of a victim of the incident mentioned above, as has been surmised. It would also contribute to the overall chronology of Neolithic funerary practice, in which the role and frequency of single burials remain ill-understood.

Calibrated date: 1σ: 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: F Healy (26 November 2006), from the burial dated by UB-4311 and OxA-7818, and in good agreement with those dates.

Laboratory comment: ORAU (13 October 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7849 3050 ±45 BP

$\delta^{13}C$: -21.2‰

Sample: ST82 124, submitted in December 1997 by F Healy

Material: human bone (fragment of right femur from articulated skeleton of older mature/older adult, ?male) (J McKinley)

Initial comment: the skeleton from which the sample comes lay crouched in the silty fills of a chalk-cut pit (ST82 F16) which had been ploughed down to only 0.2m deep. The skeleton had been crushed by agricultural and earth-moving machinery. The only possibly associated artefact was small plain, flint-tempered body sherd, perhaps of Neolithic Bowl. Archival reference: ST82 F16.

Objectives: to determine whether the burial formed part of the substantial Neolithic use of the hill, and to contribute to the overall picture of Neolithic funerary practice, in which the role and frequency of often inconspicuous single burials remain ill-understood.

Calibrated date: 1σ: 1400–1230 cal BC
2σ: 1430–1130 cal BC

Final comment: F Healy (26 November 2006), the burial formed part of the middle Bronze Age occupation of the site.

UB–4311 4751 ±23 BP

$\delta^{13}C$: -21.3 ±0.2‰

Sample: ST81 3181, submitted in December 1997 by F Healy

Material: human bone (young adult male, right femur from articulated skeleton) (J McKinley)

Initial comment: a replicate of OxA-7818.

Objectives: as OxA-7818

Calibrated date: 1σ: 3635–3520 cal BC
2σ: 3640–3380 cal BC

Final comment: see OxA-7818

Laboratory comment: see OxA-7818

Hambledon Hill: western outwork, 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: a linear earthwork extending along the west side of the central dome of the hill and continuing beneath the hillfort ramparts along the west side of the northern spur. Earthwork survey indicates that it post-dated the south cross-dykes.

Objectives: to date the earthwork as a step towards refining the chronology of the complex.

OxA–7815 4660 ±40 BP

$\delta^{13}C$: -25.0‰

Sample: WOWK82 C22, submitted in December 1997 by F Healy

Material: charcoal: *Quercus* sp. (P Austin 1997)

Initial comment: from a ploughed-down posthole 0.23m in diameter and surviving to 0.23m deep, filled with a dark grey silt fill with charcoal and small chalk lumps in a band of protected chalk marking the line of the former bank of the western outwork on Hambledon Hill. Archival reference: WOWK82 area 2 F6.

Objectives: the location of this posthole and one other in a very small excavated area of protected chalk suggests that the former bank may have had a timber substructure, like those of outworks elsewhere on the hill. Dating the sample would indicate whether the posthole from which it came was of Neolithic or later date, and hence possibly related to the bank.

Calibrated date: *1σ:* 3520–3360 cal BC
2σ: 3630–3350 cal BC

Final comment: F Healy (26 November 2006), the date provides a *terminus post quem* for the construction of the western outwork.

Laboratory comment: ORAU (13 October 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

Hartlepool: Carr House Sands, Cleveland

Location: NZ 5228131006
Lat. 54.40.19 N; Long. 01.11.21 W

Project manager: R Annis (Cleveland County Council Archaeology Section), 1994

Archival body: Tees Archaeology, Durham University

Description: a wattle panel lying in silts stratified between two layers of peat. The silt was contained within a palaeochannel and had been deposited quickly. The panel was uncovered by tidal scour and was in a good state of preservation.

Objectives: this is the only substantial artefact from this area of prehistoric activity, stratigraphically it represents the earliest evidence of human activity from these deposits apart from unassociated Mesolithic material. If part of fish trap, it will be the earliest so far recovered in the UK.

References: Waughman 1995

GU–5435 4900 ±60 BP

$\delta^{13}C$: -27.8‰

Sample: HCH 94/1, submitted on 1 June 1994 by R Annis

Material: wood (waterlogged): *Corylus avellana*, ?hazel rods (J Huntley 1994)

Initial comment: part of a wattle panel lying in silts stratified between two layers of peat. The silt lies in a palaeochannel and had been deposited rapidly. The panel was uncovered by tidal scour and was in a good state of preservation.

Objectives: this is the only substantial artefact from this area of prehistoric activity.

Calibrated date: *1σ:* 3710–3640 cal BC
2σ: 3800–3530 cal BC

Final comment: R Annis (28 March 1995), these two samples give a rather earlier date than was expected for this object. The presence of early Neolithic material at this site provides a valuable guide to the dating of the deposit soon to be excavated (in 1995) in advance of sea wall construction. We hope that further work may shed some light on the function of the panel, and perhaps uncover associated parts of a longer structure.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon measurements (GU-5435 and GU-5436) are statistically consistent at 95% confidence (T′=0.1; T′(5%)=3.8; v=1; Ward and Wilson 1978). Their weighted mean (4890 ±43 BP) calibrates to 3770–3630 cal BC at 95% confidence; Reimer *et al* 2004).

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

GU–5436 4880 ±60 BP

$\delta^{13}C$: -28.4‰

Sample: HCH 94/2, submitted on 1 June 1994 by R Annis

Material: wood (waterlogged): *Corylus avellana*, ?hazel rods (J Huntley 1994)

Initial comment: as GU-5435

Objectives: as GU-5435

Calibrated date: *1σ:* 3710–3630 cal BC
2σ: 3790–3530 cal BC

Final comment: see GU-5435

Laboratory comment: see GU-5435

Hassocks: Friars Oak, West Sussex

Location: TQ 300163
Lat. 50.55.51 N; Long. 00.08.59 W

Project manager: C Butler (Mid Sussex Field Archaeological Team), 1994

Archival body: Mid Sussex Field Archaeological Team

Description: a sunken-featured building noticed during the topsoil stripping for a new golf course. A previously unknown Roman road was also discovered, below this Roman road were a large number of stakes and posts sunk into the alluvial clays and preserved by the waterlogged conditions.

Objectives: to help in the understanding of the site, by making sense of the stratigraphy of otherwise undateable contexts.

Final comment: C Butler (24 November 1995), the dates provided have helped our understanding of the site, making sense of the stratigraphy of otherwise undatable contexts.

References: Butler 2000

GU–5585 4370 ±60 BP

$\delta^{13}C$: -27.2‰

Sample: 1994-28, B1/W50, submitted on 26 January 1995 by C Butler

Material: wood (waterlogged): *Alnus glutinosa* L. Gaertn (J Hillam 1994)

Initial comment: from a burnt log lying in a possible old land surface context, which was exposed during landscaping. It may have been disturbed by this, but its location within the context could clearly be seen.

Objectives: to date the old land surface and help to understand the sequence of events here and relate this to other parts of the site.

Calibrated date: *1σ:* 3090–2900 cal BC
2σ: 3330–2880 cal BC

Final comment: C Butler (24 November 1995), this has dated the old land surface within an alluvial sequence giving us a better idea of the course of events here and providing a firm date for the environmental evidence.

GU–5586 3760 ±50 BP

$\delta^{13}C$: -26.9‰

Sample: 1994-28, B2/139, submitted on 26 January 1995 by C Butler

Material: wood (waterlogged): *Fraxinus excelsior*, *c* 10 rings including bark edge (J Hillam 1994)

Initial comment: from a log with a sawn end lying on top of the context containing W84 (GU-5587). The top of the wood was damaged by a mechanical digger during landscaping before discovery, but was not moved from its location.

Objectives: this, and other pieces of wood, give the appearance of having been laid on top of a peaty context to stabilise it. Although the wood has a sawn end, it also has evidence of possible beaver activity. B2/W84 (GU-5587) should date the peaty context, and this date will tell us when the wood was laid on top of it.

Calibrated date: *1σ:* 2280–2050 cal BC
2σ: 2340–2020 cal BC

Final comment: C Butler (24 November 1995), this date and GU-5587 demonstrate that this feature was all of one date and ties in well with pollen analysis, which suggested an early Bronze Age date for this deposit.

GU–5587 3760 ±60 BP

$\delta^{13}C$: -26.0‰

Sample: 1994-28, B2/W84, submitted on 26 January 1995 by C Butler

Material: wood (waterlogged): *Fraxinus excelsior*, outer 1cm; *c* 10 rings including bark edge (J Hillam 1994)

Initial comment: from a log sealed well within the context.

Objectives: this context overlies a prehistoric feature, and has a number of pieces of wood lying on top of it, one of which is also to be dated (GU-5586) and in turn is overlain by Saxon occupation. The dating of this context is critical in helping to understand what was taking place in this part of the site.

Calibrated date: *1σ:* 2290–2040 cal BC
2σ: 2400–1980 cal BC

Final comment: C Butler (24 November 1995), this date gives this feature a date which was expected and with GU-5586 shows that all of the wood in this feature was deposited at the same time.

GU–5588 6020 ±100 BP

$\delta^{13}C$: -25.3‰

Sample: 1994-28, B1/W47, submitted on 26 January 1995 by C Butler

Material: wood (waterlogged): *Quercus* sp., sapwood (J Hillam 1994)

Initial comment: from a log sealed within an alluvial deposit overlain by an Iron Age/Roman wooden trackway and a later Roman road.

Objectives: dates on the timbers from the overlying wooden trackway will give a *terminus ante quem* for the alluvial deposits. However, this date will also help us to understand when the alluvial deposits were being laid down and help to clarify whether they were associated with other activities on the site such as water course management.

Calibrated date: *1σ:* 5050–4790 cal BC
2σ: 5220–4700 cal BC

Final comment: C Butler (24 November 1995), GU-5588 shows that the alluvial deposits have a long history, and fits in well with the other dates for this sequence (GU-5585 and UB-3911-2). A date in the Mesolithic is made more interesting due to axe cut marks on this log.

GU–5589 3700 ±50 BP

$\delta^{13}C$: -25.4‰

Sample: 1994-28, B2/W55, submitted on 26 January 1995 by C Butler

Material: wood (waterlogged): *Quercus* sp., root (J Hather 1994)

Initial comment: from a wattle/brushwood feature within an occupation layer overlying an alluvial deposit and overlain by a sandy soil layer.

Objectives: although this feature lies in an 'occupation' layer, it also extends into the underlying alluvial deposit. It is not clear whether the feature itself it Saxon, Roman, or earlier as all the finds associated with it are 'rubbish' (pottery sherds/bones, etc) which could easily have been deposited at a later date than its construction.

Calibrated date: *1σ:* 2200–2020 cal BC
2σ: 2280–1940 cal BC

Final comment: C Butler (24 November 1995), this date and GU-5590 were a surprise and have caused a rethink of the sequence of events here as we originally thought they would be Saxon. This area has been subject to recutting possibly in Roman/Saxon times and these pieces must have come from a disturbed waterlogged Bronze Age feature and been redeposited in this location.

GU–5590 3490 ±50 BP

δ¹³C: -26.3‰

Sample: 1994-28, B2/W42, submitted on 26 January 1995 by C Butler

Material: wood (waterlogged): *Quercus* sp., sapwood with bark edge (J Hather 1994)

Initial comment: as GU-5589

Objectives: as GU-5589

Calibrated date: *1σ:* 1890–1700 cal BC
2σ: 1950–1680 cal BC

Final comment: see GU-5589

UB–3911 1919 ±34 BP

δ¹³C: -24.9 ±0.2‰

Sample: B1/W1, submitted on 26 January 1995 by C Butler

Material: wood (waterlogged): *Quercus* sp., sapwood; *c* 20 rings (J Hillam 1994)

Initial comment: UB-3911 and UB-3912 are from posts from a trackway. This post, and others associated with it, was sealed below a Roman road (sand agger and flint metalling) and was dug into the underlying alluvial deposits. Its location adjacent to a stream has kept it in a waterlogged condition, and has not been disturbed since the construction of the Roman road above it.

Objectives: the post forms part of a wooden trackway replaced by a later Roman road running from the Roman settlement at Hassocks 1 km to the south. Dating this post will determine not only the date of this wooden trackway but also assist in dating the later Roman road for which there is no dating evidence at present.

Calibrated date: *1σ:* cal AD 50–130
2σ: cal AD 10–140

Final comment: C Butler (25 November 1995), this date is exactly as hoped for, and confirms that this trackway was replaced by the road above it.

Laboratory comment: Belfast (28 September 1995): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963

UB–3912 1929 ±19 BP

δ¹³C: -25.4 ±0.2‰

Sample: B1/143, submitted on 26 January 1995 by C Butler

Material: wood (waterlogged): *Quercus* sp., sapwood; *c* 15 rings (J Hillam 1994)

Initial comment: as UB-3911

Objectives: as UB-3911

Calibrated date: *1σ:* cal AD 55–85
2σ: cal AD 25–130

Final comment: see UB-3911

Laboratory comment: Belfast (6 September 1995): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963

Hemington Fields, Leicestershire

Location: SK 46043065
Lat. 52.52.15 N; Long. 01.18.58 W

Project manager: C R Salisbury (Independent), 1985–94

Archival body: Leicestershire Museums

Description: a palaeochannel in the vicinity of the confluence of the Rivers Derwent and Trent. Soon after being bridged in AD 1240, the river suddenly changed course leaving an oxbow lake. The expanding meander core is revealed as a continuous river bed horizon overlain by 2-3m of sand and quartzite gravel.

Objectives: to date some of the 127 unique types of fishing gear stone anchors with remnants of withy bands in their grooves.

Final comment: C Salisbury (11 January 1998), the dates show the position of a thirteenth-century AD channel.

Laboratory comment: English Heritage (17 January 2012), nine further dates from this site were published in Bayliss *et al* 2013 (90–2; GU-5065, -5070, OxA-2288–9, and OxA-3028).

References: Bayliss *et al* 2013, 90–2
Bronk Ramsey *et al* 2000b, 251
Salisbury 1995

OxA–5325 705 ±30 BP

δ¹³C: -27.1‰

Sample: PL AN 22, submitted on 12 September 1994 by C Salisbury

Material: wood (waterlogged): *Salix* sp., willow rod/withy, 1 year old (C Salisbury)

Initial comment: the four samples OxA-5325–7 and OxA-5426, are all from withy bands wrapped round anchor stones lying on the ancient river bed. OxA-5325 is from an 80kg anchor stone, 100m from the modern river.

Objectives: fishing gear is bound to the stone anchor by a withy. These unique artefact types were being made for several centuries and dating may establish an evolving design as well as contemporaneity with adjacent fish weirs. They will also date the river bed.

Calibrated date: *1σ:* cal AD 1270–1300
2σ: cal AD 1260–1390

Final comment: C Salisbury (11 January 1998), this anchorstone lines up with anchors PLAN18 (OxA-2289; 690 ±80 BP, cal AD 1200-1420 at 95% confidence; Reimer *et al* 2004) and PLAN23 (OxA-5326, from Hemington Pit, *see* below) to show the position of a thirteenth-century channel a little west of the 8–9 fishweirs PL17 (OxA-2288; 1175 ±80 BP, cal AD 660–1030 at 95% confidence; Reimer *et al* 2004) and PL44 (GU-5468, from Hemington Pit, *see* below) which must have been formed by an avulsion from the large thirteenth-century palaeochannel. These anchors have no associated fishweirs and their style is indistinguishable from the eighth to ninth century anchor PLAN42 (OxA-3028; 1240 ±90 BP, cal AD 640–990 at 95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004
Salisbury 1995

OxA–5326 730 ±65 BP

$\delta^{13}C$: -27.1‰

Sample: PL AN 23, submitted on 12 September 1994 by C Salisbury

Material: wood (waterlogged): *Salix* sp., willow withy/rod, 1 year old (C Salisbury)

Initial comment: a withy band wrapped round an 86.6kg anchor stone, 100m from the modern river.

Objectives: as OxA-5325

Calibrated date: *1σ:* cal AD 1250–1300
2σ: cal AD 1180–1400

Final comment: see OxA-5325

OxA–5327 790 ±70 BP

$\delta^{13}C$: -25.7‰

Sample: PL AN 121, submitted on 12 September 1994 by C Salisbury

Material: wood (waterlogged): *Corylus* sp., withy, 3 years old (C Salisbury)

Initial comment: a withy wrapped round a 40kg stone anchor, 200m from the modern river and 50m upstream from a bridge dated cal AD 1240. *See* OxA-5325.

Objectives: as OxA-5325

Calibrated date: *1σ:* cal AD 1180–1280
2σ: cal AD 1040–1380

Final comment: C Salisbury (11 January 1998), this anchorstone and anchor PLAN 122 (OxA-5426) are both thirteenth century in date. They lie 25–50m upstream of the contemporary bridge dated dendrochronologically to AD 1240, and confirm the position of the channel shortly before it went out of use. There are no fishweirs associated. Because the anchorstones are of a unique artefactual type, found only at Hemington, the assumption that they are for fishing and not boats lies in a balance of probabilities. Whatever their use, and anchors PLAN 18, 22, and 23, they are not part of a post-and-wattle fishweir.

OxA–5426 740 ±50 BP

$\delta^{13}C$: -29.0‰

Sample: PL AN 122, submitted on 12 September 1994 by C Salisbury

Material: wood (waterlogged): *Salix* sp., willow withy, 1 year old (C Salisbury)

Initial comment: a withy wrapped round a 71kg stone anchor, 200m from the modern river and 50m upstream from a bridge dating to cal AD 1240.

Objectives: as OxA-5327

Calibrated date: *1σ:* cal AD 1250–1290
2σ: cal AD 1210–1390

Final comment: see OxA-5327

Hemington Pit, Leicestershire

Location: *see* individual results

Project manager: C Salisbury (Independent), 1986, 1991–3

Archival body: Leicestershire Museums

Description: a series of fish weirs selected to represent an even spread across the area of the meander core.

Objectives: it is hoped to follow the process through time of the river course including variability such as brading. Dating will also help to establish changing typology.

Final comment: see Hemington Fields (above).

References: Salisbury 1995
Salisbury 1996

GU–5464 1330 ±50 BP

$\delta^{13}C$: -26.2‰

Sample: PL FW8, submitted on 12 September 1994 by C Salisbury

Material: wood (waterlogged; up to 20 years growth): *Alnus* sp.; *Betula* sp. (C Salisbury)

Initial comment: located at SK 45913018; Lat. 52.52.00N; Long. 01.19.05W (one of seven samples from posts and wattle from a fish weir driven into the ancient river bed.

Objectives: this particular sample can be compared with HAR-8507 (1280 ±70 BP, cal AD 640–940 at 95% confidence; Reimer *et al* 2004; Bayliss *et al* 2012, 147), producing a middle Saxon date even though it was lying on the rim of a meander core dated ninth to thirteenth century AD. Either the first date was wrong, or this is a parcel of flood plain that has survived the meander spread by avulsion of the river or by leat digging.

Calibrated date: *1σ:* cal AD 650–770
2σ: cal AD 630–780

Final comment: C Salisbury (11 January 1998), the eighth-century AD date confirms the original radiocarbon date (HAR-8507). Since this weir lies on the banks of the palaeochannel that went out of use in the thirteenth-century, it confirms the stability of this reach of the river Trent. This may be because the river at this point was armoured by a stratum of clay deposited in the Late Devensian.

References: Bayliss *et al* 2012, 147 Reimer *et al* 2004

GU–5465 1290 ±70 BP

$\delta^{13}C$: -24.7‰

Sample: PL FW33, submitted on 12 September 1994 by C Salisbury

Material: wood (waterlogged): *Crataegus* sp.

Initial comment: located at SK 46153070; Lat. 52.52.16N; Long. 01.18.52W; from a post. As GU-5464.

Objectives: as GU-5464

Calibrated date: *1σ:* cal AD 650–780
2σ: cal AD 630–900

Final comment: C Salisbury (11 January 1998), this helps to explain the development of the meander core. There was no steady expansion but a complex of changing braided and anastomotic channels, caused partly by the natural development of sand bars, but also by the presence of the fish weirs.

GU–5466 1130 ±110 BP

$\delta^{13}C$: -23.9‰

Sample: PL FW40, submitted on 12 September 1994 by C Salisbury

Material: wood: *Quercus* sp., roundwood post (C Salisbury)

Initial comment: located at SK 46193072; Lat. 52.52.17N; Long. 01.18.50W; from a round wood post. As GU-5464.

Objectives: as GU-5464

Calibrated date: *1σ:* cal AD 770–1020
2σ: cal AD 660–1160

Final comment: see GU-5065

GU–5467 1110 ±50 BP

$\delta^{13}C$: -24.9‰

Sample: PL FW42, submitted on 12 September 1994 by C Salisbury

Material: wood (waterlogged): *Quercus* sp., roundwood, including bark edge; round section post (C Salisbury)

Initial comment: as GU-5464; located at SK 46173061; Lat. 52.52.13N; Long. 01.18.51W.

Objectives: as GU-6464

Calibrated date: *1σ:* cal AD 880–1000
2σ: cal AD 770–1030

Final comment: see GU-5465

GU–5468 1270 ±50 BP

$\delta^{13}C$: -26.5‰

Sample: PL FW44, submitted on 12 September 1994 by C Salisbury

Material: wood (waterlogged): *Alnus* sp., last 10 rings; *Corylus* sp., last 10 rings (C Salisbury)

Initial comment: from two round section posts. As GU-5464; located at SK 46153056; Lat. 52.52.12N; Long. 01.18.52W.

Objectives: as GU-5464

Calibrated date: *1σ:* cal AD 670–780
2σ: cal AD 650–890

Final comment: see GU-5065

GU–5469 1190 ±60 BP

$\delta^{13}C$: -24.5‰

Sample: PL FW52, submitted on 12 September 1994 by C Salisbury

Material: wood (waterlogged; wattle rods; average 7 rings): *Salix* sp.; *Corylus* sp. (C Salisbury)

Initial comment: from wattle woven between posts located at SK 46203051; Lat. 52.52.10N; Long. 01.18.49W. As GU-5464.

Objectives: as GU-5464

Calibrated date: *1σ:* cal AD 720–950
2σ: cal AD 670–990

Final comment: see GU-5465

GU–5470 1180 ±60 BP

$\delta^{13}C$: -25.1‰

Sample: PL FW57, submitted on 12 September 1994 by C Salisbury

Material: wood (waterlogged): *Quercus* sp., roundwood (C Salisbury)

Initial comment: from wattle sails located at SK 46163035; Lat. 52.52.05N; Long. 01.18.52W. As GU-5464.

Objectives: as GU-5464. This fish weir lies on the rim of the core and should provide a terminal date.

Calibrated date: *1σ:* cal AD 770–950
2σ: cal AD 670–1000

Final comment: C Salisbury (11 January 1998), this ninth century AD fish weir lies in the bank of the palaeochannel that went out of use in the thirteenth century. Further west, there are timbers that are dendrodated to AD 1096 in the channel that may derive from the eleventh century mill tail race. Again, the thirteenth-century channel shows remarkable stability (*see* GU-5464).

Highcliff Nab, Cleveland

Location: NZ 61021384
Lat. 54.30.58 N; Long. 01.03.26 W

Project manager: M Waughman (Tees Archaeology), June 1996

Archival body: Tees Archaeology

Description: a Mesolithic site was excavated along an eroding section of a footpath at Highcliff Nab, north of Guisborough in North Yorkshire. Flints were recovered and further excavation produced evidence of burning with a concentration of charcoal in one area, which has been interpreted as a hearth.

Objectives: the lithic evidence from this site indicates Mesolithic occupation over a long period of time, with both earlier and later forms of microlith. These dates are intended to demonstrate a relationship between the hearths and the lithics and to clarify the chronology.

References: Waughman 1996

OxA–7712 250 ±35 BP

$\delta^{13}C$: -25.8‰

Sample: GHN96 02, submitted on 5 January 1997 by R Daniels

Material: carbonised plant macrofossil (*Ulex* sp., pods) (J Huntley 1996)

Initial comment: from a concentrated charcoal fill of a sub-oval hearth with little *in situ* burning. The sand component of the subsoil at the base and sides was mostly scorched to bright orange. The charcoal fill was largely sealed by the upper fill, the top few centimetres was exposed on the surface at one side, but this was not sampled.

Objectives: lithic evidence from previous work indicates Mesolithic occupation over a long period of time, with both earlier and later forms of microlith. This date is intended to demonstrate a relationship between the hearths and the lithics and to clarify the chronology.

Calibrated date: *1σ:* cal AD 1640–1800
2σ: cal AD 1520–1955*

Final comment: M Waughman (1998), the post-medieval date returned by OxA-7712 and OxA-7713 was a surprise since the feature had the appearance of greater antiquity and produced Mesolithic finds similar to those from stratified deposits excavated nearby. Although these finds could have been residual, the post-medieval date raises the possibility that it was in fact an undetected post-medieval intrusion into an earlier feature which was sampled. This might not have been obvious under the salvage conditions in which the feature was excavated because the top had been truncated by erosion.

Laboratory comment: ORAU (9 June 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7713 210 ±35 BP

$\delta^{13}C$: -25.1‰

Sample: GHN96 02, submitted on 5 January 1997 by R Daniels

Material: carbonised plant macrofossil (*Ulex* sp., seeds) (J Huntley 1996)

Initial comment: as OxA-7712

Objectives: as OxA-7712

Calibrated date: *1σ:* cal AD 1650–1955*
2σ: cal AD 1640–1955*

Final comment: *see* OxA-7712

Laboratory comment: ORAU (9 June 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

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: Van de Noort *et al* 1993
Van de Noort 2004
Van de Noort and Ellis 1995a
Van de Noort and Ellis 1995b
Van de Noort and Ellis 1996
Van de Noort and Ellis 1997
Van de Noort and Ellis 1998a
Van de Noort and Ellis 1998b
Van de Noort and Ellis 1999a
Van de Noort and Ellis 1999b
Van de Noort and Ellis 2000a
Van de Noort and Ellis 2000b
Van de Noort and Ellis 2000c

Humber Wetlands Project: Ancholme, Brigg, Lincolnshire

Location: SE 9915008800 to SE 9960008900
Lat. 53.33.58 N; Long. 00.30.10 W, to
Lat. 53.34.01 N; Long. 00.29.45 W

Project manager: Robert Van de Noort (University of Hull), 1997

Archival body: North Lincolnshire Museum, Scunthorpe

Description: an archaeological survey of the Ancholme floodplain below 10m OD from the confluence of the rivers Rase and Ancholme near Toft next Newton (TF 035870) to the river Humber (SE 211976). The Ancholme valley is bounded by the Lincoln Edge to the west and the Lincolnshire Wolds to the east.

Objectives: the wetland development across the Ancholme valley, both laterally and longitudinally, was investigated in relation to sea-level changes. Each sample was taken from the base of the lower peat to minimise compaction and give maximal accuracy for the OD height. Samples were taken at different depths along the gradient of the valley floor to reflect the onset of wetland development at a certain time, elevation and zone. The data will be fed into a predictive mathematical model that will assign a specific type of wetland to a given archaeological period.

Final comment: R van de Noort (20 November 2004), the data from the transect across the River Ancholme at Brigg provides a surprisingly consistent trend in the development of wetlands in these part of the Humber Wetlands. By *c* 4000 cal BC, riparian wetlands existed at a height of around -3.8 m OD, and around 3000 cal BC these wetlands had expanded up to a height of *c* -2.0 m OD. By 2000 cal BC, the floodplain wetlands had reached Ordnance Datum, and at 1000 cal BC extended into the lowlands up to a height of *c* 1.5m OD. The development of these wetlands was arrested by rapid coastal change as marine alluvium deposits sealed the floodplain peat during the first millennium cal BC. 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: Neumann 1998

GU–5699 5040 ±170 BP

$\delta^{13}C$: -30.8‰

Sample: SE994088/02, submitted on 13 November 1997 by H Neumann

Material: peat (humic acid)

Initial comment: from SE 9934408836. The peat underlies estuarine silty clay and was sampled at its base at a depth of -2.69m to -2.66m OD with a sharp lower boundary onto sand.

Objectives: to establish a chronology for the onset of wetland development.

Calibrated date: *1σ:* 4040–3640 cal BC
2σ: 4260–3380 cal BC

Final comment: H Neumann (1998), this sample falls well into a post-elm decline mid-Holocene date which had been assigned to this assemblage.

Laboratory comment: SURRC (1997): the humic acid fraction of this sample was dated.

GU–5700 4730 ±100 BP

$\delta^{13}C$: -30.7‰

Sample: SE994088/04, submitted on 13 March 1997 by H Neumann

Material: peat (humic acid)

Initial comment: from SE 9947808866. The peat underlies estuarine silty clay and was sampled at its base at a depth of -2.48m to -2.45m OD, with a sharp lower boundary onto sand.

Objectives: to establish a chronology for the onset of wetland development.

Calibrated date: *1σ:* 3640–3370 cal BC
2σ: 3710–3340 cal BC

Final comment: H Neumann (1998), this sample dated the lower woody peat, which had reasonable pollen preservation.

Laboratory comment: see GU-5699

OxA–7090 4300 ±50 BP

$\delta^{13}C$: -26.9‰

Sample: SE994088/01, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from SE 9925108817. The peat underlies estuarine silty clay and was sampled at its base at a depth of -1.49m to -1.46m OD with a sharp lower boundary onto sand.

Objectives: to establish a chronology for the onset of wetland development.

Calibrated date: *1σ:* 2930–2880 cal BC
2σ: 3030–2870 cal BC

Final comment: H Neumann (1998), this date confirmed the pollen evidence which suggested a post-elm decline, mid-Holocene date.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1997): the humin fraction of this sample was dated.

OxA–7091 3940 ±45 BP

$\delta^{13}C$: -27.0‰

Sample: SE992088/01, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from SE 9915908807. The peat underlies estuarine silty clay and was sampled at its base at a depth of -0.93m to -0.90m OD with a sharp lower boundary onto sand.

Objectives: to establish a chronology for the onset of wetland development.

Calibrated date: *1σ:* 2490–2340 cal BC
2σ: 2570–2290 cal BC

Final comment: H Neumann (1998), this is the earliest evidence for clearance activity in the Brigg area, a slightly later date was obtained from GU-5706 (3890 ±60 BP; 2550–2180 cal BC at 95% confidence; Reimer *et al* 2004) at South Ferriby. This pre-dates the earliest dated forest clearance documented in Ancholme valley so far, as Castlethorpe, near Brigg where a charcoal layer was dated to 1930–1510 cal BC (3410 ±80 BP, BM-1795; at 95% confidence, Reimer *et al* 2004).

Laboratory comment: see OxA-7090

References: Reimer *et al* 2004

OxA–7136 4990 ±75 BP

δ^13^C: -28.1‰

Sample: SE994088/03, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from SE 9940708852. The peat underlies estuarine silty clay and was sampled at its base at a depth of -4.62m to -4.59m OD.

Objectives: to establish a chronology for the onset of wetland development.

Calibrated date: *1σ:* 3940–3660 cal BC
2σ: 3970–3640 cal BC

Final comment: H Neumann (1998), this was the oldest radiocarbon date obtained as well as the earliest date for peat development in the Ancholme Valley.

Laboratory comment: see OxA-7090

OxA–7137 6170 ±90 BP

δ^13^C: -28.5‰

Sample: SE994088/07, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from SE 99596 08897. The peat underlies estuarine silty clay and was sampled at its base at a depth of -6.35m to -6.32m OD with a distinct lower boundary onto peaty sand. The peat above was 2.87m thick and contained large trees and bands of grey clay indicating occasional flooding from the old river Ancholme, now situated 34m to the east.

Objectives: to establish a chronology for the onset of wetland development.

Calibrated date: *1σ:* 5290–4990 cal BC
2σ: 5330–4840 cal BC

Final comment: H Neumann (1998), this sample dated the peat overlying the marine sand which suggests that the Old Ancholme palaeochannel acted as an inlet of the Humber in fully open marine conditions, carrying marine sand prior to this samples date.

Laboratory comment: see OxA-7090

Humber Wetlands Project: Ancholme, Redbourne, Lincolnshire

Location: TA 00000022 to TA 01500018
Lat. 53.29.20 N; Long. 00.29.34 W, to
Lat. 53.29.18 N; Long. 00.28.12 W

Project manager: R Van de Noort (University of Hull), 1997

Archival body: North Lincolnshire Museum, Scunthorpe

Description: the area is under intensive agriculture and any signs of an upper peat are restricted to patches of dark brown earthy topsoil. A moated site with twelfth-century pottery is located at the edge of the floodplain on a slightly higher area of glacial drift with the Catchwater drain skirting around its southeastern edge (Redbourne-5).

Objectives: the wetland development across the Ancholme valley, both laterally and longitudinally, was investigated in relation to sea-level changes. Each sample was taken from the base of the lower peat to minimise compaction and give maximal accuracy for the OD height. Samples were taken at different depths along the gradient of the valley floor to reflect the onset of wetland development at a certain time, elevation and zone. The data will be fed into a predictive mathematical model that will assign a specific type of wetland to a given archaeological period.

Final comment: R Van de Noort (20 November 2004), the data from the transect across the River Ancholme at Redbourne provides a consistent trend in the development of wetlands in these part of the Humber Wetlands. By *c* 4000 cal BC, riparian wetlands existed at a height of around -3.8 m OD, and around 3000 cal BC these wetlands had expanded up to a height of *c* -2.0m OD. By 2000 cal BC, the floodplain wetlands had reached Ordnance Datum, and at 1000 cal BC extended into the lowlands up to a height of *c* 1.5m OD. The development of these wetlands was arrested by rapid coastal change as marine alluvium deposits sealed the floodplain peat during the first millennium cal BC. 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: Neumann 1998

GU–5701 3940 ±70 BP

δ^13^C: -28.6‰

Sample: TA 009001/03, submitted on 13 March 1997 by H Neumann

Material: peat (humic acid)

Initial comment: from TA 00630029. The peat underlies estuarine silty clay and was sampled at its base at a depth of -0.28 to -0.25m OD, with a sharp lower boundary onto sand.

Objectives: to establish a chronology for the onset of wetland development.

Calibrated date: *1σ:* 2570–2340 cal BC
2σ: 2620–2200 cal BC

Final comment: H Neumann (1998), during the Bronze Age the peat expanded beyond the confines of the channel edges and spread on to the adjacent floodplain between 2620–2200 cal BC (GU-5701) and 1880–1500 cal BC (GU-5702).

Laboratory comment: SURCC (1997): the humic acid fraction of this sample was dated.

GU–5702 3370 ±60 BP

$\delta^{13}C$: -29.2‰

Sample: TA 010002/04, submitted on 13 March 1997 by H Neumann

Material: peat (humic acid)

Initial comment: from TA 00000022. The peat underlies estuarine silty clay and was sampled at its base at a depth of 0.66m to 0.69 OD with a sharp lower boundary onto Lake Humber clay.

Objectives: as GU-5701

Calibrated date: *1σ:* 1750–1610 cal BC
2σ: 1880–1500 cal BC

Laboratory comment: see GU-5701

GU–5703 3590 ±50 BP

$\delta^{13}C$: -31.9‰

Sample: TA 016002/02, submitted on 13 March 1997 by H Neumann

Material: peat (humic acid)

Initial comment: from TA 01240020. The sample was underlying estuarine silty clay and sampled at a depth of -0.07m to -0.04m OD with a sharp lower boundary onto lake Humber clay.

Objectives: as GU-5701

Calibrated date: *1σ:* 2030–1880 cal BC
2σ: 2130–1770 cal BC

Final comment: H Neumann (1998), one of two samples taken from the core which provided a date, but the pollen was to degraded to make any interpretation.

Laboratory comment: see GU-5619

OxA–7051 4475 ±40 BP

$\delta^{13}C$: -29.8‰

Sample: TA009001/01, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from TA00590027. The peat underlies estuarine silty clay and sampled at a depth of -1.19m to -1.94m OD with a sharp lower boundary onto grey silty clay.

Objectives: as GU-5701

Calibrated date: *1σ:* 3340–3030 cal BC
2σ: 3360–3010 cal BC

Final comment: H Neumann (1998), the dates taken from the base of the peat at Redbourne suggested that peat started accreting alongside the channel during the Neolithic at 3360–3030 cal BC (the calibrated weighted mean of OxA-7051 and OxA-7064).

Laboratory comment: Ancient Monuments Laboratory (2000), the two replicate determinations (OxA-7051 and OxA-7064) are statistically consistent (T'=0.6; T'(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (4495 ±31 BP) calibrates to 3360–3030 cal BC at 95% confidence (Reimer *et al* 2004).

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1997): the humin fraction of this sample was dated.

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

OxA–7064 4525 ±50 BP

$\delta^{13}C$: -28.5‰

Sample: TA009001/01, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: a replicate of OxA-7051.

Objectives: as GU-5701

Calibrated date: *1σ:* 3360–3100 cal BC
2σ: 3490–3020 cal BC

Final comment: see OxA-7051

Laboratory comment: see OxA-7051

OxA–7065 3595 ±50 BP

$\delta^{13}C$: -26.8‰

Sample: TA 016002/05, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from TA 01500018. The sample was underlying estuarine silty clay and sampled at a depth of -0.04m to -0.08m OD below the surface with a sharp lower boundary onto Lake Humber clay

Objectives: as GU-5701

Calibrated date: *1σ:* 2030–1880 cal BC
2σ: 2130–1770 cal BC

Final comment: H Neumann (1998), one of two samples taken from this core, the pollen grains were poorly preserved and counts are too low to make any meaningful interpretation.

Laboratory comment: see OxA-7051

Humber Wetlands Project: Ancholme, South Ferriby, Lincolnshire

Location: SE 98432092 to SE 97102124
Lat. 53.40.31 N; Long. 00.30.35 W, to
Lat. 53.40.42 N; Long. 00.31.47 W

Project manager: R Van de Noort (University of Hull), 1997

Archival body: North Lincolnshire Museum, Scunthorpe

Description: South Ferriby is situated alongside the outside of a meander where the Humber curves southwards after skirting around the Lincoln Edge and has eroded into the soft sediments of the Lower Ancholme.

Objectives: the wetland development across the Ancholme Valley, both laterally and longitudinally, was investigated in relation to sea-level changes. The data will be fed into a predictive mathematical model that will assign a specific type of wetland to a given archaeological period.

Final comment: R Van de Noort (20 November 2004), the data from the transect across the River Ancholme at South Ferriby provides a consistent trend in the development of wetlands in these part of the Humber Wetlands. By *c* 4000 cal BC, riparian wetlands existed at a height of around -3.8 m OD, and around 3000 cal BC these wetlands had expanded up to a height of *c* -2.0m OD. By 2000 cal BC, the floodplain wetlands had reached Ordnance Datum, and at 1000 cal BC extended into the lowlands up to a height of *c* 1.5m OD. The development of these wetlands was arrested by rapid coastal change as marine alluvium deposits sealed the floodplain peat during the first millennium cal BC. 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: Neumann 1998

GU–5704 1840 ±60 BP

$\delta^{13}C$: -29.9‰

Sample: SE971212/01, submitted on 13 March 1997 by H Neumann

Material: soil (humic acid; organic silty clay)

Initial comment: from SE 97102124. This sample represents paludification, which resulted in the burial of the Roman road. It was taken on the intertidal foreshore at 1.2m OD. It rests directly on the stony road surface and is buried by grey, less organic estuarine clay. The road emerges from the mud cliff below the saltmarsh and runs from an outcrop of glacial sandy gravels towards the sea.

Objectives: this sample will date the burial of the (Roman) road, which is thought to be in the same stratigraphical context as the upper peat. This is the only location where this upper peat is not underlain by the lower peat, compaction is minimised and therefore it will provide the best possible estimate of the OD height and the timing of (post-) marine transgression.

Calibrated date: *1σ:* cal AD 80–250
2σ: cal AD 30–340

Final comment: H Neumann (1998), this sample dated the organic clay directly resting on the surface of the road. By combining the relative and absolute dating provided by the archaeological evidence and the radiocarbon results the estimated date ranges cal AD 47–130 for the construction of the road and cal AD 70–260 for its burial by alluvium. This provides a date for a Roman marine transgression adjacent to the Humber at 1.2m OD.

Laboratory comment: SURCC (1997): the humic acid fraction of this sample was dated.

GU–5705 1960 ±50 BP

$\delta^{13}C$: -27.1‰

Sample: SE971212/02, submitted on 13 March 1997 by H Neumann

Material: wood (waterlogged): unidentified

Initial comment: from SE 97102124. The brushwood underlies the stony surface of a possible Roman road on the intertidal foreshore. It represents the upper layer of brushwood, which appears to overlie a lower layer of brushwood and stone. It is thought to represent the last phase of road construction before the road was buried by estuarine sedimentation.

Objectives: to date the construction of the Roman road, which is thought to be in the same stratigraphical context as the upper peat behind the sea-bank. On the foreshore the organic material is better preserved because of the absence of drainage. This would assign it to a time period of marine regression during the Romano-British period, which has been documented in other foreshores around the British coast (Allen and Rippon 1996, Fulford *et al* 1994). The road is not underlain by lower peat, compaction is minimised and will therefore provide the best possible estimate of the OD height for the final phase of this regression.

Calibrated date: *1σ:* 20 cal BC–cal AD 90
2σ: 60 cal BC–cal AD 140

Final comment: H Neumann (1998), the archaeological evidence suggests that the sample must date to after the Roman invasion which took place here at AD 47.

References: Allen and Rippon 1996
Fulford *et al* 1994

GU–5706 3890 ±60 BP

$\delta^{13}C$: -28.6‰

Sample: SE984209/01, submitted on 13 March 1997 by H Neumann

Material: wood and peat (humic acid)

Initial comment: from SE984209; from peat which underlies estuarine silty clay and was sampled at its base at a depth of -1.14m to -1.11m OD with a sharp lower boundary onto sand.

Objectives: the wetland development across the Ancholme valley, both laterally and longitudinally, was investigated in relation to sea-level changes. Each sample was taken from the base of the lower peat to minimise compaction and give maximal accuracy for the OD height. Samples are taken at different depths along the gradient of the valley floor to reflect the onset of wetland development at a certain time, elevation, and zone. The data will be fed into a predictive mathematical model that will assign a specific type of wetland to a given archaeological period.

Calibrated date: *1σ:* 2470–2280 cal BC
2σ: 2570–2150 cal BC

Final comment: see OxA-7091

Laboratory comment: see GU-5704

GU–5707 4700 ±80 BP

$\delta^{13}C$: -28.5‰

Sample: SE982209/01, submitted on 13 March 1997 by H Neumann

Material: wood (waterlogged): unidentified

Initial comment: from SE 982209; the peat underlies estuarine silty clay and a well preserved horizontal piece of wood at the base was sampled at a depth of -2.15m to -2.11m OD with a sharp lower boundary onto lake Humber clay.

Objectives: as GU-5706

Calibrated date: *1σ:* 3640–3360 cal BC
2σ: 3650–3340 cal BC

Final comment: (13 March 1997) *see* OxA-7091

OxA–7052 3670 ±40 BP

$\delta^{13}C$: -27.5‰

Sample: SE984209/02, submitted on 13 March 1997 by H Neumann

Material: wood and peat (humin)

Initial comment: from SE984209; the peat underlies estuarine silty clay and was sampled at its base at a depth of -0.41m to -0.38m OD with a sharp lower boundary onto organic stained grey silty clay.

Objectives: as GU-5706

Calibrated date: *1σ:* 2140–1970 cal BC
2σ: 2200–1930 cal BC

Final comment: see OxA-7901

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1997): the humin fraction of this sample was dated.

OxA–7053 3310 ±40 BP

$\delta^{13}C$: -28.2‰

Sample: SE984209/03, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from SE 984209; the peat underlies estuarine silty clay and was sampled at its base at a depth of 0.55m to -0.52m OD with a sharp lower boundary onto organic stained grey silty clay.

Objectives: as GU-5706

Calibrated date: *1σ:* 1640–1520 cal BC
2σ: 1690–1500 cal BC

Final comment: see OxA-7901

Laboratory comment: see OxA-7052

OxA–7054 4960 ±40 BP

$\delta^{13}C$: -28.8‰

Sample: SE983209/01, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from SE983209; the peat underlies estuarine silty clay and was sampled at its base at a depth of -2.90m to -2.88m OD with a sharp lower boundary onto estuarine clay.

Objectives: as GU-5706

Calibrated date: *1σ:* 3790–3690 cal BC
2σ: 3910–3650 cal BC

Final comment: see OxA-7901

Laboratory comment: see OxA-7052

References: Mercer and Healy 2008, 261-2

OxA–7055 4650 ±50 BP

$\delta^{13}C$: -28.6‰

Sample: SE983209/02, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from SE983209; the peat underlies estuarine silty clay and was sampled at its base at a depth of -2.08m to -2.05m OD with a merging lower boundary into sand.

Objectives: as GU-5706

Calibrated date: *1σ:* 3520–3360 cal BC
2σ: 3630–3340 cal BC

Final comment: see OxA-7901

Laboratory comment: see OxA-7052

OxA–7056 5440 ±45 BP

$\delta^{13}C$: -29.1‰

Sample: SE978207/01, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from SE978207; the peat underlies estuarine silty clay and was sampled at its base at a depth of -5.88m to -5.85m OD with a sharp lower boundary onto estuarine clay.

Objectives: as GU-5706

Calibrated date: *1σ:* 4350–4250 cal BC
2σ: 4360–4230 cal BC

Final comment: see OxA-7901

Laboratory comment: see OxA-7052

OxA–7057 6000 ±50 BP

δ¹³C: -28.2‰

Sample: SE980208/01, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from SE 980208; the peat underlies estuarine silty clay and was sampled at its base at a depth of -3.33m to -3.30m OD with a sharp lower boundary onto sand.

Objectives: as GU-5706

Calibrated date: *1σ:* 4950–4800 cal BC
2σ: 5020–4770 cal BC

Final comment: H Neumann (1998), the dates for the onset of peat development became progressively younger towards the edge of the valley, suggesting a lateral spread of peat formation over four millennia.

Laboratory comment: see OxA-7052

OxA–7066 2635 ±45 BP

δ¹³C: -28.0‰

Sample: SE984209/04, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from SE984209; the peat underlies estuarine silty clay and was sampled at its base at a depth of 1.32m to 1.35m OD with a sharp lower boundary onto sand.

Objectives: as GU-5706

Calibrated date: *1σ:* 830–790 cal BC
2σ: 900–770 cal BC

Final comment: H Neumann (1998), the dates of 900-770 cal BC (OxA-7066 and OxA-7067) for the base of the peat on the valley margins at South Ferriby suggest that while on the centre of the valley floor salt marsh prevailed, the edges were still fringed with alder carr.

Laboratory comment: see OxA-7052

OxA–7067 2690 ±70 BP

δ¹³C: -26.7‰

Sample: SE984209/05, submitted on 13 March 1997 by H Neumann

Material: peat (humin)

Initial comment: from SE 9843020924; the peat underlies estuarine silty clay and was sampled at its base at a depth of 2.00m to 2.03m OD with a distinct lower boundary onto silty fine sand.

Objectives: as GU-5706

Calibrated date: *1σ:* 910–800 cal BC
2σ: 1010–770 cal BC

Final comment: see OxA-7057

Laboratory comment: see OxA-7052

OxA–7138 4440 ±70 BP

δ¹³C: -25.7‰

Sample: SE971212/03, submitted on 13 March 1997 by H Neumann

Material: sediment (humin; organic clay)

Initial comment: from SE 97102124; from a section in the mud cliff at the edge of the saltmarsh where the edge of the Roman road is visible. The section is located below HWM and is therefore inundated twice daily. The samples comes from an organic clay layer which continues at the same level as the road. In the sampled location it rests on gravelly sand (glacial), but it can be traced over about 30m along the section as a distinct edge. A slight dip next to the edge of the road may represent a drainage ditch related to the road in which case the organic layer represents the contemporary marsh on the seaward side of the road. It is however possible that the edge of the road is erosive in which case the organic layer represents a later, temporary phase of slightly lower sea-level. This would then demonstrate that this part of the road was located on dry ground.

Objectives: the sample will date the wetland on the seaward side of the Roman road. If it is of a similar date to the road it will provide a date and precise OD height for the adjacent wetland and regressive sea-level phase. This would provide a date and precise OD height for a marine regression during the Romano-British period for the Humber Estuary for the first time. If the date is considerably later it would represent an erosive edge at the side of the road and date a stabilisation phase on the foreshore.

Calibrated date: *1σ:* 3340–2920 cal BC
2σ: 3370–2900 cal BC

Final comment: A Bayliss (1998), it is difficult to explain the marked difference between two measurements (OxA-7138 and OxA-7139) on the same sample being caused by such contamination. It is more likely that the dated material represents reworked older peat redeposited over the Roman Road (Bayliss in Van de Noort and Ellis 1998).

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on this sample, OxA-7138 and OxA-7139, are statistically significantly different (T′=27.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: see OxA-7052

References: Bayliss 1998
Ward and Wilson 1978

OxA–7139 3940 ±65 BP

δ¹³C: -26.0‰

Sample: SE971212/03, submitted on 13 March 1997 by H Neumann

Material: sediment (humin; organic clay)

Initial comment: as OxA-7138

Objectives: as OxA-7138

Calibrated date: *1σ:* 2570–2340 cal BC
2σ: 2620–2200 cal BC

Final comment: see OxA-7138

Laboratory comment: see OxA-7052

Humber Wetlands Project: Barmston Drain, Humberside

Location: TA 16855864
Lat. 54.00.37 N; Long. 00.13.00 W

Project manager: R Van de Noort (University of Hull), 1994

Archival body: Hull and East Riding Museum

Description: the lake-dwelling at Barmston was situated on the fluvio-glacial sands and gravels, possibly overlooking an small are where peat was developing.

Objectives: to determine the date of the peat growth.

Final comment: R Van de Noort (20 November 1994), this series shows that the 'Barmston lake dwelling' site was not a lake dwelling, but a settlement built on top of the organic deposits of a mere that had dried up in the Early Holocene.

References: Van de Noort 2004
Van de Noort and Ellis 1995a
Varley 1968

GU–5448 10190 ±110 BP

δ¹³C: -32.0‰

Sample: TA 168586 S1, submitted on 9 November 1994 by R Van de Noort

Material: peat (humic acid; slightly silty detritus peat with an appreciable calcium carbonate content (A Hall)

Initial comment: from the base of the peat at a depth of 91–1184cm, which developed on top of the settlement. The section description from the pit cutting through Varley's 1960 excavation trench at site A (his terminology). Undisturbed sediments lie to the east beneath a modern field drain. Backfill deposits, comprised a mixture of peat, silts, plough soil, and wood macrofossils (relatively compacted). The boundary between cut and undisturbed deposits was very distinct and sharp. Several plastic marker tags from the original excavation were recovered (pencil labels legible). Wood in the undisturbed section was degraded. Wood in the backfill displays variable preservation, generally poor, but good considering its history. The basal wood in Varley's trench may be *in situ*.

Objectives: the earlier excavation by Varley in 1960 has provided some information on the Bronze Age settlement site. It is obvious from our preservation assessment (1994) that the site is drying out rapidly. However, what is unclear is the relation between the settlement and the peat. Is the peat, as Varley states co-terminus with the settlement site (and the peat will therefore hold little information on the Bronze Age occupation), or is the presence of worked wood in the peat an indication that the occupation continued at the time of peat accumulation (and the peat will therefore contain waterlogged source material directly related to the settlement). If the latter case is correct, the desiccation of the area has important management implications. The two samples submitted, TA 168586.S1 (GU-5448 and GU-5449) and TA 168586 (GU-5450), are to give a global indication on the relation in time between the occupation and peat growth.

Calibrated date: *1σ:* 10140–9690 cal BC
2σ: 10440–9400 cal BC

Final comment: R Van de Noort and S Ellis (1995), the dates obtain indicate that the sedimentary sequence from the hollow follows in general outline the development of other meres in Holderness, with inorganic late glacial sediments (Varley's Shell-bed) on the gravel outwash followed by peat from the early Holocene onwards. In short, the 'Barmston lake dwelling' site was not a lake dwelling, but a settlement built on top of the organic deposits of a mere that had dried up in the Early Holocene.

Laboratory comment: SURRC (1995): the humic aid fraction of this sample was dated.

GU–5449 10720 ±110 BP

Sample: TA 168586 S1, submitted on 9 November 1994 by R Van de Noort

Material: peat (humin; slightly silty detritus peat with an appreciable calcium carbonate content (A Hall)

Initial comment: as GU-5448

Objectives: as GU-5448

Calibrated date: *1σ:* 10780–10620 cal BC
2σ: 10830–10480 cal BC

Final comment: see GU-5448

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on the humic acid and humin fractions of this sample (GU-5448, and -5449) are statistically significantly different (T′=11.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: SURRC (1995): the humin fraction of this sample was dated.

References: Ward and Wilson 1978

GU–5450 9300 ±70 BP

δ¹³C: -27.3‰

Sample: TA 168586, submitted on 9 November 1994 by R Van de Noort

Material: wood: *Salix* sp., waterlogged (A Hall 1994)

Initial comment: as GU-5448

Objectives: as GU-5448

Calibrated date: *1σ:* 8640–8450 cal BC
2σ: 8750–8300 cal BC

Final comment: see GU-5448

Humber Wetlands Project: Humberhead Levels, Rossington Bridge Roman Fort, South Yorkshire

Location: SK 46263991
Lat. 52.57.15 N; Long. 01.18.41 W

Project manager: R Van de Noort (University of Hull), 1996

Archival body: Doncaster Museum

Description: the 'Vexillation' fort crop mark at Rossington (SAM No. 1044) lies on the sand terrace overlooking the River Torne. It is situated close to the Antonine Great North Roman Road that links Doncaster, to the North, and Bawtry and ultimately Ermine Street (North of Lincoln), to the South. The road which may date to the AD 60s, crosses the Torne close by at the Rossington Roman pottery kiln scheduled monument (to the North East). The wetland archaeological potential was confirmed by a small-scale assessment excavation. This revealed a possible ditch feature in which organic sediments, including worked wood, had accumulated before being buried by material eroded from up-slope. Although Roman pottery and an undated flint artefact were recovered from the later colluvium (layer 4) no cultural debris was recovered from the organic sequence (layers 5 and 6).

Objectives: the morphology of the possible ditch or vallum cannot be easily recognised as of Roman date (ie it is not a V or punic ditch shape). It is therefore possible that the deposits are entirely natural in origin having developed on the margin of the floodplain. Alternatively, the Roman inhabitants may have utilised the break in slope at this point as a means of defence. The subsequent accumulation of organic sediments may then form a valuable resource in the environmental study of the early impact of Roman military presence in the region. Dates from the top and base of the organic sediments will provide an indication of the degree of contemporaneity between the palaeoenvironmental resource and the Roman fort.

Final comment: R Van de Noort (30 November 2004), the radiocarbon dates show the existence of a palaeoenvironmental deposit for most of the first millennium AD within one of the ditches of the fort after its abandonment, probably very early in the Roman period.

References: Van de Noort and Ellis 1997

OxA–6355 1850 ±60 BP

$\delta^{13}C$: -27.6‰

Sample: SK626991.A3, submitted on 30 May 1996 by M Dinnin

Material: plant macrofossils (?*Alnus* sp.) (M Dinnin 1996)

Initial comment: from the basal 5cm of layer 6 (sandy organic detritus). Layer 6 was overlain by material probably eroded and redeposited from up-slope (layers 1–4).

Objectives: to determine whether the organic sequence accumulated during or shortly after the early Roman military presence in the area. If this is the case the deposits may then form a valuable resource for the study of environmental impact of early Roman military presence in the region.

Calibrated date: *1σ:* cal AD 80–240
2σ: cal AD 20–340

Final comment: R Van de Noort (30 November 2004), the sandy organic detritus commenced accumulation in the Roman period.

OxA–6356 925 ±60 BP

$\delta^{13}C$: -27.6‰

Sample: SK626991.A6, submitted on 30 May 1996 by M Dinnin

Material: plant macrofossils (?*Alnus* sp.) (M Dinnin 1996)

Initial comment: from the top 5cm of layer 5 (silty humified peat). It was overlain by 86cm of material, probably eroded from up-slope (layers 1–4). Layer 5 contained wood roots and branches *in situ*.

Objectives: to determine the upper age limit of the organic sequence. If it is of Roman or early post-Roman age, the deposits may then form a valuable resource for the study of environmental impact of early Roman military presence in the region.

Calibrated date: *1σ:* cal AD 1020–1190
2σ: cal AD 990–1250

Final comment: R Van de Noort (30 November 2004), the top of the sandy organic detritus dates towards the end of the first millennium AD.

Humber Wetlands Project: Humberhead Levels, Scaftworth Roman Road, South Yorkshire

Location: SK 46573928
Lat. 52.56.55 N; Long. 01.18.25 W

Project manager: R Van de Noort (University of Hull), 1995

Archival body: Doncaster Museum

Description: a Roman road, which crosses the River Idle floodplain between Scaftworth (Nottinghamshire) and Bawtry (South Yorkshire). It is part of the same Roman road that passes near to the Vexillation fort at Rossington Bridge before crossing the River Torne next to the Roman kiln site en route to Doncaster. On the east bank of the Idle, the road can be traced, intermittently, heading towards Lincoln. Near Holly Tree Farm, Scaftworth, the road passes just north of a fourth century AD Roman Fort (triple ditched enclosure; SAM Nottinghamshire 56). The fort, situated on the terrace gravels, is visible as a crop mark and was excavated by Bartlett and Riley (1958) and later by Kennedy (1984; Gilbertson and Blackman 1985). It has been the subject of a preservation assessment by the Humber Wetlands Project (August 1995) and geophysical survey (Cole 1996). In 1995, the Humber Wetlands Project carried out a small-scale excavation in order to assess the preservation state of the site. This work has led to a re-interpretation of the site. The HWP excavation suggests that Kennedy's wooden rafting structure is in fact an early Roman road built from timber and covered in turves. At a later date this was 'upgraded' to the more typical mettled Roman road (layers 3 and 4). The second road does not follow the course of the first road precisely. The mettled road was reinforced using rows of substantial timbers so that it would have stood relatively high above the peats of the floodplain. There is some evidence for repairs to the structure. The road was subsequently buried by fen peat. As it fell out of use the mettled surface collapsed and spread laterally across the peat surface, perhaps being partially reworked by floodwater.

Objectives: sample SK657927.AG comes from the sandy peat (layer 3) that lies immediately over the spread of gravels derived from the collapsed mettled road (layer 4). It, therefore, has the potential to provide a date for when this abandonment occurred, ie the road's life span. A date would also provide a maximum age for the overlying peats that may provide a threatened palaeoenvironmental resource for reconstructing the ?late Roman and post-Roman environment.

Final comment: R Van de Noort (30 November 2004), the Iron Age date of material overlying the Roman road indicate that the samples were derived from much older material that had been reworked by the River Idle. No further conclusions about the abandonment of the road can be drawn from this.

Laboratory comment: English Heritage (22 September 1997), OxA-6354 and OxA-6552 are replicate samples on the same material. They are statistically indistinguishable at 95% confidence (Ward and Wilson 1978; T′=1.6; T′(5%)=3.8). A weighted mean of these measurements can therefore be taken before calibration (2123 ±46 BP). This calibrates to 360–40 cal BC (at 95% confidence; Reimer *et al* 2004).

References: Bartlett and Riley 1958
Dearne 1997
Gilbertson and Blackman 1985
Kennedy 1984
Reimer *et al* 2004
Van de Noort and Ellis 1997
Ward and Wilson 1978

OxA–6354 2170 ±60 BP

$\delta^{13}C$: -28.1‰

Sample: SK657927.BE, submitted on 31 May 1996 by M Dinnin

Material: plant macrofossils (?*Alnus* sp. (2 fragments); one reed leaf) (M Dinnin 1995)

Initial comment: twigs from sandy peat (layer 3) immediately overlying the edge of spread gravels derived from a collapsed Roman road. The sample was from a depth of 80–85cm below ground level. The watertable was 1m below ground level.

Objectives: to provide an age for the abandonment/collapse of the second Roman road and a maximum age for the palaeoenvironmental resource within the overlying peat. This will enhance our interpretation of sites nearby at Rossington, Scaftworth 'fort' and landscape archaeology of the region.

Calibrated date: *1σ:* 360–120 cal BC
2σ: 390–40 cal BC

Final comment: R Van de Noort (30 November 2004), the Iron Age date of material overlying the Roman road indicate that the samples were derived from much older material that had been reworked by the River Idle. No further conclusions about the abandonment of the road can be drawn from this.

Laboratory comment: see series comments

OxA–6552 2050 ±75 BP

$\delta^{13}C$: -28.4‰

Sample: SK657927.BE, submitted on 31 May 1996 by M Dinnin

Material: plant macrofossils (?*Alnus* sp. (2 fragments); one reed leaf) (M Dinnin 1995)

Initial comment: a replicate of OxA-6354.

Objectives: as OxA-6354

Calibrated date: *1σ:* 180 cal BC–cal AD 50
2σ: 360 cal BC–cal AD 120

Final comment: see OxA-6354

Laboratory comment: see series comments

Humber Wetlands Project: Keyingham Drain, Humberside

Location: TA 26602759 to TA 32103110
Lat. 53.43.45 N; Long. 00.04.51 W, to
Lat. 53.45.33 N; Long. 00.00.15 E

Project manager: R Van de Noort (University of Hull), 1994

Archival body: Hull and East Riding Museum

Description: the main part of the Keyingham valley is about 8km long and trends south-south-west/north-north-east. The valley bottom widens and assumes a complex outline with several large embayments. In response to this the artificial water course of the Keyingham Drain branches at the Engine Corner, the site of the windmill pump during the eighteenth century. The long Keyingham drainage basin and field recording of sediment sequences will be used to tentatively correlate between cores and identify buried land surfaces.

Objectives: to determine the temporal range of the palaeoenvironmental source material in different parts of Keyingham Drain and be able to link the palaeoenvironmental source material directly to the archaeological sites. It will also contribute to our very limited understanding of sea-level changes in prehistory.

Final comment: R Van de Noort (30 November 2004), this series provides a temporal dimension to the geographical expansion of the wetlands in the Keyingham Drain area, showing that sea-level change resulted in the lateral expansion of wetland deposition over this glaciofluvial valley which included several former meres.

Laboratory comment: Ancient Monuments Laboratory (2000), of the ten samples dated, nine have replicate measurements on the humic acid and bulk humin fractions.

In three cases the results from these fractions are significantly different. Two of these pairs date to the early Mesolithic (GU-5473–4 and GU-5471–2), and in these cases the difference may be explained by the migration downwards of humic acids in an alkaline environment (Dresser 1970). A small degree of penetration by younger material would make a relatively large difference to the results because radiocarbon concentrations are much lower in older samples. It is more difficult to account for the age difference between GU-5489 and GU-5490 in this way since the sample was fairly acidic (pH 5.64) and the two fractions of the other pairs of first millennium samples are consistent (nor are the results on humin necessarily older) (GU-5485–6 and GU-5487–8). This comparability of humin and humic acid fractions was observed by Shore (1988), so this difference may simply relate to statistical scatter.

References: Dresser 1970
Shore 1988
Van de Noort and Ellis 1995a
Ward and Wilson 1978

GU–5471 9440 ±120 BP

$\delta^{13}C$: -25.1‰

Sample: TA 264274 S1, submitted on 22 December 1994 by R Van de Noort

Material: peat (humic acid)

Initial comment: from the bottom 5cm of a peat layer, which was sealed by alluvial sediments. The peat layer was identified during transect coring, and was traced over larger parts of the drain at this transect, TA 26602759. The sample was recovered from a depth of 5.99m to 6.05m below the surface (-4.13m to -4.19m OD).

Objectives: this sample was taken as part of the radiocarbon dating programme from southern Holderness by the Humber Wetlands Project.

Calibrated date: *1σ:* 9120–8570 cal BC
2σ: 9220–8340 cal BC

Final comment: R Van de Noort and S Ellis (1995), GU-5471 and GU-5472 date the base of the biogenic deposit which contains a very early Holocene pollen spectrum lacking taxa other than *Betula* and *Corylus*.

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on the humic acid and humin fractions of this sample (GU-5471 and GU-5472) are statistically significantly different (T′=7.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: SURRC (1995): the humic acid fraction of this sample was dated.

References: Ward and Wilson 1978

GU–5472 9880 ±100 BP

$\delta^{13}C$: -20.3‰

Sample: TA 265274 S1, submitted on 22 December 1994 by R Van de Noort

Material: peat (humin)

Initial comment: as GU-5471

Objectives: as GU-5471

Calibrated date: *1σ:* 9450–9260 cal BC
2σ: 9760–9210 cal BC

Final comment: see GU-5471

Laboratory comment: see GU-5471

Laboratory comment: SURRC (1995): the humin fraction of this sample was dated.

GU–5473 9590 ±90 BP

$\delta^{13}C$: -29.0‰

Sample: TA 261285 S1, submitted on 22 December 1994 by R Van de Noort

Material: peat (humic acid)

Initial comment: from the bottom 5cm of a peat layer, which was sealed by alluvial sediments. The peat layer was identified during transect coring, and was traced over larger parts of the drain at this transect, TA 26222847. The sample was recovered from a depth of 2.10m to 2.17m below the surface (-1.19m to -1.26m OD).

Objectives: as GU-5471

Calibrated date: *1σ:* 9220–8780 cal BC
2σ: 9260–8650 cal BC

Final comment: R Van de Noort and S Ellis (1995), GU-5473 and GU-5474 dates the base of the peat deposit. This is associated with a very early Holocene pollen spectrum indicating an open grass and sedge landscape, lacking trees other than *Betula* and *Corylus*.

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on the humic acid and humin fractions of this sample (GU-5473 and GU-5474) are statistically significantly different (T′=4.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: see GU-5471

References: Ward and Wilson 1978

GU–5474 9880 ±110 BP

$\delta^{13}C$: -23.3‰

Sample: TA 261285 S1, submitted on 22 December 1994 by R Van de Noort

Material: peat (humin)

Initial comment: as GU-5473

Objectives: as GU-5471

Calibrated date: *1σ:* 9450–9250 cal BC
2σ: 9810–9180 cal BC

Final comment: see GU-5473

Laboratory comment: see GU-5472

GU–5475 4240 ±50 BP

δ¹³C: -29.8‰

Sample: TA 278285 S1, submitted on 22 December 1994 by R Van de Noort

Material: peat (humic acid)

Initial comment: from the bottom 5cm of a peat layer, which was sealed by alluvial sediments. The peat layer was identified during transect coring, and was traced over larger parts of the drain at this transect, TA 27772846. The sample was recovered from a depth of 2.90m to 2.94m below the surface (-1.343m to -1.38m OD).

Objectives: as GU-5471

Calibrated date: *1σ:* 2910–2870 cal BC
2σ: 2920–2670 cal BC

Final comment: R Van de Noort and S Ellis (1995), GU-5475 and GU-5476 date the base of the peat at TA278285.07 which indicates that wetland development in this part of the Roos Valley commenced before 3010–2660/2910–2580 cal BC.

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on the humic acid and humin fractions of this sample (GU-5475 and GU-5476) are statistically consistent (T′=1.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (4195 ±35 BP) calibrates to 2890–2620 cal BC at 95% confidence (Reimer *et al* 2004).

Laboratory comment: see GU-5471

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

GU–5476 4150 ±50 BP

δ¹³C: -27.9‰

Sample: TA 278285 S1, submitted on 22 December 1994 by R Van de Noort

Material: peat (humin)

Initial comment: as GU-5475

Objectives: as GU-5471

Calibrated date: *1σ:* 2880–2620 cal BC
2σ: 2890–2570 cal BC

Final comment: see GU-5475

Laboratory comment: see GU-5472

GU–5477 5080 ±60 BP

δ¹³C: -29.2‰

Sample: TA 273284 S1, submitted on 22 December 1994 by R Van de Noort

Material: peat (humic acid)

Initial comment: from the bottom 5cm of a peat layer, which was sealed by alluvial sediments. The peat layer was identified during transect coring, and was traced over larger parts of the drain at this transect, TA 27102844. The sample was recovered from a depth of 4.10m to 4.21m below the surface (-2.61m to -2.72m OD).

Objectives: as GU-5471

Calibrated date: *1σ:* 3970–3790 cal BC
2σ: 3990–3700 cal BC

Final comment: R Van de Noort and S Ellis (1995), GU-5477, GU-5478, GU-5483, and GU-5484 dates the base of the peat at TA 273284.03 which indicates that wetland development in the western part of the Roos valley commenced before 4030–3700/4230–3820 cal BC to 3990–3640/4230–3700 cal BC.

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on the humic acid and humin fractions of this sample (GU-5477 and GU-5478) are statistically consistent (T′=2.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (5141 ±42 BP) calibrates to 4040–3800 cal BC at 95% confidence; Reimer *et al* 2004).

Laboratory comment: see GU-5471

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

GU–5478 5200 ±60 BP

δ¹³C: -29.5‰

Sample: TA 273284 S1, submitted on 22 December 1994 by R Van de Noort

Material: peat (humin)

Initial comment: as GU-5477

Objectives: as GU-5471

Calibrated date: *1σ:* 4050–3960 cal BC
2σ: 4230–3810 cal BC

Final comment: see GU-5477

Laboratory comment: see GU-5472

GU–5479 2250 ±50 BP

δ¹³C: -29.0‰

Sample: TA 309304 S2, submitted on 22 December 1994 by R Van de Noort

Material: peat (humic acid)

Initial comment: from the bottom 5cm of a peat layer, which was sealed by alluvial sediments. The peat layer was identified during transect coring, and was traced over larger parts of the drain at this transect, TA 31003025. The sample was recovered from a depth of 1.45m to 1.55m below the surface (0.34 to 0.24m OD).

Objectives: as GU-5471

Calibrated date: *1σ:* 400–200 cal BC
2σ: 410–190 cal BC

Final comment: R Van de Noort and S Ellis (1995), GU-5479 and GU-5480 dates the onset of peat development to 400–190 cal BC (GU-5479)/ 760–380 cal BC (GU-5480) in borehole TA 30930404.

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on the humic acid and humin fractions of this sample (GU-5479 and GU-5480) are statistically significantly different (T′=5.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: see GU-5471

References: Ward and Wilson 1978

GU–5480 2370 ±50 BP

$\delta^{13}C$: -29.9‰

Sample: TA 309304 S2, submitted on 22 December 1994 by R Van de Noort

Material: peat (humin)

Initial comment: as GU-5479

Objectives: as GU-5471

Calibrated date: *1σ:* 490–390 cal BC
2σ: 740–370 cal BC

Final comment: see GU-5479

Laboratory comment: see GU-5472

GU–5481 2520 ±50 BP

$\delta^{13}C$: -29.0‰

Sample: TA 278285 S3, submitted on 30 January 1995 by R Van de Noort

Material: peat (humic acid)

Initial comment: from the bottom 5cm of a peat layer, which was sealed by alluvial sediments. The peat layer was identified during transect coring, and was traced over larger parts of the drain at this transect, TA 27702846. The sample was recovered from a depth of 2.90m to 2.95m below the surface (-1.34m to -1.38m OD).

Objectives: as GU-5471

Calibrated date: *1σ:* 800–540 cal BC
2σ: 810–430 cal BC

Final comment: R Van de Noort and S Ellis (1995), this date appears anomalous with those obtained from this and other sites in the valley.

Laboratory comment: see GU-5471

GU–5483 5010 ±70 BP

$\delta^{13}C$: -28.6‰

Sample: TA 273284 S3, submitted on 30 January 1995 by R Van de Noort

Material: peat (humic acid)

Initial comment: from the bottom 5cm of a peat layer, which was sealed by alluvial sediments. The peat layer was identified during transect coring, and was traced over larger parts of the drain at this transect, TA 27202844. The sample was recovered from a depth of 3.95m to 4.00m below the surface (-2.46m to -2.51m OD).

Objectives: as GU-5471

Calibrated date: *1σ:* 3950–3700 cal BC
2σ: 3970–3640 cal BC

Final comment: see GU-5477

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on the humic acid and humin fractions of this sample (GU-5483 and GU-5484) are statistically consistent (T′=1.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (5060 ±55 BP) calibrates to 3980–3700 cal BC at 95% confidence (Reimer *et al* 2004).

Laboratory comment: see GU-5471

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

GU–5484 5140 ±90 BP

$\delta^{13}C$: -29.6‰

Sample: TA 273284 S3, submitted on 30 January 1995 by R Van de Noort

Material: peat (humin)

Initial comment: as GU-5483

Objectives: as GU-5471

Calibrated date: *1σ:* 4040–3800 cal BC
2σ: 4230–3700 cal BC

Final comment: see GU-5477

Laboratory comment: see GU-5472

GU–5485 2580 ±50 BP

$\delta^{13}C$: -28.8‰

Sample: TA 321310 S1, submitted on 30 January 1995 by R Van de Noort

Material: peat (humic acid)

Initial comment: from the bottom 5cm of a peat layer, which was sealed by alluvial sediments. The peat layer was identified on the foreshore, where the Keyingham Drain is being eroded by the sea, TA 32103100. The peat was visible over a large area. Subsequent coring established that this peat was located on top of alluvium and that there were no other peat layers in the stratigraphy. The sample was recovered from a depth of 0.20m to 0.25m below the surface (-0.97m to -0.92m OD).

Objectives: as GU-5471

Calibrated date: *1σ:* 810–760 cal BC
2σ: 830–540 cal BC

Final comment: R Van de Noort and S Ellis (1995), at some point after GU-5475, the date from the base of the peat at Halsham Carrs, rising sea-level in the Humber until shortly before 810–410 cal BC (GU-5487)/ 800–400 cal BC (GU-5488) to 830–540 cal BC (GU-5485)/ 920–790 cal BC (GU-5486) when a decrease in tidal influence led to the accumulation of freshwater deposits.

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on the humic acid and humin fractions of this sample (GU-5485 and GU-5486) are statistically consistent (T′=1.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weightred mean (2625 ±35 BP) calibrates to 840–780 cal BC at 95% confidence (Reimer *et al* 2004).

Laboratory comment: see GU-5471

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

GU–5486 2670 ±50 BP

δ¹³C: -28.9‰

Sample: TA 321310 S1, submitted on 30 January 1995 by R Van de Noort

Material: peat (humin)

Initial comment: as GU-5485

Objectives: as GU-5471

Calibrated date: *1σ:* 850–800 cal BC
2σ: 920–790 cal BC

Final comment: see GU-5485

Laboratory comment: see GU-5472

GU–5487 2510 ±60 BP

δ¹³C: -28.4‰

Sample: TA 321310 S2, submitted on 30 January 1995 by R Van de Noort

Material: peat (humic acid)

Initial comment: from the bottom 5cm of a peat layer, which was sealed by alluvial sediments. The peat layer was identified on the foreshore, where the Keyingham Drain is being eroded by the sea, TA 32103110. The peat was visible over a large area. Subsequent coring established that this peat was located on top of alluvium and that there were no other peat layers in the stratigraphy. The sample was recovered from a depth of 0.20m to 0.25m below the surface (-0.97m to -0.92m OD).

Objectives: as GU-5471

Calibrated date: *1σ:* 800–530 cal BC
2σ: 810–400 cal BC

Final comment: see GU-5485

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on the humic acid and humin fractions of this sample (GU-5487 and GU-5488) are statistically consistent (T′=0.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean (22475 ±58 BP) calibrates to 790-400 cal BC at 95% confidence (Reimer *et al* 2004).

Laboratory comment: see GU-5471

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

GU–5488 2450 ±50 BP

δ¹³C: -28.8‰

Sample: TA 321310 S2, submitted on 30 January 1995 by R Van de Noort

Material: peat (humin)

Initial comment: as GU-5487

Objectives: as GU-5471

Calibrated date: *1σ:* 760–410 cal BC
2σ: 790–400 cal BC

Final comment: see GU-5485

Laboratory comment: see GU-5472

GU–5489 2420 ±50 BP

δ¹³C: -28.9‰

Sample: TA 309304 S3, submitted on 30 January 1995 by R Van de Noort

Material: peat (humic acid)

Initial comment: from the bottom 5cm of a peat layer, which was sealed by alluvial sediments. The peat layer was identified during transect coring, and was traced over larger parts of the drain at this transect TA 31003020. The sample was recovered from a depth of 1.00m to 1.10m below the surface (0.79 to 0.69m OD).

Objectives: as GU-5471

Calibrated date: *1σ:* 740–400 cal BC
2σ: 770–390 cal BC

Final comment: R Van de Noort and S Ellis (1995), the onset of peat development has been dated to 780–390cal BC (GU-5489)/840–560 cal BC (GU-5490) from the borehole TA309304.05.

Laboratory comment: Ancient Monuments Laboratory (2000), the replicate measurements on the humic acid and humin fractions of this sample (GU-5489 and GU-5490) are statistically significantly different (T′=5.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: see GU-5471

References: Ward and Wilson 1978

GU–5490 2590 ±50 BP

δ¹³C: -30.0‰

Sample: TA 309304 S3, submitted on 30 January 1995 by R Van de Noort

Material: peat (humin)

Initial comment: as GU-5489

Objectives: as GU-5471

Calibrated date: *1σ:* 810–770 cal BC
2σ: 830–550 cal BC

Final comment: see GU-5489

Laboratory comment: see GU-5472

Humber Wetlands Project: Skipsea, Round Hill, Humberside

Location: TA 16015593
Lat. 53.59.10 N; Long. 00.13.50 W

Project manager: R Van de Noort (University of Hull), September 1994

Archival body: Hull and East Riding Museum

Description: one of the excavated test pits of 1994 was situated as closely as possible to the 1885 site. An unsharpened alder stake was found in the centre of the small test pit. The stake was evidently not in its natural position, although no marks of human activity were found on it, it was concluded that it was similar to those found by Boynton.

Objectives: flint material recovered by the Humber Wetlands Project was restricted in date to the Mesolithic period. The recovered 'stake' may be related to this Mesolithic scatter, and if this is indeed the case, the lower parts of the site may exist in waterlogged, peat overgrown conditions. This would make the site one of national importance.

Final comment: R Van de Noort (30 November 2004), the date for the *Salix* sp. stake is very early. The early Mesolithic date suggests a structure or platform on the bank of the Bail-Low mere complex, which was reused at later dates.

References: Smith 1911
Van de Noort and Ellis 1995a

GU–5451 9080 ±100 BP

$\delta^{13}C$: -27.4‰

Sample: TA160560.S1, submitted on 9 November 1994 by R Van de Noort

Material: wood (waterlogged): *Salix* sp. (D Taylor 1994)

Initial comment: from a piece of worked wood recovered from assessment pit 2 at a depth of 89–134cm. A piece of coppiced, worked wood and a large wood chip (15cm × 7cm) were recovered from the upper part of the peat at about 75cm. A piece of unworked wood penetrated the lower part of the peat and upper part of the sandy gravels. The wood, about 19cm in length, and 7cm in circumference, was poorly preserved. It would appear that the timber had been driven through the lower part of the peat, until the rounded and shattered end came to rest on the dense pebbly gravels at 1.43m. The wood could not be traced in the overlying peats suggesting that the original 'stake' was driven through the peat deposits when only about 10cm had accumulated, the upper part of the wood, being exposed to aerobic conditions, subsequently decayed or was broken off. In his discussion on the Roundhill site, Smith (1911) refers to the presence of wooden stakes, likewise unworked, driven into the sands and gravels. Such timbers could have provided a stable footing for a structure.

Objectives: the dating of the stake is the only way to establish the importance of the site.

Calibrated date: *1σ:* 8340–8230 cal BC
2σ: 8560–7980 cal BC

Final comment: R Van de Noort and S Ellis (1995), considering the temporal and locational analogies with the early Mesolithic Star Carr site in the Vale of Pickering, and re-interpreting the results from Boynton's work in 1885, the site may have been a platform for hunting and fishing purposes, possibly as part of a larger settlement.

References: Smith 1911
Van de Noort and Ellis 1995a

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; ν=1; Ward and Wilson 1978).

Laboratory comment: English Heritage (2013), four further dates from this site were funded after 1998 (GU-5267–70).

References: Van de Noort and Ellis 1999a
Ward and Wilson 1978

GU–5708 3140 ±50 BP

$\delta^{13}C$: -28.1‰

Sample: SE975247.T1 CN, submitted on 8 October 1997 by R Van de Noort

Material: wood (waterlogged): *Corylus* sp. (M Taylor 1997)

Initial comment: from context [006], trench 1. The sample was related to the first of two structures, excavated from an intertidal estuarine mud deposit. The sample was taken from an upright peg hammered into the clay, associated with a woven hurdle. The site and samples were excavated from a single recognisable clay deposit and were waterlogged. *See* also GU-5709–11 for further measurements from this structure.

Objectives: apart from axe facets on the wood, it is not possible to date the trackway by any other means.

Calibrated date: *1σ:* 1490–1320 cal BC
2σ: 1510–1280 cal BC

Final comment: W Fletcher (1999), the dates place this trackway firmly in the Bronze Age. These dates corroborate the axemark analysis, which appears to represent bronze technology (Fletcher *et al* in Van de Noort and Ellis 1999, 205-41).

References: Van de Noort and Ellis 1999a, 205–41

GU–5709 3070 ±50 BP

$\delta^{13}C$: -27.3‰

Sample: SE975247.T1 CP, submitted on 8 October 1997 by R Van de Noort

Material: wood (waterlogged): *Corylus* sp. (M Taylor 1997)

Initial comment: as GU-5708

Objectives: as GU-5708

Calibrated date: *1σ:* 1420–1260 cal BC
2σ: 1440–1200 cal BC

Final comment: see GU-5708

GU–5710 3030 ±50 BP

$\delta^{13}C$: -27.4‰

Sample: SE975247.T2 DE, submitted on 8 October 1997 by R Van de Noort

Material: wood (waterlogged): *Corylus* sp. (M Taylor 1997)

Initial comment: from a rod forming part of the woven hurdle. As GU-5708.

Objectives: as GU-5708

Calibrated date: *1σ:* 1390–1210 cal BC
2σ: 1420–1120 cal BC

Final comment: W Fletcher *et al* (1999), the dates (GU-5710 and GU-5711) are statistically significantly different, but place this trackway firmly in the Bronze Age. These dates corroborate the axemark analysis, which appears to represent bronze technology.

GU–5711 2810 ±50 BP

$\delta^{13}C$: -27.8‰

Sample: SE975247.T2 EH, submitted on 8 October 1997 by R Van de Noort

Material: wood (waterlogged): *Corylus* sp. (M Taylor 1997)

Initial comment: as GU-5708

Objectives: as GU-5708

Calibrated date: *1σ:* 1020–900 cal BC
2σ: 1120–830 cal BC

Final comment: see GU-5710

Ingleby Barwick: Windmill Fields, Co. 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), a further five dates from this site were subsequently funded after 1997 (OxA-8650–2 and OxA-8728–9).

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
Ward and Wilson 1978

UB–4173 3364 ±22 BP

$\delta^{13}C$: -21.4 ±0.2‰

Sample: IWF 96/5, submitted on 22 July 1997 by R Annis

Material: human bone (left femur) (S Anderson 1997)

Initial comment: femur of articulated crouched burial, part of a group of graves in gravelly clay soil. Found within 0.75m of former ground surface, in which ridge and furrow was seen.

Objectives: a high status burial from a site with both cist-burial of excarnated remains and individual furnished graves, in an area previously thought unoccupied in the early Bronze Age. Absolute dates for the equipped burials and relative dating of these and the cist burials are needed for proper interpretation of the site.

Calibrated date: *1σ:* 1690–1625 cal BC
2σ: 1740–1610 cal BC

Final comment: R Annis (29 October 1999), the date confirms the assumption made on the basis of the grave goods and associations with other burials, that this is an early Bronze Age site. The date is part of a series, which will, it is hoped, provide evidence of use of this area as a burial ground over the late Neolithic and early Bronze Age transition.

Laboratory comment: Belfast (5 January 1998): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Wilson *et al* 1996

UB–4174 3609 ±24 BP

$\delta^{13}C$: -22.0 ±0.2‰

Sample: IWF 96/6, submitted on 22 July 1997 by R Annis

Material: human bone (left femur and fragments of right femur) (S Anderson 1997)

Initial comment: as UB-4173, a disarticulated secondary burial was found near this skeleton.

Objectives: as UB-4173

Calibrated date: *1σ:* 2020–1935 cal BC
2σ: 2035–1890 cal BC

Final comment: R Annis (29 October 1999), the date confirms the assumption made on the basis of the grave goods, that this is an early Bronze Age burial site. The high status woman dated by this sample is interestingly slightly younger, by the calibrated date, than a nearby high-status male burial (UB-4173). This date is part of a series intended to examine the period of use of this unusual group. The date of this well-equipped burial is not from one obtained form the Migdele hoard with which the grave goods from this site have some close affinities.

Ipswich: Buttermarket/St Stephen's Lane, Suffolk

Location: TM 162445
Lat. 52.03.22 N; Long. 01.09.14 E

Project manager: T Loader (Suffolk County Council), 1988

Archival body: Suffolk County Council

Description: the Buttermarket cemetery was excavated in 1987–8. Seventy-seven early medieval graves were excavated within an area of 4600m^2. This is not, however, a complete sample. There had been considerable disturbance by later activity and it is likely that at least as many graves had been destroyed as survived. This was an inhumation cemetery with no cremation burials recovered. The cemetery lay immediately north of the seventh- and eighth-century trading settlement, or *emporium*, which it served.

Objectives: it is hoped that the radiocarbon programme will: 1. test the hypothesis that the cemetery developed to the west from an initial area in use in the first half of the seventh century; 2. establish whether otherwise undatable burials belong to the seventh or eighth centuries; 3. following from 2, establish whether the cemetery was in use throughout the seventh and eighth centuries or whether it was primarily a seventh-century cemetery, which saw sporadic use in the eighth century; 4. refine the artefactual dating of key graves; 5. establish with greater precision the date at which the cemetery came into use.

Final comment: C Scull (30 January 2007), the combination of high-precision radiocarbon dating and conventional material-culture dating provides a robust chronological model for burial at Buttermarket which is based on a sample of 27 graves (38% of those excavated). It suggests that burial on the site started in *cal AD 595–640 (95% probability; start_cemetery*; Bayliss *et al* 2009b, fig 3.102) or *cal AD 610–635 (68% probability*). Burial on the site ended in *cal AD 660–690 (95% probability; end_cemetery*; Bayliss *et al* 2009b, fig 3.102), or *cal AD 665–680 (68% probability*). The cemetery was in use for *25–90 years (95% probability*; Bayliss *et al* 2009b, fig 3.103), or for *35–70 years (68% probability*).There was no simple sequence of spatial development with new areas coming into use as old ones were abandoned, but there is some evidence that the eastern area may have seen more burials in the earlier decades of the cemetery's use, with similarly intensive use of areas to the west and south in the decades after AD 640.

Laboratory comment: Rafter Radiocarbon Laboratory (12 October 2012), sub-samples of bone from each dated skeleton were processed to gelatin at Rafter Radiocarbon Laboratory, and carbon and nitrogen percentage abundance and stable isotopic ratios were measured. Additionally, amino-acid groups were analytically determined in hydrolysates from gelatin sub-samples at the University of Otago. This work is reported in Beavan-Athfield (2000).

References: Archibald 2009
Bayliss *et al* 2009b
Beavan-Athfield 2000
Scull and Bayliss 1999a
Scull and Bayliss 1999b
Scull 2009

OxA–6792 1200 ±40 BP

$\delta^{13}C$: -19.5 ±0.2‰
$\delta^{13}C$ (diet): -20.1 ±0.1‰
$\delta^{15}N$ (diet): +10.7 ±0.3‰
C/N ratio: 2.8

Sample: IAS 3104 4153, submitted in September 1996 by C Scull

Material: human bone (scapula) (S Mays 1996)

Initial comment: bone from grave 4152 - remnant of articulated skeleton comprising skull, part of the right humerus, pelvis, and leg bones.

Objectives: to refine the artefactual dating and confirm the result of UB-4044 which appears to conflict with the coin contained in the grave.

Calibrated date: *1σ:* cal AD 760–890
2σ: cal AD 680–960

Final comment: C Scull (30 January 2007), the five radiocarbon measurements on this skeleton (OxA-6792-3, OxA-7859–60, and UB-4044) are not statistically consistent (T′=25.2; T′(5%)=9.5; ν=4; Ward and Wilson 1978). This result is a clear outlier and appears to be anomalously young.

References: Ward and Wilson 1978

OxA–6793 1355 ±45 BP

$\delta^{13}C$: -19.7 ±0.2‰

Sample: IAS 3104 4153, submitted in September 1996 by C Scull

Material: human bone (clavicle) (S Mays 1996)

Initial comment: bone from grave 4152 - remnant of articulated skeleton comprising skull, part of the right humerus, pelvis, and leg bones.

Objectives: as OxA-6792

Calibrated date: *1σ:* cal AD 640–680
2σ: cal AD 610–770

Final comment: C Scull (30 January 2007), excluding one clear outlier, OxA-6792, the four remaining radiocarbon results from this burial (OxA-6793, OxA-7859–60, and UB-4044) are statistically consistent (T′=3.0; T′(5%)=7.8; ν=3; Ward and Wilson 1978). The coin of Offa, closely dated to *c* AD 792–6, which was recovered from the grave fill, appears to be intrusive.

References: Ward and Wilson 1978

OxA–7859 1365 ±40 BP

$\delta^{13}C$: -19.5‰
$\delta^{13}C$ (diet): -20.1 ±0.1‰
$\delta^{15}N$ (diet): +10.7 ±0.3‰
C/N ratio: 2.8

Sample: IAS 3104 4153, submitted in September 1996 by C Scull

Material: human bone (right clavicle and scapula) (S Mays 1996)

Initial comment: bone from grave 4152; remnant of articulated skeleton comprising skull, part of the right humerus, pelvis, and leg bones.

Objectives: as OxA-6792

Calibrated date: *1σ:* cal AD 640–680
2σ: cal AD 610–770

Final comment: see OxA-6793

OxA–7860 1415 ±40 BP

$\delta^{13}C$: -19.6‰
$\delta^{13}C$ (diet): -20.1 ±0.1‰
$\delta^{15}N$ (diet): +10.7 ±0.3‰
C/N ratio: 2.8

Sample: IAS 3104 4153, submitted in September 1996 by C Scull

Material: human bone (S Mays 1996)

Initial comment: bone from grave 4153; remnant of articulated skeleton comprising skull, part of the right humerus, pelvis, and leg bones.

Objectives: as OxA-6792

Calibrated date: *1σ:* cal AD 600–660
2σ: cal AD 560–670

Final comment: see OxA-6793

UB–4039 1441 ±20 BP

$\delta^{13}C$: -20.9 ±0.2‰
$\delta^{13}C$ (diet): -20.2‰
$\delta^{15}N$ (diet): +11.6‰
C/N ratio: 2.9

Sample: IAS 3104 3872; sample 24180/4, submitted on 22 February 1996 by C Scull

Material: human bone (skull, lower legs, left and right humeri, left and right femora, mandible, and right pelvis) (M Cox 1996)

Initial comment: bone from grave 3871; articulated skeletal remains.

Objectives: to test the hypothesis that this is one of the very earliest graves in the cemetery (late-sixth/early-seventh century AD). To test the hypothesis that this is an early area of the cemetery. To refine artefactual dating.

Calibrated date: *1σ:* cal AD 600–645
2σ: cal AD 575–655

Final comment: C Scull (30 January 2007), the posterior density estimate for this burial (*UB-4039*, Bayliss *et al* 2009b, fig 3.102) is compatible with recent dating for artefact chronologies for Merovingian-period burials in the Rhineland, which would assign this grave assemblage to AD 610/20-640/50.

References: Bayliss *et al* 2009b

UB–4040 1396 ±20 BP

$\delta^{13}C$: -20.1 ±0.2‰

Sample: IAS 3104 3900, 4041, submitted on 22 February 1996 by C Scull

Material: human bone (legs, cranium, and mandible) (M Cox 1996)

Initial comment: bone from grave 3897; skeletal remains of a crouched burial. The bones were somewhat disturbed.

Objectives: to test whether this is an early (seventh-century AD) area of the cemetery. To establish whether otherwise undatable burials are seventh or eighth century.

Calibrated date: *1σ:* cal AD 640–660
2σ: cal AD 615–665

Final comment: C Scull (30 January 2007), although cut by grave 3898 (UB-4075) and pit 1976 (period 6), this unfurnished burial still falls within the mid-seventh century cal AD (Bayliss *et al* 2009b, fig 3.102). The radioarbon date is compatible with the stratigraphy.

References: Bayliss *et al* 2009b

UB–4041 1301 ±20 BP

δ¹³C: -20.3 ±0.2‰

Sample: IAS 3104 0265, submitted in February 1996 by C Scull

Material: human bone (left humerus, left and right femur, left and right tibia, right radius, right ulna, and left patella) (M Cox 1996)

Initial comment: bone from grave 0249; the skull was missing, the west end was cut away.

Objectives: to establish a date for the eastern most group of burials; to test the hypothesis that this is a late eighth-century area of the cemetery; to establish whether otherwise undatable graves belong to seventh or eighth century.

Calibrated date: *1σ:* cal AD 665–765
2σ: cal AD 660–770

Final comment: C Scull (30 January 2007), this unfurnished burial, from the easternmost group of burials, falls comfortably within the mid seventh-century currency of the cemetery (Bayliss *et al* 2009b, fig 3.102).

References: Bayliss *et al* 2009b

UB–4042 1407 ±20 BP

δ¹³C: -21.3 ±0.2‰

Sample: IAS 3104 1214, by C Scull

Material: human bone (left and right legs, left and right arms, and pelvis) (M Cox 1996)

Initial comment: bone from grave 1674; the skeleton was lying face downwards on the natural substrate. The body was partially obscured by a layer of natural-like (possibly windblown) sand.

Objectives: to test the hypothesis that this is a late area of the cemetery (ie eighth-century), and to establish whether otherwise undatable burials are seventh or eighth century.

Calibrated date: *1σ:* cal AD 635–655
2σ: cal AD 605–660

Final comment: C Scull (30 January 2007), the posterior density estimate for this burial (UB-4042; Bayliss *et al* 2009b, fig 3.102) is consistent with the date range for this burial suggested by the bead-types which it contained. It is clearly seventh-century in date.

References: Bayliss *et al* 2009b

UB–4043 1320 ±22 BP

δ¹³C: -20.9 ±0.2‰

Sample: IAS 3104 2493, submitted in February 1996 by C Scull

Material: human bone (left and right legs, left and right arms, and right pelvis) (M Cox 1996)

Initial comment: bone from grave 2365; the remains of a crouched burial. The head, legs, and some of the long bones in the arm survived intact.

Objectives: to test the hypothesis that this is an early (seventh- or first half of the eighth-century) area of the cemetery.

Calibrated date: *1σ:* cal AD 660–690
2σ: cal AD 655–765

Final comment: C Scull (30 January 2007), this burial is more precisely dated by the chronological model (*UB-4043*; Bayliss *et al* 2009b, fig 3.102) than by the typology of the associated artefacts. It is clearly seventh-century in date.

UB–4044 1413 ±21 BP

δ¹³C: -20.9 ±0.2‰

Sample: IAS 3104 4153, submitted in February 1996 by C Scull

Material: human bone (left and right legs, skull, pelvis, and mandible) (M Cox 1996)

Initial comment: bone from grave 4152 - remnant of an articulated skeleton. This burial was coin-dated to post-AD 792.

Objectives: to test whether this is a later (eighth-century) area of the cemetery.

Calibrated date: *1σ:* cal AD 630–655
2σ: cal AD 600–660

Final comment: see OxA-6793

Laboratory comment: see OxA-6792

UB–4045 1398 ±210 BP

δ¹³C: -19.5 ±0.2‰

Sample: IAS 3104 4308, submitted in February 1996 by C Scull

Material: human bone (left and right legs) (M Cox 1996)

Initial comment: bone from grave 4307 - a skeleton lying in a semi-crouched position, face downwards in the grave with the left hand below the skull and legs drawn up towards the body, leaving a void area at the eastern end of the grave.

Objectives: to test whether this is a later (eighth-century) area of the cemetery. To determine whether otherwise undatable burials are seventh or eighth century in date.

Calibrated date: *1σ:* cal AD 420–880
2σ: cal AD 170–1030

Final comment: C Scull (30 January 2009), this unfurnished grave falls comfortably with the currency of the cemetery suggested by the radiocarbon dating and analysis of associated artefacts. It is clearly seventh century in date.

UB–4046 1404 ±21 BP

$\delta^{13}C$: -20.2 ±0.2‰

Sample: IAS 3104 4345, submitted in February 1996 by C Scull

Material: human bone (arms and legs) (M Cox 1996)

Initial comment: bone from grave 4344 - an articulated skeleton lying in a supine position within the grave.

Objectives: to test whether this is a later (eighth-century) area of the cemetery. To determine whether the grave is seventh or eighth century in date. To refine artefactual dating.

Calibrated date: *1σ:* cal AD 635–655
2σ: cal AD 605–665

Final comment: C Scull (30 January 2009), the posterior density estimate for the date of this grave (*UB-4046*; Bayliss *et al* 2009b, fig 3.102) is compatible with the dating of the associated artefact assemblage. It is clearly seventh-century in date.

References: Bayliss *et al* 2009b

UB–4047 1349 ±20 BP

$\delta^{13}C$: -19.7 ±0.2‰

Sample: IAS 3104 4453, submitted in February 1996 by C Scull

Material: human bone (left and right femur, and left tibia) (M Cox 1996)

Initial comment: bone from grave 4431 - an articulated skeleton lying in a supine position within the grave. This has a stratigraphic relationship with the ring-ditch around grave 4149.

Objectives: to test whether this is a later (later seventh-century) area of the cemetery. To determine whether the grave is seventh or eighth century in date.

Calibrated date: *1σ:* cal AD 655–670
2σ: cal AD 645–685

Final comment: C Scull (30 January 2009), this unfurnished burial in the southern area of the site clearly dates to the second half of the seventh century AD (Bayliss *et al* 2009b, fig 3.102).

References: Bayliss *et al* 2009b

UB–4048 1377 ±20 BP

$\delta^{13}C$: -20.1 ±0.2‰

Sample: IAS 3104 4927, submitted in February 1996 by C Scull

Material: human bone (left and right legs) (M Cox 1996)

Initial comment: bone from grave 4926 - a skeleton lying in a supine position respecting the putative barrow over grave 1306.

Objectives: as UB-4047

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

Final comment: see UB-4047

UB–4049 1337 ±20 BP

$\delta^{13}C$: -20.5 ±0.2‰
$\delta^{13}C$ (diet): -20.5‰
$\delta^{15}N$ (diet): +11.0‰
C/N ratio: 2.8

Sample: IAS 3104 4980, submitted in February 1996 by C Scull

Material: human bone (left and right legs, pelvis) (M Cox 1996)

Initial comment: bone from grave 4979 - an articulated skeleton with the head towards the south. Lying in a supine position with the head facing the west and the legs flexed.

Objectives: as UB-4047

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

Final comment: see UB-4047

References: Beavan-Athfield 2000
Stafford *et al* 1988

UB–4070 1463 ±19 BP

$\delta^{13}C$: -20.3 ±0.2‰

Sample: IAS 3104 4547, submitted in February 1996 by C Scull

Material: human bone (S Mays 1996)

Initial comment: bone from grave 4547; a north/south orientated, articulated inhumation below the silting of the ring-ditch.

Objectives: to establish an absolute date for the burial and assist in determining the sequence of cemetery development.

Calibrated date: *1σ:* cal AD 580–625
2σ: cal AD 560–645

Final comment: C Scull (30 January 2009), this burial in the southern area of the site, apparently cut by ditch 4334, dates to the first half of the seventh century AD (Bayliss *et al* 2009b, fig 3.102).

References: Bayliss *et al* 2009b

UB–4074 1419 ±23 BP

$\delta^{13}C$: -20.6 ±0.2‰

Sample: IAS 3104 2307, submitted in February 1996 by C Scull

Material: human bone (skull, leg bone, and humerus) (S Mays 1996)

Initial comment: from grave 2297; an articulated human bone from an inhumation burial.

Objectives: as UB-4070

Calibrated date: *1σ:* cal AD 610–655
2σ: cal AD 595–660

Final comment: C Scull (30 January 2007), the posterior density estimate for this burial (*UB-4074*; Bayliss *et al* 2009b, fig 3.102) is compatible with recent dating for artefact chronologies for Merovingian-period burials in the Rhineland which would assign this grave assemblage to AD 610/20–640/50. It is also compatible with the dating for the associated belt suite (Scull 2009, 248).

Laboratory comment: Belfast (2 January 1997): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Bayliss *et al* 2009b
Scull 2009
Wilson *et al* 1996

UB–4075 1436 ±23 BP

$\delta^{13}C$: -20.0 ±0.2‰

Sample: IAS 3104 3901, 4042, submitted in February 1996 by C Scull

Material: human bone (leg bone, right arm, right femur, right clavicle, and scapula fragment) (S Mays 1996)

Initial comment: bone from grave 3898, which cuts grave 3897 and is cut by pit 2518 (period 6).

Objectives: to establish an absolute date of the burial and assist in determining the sequence of cemetery development.

Calibrated date: *1σ:* cal AD 600–650
2σ: cal AD 575–655

Final comment: C Scull (30 January 2009), this unfurnished burial clearly dates to the mid-seventh century AD (Bayliss *et al* 2009b, fig 3.102). This date is in good agreement with the recorded stratigraphy.

Laboratory comment: Belfast (2 January 1997): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Bayliss *et al* 2009b
Wilson *et al* 1996

UB–4076 1356 ±23 BP

$\delta^{13}C$: -20.4 ±0.2‰
$\delta^{13}C$ (diet): -20.1‰
$\delta^{15}N$ (diet): +11.7‰
C/N ratio: 2.9

Sample: IAS 3104 4270, submitted in February 1996 by C Scull

Material: human bone (left and right femur) (S Mays 1996)

Initial comment: bone from grave 4269; articulated skeletal remains from an inhumation burial preserved as residual pieces of bone and staining.

Objectives: as UB-4075

Calibrated date: *1σ:* cal AD 650–670
2σ: cal AD 645–685

Final comment: C Scull (30 January 2009), this burial, from the western area of the site, probably dates to the mid seventh century AD (Bayliss *et al* 2009b, fig 3.102). It contained a range of iron objects, including a stylus (Scull 2009, fig 3.56).

Laboratory comment: Belfast (7 February 1997): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Bayliss *et al* 2009b
Scull 2009
Wilson *et al* 1996

UB–4077 1476 ±24 BP

$\delta^{13}C$: -21.0 ±0.2‰

Sample: IAS 3104 4341, submitted in February 1996 by C Scull

Material: human bone (human bone: skull, long-bone fragment) (S Mays 1996)

Initial comment: from grave 4275; an articulated human bone from an inhumation burial.

Objectives: as UB-4075

Calibrated date: *1σ:* cal AD 565–615
2σ: cal AD 540–645

Final comment: C Scull (30 January 2009), this radiocarbon date is hard to reconcile with the currently accepted numismatic chronology for the two tremisses mounted as pendants recovered from this grave (Archibald 2009, 267–9).

Laboratory comment: Belfast (7 February 1997): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Archibald 2009
Wilson *et al* 1996

UB–4208 1452 ±20 BP

$\delta^{13}C$: -20.5 ±0.2‰
$\delta^{13}C$ (diet): -20.3‰
$\delta^{15}N$ (diet): +10.8‰
C/N ratio: 2.9

Sample: IAS 3104 2955, submitted in February 1996 by C Scull

Material: human bone (right tibia and femur) (S Mays 1996)

Initial comment: bone from grave 2946.

Objectives: to refine the stratigraphic dating.

Calibrated date: *1σ:* cal AD 595–640
2σ: cal AD 565–650

Final comment: C Scull (30 January 2009), this grave was sealed by structure 5122 (period 3) and dates to the first half of the seventh century AD (Bayliss *et al* 2009b, fig 3.102).

References: Bayliss *et al* 2009b

UB–4209 1384 ±21 BP

$\delta^{13}C$: -20.1 ±0.2‰
$\delta^{13}C$ (diet): -20.2‰
$\delta^{15}N$ (diet): +10.3‰
C/N ratio: 2.9

Sample: IAS 3104 3089, submitted in February 1996 by C Scull

Material: human bone (left and right tibia, fibula, and right foot bones) (S Mays 1996)

Initial comment: bone from grave 3087.

Objectives: as UB-4208

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

Final comment: C Scull (30 January 2009), this mid seventh-century grave (Bayliss *et al* 2009b, fig 3.102) was sealed below layer 2750 (?period 3) and cut by pit 2557 (period 6).

References: Bayliss *et al* 2009b

UB–4210 1360 ±22 BP

$\delta^{13}C$: -19.9 ±0.2‰
$\delta^{13}C$ (diet): -19.9‰
$\delta^{15}N$ (diet): +11.5‰
C/N ratio: 2.8

Sample: IAS 3104 1765, submitted in February 1996 by C Scull

Material: human bone (left and right tibia and femora) (S Mays 1996)

Initial comment: bone from grave 1760.

Objectives: as UB-4208

Calibrated date: *1σ:* cal AD 650–670
2σ: cal AD 645–680

Final comment: C Scull (30 January 2009), this mid seventh-century grave (Bayliss *et al* 2009b, fig 3.102) was cut by pits 1526 (period 3) and 1727 (period 4).

References: Bayliss *et al* 2009b

Isles of Scilly Project

Location: SV 9214 (centred on)
Lat. 49.56.48 N; Long. 06.17.41 W

Project manager: J Ratcliffe and V Straker (Cornwall Archaeology Unit and Bristol University), 1989–93

Description: between 1985 and 1993, a small-scale recording and sampling programme was undertaken to assess the palaeoenvironmental potential of early coastal sites around the Isles of Scilly.

Objectives: for intertidal peat deposits, the aim was to test their potential for enhancing understanding of the vegetational history of Scilly and past sea-level change; for cliff-face sites, the aim was to assess their potential for understanding the diet and economy of early Scillonians.

Final comment: J Ratcliffe and V Straker (11 April 2000), the radiocarbon dates have provided a chronological framework for the palaeoenvironmental evidence.

References: Ratcliffe and Straker 1996

Isles of Scilly Project: Bonfire Carn

Location: SV 88101412
Lat. 49.56.41 N; Long. 06.20.52 W

Project manager: V Straker (University of Bristol), 1993

Archival body: University of Bristol

Description: located in the cliff face below Bonfire Carn, on the east side of Samson Hill on the island of Bryher, this site was first recorded by A Gray in the 1930s. It was rediscovered in 1990 and recorded and sampled in 1992–3. The remains could represent the interior and walls of a late Bronze Age building, but cliff erosion has made precise interpretation difficult.

Objectives: between 1989 and 1993 English Heritage funded a small-scale sampling and recording programme to assess the palaeoenvironmental potential and establish a chronology for eroding cliff-face sites on the Isles of Scilly. The exposure below Bonfire Carn was recorded and sampled as part of this project.

References: Bronk Ramsey *et al* 2000a, 468
Gray and Ashbee 1972
Ratcliffe and Straker 1996

OxA–5289 2785 ±60 BP

$\delta^{13}C$: -23.1‰

Sample: Brybon 1, submitted on 23 November 1994 by V Straker

Material: charcoal: *Ulex/Cytisus* sp. (R Gale 1994)

Initial comment: the charcoal was extracted from a soil sample taken from an occupation layer visible in a cleaned cliff section below Bonfire Carn, where what may be the interior of a prehistoric building is visible. Part of it had already eroded away and its extent behind the cliff face is not known. Several bulk samples were processed but only layer 5 provided suitable material for dating.

Objectives: the cliff face site below Bonfire Carn on the east side of Samson Hill is one of several sites that are suffering coastal erosion on Scilly. Recording, dating and limited environmental analysis have been carried out to characterise the settlements and assist in recommendations for management and interpretation. In addition, radiocarbon dating of deposits that have also produced pottery is proving invaluable in refining the pottery chronology for Scilly.

Calibrated date: *1σ:* 1010–840 cal BC
2σ: 1120–810 cal BC

Final comment: V Straker (11 April 2000), the late Bronze Age date for the charcoal from the occupation layer, presumed to be within a building exposed in the cliff face below Bonfire Carn, provides a date for at least this part of a site whose extent is not currently known. The same context produced occasional barley grain and chaff, and seeds of arable, grassland, and heathland plants.

OxA–5290 2755 ±65 BP

δ^{13}C: -25.7‰

Sample: Brybon 2, submitted in November 1994 by V Straker

Material: charcoal: Ericaceae (R Gale 1994)

Initial comment: from the same bulk sample as OxA-5289.

Objectives: as OxA-5289

Calibrated date: *1σ:* 980–820 cal BC
2σ: 1060–800 cal BC

Final comment: see OxA-5289

Isles of Scilly Project: East Porth, Tean

Location: SV 90901645
Lat. 49.58.01 N; Long. 06.18.39 W

Project manager: V Straker (University of Bristol), 1994

Archival body: University of Bristol

Description: on the low cliff on the west side of East Porth, Tean are the remains of a multi-period domestic and ecclesiastical site, including a Romano-British limpet midden.

Objectives: to date the midden and help refine the pottery sequence.

Final comment: J Ratcliffe (1994), two very useful dates. In 1956, an inland part of this midden was dated from pottery evidence to the Romano-British period. The radiocarbon dates confirm deposition started during this period. The seventh- to eighth-century *terminus post quem* relates well to early Christian activity also identified in 1956.

References: Hedges *et al* 1995, 421–2

OxA–4698 1355 ±50 BP

δ^{13}C: -25.3‰

Sample: TEAN1, submitted on 10 February 1994 by V Straker

Material: grain: *Avenena* sp., charred (V Straker 1994)

Initial comment: grain extracted from bulk sample from upper half of the midden.

Objectives: to date midden and help refine pottery sequence.

Calibrated date: *1σ:* cal AD 640–690
2σ: cal AD 600–770

Final comment: J Ratcliffe (1994), as well as providing a *terminus post quem* for the midden, this date lends support to the interpretation in 1956 that features excavated inland were of early Christian date - a stone chapel and cemetery previously datable only by analogy with similar remains elsewhere.

OxA–4699 1605 ±50 BP

δ^{13}C: -22.3‰

Sample: TEAN2, submitted on 10 February 1994 by V Straker

Material: grain: *Hordeum* sp., charred (V Straker 1994)

Initial comment: grain extracted from bulk sample from lower half of the midden (layer 3).

Objectives: to date the midden and help refine the pottery sequence.

Calibrated date: *1σ:* cal AD 390–540
2σ: cal AD 340–570

Final comment: J Ratcliffe (1994), this date indicates that deposition of the midden began sometime during the mid to late Romano-British period. As well as fitting more closely the suspected start date, this radiocarbon result will help refine the Romano-British pottery sequence for Scilly (pottery being the original dating source for the midden).

Isles of Scilly Project: St Agnes, Porth Killier

Location: SV 88100848
Lat. 49.53.39 N; Long. 06.20.36 W

Project manager: V Straker (University of Bristol), 1989

Archival body: Isles of Scilly Museum

Description: part of the Isles of Scilly project which involves coastal monitoring and recording due to erosion, by the Cornwall Archaeology Unit.

Objectives: to refine the pottery and feature chronology with which these samples were associated.

Final comment: J Ratcliffe (1994), these determinations are extremely useful representing as they do the first dates obtained for this settlement, Scilly's most extensive prehistoric cliff-face site, which has been recorded since the 1930s and has yielded substantial quantities of pottery (and other artefacts). A Bronze Age date range was expected and, as well as confirming the date of the structural remains, it can be used to refine Scilly's Prehistoric pottery sequence (still largely floating).

Laboratory comment: English Heritage (2013), two further samples were dated prior to 1993 and were published in Bayliss *et al* (2013, 98–9; OxA-3647–8).

References: Bayliss *et al* 2013, 98–9
Hedges *et al* 1995, 421–2
Ratcliffe and Straker 1996

OxA–4700 2935 ±55 BP

δ^{13}C: -27.2‰

Sample: AGNPK3, submitted on 10 February 1994 by V Straker

Material: charcoal: *Calluna* sp., heather, *c* 16 fragments charred root wood (0.30g) (V Straker 1989)

Initial comment: sample 4 from the context at the base of the Bronze Age settlement sequence. The age of the wood is *c* four years, and comprised small fragments of contorted rootwood extracted from the bulk sample.

Objectives: to date the base of the sequence and refine the pottery chronology, which is insecure for prehistoric Scilly.

Calibrated date: *1σ:* 1230–1040 cal BC
2σ: 1370–970 cal BC

Final comment: J Ratcliffe (1994), this date is later than those for the midden. This was what was hoped for because although the midden lay at roughly the same level in the cliff section, it appeared to represent earlier domestic rubbish re-used as infill for the stone-faced walling of a hut circle. The date extends the occupation of the site well into the late Bronze Age.

Isles of Scilly Project: St Mary's, Halangy Porth

Location: SV 90911251
Lat. 49.55.54 N; Long. 06.18.27 W

Project manager: V Straker (University of Bristol), September 1992

Archival body: Isles of Scilly Museum

Description: a circular building with an estimated diameter of 12m and a rectangular structure which appeared to have been either built as an annex to it or to totally supersede it.

Objectives: the dates from Halangy are required in order to date the features exposed in the eroding cliff section. This is one of the coastal sites that is monitored regularly as part of the implementation of the archaeological management plan for Scilly. Dates have already been obtained from other cliff sections, eg Porth Killier, West Porth, and East Porth, Samson.

Final comment: J Ratcliffe (1994), two very exciting and useful dates. They are later than expected (being Iron Age rather than Bronze Age) and will help with the understand of the development of both this settlement, its assumed successor lying a short distance inland, and with the refining of the prehistoric pottery sequence for Scilly.

References: Hedges *et al* 1995, 421–2
Ratcliffe and Straker 1996

OxA–4696 2250 ±50 BP

$\delta^{13}C$: -25.4‰

Sample: HAL922, submitted on 11 February 1994 by V Straker

Material: charcoal: *Ulex* sp., gorse, 2 fragments; *Prunus* sp., 1 fragment (V Straker 1992)

Initial comment: upper layer of fill of hearth 23, which was cut into the underlying rab and exposed in the cliff section. The fragments are from mature wood rather than small twigs.

Objectives: the dates from Halangy are required in order to date the features exposed in the eroding cliff section.

Calibrated date: *1σ:* 400–200 cal BC
2σ: 410–190 cal BC

Final comment: J Ratcliffe (1994), submitted to obtain a date for occupation of the hut circle but also a *terminus post quem* for the feature - a shore-lined hearth. The date indicated that the latter was in use until the mid-to-late Iron Age. The hut circle may have continued in use after this date, but probably not for long.

OxA–4697 2390 ±50 BP

$\delta^{13}C$: -25.2‰

Sample: HAL921, submitted on 11 February 1994 by V Straker

Material: charcoal (10% subsample): *Calluna* sp., 1 fragment; and 2 fragments of cf. *Rosa* sp.; *Ulmus* sp., 8 fragments (V Straker 1994)

Initial comment: from hearth 23, visible in the cliff section, which is cut into the underlying natural rab. From a bulk sample collected from the cleaned section and charcoal extracted in the laboratory in Department of Geography, Bristol. The sample consists of *c* 100 fragments weighing 0.4g of which 10% were identified. Most were >2mm in size and appear to be small fragments of mature wood.

Objectives: as OxA-4696

Calibrated date: *1σ:* 540–390 cal BC
2σ: 750–380 cal BC

Final comment: J Ratcliffe (1994), submitted to obtain a date for occupation of the hut circle but also the feature sampled (a shore-lined hearth). The early-to-mid Iron Age date obtained does not necessarily represent when occupation began (since the hearth may have been periodically cleaned out by other hearths) but is very useful nevertheless.

Isles of Scilly Project: St Mary's, Porth Cressa

Location: SV 90551034
Lat. 49.54.44 N; Long. 06.18.39 W

Project manager: V Straker (University of Bristol), September 1991

Archival body: University of Bristol

Description: a hut circle and a limpet midden. The overall length of the exposed remains was 7m, with more stones visible in the cliff face to the south, which were also probably part of this or an associated structure.

Objectives: to provide a date for the midden and by inference a *terminus post quem* for the settlement at Porth Cressa. This will allow us to be placed broadly in the sequence of prehistoric coastal settlements on Scilly. Coastal sites are being monitored as part of the implementation of the Isles of Scilly management plan by the Cornwall Archaeological Unit.

References: Ratcliffe and Straker 1996

GU–5413 3250 ±50 BP

δ¹³C: -1.1‰

Sample: PCRESS2, submitted on 16 February 1994 by V Straker

Material: shell (300g) (limpets (*Patella vulgata*)) (V Straker 1991)

Initial comment: midden accumulated inside disused hut, visible in cliff section (layer 3).

Objectives: to provide a date for the midden and by inference a *terminus post quem* for the settlement at Porth Cressa.

Calibrated date: *1σ:* 1220–1010 cal BC
2σ: 1300–910 cal BC

Final comment: J Ratcliffe and V Straker (1995), these two date ranges do not overlap but together suggest that the midden dates to the middle to late Bronze Age.

Laboratory comment: English Heritage (2014): this measurement has been calibrated using the marine calibration data of Reimer *et al* (2013) and a ΔR value of 5 ±40 BP (Stuiver and Braziunas (1993).

References: Stuiver and Braziunas 1993

OxA–4701 3165 ±55 BP

δ¹³C: -24.8‰

Sample: PCRESS1, submitted on 16 February 1994 by V Straker

Material: charcoal: Rosaceae, cf *Rosa/Rubus* (rose/blackberry) (V Straker 1991)

Initial comment: charcoal from a limpet midden, layer 3 in the section. The midden had been dumped in a disused hut.

Objectives: as GU-5413

Calibrated date: *1σ:* 1500–1400 cal BC
2σ: 1600–1290 cal BC

Final comment: J Ratcliffe (1994), a very good date. The sample was submitted to obtain a *terminus post quem* for a hut circle, which was part of an extensive, continually eroding cliff-face site suspected to be of Bronze Age date. The date obtained allows us to place occupation of the hut in the early to mid Bronze Age.

Laboratory comment: ORAU (29 April 1994): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Hedges *et al* 1995, 421–2

Isles of Scilly Project: St Mary's, Porth Mellon

Location: SV 90961085
Lat. 49.55.01 N; Long. 06.18.20 W

Project manager: V Straker (University of Bristol), September 1992

Archival body: University of Bristol

Description: the exposed peat on Porth Mellon Beach was photographed in June 1992. During the low tides of October 1992, its position and extent was surveyed and its vertical position determined. Two exposed shelves of peat were recorded, both located on the north east side of the bay.

Objectives: to confirm whether the two exposures represent two separate phases of peat formation, as well as to compare the results with those obtained from the Higher and Lower Moors inland peat mires on St Mary's sampled during 1979.

References: Ratcliffe and Straker 1996

GU–5392 3810 ±80 BP

δ¹³C: -26.2‰

Sample: PMEL5, submitted in January 1994 by V Straker

Material: wood: unidentified, too degraded to identify; hardwood, most like birch on TLS (V Straker 1992)

Initial comment: wood from base of upper peat at *c* 15cm depth. As far as it is possible to tell from the degraded and compressed condition of the wood, it is a piece from a small branch under 20 years old.

Objectives: the intertidal 'peats' (including silty clays and loams) are important not only because they are suffering severe wave erosion and are a diminishing resource, but also because they preserve information on the environmental history of the Scilly Isles, such as sea level change, vegetation history, and the impact of human activity on the landscape. A dated sequences of these deposits from Scilly will allow the vegetation history of the islands to be established in relation to sea-level rise. This will be of considerable importance to the islands. These Porth Mellon samples are the first intertidal deposits from St Mary's to be submitted for dating.

Calibrated date: *1σ:* 2450–2130 cal BC
2σ: 2480–2020 cal BC

Final comment: J Ratcliffe and V Straker (1995), the radiocarbon dates confirmed that the two exposures represented two separate phases of formation. Both began forming around the late Neolithic but the start date for the lower exposure is at least 500 years earlier than that for the upper.

GU–5393 4280 ±50 BP

δ¹³C: -28.4‰

Sample: PMEL1, submitted on 10 February 1994 by V Straker

Material: peat (humic acid; humic silty clay) (V Straker 1992)

Initial comment: top 4cm lower band of 'peat' exposed at low tide. It is probable that this is not the true top of the deposit, which will have eroded away owing to wave action.

Objectives: as GU-5392

Calibrated date: *1σ:* 2920–2880 cal BC
2σ: 3020–2770 cal BC

Final comment: see GU-5392

Laboratory comment: SURRC (1994): the humic acid fraction of this sample was dated.

GU–5394 4310 ±60 BP

δ¹³C: -28.3‰

Sample: PMEL 2, submitted on 10 February 1994 by V Straker

Material: peat (humic acid; humic silty clay) (V Straker 1992)

Initial comment: basal 2cm of the lower band of 'peat' (not true peat - humic silty clay and sand lenses) exposed at low tide.

Objectives: as GU-5392

Calibrated date: *1σ:* 3010–2880 cal BC
2σ: 3090–2870 cal BC

Final comment: see GU-5392

Laboratory comment: see GU-5393

GU–5395 3900 ±70 BP

δ¹³C: -26.2‰

Sample: PMEL3, submitted on 10 February 1994 by V Straker

Material: peat (humic acid; humic silty clay) (V Straker 1992)

Initial comment: sample from 2-4cm depth of upper 'peat' (humic silty clay) exposed at low tide. It is probable that this is not the true top of the deposit, which will have eroded away owing to wave action.

Objectives: as GU-5392

Calibrated date: *1σ:* 2480–2280 cal BC
2σ: 2580–2140 cal BC

Final comment: see GU-5392

Laboratory comment: see GU-5393

GU–5396 3980 ±100 BP

δ¹³C: -28.8‰

Sample: PMEL4, submitted on 10 February 1994 by V Straker

Material: peat (humic acid; humic silty clay) (V Straker 1992)

Initial comment: basal 2cm of upper 'peat' (humic silty clay) exposed at low tide. Deposit is *c* 15cm thick and grades into humic sand with lenses of silty clay. It is probable that this is not the true top of the deposit, which will have eroded away owing to wave action.

Objectives: as GU-5392

Calibrated date: *1σ:* 2620–2340 cal BC
2σ: 2880–2200 cal BC

Final comment: see GU-5392

Laboratory comment: see GU-5393

Kilnsea Boat, Humberside

Location: TA 412178
Lat. 53.38.15 N; Long. 00.08.09 E

Project manager: R Van de Noort (University of Hull), September 1996

Archival body: Hull and East Riding Museum

Description: a plank found on the Kilnsea beach in the East Riding of Yorkshire, near an intertidal inlet, which has been identified as part of a prehistoric plank boat.

Objectives: the samples submitted are from a plank which was part of a sewn plank boat found by members of the Hull Natural History Society, lying on the beach during low tide. Dating of the object is an essential part of the academic analysis and reporting of the find. The plank has an insufficient number of tree-rings for dendrochronological dating, and therefore two samples from the underside of the plank have been submitted for radiocarbon dating. The only comparable finds are the middle Bronze Age boats from North Ferriby and the Dover Boat, of similar age. Although not unique, the discovery is of national importance.

References: Van de Noort *et al* 1999

OxA–6939 3455 ±35 BP

δ¹³C: -22.5‰

Sample: Boat sample 1, submitted on 23 October 1996 by R Van de Noort

Material: wood (waterlogged): *Quercus* sp. (R Van de Noort 1996)

Initial comment: from a piece of wood, a tangentially split plank from a primeval oak, carved into a slightly curved plank with evidence of four 'notches'.

Objectives: to date the plank.

Calibrated date: *1σ:* 1880–1690 cal BC
2σ: 1890–1680 cal BC

Final comment: R Van de Noort (2001), the dates help confirm the view that the ancestry of the style of boat-building of Ferriby 1 and 2 had to be sought in the early rather than the middle Bronze Age.

Laboratory comment: Ancient Monuments Laboratory (2000), these two results are statistically significantly different at 95% confidence (T′=4.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978). However, as the measurements are replicates on the same piece of wood, a weighted mean can be calculated (3406 ±26 BP) which calibrates to 1770–1620 cal BC at 95% confidence (Reimer *et al* 2004).

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

OxA–6940 3340 ±40 BP

δ¹³C: -23.2‰

Sample: Boat sample 2, submitted on 23 October 1996 by R Van de Noort

Material: wood (waterlogged): *Quercus* sp. (R Van de Noort 1996)

Initial comment: as OxA-6939

Objectives: as OxA-6939

Calibrated date: 1σ: 1690–1560 cal BC
2σ: 1740–1510 cal BC

Final comment: see OxA-6939

Laboratory comment: see OxA-6939

Lichfield Cathedral, Staffordshire

Location: SK 116098
Lat. 52.41.08 N; Long. 01.49.42 W

Project manager: W Rodwell (Independent), 1992

Archival body: Dean and Chapter, Lichfield Cathedral

Description: the cathedral has a long and distinguished ecclesiastical history in the Anglo-Saxon period, which has hitherto been unsupported by archaeological evidence. The foundation of the cathedral dates from no later than cal AD 669.

Objectives: to provide a chronology for burials at the cathedral.

Laboratory comment: English Heritage (14 June 2014), six further samples were previously dated and are published in Bayliss *et al* 2013 (103–5; GU-5281–6).

References: Bayliss *et al* 2013, 103–5

GU–5354 1130 ±50 BP

$\delta^{13}C$: -25.9‰

Sample: LC 07 charcoal from grave, submitted on 1 August 1993 by W Rodwell

Material: charcoal: unidentified

Initial comment: charcoal bed F347 from the grave containing skeleton no. 28. The skeleton itself was submitted as LC 03 and dated as GU-5283, which turned out unexpectedly early.

Objectives: to establish a date for the burial. Stratigraphically this is later than LC 04 (GU-5284, 1030 ±50 BP, cal AD 890–1160 at 95% confidence; Reimer *et al* 2004), LC 05 (GU-5285, 1210 ±50 BP, cal AD 670–970 at 95% confidence; Reimer *et al* 2004), and LC 06 (GU-5286, 1200 ±50 BP, cal AD 670–980 at 95% confidence; Reimer *et al* 2004), and a tenth- to eleventh-century date is expected.

Calibrated date: 1σ: cal AD 780–990
2σ: cal AD 770–1020

Final comment: W Rodwell (14 March 1994), the late Saxon date for this charcoal grave was anticipated, although why the skeleton itself (LC 03, GU-5283) returned at erroneous result is unexplained. The slightly later date of LC 07 (GU-5354) and LC 05 (GU-5285) and LC 06 (GU-5286) is consistent with the stratigraphic sequence of the burials themselves.

References: Reimer *et al* 2004

GU–5434 960 ±60 BP

$\delta^{13}C$: -20.4‰

Sample: LC 08 Skeleton 16, submitted on 25 May 1994 by W Rodwell

Material: human bone (J Rogers 1992)

Initial comment: part of skeleton 16 from one of the primary graves in the Anglo-Saxon cemetery, east of the original cathedral, and sealed below the floor of the thirteenth-century quire aisle extension. It was also sealed by the construction levels for the late eleventh-century sanctuary apse.

Objectives: to confirm a date for this primary grave. The grave had side-ledges and a head recess, and is of the type likely to be middle Saxon.

Calibrated date: 1σ: cal AD 1010–1160
2σ: cal AD 980–1220

Final comment: W Rodwell, this is a much more acceptable result than the demonstrably erroneous GU-5281, which was taken from the same skeleton. Although it was suspected, on the basis of grave typology, that the burial might be middle Saxon, the result in fact indicates a late Saxon date, or very early Norman. Stratigraphically the burial must be earlier than the 1090s. This accords with other evidence, from more recent excavations, suggesting a Saxo-Norman cemetery east of the cathedral.

Laboratory comment: English Heritage (14 June 2014), this measurement is statistically inconsistent (T'=329.4; $T'(5\%)$=3.8; v=1; Ward and Wilson 1978) with a previous determination on this skeleton (GU-5281, 2410 ±50 BP, 770–390 cal BC at 95% confidence; Reimer *et al* 2004). GU-5281 was contaminated by the addition of dead carbon from a contaminated oxygen cylinder.

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

Lindow Moss: Lindow Wood, Cheshire

Location: SJ 824804
Lat. 53.19.12 N; Long. 02.15.51 W

Project manager: C Wells (University of Lancaster), 1994

Archival body: Centre for Environmental Change and Quaternary Research, Cheltenham College of Higher Education

Description: Lindow Moss was formerly very extensive, once covering some 600ha and was formed in a complex of deep hollows within the boulder clay and glacial gravels. By the time of the publication of the Tithe Maps in 1843, it had shrunk in size to about 300ha, and today it is only about a tenth of its original area, half of which is worked commercially for peat extraction. The remainder is partly covered in birch scrub.

Objectives: to establish the chronology of pine domination at Lindow Moss.

Final comment: C Wells (20 May 1996), the series of dates (GU-5562–6) has established a broadly Neolithic context for this phase of the mire's ontogeny. This is of some archaeological significance as it allows more detailed environmental reconstruction relating to periods of human occupation of 'sand islands' at the site and also dates some of the more prominent charcoal bands in the stratigraphy. GU-5567–70 will be related to other palaeoenvironmental analyses to establish the environmental conditions related to bog-pine germination and mortality.

References: Lageard *et al* 1996
Leah 1997

GU–5562 4060 ±70 BP

$\delta^{13}C$: -27.9‰

Sample: Lin I, 40–41cm, submitted on 21 September 1995 by C Wells

Material: peat (humic acid)

Initial comment: taken from 40-41cm in a peat column adjacent to subfossil pine stumps.

Objectives: to establish the deposition rate curve for the peat column. The peat samples in this series are also being analysed for peat humification, plant macrofossils, tephra and chemical elements, as part of a project to establish the environmental conditions of bog pine establishment on Lindow Moss. GU-5562 also dates a decline in the elm pollen at this depth.

Calibrated date: *1σ:* 2840–2480 cal BC
2σ: 2880–2460 cal BC

Final comment: C Wells (20 May 1996), the date as part of a sequence has established the chronology of pine domination at Lindow Moss.

Laboratory comment: SURRC (1995): the humic acid fraction of this sample was dated.

GU–5563 4220 ±60 BP

$\delta^{13}C$: -28.3‰

Sample: Lin II, 8–9cm, submitted on 21 September 1995 by C Wells

Material: peat (humic acid)

Initial comment: as GU-5562; taken from a depth of 8–9cm.

Objectives: to date a peak in the pine pollen at this depth. *See* also GU-5562.

Calibrated date: *1σ:* 2900–2700 cal BC
2σ: 2920–2620 cal BC

Final comment: see GU-5562

Laboratory comment: see GU-5562

GU–5564 7140 ±80 BP

$\delta^{13}C$: -29.3‰

Sample: Lin II, 127.5–129cm, submitted on 21 September 1995 by C Wells

Material: peat (humic acid)

Initial comment: as GU-5562; taken from a depth of 127.5–129cm.

Objectives: as GU-5564

Calibrated date: *1σ:* 6070–5920 cal BC
2σ: 6220–5850 cal BC

Final comment: see GU-5562

Laboratory comment: see GU-5562

GU–5565 5570 ±60 BP

$\delta^{13}C$: -29.3‰

Sample: Lin II, 79–81cm, submitted on 21 September 1995 by C Wells

Material: peat (humic acid)

Initial comment: as GU-5562; taken from a depth of 79–81cm.

Objectives: as GU-5562

Calibrated date: *1σ:* 4460–4340 cal BC
2σ: 4540–4330 cal BC

Final comment: see GU-5562

Laboratory comment: see GU-5562

GU–5566 7780 ±70 BP

$\delta^{13}C$: -29.1‰

Sample: Lin II, 163.5–165.5cm, submitted on 21 September 1995 by C Wells

Material: peat (humic acid)

Initial comment: as GU-5562; taken from a depth of 163.5–165.5cm.

Objectives: as GU-5562

Calibrated date: *1σ:* 6660–6500 cal BC
2σ: 6780–6460 cal BC

Final comment: see GU-5562

Laboratory comment: see GU-5562

GU–5567 5190 ±50 BP

$\delta^{13}C$: -26.0‰

Sample: K108, submitted on 13 October 1995 by C Wells

Material: wood (waterlogged; *Pinus sylvestris L.*) (J Lageard 1994)

Initial comment: from a disc sample of wood taken from an exposed former mire woodland layer.

Objectives: to establish the timing of preliminary tree-ring width chronology LM1-1. The sample age will be related to other palaeoenvironmental analyses to establish the environmental conditions related to bog-pine germination and mortality.

Calibrated date: *1σ:* 4050–3960 cal BC
2σ: 4230–3940 cal BC

Final comment: C Wells (20 May 1996), the date has confirmed the early Neolithic context of the pine layer at Lindow Moss.

GU–5568 5260 ±70 BP

δ¹³C: -25.6‰

Sample: K085, submitted on 13 October 1995 by C Wells

Material: wood (waterlogged; *Pinus sylvestris L.*) (J Lageard 1994)

Initial comment: as GU-5567

Objectives: as GU-5567

Calibrated date: *1σ:* 4230–3970 cal BC
2σ: 4320–3950 cal BC

Final comment: see GU-5567

GU–5569 5150 ±50 BP

δ¹³C: -25.9‰

Sample: K114, submitted on 13 October 1995 by C Wells

Material: wood (waterlogged; *Pinus sylvestris L.*) (J Lageard 1994)

Initial comment: as GU-5567

Objectives: as GU-5567

Calibrated date: *1σ:* 3990–3940 cal BC
2σ: 4050–3800 cal BC

Final comment: see GU-5567

GU–5570 5330 ±80 BP

δ¹³C: -25.6‰

Sample: K084, submitted on 13 October 1995 by C Wells

Material: wood (waterlogged; *Pinus sylvestris L.*) (J Lageard 1994)

Initial comment: as GU-5567

Objectives: as GU-5567

Calibrated date: *1σ:* 4330–4040 cal BC
2σ: 4350–3970 cal BC

Final comment: see GU-5567

Long Mynd, Shropshire

Location: SO 42109538 and SO 43999432
Lat. 52.33.10 N; Long. 02.51.15 W, and
Lat. 52.32.37 N; Long. 02.49.34 W

Project manager: J Dinn (Hereford and Worcester County Council Archaeological Service), 1992

Description: the proposed dating programme forms part of a project designed to test environmental potential in the uplands of the Welsh Marches.

Objectives: dating will be important in establishing past land-use on the Long Mynd from the environmental evidence.

Final comment: J Dinn (1995), charcoal from soils buried beneath two earthwork sites (some 2km apart) was submitted. The dates are consistent with early and late Bronze Age dates for the two earthworks, micromorphological and environmental assessment from both sites indicates a high potential for interpretation of the environmental and land-use history of the Long Mynd dating of the earthworks has been crucial to this process.

References: Dinn *et al* 2006
Hedges *et al* 1995, 423

OxA–5080 3485 ±45 BP

δ¹³C: -25.0‰

Sample: SA198/008, submitted on 5 July 1993 by C de Rouffignac

Material: charcoal: *Betula* sp. (S Limbrey 1992)

Initial comment: the sample was taken from a layer of charcoal (008) underlying the barrow material, which directly overlay what is interpreted as a pre-barrow ground surface. The layer was completely sealed by barrow material.

Objectives: there is no artefact dating for this barrow, which is dated to the early Bronze Age on morphological grounds. The charcoal is thought to be closely contemporary with the construction of the barrow.

Calibrated date: *1σ:* 1890–1700 cal BC
2σ: 1930–1680 cal BC

Final comment: J Dinn (25 April 1995), this date and OxA-5081 confirm the early Bronze Age date suggested by the morphology of the Shooting Box barrow.

OxA–5081 3445 ±45 BP

δ¹³C: -24.9‰

Sample: SA198/008, submitted on 5 July 1993 by C de Rouffignac

Material: charcoal: *Betula* sp. (S Limbrey 1992)

Initial comment: as OxA-5080

Objectives: as OxA-5080

Calibrated date: *1σ:* 1880–1680 cal BC
2σ: 1890–1630 cal BC

Final comment: see OxA-5080

OxA–5082 5155 ±45 BP

δ¹³C: -26.1‰

Sample: SA251/110, submitted on 6 July 1993 by C de Rouffignac

Material: charcoal: *Corylus avellana* (S Limbrey 1992)

Initial comment: the sample is from a layer of charcoal-rich soil (110) sealed below the bank, adjacent to the ditch cut. Although the thickness of the bank is small, the stratigraphic relationships were clear.

Objectives: the linear earthworks on the Long Mynd are undated. Dating would be a start to determining the context of the earthworks and establishing associations. An environmental date from SA251 could then be more usefully compared with SA198.

Calibrated date: *1σ:* 3990–3950 cal BC
2σ: 4050–3800 cal BC

Final comment: J Dinn (25 April 1995), prior to this dating programmed the linear earthworks on the Long Mynd were undated. This date and OxA-5083, from charcoal from a soil layer immediately below the earthwork strongly suggest a later Bronze Age date.

OxA–5083 3105 ±45 BP

δ¹³C: -25.7‰

Sample: SA251/110, submitted on 6 July 1992 by C de Rouffignac

Material: charcoal: *Corylus avellana* (S Limbrey 1992)

Initial comment: as OxA-5082

Objectives: as OxA-5082

Calibrated date: *1σ:* 1430–1300 cal BC
2σ: 1500–1230 cal BC

Final comment: see OxA-5082

March Hill, West Yorkshire

Location: SE 00761286
Lat. 53.36.43 N; Long. 01.58.19 W

Project manager: P Spikins (University of Cambridge), 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), four further samples were dated after 1998 (OxA-9644-5 and OxA-10210-1).

References: Griffiths 2011
Spikins 1999

GU–5635 3320 ±50 BP

δ¹³C: -28.5‰

Sample: MH95 Peat, submitted on 26 February 1996 by P Spikins

Material: peat (humic acid)

Initial comment: the sample was a basal peat taken from the level where the peat graded into dark-brown mineral soil. The sample was taken from about 1m away from the south west edge of trench A (where four hearths were excavated). The sample was taken from a maximum vertical spread of 2–3cm from a defined area.

Objectives: the date of basal peat will provide an important *terminus ante quem* for the use of the hearths in trench A (which were sealed by this peat). A date within the Mesolithic would have important consequences for an explanation of the topographic location of rod sites (at supposedly higher elevations) and for changing upland resources in the Mesolithic.

Calibrated date: *1σ:* 1670–1520 cal BC
2σ: 1740–1490 cal BC

Final comment: S Griffiths (15 October 2012), the age of the peat means that these results (*see* also GU-5636) does not significantly constrain the results on material associated with use of the Mesolithic hearths.

Laboratory comment: English Heritage (15 October 2012), the two results on the peat are statistically consistent (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978), therefore a weighted mean (3315 ±36 BP can be taken before calibration (1690–1500 cal BC at 95% confidence; Reimer *et al* 2004).

Laboratory comment: SURRC (1996): the humic acid fraction of this sample was dated.

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

GU–5636 3310 ±50 BP

δ¹³C: -28.8‰

Sample: MH95 Peat, submitted on 26 February 1996 by P Spikins

Material: peat (humin)

Initial comment: as GU-5635

Objectives: as GU-5635

Calibrated date: *1σ:* 1650–1510 cal BC
2σ: 1740–1450 cal BC

Final comment: see GU-5635

Laboratory comment: see GU-5635 SURRC (1996): the humin fraction of this sample was dated.

OxA–6296 5790 ±35 BP

δ¹³C: -24.4‰

Sample: MH94 TrA H1, submitted on 30 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: the sample was taken from the fill of a hearth composed of a circle of built-up stones (*c* 45cm across, 10–15cm deep), under 50cm of peat. The hearth contained flint flakes consistent with the refitted assemblage but no diagnostic artefacts.

Objectives: this hearth is at the centre of the re-fit pattern of later Mesolithic technology. A date for this hearth and the neighbouring hearths in the trench would contribute to our understanding of occupation of this small area.

Calibrated date: *1σ:* 4710–4590 cal BC
2σ: 4730–4540 cal BC

Final comment: S Griffiths (15 October 2012), the result dates the use of the hearth and probably lithic working activity in the vicinity (*see* also UB-4050).

Laboratory comment: English Heritage (15 October 2012), the two results from this charcoal are statistically consistent (T′=0.3; T′(5%)=3.8; v=1; Ward and Wilson 1978), and so a weighted mean can be taken before calibration (5807 ±19 BP; 4720–4600 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–6297 5835 ±35 BP

δ¹³C: -24.4‰

Sample: MH94 TrA H2, submitted on 30 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: the sample was taken from the fill of a hearth composed of a circle of built-up stones (*c* 40cm across, 8cm deep), under 40–50cm of peat.

Objectives: a date for this hearth and the neighbouring hearths in the trench would contribute to our understanding of occupation of this small area. The hearth is of a similar style to a hearth previously dated by R Switsur (March Hill site II), which was probably adjacent to this area.

Calibrated date: *1σ:* 4730–4680 cal BC
2σ: 4790–4600 cal BC

Final comment: S Griffiths (15 October 2012), the result dates the use of the hearth and probably lithic working activity in the vicinity (*see* also UB-4051).

Laboratory comment: English Heritage (15 October 2012), the two results on this charcoal are statistically consistent (T′=0.1; T′(5%)=3.8; v=1; Ward and Wilson 1978) and so a weighted mean can be taken before calibration (5828 ±22 BP; 4770–4610 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–6298 5745 ±35 BP

δ¹³C: -24.6‰

Sample: MH95 TrA H3, submitted on 16 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: a sample from hearth H3, which took the form of an oval pit *c* 60cm × 40cm × 20cm, and contained sandstone stones, pebbles, a small amount of flint, and charcoal. The hearth was located in square CO in the north-west part of trench A. An iron pan cut the top of the hearth hardening the uppermost charcoal. The hearth was within mineral soil under 60–70cm of peat.

Objectives: the hearth contained a scalene triangle microlith and was surrounded by a scalene triangle assemblage, the date will contribute to our understanding of the phasing of these industries.

Calibrated date: *1σ:* 4680–4540 cal BC
2σ: 4710–4490 cal BC

Final comment: S Griffiths (15 October 2012), this result dates the use of the hearth and the use of scalene triangles at the site (*see* also UB-4052).

Laboratory comment: English Heritage (15 October 2012), the two results on this charcoal are statistically consistent (T′=1.3; T′(5%)=3.8; v=1; Ward and Wilson 1978) and so a weighted mean can be taken before calibration (5775 ±23 BP; 4710–4540 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–6299 5830 ±35 BP

δ¹³C: -25.3‰

Sample: MH95 TrA H4, submitted on 16 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: the hearth consisted of a small pit (22cm × 24cm) filled with charcoal in a matrix of sandy mineral soil/iron pan. A large number of pieces of very burnt flint were collected from the hearth fill - none were identifiable to period but are likely to be associated with flint knapping activity in the area. The quantity of flint indicates that it may have been deliberately heat-treated. The hearth was within mineral soil under 50-60cm of peat.

Objectives: the dates will contribute to the understanding of activities at the location, and specifically the use of the hearth for heat treating flint.

Calibrated date: *1σ:* 4730–4680 cal BC
2σ: 4790–4590 cal BC

Final comment: S Griffiths (15 October 2012), dates the use of the hearth for the heat treatment of flint (*see* also OxA-6300).

Laboratory comment: English Heritage (15 October 2012), the two results on this charcoal are statistically consistent (T′=0.2; T′(5%)=3.8; v=1; Ward and Wilson 1978) and so a weighted mean can be taken before calibration (5841 ±27 BP; 4790–4610 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–6300 5855 ±40 BP

δ¹³C: -26.0‰

Sample: MH95 TrA H4, submitted on 16 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: as OxA-6299

Objectives: as OxA-6299

Calibrated date: *1σ:* 4790–4680 cal BC
2σ: 4830–4610 cal BC

Final comment: see OxA-6299

Laboratory comment: see OxA-6299

OxA–6301 5310 ±45 BP

δ¹³C: -25.5‰

Sample: MH94 TrB H1, submitted on 16 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: a sample from hearth TrB H1, on March Hill top. The feature comprised a small pit *c* 40cm × 40cm × 15cm surrounded by stones and containing several pieces of flint. The hearth was re-used at least once. The hearth was cut by an iron-pan resulting in hardening of some charcoal. A rod microlith and partially burnt core were found within the hearth and it was surrounded by rod type industry.

Objectives: the hearth date contributes to our knowledge of rod microlith use.

Calibrated date: *1σ:* 4240–4040 cal BC
2σ: 4320–3990 cal BC

Final comment: S Griffiths (15 October 2012), the result dates the use of the hearth and is possibly associated with the use of rod microliths. Unfortunately, it was not recorded which samples derived from the upper and lower use of the feature, so it is not possible to be more exacting about the chronology of the use of the hearth or the rod microlith which was recovered from it (*see* OxA-6302, -6303, -6304, -6305, -6306, and UB-4053).

Laboratory comment: English Heritage (15 October 2012), the seven results on this charcoal are statistically inconsistent at 95% confidence (T′=13.3; T′(5%)=12.6; v=6; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–6302 5315 ±35 BP

δ¹³C: -26.1‰

Sample: MH94 TrB H1, submitted on 16 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: as OxA-6301

Objectives: as OxA-6301

Calibrated date: *1σ:* 4240–4040 cal BC
2σ: 4260–4000 cal BC

Final comment: see OxA-6301

Laboratory comment: see OxA-6301

OxA–6303 5255 ±30 BP

δ¹³C: -25.1‰

Sample: MH94 TrB H1, submitted on 16 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: as OxA-6301

Objectives: as OxA-6301

Calibrated date: *1σ:* 4150–3990 cal BC
2σ: 4230–3970 cal BC

Final comment: see OxA-6301

Laboratory comment: see OxA-6301

OxA–6304 5180 ±30 BP

δ¹³C: -26.5‰

Sample: MH94 TrB H1, submitted on 16 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: as OxA-6301

Objectives: as OxA-6301

Calibrated date: *1σ:* 4040–3960 cal BC
2σ: 4050–3950 cal BC

Final comment: see OxA-6301

Laboratory comment: see OxA-6301

OxA–6305 5270 ±45 BP

δ¹³C: -25.6‰

Sample: MH94 TrB H1, submitted on 16 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: as OxA-6301

Objectives: as OxA-6301

Calibrated date: *1σ:* 4230–3990 cal BC
2σ: 4240–3970 cal BC

Final comment: see OxA-6301

Laboratory comment: see OxA-6301

OxA–6306 5190 ±45 BP

δ¹³C: -25.3‰

Sample: MH94 TrB H1, submitted on 16 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1996)

Initial comment: as OxA-6301

Objectives: as OxA-6301

Calibrated date: *1σ:* 4040–3960 cal BC
2σ: 4060–3940 cal BC

Final comment: see OxA-6301

Laboratory comment: see OxA-6301

UB–4050 5813 ±22 BP

δ¹³C: -26.4 ±0.2‰

Sample: MH94 TrA H1, submitted on 30 January 1996 by P Spikins

Material: charcoal: Pomoideae; *Prunus* sp.; *Corylus* sp. (R Gale 1994)

Initial comment: as OxA-6296

Objectives: as OxA-6296

Calibrated date: *1σ:* 4715–4620 cal BC
2σ: 4725–4600 cal BC

Final comment: see OxA-6296

Laboratory comment: see OxA-6296

Laboratory comment: Belfast (6 August 1996): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Wilson *et al* 1996

UB–4051 5824 ±28 BP

δ¹³C: -26.0 ±0.2‰

Sample: MH94 TrA H2, submitted on 30 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1994)

Initial comment: as OxA-6297

Objectives: as OxA-6297

Calibrated date: *1σ:* 4720–4680 cal BC
2σ: 4770–4600 cal BC

Final comment: see OxA-6297

Laboratory comment: see OxA-6297

Laboratory comment: Belfast (12 September 1996): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Wilson *et al* 1996

UB–4052 5796 ±29 BP

δ¹³C: -26.8 ±0.2‰

Sample: MH95 TrA H3, submitted on 16 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1994)

Initial comment: as OxA-6298

Objectives: as OxA-6298

Calibrated date: *1σ:* 4710–4600 cal BC
2σ: 4730–4540 cal BC

Final comment: see OxA-6298

Laboratory comment: see OxA-6298

Laboratory comment: Belfast (6 August 1996): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Wilson *et al* 1996

UB–4053 5271 ±24 BP

δ¹³C: -26.3 ±0.2‰

Sample: MH94 TrB H1, submitted on 16 January 1996 by P Spikins

Material: charcoal: *Corylus* sp. (R Gale 1994)

Initial comment: as OxA-6301

Objectives: as OxA-6298

Calibrated date: *1σ:* 4225–4040 cal BC
2σ: 4230–3990 cal BC

Final comment: see OxA-6301

Laboratory comment: see OxA-6301

Laboratory comment: Belfast (12 September 1996): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Wilson *et al* 1996

Market Lavington, Wiltshire

Location: SU 132574
Lat. 51.18.54 N; Long. 01.48.38 W

Project manager: M Canti and D Jordan (Ancient Monument Laboratory), 1990

Archival body: Wessex Archaeology

Description: the site mainly comprises a series of negative features sealed by a mid-late Saxon occupation homogeneous deposit. There is limited late Neolithic/early Bronze Age faunal material from linear ditch features, and some Roman material, but most of the features and material are attributable to the Saxon-early medieval period.

Objectives: up to 3m of peat was located at the base of the Upper Greensand ridge. As the adjacent slope had produced flint artefacts of Neolithic and Bronze Age date and there were earthworks and other artefacts dating from Roman, Saxon, and medieval periods it was suspected that the deep stratified peat deposits would contain a long palaeo-vegetational history. Such sequences within Wessex are extremely rare, and its close association with dated archaeology and proximity to the chalk made it of national importance. A number of cores and monoliths were obtained from two locations along the ancient infilled channel immediately adjacent to the archaeological excavations.

Final comment: P Wiltshire (21 May 1997), this palynological study provides the most comprehensively analysed and dated sequence of Saxon and earlier medieval deposits in the British Isles. It presents convincing evidence for the changing pattern of vegetation and land use at the site.Overall the radiocarbon dates show good agreement with the stratigraphy. This suggests that they provide a realistic estimate for the chronology of the sequence. The sediment accumulation rate in the upper part of the channel appears to have been relatively constant at approximately 0.12cm per year.

Laboratory comment: English Heritage (2013), five further dates were funded prior to 1993 and were published in Bayliss *et al* (2013, 113–4; OxA-2996–3000).

Laboratory comment: English Heritage (25 September 2012), further modelling of this sequence of sediments is presented by Meadows (2011).

References: Bayliss *et al* 2013, 113–4
Meadows 2011
Williams and Newman 2006

OxA–6339 1055 ±60 BP

$\delta^{13}C$: -28.7‰

Sample: 20 & 22cm, submitted on 19 January 1996 by P Wiltshire

Material: sediment (humin; organic)

Initial comment: from a depth of 20 and 22cm.

Objectives: the sediments in this sample contained evidence of diverse arable agriculture; pollen of grapevine, currant, flax, and cereals were found. It is exceedingly important to date the presence of grape since the data imply the existence of a Saxon vineyard. This is the earliest evidence for viticulture as opposed to consumption of grapes.

Calibrated date: *1σ:* cal AD 900–1030
2σ: cal AD 880–1150

Final comment: P Wiltshire (21 May 1997), this sample dates the later part of pollen zone ML5.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1996): the humin fraction of this sample was dated.

OxA–6340 1060 ±60 BP

$\delta^{13}C$: -28.8‰

Sample: 24–26cm, submitted on 19 January 1996 by P Wiltshire

Material: sediment (humin; organic)

Initial comment: from a depth of 24-26 cm.

Objectives: as OxA-6399. Pollen of grapevine, rye, and cereals were found showing intensive arable agriculture.

Calibrated date: *1σ:* cal AD 890–1030
2σ: cal AD 780–1150

Final comment: P Wiltshire (21 May 1997), this sample dates a peaty band within the channel and falls within pollen zone ML5.

Laboratory comment: see OxA-6339

OxA–6341 1035 ±60 BP

$\delta^{13}C$: -28.6‰

Sample: 30 & 32cm, submitted on 19 January 1996 by P Wiltshire

Material: sediment (humin; organic)

Initial comment: from a depth of 30 and 32cm.

Objectives: as OxA-6339. Pollen of grapevine, rye, other cereals, and cannabis were found showing intensive agriculture.

Calibrated date: *1σ:* cal AD 970–1030
2σ: cal AD 880–1160

Final comment: P Wiltshire (21 May 1997), this sample falls within pollen zone ML5 and dates to the time when the rise of fungal infections in the local plant communities ended.

Laboratory comment: see OxA-6339

OxA–6342 1160 ±60 BP

$\delta^{13}C$: -28.1‰

Sample: 34cm, submitted on 19 January 1996 by P Wiltshire

Material: sediment (humin; organic)

Initial comment: from a depth of 34cm.

Objectives: this is a particularly important sample because it represents the first appearance of grapevine pollen in the sequence. This could be registering the establishment of vineyards in the vicinity of the village.

Calibrated date: *1σ:* cal AD 770–980
2σ: cal AD 680–1020

Final comment: P Wiltshire (21 May 1997), this sample dates the start of pollen zone ML5, which provides evidence for a marked increase in the range and quantity of crop plants present.

Laboratory comment: see OxA-6339

OxA–6343 1080 ±60 BP

$\delta^{13}C$: -27.6‰

Sample: 38–40cm, submitted on 19 January 1996 by P Wiltshire

Material: sediment (organic)

Initial comment: from a depth of 38-40 cm.

Objectives: this sample is important in establishing the chronology of the establishment of the vineyard. No grapevine pollen was found and the sample was taken from a level closely beneath levels containing vine pollen.

Calibrated date: *1σ:* cal AD 890–1020
2σ: cal AD 770–1040

Final comment: P Wiltshire (21 May 1997), this sample dates pollen zone ML4. An increase in the organic content of the sediment at this level may indicate that organic waste was dumped in the channel at this time. Cereal cultivation may have also expanded locally, as did the prevalence of fungal infections in the local plant communities.

Laboratory comment: English Heritage (29 May 2009), recent remodelling of this sequence of dates suggests that this result may be slightly too recent.

Laboratory comment: see OxA-6339

OxA–6344 1290 ±60 BP

$\delta^{13}C$: -27.0‰

Sample: 52 & 54cm, submitted on 19 January 1996 by P Wiltshire

Material: sediment (humin; organic)

Initial comment: from a depth of 52 and 54cm.

Objectives: this sample is important since it represents a time just before a large expansion in cereal crops and coincides with a drop in taxa characteristic in heathland. It also registers changes within the local meadow flora and could be indicating substantial changes in local land use. The sample also coincides with the beginning of what appears to be a fungal rust epidemic. Further work is continuing in an attempt to establish the significance of this enormous rise in fungal rust spores.

Calibrated date: *1σ:* cal AD 660–780
2σ: cal AD 640–890

Final comment: P Wiltshire (21 May 1997), this sample dates pollen zone ML3, which saw wetter conditions prevail in the channel. A decline in the pollen of sedges, bracken, heather, and hazel may suggest that these plants were exploited for domestic use at this time.

OxA–6345 1425 ±60 BP

$\delta^{13}C$: -27.5‰

Sample: 60-62cm, submitted on 19 January 1996 by P Wiltshire

Material: sediment (humin; organic)

Initial comment: from a depth of 60–62cm.

Objectives: this sample indicates the beginning of a sustained increase in cereal production at the site. It also contains information on impacts on the local meadow vegetation. These changes could be heralding significant differences in local land use.

Calibrated date: *1σ:* cal AD 580–660
2σ: cal AD 530–690

Final comment: P Wiltshire (21 May 1997), this sample dates the lower part of pollen zone ML2 (*see* OxA-6346).

Laboratory comment: see OxA-6339

OxA–6346 1380 ±60 BP

$\delta^{13}C$: -27.6‰

Sample: 70 & 72cm, submitted on 19 January 1996 by P Wiltshire

Material: sediment (humin; organic)

Initial comment: from a depth of 70 and 72cm.

Objectives: to elucidate the sediment accretion rates in this part of the sequence. A date at this level will also constrain the dates of samples above and below and thus enhance precision of the chronology.

Calibrated date: *1σ:* cal AD 610–680
2σ: cal AD 560–770

Final comment: P Wiltshire (21 May 1997), this sample dates the upper part of pollen zone ML2 which shows that the locality was dominated by damp grassland/pasture with some evidence of arable agriculture and locally wet conditions in the channel.

Laboratory comment: see OxA-6339

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 upon Tyne), 1995

Archival body: Museum of Antiquities, Newcastle-upon-Tyne

Description: a cropmark ovoid enclosure with an inner ditch (and now destroyed outer bank) with two opposed entrances. Thought by some to be a henge but different to the Milfield henges. It measures *c* 100m across and there is early Neolithic settlement evidence on the site (Harding 1981; Waddington 1996; 1997a; 1997b; 1999).

Objectives: at present the existence of Grimston Ware gives the enclosure and droveway an early Neolithic date. If the radiocarbon dates back up the pottery evidence, this monument complex will become one of the earliest, if not the earliest, architectural edifice in the Isles and would greatly support the author's interpretation of cup and ring marks in the area, as well as having important implications for the transition from hunger-gatherer communities of farming communities.

Final comment: C Waddington (23 October 1997), the radiocarbon dated hazelnut shells samples OxA-6832 and OxA-6833 relate to the contents of two 'domestic' pits situated inside the Coupland Enclosure. Both of these small pits contained charcoal, hazelnut shell and sherds of Grimston Ware pottery. It was thought that because these pits were positioned in a way that did not respect the layout of the enclosure and droveway that they had been the remains of a slightly earlier occupation of the site. The two dates are marginally earlier than the two dates (Beta-96130, 4950 ±70 BP, 3950–3630 cal BC at 95% confidence; Reimer *et al* 2004; and Beta-96129, 5040 ±70 BP, 3980–3650 cal BC at 95% confidence; Reimer *et al* 2004), which date the construction of the monument complex and, therefore, appear to qualify the view that an earlier occupation of the site took place prior to the construction of the enclosure.

Laboratory comment: English Heritage (2013), five further dates from this site were funded after 1998 (OxA-10636–8, OxA-10692, and OxA-10763).

References:
Harding 1981
Reimer *et al* 2004
Waddington 1997a
Waddington 1997b
Waddington 1999

OxA–6832 5090 ±60 BP

δ¹³C: -22.4‰

Sample: HAZ 027, submitted on 10 June 1996 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell (*Corylus avellana*))

Initial comment: from context 027, a shallow pit (1) truncated by ploughing, cut into the pro-glacial coarse gravel sub-strata. The pit fill was homogenous with no evidence of stratigraphy, indicating that its use comprised of a single event.

Objectives: to date the earliest phase of occupation on the site. The date should provide evidence for an early Neolithic domestic occupation, before the enclosure was constructed; and will show whether early Neolithic remains are being destroyed by the continued ploughing of the site.

Calibrated date: *1σ:* 3970–3790 cal BC
2σ: 4040–3710 cal BC

Final comment: C Waddington (23 October 1997), the sample came from a small pit *c* 30cm across, containing sherds of Grimston Ware and charcoal. It is interpreted as the truncated remains of a domestic rubbish pit into which waste from the cooking process was buried. This early Neolithic date corresponds well with the early Neolithic date suggested by the pottery type. The date is slightly earlier than those for the enclosure (Beta-96130 and Beta-96129). Furthermore, as this sample was taken from hazelnut and the enclosure samples taken from charcoal, it is likely that the enclosure dates are not quite as early as the wood of the charcoal whereas the hazelnut shell is a genuinely early date. The conclusion, therefore, is that an occupation of the site took place prior to the construction of the Coupland Enclosure and droveway.

Laboratory comment: ORAU (8 August 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–6833 5060 ±60 BP

δ¹³C: -22.3‰

Sample: HAZ 021, submitted on 10 June 1996 by C Waddington

Material: carbonised plant macrofossil (hazelnut shell (*Corylus avellana*))

Initial comment: from context 021, and from the middle of the fill of a shallow pit (2).

Objectives: as OxA-6823. This date will also provide a date for Grimston Ware pottery with which it is directly associated.

Calibrated date: *1σ:* 3960–3770 cal BC
2σ: 3980–3700 cal BC

Final comment: C Waddington (23 October 1997), the early date for this pit suggests there was an earlier occupation on this site before the construction of the Coupland Enclosure and Droveway.

Laboratory comment: ORAU (8 August 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

Narborough Bog, Leicestershire

Location: SP 549979
Lat. 52.34.33 N; Long. 01.11.23 W

Project manager: A Brown (University of Exeter), 1994

Archival body: University of Exeter

Description: Narborough Bog is located on the Soar floodplain 7km south (upstream) of the centre of Leicester. It is a small floodplain wetland covered by woodland and reedbed and was almost certainly used for osiers in the recent past. The peat is composed of a Boreal wood peat overlain by herbaceous peat. A lower peat may be of pre-Boreal age.

Objectives: to date pollen events (eg clearances) and important pollen boundaries. This site is unique in the East Midlands having a pollen sequence covering most of the Holocene.

Final comment: A Brown (1 February 2010), in the Soar valley there are indications from Narborough of late Neolithic/early Bronze Age deforestation and possibly some regeneration in the middle Bronze Age, but as yet the location or extent of this land use change is unknown (Brown 1999, 591).

References: Brown 1999

GU–5526 8880 ±150 BP

δ¹³C: -29.3‰

Sample: NMB 1a and 1b, submitted on 14 February 1995 by A Brown

Material: peat (humic acid; wood and herb peat, *Alnus glutinosa*) (A Brown 1995)

Initial comment: from the pre-deforestation (and pre-elm decline) levels of a floodplain peat bog. This is a combined sample of 1a, primary material from a depth of 143–145cm and 1b, additional material from a depth of 141–143cm.

Objectives: to provide a pre-elm decline date near the base of the peat bog and pollen diagram.

Calibrated date: *1σ:* 8280–7730 cal BC
2σ: 8340–7590 cal BC

Final comment: A Brown (1 February 2010), provides the date near the base of the peat bog and the pollen diagram (Brown 1999, Fig 3).

Laboratory comment: SURRC (1995): the humic acid fraction of this sample was dated.

GU–5527 4280 ±70 BP

δ¹³C: -28.7‰

Sample: NMB 2a and 2b, submitted on 14 February 1995 by A Brown

Material: peat (humic acid; herbaceous) (A Brown 1995)

Initial comment: from an *in situ* peat bog; a combined sample of 2a from a depth of 76–78cm and 2b from a depth of 78–80cm.

Objectives: to provide a date for the elm decline.

Calibrated date: *1σ:* 2930–2870 cal BC
2σ: 3090–2680 cal BC

Final comment: A Brown (1 February 2010), this result dates the dramatic change in vegetation to the late Neolithic, as lime disappears and both alder and hazel fall dramatically; both to recover to previous levels. Grasses increase but less so sedges and typical pastoral indicators. Cereals also appear for the first time at this level. The stratigraphy indicates that this at least in part reflects an on-site change as wood disappears from the macrofossils, however, the pollen suggests that this is also a wider floodplain event (Brown 1999, 588).

Laboratory comment: see GU-5526

GU–5528 3680 ±50 BP

δ¹³C: -28.7‰

Sample: NMB 3a and 3b, submitted on 14 February 1995 by A Brown

Material: peat (humic acid; herbaceous) (A Brown 1995)

Initial comment: from an *in situ* peat bog; a combined sample of 3a from a depth of 72–74cm and 3b from a depth of 70–72cm.

Objectives: as GU-5527

Calibrated date: *1σ:* 2140–1970 cal BC
2σ: 2210–1920 cal BC

Final comment: A Brown (1 February 2010), although the accumulation rate between the late Neolithic/early Bronze Age (GU-5228) and the early post-Roman period (GU-5529) increases only marginally, there are dramatic changes in pollen content, possibly hiding a hiatus which corresponds to the upper limit of the wood peat (Brown 1999, 588).

Laboratory comment: see GU-5526

GU–5529 1550 ±50 BP

δ¹³C: -28.7‰

Sample: NMB 4a and 4b, submitted on 14 February 1995 by A Brown

Material: peat (humic acid; *Phragmites*) (A Brown 1995)

Initial comment: from an *in situ* peat bog; a combined sample of 4a from a depth of 50–52cm and 4b from a depth of 48–50cm.

Objectives: to date the end of the second clearance phase and the clearance of the floodplain.

Calibrated date: *1σ:* cal AD 420–570
2σ: cal AD 390–620

Final comment: A Brown (1 February 2010), *see* GU-5528. By the middle Bronze Age the alder, lime and to a lesser extent hazel, have recovered. In the early Iron age there is an abrupt decline in alder, lime and oak, with an increase in herbs and particularly bracken. The open floodplain is then maintained until post-medieval times (Brown 1999, 588).

Laboratory comment: see GU-5526

North Ferriby Foreshore, Humberside

Location: SE 994256
Lat. 53.43.02 N; Long. 00.29.37 W

Project manager: R Van de Noort (Humber Wetlands Project), 1994

Archival body: Hull and East Riding Museum

Description: stray find from North Ferriby foreshore, the third example of a paddle from this site.

Objectives: to date the paddle which is a fairly unique object in the United Kingdom for its assumed period. Moreover, accurate dating of the previous finds from the North Ferriby foreshore has not been possible as finds largely pre-date the development of radiocarbon dating.

Laboratory comment: Ancient Monuments Laboratory (31 May 1995), OxA-5398 and OxA-5399 are replicate measurements on the same object, and as these results are not statistically significantly different (T′=0.3; T′(5%)=3.8; v=1; Ward and Wilson 1978), the weighted mean of the results is 3062 ±31 BP which calibrates to 1410–1210 cal BC at 95% confidence (Reimer *et al* 2004.

References: Fenwick 1995
Reimer *et al* 2004
Van de Noort and Ellis 1995a

OxA–5398 3045 ±45 BP

δ¹³C: -29.6‰

Sample: Paddle S1, submitted on 22 December 1994 by R Van de Noort

Material: wood (waterlogged): *Fraxinus* sp., probably (R Van de Noort 1995)

Initial comment: from part of a paddle found on the foreshore.

Objectives: to confirm a Bronze Age date.

Calibrated date: *1σ:* 1400–1220 cal BC
2σ: 1420–1130 cal BC

Final comment: V Fenwick (1995), a complete but unassociated paddle with a blade of similar form was found on the eroding foreshore near Burnham-on-Crouch, Essex in 1983.

OxA–5399 3080 ±45 BP

δ^{13}*C:* -29.1‰

Sample: Paddle S2, submitted on 22 December 1994 by R Van de Noort

Material: wood (waterlogged): *Fraxinus* sp., probably (R Van de Noort 1995)

Initial comment: a replicate of OxA-5398.

Objectives: as OxA-5398

Calibrated date: *1σ:* 1420–1270 cal BC
2σ: 1440–1210 cal BC

Final comment: see OxA-5398

North Peak Environmentally Sensitive Area, Derbyshire

Location: SE 0933904047; SE 0203500345; and SK 0328199894
Lat. 53.31.58 N; Long. 01.51.33 W;
Lat. 53.29.58 N; Long. 01.58.10 W; and
Lat. 53.29.44 N; Long. 01.57.02 W

Project manager: D Garton (Trent and Peak Archaeological Trust), 1992–3

Archival body: Trent and Peak Archaeological Trust

Description: high Pennine moorland above 400m, on Kinderscout Gritstones, with eroding peat cover. The sites were sampled as part of an exercise to understand the effects of peat erosion on the Mesolithic archaeology.

Objectives: GU–5376-81 represent six radiocarbon dates from three sites, all samples are taken from a similar stratigraphic horizon. The dating will provide a basal chronological marker for the pollen analysis, and indicate the broad time-depth between the deposition of the flintwork and peat initiation. Both will indicate the potential of the peat overlying flint-scatter sites as a resource in examining issues of the Mesolithic landscape on these moorlands.

Final comment: D Garton (1994), three sets of samples were dated from the basal horizon of blanket peat overlying a mineral soil. The dates from MST 03 (GU-5376–7) are as predicted from the pollen evidence and concur with other dates, plus palynological comparisons, of peat initiation elsewhere in the area. The dates for MST 01 (GU-5380–1) and MST 02 (GU-5378–9) are much later than the other evidence for the same area (Tallis 1991, 749–56) and may suggest continued use of parts of these moorlands much later than previously thought. These results suggest that the potential for the reconstruction of the Mesolithic environment from the peat at the actual sites where Mesolithic material is located in the mineral soil is low.

Laboratory comment: English Heritage (2013), eleven further dates from this site were subsequently funded (OxA-9538–46, OxA-9603, and OxA-10212).

References: Garton 2009
Tallis 1991

GU–5376 5370 ±50 BP

δ^{13}*C:* -27.1‰

Sample: MST 03 0020/1, submitted on 24 January 1994 by D Garton

Material: peat (humic acid) (J Tallis 1993)

Initial comment: GU-5376–7 are from SE 0933904047, from a cut face of an excavated trench. The samples came from the base of the peat, immediately above the interface with an erosion horizon. The Mesolithic flintwork found nearby is presumed to come from the mineral soil below the erosion horizon.

Objectives: dating will provide a basal chronological marker for the pollen analysis, and indicate the broad time-depth between the deposition of the flintwork and peat initiation. Both will indicate the potential of the peat overlying flint-scatter sites as a resource in examining issues of the Mesolithic landscape on these moorlands.

Calibrated date: *1σ:* 4330–4070 cal BC
2σ: 4340–4040 cal BC

Final comment: D Garton (7 July 1994), GU-5376 and GU-5377 have provided a basal chronological marker for the pollen analysis, and indicate some time-depth between the presumed deposition of the Mesolithic flintwork in the mineral soil in the area and peat initiation.

Laboratory comment: SURRC (1994): the humic acid fraction of this sample was dated.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon determinations (GU-5376–7) are statistically consistent (T′=0.8; T′(5%)=3.8; v=1; Ward and Wilson 1978). Their weighted mean (5399 ±39 BP) calibrates to 4340–4070 cal BC at 95% confidence (Reimer *et al* 2004).

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

GU–5377 5440 ±60 BP

δ^{13}*C:* -27.0‰

Sample: MST 03 0020/2, submitted on 24 January 1994 by D Garton

Material: peat (humin) (J Tallis 1993)

Initial comment: as GU-5376

Objectives: as GU-5376

Calibrated date: *1σ:* 4350–4240 cal BC
2σ: 4370–4070 cal BC

Final comment: see GU-5376

Laboratory comment: see GU-5376

Laboratory comment: SURRC (1994): the humin fraction of this sample was dated.

GU–5378 3610 ±50 BP

δ^{13}*C:* -27.1‰

Sample: MST 02 0009/1, submitted on 24 January 1994 by D Garton

Material: peat (humic acid) (J Tallis 1993)

Initial comment: GU-5378-9 are from ngr SK 0328199894; from a cut face of an excavated trench. The samples came from the base of the peat, immediately above the interface with an erosion horizon. Mesolithic flintwork was found in the mineral soil below the erosion horizon. The samples avoided cracks through the peat, and were below modern rootlet penetration.

Objectives: as GU-5376

Calibrated date: *1σ:* 2040–1890 cal BC
2σ: 2140–1780 cal BC

Final comment: D Garton (7 July 1994), GU-5378 and GU-5379 have provided a basal chronological marker for the pollen analysis, and indicate a considerable time-depth between the deposition of Mesolithic flintwork in the mineral soil below the peat and peat initiation. The spatial integrity and composition of the flintwork suggests that the evident erosion horizon prior to peat initiation did not disrupt the sandy uncohesive mineral soil in which the flintwork was recovered.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon determinations (GU-5378–9) are statistically inconsistent (T′=14.6; T′(5%)=3.8; v=1; Ward and Wilson 1978).

Laboratory comment: see GU-5376

References: Ward and Wilson 1978

GU–5379 3880 ±50 BP

δ¹³C: -28.4‰

Sample: MST 02 0009/2, submitted on 24 January 1994 by D Garton

Material: peat (humin) (J Tallis 1993)

Initial comment: as GU-5378

Objectives: as GU-5376

Calibrated date: *1σ:* 2470–2280 cal BC
2σ: 2480–2200 cal BC

Final comment: see GU-5378

Laboratory comment: see GU-5378

GU–5380 3560 ±50 BP

δ¹³C: -28.2‰

Sample: MST 01 0002/1, submitted on 24 January 1994 by D Garton

Material: peat (humic acid) (J Tallis 1993)

Initial comment: GU-5380–1 are from ngr SE 0203500345, from a cut face of an excavated trench. The samples came from the base of the peat, immediately above the interface with an erosion horizon. Mesolithic flintwork was found in the mineral soil below the erosion horizon. The samples avoided cracks through the peat, and were below modern rootlet penetration.

Objectives: as GU-5376

Calibrated date: *1σ:* 1960–1820 cal BC
2σ: 2040–1740 cal BC

Final comment: D Garton (7 July 1994), GU-5380 and GU-5381 have provided a basal chronological marker for the pollen analysis, and indicate a considerable time-depth between the deposition of Mesolithic flintwork in the mineral soil below the peat and peat initiation. As flintwork was also found in the basal peat this demonstrates that at least part of this Mesolithic site has been eroded and some of the flintwork is in disturbed contexts.

Laboratory comment: English Heritage (14 June 2014), the two radiocarbon determinations (GU-5380–1) are statistically consistent (T′=1.0; T′(5%)=3.8; v=1; Ward and Wilson 1978). Their weighted mean (3595 ±36 BP) calibrates to 2040–1880 cal BC at 95% confidence (Reimer *et al* 2004).

Laboratory comment: see GU-5376

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

GU–5381 3630 ±50 BP

δ¹³C: -28.2‰

Sample: MST 01 0002/2, submitted on 24 January 1994 by D Garton

Material: peat (humin) (J Tallis 1993)

Initial comment: as GU-5380

Objectives: as GU-5380

Calibrated date: *1σ:* 2120–1920 cal BC
2σ: 2140–1880 cal BC

Final comment: see GU-5380

Laboratory comment: see GU-5377

North Somerset Moors: boat, Somerset

Location: ST 35456587
Lat. 51.23.08 N; Long. 02.55.39 W

Project manager: M Clarke (Banwell Archaeology Society), June 1974

Archival body: unknown

Description: two fragments of curved black timber were seen by contractors during excavations for a sewage main across Congresbury Moor. They appeared to belong to a boat, but were lost during the works. The remains were found in cutting the approach to the west bank of the River Banwell, east of Collum Farm, at a depth of 18 feet (5.5m below the ground level). A salvaged piece measured 0.41m by 0.14m by 0.06m, and appeared to have been worked, although not curved as the other pieces described by the contractors. This piece was forwarded to Mr P J Fowler at Bristol University for dating at the Harwell Radiocarbon Laboratory.

Objectives: to date the timber and to place the discovery within its context.

Final comment: B Mowat (22 November 2012), in the absence of any apparently demonstrable equation of this timber with a specifically-recognisable boat timber, of a species identification, jointing or other features, or of any form of recorded situation within the local stratigraphy, any suggestion that this timber represents the loss of a ship or boat can be no more than highly tentative. Particular concern attaches to the reported depth of discovery, which is inconsistent with that (within the top 0.9m of the surface alluvium) at which discoveries of the Roman period are normally made in this area.

References: Clarke 1977
Clarke 1979
Rippon 2006

HAR–1213 1600 ±90 BP

$\delta^{13}C$: -26.0 ±1.0‰

Sample: AML 744090, submitted in September 1974 by M Clarke, P Fowler, and R Mercer

Material: wood (waterlogged): unidentified

Initial comment: wood described as 'black and hard' although 'not curved', thought to be from a boat and found at a reported depth of 18ft.

Objectives: to date the timber.

Calibrated date: *1σ:* cal AD 350–570
2σ: cal AD 240–650

Final comment: M Clarke (1977), the date is surprising as many Roman sites on the Northern Levels occur in the top metre of alluvium, in contrast to the depth that this timber was found. It is a matter of regret that the timber could not be studied in its context. However, it is tentatively suggested that the object from which the timber came could have been deposited (naturally, or by human hand) in a creek which had intrenched itself into the alluvium below the fourth-century AD moor's surface; the creek having since been obliterated. This creek could most likely have been part of what is known as Northfield Rhyne, a tributary of the River Banwell which rises in the lowlands north of Worle (Clarke 1977, 42).

Final comment: P Fowler (15 October 2012), a date in the mid first millennium AD would fit well into the flooding, and alluvial deposition, of this low-lying area in sub- and post-Roman times.

Laboratory comment: English Heritage (13 November 2012), a further measurement on HAR-977 was calculated after topping up, revialling and recounting, after the vial fractured during the first count. A preliminary certificate dated 23 May 1975 states that the result was 1450 ±70 BP. As this did not agree with the first attempt, the material was resampled as HAR-1213. In fact, the two results (the second measurement on HAR-977 and HAR-1213) are statistically consistent (T′=1.7; T′(5%)=3.8; v=1; Ward and Wilson 1978), and so a weighted mean can be taken before calibration (1508 ±56 BP; cal AD 530-620 at 68% confidence, and cal AD 430–650 at 95% confidence; Reimer *et al* 2004). This suggests that in fact the wood's true age lies in the Anglo-Saxon rather than the Roman period. In addition, the wood was not identified to species and therefore it is possible the 'boat' was constructed of 'old wood' and is younger than the radiocarbon date may suggest.

Laboratory comment: AERE Harwell (16 October 1975), this date was produced after the counting vial cracked during the counting of the sample in the first attempt (HAR-977), and it was necessary to start again with the residual material. The quantity was not as much as required to reduce the error term below 90 years.

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

North West Wetlands Survey, Cheshire, Cumbria, Greater Manchester, Lancashire, Merseyside, Shropshire and Staffordshire

Location: *see* individual sites

Project manager: R Middleton (Lancaster University Archaeology Unit), 1990–6

Description: a major programme of archaeological and palaeoecological work on the lowland wetlands of the seven counties, undertaken in partnership with the National Museums and Galleries on Merseyside and the Greater Manchester Archaeological Unit.

A pilot study (Howard-Davis *et al* 1988) had identified areas of peat and collated the known archaeological and palaeoecological data for prehistoric activity associated with the lowland wetlands in the northern area of this study, and highlighted the need for detailed field investigation.

Objectives: to assess the archaeological and palaeoenvironmental potential of the lowland wetlands of the north-west.

References: Cowell and Innes 1994
Hall *et al* 1995
Hodgkinson *et al* 2000
Howard-Davis *et al* 1988
Leah *et al* 1996
Leah 1997
Middleton *et al* 1995
Middleton *et al* forthcoming

North West Wetlands Survey: Aqualate, Staffordshire

Location: SJ 77262013
Lat. 52.46.41 N; Long. 02.20.14 W

Project manager: E Huckerby (Lancaster University Archaeology Unit), 1996

Archival body: Oxford Archaeology

Description: the boat was discovered during a time of low water levels and it was located on the southern margins of the Aqualate mere.

Objectives: to date the boat.

References: Leah *et al* 1996

GU–5670 980 ±60 BP

δ¹³C: -26.8‰

Sample: Aqualate boat, submitted on 8 July 1996 by E Huckerby

Material: wood (waterlogged): *Quercus* sp., heartwood (R Gale 1996)

Initial comment: a boat contained in sediments beside Aqualate mere, first revealed by dry weather in the summer of 1995.

Objectives: to date the boat.

Calibrated date: *1σ:* cal AD 990–1160
2σ: cal AD 900–1210

Final comment: E Huckerby (1997), the date is in general agreement with the dates of other wooden boats from meres and mosses in the North West (Switzur 1989).

References: Switzur 1989

North West Wetlands Survey: Barton Moss, Greater Manchester

Location: SJ 72359700
Lat. 53.28.08 N; Long. 02.25.00 W

Project manager: C Wells (Lancaster University Archaeology Unit), 1993

Archival body: Oxford Archaeology

Description: Barton Moss was one of two locations on Chat Moss where detailed plant macrofossil analysis took place. It was situated close to the heart of the mire complex.

Objectives: to elucidate the time span encompassed by the Barton Moss peat archive and to date significant stratigraphic changes in order to compare with mire ontogeny in the rest of Chat Moss complex.

References: Hall *et al* 1995

GU–5366 3280 ±50 BP

δ¹³C: -27.1‰

Sample: A 20–30cm, submitted in April 1993 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 20–30cm within a peat core of 4m.

Objectives: to date the upper limit on the palaeoecological archive.

Calibrated date: *1σ:* 1630–1500 cal BC
2σ: 1690–1430 cal BC

Final comment: C Wells (1995), the date confirmed the degree of truncation at the site and allowed an upper limit to be placed on the palaeoecological archive.

Laboratory comment: SURRC (1994): the humic acid fraction of this sample was dated.

GU–5367 4300 ±60 BP

δ¹³C: -28.2‰

Sample: B 70–80cm, submitted in April 1993 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 70–80cm within a peat core of 4m.

Objectives: to date the charcoal peaks observed in the peak profile.

Laboratory comment: see GU-5366

Calibrated date: *1σ:* 2930–2880 cal BC
2σ: 3090–2770 cal BC

Final comment: C Wells (1995), the date helped to elucidate the age of charcoal peaks observes in the stratigraphy of the peat profile.

GU–5368 4870 ±60 BP

δ¹³C: -27.7‰

Sample: C 105–115cm, submitted in April 1993 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 105–115cm within a peat core of 4m.

Objectives: to date the charcoal peak within the peat profile.

Calibrated date: *1σ:* 3710–3630 cal BC
2σ: 3780–3520 cal BC

Final comment: C Wells (1995), the date enabled the dating of the stratigraphy at the site and to place a charcoal peak within the peat profile to be assigned a Neolithic context.

GU–5369 6020 ±60 BP

δ¹³C: -28.2‰

Sample: D 152–162cm, submitted in April 1993 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 152–162cm within a peat core of 4m.

Objectives: to date the stratigraphy of the peat profile.

Calibrated date: *1σ:* 5000–4830 cal BC
2σ: 5190–4770 cal BC

Final comment: C Wells (1995), provided a late Mesolithic context for a stratigraphic feature indicating a switch to wetter conditions within a peat profile.

Laboratory comment: see GU-5366

GU–5370 6850 ±60 BP

δ¹³C: -27.8‰

Sample: E 215–225cm, submitted in April 1993 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 215–225cm within a peat core of 4m.

Objectives: to date the charcoal peak within the peat profile.

Calibrated date: *1σ:* 5780–5670 cal BC
2σ: 5880–5630 cal BC

Final comment: C Wells (1995), provided evidence for a Mesolithic age for a charcoal peak recorded within a peat profile.

Laboratory comment: see GU-5366

GU–5371 8480 ±50 BP

$\delta^{13}C$: -27.2‰

Sample: F 330-360cm, submitted in April 1993 by C Wells

Material: peat

Initial comment: from a depth of 330–360cm within a peat core of 4m.

Objectives: to date the stratigraphy of the peat profile.

Calibrated date: *1σ:* 7580–7520 cal BC
2σ: 7600–7480 cal BC

Final comment: C Wells (1995), the result confirmed the early post-Glacial date for the inception of peat formation at the site.

Laboratory comment: see GU-5366

GU–5372 7750 ±60 BP

$\delta^{13}C$: -27.7‰

Sample: G 380–400cm, submitted in April 1993 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 380–400cm within a peat core of 4m.

Objectives: to date the stratigraphy of the peat profile.

Calibrated date: *1σ:* 6650–6490 cal BC
2σ: 6690–6460 cal BC

Final comment: C Wells (1995), the date is almost certainly anomalous because of contamination caused by sampling difficulties experienced at the site.

Laboratory comment: see GU-5366

North West Wetlands Survey: Chat Moss, Greater Manchester

Location: SJ 71169816
Lat. 53.28.45 N; Long. 02.26.05 W

Project manager: C Wells (Lancaster University Archaeology Unit), 1992

Archival body: Oxford Archaeology

Description: Chat Moss, the largest of the mosses in Manchester, lies north of the Mersey and west of central Manchester. The samples were taken from Nook Farm on the northern edge of Chat Moss, approximately 700m south of the Moss Brook.

Objectives: to date the artefactual evidence and provide a date for a possible clearance in this area.

Final comment: E Huckerby (27 July 1994), this series gives results for the initiation of peat development in a north/south transect adjacent to a possible late Mesolithic lithic scatter at Nook Farm on Chat Moss, Greater Manchester. The Neolithic to early Bronze Age dates are consistent with the pollen analytical results which suggest a Neolithic age. The increase in age from GU-5272 to -5271 to -5273 is acceptable as the peat probably gradually spread outwards up the slope of the mineral surface. The date GU-5280 for a birch stump embedded in peat of GU-5273 is in agreement, as is that for the carbonised wood GU-5325.

Laboratory comment: English Heritage (2013), five further dates were funded prior to 1993 and were published in Bayliss *et al* (2013, 121–2; GU-5271–3, -5280, and -5325).

References: Bayliss *et al* 2013, 121–2
Hall *et al* 1995, 50-62

GU–5356 2170 ±50 BP

$\delta^{13}C$: -27.3‰

Sample: Chat6, submitted on 6 January 1994 by E Huckerby

Material: peat (humic acid; Eriophorum)

Initial comment: 5–10cm of peat monolith.

Objectives: to date a clearance phase and see if it correlates with CHAT 7 sample.

Calibrated date: *1σ:* 360–160 cal BC
2σ: 380–50 cal BC

Final comment: E Huckerby (1994), the date at 5-10cm appears to be inconsistent with that of GU-5271 (4590 ±70 BP, 3630–3090 cal BC at 95% confidence; Reimer *et al* 2004) from the same monolith at 25–40cm. It seems likely that the sample was contaminated by more recent material as a result of the peat extraction works.

Laboratory comment: SURRC (1994): the humic acid fraction of this sample was dated.

References: Reimer *et al* 2004

GU–5357 4020 ±50 BP

$\delta^{13}C$: -28.8‰

Sample: Chat7, submitted on 6 January 1994 by E Huckerby

Material: wood and peat (humic acid)

Initial comment: 5–10cm of a 50cm peat monolith.

Objectives: to date the peat and see if it is similar age to CHAT 6 sample.

Calibrated date: *1σ:* 2580–2470 cal BC
2σ: 2840–2460 cal BC

Final comment: E Huckerby (1994), the date at 5–10cm seems consistent with that of GU-5273 (4670 ±60 BP, 3640–3340 cal BC at 95% confidence; Reimer *et al* 2004) at 30–40cm from the same monolith.

Laboratory comment: see GU-5356

References: Reimer *et al* 2004

North West Wetlands Survey: Danes Moss, Cheshire

Location: SJ 90857050
Lat. 53.13.52 N; Long. 02.08.14 W

Project manager: C Wells (Lancaster University Archaeology Unit), 1994

Archival body: Lancaster University Archaeological Unit

Description: Danes Moss is situated to the west of Macclesfield and occupies a shallow basin depression on the watershed between the river Bollin in the north and Cow Brook to the south. Relict peats cover an area *c* 70ha probably reduced from 210ha. The stratigraphy suggest that it developed as a raised mire.

Objectives: the two samples were measured to date two major changes in the peat stratigraphy, ie the change from wood to ombrotrophic peat and the development of pool peat.

Final comment: E Huckerby (1996), only two dates comprise this series and are intended to date specific events in the mire ontogeny. The earlier date of GU-5603 provides a date for the initiation of ombrotrophic conditions and is confirmed by the pollen spectra from the deposits. GU-5602 provides a date for the formation of a pool peat and therefore of wetter conditions at the sampling point.

References: Leah 1997

GU–5602 3150 ±50 BP

$\delta^{13}C$: -27.1‰

Sample: Danes Moss 230–235cm, submitted on 13 July 1995 by E Huckerby

Material: peat (humic acid sphagnum) (C Wells)

Initial comment: from a depth of 230-235cm within a peat core of 5m depth with birch trees growing on the surface.

Objectives: to date a change to *Sphagnum cuspidatum* (pool) peat.

Calibrated date: *1σ:* 1500–1390 cal BC
2σ: 1510–1280 cal BC

Final comment: E Huckerby (1996), this sample was dated to provide a date of the pool peat which suggested wetter conditions on the mire surface. The date is of interest as it was not known what age it was likely to be.

Laboratory comment: SURRC (1995): the humic acid fraction of this sample was dated.

GU–5603 6670 ±60 BP

$\delta^{13}C$: -27.9‰

Sample: Danes Moss 492–500cm, submitted on 13 July 1995 by E Huckerby

Material: wood and peat (humic acid) (C Wells)

Initial comment: from the same core as GU-5602 at a depth of 492–500cm.

Objectives: to date the top of the wood peat prior to a change to ombrotrophic conditions.

Calibrated date: *1σ:* 5640–5540 cal BC
2σ: 5710–5480 cal BC

Final comment: E Huckerby (1996), this sample is of archaeological significance because of the charcoal records associated with the change in conditions. The radiocarbon date is supported by changes in the pollen spectra which suggest a Boreal/Atlantic transition date.

Laboratory comment: see GU-5602

North West Wetlands Survey: Red Moss, Greater Manchester

Location: SD 638100
Lat. 53.35.06 N; Long. 02.32.49 W

Project manager: C Wells (Lancaster University Archaeological Unit), 1992

Archival body: Oxford Archaeology

Description: Red Moss is a relatively small mire, famous as the North WesT's palynological regional type site for the Flandrian (Hibbert *et al* 1971). The site is located near the southern foot of the Rivington uplands. Red Moss was a glacial mere site at the north-western end of a ridge overlooking the Mersey Basin, running toward Kearsley. The survey indicates that probably half of the original mire has been removed, or buried. A number of cores were taken.

Objectives: to assess the extent and survival of peat deposits on the site, which are currently threatened by landfill.

Final comment: E Huckerby (5 October 2012), the three peat samples from Red Moss, Greater Manchester were dated to provide a chronology of changing conditions during the development of the mire. GU-5373 dated the dominance of *Sphagnum imbricatum* on the mire surface in the Iron Age. GU-5374 dated *Sphagnum cuspidatum*, which characterises the growth of pool peats, to the Romano-British/early medieval periods. Stratigraphically the growth of this peat type was expected to be in the late Bronze Age/early Iron Age. The third date, GU-5375, from *Eriphorum/Calluna* peat gave an Iron Age date, although stratigraphically it was thought to be in the Bronze Age. This last sample of peat was dated to provide a chronology for the end of a stable and relatively drier phase of mire development. The series of dates from Red Moss are problematic. Stratigraphically the samples were taken sequentially from an exposed section of the mire to date mire growth. The submission forms suggest that GU-5373 was from the upper peat following an earlier phase of pool peat (GU-5374). The pool peat succeeded stable and relatively drier conditions (GU-5375). It appears that the two lower samples of peat (GU-5374 and GU-5375) may have been contaminated by more recent intrusive material that was not observable in the field.

References: Hall *et al* 1995
Hibbert *et al* 1971

GU–5373 2260 ±50 BP

$\delta^{13}C$: -28.3‰

Sample: Red Moss 1, submitted on 19 January 1994 by C Wells

Material: peat (humic acid*Sphagnum imbricatum*) (C Wells 1993)

Initial comment: from a peat profile exposed in a cutting.

Objectives: to establish the inception of *Sphagnum imbricatum* dominance at the site.

Calibrated date: *1σ:* 400–210 cal BC
2σ: 410–190 cal BC

Final comment: E Huckerby (5 October 2012), GU-5373 dated the inception of *Sphagnum imbricatum* dominance at Red Moss, Greater Manchester. The date confirmed that *Sphagnum imbricatum* became dominant in the Iron Age as expected.

Laboratory comment: SURRC (1995): the humic acid fraction of this sample was dated.

GU–5374 1260 ±50 BP

$\delta^{13}C$: -27.1‰

Sample: Red Moss 2, submitted on 17 January 1994 by C Wells

Material: peat (*Sphagnum aspidatum*) (C Wells 1993)

Initial comment: from a profile exposed in the cutting.

Objectives: the sample may represent a sharp change to wetter conditions at the site.

Calibrated date: *1σ:* cal AD 670–780
2σ: cal AD 650–890

Final comment: E Huckerby (5 October 2012), GU-5374 dated a sample of *Sphagnum cuspidatum* peat at Red Moss, Greater Manchester. *Sphagnum cuspidatum* peat suggests wet conditions, and at red Moss was thought to represent a change to much wetter conditions in the late Bronze Age or early Iron Age. The resulting date range is, however, from the early medieval period. In the absence of any information about the exact depth from which the sample was taken in relation to GU-5373 and GU-7375, it is difficult to say whether the unexpected date was the result of modern contamination, or represents a change to wetter conditions in the early medieval period, when there is also thought to have been a deterioration in climatic conditions.

Laboratory comment: see GU-5373

GU–5375 2330 ±50 BP

$\delta^{13}C$: -27.1‰

Sample: Red Moss 3, submitted on 19 January 1994 by C Wells

Material: peat (humic acid; *Eriophorum*/*Calluna*) (C Wells 1993)

Initial comment: from a peat profile exposed in a cutting.

Objectives: the sample represents the end of a stable and relatively dry period of mire growth.

Calibrated date: *1σ:* 410–380 cal BC
2σ: 520–230 cal BC

Final comment: E Huckerby (5 October 2012), GU-5375 dated a sample of *Eriophorum*/*Calluna* peat from Red Moss, Greater Manchester. The peat marked the upper boundary of a stable and relatively dry period of mire development. A Bronze Age date was expected but the result indicated an Iron Age one, which was unexpected as the climate was thought to be wetter at this time. In the absence of any information about the relative depth of the peat, it is not possible to say whether this later date is the result of modern contamination, or that drier conditions prevailed on the mire surface into the middle Iron Age.

Laboratory comment: see GU-5373

North West Wetlands Survey: Rhonda's Moss, Lancashire

Location: SD 42302005
Lat. 53.40.25 N; Long. 02.52.25 W

Project manager: R Middleton (Lancaster University Archaeology Unit), November 1995

Archival body: Lancaster University Archaeological Unit

Description: a small (*c* 1ha) area of upstanding peat in the southern portion of Tarleton Moss *c* 8 miles south-west of Preston, Lancashire.

Objectives: the single sample was dated to give an age for the initiation of the peat at the site.

References: Middleton *et al* 1995

GU–5622 9810 ±90 BP

$\delta^{13}C$: -30.1‰

Sample: 1.60m below peg, submitted on 13 November 1995 by E Huckerby

Material: peat (humic acid; *Phragmites*)

Initial comment: the sample was taken from the face of a dried out drainage ditch below the level of the ditch bottom.

Objectives: to date the inception of peat after a marine transgression. The peat body is possibly a remnant of top moss and might therefore provide a record of the vegetational history for the past 6000 years.

Calibrated date: *1σ:* 9320–9230 cal BC
2σ: 9450–9140 cal BC

Final comment: E Huckerby (28 May 1996), the date was totally unexpected as it was assumed that peat was probably contemporary with that in the Over Wyre and Lytham districts of North Lancashire. It was thought that Rhonda's Moss was a rare example of 'Top Moss' but the date suggests that the peat is truncated and therefore will not provide a record of later prehistory or the historic period. However, it will provide a record of the Mesolithic and possibly the Neolithic periods.

Laboratory comment: SURRC (1996): the humic acid fraction of this sample was dated.

North West Wetlands Survey: Thwaite House Moss, Lancashire

Location: SD 497689
Lat. 54.06.48 N; Long. 02.46.10 W

Project manager: C Wells (Lancaster University Archaeology Unit), 1993

Archival body: Lancashire Museums Service

Description: Thwaite House Moss is a large basin mire lying between Carnforth and Lancaster, which occupies a depression in fluvio-glacial sands and gravels, which overlie carboniferous limestone country rock.

Objectives: to provide a dating framework for studying early clearance activity affecting the North Lancaster limestone areas.

Final comment: C Wells (17 February 1995), the series of dates have verified Mesolithic activity and also major Neolithic disturbance as well as clarifying the limits of the palynological record (by confirming truncation).

References: Middleton *et al* 1995

GU–5326 1540 ±50 BP

Sample: THM1 40–60cm, submitted in 1993 by C Wells

Material: peat (humic acid; fen)

Initial comment: slice from peat core at 40–60cm.

Objectives: to ascertain the age of the upper stratigraphy of a core from the basin mire.

Calibrated date: *1σ:* cal AD 420–580
2σ: cal AD 400–640

Final comment: C Wells (17 February 1995), it confirmed the stratigraphy was truncated, probably by medieval turbancy.

Laboratory comment: SURRC (1993): the humic acid fraction of this sample was dated.

GU–5327 4350 ±60 BP

δ¹³C: -27.8‰

Sample: THM2 105–120cm, submitted in 1993 by C Wells

Material: peat (humic acid; fen)

Initial comment: slice from peat core at 105–120cm.

Objectives: as GU-5326

Calibrated date: *1σ:* 3080–2900 cal BC
2σ: 3270–2880 cal BC

Final comment: C Wells (17 February 1995), it verified that a hiatus existed near the very top of the stratigraphy.

Laboratory comment: see GU-5326

GU–5328 5960 ±70 BP

δ¹³C: -28.8‰

Sample: THM3 285–300cm, submitted in 1993 by C Wells

Material: peat (humic acid; fen)

Initial comment: slice from peat core at 285–300cm.

Objectives: to ascertain the age of the clearance activity identified in the pollen sequence.

Calibrated date: *1σ:* 4940–4720 cal BC
2σ: 5020–4690 cal BC

Final comment: C Wells (17 February 1995), the dating helped to elucidate the nature of clearance activity identified in the pollen record from core from a basin mire.

Laboratory comment: see GU-5326

GU–5329 7600 ±120 BP

δ¹³C: -28.8‰

Sample: THM4 450–480cm, submitted in 1993 by C Wells

Material: peat (humic acid; fen)

Initial comment: slice from peat core at 450–480cm.

Objectives: to ascertain the age for an early clearance horizon identified in the pollen sequence.

Calibrated date: *1σ:* 6590–6380 cal BC
2σ: 6660–6220 cal BC

Final comment: C Wells (17 February 1995), the dating verified a Mesolithic age for early clearance indicators identified in pollen record from peat core in a basin mire.

Laboratory comment: see GU-5326

GU–5330 9860 ±110 BP

δ¹³C: -24.3‰

Sample: THM5 615–645cm, submitted in 1993 by C Wells

Material: peat (humic acid; fen)

Initial comment: slice from peat core at 615–645cm, the basal deposit.

Objectives: to ascertain the age of the initiation of peat growth in basin mire.

Calibrated date: *1σ:* 9440–9240 cal BC
2σ: 9760–9150 cal BC

Final comment: C Wells (17 February 1995), the dating verified an immediate post-glacial age for the earliest deposits from a basin mire.

Laboratory comment: see GU-5326

North West Wetlands Survey: Top Moss, Shropshire

Location: SJ 570270
Lat. 52.50.18 N; Long. 02.38.18 W

Project manager: C Wells (Lancaster University Archaeological Unit), November 1995

Archival body: Lancaster University Archaeological Unit

Description: Top Moss lies some 12km to the south of Brown Moss and is located to the east of the modern A49, at the point where it bypasses the village of Lee Brockhurst. Top Moss lies immediately beneath imposing sandstone outcrop, which is crowned by Bury Walls hillfort.

Objectives: to date the stratigraphic elements and provide a chronological framework for pollen analyses.

Final comment: E Huckerby (17 June 1997), the three samples from Top Moss were analysed to date stratigraphic and pollen analytical changes in a peat core from a relict raised mire in close proximity to an Iron Age hillfort. OxA-6746 and OxA-6639 confirm the pollen analytical evidence however OxA-6640 is more recent than the pollen diagram suggests in comparison with other sites in Shropshire but this is possibly a factor of the topographic position of the mire.

References: Hedges *et al* 1998, 451
Leah *et al* 1996

OxA–6639 3220 ±50 BP

$\delta^{13}C$: -26.9‰

Sample: 104-106, submitted on 22 July 1996 by E Huckerby

Material: peat (humin; Amorphous peat and *Calluna*) (C Wells 1996)

Initial comment: sample taken 1.04–1.06m from a peat core from a relict raised mire system.

Objectives: to date the formation of a significant curve of grass pollen in a pollen diagram.

Calibrated date: *1σ:* 1530–1430 cal BC
2σ: 1620–1400 cal BC

Final comment: E Huckerby (17 June 1997), the sample was taken to date the formation of a significant curve of grass pollen and other evidence of disturbance in a pollen diagram. The date confirms the pollen evidence of the early Bronze Age. It also dates the decline of *Tilia* pollen within the same age range as other sites in Shropshire.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1997): the humin fraction of this sample was dated.

OxA–6640 2195 ±50 BP

$\delta^{13}C$: -24.1‰

Sample: 56-58, submitted on 22 July 1996 by E Huckerby

Material: peat (humin; *Eriophorum Calluna*) (C Wells 1996)

Initial comment: sample taken at 0.56–0.58m in a peat core.

Objectives: as OxA-6639

Calibrated date: *1σ:* 370–190 cal BC
2σ: 400–100 cal BC

Final comment: E Huckerby (17 June 1997), the sample was analysed to date the formation of a continuous curve of cereal pollen in a pollen diagram. By comparison with other sites in Shropshire this date is later than the pollen diagram suggested. However, this maybe a factor of the topographic position of the site in relation to the Iron Age hillfort.

Laboratory comment: see OxA-6639

OxA–6746 3800 ±55 BP

$\delta^{13}C$: -26.2‰

Sample: 195–197, submitted on 22 July 1996 by E Huckerby

Material: peat (humin; *Aulocomnium* (possibly)) (E Huckerby 1996)

Initial comment: Bryophytes, which were isolated from a peat sample 1.95-1.97m from the surface of a relict raised mire system.

Objectives: to date a layer of *Aulocomnium, Potytrichum* and *Sphagnum* sect *Acutifolia* peat in the peat stratigraphy.

Calibrated date: *1σ:* 2300–2140 cal BC
2σ: 2470–2030 cal BC

Final comment: E Huckerby (17 June 1997), the date falls within the general prehistoric period that the pollen diagram suggests.

Laboratory comment: see OxA-6639

Laboratory comment: ORAU (25 March 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code VV).

References: Brock *et al* 2010

North West Wetlands Survey: Walker's Heath, Cheshire

Location: SJ 86707045
Lat. 53.13.50 N; Long. 02.11.57 W

Project manager: C Wells (Lancaster University Archaeological Unit), November 1994 and June 1995

Archival body: Lancaster University Archaeological Unit

Description: a small area of relict valley mire peat surrounded by arable land, under cereals at the time of the survey. This was set in hollow between sandy hillocks. The site is *c* 2km north-west of Gawsworth in a area west of Macclesfield.

Objectives: this series was measured to date a pollen profile that exhibited changes to the vegetation related to Mesolithic charcoal records, on pollen evidence.

Final comment: E Huckerby (16 April 1996), GU-5604-6 were not from the original pollen core and therefore they are correlated by pollen spectra, in particular the marked *Alnus* expansion. This results in dates for more recent events in the sequence than originally intended. They do, however, confirm the date of a major vegetational change in the postglacial, ie the Boreal/Atlantic transition and fall within the expected range. OxA-6139 and OxA-6140 date peat from the original profile; they date the peat both prior and during a temporary phase of grassland associated with charcoal. They support the pollen evidence of a very early Mesolithic date. Stratigraphically OxA-6140 would appear to be younger than expected.

References: Leah 1997

GU–5604 7910 ±50 BP

$\delta^{13}C$: -27.7‰

Sample: 125–135cm, submitted on 13 July 1995 by E Huckerby

Material: peat (humic acid; *Eriophorum Calluna*) (C Wells 1995)

Initial comment: from 125–135cm of a 3m peat core.

Objectives: to date changes in a pollen diagram.

Calibrated date: *1σ:* 6990–6650 cal BC
2σ: 7050–6640 cal BC

Final comment: E Huckerby (16 April 1996), the result dates sediments between 0.81–0.91m of the pollen diagrams from Walkers Heath prior to the expansion of *Alnus* pollen at the Boreal/Atlantic transition. The date was within the range recorded at other sites. It was originally hoped that this sample would date a charcoal band at 1.25m but when the pollen spectra were checked it dated peat prior to the *Alnus* expansion.

Laboratory comment: SURRC (1995): the humic acid fraction of this sample was dated.

GU–5605 7180 ±120 BP

$\delta^{13}C$: -28.2‰

Sample: 110–120cm, submitted on 13 July 1995 by E Huckerby

Material: peat (humic acid; *Eriophorum Calluna*) (C Wells 1995)

Initial comment: from 110–120cm of a 3m peat core.

Objectives: to date peat above a charcoal band related to a reduction in oak and elm pollen.

Calibrated date: *1σ:* 6220–5920 cal BC
2σ: 6340–5810 cal BC

Final comment: E Huckerby (16 April 1996), this sample was intended to date the peats above a charcoal band but when the pollen spectra were cross-checked it dated the expansion of *Alnus* pollen. The result supports other dates for this event. It dates peat between 0.66–0.76m of the Walkers Heath pollen diagram.

Laboratory comment: see GU-5604

GU–5606 5940 ±50 BP

$\delta^{13}C$: -28.1‰

Sample: 80–90cm, submitted on 13 July 1995 by E Huckerby

Material: peat (humic acid; *Eriophorum Calluna*) (C Wells 1995)

Initial comment: from 80–90cm of a 3m peat core.

Objectives: to date the rational limit of *Alnus* pollen related to a charcoal band in the peat core.

Calibrated date: *1σ:* 4900–4720 cal BC
2σ: 4950–4710 cal BC

Final comment: E Huckerby (16 April 1996), when the pollen spectra were cross-checked it was found to relate to the top of the core. The result is in agreement with other dates from the core.

Laboratory comment: see GU-5604

OxA–6139 9450 ±90 BP

$\delta^{13}C$: -27.8‰

Sample: 244–246cm, submitted on 13 November 1995 by E Huckerby

Material: peat (humin; *Eriophorum Calluna*) (C Wells 1995)

Initial comment: the sample was taken at 2.44–2.46m from peat deposits of 3m depth. It is below the level of the water table; and the deposits are a truncated relic of a valley mire.

Objectives: the pollen spectra at this level show evidence of a temporary period of grassland associated with charcoal particles. Due to sampling difficulties it was not possible to obtain a large peat sample.

Calibrated date: *1σ:* 8830–8620 cal BC
2σ: 9150–8490 cal BC

Final comment: E Huckerby (16 April 1996), the radiocarbon date confirms the evidence from the pollen diagram that the replacement of birch scrub by grassland occurred very early in the post-glacial.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1996): the humin fraction of this sample was dated.

References: Hedges *et al* 1996, 410

OxA–6140 9220 ±75 BP

$\delta^{13}C$: -27.6‰

Sample: 260–262cm, submitted on 13 November 1995 by E Huckerby

Material: peat (humic acid; wood peat) (C Wells 1995)

Initial comment: the sample was taken at 2.60–2.62m from peat deposits of 3m depth.

Objectives: stratigraphically the sample is a little below a phase in a pollen diagram where there is a very marked change in the pollen spectra associated with burning.

Calibrated date: *1σ:* 8560–8300 cal BC
2σ: 8640–8280 cal BC

Final comment: E Huckerby (16 April 1996), the result appears to be a little younger than would be expected stratigraphically.

Laboratory comment: see OxA-6139

References: Hedges *et al* 1996, 410

North West Wetlands Survey: Worsley Farm, Greater Manchester

Location: SJ 71109432
Lat. 53.28.08 N; Long. 02.25.00 W

Project manager: C Wells (Lancaster University Archaeological Unit), 1994

Archival body: Lancaster University Archaeological Unit

Description: Worsley Farm was located at the south-western extremity of the Chats Moss complex.

Objectives: to provide a chronology for this site within the Chat Moss mire complex.

Final comment: C Wells (18 February 1995), the series of dates confirm the existence of a palaeoecological archive at the site stretching from the early post-Glacial up to the Bronze Age and helps to explore the contemporaneity of stratigraphical features across the Chat Moss mire complex.

References: Hall *et al* 1995

GU–5359 3280 ±60 BP

$\delta^{13}C$: -25.0‰

Sample: A 33–42cm, submitted in April 1994 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 33–42cm within a peat core.

Objectives: to date the upper limit on the peat stratigraphy.

Calibrated date: *1σ:* 1630–1490 cal BC
2σ: 1730–1420 cal BC

Final comment: C Wells (18 February 1995), the sample dated the upper limit of the age of the peat stratigraphy at Worsley Farm and confirmed truncation of the last *c* 3500 years had taken place.

Laboratory comment: SURRC (1995): the humic acid fraction of this sample was dated.

GU–5360 4050 ±70 BP

$\delta^{13}C$: -26.4‰

Sample: B 64–66cm, submitted in April 1994 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 64–66cm within a peat core.

Objectives: to date the shift in stratigraphy.

Calibrated date: *1σ:* 2840–2470 cal BC
2σ: 2880–2450 cal BC

Final comment: C Wells (18 February 1995), the date provided a Neolithic date for a significant shift in the stratigraphy indicating wetter conditions.

Laboratory comment: see GU-5359

GU–5361 4320 ±50 BP

$\delta^{13}C$: -26.6‰

Sample: C 70–77cm, submitted in April 1994 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 70–77cm within a peat core.

Objectives: to date the charcoal peak in the stratigraphy.

Calibrated date: *1σ:* 3010–2890 cal BC
2σ: 3090–2870 cal BC

Final comment: C Wells (18 February 1995), the date provided a Neolithic date for a charcoal peak in the peat stratigraphy.

Laboratory comment: see GU-5359

GU–5362 4950 ±60 BP

$\delta^{13}C$: -26.6‰

Sample: D 110–113cm, submitted in April 1994 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 110–113cm within a peat core.

Objectives: to date the charcoal peak in the stratigraphy.

Calibrated date: *1σ:* 3790–3650 cal BC
2σ: 3940–3630 cal BC

Final comment: C Wells (18 February 1995), the date provided an early Neolithic date for a charcoal peak, which coincided with a change in the stratigraphy.

Laboratory comment: see GU-5359

GU–5363 5270 ±50 BP

$\delta^{13}C$: -26.9‰

Sample: E 150-160cm, submitted in April 1994 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 150–160cm within a peat core.

Objectives: to date the change in the stratigraphy.

Calibrated date: *1σ:* 4230–3990 cal BC
2σ: 4250–3970 cal BC

Final comment: C Wells (18 February 1995), the date provided a Neolithic context for a significant change in stratigraphy, which indicated a shift towards drier conditions at the site.

Laboratory comment: see GU-5359

GU–5364 7980 ±80 BP

$\delta^{13}C$: -24.2‰

Sample: F 300–320cm, submitted in April 1994 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 300–320cm within a peat core.

Objectives: to date the change in the stratigraphy.

Calibrated date: 1σ: 7060–6690 cal BC
2σ: 7090–6640 cal BC

Final comment: C Wells (18 February 1995), the date provided a Mesolithic date for a change in stratigraphy indicative of a shift to wetter conditions at the site.

Laboratory comment: see GU-5359

GU–5365 9140 ±70 BP

$\delta^{13}C$: -28.8‰

Sample: G 410–430cm, submitted in April 1994 by C Wells

Material: peat (humic acid)

Initial comment: from a depth of 410–430cm within a peat core.

Objectives: to date the inception of the pollen/macro record.

Calibrated date: 1σ: 8440–8280 cal BC
2σ: 8560–8240 cal BC

Final comment: C Wells (18 February 1995), the date confirmed an early post-glacial age for the interception of the pollen/macro record at the site.

Laboratory comment: see GU-5359

Norwich, Castle Mall, Norfolk

Location: TG 233084
Lat. 52.37.37 N; Long. 01.17.59 E

Project manager: E Shepherd (Norfolk Archaeological Unit), 1987–91

Description: excavations were carried out within and around the south bailey of the castle. Evidence spans the late Saxon to post-medieval periods.

Objectives: to establish the date of a cemetery sealed by one of the castle ramparts. This cemetery is currently thought to date to the tenth to eleventh centuries AD, but radiocarbon dates may place it earlier.

References: Bayliss *et al* 2004c
Shepherd Popescu 2009a

Norwich Castle Mall: Farmer's Avenue, Norfolk

Location: TG 233084
Lat. 52.37.37 N; Long. 01.17.59 E

Project manager: E Shepherd (Norfolk Archaeological Unit), 1987–91

Archival body: Norfolk Museums Service

Description: this cemetery (as excavated) consists of 85 burials plus bone from 29 disarticulated contexts. Lying beneath the south bailey rampart, it dates on ceramic grounds to the tenth-eleventh centuries AD. One skeleton, however, wore an ansate brooch of eighth-ninth-century type.

Objectives: radiocarbon dates from a cemetery to the north suggest a possible middle Saxon date, while another to the south (Timberhill) has radiocarbon dates of the late tenth to eleventh centuries AD. This could suggest a sequence of cemeteries in the later castle area (a total of five are known) and it is crucial to discover where the Farmer's Avenue cemetery fits into this sequence.

Final comment: E Shepherd Popescu (7 April 2004), this group, relating to a cemetery sealed beneath the late eleventh-/early twelfth-century rampart of Norwich Castle's south bailey, was selected for radiocarbon dating both to confirm the late Saxon date of the burial ground (suggested by pottery and other finds); and to resolve an apparent anomaly between an ansate brooch of eighth–ninth century date and the ceramics, which suggested a late tenth- to mid eleventh-century date. The results indicate that the brooch (which was worn by sk.11667) was probably an heirloom. The acquisition of radiocarbon dates from three separate cemeteries at this site allows fuller understanding of the development sequence.

GU–5733 1100 ±60 BP

$\delta^{13}C$: -19.0 ±0.3‰
$\delta^{15}N$ (diet): +13.4 ±0.3‰

Sample: No 11595, submitted on 16 February 1998 by E Shepherd

Material: human bone (child, 9–10 years) (S Anderson 1998)

Initial comment: from grave 11596, above grave for skeleton 11669 (GU-5736). The skeleton was fully articulated.

Objectives: to establish the date of this cemetery, subsequently sealed by one of the castle ramparts (*c* AD 1068–1122). The burials must be placed in their surrounding context of cemeteries - five are known beneath/around the castle precinct, of which two have so far been dated (one middle Saxon, the other late Saxon).

Calibrated date: 1σ: cal AD 880–1020
2σ: cal AD 770–1030

Final comment: E Shepherd Popescu (7 April 2004), the dating confirms a pre-Conquest burial.

GU–5734 1070 ±50 BP

$\delta^{13}C$: -18.7 ±0.3‰
$\delta^{15}N$ (diet): +10.5 ±0.3‰

Sample: No 11636, submitted on 16 February 1998 by E Shepherd

Material: human bone (young/middle aged female) (S Anderson 1998)

Initial comment: from a grave truncated to the south by a modern feature. The skeleton was fully articulated.

Objectives: as GU-5733

Calibrated date: 1σ: cal AD 890–1020
2σ: cal AD 880–1040

Final comment: E Shepherd Popescu (7 April 2004), the date (cal AD 940–1030) indicates that the brooch in the underlying grave was probably an heirloom and confirms a pre-Conquest burial.

GU–5735 1150 ±70 BP

$\delta^{13}C$: -19.0 ±0.3‰
$\delta^{15}N$ (diet): +11.0 ±0.3‰

Sample: No 11653, submitted on 16 February 1998 by E Shepherd

Material: human bone (female, 21–25 years) (S Anderson 1998)

Initial comment: from a fully articulated skeleton in the isolated grave 1666.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 770–990
2σ: cal AD 680–1030

Final comment: see GU-5733

GU–5736 1070 ±60 BP

$\delta^{13}C$: -18.4 ±0.3‰
$\delta^{15}N$ (diet): +13.9 ±0.3‰

Sample: No 11669, submitted on 16 February 1998 by E Shepherd

Material: human bone (young female) (S Anderson 1998)

Initial comment: from grave 11670 which was above the grave for skeleton 11689 (GU-5737) and below that for skeleton 11595 (GU-5733). The skeleton was fully articulated.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 890–1030
2σ: cal AD 770–1120

Final comment: see GU-5733

GU–5737 1070 ±70 BP

$\delta^{13}C$: -19.2 ±0.3‰
$\delta^{15}N$ (diet): +10.4 ±0.3‰

Sample: No 11689, submitted on 16 February 1998 by E Shepherd

Material: human bone (middle-aged female) (S Anderson 1998)

Initial comment: from grave 11690 which was beneath the grave for skeleton 11669 (GU-5736). The skeleton was fully articulated but there was some truncation by later features.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 890–1030
2σ: cal AD 770–1160

Final comment: see GU-5733

GU–5738 1030 ±50 BP

$\delta^{13}C$: -19.3 ±0.3‰
$\delta^{15}N$ (diet): +10.1 ±0.3‰

Sample: No 11723, submitted on 16 February 1998 by E Shepherd

Material: human bone (middle-aged/old female) (S Anderson 1998)

Initial comment: from grave 11724, which was above the grave for skeleton 11806 (GU-5740). The skeleton was fully articulated, though some parts were truncated.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 980–1030
2σ: cal AD 890–1160

Final comment: see GU-5733

GU–5739 1140 ±60 BP

$\delta^{13}C$: -19.7 ±0.3‰
$\delta^{15}N$ (diet): +9.9 ±0.3‰

Sample: No 11775, submitted on 16 February 1998 by E Shepherd

Material: human bone (young/middle-aged female) (S Anderson 1998)

Initial comment: from a fully articulated skeleton in an isolated grave.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 770–990
2σ: cal AD 710–1020

Final comment: see GU-5733

GU–5740 1050 ±50 BP

$\delta^{13}C$: -19.0 ±0.3‰
$\delta^{15}N$ (diet): +11.7 ±0.3‰

Sample: No 11806, submitted on 16 February 1998 by E Shepherd

Material: human bone (young ?male) (S Anderson 1998)

Initial comment: from grave 11805, which was beneath the grave for skeleton 11723 (GU-5738). The skeleton was fully articulated, but some parts were truncated. The individual ossibly suffered from Scheurmann's Disease.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 960–1030
2σ: cal AD 880–1120

Final comment: see GU-5733

GU–5741 1070 ±50 BP

$\delta^{13}C$: -18.9 ±0.3‰
$\delta^{15}N$ (diet): +11.3 ±0.3‰

Sample: No 22031, submitted on 16 February 1998 by E Shepherd

Material: human bone (old female) (S Anderson 1998)

Initial comment: from an outlying isolated grave in the north eastern part of the cemetery. One of four graves overlying a pit group, containing pottery dated to the late tenth to eleventh centuries.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 890–1020
2σ: cal AD 880–1040

Final comment: E Shepherd Popescu (7 April 2004), this date combined with ceramic dates may indicate burial in the early eleventh century AD.

GU–5742 1000 ±60 BP

δ¹³C: -18.7 ±0.3‰
δ¹⁵N (diet): +11.9 ±0.3‰

Sample: No 22116, submitted on 16 February 1998 by E Shepherd

Material: human bone (child, 10–11 years) (S Anderson 1998)

Initial comment: from an outlying grave in the north eastern part of the cemetery. Only the lower legs and feet and one arm survived truncation. One of four graves overlying a pit group, containing pottery dated to the late tenth to eleventh centuries AD.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 980–1150
2σ: cal AD 890–1170

Final comment: see GU-5741

GU–5743 1200 ±120 BP

δ¹³C: -20.4 ±0.3‰
δ¹⁵N (diet): +9.3 ±0.3‰

Sample: No 60381, submitted on 16 February 1998 by E Shepherd

Material: human bone (middle-aged/old female) (S Anderson 1998)

Initial comment: from an isolated grave in the northern part of the cemetery. This skeleton shows notable pathological conditions, and DNA analysis indicates similar genetic traits to individuals in Orkney.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 670–990
2σ: cal AD 610–1040

Final comment: see GU-5733

GU–5744 1000 ±50 BP

δ¹³C: -19.5 ±0.3‰
δ¹⁵N (diet): +10.1 ±0.3‰

Sample: No 60458, submitted on 16 February 1998 by E Shepherd

Material: human bone (middle-aged/old female) (S Anderson 1998)

Initial comment: from a fully articulated skeleton in isolated grave 60455. The burial was positioned with the left arm across the waist and the right arm crossed up towards the left shoulder.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 990–1120
2σ: cal AD 900–1160

Final comment: see GU-5733

GU–5745 1040 ±80 BP

δ¹³C: -19.1 ±0.3‰
δ¹⁵N (diet): +9.6 ±0.3‰

Sample: No 60466, submitted on 16 February 1998 by E Shepherd

Material: human bone (middle-aged/old female) (S Anderson 1998)

Initial comment: from isolated grave 60467 in the northern part of the cemetery. The individual suffered from metopism.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 890–1040
2σ: cal AD 770–1170

Final comment: E Shepherd Popescu (7 April 2004), DNA analysis indicates this individual shared the same DNA haplotype as Sk. 11681 from the same cemetery, suggesting a material relationship (although this may be coincidence as these are common European variants).

GU–5746 950 ±50 BP

δ¹³C: -19.4 ±0.3‰
δ¹⁵N (diet): +10.6 ±0.3‰

Sample: No 60502, submitted on 16 February 1998 by E Shepherd

Material: human bone (35–40 year old female) (S Anderson 1998)

Initial comment: from a fully articulated skeleton in an isolated grave, which survived to 0.36m deep. The individual suffered from metopism.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 1020–1160
2σ: cal AD 990–1220

Final comment: see GU-5733

GU–5747 1090 ±70 BP

δ¹³C: -21.2 ±0.3‰
δ¹⁵N (diet): +7.2 ±0.3‰

Sample: No 60541, submitted on 16 February 1998 by E Shepherd

Material: human bone (middle-aged/old male) (S Anderson 1998)

Initial comment: from a fully articulated skeleton in grave 60542, which contained a wooden coffin stain. The individual was buried with the arms crossed above chest, and had a possible traumatic injury to the left shoulder and left foot.

Objectives: as GU-5733

Calibrated date: *1σ:* cal AD 880–1020
2σ: cal AD 770–1120

Final comment: see GU-5733

Norwich Castle Mall: Timberhill, Norfolk

Location: TG 233084
Lat. 52.37.37 N; Long. 01.17.59 E

Project manager: E Shepherd (Norfolk Archaeological Unit), 1987–91

Archival body: Norfolk Museums Service

Description: a total of 189 burials were recovered from the northern most part of the churchyard of St John at the Castle Gate (de Berstrete, now St John the Baptist, Timberhill). This graveyard was originally thought to date from the twelfth to fourteenth centuries, although initial radiocarbon dating suggested an early pre-Conquest date.

Objectives: three burials lay to the east of the cemetery and were recorded as cutting into the fills of a castle-related ditch. If these also give a pre-Conquest date, they would entail a reinterpretation of the ditch (eg as that forming the southern limit of the Saxon burgh). Alternatively they could be late burials. The most unusual aspect of this cemetery was the presence of a high level of leprosy, possibly affecting a fifth of the excavated population.

Final comment: E Shepherd (29 January 2002), the discovery through the radiocarbon of two groups of middle Saxon burials in this area of Norwich was unexpected, as was the early date for the lepers at Timberhill. These burials appear to be partially contemporary with those from Farmer's Avenue, although the cemetery was in use for less time.

Laboratory comment: English Heritage (20 May 2014), following radioacarbon dating at the Oxford Radiocarbon Accelerator Unit, carbon and nitrogen stable isotopic measurements were undertaken at the Rafter Radiocarbon Laboratory using methods outined in Beavan-Athfield (2000). Stable isotopic measuremetns for samples dated at East Kilbride were made as described by Cook *et al* (2001).

References: Bayliss *et al* 2004
Beavan-Athfield 2000
Cook *et al* 2001
Shepherd Popescu 2009b

GU–5748 950 ±60 BP

$\delta^{13}C$: -19.9‰
$\delta^{13}C$ (diet): -19.2 ±0.3‰
$\delta^{15}N$ (diet): +11.5 ±0.3‰

Sample: 11518, submitted on 16 February 1998 by E Shepherd

Material: human bone (child aged 12–15 years) (S Anderson 1998)

Initial comment: this child burial was cut into the fills of a castle-related ditch, the fills of which are dated by pottery to the twelfth century AD. The skeleton was fully articulated and came from grave 11872. The burial was later than 11502 (GU-5749).

Objectives: this skeleton could be a late child burial on the northern side of the church (as GU-5749).

Calibrated date: *1σ:* cal AD 1020–1170
2σ: cal AD 980–1220

Final comment: E Shepherd (2002), the date proves that the burial was later than burial 11502 (GU-5749).

GU–5749 910 ±70 BP

$\delta^{13}C$: -20.3 ±0.3‰
$\delta^{13}C$ (diet): -19.4 ±0.3‰
$\delta^{15}N$ (diet): +10.8 ±0.3‰

Sample: 11502, submitted on 16 February 1998 by E Shepherd

Material: human bone (old male) (S Anderson 1998)

Initial comment: from a fully articulated skeleton in grave 11877. The grave cut into the fills of a castle-related ditch. The fills have been dated by pottery to the twelfth century AD. The burial was earlier than GU-5748.

Objectives: to establish the period of use of the cemetery to the north-east of the church. This may lead to a reinterpretation of the ditch the grave cut (ie as the possible boundary of Norwich's Saxon burgh) and/or the reinterpretation of the stratigraphic sequence. The dating so far carried out has significant implications for the Norwich/Norfolk ceramic sequence during the late Saxon and early medieval periods.

Calibrated date: *1σ:* cal AD 1020–1220
2σ: cal AD 990–1270

Final comment: E Shepherd (2002), the date proves that this burial is earlier than burial 11518 (GU-5748).

OxA–6370 950 ±90 BP

$\delta^{13}C$: -19.8‰
$\delta^{13}C$ (diet): -18.8 ±0.3‰
$\delta^{15}N$ (diet): +9.8 ±0.3‰

Sample: 11116, submitted on 12 January 1996 by E Shepherd

Material: human bone (young female) (S Anderson)

Initial comment: this burial lay in the north-western part of the cemetery and was stratigraphically earlier than burial 11117 (OxA-6881). The skeleton belongs to 'family 2' and has more than one zygoma-facial foramen on each side. Other samples from this north-west part of the cemetery are OxA-6372, OxA-6373, OxA-6374, and OxA-6881. These samples also belong to 'family 2'.

Objectives: the excavated part of the medieval cemetery of St John de Berstrete (now Timberhill) dates to the twelfth to fifteenth centuries and includes a significant number of lepers (up to 35). Closer dating will aid the interpretation of the cemetery's development and its relationship to surrounding tenements. For the lepers it will enable a clearer understanding of why they were buried here (eg in relation to documentary evidence).

Calibrated date: *1σ:* cal AD 990–1190
2σ: cal AD 890–1270

Final comment: E Shepherd (1999), the samples (OxA-6370 to -8385, and -6881) came from the northern part of the cemetery of St John de Berstrete (later St John the Baptist, Timberhill), the earliest documentary reference to the church being made in AD 1157. This cemetery, which contains a high proportion of leper burials lies just to the south-west of the castle precinct. On the basis of ceramics, documentary evidence and stratigraphic position, this part of the cemetery had been dated to the late twelfth to fourteenth century. It was envisaged that the radiocarbon dates might help to date the leper burials more closely, given their unexpected location within the medieval city. In the event, the radiocarbon dates are pre-Conquest, implying significant changes in interpretation and conflicting with the present ceramic sequence for Norwich/Norfolk. One burial (OxA-6382) has a middle Saxon date and, again, this cemetery may have been in use much earlier than previously thought.

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6371 950 ±90 BP

δ¹³C: -18.9‰

Sample: 11117, submitted on 12 January 1996 by E Shepherd

Material: human bone (leper, ?male, ?16–20 years) (S Anderson)

Initial comment: as OxA-6881

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 990–1190
2σ: cal AD 890–1270

Final comment: see OxA-6370

Laboratory comment: see OxA-6881

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6372 970 ±90 BP

δ¹³C: -19.7‰
δ¹³C (diet): -19.3 ±0.3‰
δ¹⁵N (diet): +10.5 ±0.3‰

Sample: 11187, submitted on 12 January 1996 by E Shepherd

Material: human bone (child, 10–12 years) (S Anderson)

Initial comment: this burial came from the north-western part of the cemetery, as OxA-6370, and the grave was stratigraphically above leper burial 11235 (OxA-6373). As OxA-6370, the skeleton belongs to 'family 2' and has more than one zygoma-facial foramen on each side.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 980–1170
2σ: cal AD 880–1260

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6373 1070 ±90 BP

δ¹³C: -19.3‰
δ¹³C (diet): -18.7 ±0.3‰
δ¹⁵N (diet): +10.8 ±0.3‰

Sample: 11235, submitted on 12 January 1996 by E Shepherd

Material: human bone (young female) (S Anderson)

Initial comment: from the north-western part of the cemetery. The grave was stratigraphically above burial 11245 (OxA-6374) and below 11187 (OxA-6372). It survived to a depth of 0.09m and had been truncated to the south-east by a wall construction trench. The skeleton belongs to 'family 2' and has metopism, epipteric bones, and two parietal notch bones.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 880–1030
2σ: cal AD 720–1170

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6374 1120 ±100 BP

δ¹³C: -19.4‰
δ¹³C (diet): -17.8 ±0.3‰
δ¹⁵N (diet): +11.5 ±0.3‰

Sample: 11245, submitted on 12 January 1996 by E Shepherd

Material: human bone (middle-aged female) (S Anderson)

Initial comment: this burial came from the north-western part of the cemetery and the grave was stratigraphically below leper burial 11235. The skeleton belongs to 'family 2' and has metopism, palatine tori, epipteric bones, and more than one zygoma-facial foramen on each side.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 770–1020
2σ: cal AD 670–1160

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6375 1060 ±90 BP

δ¹³C: -19.1‰
δ¹³C (diet): -19.9 ±0.3‰
δ¹⁵N (diet): +10.9 ±0.3‰

Sample: 11290 (13008), submitted on 12 January 1996 by E Shepherd

Material: human bone (middle-aged female) (S Anderson)

Initial comment: this burial lay in the eastern part of the cemetery and the grave was stratigraphically above burial 11328. The skeleton belongs to 'family 9' (equates with skeleton 13008) and has spondyloysis.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 890–1040
2σ: cal AD 730–1170

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6376 1040 ±90 BP

$\delta^{13}C$: -18.6‰
$\delta^{13}C$ (diet): -17.0 ±0.3‰
$\delta^{15}N$ (diet): +11.7 ±0.3‰

Sample: 11328 (13009), submitted on 12 January 1996 by E Shepherd

Material: human bone (leper, unsexed, *c* 16 years old) (S Anderson)

Initial comment: this burial lay in the eastern part of the cemetery and lay below 11290 and above 13156. The skeleton belongs to 'family 8' and has parietal notch bones.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 890–1120
2σ: cal AD 770–1190

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6377 1130 ±90 BP

$\delta^{13}C$: -17.9‰
$\delta^{13}C$ (diet): -18.8 ±0.3‰
$\delta^{15}N$ (diet): +13.5 ±0.3‰

Sample: 13055, submitted on 12 January 1996 by E Shepherd

Material: human bone (probably leper, unsexed, aged *c* 16–19 years) (S Anderson)

Initial comment: this grave lay in the southern part of the excavated cemetery and was stratigraphically above skeletons 13181, 13119, and 13111. This burial lay in a flint and chalk-lined grave which closely fitted the body.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 770–1020
2σ: cal AD 670–1120

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6378 1130 ±90 BP

$\delta^{13}C$: -19.3‰
$\delta^{13}C$ (diet): -19.1 ±0.3‰
$\delta^{15}N$ (diet): +12.0 ±0.3‰

Sample: 13093, submitted on 12 January 1996 by E Shepherd

Material: human bone (?young ?female) (S Anderson)

Initial comment: this grave lay in the southern part of the cemetery. It was stratigraphically below skeleton 13055 and above skeleton 13111. No grave cut was recorded and the burial had been truncated by later graves.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 770–1020
2σ: cal AD 670–1120

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6379 1000 ±90 BP

$\delta^{13}C$: -19.5‰
$\delta^{13}C$ (diet): -20.6 ±0.3‰
$\delta^{15}N$ (diet): +11.4 ±0.3‰

Sample: 13111, submitted on 12 January 1996 by E Shepherd

Material: human bone (leper, young/middle-aged female) (S Anderson)

Initial comment: this grave lay in the southern part of the excavated cemetery. The grave cut was not distinguishable. The skeleton lay below skeleton 13093 and above skeleton 13178.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 970–1160
2σ: cal AD 780–1230

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6380 985 ±45 BP

$\delta^{13}C$: -19.7‰
$\delta^{13}C$ (diet): -19.3 ±0.3‰
$\delta^{15}N$ (diet): +10.0 ±0.3‰

Sample: 13119, submitted on 12 January 1996 by E Shepherd

Material: human bone (possible leper, ?female, aged 25–30 years) (S Anderson)

Initial comment: the burial lay in the southern part of the excavated cemetery. Two skulls were reinterred above the right arm. The burial was stratigraphically below skeleton 13055 and above skeleton 13178.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 1010–1150
2σ: cal AD 980–1160

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200-1

OxA–6381 1035 ±40 BP

δ¹³C: -19.9‰
δ¹³C (diet): -20.4 ±0.3‰
δ¹⁵N (diet): +10.7 ±0.3‰

Sample: 13125, submitted on 12 January 1996 by E Shepherd

Material: human bone (old ?female) (S Anderson)

Initial comment: from the southern part of the excavated cemetery.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 980–1030
2σ: cal AD 890–1040

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200-1

OxA–6382 1420 ±45 BP

δ¹³C: -20.3‰
δ¹³C (diet): -20.9 ±0.3‰
δ¹⁵N (diet): +10.7 ±0.3‰

Sample: 13156, submitted on 12 January 1996 by E Shepherd

Material: human bone (child, aged 6–10 years) (S Anderson)

Initial comment: this burial lay in the eastern part of the cemetery and was stratigraphically below burial 11328. The skeleton belongs to 'family 8' and has parietal notch bones.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 600–660
2σ: cal AD 550–670

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6383 1060 ±40 BP

δ¹³C: -19.7‰
δ¹³C (diet): -20.3 ±0.3‰
δ¹⁵N (diet): +11.0 ±0.3‰

Sample: 13158, submitted on 12 January 1996 by E Shepherd

Material: human bone (middle-aged female) (S Anderson)

Initial comment: the burial lay in the southern part of the excavated cemetery, beneath skeleton 13125 and above 13181. The grave cut was much truncated.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 960–1020
2σ: cal AD 890–1030

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6384 1050 ±60 BP

δ¹³C: -18.6‰
δ¹³C (diet): -20.4 ±0.3‰
δ¹⁵N (diet): +11.8 ±0.3‰

Sample: 13178, submitted on 12 January 1996 by E Shepherd

Material: human bone (child, aged 18–24 months) (S Anderson)

Initial comment: the burial lay in the southern part of the excavated cemetery. It lay stratigraphically beneath skeleton 13119 and 13111.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 900–1030
2σ: cal AD 880–1160

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6385 1035 ±55 BP

δ¹³C: -19.9‰
δ¹³C (diet): -20.0 ±0.3‰
δ¹⁵N (diet): +10.2 ±0.3‰

Sample: 13181, submitted on 12 January 1996 by E Shepherd

Material: human bone (probable leper, middle-aged/old male) (S Anderson)

Initial comment: the burial lay in the southern part of the excavated cemetery and was stratigraphically beneath skeleton 13158.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 970–1030
2σ: cal AD 890–1160

Final comment: see OxA-6370

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6386 1280 ±100 BP

δ¹³C: -19.3‰

Sample: 45068, submitted on 12 January 1996 by E Shepherd

Material: human bone (left humerus, adult) (S Anderson)

Initial comment: the bone was one of several recovered from the fill of a modern service trench. The trench had preserved residual material from features it cut. The earlier features were then removed during an episode of landscaping. The large quality of bone from nearby features suggests the presence of a lost cemetery.

Objectives: the sample is part of a large quantity of nearby bone, all of it residual. The suggestion is that it represents a cemetery, the features of which were later removed by landscaping. The date of the bone should give a good indication of the age of the cemetery. If late Saxon in date the information helps us in constructing a street plan for the pre-Conquest town of Norwich, and the likely size of its population. If middle Saxon, it helps define the likely areas of Norwich settled in this period. If prehistoric (or Roman) this would similarly greatly aid our understanding of the area during these periods.

Calibrated date: *1σ:* cal AD 650–890
2σ: cal AD 580–990

Final comment: E Shepherd (1999), three samples (OxA-6386 to -6388) came from an area of displaced human bone in the northern part of the Castle Mall site (later the castle Barbican), centred around a single *in situ* burial. The radiocarbon dates, which span the seventh to mid-tenth centuries AD, are significant as they suggest an area of middle Saxon activity in the centre of the city (the previous interpretation has been that pre-urban settlements did not being until the eighth century, with no settlement at the Castle Mall site until the late-ninth or tenth century).

Laboratory comment: English Heritage (20 May 2014), the three samples from the assemblage of disarticulated, residual bone are from distinct individuals as each sample was from a left humerus.

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6387 1315 ±45 BP

δ¹³C: -19.3‰

Sample: 46038, submitted on 12 January 1996 by E Shepherd

Material: human bone (left humerus, adult) (S Anderson)

Initial comment: the bone was one of several recovered from a fill of a medieval refuse pit. The pit had preserved residual material from the features/layers it had cut. The earlier feature/layer was then removed during landscaping. Large quantities of such bone was recovered from nearby features. Sample 46057 came from the same pit.

Objectives: the sample is one of a large quantity of bones recovered from an area of the site. It may have come from a grave in a cemetery, features of which have been lost to later truncation. It is hoped the bone will help date such a cemetery. The presence of such a cemetery would help us understand more fully the layout of the late Saxon town of Norwich, and the likely size of its population. If middle Saxon, it would help define a period in which little activity in Norwich is known. If earlier still the knowledge would contribute to our understanding of the area of Norwich before it became a town.

Calibrated date: *1σ:* cal AD 650–770
2σ: cal AD 640–780

Final comment: see OxA-6386

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6388 1210 ±45 BP

δ¹³C: -19.3‰

Sample: 46057, submitted on 12 January 1996 by E Shepherd

Material: human bone (left humerus, adult) (S Anderson)

Initial comment: as OxA-6387

Objectives: as OxA-6387

Calibrated date: *1σ:* cal AD 720–890
2σ: cal AD 670–950

Final comment: see OxA-6387

References: Bronk Ramsey *et al* 1999, 200–1

OxA–6881 930 ±40 BP

δ¹³C: -18.5‰
δ¹³C (diet): -18.2 ±0.3‰
δ¹⁵N (diet): +11.4 ±0.3‰

Sample: 11117, submitted on 12 January 1996 by E Shepherd

Material: human bone (leper, ?male, ?16–20 years) (S Anderson)

Initial comment: this burial lay in the north-western part of the cemetery and was stratigraphically above burial 1116. Two (or possibly three) skulls were reinterred in the foot of the grave. The skeleton belongs to 'family 2' and has parietal notch bones. A replicate of OxA-6371.

Objectives: as OxA-6370

Calibrated date: *1σ:* cal AD 1030–1170
2σ: cal AD 1020–1220

Final comment: see OxA-6370

Laboratory comment: English Heritage (20 May 2014), the two radiocarbon results on this skeleton are statistically consistent, and provide a weighted mean (933 ±37 BP), which calibrates to cal AD 1020–1210 (Reimer *et al* 2013) (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978).

References: Bronk Ramsey *et al* 1999, 200–1
Reimer *et al* 2013
Ward and Wilson 1978

Norwich: Greyfriars, Norfolk

Location: TG 6233730860
Lat. 52.48.39 N; Long. 01.53.34 E

Project manager: P Emery (Norfolk Archaeological Unit), 1994

Archival body: Norfolk Museums and Archaeology Service

Description: a pit (12257) containing the *in situ* remains of the pedestal of a bell-mould was found *c* 5m to the east of the King Street frontage which, from AD 1292, defined the western limit of the Friary precinct. It was located within a small foundry immediately north of a Friary building and south-west of the west end of the Friary church (Emery 2007, 122).

Objectives: accurate intrinsic dating is crucial because local truncation has rendered the feature isolated in terms of stratigraphy. Although conceivably residual, one particular sherd of Raeren Ware and a number of bricks (fourteenth century onwards) offer a loose *terminus post quem*. However, we cannot be sure that the bell-pit pre-dates the dissolution of this Friary (AD 1538), although Paul Cattermole does point out that bell-founding is likely to have been a less common activity in the period immediately following the Dissolution when a surplus of second-hand bells was available.

Final comment: P Emery (2007), the radiocarbon date is compatible with the later of the two possible ranges provided by the archaeomagnetic dating.

References: Emery 2007
Noel 1996

UB–4130 363 ±21 BP

$\delta^{13}C$: -25.4 ±0.2‰

Sample: 12410, submitted on 27 January 1997 by P Emery

Material: wood (carbonised): *Fraxinus* sp., heartwood pole (J Watson 1994)

Initial comment: a pole of 85mm diameter used as strickle for bell-pit 12257 - the pole was clearly defined within the compacted and burnt natural beneath the pedestal. This pedestal was not quite horizontal, and so may have been slightly disturbed when the bell was removed.

Objectives: to confirm the archaeomagnetic date from the pedestal of AD 1010–1095 or AD 1490–1525 (Noel 1996); the second possibility is preferred on both geophysical and archaeological grounds. The radiocarbon date will produce welcome confirmation of the UK archaeomagnetic calibration curve for this period.

Calibrated date: *1σ:* cal AD 1465–1620
2σ: cal AD 1450–1635

Final comment: P Emery (2007), while the archaeomagnetic dating suggests that the bell pit was in use at some time between 48 and 13 years before the Dissolution of the Friary, the radiocarbon results on their own are not conclusive as to whether this feature was associated with the institution or with post-Dissolution occupation of the site.

Oxford: St Aldates, BT Tunnel, Oxfordshire

Location: SP 51430564
Lat. 51.44.48 N; Long. 01.15.18 W

Project manager: G Campbell (Oxford Archaeological Unit), 1991

Archival body: Oxford Museums Service

Description: the British Telecom tunnel at St Aldates Manhole site in Oxford.

Objectives: to provide a chronology for the site stratigraphy.

Final comment: G Campbell (19 November 1993), the dates produced a clear succession in agreement with the site stratigraphy with no conflicts between dates. The small number of artefacts made the dates essential for constructing an absolute chronology for the site. The chief disappointment was the failure to bracket closely the ford 11 between the channel deposit 10 and the reedy peat 9.

References: Dodd 2003, 120–7

GU–5333 1260 ±50 BP

$\delta^{13}C$: -24.5‰

Sample: OXSAM 91 RC2, submitted on 4 May 1993 by G Campbell

Material: wood (waterlogged): *Quercus* sp. (J Hillam 1991)

Initial comment: timber 825 is one of five timber piles forming a possible bridge pier. Orientated vertically, its upper part was encased in a matrix of calcareous stone and mortar, its lower part in clay. This timber had insufficient rings for dendrochronology and its outer part was sampled for dating.

Objectives: one of five upright posts forming a probable pier for a wooden bridge, found encased in the structure of the Norman Grandpont. Dating will corroborate a Saxon precursor to the Norman stone bridge on the south approach to Oxford and will provide a *terminus post quem* for the Norman bridge.

Calibrated date: *1σ:* cal AD 670–780
2σ: cal AD 650–890

Final comment: G Campbell (19 November 1993), the date confirms this probable bridge pier as being middle or possibly late Saxon, and unlikely to be part of the construction of the Norman stone causeway (Grandpont).

GU–5334 450 ±50 BP

$\delta^{13}C$: -28.9‰

Sample: OXSAM 91 RC3, submitted on 4 May 1993 by G Campbell

Material: organic matter (dung; probably horse) (M Robinson 1991)

Initial comment: fill of one of a number of channels or pits covering an area 30m wide, west of the Norman stone bridge (Grandpont), 2m below modern surface. Environmental analysis indicates rapid waterlogging after deposition with no subsequent disturbance or contamination.

Objectives: fill of dung from one of several similar features spread west of Oxfords Norman bridge (Grandpont) at the top of the sites sequence. This sample will provide a firm date for an unusual activity upstream from Grandpont and a *terminus ante quem* for a large number of the site's deposits.

Calibrated date: *1σ:* cal AD 1420–1460
2σ: cal AD 1400–1620

Final comment: G Campbell (19 November 1993), this late medieval or early post-medieval date on dung gives a *terminus ante quem* for much of the site's deposits and was useful in clarifying the conflict between the stratigraphy and the artefact content of the later deposits.

Laboratory comment: SURRC (1995): this sample was given an acid wash only, so the dated material consisted of the humic acid and humin fractions together.

OxA–4353 1340 ±80 BP

$\delta^{13}C$: -27.4‰

Sample: OXSAM 91 RC1, submitted on 4 May 1993 by G Campbell

Material: wood (waterlogged): *Acer* sp. (M Robinson 1991)

Initial comment: the worked stake was recovered from reedy peat (context 9) (above stone ford 11 and under thin calcareous ground 12).

Objectives: the undated surface 11 is a postulated ford pre-dating the Saxon causeway and Norman stone bridge (Grandpont), but these relationships were not certain. Roadways of the Roman period cross the Thames floodplain in the vicinity. This date will indicate the time by which the ford went out of use and its relationship to Grandpont.

Calibrated date: *1σ:* cal AD 640–770
2σ: cal AD 560–890

Final comment: G Campbell (19 November 1993), the middle Saxon date for channel fill 9 (containing flax capsules) compares well with known middle Saxon channels of similar character.

References: Hedges *et al* 1994, 364–5

OxA–4354 8170 ±130 BP

$\delta^{13}C$: -28.5‰

Sample: OXSAM 91 RC4, submitted on 4 May 1993 by G Campbell

Material: wood (waterlogged): *Salix* sp. (M Robinson 1991)

Initial comment: wood recovered *c* 3m below the surface and 2m below thewater table, from grey clay with sand and gravel inclusions (10), a channel fill below stone layer 11 and peat bed 9.

Objectives: this sample is from the channel fill (10) below the possible ford 11, pre-dating the Saxon causeway and Norman stone bridge (Grandpont). A date will indicate whether the Thames channel filled in the Roman or Saxon period, and (along with sample OXSAM RC1) will bracket the ford construction.

Calibrated date: *1σ:* 7360–7040 cal BC
2σ: 7530–6700 cal BC

Final comment: G Campbell (19 November 1993), the Mesolithic date for the channel fill is compatible with the environmental evidence and indicates that the single flax capsule is likely to be intrusive. The lack of *Alnus* may mean the true date of the deposit lies closer to the early end of the date-range.

References: Hedges *et al* 1994, 364–5

Pontefract Castle, West Yorkshire

Location: SE 225461
Lat. 53.54.38 N; Long. 01.39.27 W

Project manager: I Roberts (West Yorkshire Archaeology Service), 1982–6

Archival body: Wakefield Museum

Description: excavations at Pontefract Castle were carried out as part of a programme of conservation and protection of the surviving remains. The site was an important stronghold, from the late Saxon period through to the castle's demolition by Parliament in AD 1649 (Roberts 2002, x).

Objectives: to date the pre-Castle structure and burials.

References: Roberts 2002

GU–5750 1190 ±70 BP *$\delta^{13}C$:* -20.4‰

$\delta^{13}C$ (diet): -19.5 ±0.3‰
$\delta^{15}N$ (diet): +10.3 ±0.3‰

Sample: 3709, context 352, submitted on 3 March 1998 by I Roberts

Material: human bone (left radius, ulna, and humerus; male) (S Mays 1998)

Initial comment: the sample came from a pre-castle burial close to the chapel in the castle. The graves were located by virtue of being cut by a fourteenth- or fifteenth-century pit which had removed parts of the skeleton.

Objectives: stratigraphically the burials pre-date the castle and are believed to be of Saxon date, perhaps an extension of the Saxon cemetery outside the castle. Radiocarbon dating is required to confirm the pre-castle Saxon origins, and so to provide detail of possible contempraneity with phases of Saxon burials externally.

Calibrated date: *1σ:* cal AD 710–950
2σ: cal AD 660–1000

Final comment: I Roberts (2002), the evidence for the Saxon cemetery, albeit limited, clearly suggests intense usage of this part of the castle promontory during the eighth to tenth centuries. What artefact dating there is seems to corroborate the radiocarbon dates of the skeletons in confirming the presence of a pre-Conquest burial site here. What is perhaps of greater significance, however, is that these radiocarbon dates broadly correspond to those provided by the skeletons from the Anglo-Saxon cemetery on The Booths. This site lies a mere 100m to the east where 197 graves, dating to the seventh to eleventh centuries, were found in association with a small two-cell church. Altogether, the evidence points to an extensive and long-lived Anglo-Saxon cemetery covering the eastern slope of the pre-castle promontory (Roberts 2002, 84-5).

Laboratory comment: SUERC (2014): the $\delta^{13}C$ value measured on a sub-sample of the carbon dioxide produced from bulk collagen combustion for conventional (radiometric) radiocarbon dating was used to determine a fractionation factor for age calculation, since this value reflects both the natural isotopic ratio of the sample and any fractionation induced during the combustion process used for large samples. Isotopic ratios were also obtained on sub-samples of the prepared collagen, which more accurately reflect the natural isotopic composition of the samples and should be used for dietary reconstruction.

GU–5751 1100 ±50 BP *$\delta^{13}C$:* -19.9‰

$\delta^{13}C$ (diet): -19.8 ±0.3‰
$\delta^{15}N$ (diet): +10.5 ±0.3‰

Sample: 3712, context 354, submitted on 3 March 1998 by I Roberts

Material: human bone (left femur) (S Mays 1998)

Initial comment: as GU-5750

Objectives: as GU-5750

Calibrated date: *1σ:* cal AD 890–1000
2σ: cal AD 770–1030

Final comment: see GU-5750

Laboratory comment: see GU-5750

GU–5752 990 ±50 BP

$\delta^{13}C$: -25.5‰

Sample: 1327, context 175, submitted on 3 March 1998 by I Roberts

Material: charcoal: *Quercus* sp., roundwood of up to 10 years growth (R Gale 1998)

Initial comment: the wooden 'post' comes from a layer associated with a timber post structure that was found below the basement floor of the thirteenth- or fourteenth-century constable tower. Pottery from the layers associated with this structure were spot-dated at discovery as late Roman, prior to being stolen. Photographs of the pottery show it to be shell-tempered, and possibly of Saxon origin - as seen elsewhere on the castle site.

Objectives: to provide dating resolution that will establish whether there were Roman structures on the castle site or Saxon structures, perhaps contemporary with the burial ground or early medieval (ie Norman) structures, pre-dating the construction of the earthwork castle.

Calibrated date: *1σ:* cal AD 990–1150
2σ: cal AD 970–1170

Final comment: I Roberts (2002), this result suggests a late Saxon date for the structure. If correct it would appear that the pre-castle ground surface on this part of the promontory, although being some 4m below the present ground surface, was still actually some 2m lower than late Saxon levels around the early chapel. This suggests that the pre-castle topography in this area was substantially different, possibly explaining the apparent curtailment of the Saxon cemetery somewhere to the north-west of the tower site (Roberts 2002, 102-3).

Laboratory comment: English Heritage (26 August 1998), the duplicate measurements on sample 1327 are not statistically different and so a weighted mean of 975 ±35 BP can be taken before calibration (T′=0.2; T′(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

GU–5753 960 ±50 BP

$\delta^{13}C$: -25.5‰

Sample: 1327, context 175, submitted on 3 March 1998 by I Roberts

Material: charcoal: *Quercus* sp., roundwood of up to 10 years growth (R Gale 1998)

Initial comment: a replicate of GU-5752.

Objectives: as GU-5752

Calibrated date: *1σ:* cal AD 1020–1160
2σ: cal AD 980–1210

Final comment: see GU-5752

Laboratory comment: see GU-5752

Porlock Marsh, Somerset

Location: SS 88004680
Lat. 51.12.32 N; Long. 03.36.13 W

Project manager: V Straker (University of Bristol), 1995

Archival body: University of Bristol

Description: Porlock Marsh, on the Somerset coast, within Exmoor National Park, is a low-lying area of *c* 147ha below the 10m contour and landward of a shingle ridge. The Marsh surface concealed an inlet of up to 10m depth comprising intercalated peats and minerogenic sediments dating from the early to mid Mesolithic period, bounded by solifluction lobes which would have provided adjacent dry ground for human occupation.

Objectives: the buried archaeological potential of Porlock Marsh as known in 1995 centred on the fact that peat and forest beds were visible in the intertidal zone and in the past worked flint and chert had been associated with them. English Heritage funded an assessment of the surface and buried archaeological potential as a breach of the shingle ridge and consequent coastal erosion was predicted. The shingle ridge breached the following year in October 1996. A programme of coring and sediment description at 42 locations was carried out and environmental assessments (pollen, plant macrofossils, diatoms, foraminifera) carried out at four locations. The peats and clays preserved a long record of Holocene environmental changes related to fluctuating salt marsh, freshwater swamp, alder carr, and lagoonal environments which could be associated with sea-level changes. The dates were needed to provide a chronology of the environmental changes, define periods of potential human activity at risk from coastal erosion and provide sea-level index points.

Final comment: V Straker (11 April 2000), the radiocarbon dates have provided a chronology for the environmental changes and related human activity associated with Mesolithic to present-day sea-level change in a dynamic environment. Since the project was carried out in 1995, the shingle ridge has breached and the predicted coastal erosion is taking place. The chronology given by the dates has provided an essential framework for the continued monitoring of the eroding sediments and recording of archaeological features in the newly established intertidal zone.

Laboratory comment: English Heritage (20 May 2014), seven further measurements on bulk sediment and two on tree-stumps from this site were subsequently undertaken. For full details *see* Jennings *et al* 1998 (table 2).

References: Canti *et al* 1996
Jennings *et al* 1998

OxA–6399 5120 ±55 BP

δ^{13}*C:* -27.7‰

Sample: 1, submitted on 8 March 1996 by V Straker

Material: peat (13.19g) (freshwater (pool or slow flowing stream)) (V Straker & J Jones 1996)

Initial comment: Insert 2, 5.84-5.88m depth (-2.01m OD). The top centimetre of the highest peat, stratified between estuarine clays and silty clays (with earlier peats lower down the core).

Objectives: to provide a chronology for the environmental changes, define the periods of potential settlement, and provide sea-level index points.

Calibrated date: *1σ:* 3980–3800 cal BC
2σ: 4040–3780 cal BC

Final comment: V Straker (11 April 2000), the date for the top of the uppermost peat in Insert (core) 2 provides a late Mesolithic to early Neolithic age for the end of the freshwater swamp environment and renewed establishment of saltmarsh.

Laboratory comment: SURRC (1996): the humin fraction of this sample was dated.

References: Bronk Ramsey *et al* 2000a, 465

OxA–6400 6360 ±60 BP

δ^{13}*C:* -30.2‰

Sample: 3, submitted on 8 March 1996 by V Straker

Material: peat (humin) (12.41g) (alder carr) (V Straker and J Jones 1996)

Initial comment: Insert 2, 9.25–9.26m depth below surface (-5.42m OD). From the base of the middle peat, stratified between estuarine clays and silty clays.

Objectives: as OxA-6399

Calibrated date: *1σ:* 5470–5300 cal BC
2σ: 5480–5210 cal BC

Final comment: V Straker (11 April 2000), this result provides a mid- to-late Mesolithic date for the start of a phase of alder carr vegetation, indicating reduced marine influence.

Laboratory comment: see OxA-6399

References: Bronk Ramsey *et al* 2000a, 465

OxA–6401 5160 ±100 BP

δ^{13}*C:* -28.3‰

Sample: 5, submitted on 8 March 1996 by V Straker

Material: peat (humin) (10.30g) (alder carr) (V Straker and J Jones 1996)

Initial comment: Insert 4, 5.15–5.16m depth below ground surface (-0.3m OD). From the top of the peat band which is stratified within clays and silty clays.

Objectives: as OxA-6399

Calibrated date: *1σ:* 4050–3800 cal BC
2σ: 4240–3700 cal BC

Final comment: V Straker (11 April 2000), the result for the top of the peat provides a late Mesolithic to early Neolithic date for the end of the period of alder carr woodland environment and renewed establishment of marine and brackish conditions.

Laboratory comment: see OxA-6399

References: Bronk Ramsey *et al* 2000a, 465

OxA–6402 4925 ±60 BP

δ^{13}*C:* -29.3‰

Sample: 7, submitted on 8 March 1996 by V Straker

Material: peat (humin) (14.87g) (alder carr) (V Straker and J Jones 1996)

Initial comment: Insert 39, 5.10–5.20m depth below ground surface (-1.48m OD). From the top of the peat band, stratified between silty clays and clays, and marking the western extent of buried organic deposits.

Objectives: as OxA-6399

Calibrated date: *1σ:* 3780–3640 cal BC
2σ: 3910–3630 cal BC

Final comment: V Straker (11 April 2000), the result for the top of the peat provides an early Neolithic date for the end of the period of alder carr woodland environment and renewed establishment of marine and brackish conditions. This is the only date that clearly shows the continuation of this phase of terrestrial conditions into the Neolithic period.

Laboratory comment: see OxA-6399

OxA–6569 5450 ±70 BP

δ^{13}*C:* -26.9‰

Sample: 2, submitted on 8 March 1996 by V Straker

Material: peat (humin) (14.87g) (freshwater (pool or slow flowing stream)) (V Straker 1996)

Initial comment: Insert 2, 5.99–6.0m below ground surface (-2.16m OD). The basal centimetre of the highest peat. Stratified as OxA-6399, between estuarine clays and silty clays (with earlier peats lower down the core).

Objectives: as OxA-6399

Calibrated date: *1σ:* 4360–4240 cal BC
2σ: 4450–4070 cal BC

Final comment: V Straker (11 April 2000), this result provides a late Mesolithic date for the onset of a phase of freshwater swamp environment which lasted (*see* OxA-6399, Porlock 1) for a maximum of *c* 680 years, but could have been very much shorter.

Laboratory comment: see OxA-6399

OxA–6570 7280 ±90 BP

$\delta^{13}C$: -25.8‰

Sample: 4, submitted on 8 March 1996 by V Straker

Material: peat (humin) (15.90g) (saltmarsh and alder fen peat) (V Straker and J Jones 1996)

Initial comment: Insert 2, 9.38–9.39m depth below the ground surface at -5.64m OD. From the base of the lowest band of peat. Above this are clays, silty clays and two further peat bands, PORLOCK 1–3 (OxA-6399, OxA-6569, and OxA-6400).

Objectives: as OxA-6399. This date is particularly important as it should be the earliest in the sequence.

Calibrated date: *1σ:* 6240–6050 cal BC
2σ: 6380–5990 cal BC

Final comment: V Straker (11 April 2000), this sample is dated to the early-to-mid Mesolithic and provides a *terminus post quem* for the Holocene sequence in Porlock Marsh. The environment was one of fluctuating saltmarsh and terrestrial conditions.

Laboratory comment: see OxA-6399

References: Bronk Ramsey *et al* 2000a, 465

OxA–6571 5515 ±65 BP

$\delta^{13}C$: -28.0‰

Sample: 6, submitted on 8 March 1996 by V Straker

Material: peat (humin) (15.98g) (sedge peat) (V Straker and J Jones 1996)

Initial comment: Insert 4, 5.38–5.39m depth below the ground surface (-0.54m OD). From the base of the single peat band, stratified between clays and silty clays.

Objectives: as OxA-6399

Calibrated date: *1σ:* 4450–4330 cal BC
2σ: 4470–4250 cal BC

Final comment: V Straker (11 April 2000), this result provides a late Mesolithic date for reduced marine influence and the onset of a phase of alder carr woodland which lasted (*see* OxA-6401, Porlock 5) for a maximum of *c* 780 years, but could have been very much shorter. The calibrated age ranges for dates for OxA-6399 and -6569 from Insert 2, some 200 metres to the north west are very similar and it is possible that the freshwater swamp located there was contemporary with the alder carr in Insert 4 which may have been growing at a slightly higher altitude.

Laboratory comment: see OxA-6399

References: Bronk Ramsey *et al* 2000a, 465

OxA–6572 5290 ±75 BP

$\delta^{13}C$: -28.3‰

Sample: 8, submitted on 8 March 1996 by V Straker

Material: peat (humin) (12.36g) (alder carr) (V Straker and J Jones 1996)

Initial comment: Insert 39, 5.50–5.51m depth below the ground surface (-0.78m OD). From the base of the single peat band, stratified between silty clays and clays.

Objectives: as OxA-6399

Calibrated date: *1σ:* 4240–3990 cal BC
2σ: 4330–3960 cal BC

Final comment: V Straker (11 April 2000), this result provides a late Mesolithic to early Neolithic date for reduced marine influence and the onset of a phase of alder carr woodland which lasted (*see* OxA-6402, Porlock 5) for a maximum of *c* 790 years, but could have been very much shorter. The calibrated age ranges for the dates for OxA-6401 and -6571 from Insert 4 overlap and probably date the same phase of alder carr development.

Laboratory comment: see OxA-6399

References: Bronk Ramsey *et al* 2000a, 465

Radley: Barrow Hills, Oxfordshire

Location: SU 51359815
Lat. 51.40.45 N; Long. 01.15.26 W

Project manager: C Halpin (Central Excavation Unit), 1983–5

Archival body: Ashmolean Museum, Natural History Museum

Description: the excavations conducted in advance of housing construction over the west end of the early Bronze Age barrow cemetery at Barrow Hills, close to the Abingdon causewayed enclosure, yielded evidence for ceremonial and funerary use of the complex from the earlier Neolithic to at least the middle Bronze Age. The site consists of 17 barrows in two rows forming an 'avenue' which appeared to be aligned upon an earlier causewayed enclosure to the west. Eleven of the barrows had been excavated in the past to varying degrees. Current excavations involved barrows 1, 12, and 13 sited at the south-west end of the cemetery.

Objectives: to determine the use and chronological sequence of the Barrow Hills complex, incorporating evidence from the 1983–5 and earlier excavations.

Final comment: F Healy (17 October 1995), the Oxford AMS dates for Barrow Hills, combined with a series of 25 British Museum dates for the site, some of them published by Bradley (1992), and the British Museum dates for the Abingdon causewayed enclosure (Avery 1982), provide a suite of over 50 dates for the monument as a whole. All are listed in full and individually evaluated and discussed in detail by Ambers *et al* (1999).

Collectively they document ritual and funerary use of the site over more than two thousand years, from the mid-fourth to the late second millennium cal BC, with a probable lull in monument building in the early third millennium. The large number of high-quality dates has made it possible to define the development of the complex and its spatial organisation at different periods.

Individually, some dates elucidate the chronology of generally poorly-dated feature, monument or artefact types, such as non-monumental early and middle Neolithic burials

(OxA-1881–2, OxA-4359), BM-2709; 4270 ±100 BP; 3270–2570 cal BC at 95% confidence (Reimer *et al* 2004), BM-2710; 4530 ±50 BP; 3490–3020 cal BC at 95% confidence (Reimer *et al* 2004), BM-2714; 4470 ±70 BP; 3370–2910 cal BC at 95% confidence (Reimer *et al* 2004), and BM-2716; 4600 ±70 BP; 3630–3090 cal BC at 95% confidence (Reimer *et al* 2004)), pond barrows (OxA-1879–80, OxA-1903, BM-2697; 3320 ±50 BP; 1740–1490 cal BC at 95% confidence (Reimer *et al* 2004), and BM-2698; 3500 ±50 BP; 1960–1680 cal BC at 95% confidence (Reimer *et al* 2004)), early metalwork (OxA-1874-5, and OxA-4356), and a 'Wessex' grave group (OxA-1886).

Laboratory comment: English Heritage (1 February 2013), 19 further dates were funded by English Heritage prior to 1993 and are published in Bayliss *et al* (2013, 145–9; OxA-1872–89 and OxA-1903).

References: Ambers *et al* 1999
Avery 1982
Barclay and Halpin 1999
Bayliss *et al* 2013
Bradley 1992
Hedges *et al* 1990, 218–21

OxA–4355 3785 ±90 BP

δ¹³C: -21.6‰

Sample: RBH3, submitted on 27 May 1993 by A Barclay

Material: human bone (femur) (A Boyle 1993)

Initial comment: inhumation burial from the central grave, barrow 3. The skeleton was articulated and was associated with a copper alloy dagger of type Milston. The grave was shallow and was dug into gravel and was overlain by mound material and ploughsoil. Barrow 3 ditch was cut by the ditch of barrow 4 and its outer bank overlay the ditch of barrow 2.

Objectives: to date an important 'Wessex culture' grave assemblage. The aim is to understand the chronological development of this group relative to the overall evolution of the cemetery complex.

Calibrated date: *1σ:* 2350–2040 cal BC
2σ: 2480–1950 cal BC

Final comment: F Healy (17 October 1995), this sample dates the skeleton of an ageing ?man, buried in the central grave of barrow 3, accompanied by a bronze dagger of Gerloff's (1975) Milston type, excavated by Atkinson in 1944 (Atkinson 1952–3, 23–5).

References: Atkinson 1952–3
Gerloff 1975
Hedges *et al* 1996, 400

OxA–4356 3880 ±90 BP

δ¹³C: -21.4‰

Sample: RBH4A, submitted on 27 May 1993 by A Barclay

Material: human bone (femur) (A Boyle 1993)

Initial comment: the central grave, a male inhumation associated with a European style Beaker, a pair of gold earrings, and indirectly, three barbed and tanged arrowheads. The skeleton was fully articulated, buried on the floor of a *c* 0.9m deep grave and overlain by a barrow mound. The grave was dug into natural gravel. It had been disturbed by a later 'robber' pit. However, the skeleton survived undisturbed.

Objectives: to date a Beaker grave assemblage of national importance. The earrings are believed to form the earliest evidence for gold work. Therefore, their associations and secure context are of great importance. The barrow possibly formed a focus for a linear group (barrows I-II). There also exists a stratigraphic sequence between the barrow ditches (2, 3, and 4). A determination will allow for this group of barrows to be placed within the overall chronological development of the site.

Calibrated date: *1σ:* 2480–2200 cal BC
2σ: 2580–2040 cal BC

Final comment: F Healy (17 October 1995), the date is closely comparable to that of 3740 ±80 BP (OxA-1072; 3740 ±80 BP; 2460–1920 cal BC; Reimer *et al* 2004) for similar gold ornaments from Chilbolton, Hampshire (Russel 1990).

References: Hedges *et al* 1996, 400
Reimer *et al* 2004
Russel 1990

OxA–4357 3660 ±80 BP

δ¹³C: -21.4‰

Sample: RBH15 (1), submitted on 27 May 1993 by A Barclay

Material: human bone (A Boyle 1993)

Initial comment: a semi-articulated bone from pit 1, near the centre of barrow 15. Bones and finds were found at three levels within the grave. A medieval sherd, misidentified as Neolithic would suggest the grave was disturbed. The grave has been dated to the early Bronze Age based on flints found within the grave fill. Neolithic finds also came from the grave, in addition the barrow is more typically Neolithic.

Objectives: to determine whether the grave belongs to the early Bronze Age or is indeed of Neolithic date as suggested by the form of barrow. A second burial, pit 2 is also to be dated. The grave and barrow can then be compared with the other barrow groups in the cemetery.

Calibrated date: *1σ:* 2190–1920 cal BC
2σ: 2290–1780 cal BC

Final comment: F Healy (17 October 1995), since the relationship between burial and monument remains uncertain, the date does not prelude a Neolithic date for the barrow, which has been suggested because of the similarity of its two slight, widely-spaced, concentric ditches to those of local Neolithic round barrows.

References: Hedges *et al* 1996, 400

OxA–4358 3660 ±90 BP

δ¹³C: -20.9‰

Sample: RBH17 (1), submitted on 27 May 1993 by A Barclay

Material: human bone (femur) (A Boyle 1993)

Initial comment: an articulated inhumation in a shallow grave (pit 1). The position of the grave relative to pit 2 would suggest that it is secondary. The barrow is a northern outlier within the barrow complex. The human bone from pit 2 could not be found and was probably never recovered from the excavation.

Objectives: to date an unaccompanied burial and relate it and the barrow to the correct phase of the cemetery.

Calibrated date: *1σ:* 2200–1910 cal BC
2σ: 2300–1770 cal BC

Final comment: F Healy (17 October 1995), the relation of the grave to the monument remains uncertain; it location suggests that it may have been secondary.

References: Hedges *et al* 1996, 400

OxA–4359 4700 ±100 BP

$\delta^{13}C$: -21.1‰

Sample: RBH 5356, submitted on 27 May 1993 by A Barclay

Material: human bone (femur and tibia) (A Boyle 1993)

Initial comment: the flat grave was shallow (depth of 0.1m below the base of plough soil). Some disturbance had been caused to the east side of the grave. However, the skeleton although missing the skull was still articulated. The grave was one of three flat grave goods and have been dated to the middle Neolithic (5355, BM-2710; 5354, OxA-1882).

Objectives: to demonstrate whether this grave belongs to the same middle Neolithic phase as 5354-5, the oval barrow, a multiple grave, and the Abingdon causewayed enclosure. The identification of a flat grave cemetery of contemporary date to the causewayed enclosure is of national importance.

Calibrated date: *1σ:* 3640–3360 cal BC
2σ: 3660–3120 cal BC

Final comment: F Healy (17 October 1995), this date and those on the skeletons from the two other graves in the group place them in the fourth millennium cal BC. The grouping of three burials seems so far unique among early or middle Neolithic flat graves, most of which appear isolated.

References: Hedges *et al* 1996, 400

Raunds Prehistoric, Northamptonshire

Location: SP 976925
Lat. 52.20.29 N; Long. 00.34.02 W

Project manager: A Chapman and D Windell (Northampton County Council), 1985–92

Description: since 1985, large-scale excavation and survey has been carried out around Raunds, Northamptonshire, in the midlands of England. This has led to the discovery of a monumental prehistoric landscape, which lasted more than 2000 years. The complex comprises an early Neolithic long barrow, turf mound, and long mound, a later Neolithic long enclosure and causewayed ring-ditch, and at least 14 Bronze Age barrows. There are also a number of undated enclosures and ring-ditches. The northern part of this complex lies under a deserted medieval hamlet at West Cotton.

Objectives: to help construct a chronological framework for the site.

Final comment: J Harding and F Healy (2007), the Raunds Area Project investigated more than 20 Neolithic and Bronze Age monuments in the Nene Valley. From *c* 5000 cal BC to the early first millennium cal BC a succession of ritual mounds and burial mounds were built as settlement along the valley sides increased and woodland was cleared. Starting as a regular stopping-place for flint knapping and domestic tasks, first the Long Mound, and then Long Barrow, the north part of the Turf Mound and the Avenue were built in the fifth millennium BC. With the addition of the Long Enclosure, the Causewayed Ring-Ditch, and the Southern Enclosure, there was a chain of five or six diverse monuments stretched along the river bank by *c* 3000 cal BC. Later, a timber platform, the Riverside Structure, was built and the focus of ceremonial activity shifted to the Cotton 'Henge', two concentric ditches on the occupied valley side. From *c* 2200 cal BC monument building accelerated and included the Segmented Ditch Circle and at least 20 round barrows, almost all containing burials, at first inhumations, then cremations down to *c* 1000 cal BC, by which time two overlapping systems of paddocks and droveways had been laid out. Finally, the terrace began to be settled when these had gone out of use, in the early first millennium cal BC.

References: Harding and Healy 2007
Harding and Healy 2011
Parry 2006
Windell *et al* 1990

Raunds Prehistoric: Irthlingborough, Northamptonshire

Location: SP 965715
Lat. 51.56.25 N; Long. 01.16.40 W

Project manager: C Halpin (Central Excavation Unit), 1987

Archival body: English Heritage

Description: a ceremonial and mortuary monument complex excavated in advance of gravel extraction and road building in the Nene valley at Irlingborough, Stanwick, and West Cotton.

Objectives: to date the features and phases of the complex.

Laboratory comment: English Heritage (1 February 2013), a further 15 dates were funded prior to 1993 and were published in Bayliss *et al* (2013, 150-3; OxA-3051–9, OxA-3089, OxA-3120–1, OxA-4067, and UB-3147–8).

References: Bayliss *et al* 2013
Dix 1987, 3–30
Harding and Healy 2007
Kinnes 1979
Macphail and Goldberg 1990, 425–9

OxA–7902 3775 ±45 BP

$\delta^{13}C$: -25.1‰

Sample: 291-11439, submitted on 10 March 1998 by S Rault

Material: charcoal: *Quercus* sp., sapwood (0.06g) (R Gale 1998)

Initial comment: part of the oak timber from the central burial in barrow 1. This sample is believed to be part of the 'coffin' associated with the primary burial. For a further measurement from this barrow *see* also OxA-7948.

Objectives: to date the primary burial and compare the result with two further samples from the Beaker burial, OxA-4067 (4100 ±80 BP; 2890–2460 cal BC at 95% confidence) on human bone and UB-3148 (3681 ±47 BP; 2200–1920 cal BC at 95% confidence) on a boar's tusk.

Calibrated date: 1σ: 2290–2130 cal BC
2σ: 2340–2030 cal BC

Final comment: P Marshall (12 November 2012), the measurements on the primary skeleton (UB-3148) and sapwood from the chamber or coffin are statistically consistent (T′=2.1, T′(5%)=3.8, v=1; Ward and Wilson 1978) and therefore provide the best estimate for the date of inhumation. The date is consistent with the currency of Beakers in England.

Laboratory comment: ORAU (22 September 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Ward and Wilson 1978

OxA–7903 3650 ±45 BP

$\delta^{13}C$: -25.1‰

Sample: 291-33008, submitted on 10 March 1998 by S Rault

Material: charcoal: *Rhamnus cathartica* sp. (1g) (G Campbell 1998)

Initial comment: from barrow 3. The sample from which the charcoal was derived was taken from a concentration of charcoal within ditch fill 30738. *See* also OxA-7949 for a further measurement from the same ditch fill.

Objectives: the species present in this sample suggest that the burning represents the removal of scrub from the monument and therefore reflects its maintenance as a ceremonial structure. The dating of the charcoal would therefore date the later activity associated with the monument.

Calibrated date: 1σ: 2130–1940 cal BC
2σ: 2200–1890 cal BC

Final comment: P Marshall (12 November 2012), the oak charcoal fragments dated by OxA-7903 and -7949 were stratified in the same layer in base of the recut ditch, and may relate to scrub clearance from the mound at some time after its construction. The measurements are statistically consistent (T′=0.4; T′(5%)=3.8, v=1; Ward and Wilson 1978) and provide a *terminus ante quem* for the construction of barrow 3.

References: Ward and Wilson 1978

OxA–7904 4505 ±45 BP

$\delta^{13}C$: -23.8‰

Sample: 291-55374, submitted on 10 March 1998 by S Rault

Material: charcoal: *Corylus* sp. (5g) (G Campbell 1998)

Initial comment: from a timber from the primary silting within the causewayed ring-ditch.

Objectives: to date the primary silting of the ditch.

Calibrated date: 1σ: 3350–3090 cal BC
2σ: 3370–3020 cal BC

Final comment: F Healy (2007), this date is compatible with another on an alder/hazel charcoal fragment from the north terminal (OxA-3055), and with a measurement on an implement from an early recut (OxA-3121), suggesting that this monument was constructed at the end of the fourth millennium cal BC.

Laboratory comment: ORAU (22 September 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7948 3005 ±35 BP

$\delta^{13}C$: -25.4‰

Sample: 291-11256, submitted on 10 March 1998 by S Rault

Material: plant macrofossils (0.10g) (charred tubers, indeterminate tuber fragments) (G Campbell 1998)

Initial comment: the tubers were removed from a soil sample taken from fill 30309 from cremation 6403, beyond the outer ditch of barrow 1. Tubers tend to be associated with Bronze Age cremations and therefore these items are unlikely to be intrusive. For a further measurement from this barrow *see* also OxA-7902.

Objectives: to date the cremations associated with this monument and to compare the result with OxA-3089 (2950 ±50 BP; 1370–1000 cal BC at 95% confidence) from charred plant tubers from cremations cut into the gravel on the berm between the middle and outer ditches.

Calibrated date: 1σ: 1290–1200 cal BC
2σ: 1390–1120 cal BC

Final comment: P Marshall (12 November 2012), the result provides a date for the cremation and is statistically consistent (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978) with the measurement of material (OxA-3089) from the cremation that post-dates the final enlargement of the mound, since it was cut into gravel upcast derived from the cutting of the outer ditch and deposited in the top of the partly silted middle ditch.

References: Ward and Wilson 1978

OxA–7949 3610 ±40 BP

δ^13^C: -24.5‰

Sample: 291-33008, submitted on 10 March 1998 by S Rault

Material: charcoal: *Prunus* sp. (G Campbell 1998)

Initial comment: as OxA-7903

Objectives: as OxA-7903

Calibrated date: *1σ:* 2030–1910 cal BC
2σ: 2130–1880 cal BC

Final comment: see OxA-7903

Laboratory comment: ORAU (22 September 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7950 3625 ±40 BP

δ^13^C: -21.3‰

Sample: AOR 55243, submitted on 10 March 1998 by S Rault

Material: animal bone (250g) (fibia, large artiodactyl) (S Davis 1998)

Initial comment: from the basal fill of a pit at the centre of the mound of barrow 5. The upper fill of the pit was sealed by remnant mound material. The pit cut another pit at the centre of the barrow, which contained five arrowheads and a Beaker, but no human remains. The basal fill of the pit containing the bone was extremely well sealed.

Objectives: to provide a *terminus ante quem* for the pit containing the grave goods and a *terminus post quem* for the construction of the mound. This measurement can be compared with OxA-3120 (3680 ±100 BP; 2400–1770 cal BC at 95% confidence; Reimer *et al* 2004) on animal bone from the same barrow.

Calibrated date: *1σ:* 2040–1930 cal BC
2σ: 2140–1880 cal BC

Final comment: see OxA-3055

References: Reimer *et al* 2004

Raunds Prehistoric: Stanwick, Avenue, Northamptonshire

Location: SP 999733
Lat. 52.20.54 N; Long. 00.32.00 W

Project manager: S Rault (English Heritage), 1992

Archival body: Northampton Museum

Description: a series of samples from the Southern Avenue.

Objectives: the two samples in this series, OxA-7867 and OxA-7868 are from charred tubers from part of the Southern Avenue and are submitted to provide further dating for the Avenue and the activity associated with this feature.

Final comment: J Harding and F Healy (2007), the evidence supplied by the radioacarbon dating and the environmental evidence indicates that areas of grassland were present in the valley bottom from almost the start of the Neolithic. Human activity occurred at, or even before, the elm decline of *c* 4000 cal BC.

Laboratory comment: English Heritage (1998), two further measurements: GU-5318 and GU-5319 from the Southern Avenue were published in Bayliss *et al* (2013, 156).

References: Bayliss *et al* 2013
Harding and Healy 2007
Harding and Healy 2011

OxA–7867 5325 ±50 BP

δ^13^C: -27.2‰

Sample: 291-99158, submitted on 10 March 1998 by S Rault

Material: plant macrofossils (charred *Arrhenatherum* tuber) (G Campbell 1998)

Initial comment: from context 87507 from part of the Southern Avenue.

Objectives: to provide further dating evidence for the avenue and for the activity associated with this feature.

Calibrated date: *1σ:* 4250–4040 cal BC
2σ: 4330–3990 cal BC

Final comment: J Harding and F Healy (2007), this result provides a fifth millennium date for the hollow in the north-east part of the southern alignment. The charred tubers may relate to vegetation burning prior to the construction of the monument, or indicate a fifth millennium origin for the Avenue itself, the fourth millennium material relating to its latest use or destruction.

Laboratory comment: ORAU (22 September 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7868 4970 ±45 BP

δ^13^C: -24.4‰

Sample: 291-99156, submitted on 10 March 1998 by S Rault

Material: carbonised plant macrofossil (*Corylus* sp. nutshell) (G Campbell 1998)

Initial comment: from context 87502.

Objectives: as OxA-7868

Calibrated date: *1σ:* 3800–3690 cal BC
2σ: 3940–3650 cal BC

Final comment: J Harding and F Healy (2007), two pieces of charred oak from F87575 yielded statistically consistent dates in the early fourth millennium (GU-5318–9). This result provides a third consistent measurement and the three results together provide an estimated date for the monument of *3860–3620 cal BC; 92% probability; Last Avenue; Harding and*

Healy 2007, fig 3.17). If the monument was indeed short-lived, this may have been close to the time of its construction.

Laboratory comment: ORAU (22 September 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

Raunds Prehistoric: Stanwick, Emmer, Northamptonshire

Location: SP 999733
Lat. 52.20.54 N; Long. 00.32.00 W

Project manager: S Rault (English Heritage), 1990

Archival body: Northampton Museum

Description: the grain samples submitted were from the top fill of a posthole which forms part of a 'fence' associated with 'hut' building 85151.

Objectives: to establish the date for the fence and hut. This grain is the only substantial assemblage of emmer from the Raunds Area Project as a whole.

Final comment: J Harding and F Healy (2007), the two dated samples provide the first substantial evidence for the growing of cereal crops in the area. However, given that the assemblage consists almost entirely of grain, mainly wheat with a little barley, and a few weed seeds, it is possible that it was brought to this location fully threshed. The fields where cereals were grown may still have been located away from the floodplain on the valley slopes or elsewhere.

References: Harding and Healy 2007
Harding and Healy 2011

OxA–7905 2815 ±40 BP

$\delta^{13}C$: -22.8‰

Sample: 291-80522, submitted on 10 March 1998 by S Rault

Material: grain: *Triticum dicoccum* (G Campbell 1998)

Initial comment: retrieved from soil sample 80522 taken from fill 85107 or posthole 85106. This was the top fill of this posthole and is described as a black silt containing several fragments of charcoal and some burnt stone. The posthole as excavated was 0.14m deep.

Objectives: to establish a date for the emmer grain.

Calibrated date: *1σ:* 1020–910 cal BC
2σ: 1090–840 cal BC

Final comment: see series comments

Laboratory comment: ORAU (22 September 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7946 2795 ±40 BP

$\delta^{13}C$: -21.4‰

Sample: 291-80522, submitted on 10 March 1998 by S Rault

Material: grain: *Triticum dicoccum* (G Campbell 1998)

Initial comment: as OxA-7905

Objectives: as OxA-7905

Calibrated date: *1σ:* 1010–900 cal BC
2σ: 1050–830 cal BC

Final comment: see series comments

Laboratory comment: ORAU (22 September 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

Raunds Prehistoric: Stanwick, Redlands Farm, Northamptonshire

Location: SP 965710
Lat. 52.19.42 N; Long. 00.35.02 W

Project manager: M Robinson (University Museum, Oxford), 1989

Archival body: Northampton Museum

Description: a long barrow and Bronze Age barrow 9.

Objectives: to date the construction of the long barrow; to establish whether its construction fell within the date range of the other earlier Neolithic monuments on the valley bottom of the River Nene which comprise the ritual complex in the Raunds area; to show whether the organic sediments in the southern barrow ditch belonged to the early life of the barrow; to date the secondary use of the monument as a focus for cremation burial; and finally to establish whether this secondary use fell within the date range of the Bronze Age round barrow cemetery in the valley bottom.

Final comment: M Robinson (1993), all the objectives are satisfactorily achieved by these results.

Laboratory comment: English Heritage (16 June 2012), four further dates were funded prior to 1993 and are published in Bayliss *et al* (2013, 156–7; OxA-2989 and OxA-3001–3).

References: Bayliss *et al* 2013
Harding and Healy 2007
Harding and Healy 2011
Hedges *et al* 1993, 157–8
Whittle *et al* 2011, 300–14

OxA–5543 3645 ±45 BP

$\delta^{13}C$: -21.4‰

Sample: SK747, submitted in February 1995 by G Keevill

Material: human bone (right and left femurs, tibiae, fibulae; adult male) (A Boyle)

Initial comment: from the primary, or at least central, inhumation in round barrow 9. The preservation of the skeleton was fair because it came from the deepest of the excavated graves.

Objectives: this grave is of interest because of its apparently primary position and the possibility that it could be significantly earlier than the other graves. No grave goods were found, but SK751 (BM-2866; 3610 ±50 BP; 2140–1780 cal BC at 95% confidence; Reimer *et al* 2004) had a Beaker and was clearly secondary.

Calibrated date: *1σ:* 2130–1940 cal BC
2σ: 2150–1890 cal BC

Final comment: G Keevill (25 September 1995), the date is consistent with the presumed early Bronze Age date for the monument and also fits well with the earlier date, BM-2866, on a satellite burial which was accompanied by a beaker.

Laboratory comment: Ancient Monuments Laboratory (25 September 1995), the weighted mean of OxA-5543 and OxA-5544 is 3687 ±34 BP (T′=2.2; T′(5%)=3.8; v=1; Ward and Wilson 1978), which calibrates to 2200–1950 cal BC at 95% confidence (Reimer *et al* 2004).

References: Hedges *et al* 1997, 252–3
Reimer *et al* 2004
Ward and Wilson 1978

OxA–5544 3750 ±55 BP

δ¹³C: -21.1‰

Sample: SK747, submitted in February 1995 by G Keevill

Material: human bone (right and left femurs, tibiae, fibulae) (A Boyle)

Initial comment: a replicate of OxA-5543.

Objectives: as OxA-5543

Calibrated date: *1σ:* 2280–2040 cal BC
2σ: 2340–1980 cal BC

Final comment: see OxA-5543

Laboratory comment: see OxA-5543

References: Hedges *et al* 1997, 252–3

OxA–5545 3690 ±40 BP

δ¹³C: -21.4‰

Sample: SK737, submitted in February 1995 by G Keevill

Material: human bone (all long bones femur: tibia, fibula, humerus, radius, and ulna; infant) (A Boyle)

Initial comment: from a secondary inhumation in double-ditched round barrow 9, which had been ploughed out. The preservation of the skeleton was poor.

Objectives: to provide a date for this satellite burial.

Calibrated date: *1σ:* 2140–2020 cal BC
2σ: 2200–1950 cal BC

Final comment: G Keevill (25 September 1995), the off-centre positioning had suggested that this was a secondary grave. The date is consistent with the presumed early Bronze Age date for the monument and fits well with BM-2866. The calibrated date range is close to that of the primary burial (OxA-5543 and OxA-5544) but the secondary nature of this sample can be supported from these determinations.

Laboratory comment: Ancient Monuments Laboratory (25 September 1995), the weighted mean of OxA-5545 and OxA-5546 (T′=1.5; T′(5%)=3.8; v=1; Ward and Wilson 1978) is 3656 ±29 BP, which calibrates to 2140–1940 cal BC at 95% confidence (Reimer *et al* 2004).

References: Hedges *et al* 1997, 252–3
Reimer *et al* 2004
Ward and Wilson 1978

OxA–5546 3615 ±45 BP

δ¹³C: -21.1‰

Sample: SK737, submitted in February 1995 by G Keevill

Material: human bone (all long bones: femur, tibia, fibula, humerus, radius, and ulna; infant) (A Boyle)

Initial comment: a replicate of OxA-5545.

Objectives: as OxA-5545

Calibrated date: *1σ:* 2040–1910 cal BC
2σ: 2140–1880 cal BC

Final comment: see OxA-5545

Laboratory comment: see OxA-5545

References: Hedges *et al* 1997, 252–3

OxA–5547 3495 ±40 BP

δ¹³C: -21.7‰

Sample: SK732, submitted in February 1995 by G Keevill

Material: human bone (all long bones: femur, tibia, fibula, humerus, radius, and ulna; sub-adult) (A Boyle)

Initial comment: from a secondary inhumation in a double-ditched round barrow 9. The preservation of the bones is poor largely due to plough truncation. The skeleton lay virtually at gravel surface level, this was probably a gravel island in the floodplain and sealed by ploughed-out barrow mound material.

Objectives: to provide a date for a non-central (satellite) burial in the double-ditch and to assess the relationship of the burial to the central grave.

Calibrated date: *1σ:* 1890–1740 cal BC
2σ: 1930–1690 cal BC

Final comment: G Keevill (25 September 1995), the date is consistent with the presumed early Bronze Age date for the monument, and is noticeably later than those for the other burials in the monument. This is interesting because the burial was much shallower than the others and the skeleton was revealed virtually at the gravel surface.

Laboratory comment: Ancient Monuments Laboratory (25 September 1995), the weighted mean of OxA-5547 and OxA-5548 (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978) is 3496 ±34 BP, which calibrates to 1920–1690 cal BC at 95% confidence (Reimer *et al* 2004).

References: Hedges *et al* 1997, 252–3
Reimer *et al* 2004
Ward and Wilson 1978

OxA–5548 3500 ±70 BP

$\delta^{13}C$: -21.6‰

Sample: SK732, submitted in February 1995 by G Keevill

Material: human bone (all long bones: femur, tibia, fibula, humerus, radius, and ulna; sub-adult) (A Boyle)

Initial comment: as OxA-5547

Objectives: as OxA-5547

Calibrated date: *1σ:* 1920–1690 cal BC
2σ: 2030–1640 cal BC

Final comment: see OxA-5547

Laboratory comment: see OxA-5547

References: Hedges *et al* 1997, 252–3

OxA–5549 3665 ±45 BP

$\delta^{13}C$: -20.9‰

Sample: 130, submitted in February 1995 by G Keevill

Material: human bone (long bones and pelvis) (A Boyle)

Initial comment: from an inhumation cut into the top of a Neolithic long barrow. No actual grave cut could be seen. The inhumation was presumed to be crouched but had been disturbed by ploughing. The sample is from a group of three inhumations and was furthest to the north east. The central burial (BM-2833) was well preserved and was associated with a shale bracelet, a copper alloy basket type earring, a Beaker pot and two flint flakes. There were no associated artefacts with OxA-5549.

Objectives: this inhumation and barrow are part of a series of earlier prehistoric monuments and form part of the Raunds Area Project. A date for the inhumation will enable its relationship to the central burial to be explored and help establish the sequence of secondary activity associated with the long barrow.

Calibrated date: *1σ:* 2140–1970 cal BC
2σ: 2200–1910 cal BC

Final comment: P Bradley (4 October 1995), the central burial, BM-2833 gave a radiocarbon determination of 3450 ±45 BP, which calibrates to 1890-1630 cal BC at 95% confidence (Reimer *et al* 2004). Although the date for OxA-5549 is slightly earlier, it seems consistent with BM-2883.

References: Hedges *et al* 1997, 252–3
Reimer *et al* 2004

OxA–5550 3730 ±45 BP

$\delta^{13}C$: -21.8‰

Sample: 131, submitted in February 1995 by G Keevill

Material: human bone (humerus) (A Boyle)

Initial comment: human bone from a grave cut into the top of the Neolithic long barrow, SK131 dated by the British Museum (BM-2833) and accompanied by Beaker grave goods (*see* OxA-5549 for details). The grave contained bone from two other individuals: an adult, represented by skull fragments, teeth and pelvis; and a sub-adult, represented by an immature humerus. The additional bone is weathered.

Objectives: to date the additional individual from this burial and to investigate its contemporaneity with SK131. It is possible that these extra fragments are considerably older than the complete inhumation and may represent curated remains.

Calibrated date: *1σ:* 2210–2030 cal BC
2σ: 2290–1980 cal BC

Final comment: P Bradley (4 October 1995), OxA-5550 was submitted in order to date one of the two additional individuals interned with SK131 and a date was obtained on the sub-adult humerus. It was postulated that the fragmentary and weathered remains may have been substantially older than SK131 (BM-2883) and could perhaps represent curated remains. From the radiocarbon determinations this would indeed seem to be the case. Similar burial practices have been identified at West Cotton, barrow 1 (*see* UB-3311 and UB-3310; Bayliss *et al* 2013, 158).

References: Bayliss *et al* 2013
Hedges *et al* 1997, 252–3

OxA–5551 2655 ±55 BP

$\delta^{13}C$: -21.6‰

Sample: 239, submitted in February 1995 by G Keevill

Material: animal bone: *Cervus elaphus*, humerus (S Davis)

Initial comment: animal bone recovered from the fill of a pit situated towards the middle of the long barrow. The pit and cist are thought to be primary features together with a palisade trench. A cairn may have covered the top of this pit but it was somewhat disturbed by later ploughing. The pit seems to have silted up naturally.

Objectives: to date the primary feature associated with the long barrow, and to date the primary use of the long barrow and tie the determination in with dates already obtained on waterlogged material from the long barrow ditches. The sequence of construction and use will be of importance in the wider Raunds Area Project context.

Calibrated date: *1σ:* 840–790 cal BC
2σ: 920–770 cal BC

Final comment: P Bradley (4 October 1995), OxA-5551 was submitted to date one of the primary features of the long barrow, pit 239. Although the pit was plough damaged, it was thought that animal bone from the lowest fill of the feature was secure enough for dating. However, the full extent of animal disturbance to the feature was not fully appreciated at the time of submission and it must be assumed that contamination has occurred producing this rogue date.

References: Hedges *et al* 1997, 252–3

OxA–5632 4825 ±65 BP

δ^{13}C: -20.2‰

Sample: 233, submitted in February 1995 by G Keevill

Material: human bone (weathered long bone) (A Boyle)

Initial comment: the only human remains contemporary with the primary use of the long barrow were found in the fill of a stone built cist situated towards the rear of the long barrow. The cist was constructed of limestone blocks of which four to six courses survived, and the base was also lined with limestone. A small cairn may have covered the cist although plough damage makes this interpretation difficult. The cist appears to have been cleaned out and backfilled.

Objectives: to date the cleaning out and backfilling of the cist and tie this into the sequence of dates already obtained from organic material from the long barrow ditches. The determination will enable the construction and use of the monument to be determined. This sequence will also be of importance to the Raunds Area Project as a whole. The bone is weathered and may represent a token deposit of curated remains.

Calibrated date: *1σ:* 3660–3530 cal BC
2σ: 3710–3380 cal BC

Final comment: P Bradley (4 October 1995), OxA-5632 and OxA-5633 were obtained to establish the date of funerary activity associated with the primary phase long barrow. As only 50g of weathered human bone was recovered, it was postulated that the feature may have been cleaned out and backfilled with a single long bone being interned. This may represent a token deposit of curated remains. Comparing OxA-5632–3 with OxA-3001–3 from the waterlogged material from the long barrow ditches, the sequence of monument construction, use, and collapse seems clear.

Laboratory comment: English Heritage (20 May 2014), the two measurements on this bone are statistically consistent (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978), and so a weighted mean (4823 ±50 BP) can be taken before calibration (3710–3510 cal BC; 95% confidence; Reimer *et al* 2004).

References: Hedges *et al* 1997, 252–3
Reimer *et al* 2004
Ward and Wilson 1978

OxA–5633 4820 ±80 BP

δ^{13}C: -20.5‰

Sample: 233, submitted in February 1995 by G Keevill

Material: human bone (weathered long bone) (A Boyle)

Initial comment: a replicate of OxA-5632.

Objectives: as OxA-5632

Calibrated date: *1σ:* 3660–3520 cal BC
2σ: 3770–3370 cal BC

Final comment: see OxA-5632

Laboratory comment: see OxA-5632

References: Hedges *et al* 1997, 252–3

OxA–6403 3610 ±80 BP

δ^{13}C: -27.0‰

Sample: 168 (context 276), submitted in December 1995 by P Bradley

Material: wood (waterlogged): *Alnus glutinosa*, roots (M Robinson)

Initial comment: the sample consists of roots which have resulted from limited woodland regeneration and tree growth on the long barrow itself, probably during the later Neolithic. *Alnus* sp. roots were recovered from two discrete clusters in the southern ditch. *Alnus* sp. was also identified in the contemporary waterlogged macroscopic plant remains. Some Pomoideae was also recovered from this cluster, it may be residual and a possible contaminant. *See* also OxA-6404 for the measurement on the other cluster.

Objectives: to date the episode of woodland regeneration. This will enhance both the environmental and structural understanding of the site to allow comparison with other monuments in the area.

Calibrated date: *1σ:* 2130–1880 cal BC
2σ: 2200–1740 cal BC

Final comment: P Bradley (3 June 1997), the two alder root clusters represented by OxA-6403 and OxA-6404 were thought to represent later Neolithic woodland regeneration of the barrow mound. Dating this phase of regeneration was thought to be of value to allow comparisons to be made with other monuments within the Raunds monument complex. Although the dates are slightly later than anticipated, the sequence of later woodland regeneration has been established through the use of radiocarbon dating.

Laboratory comment: ORAU (17 April 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

OxA–6404 3685 ±65 BP

δ^{13}C: -28.4‰

Sample: 185 (context 284), submitted in December 1995 by P Bradley

Material: wood (waterlogged): *Alnus glutinosa*, roots (M Robinson)

Initial comment: as OxA-6403

Objectives: as OxA-6403

Calibrated date: *1σ:* 2200–1970 cal BC
2σ: 2290–1890 cal BC

Final comment: see OxA-6403

Laboratory comment: ORAU (17 April 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

OxA–6405 5005 ±50 BP

$\delta^{13}C$: -26.5‰

Sample: 250/35, submitted in December 1995 by P Bradley

Material: wood (waterlogged): *Quercus* sp., sapwood (M Robinson)

Initial comment: from a woodchip with clear facets. This piece of wood could be 'refitted' to the flint axe, which was one of a group of ten pieces found in a limited area of the southern ditch. All of these pieces had toolmarks, which were made by the flint axe. *See* OxA-6406 for a further measurement from a woodchip.

Objectives: to date the woodworking activity within the southern ditch and therefore help to clarify the sequence as a whole for the monument; and to date the association of the flint axe with the worked wood which will aid understanding of Neolithic woodworking practices.

Calibrated date: *1σ:* 3930–3700 cal BC
2σ: 3960–3650 cal BC

Final comment: P Bradley (3 June 1997), the sequence of activity seems clear: woodworking in or around the ditch, construction of the palisade and barrow mound, deposition of the axe in the mound. The axe subsequently eroded out of the mound into the upper fills of the ditch. These determinations provide a date for the woodworking activities on site, the construction of the barrow itself and they are also useful for flint typology.

Laboratory comment: ORAU (17 April 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

OxA–6406 4960 ±45 BP

$\delta^{13}C$: -27.4‰

Sample: 250/32, submitted in December 1995 by P Bradley

Material: wood (waterlogged): *Quercus* sp., sapwood (M Robinson)

Initial comment: as OxA-6405

Objectives: as OxA-6405

Calibrated date: *1σ:* 3790–3660 cal BC
2σ: 3930–3640 cal BC

Final comment: P Bradley (3 June 1997), OxA-6406 was one of a group of woodchips which showed clear evidence for woodworking. The toolmarks matched the rather worn cutting edge of an almost complete flint axe, which was recovered from the upper fills of the barrow ditch, close to, where the wood debris was discarded. The axe had been used to work the wood, which was then used to construct the long barrow, the axe was then deposited into the mound, and was subsequently eroded into the ditch. The determinations on the woodchips (OxA-6405 and OxA-6406) provide a date for the woodworking activity and indirectly a date for the construction of the monument itself. It is also an invaluable association for the flint axe.

Laboratory comment: ORAU (17 April 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

Raunds Prehistoric: Stanwick, Segmented Ditch Circle, Northamptonshire

Location: SP 999733
Lat. 52.20.54 N; Long. 00.32.00 W

Project manager: S Rault (English Heritage), 1992

Archival body: Northampton Museum

Description: a small hengiform monument built over the south-west end of the Avenue, which by then must have survived as as a set of shallow silted hollows. The cremated remains of a 10–15 year-old had been incorporated into the backfilling, as well as a second cremation burial of a woman over 50. A third male cremation was located near the edge of the enclosure.

Objectives: to date a cremation associated with this monument as well as the monument itself.

Final comment: J Harding and F Healy (2007), two further dates from the Segemented Ring-Ditch (GU-5316–7; Bayliss *et al* 2013, 155–6) probably relate to the time of its construction. Chronological modelling of the radiocarbon results indicate that it was built in *2020–1680 cal BC (95% probability; Last Segmented Ditch Circle*; Harding and Healy 2007, fig 3.87). The three results published here are from residual material on the site, which may be related to the Avenue.

References: Harding and Healy 2007
Harding and Healy 2011

OxA–7906 8715 ±60 BP

$\delta^{13}C$: -23.1‰

Sample: 291-99206, submitted on 10 March 1998 by S Rault

Material: carbonised plant macrofossil (*Corylus* sp. nutshell fragment) (G Campbell 1998)

Initial comment: recovered from soil sample 99205, taken from context 87595, a circular cut containing a cremation within the centre of the Segmented Ditch Circle.

Objectives: to date the cremation associated with the monument.

Calibrated date: *1σ:* 7800–7600 cal BC
2σ: 7960–7590 cal BC

Final comment: J Harding and F Healy (2007), this ninth or eighth millennium sample was almost certainly redeposited. This cremation may conceivably relate to the earlier Avenue - it was on the midline of the Avenue but eccentric to the Circle.

Laboratory comment: ORAU (22 September 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7907 5750 ±45 BP

δ¹³C: -24.6‰

Sample: 291-99196, submitted on 10 March 1998 by S Rault

Material: carbonised plant macrofossil (tuber, *Arrhenatherium etatius* ssp. bulbosum, charred) (G Campbell 1998)

Initial comment: from fill 87556 of a pit forming part of the segmented ditch circle. The material is very small and may have moved down the feature. However, since it is derived from the primary silt it should still relate to the infilling of the pit.

Objectives: to provide further dating evidence for the monument.

Calibrated date: *1σ:* 4690–4530 cal BC
2σ: 4720–4480 cal BC

Final comment: J Harding and F Healy (2007), this result (redeposited in the main fill of the Segmented Ditch Circle), along with other late fifth millennium dates from the Segmented Ditch Circle, show that little-grazed grassland prevailed by this date. This is the earliest dated instance of clearance, by whatever agency, in the area, at a time when at least part of the north of the island remained wooded. OxA-7907 and OxA-7958 are not statistically consistent, but do reflect the human activity either relating to vegetation burning prior to the construction of the monument, or indicate a fifth millennium origin for the Avenue.

Laboratory comment: ORAU (22 September 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7958 5455 ±70 BP

δ¹³C: -27.8‰

Sample: 291-99191, submitted on 10 March 1998 by S Rault

Material: carbonised plant macrofossil (tuber, *Arrhenatherium etatius* ssp. bulbosum, charred) (G Campbell 1998)

Initial comment: retrieved from soil sample 99191 taken from primary silt 87560 infilling one of the pits making up the segmented ditch circle. As the material is very small it may have moved down the profile, but should still produce a date relating to the infilling of this feature.

Objectives: as OxA-7907

Calibrated date: *1σ:* 4360–4250 cal BC
2σ: 4450–4070 cal BC

Final comment: see OxA-7907

Laboratory comment: ORAU (22 September 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

Raunds Prehistoric: West Cotton, barrow 6, Northamptonshire

Location: SP 97607256
Lat. 52.20.30 N; Long. 00.34.02 W

Project manager: D Windell and A Chapman (Northamptonshire County Council Archaeological Unit), 1987

Archival body: Northampton Museum

Description: barrow 6 was a complex, multi-phase round barrow, with three concentric ditches, each associated with a mound. The first ditch may have been centred on a pre-existing tree, perhaps in conjunction with a large open pit immediately to the north-west. The Beaker grave truncated the tree-throw hollow at its eastern end, suggesting that the tree was no longer present. The main burial, of a male crouched on his left side, contained many grave goods. Under the grave there was a small pit containing the disarticulated remains of a male and another individual. There is evidence that the bones had been exhumed from elsewhere after partial decomposition. The initial mound was of turf and topsoil, and appears to have closely followed the Beaker burial. The middle ditch was then cut around the mound, which was extended, incorporating the extracted gravel over the heavily silted inner ditch. A large postpit was dug into the upper fills of this ditch. The final, outer, ditch was *c* 31m in diameter. A further arc on the eastern side formed part of this enclosure, although interrupted by a causeway on either side where the outer ditch intersected with the Ditched Enclosure, suggesting that the latter's internal bank was visible and deliberately respected. Topsoil, probably from the outer ditch and berm, was dumped around the mound perimeter, which was then gravel-capped. Two infant cremations (one beneath a small Collared Urn) were inserted into secondary fills of the outer ditch, and an adult cremation in a Collared Urn was buried in the berm, all in the area shared with the ditched enclosure. Prior to ploughing there was deliberate backfilling of parts of the outer ditch.

Objectives: to date the burial sequence within barrow 6.

Final comment: A Bayliss and F Healy (2011), a bone from one of two incomplete disarticulated skeletons in a grave beneath the primary burial of the barrow was dated by *UB-3310* (4500 ±33 BP; Bayliss *et al* 2013, 158) to *3360–3090 cal BC at 95% probability*. Around a thousand years later, the primary burial was made, an event which would have been almost immediately followed by the construction of the first mound and ditch. The articulated skeleton, which was accompanied by a Beaker and elaborate grave goods, is dated to *2140-2080 cal BC at 14% probability* or *2050–1890 cal BC at 82% probability* (*UB-3311*) (UB-3311; 3608 ±41 BP; Bayliss *et al* 2013, 158). Pomoideae charcoal fragments from a stakehole in a cremation pit cut into the silted outer ditch (*OxA-7866*) are later than the construction of the mound, and provide an estimate for the date of the cremation of *2030–1870 cal BC at 89% probability*. The charcoal seems to have formed part of the surrounding cremation and to have fallen into the stakehole together with fragments of cremated bone after the stake had decayed. It is likely to be close in age to the cremation. Material from the second dated cremation from this ditch was mature oak and so provides only a *terminus post quem* of *1750–1490 cal BC at 95% probability* (*UB-3315*) (Bayliss *et al* 2011, fig SS6.11) (UB-3315; 3347 ±54 BP; Bayliss *et al* 2013, 158).

Laboratory comment: English Heritage (1 June 2012), three further dates from this site were funded before 1993 and were published in Bayliss *et al* (2013, 157–8; UB-3310–11 and UB-3315).

References: Bayliss *et al* 2011
Bayliss *et al* 2013
Harding and Healy 2007
Windell *et al* 1990

OxA–7866 3610 ±40 BP

δ¹³C: -23.9‰

Sample: S53 (3224), submitted on 10 March 1998 by S Rault

Material: charcoal: Pomoideae (<5g) (G Campbell 1998)

Initial comment: fragments of a stake associated with cremated bone. The charcoal was recovered from the stake setting within the pit. The pit was 0.10m deep as excavated, although *c* 0.1m of the pit had been removed before it was recognised. The pit was cut into the outer ditch circuit of Barrow 6 and was sealed by a dumped gravelly layer.

Objectives: to date the secondary use of the barrow and the cremation associated with this feature.

Calibrated date: *1σ:* 2030–1910 cal BC
2σ: 2130–1880 cal BC

Final comment: F Healy and J Harding (2007), this sample is later than the third mound of barrow 6. The charcoal probably derived from the cremation deposit and entered the stakehole together with a fragment of cremated bone after the stake had decayed.

Laboratory comment: ORAU (13 October 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

Raunds Prehistoric: West Cotton, Beaver, Northamptonshire

Location: SP 976725
Lat. 52.20.29 N; Long. 00.34.02 W

Project manager: A Chapman (Northamptonshire County Council Archaeological Unit), 1989

Archival body: Northampton Museum

Description: a series of river deposits filling a palaeochannel of the River Nene at West Cotton.

Objectives: to date the beaver bones, and hence the palaeochannel deposit.

References: Harding and Healy 2007
Harding and Healy 2011
Hedges *et al* 1995, 422
Windell *et al* 1990

OxA–4740 2900 ±60 BP

δ¹³C: -21.9‰

Sample: WC 7109 CAS, submitted on 14 March 1994 by U Albarella

Material: animal bone (femur of *Castor fiber*) (U Albarella)

Initial comment: found during excavation of the lowest unit of a series of river deposits thought to be of Saxon and later date filling a palaeochannel of the River Nene. They immediately and unconformably overlie an earlier sequence of channel deposits thought to be of Neolithic date.

Objectives: if of Saxon date, this would be one of the latest known survivals of beaver in Britain, and thus of considerable interest. There is, however, a clear possibility that it derives from the underlying earlier channel fill.

Calibrated date: *1σ:* 1210–1000 cal BC
2σ: 1270–910 cal BC

Final comment: U Albarella (1995), this radiocarbon date allows us to rule out the possibility that the bone derives from a Saxon animal, which would have made it a very late survivor of beaver in England.

Raunds Prehistoric: West Cotton, long mound, Northamptonshire

Location: SP 97512725
Lat. 51.56.04 N; Long. 00.34.55 W

Project manager: D Windell (Northamptonshire County Council Archaeological Unit), 1987–9

Archival body: Northampton Museum

Description: the long mound was 135m long, and between 13m and 18m wide. It was aligned a few degrees north-east of true east-west. Almost exactly half of the mound was fully excavated. It was built of turf and incorporated struck flint, pottery, and animal bone. A pit beneath probably pre-dated the construction of the mound by several centuries. It is suggested that initially the structure comprised regular bays defined by transverse and longitudinal stake lines along the northern and southern edges of a mound. At the eastern end there may have been a 'chamber' defined by stake lines and possibly flanked by open bays, with a forecourt and facade. Subsequently, a simple dumped mound with no bay structure was constructed beyond the easternmost stake line, the possible facade, with the 'chamber' area perhaps being covered by a low mound. Following the extension of the mound to its full length, a gully was cut around the top edge of the mound the fills of which contained quantities of burnt debris. At the eastern end stakes were set into the gully fill and may suggest the presence of some form of facade, which was probably refurbished at intervals. The mound was at least partially flanked by broad shallow 'quarry pits', although no material from these was used in the mound make-up, and they may have post-dated its construction.

Objectives: to date all the major phases of the monument.

Final comment: A Bayliss (2012), the dating of the long mound is problematic. It appears that the bulk charcoal samples may have contained differing proportions of intrusive charcoal from the overlying Saxon and medieval deposits. The interpretation of these dates is fully discussed by Bayliss *et al* (2011, 870-7).

Laboratory comment: English Heritage, four further samples were dated prior to 1993 and were published in Bayliss *et al* (2013, 159–60; UB-3313, -3320, -3329, and -3417).

Laboratory comment: English Heritage (26 July 2012), one further sample (128 from unit 5549) failed to produce a result.

References: Bayliss *et al* 2011
Bayliss *et al* 2013
Harding and Healy 2007
Harding and Healy 2011
Windell *et al* 1990

OxA–7939 5090 ±45 BP

$\delta^{13}C$: -24.9‰

Sample: S25/990, submitted on 10 March 1998 by S Rault

Material: charcoal: *Quercus* sp., sapwood (R Gale 1998)

Initial comment: one of four stakes located along the eastern terminal of gully F938. Two of these stakes have already been dated (UB-3320 and UB-3324). This gully was cut into the upper surface of the mound towards its outer edges. *See* also OxA-7951 below for a further measurement.

Objectives: to date the activity related to the use of the gully. The stakes may represent the remains of fencing forming an eastern facade to the monument. This may have been maintained over a lengthy period.

Calibrated date: *1σ:* 3970–3800 cal BC
2σ: 3980–3770 cal BC

Final comment: P Marshall (12 November 2012), the gully cut into and surrounding the top of the entire mound contained much burnt material, all of it stratigraphically later than samples in and under the mound. Five radiocarbon measurements have been made on charcoal from this feature: three fall in the earlier part of the fourth millennium cal BC (UB-3417, OxA-7939, and -7951), and two wholly or partly in the third (UB-3320 and UB-3324). UB-3417 was a bulked sample of oak charcoal from the west end of the gully, the other four samples were charred stakes inserted into the east end. The samples for UB-3320 and -3324 were of hazel or alder of up to twenty years growth. That for UB-3324, although broken, seemed to consist of a single piece of wood; that for UB-3320 consisted of many fragments, which were less obviously from a single object. The samples for OxA-7939 and -7951 were single fragments of sapwood from oak stakes.The five measurements from the gully are not statistically consistent (T′=299.6, T′(5%)=9.5, v=4; Ward and Wilson 1978). They cover well over a thousand years. The bulked sample for UB-3417 is particularly likely to be of different age from its context, since it consisted of oak fragments of unknown maturity which did not have any functional coherence and so may not all have been of the same age. It thus differs from the other samples from the gully which all came from charred stakes. However, it is short-lived, apparently *in situ*, stakes which provide the earliest and the latest dates from the gully (OxA-7939 and UB-3320). The two measurements on single fragments of oak sapwood are statistically consistent (T′=3.2; T′(5%)=3.8; v=1; ward and Wilson 1978), and are rather earlier than all three conventional dates. The conventional dates are widely scattered (T′=103.0; T′(5%)=6.0; v=2; Ward and Wilson 1978), which may suggest that the samples, which consisted of more than a single fragment of charcoal, contained material of differing ages. The whole stake samples (UB-3320 and UB-3324) may have included some fragments derived from overlying deposits. The AMS results on single sapwood fragments are, on the other hand, reliable measurements on *in situ* stakes in the gully.

References: Ward and Wilson 1978

OxA–7940 4995 ±50 BP

$\delta^{13}C$: -25.0‰

Sample: S27/2061, submitted on 10 March 1999 by S Rault

Material: charcoal: *Quercus* sp., sapwood (R Gale 1998)

Initial comment: from the matrix of the long mound (2061).

Objectives: to establish a date for the long mound.

Calibrated date: *1σ:* 3910–3700 cal BC
2σ: 3950–3650 cal BC

Final comment: F Healy and J Harding (2007), this sample provides a useful *terminus post quem* for the construction of the long mound.

OxA–7941 4015 ±45 BP

$\delta^{13}C$: -23.7‰

Sample: S136/5456, submitted on 10 March 1998 by S Rault

Material: charcoal: *Quercus* sp., sapwood (R Gale 1998)

Initial comment: from fill 5456 of pit 5484. One of four pieces of carbonised wood found within the shallow subsidence hollow of a pit sealed by the long mound and cut into the pre-mound subsoil. The sample is believed to indicate *in situ* burning. Pit 5484 was 0.3m deep, and the subsidence hollow in which the wood was found was 0.1m deep. A sample from another pit believed to be contemporary with this feature has already been dated (UB-3329). *See* also OxA-7942 and OxA-7952 below.

Objectives: to date the activity taking place prior to the construction of the long mound.

Calibrated date: *1σ:* 2580–2470 cal BC
2σ: 2840–2460 cal BC

Final comment: P Marshall (12 November 2012), thought to be sealed by the mound, this pit was capped by four large pieces of carbonised wood which seemed to have been burnt *in situ* in the top of it, in an area riddled with rabbit burrows. Three single fragments of oak sapwood yielded measurements (OxA-7941, -7942, and -7952) which are statistically consistent (T′=0.5; T′(5%)=6.0; v=2; Ward and Wilson 1978). The *in situ* burning suggests that the samples were contemporary with their context, yet they date to the mid-third millennium cal BC.

References: Ward and Wilson 1978

OxA–7942 3970 ±45 BP

δ¹³C: -24.2‰

Sample: S133/5456, submitted on 10 March 1998 by S Rault

Material: charcoal: *Quercus* sp., sapwood (R Gale 1998)

Initial comment: as OxA-7941

Objectives: as OxA-7941

Calibrated date: *1σ:* 2570–2460 cal BC
2σ: 2580–2340 cal BC

Final comment: see OxA-7941

OxA–7943 4770 ±45 BP

Sample: WC85 874/5261, submitted on 10 March 1998 by S Rault

Material: carbonised plant macrofossil (*Corylus* sp. nutshell fragments) (R Gale 1998)

Initial comment: from fill 5261 of hollow 5263. The hollow was 0.4m deep and the fill consisted of a mottled dark-brown sandy silt. The fill of the pit was sealed by the lower fill of the larger quarry pit, the northern quarry pit that flanks the Long Mound.

Objectives: the northern quarry pit flanks the mound and is believed to have been dug near contemporarily with the construction of the mound or subsequent to the mound construction. The dating of this material should allow clarification of this interpretation.

Calibrated date: *1σ:* 3640–3510 cal BC
2σ: 3650–3370 cal BC

Final comment: P Marshall (12 November 2012), the flanking 'quarry pits' were not sealed by the mound, and, on stratigraphic grounds, may have been cut at any time in its history. The available measurements are for a single context from one of the pits in the base of the northern hollow. The short-life samples on which OxA-7943 and -7944 were made make them likely to be close in age to their context. This is supported by the fact that the measurements are statistically consistent ($T'=0.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). On the basis of the latest material within this deposit, the date of F5263 is mid-fourth millennium cal BC.

References: Ward and Wilson 1978

OxA–7944 4750 ±45 BP

δ¹³C: -26.1‰

Sample: WC85 850/5261, submitted on 10 March 1998 by S Rault

Material: carbonised plant macrofossil (*Arrehatherum elatius* ssp. bullosum tubers) (G Campbell 1998)

Initial comment: from fill 5261 or hollow 5263, as OxA-7943.

Objectives: as OxA-7943

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3650–3370 cal BC

Final comment: see OxA-7944

OxA–7951 4970 ±50 BP

δ¹³C: -24.4‰

Sample: S26/990, submitted on 10 March 1998 by S Rault

Material: charcoal: *Quercus* sp., sapwood (R Gale 1998)

Initial comment: as OxA-7939

Objectives: as OxA-7939

Calibrated date: *1σ:* 3800–3690 cal BC
2σ: 3940–3640 cal BC

Final comment: see OxA-7939

OxA–7952 3995 ±50 BP

δ¹³C: -24.8‰

Sample: S134/5457, submitted on 10 March 1998 by S Rault

Material: charcoal: *Quercus* sp., sapwood (R Gale 1998)

Initial comment: from fill 5457 of pit 5484. As OxA-7941.

Objectives: as OxA-7941

Calibrated date: *1σ:* 2580–2460 cal BC
2σ: 2830–2340 cal BC

Final comment: see OxA-7941

Raunds Prehistoric: West Cotton, turf mound, Northamptonshire

Location: SP 97477236
Lat. 52.20.29 N; Long. 00.34.10 W

Project manager: A Chapman and D Windell (Northamptonshire County Council Archaeological Unit), 1987

Archival body: Northampton Museum

Description: the turf mound was to the immediate north of barrow 2. Roughly circular in plan, of *c* 19m diameter, it stood to a height of 0.5m at the centre. A full understanding of the development of the monument was not possible because much of the evidence was obtained during a watching brief and salvage excavations. Part of the north-eastern end of the mound was fully excavated and the general outline of the monument's plan-form obtained within the quarry area. It consisted of a slightly elongated, unditched mound, onto the southern tail of which a later, ditched, subcircular mound was built. Fences were built, and burnt, in two gullies cut into the original north mound. Both mounds were of turf or turf and topsoil construction. A probable tree-hollow, containing a flint scatter including two leaf arrowheads, pre-dated the construction of the north mound. A pit containing a sherd of Grooved Ware or Beaker and a red deer antler underlay the south mound. There was no evidence that this pit had contained an inhumation burial. A scatter of Beaker sherds on top of the north mound and in a pit cut into it reflect activity perhaps contemporary with the construction of the south mound.

Objectives: to provide further evidence for the chronology and phasing of what was believed to be the earliest monument in the Raunds complex.

Final comment: A Bayliss and F Healy (2011), the gully which contained the samples for OxA-7865, OxA-7945, UB-3314, and UB-3317 was one of two cut into the northern part of the mound. All four measurements are statistically consistent (T′=6.7, T′(5%)=7.8, ν=3; Ward and Wilson 1978). The intervals between the construction of the mound and the cutting of two successive gullies can only be guessed at. If they were negligible, the mound would have been built in *3750–3620 at 77% probability or 3600–3520 cal BC at 18% probability (Turf Mound 1;* Bayliss *et al* 2011, fig SS6.8). A stake charred *in situ* can scarcely have been derived from an earlier context, and the consistency of all the dates reinforces the argument that a tightly defined concentration of Beaker pottery in the mound was in fact in a pit undetected at the time of excavation.

Laboratory comment: English Heritage (12 December 2012), two further dates were funded prior to 1993 and were published in Bayliss *et al* (2013, 162; UB-3314 and -3317).

References: Bayliss *et al* 2011
Bayliss *et al* 2013
Harding and Healy 2007
Ward and Wilson 1978
Windell *et al* 1990

OxA–7865 4975 ±35 BP

$\delta^{13}C$: -24.3‰

Sample: S100/6361, submitted on 10 March 1998 by D Windell

Material: charcoal: *Corylus* sp., root (G Campbell 1998)

Initial comment: from a concentration of charcoal found within the fill of a re-cut of the eastern linear gully cut into the top of the mound. The fill, 6361, is medium brown to grey brown sandy loam.

Objectives: to date the recutting of the eastern gully within the first phase of use of the turf mound.

Calibrated date: *1σ:* 3790–3700 cal BC
2σ: 3920–3650 cal BC

Final comment: P Marshall (12 November 2012), the gully which contained the samples for OxA-7865 and -7945, UB-3314, and -3317 was one of two cut into the northern part of the mound. The sample for OxA-7865 came from a recut of the south part of that gully, the others from the northern part of the gully, which appeared to be part of the recut rather than the original slot. All four measurements are statistically consistent (T′=6.7; T′(5%)=7.8; ν=3; Ward and Wilson 1978). The intervals between the construction of the mound and the cutting of two successive gullies can only be guessed at. If they were negligible, the mound would have been built in 38th or 37th centuries cal BC.

Laboratory comment: ORAU (13 October 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Ward and Wilson 1978

OxA–7945 5035 ±35 BP

$\delta^{13}C$: -23.9‰

Sample: S97/6302, submitted on 10 March 1998 by D Windell

Material: charcoal: *Corylus* sp., root (G Campbell 1998)

Initial comment: from a concentration of charcoal found within the fill of the eastern gully cut into the top of the turf mound; fill 6302. The sample was found at the base of the gully. The fill was similar to the mound itself, dark grey brown to near black sandy loam. The sample consists of charcoal fragments associated with blocks of reddened sand. The gully at this point was 0.7m wide and 0.39m deep. The gully was partly cut away by a medieval furrow.

Objectives: to give a further date on the first phase of mound use.

Calibrated date: *1σ:* 3940–3770 cal BC
2σ: 3960–3710 cal BC

Final comment: see OxA-7865

OxA–7947 3870 ±30 BP

$\delta^{13}C$: -25.7‰

Sample: S90/6053, submitted on 10 March 1998 by D Windell

Material: charcoal: *Corylus* sp. (G Campbell 1998)

Initial comment: found at the southern end of the base of pit 6047, 0.6m deep, interpreted as the primary feature under the Turf Mound (formerly barrow 2). No human bone was found in the pit. The charcoal was clearly part of a single rectangular piece. The pit cut into mixed leached sands and gravel. It was located during machining but had clearly been sealed by up to 0.4m of undisturbed mound. See OxA-8017 below for a further measurement.

Objectives: to date the infilling of the primary feature beneath the Turf Mound, ?grave pit, and provide a *terminus post quem* for the mound.

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

Final comment: P Marshall (12 November 2012), the sample for OxA-7947 and -8017 came from a pit (F6047) under the southern part of the mound. It was a single, rectangular piece of carbonised hazel 105mm × 45mm and less than 5mm thick. Either the pit was cut through the mound, or the southern mound, with its encircling ring-ditch, was a substantially later addition to the northern one. The salvage conditions in which the pit was excavated leave both options open, but the recognition of this pit only after the mound had been removed, while others were observed cut into its surface, suggests that it may indeed have preceded the monument.

Laboratory comment: English Heritage (20 May 2014), the two measurements from this charred timber are statistically consistent (T′=1.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and so a weighted mean (3895 ±22 BP) can be taken before calibration (2470–2290 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–8017 3920 ±30 BP

δ¹³C: -25.8‰

Sample: S90/6053, submitted on 10 March 1998 by D Windell

Material: charcoal: *Corylus* sp. (G Campbell 1998)

Initial comment: as OxA-7947

Objectives: as OxA-7947

Calibrated date: *1σ:* 2470–2340 cal BC
2σ: 2480–2290 cal BC

Final comment: see OxA-7947

Laboratory comment: see OxA-7947

Raunds: South Stanwick, Northamptonshire

Location: SU 962705
Lat. 51.25.29 N; Long. 00.36.58 W

Project manager: G D Keevil (Oxford Archaeological Unit), 1990

Archival body: Oxford Archaeological Unit

Description: small Roman 'settlement complex' including a mill and two rectangular barns within a system of ditched enclosures and field boundaries. The mill was subsequently converted into a villa with hypocaust.

Objectives: to ascertain whether the fallow deer bone submitted is Roman, or at least whether or not it is pre-Norman.

References: Davis 1997
Keevill 1992

OxA–7896 965 ±45 BP

δ¹³C: -21.8‰

Sample: context 487, Area H, Phase 0 cleaning, Box 13, submitted on 27 January 1998 by S Davis

Material: animal bone: Dama dama, calcaneum of adult fallow deer (24.50g) (S Davis 1998)

Initial comment: from context 487, area H, phase O cleaning, box 13: the sample was retrieved during cleaning of the archaeological layer. The bone preservation at the site is generally moderately good.

Objectives: fallow deer, now common in England, are not a native species, and are generally considered to have been introduced by the Normans. However, in the past, occasional finds of fallow deer bones have been reported from Roman contexts. Sometimes these are dismissed as later contaminants, but since the Romans are known to have introduced fallow deer into Switzerland, France, Germany, and Spain, there seems good reason to believe they brought them across the channel too. The presence of a bone rather than an antler suggests the original presence of the whole animal and not simply an antler (which are traded as raw material for tool production).

Calibrated date: *1σ:* cal AD 1020–1160
2σ: cal AD 990–1170

Final comment: S Davis (4 October 1999), there is always a need to be cautious when trying to extrapolate from finds of single bones in archaeology. As suspected this bone was not Roman. A post-Roman date for this bone therefore leaves the question of a Roman introduction of fallow deer still unanswered.

References: Bronk Ramsey *et al* 2000a, 471

Salisbury Plain Project, Wiltshire

Location: see individual sites
Lat. ; Long. , see individual sites

Project manager: R Entwistle (University of Reading), 1992

Description: a series of fieldwalking surveys and excavations of Iron Age and Romano-British sites in two areas of the Salisbury Plain Training Area was undertaken. Altogether some 18 new settlement sites were discovered, of which 13 were Romano-British, three were predominantly Iron Age, and two produced evidence of middle-late Bronze Age occupation. Small-scale excavation was undertaken at eight enclosures and field systems, accompanied by targeted environmental sampling. An increase in enclosure through to the later Iron Age was revealed, when there was evidence for settlement abandonment followed by a further development of unenclosed settlement and the emergence of nucleated villages such as Chisenbury Warren in the late Iron Age and through the Romano-British period.

Objectives: to assist with building a chronology for the Iron Age and Romano-British sites identified during the Salisbury Plain Project.

References: Fulford *et al* 2006

Salisbury Plain Project: Warren Hill, Wiltshire

Location: SU 257476
Lat. 51.13.08 N; Long. 01.37.55 W

Project manager: R Entwistle (University of Reading), 1992

Archival body: Devizes Museum

Description: this site is only visible on aerial photographs. The ditch is V-shaped with sherds of early Iron Age pottery in fresh condition. Fragments of triangular baked clay loom weights were recovered from the lower silts, into which a shallow scoop containing three ox skulls had been cut.

Objectives: the enclosure is one of a number in the study area. Provisional dating rests on ceramic sequences - replicated at a number of enclosures, which indicates an early Iron Age to middle Iron Age time scale. However, pottery of that period is not well-dated in the area, and radiocarbon dating is important to achieve a more refined understanding of the local early to middle Iron Age chronology.

Final comment: P Marshall (26 September 2008), the radiocarbon dates show the ditch deposits span several centuries and testify to the continuing significance of the ditch even though its monumental scale seems not to have been maintained.

References: Fulford *et al* 2006, 43–5

GU–5441 2130 ±60 BP

δ¹³C: -21.6‰

Sample: 049, context 25, submitted on 23 August 1994 by R Entwistle

Material: animal bone (bulk)

Initial comment: sample from context 25 the fill of a small cut (45) - lower horizon of a modern deposit containing animal bone, middle Iron Age sherds, and burnt flint. Much of this material was in very fresh condition with soot on the burnt flint and sherds.

Objectives: the project aims to understand the development of the Iron Age settlement pattern and so it is important to date the origin and final occupation of these sites. The midden debris reflects the final phase of activity and is of middle Iron Age date.

Calibrated date: *1σ:* 350–50 cal BC
2σ: 370 cal BC–cal AD 10

Final comment: P Marshall (26 September 2008), the radiocarbon dates show the ditch deposits span several centuries and testify to the continuing significance of the ditch even though its monumental scale seems not to have been maintained.

Laboratory comment: English Heritage (26 September 2008), the two measurements from this context (GU-5441 and GU-5442) are statistically consistent (T′=1.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

GU–5442 2230 ±60 BP

δ¹³C: -21.8‰

Sample: 049, context 25, submitted on 23 August 1994 by R Entwistle

Material: animal bone (bulk)

Initial comment: as GU-5441

Objectives: as GU-5441

Calibrated date: *1σ:* 390–200 cal BC
2σ: 410–110 cal BC

Final comment: see GU-5441

Laboratory comment: see GU-5441

GU–5443 2370 ±50 BP

δ¹³C: -21.3‰

Sample: 049, context 40, submitted on 23 August 1994 by R Entwistle

Material: animal bone (bulk)

Initial comment: stratigraphically 40 and 41 (75) are contemporary and earlier than 72, 73, and 74.

Objectives: as GU-5441

Calibrated date: *1σ:* 490–390 cal BC
2σ: 740–370 cal BC

Final comment: see GU-5441

GU–5444 2470 ±50 BP

δ¹³C: -23.4‰

Sample: 049, context 41, SF75, submitted on 23 August 1994 by R Entwistle

Material: animal bone: *Bos* sp., cattle skull and jaw (D Serjeantson 1994)

Initial comment: the samples were recovered from between 2.6m and 3.0m below the present land surface. Stratigraphically earlier than 72, 73, and 74.

Objectives: as GU-5441

Calibrated date: *1σ:* 770–430 cal BC
2σ: 800–400 cal BC

Final comment: see GU-5441

Laboratory comment: English Heritage (26 September 2008), the three measurements from this context (GU-5445, GU-5446, and GU-5447) are statistically consistent (T′=2.1; T′(5%)=6.0; ν=2; Ward and Wilson 1978).

References: Ward and Wilson 1978

GU–5445 2410 ±60 BP

δ¹³C: -21.7‰

Sample: 049, context 43, SF72, submitted on 23 August 1994 by R Entwistle

Material: animal bone: *Bos* sp., cattle skull (D Serjeantson 1994)

Initial comment: the samples were recovered from between 2.6m and 3.0m below the present land surface. From context (43) paced in a shallow deposit (42) cut into context (41), and covered with a layer of probable topsoil (41).

Objectives: as GU-5441

Calibrated date: *1σ:* 740–400 cal BC
2σ: 780–380 cal BC

Final comment: see GU-5441

Laboratory comment: see GU-5444

GU–5446 2330 ±50 BP

δ¹³C: -22.6‰

Sample: 049, context 43, SF73, submitted on 23 August 1994 by R Entwistle

Material: animal bone: *Bos* sp., cattle skull (D Serjeantson 1994)

Initial comment: as GU-5445

Objectives: as GU-5441

Calibrated date: 1σ: 410–380 cal BC
2σ: 520–230 cal BC

Final comment: see GU-5441

Laboratory comment: see GU-5445

GU–5447 2270 ±80 BP

$\delta^{13}C$: -22.7‰

Sample: 049, context 43, SF74, submitted on 23 August 1994 by R Entwistle

Material: animal bone: *Bos* sp., cattle skull (D Serjeantson 1994)

Initial comment: as GU-5445. Earlier than sample 25, contemporary with 72 and 73, and later than 75, 41, and 40.

Objectives: as GU-5441

Calibrated date: 1σ: 410–200 cal BC
2σ: 520–120 cal BC

Final comment: see GU-5441

Laboratory comment: see GU-5445

Salisbury Plain Project: Widdington Farm, Wiltshire

Location: SU 12825411
Lat. 51.17.08 N; Long. 01.48.58 W

Project manager: R Entwistle (University of Reading), 1992

Archival body: Devizes Museum

Description: this enclosure lies just to the east of Casterley Hillfort. It is no longer visible on the ground, but appears on aerial photographs as a sub-circular feature. The chronological sequence was similar to that of the Warren Hill enclosure. Early Iron Age pottery was recovered from the bottom of the ditch, and throughout the secondary silts (context 17).

Objectives: the pottery sequence from the enclosure ditch at Widdington Farm shows that the crouched inhumation occupies a stratigraphic position transitional between the early and middle Iron Age. This site is one of a number in the Salisbury Plain Area where broadly similar ceramic phasing has been recognised. The purpose of the assay is to provide independent dating for the pottery transition which can be applied to other excavated in the study area.

References: Fulford *et al* 2006, 22

UB–3843 2014 ±19 BP

$\delta^{13}C$: -20.3 ±0.2‰

Sample: SF3, submitted on 4 August 1994 by R Entwistle

Material: human bone (crouched inhumation) (J Firth 1994)

Initial comment: the grave appeared to be undisturbed and was situated at approximately 1.2m below the ground surface.

Objectives: to date the pottery transition, which can be applied to other excavated in the study area.

Calibrated date: 1σ: 45 cal BC–cal AD 20
2σ: 55 cal BC–cal AD 50

Final comment: Peter Marshall (26 September 2008), the grave may have been subjected to some disturbance, as a number of bones probably from the same individual were found within both layers of the midden deposit. The grave cut into the lower midden deposit (17) but was sealed by the upper midden deposit (11). This suggests that the midden accumulated over a considerable period of time, although there was no indication that any soil had formed within the ditch during that process.

Seaham Lodge, Co. Durham

Location: NZ 42255070
Lat. 54.50.57 N; Long. 01.20.31 W

Project manager: C Adamson (Northern Archaeological Associates), March 1997

Archival body: Northern Archaeological Associates

Description: discoveries of human skeletons in the grounds of Seaham Hall have been documented from the middle of the eighteenth century. The bones have variously been described as prehistoric, Romano-British, ancient British, and Anglo-Saxon, and as being disarticulated and buried in a war grave. In order to examine the burials under controlled conditions, an archaeological excavation was commissioned by the County Archaeologist of Durham County Council in the grounds of the lodge of Seaham Hall. The remains of ten inhumations were uncovered and recorded in an area measuring little more than 7m by 3m by Northern Archaeological Associates. The west-east orientation of the burials indicated burial in the Christian tradition and a small assemblage of pottery recovered from the grave fills was of medieval date. The remains were examined *in situ* by a palaeopathologist and covered over.

Objectives: to provide crucial information on the general period of the cemetery.

References: Adamson and Abramson 1997
Bronk Ramsey *et al* 1999, 199

OxA–7336 1285 ±35 BP

$\delta^{13}C$: -19.5‰

Sample: 016, submitted on 9 April 1997 by P Abramson

Material: human bone (right humerus) (J Langston 1997)

Initial comment: the sample was taken from a near-complete skeleton, the lower part of the body being disturbed by a later inhumation. The burial was *c* 0.75m below the surface. No dating evidence was associated with this sample.

Objectives: human skeletal material has been recovered from the area of the site for *c* 150 years, without any archaeological input. The nearest church is *c* 150m from the site. The excavation has demonstrated that a) the burials are articulated, b) aligned west to east, c) without grave goods, d) *c* 0.75–1.50m below the surface. Several small sherds of medieval pottery (*c* twelfth–fourteenth century) were recovered from a grave but these could be intrusive. A radiocarbon date would provide crucial information on the general period of the cemetery.

Calibrated date: *1σ:* cal AD 670–770
2σ: cal AD 650–780

Final comment: P Abramson (1999), the radiocarbon dates obtained from two skeletons indicated that burials was likely to have been within the period spanning the mid-seventh to the late-ninth centuries AD. The cemetery may in some way be associated with the Saxon church of Seaham St Mary, situated 200m to the south of the burials.

OxA–7337 1260 ±35 BP

δ¹³C: -19.9‰

Sample: 019, submitted on 9 April 1997 by P Abramson

Material: human bone (right humerus) (J Langston 1997)

Initial comment: the sample was taken from a complete skeleton, which was *c* 0.75m below the ground level. No dating evidence was associated with this sample.

Objectives: as OxA-7336

Calibrated date: *1σ:* cal AD 680–780
2σ: cal AD 660–880

Final comment: see OxA-7336

Seathwaite, Cumbria

Location: NY 235111
Lat. 54.29.23 N; Long. 03.10.52 W

Project manager: D Anderson and A Parker (University of Lancaster), 1993, and 1997-9

Archival body: Lake District National Park Authority

Description: erosion from the River Derwent exposed a sequence of deposits *c* 1km south of Seathwaite Farm. Peat approximately 0.5m–2m deep was overlain by colluvial deposits up to 3m deep derived from reworked tills. Such peat deposits form ideal conditions for the preservation of organic remains, from pollen to timber, which hold the potential to reveal information about past climatic variations and human impact on the environment. Subsequent recording, excavation, and analysis identified worked timbers, a probable fence, a relict drystone wall, and a brushwood structure.

Objectives: to provide a chronological framework for the peat deposits.

Final comment: C Wild, C Wells, D Anderson, J Boardman, and A Parker (2001), two further determinations have been obtained on worked timbers from this site (AA-27748, 395 ±45 BP; and AA-27747, 325 ±60 BP.

References: Bronk Ramsey *et al* 2002, 43
Wild *et al* 2001

OxA–7749 150 ±40 BP

δ¹³C: -25.8‰

Sample: SW-1, submitted on 11 December 1997 by D Anderson and A Parker

Material: waterlogged plant macrofossil: Cyperaceae spp., seeds (A Parker 1993)

Initial comment: SW-1is located at 1–2cm depth in the peat section. The seeds were *in situ* within the exposed peat under a colluvial fan.

Objectives: SW-1 will provide a maximum age for the formation of the colluvial fan which overlies the peat deposit. The fan appears to have formed due to enhanced erosion by human land-use in the catchment (indicated by the pollen analysis). thus, the timing of the fan can provide insight into the historical period when human disturbances became intense within the area.

Calibrated date: *1σ:* cal AD 1660–1950
2σ: cal AD 1660–1955*

Final comment:, this result shows that the alluvial fan formed during or before the post-medieval period.

Laboratory comment: English Heritage (2000), this determination from the top of the peat sequence provides a *terminus post quem* for the formation of the colluvial fan. The seeds are unlikely to be intrusive given that they were sealed by 3m of deposits.

Laboratory comment: ORAU (22 May 1998): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code VV).

References: Brock *et al* 2010

OxA–7750 520 ±40 BP

δ¹³C: -27.7‰

Sample: SW-2, submitted on 11 December 1997 by D Anderson and A Parker

Material: waterlogged plant macrofossil: Cyperaceae spp., seeds (A Parker 1997)

Initial comment: SW-2 was located at 33–34cm in the peat section under the colluvial fan.

Objectives: to provide a date for the increase in human land-use within the catchment as revealed in the pollen analysis. The sample lies at the pollen zone boundary between SF-2 and SF-3 characterised by a rise in anthropogenic indicators such as *Plantago lancolata*, thus, the sample will show when a new phase of land-use occurred in the area. It may possibly relate to Norse settlement.

Calibrated date: *1σ:* cal AD 1400–1440
2σ: cal AD 1310–1450

Final comment: C Wild, C Wells, D Anderson, J Boardman, A Parker (2001), it is clear from the radiocarbon dates that the coppicing episode does not relate to any perceived Gaelic-Norse land clearance, but rather to a medieval phenomenon, starting with woodland clearance in the fourteenth to mid-fifteenth century, as documented by the pollen record.

Laboratory comment: ORAU (22 May 1998): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code VV).

References: Brock *et al* 2010

OxA–7751 535 ±45 BP

$\delta^{13}C$: -27.1‰

Sample: SW-3, submitted on 11 December 1997 by D Anderson and A Parker

Material: waterlogged plant macrofossil: Cyperaceae spp., seeds (A Parker 1997)

Initial comment: SW-3 is located at 61–62cm depth in the peat section beneath the colluvial fan.

Objectives: SW-3 will provide an age for the formation of the peat deposits. It will also help to derive an age-depth curve for the whole sequence. Peat formation probably post-dates deforestation in the catchment, and the onset of peat accumulation could represent early human impact and/or climatic change to wetter/cooler conditions.

Calibrated date: *1σ:* cal AD 1320–1440
2σ: cal AD 1300–1450

Final comment: see OxA-7750

Laboratory comment: ORAU (22 May 1998): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code VV).

References: Brock *et al* 2010

Shapwick Burtle, Somerset

Location: ST 42503980
Lat. 51.09.15 N; Long. 02.49.20 W

Project manager: V Straker (University of Bristol), 1993

Archival body: University of Bristol

Description: a possible terminal of the Sweet Track in the Somerset Levels, which could help us understand the human activity both in the Levels and on the Poldens. This site has suffered little in the way of recent disturbance, and thus has an unusually complete sequence of peats.

Objectives: to date a possible terminal of Sweet Track on the Polden Hills, as wood submitted for dendrochronology cannot be dated at present.

Final comment: J Wells (1999), the five dates represented here were from a sequence of peats taken from a site that is a possible terminal of the Sweet Track. Dendrochronological analyses on wood from the Sweet Track have dated this structure to 3807/6 BC (Hillam *et al* 1990). The calibrated date ranges of all the dates tie in exceptionally well with this date. Although two of the dates are inverted (OxA-7061 and -7062) they are too close to be separated once calibrated, thus only confirming the validity of the dates from this sequence.The trackway at this site was positioned between 160cm and 180cm in the peat column that was 206cm thick. Pollen analysis revealed the changing nature of the local vegetation before, during, and after the construction of the trackway and the radiocarbon dates detailed here were those selected from critical bio- and litho-stratigraphical locations throughout that sequence. The vegetation indicated throughout the sequence from the pollen was one of a mixed oak woodland. The base of the sequence was dated elsewhere using conventional dates on peat (both humin GU-5390 and humic GU-5391 fractions) and record the time shortly after falling relative sea-levels in this region allowed for peat formation. Pollen and spore values indicate the on-set of increased wetness at 184-5cm and this level is dated by OxA-7063. The three dates OxA-7062, -7061, and -7060 all coincide with the levels in which the trackway was situated. A continuation of wetter conditions is still indicated by the pollen and spore values although at the level of the uppermost of these dates a return to drier conditions has been inferred. The uppermost date OxA-7096 at 138–9cm marks probable lime (*Tilia*) and elm (*Ulmus*) declines indicating an increase in human activity on the vegetation in this area.

References: Hillam *et al* 1990

GU–5388 4970 ±70 BP

$\delta^{13}C$: -28.2‰

Sample: SWA93 1 + SWA93 2, submitted on 11 February 1994 by V Straker

Material: peat (humic acid) (V Straker 1994)

Initial comment: the basal 1cm of peat above the interface with clay in trench B, from tin D. The sample had a pH of 5.478. This sample is a duplicate of SWA 93 2 (GU-5389).

Objectives: to establish the sequence of vegetation development on the wetland margin.

Calibrated date: *1σ:* 3910–3650 cal BC
2σ: 3960–3630 cal BC

Final comment: see series comment

Laboratory comment: English Heritage (7 January 1998), the results on the duplicate fractions of this sample are statistically consistent (T′=0.3; T′(5%)=3.8; v=1; ward and Wilson 1978), and so a weighted mean may be taken (4999 ±46 BP), which calibrates to 3950–3660 cal BC (95% confidence; Reimer *et al* 2004).

Laboratory comment: SURRC Radiocarbon Dating Laboratory (28 June 1994), the humic acid fraction of this sample was dated.

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

GU–5389 5020 ±60 BP

$\delta^{13}C$: -29.3‰

Sample: SWA93 1 + SWA93 2, submitted on 11 February 1994 by V Straker

Material: peat (humin) (V Straker 1994)

Initial comment: a duplicate of SWA 93 1, *see* GU-5388 above.

Objectives: as GU-5388

Calibrated date: *1σ:* 3950–3700 cal BC
2σ: 3970–3650 cal BC

Final comment: see series comment

Laboratory comment: see GU-5388

Laboratory comment: SURRC Radiocarbon Dating Laboratory (28 June 1994), the humin fraction of this sample was dated.

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

GU–5390 5600 ±50 BP

δ¹³C: -28.9‰

Sample: SWA93 3 + SWA93 4, submitted on 11 February 1994 by V Straker

Material: peat (humic acid) (V Straker 1994)

Initial comment: from the basal 1cm of peat above the interface with clay in trench C. From tin 3. The sample had a pH of 6.662. This sample is a duplicate of SWA 93 4 (GU-5391).

Objectives: as GU-5388

Calibrated date: *1σ:* 4490–4360 cal BC
2σ: 4540–4340 cal BC

Final comment: see series comment

Laboratory comment: English Heritage (7 January 1998), the results on the duplicate fractions of this sample are statistically consistent (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978), and so a weighted mean can be taken (5603 ±41 BP), which calibrates to 4530–4350 cal BC (95% confidence; Reimer *et al* 2004).

Laboratory comment: see GU-5388

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

GU–5391 5610 ±70 BP

δ¹³C: -28.9‰

Sample: SWA93 3 + SWA93 4, submitted on 11 February 1994 by V Straker

Material: peat (humin) (V Straker 1994)

Initial comment: a duplicate of SWA 93 3, *see* GU-5390 above.

Objectives: as GU-5388

Calibrated date: *1σ:* 4510–4350 cal BC
2σ: 4600–4330 cal BC

Final comment: see series comment

Laboratory comment: see GU-5390

Laboratory comment: see GU-5389

OxA–7060 4975 ±60 BP

δ¹³C: -26.8‰

Sample: STT/C: 162-163, submitted on 12 March 1997 by D Weir

Material: waterlogged plant macrofossil: *Alnus* sp., male catkins (D Weir 1997)

Initial comment: the sample represents a marked increase in ferns and decrease in aquatics, suggesting a return to conditions similar to those below 185cm. Grasses (*Gramineae*) increase above this level, as does representation of cereals and weeds of disturbance, such as *Plantago Lanceolata*.

Objectives: to date a level which seems to indicate a return to drier conditions, similar to those below 185cm. This seems to be associated with increased agricultural disturbance above 160cm.

Calibrated date: *1σ:* 3900–3660 cal BC
2σ: 3950–3640 cal BC

Final comment: see series comment

Laboratory comment: ORAU (2 October 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code VV).

References: Brock *et al* 2010
Bronk Ramsey *et al* 1999, 199

OxA–7061 5065 ±60 BP

δ¹³C: -26.9‰

Sample: STT/C: 169-170, submitted on 12 March 1997 by D Weir

Material: waterlogged plant macrofossil: *Alnus* sp., fruits and male catkin (D Weir 1997)

Initial comment: the sample represents a level where oak values recover, following a second period of reduction. *Corylus*-type pollen decline. There is some increase in ferns and an increase in sedges (Cyperaceae). Aquatics are still well represented.

Objectives: to date a level at which oak may recover after a second possible depletion phase. Oak depletion may relate to trackway construction, and this might therefore date the end of this phase.

Calibrated date: *1σ:* 3960–3780 cal BC
2σ: 3980–3700 cal BC

Final comment: see series comment

Laboratory comment: ORAU (2 October 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code VV).

References: Brock *et al* 2010

OxA–7062 5000 ±60 BP

δ13C: -25.4‰

Sample: STT/C: 176-177, submitted on 12 March 1997 by D Weir

Material: waterlogged plant macrofossil: *Alnus* sp., fruits, bud scales, and male catkin (D Weir 1997)

Initial comment: the sample represents a level where oak peaks again after decline, alder values drop, and aquatics show a slight increase.

Objectives: to date a level where aquatics show a slight increase suggesting that it may be somewhat wetter locally. It also dates an increase in oak which may indicate recovery from a previous phase of human depletion of oak woodland, but this could also be a natural successional change.

Calibrated date: *1σ:* 3940–3700 cal BC
2σ: 3960–3650 cal BC

Final comment: see series comment

Laboratory comment: ORAU (2 October 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code VV).

References: Brock *et al* 2010
Bronk Ramsey *et al* 1999, 199

OxA–7063 5160 ±130 BP

δ13C: -27.3‰

Sample: STT/C: 184-185, submitted on 12 March 1997 by D Weir

Material: waterlogged plant macrofossil: *Alnus* sp., fruits and bud scales (D Weir 1997)

Initial comment: the sample represents a marked decline in ferns. Below is a decline in oak and an increase in alder and *Corylus*-type pollen, and willow.

Objectives: to date the first of a series of woodland changes, some of which could be associated with hydrological change (increased wetness), such as the increase in alder and willow. Other changes, such as the fall in oak values could be associated with human activity.

Calibrated date: *1σ:* 4220–3790 cal BC
2σ: 4330–3650 cal BC

Final comment: see series comment

Laboratory comment: ORAU (2 October 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code VV).

References: Brock *et al* 2010
Bronk Ramsey *et al* 1999, 199

OxA–7096 4595 ±65 BP

δ13C: -28.0‰

Sample: STT/C: 138-139, submitted on 12 March 1997 by D Weir

Material: waterlogged plant macrofossil: *Alnus* sp., male catkin and female cone (D Weir 1997)

Initial comment: the sample represents the final decline in lime and a decline in elm and a further increase in grasses.

Objectives: to date a further increase in human activity resulting in declines in lime and elm. It also provides a date for the upper part of the pollen diagram.

Calibrated date: *1σ:* 3500–3190 cal BC
2σ: 3620–3090 cal BC

Final comment: see series comment

Laboratory comment: ORAU (2 October 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code VV).

References: Brock *et al* 2010
Bronk Ramsey *et al* 1999, 199

Sherborne Abbey, Dorset

Location: ST 63791681
Lat. 50.56.57 N; Long. 02.30.56 W

Project manager: L Keen (Department of the Environment), 1955 and 1974

Archival body: Dorset County Museum, Sherborne School

Description: the see of Sherborne was founded by King Ine of Wessex in AD 705, although the choice of Sherborne suggests the possibility of a pre-existing foundation.

Objectives: can any of the skeletons be dated to before the foundation of AD 705, and so support the hypothesis of pre-existing activity on the site.

Final comment: P Ellis (14 February 2003), the dates for the three slype burials support the immediate hypothesis raised by the finding of closely packed east-west oriented burials lying beneath the medieval claustral buildings, where two the dated burials were cut by a pre-Conquest wall. The hypothesis was that the burials marked a community predating the earliest surviving cloister layout - which was datable at Sherborne to the eleventh century. The radiocarbon dates give a date range from the mid-seventh century to the ninth century. Two of the three indicate the possibility that the start date of the cemetery predated the foundation of the abbey in AD 705. A land grant made by King Cenwalh (d. AD 672) has led to the suggestion of a British monastic settlement on which the Saxon see was sited. The radiocarbon dates certainly support this suggestion. Although it may be a mistake to read too much detail into the three dates, it does appear that they range over a long timespan indicating a longstanding associated community apparently continuing from a Christian British origin into the early centuries of Saxon see. These dates are conclusive in answering the question as to whether the infirmary burials could be linked with those from the slype, the answer being yes. The two findings of east-west oriented burials are widely separate yet clearly occupy the same date range. Whether they are spatially connected is another question. Recent research suggests that these little known early communities may have been multi-focal and so one location for one activity, in this case burial, need not be expected (there are early burials at Sherborne Old Castle). There may have been separate cemeteries attached to a polyfocal settlement, which may have represented different groups. Thus it is not necessary to argue for a large cemetery encompassing both the slype and infirmary groups. Whether they were different status remains unknown since the minimal data does not offer any hints of distinctions. Looking at the five dates together it is clear that the dating project has been highly successful. Disparate burials, both spatially and in what little could be deduced from their stratigraphic contexts, have been pulled together into a group with a coherent seventh- and eighth-century date. The dates must indicate a good possibility that here is evidence of a British Christian community burying east-west before the Saxon foundation. The dating gives legitimacy to further speculation as to why the Saxon church was founded here and why the later cloisters were on the north side of the church, the answer perhaps being that they were located on an already existing Christian site.

References: Keen and Ellis 2005

OxA–5943 1330 ±45 BP

$\delta^{13}C$: -19.4‰

Sample: SHA 74-1, sample 904, submitted on 5 September 1995 by P Ellis

Material: human bone (right femur) (J Rogers 1995)

Initial comment: from a grave cut into sandy clay overlying the natural substrate (described under burials 1 and 2). A medieval wall, presumed to be thirteenth century, which lay to its north, cut the grave. Only part of the skeleton was recovered from a narrow cutting.

Objectives: although not cut by the earliest wall beneath the slype, burial 904, predates the twelfth-century building and seems likely to form part of the cemetery of which burials 1 and 2 are part.

Calibrated date: *1σ:* cal AD 650–770
2σ: cal AD 640–780

Final comment: P Ellis (14 February 2003), this is the earliest date of the three dated skeletons from the slype area, that is to say the area between the chapter-house and the north transept of the abbey. The burial lay beneath a wall, which divided this area into a passageway to the south and a room to the north, sometime in the second half of the eleventh century or first half of the twelfth. The radiocarbon date suggests a much earlier date. The burial was orientated east-west and was found in a single narrow cutting. All of the four keyhole-type trenches cut in the slype came down onto east-west lying burials and the assumption must be that all the burials belong to a row-grave cemetery of the seventh or eighth century AD. In support of this, there is not just the radiocarbon date but also the orientation of the burial, the presence of children (though females were not recognised), and the absence of grave goods.

OxA–5944 1120 ±65 BP

$\delta^{13}C$: -19.1‰

Sample: SHA74-1, burial 1 (35), submitted on 1 August 1995 by P Ellis

Material: human bone (tibiae) (J Rogers 1995)

Initial comment: leg bones from a grave cut into sandy clay, which overlay the natural subatrate (gravel sealed by a 1m band of lime/sand (tufa). The grave was cut by a ?Saxon wall and was sealed by twelfth- and thirteenth-century levels within a twelfth-century building. Post-medieval floors lay 0.5m above the grave.

Objectives: five phases of the east range of the Sherborne Abbey cloister can be recognised from archaeological and architectural evidence: fourteenth-, thirteenth-, twelfth-century (two phases), and late Saxon. The earliest wall of the sequence cuts burial 2. Dating would give a *terminus post quem* for the sequence and a context for a cemetery associated with an early British church.

Calibrated date: *1σ:* cal AD 780–1000
2σ: cal AD 720–1030

Final comment: P Ellis (14 February 2003), this is the latest of the three dates from burials in the slype area of the monastery. The burial lay beneath a north-south running, which had been cut by a twelfth-century foundation and was bonded with a foundation overlain by the wall of the north transept. The suggested context for the north-south wall is a pre-Conquest east cloister range dated to the first half of the eleventh century. The radiocarbon date suggests an earlier date, although its latest possible date would bring it to just before the overlying wall. This seems unlikely and an earlier date in the seventh or eighth century is preferred placing the burial with the others found in this area, though clearly it belongs late in what the dating suggests was a long sequence.

OxA–5945 1245 ±50 BP

$\delta^{13}C$: -19.0‰

Sample: SHA 74-1, burial 2 (38), submitted on 8 June 1995 by P Ellis

Material: human bone (tibiae) (J Rogers 1995)

Initial comment: from a grave cut into sandy clay, which directly overlay the natural substrate surface (bands of lime, sand, and tufa 1m deep over gravel). The grave cut for burial 2 was cut by a ?Saxon wall. Excavation was below twelfth-century floor levels. A post-medieval drain lay 0.4m above the burial.

Objectives: as OxA-5944

Calibrated date: *1σ:* cal AD 680–870
2σ: cal AD 660–900

Final comment: P Ellis (14 February 2003), although the middle radiocarbon date of the three slype burials SK2a can be placed the earliest in the stratigraphic sequence since the burial was not only cut by the same eleventh-century wall, which cut SK1, but was also cut by another (undated) burial. The evidence here, therefore, adds a sequence of burying where later burials disturbed earlier ones whose location was no longer adequately marked. By this a long use of the cemetery is suggested, as is supported by the radiocarbon dates.

OxA–5946 1370 ±55 BP

δ¹³C: -20.3‰

Sample: SHA 74-2, bean 098, submitted on 8 June 1995 by P Ellis

Material: human bone (left femur) (J Rogers 1995)

Initial comment: the burial was found 2ft 6in below the level from which the infirmary was built. The natural surface is gravel with a band of white material above (lime, sand, and tufa). The skeleton was found 2m below the modern surface.

Objectives: if this skeleton, found with others in a watching brief, is of similar date to those found 60m to the south (burials 1, 2, and 904) then an extensive Saxon cemetery is indicated. A later date pre-dating the thirteenth-century or fourteenth-century infirmary would suggest a cemetery to be associated with one of the building phases at Sherborne defined by archaeological and architectural evidence.

Calibrated date: *1σ:* cal AD 640–680
2σ: cal AD 580–770

Final comment: P Ellis (14 February 2003), the stratigraphic position of the burial was clear: It pre-dated a medieval building, which we have agreed with C E Bean in thinking may have been the abbey infirmary and be dated thirteenth or fourteenth century. The burial was orientated east-west. The radiocarbon date is the earliest of the five samples submitted, and suggests that this burial belongs in the same context as those beneath the slype.

OxA–5947 1270 ±50 BP

δ¹³C: -20.2‰

Sample: SHA 74-2, bean 011, submitted on 5 September 1995 by P Ellis

Material: human bone (femur, tibia) (J Rogers 1995)

Initial comment: the burial was found 3ft below the offset of the wall of a thirteenth-century building possibly the infirmary of Sherborne Abbey. Part of the burial lay beneath a buttress of the building. The burial also predated an earlier building. The find was *c* 2m below modern surface.

Objectives: as OxA-5946

Calibrated date: *1σ:* cal AD 670–780
2σ: cal AD 650–890

Final comment: P Ellis (14 February 2003), the burial occupied the same stratigraphic position as the previous one, though in this case the ?infirmary wall cut an earlier stone wall, which itself overlay the burial which was oriented east-west. The date places the burial in a much earlier context, grouping it with the other four as part of a seventh- and eighth-century cemetery.

Sherborne: Old Castle, Dorset

Location: ST 64781678
Lat. 50.56.56 N; Long. 02.30.05 W

Project manager: P White (Department of the Environment), 1974

Archival body: Dorset County Museum

Description: a number of skeletons were recovered from beneath Sherborne Old Castle.

Objectives: to date the inhumations to provide a chronology of the cemetery site.

Final comment: A Cook (1994), the calibrated dates obtained from the bone samples taken from inhumations in four of the graves excavated on the site of the castle in 1973 and 1974 fall within a date range cal AD 600–970. Excavations between 1932 and 1976, uncovered approximately 30 similar grave pits cut into the natural substratum of the outcrop of Fuller's earth, rock, and clay, which forms the hill occupied by the castle bailey from the early twelfth century AD. It was found that the levelling of the hilltop for the bailey had destroyed all earlier contexts except for grave pits in which the inhumations, where undisturbed, were found deposited in a clean fill of humus mixed with pebbles. All the pits were orientated east-west, and there were no grave goods. This, and the number of pits and disturbed human bones recorded during the excavations, indicated the use of the site as a Christian cemetery of uncertain date, but presumed to be Saxon. In the absence of any dateable contexts, the radiocarbon dating has shown that the cemetery was of the mid Saxon period, probably originating between AD 650 and AD 750, and ceasing some two centuries before the construction of the castle.

References: Cook and White 2015

GU–5414 1290 ±60 BP

δ¹³C: -23.6‰

Sample: F12, submitted on 10 February 1994 by A Cook

Material: human bone (left femur) (S Mays 1994)

Initial comment: from the lower half of the skeleton; the upper half was below the baulk. Uncovered in a buried pit cut into natural Fullers Earth. The fill within the pit encapsulating the bones was clay loam with pebbles and larger stones in the loam above the skeleton. The pit was sealed by thirteenth- to seventeenth-century contexts.

Objectives: to determine the date of the apparently Christian cemetery on the site of the castle, which predates the construction of the Castle, and which had been partially disturbed by the levelling of the site for this construction.

Calibrated date: *1σ:* cal AD 660–780
2σ: cal AD 640–890

Final comment: A Cook (1994), dating is within the same range as the dates obtained for samples GU-5418 and mean of GU-5416 and GU-5417.

GU–5415 1190 ±50 BP

δ¹³C: -23.2‰

Sample: F15, submitted on 10 February 1994 by A Cook

Material: human bone (arm bones) (S Mays 1994)

Initial comment: from the upper half of the skeleton; the lower half was below the baulk. Uncovered in burial pit F15 on the north side of wall structure ZD, but not disturbed by and at a lower level than the bottom of the wall. The fill within the pit was the same as F12 and F14 and was sealed by the same thirteenth- to seventeenth-century contexts.

Objectives: as GU-5414

Calibrated date: *1σ:* cal AD 770–940
2σ: cal AD 680–980

Final comment: A Cook (1994), dating shows a high probability that the sample dates from about a century later than the other samples.

GU–5416 1270 ±60 BP

$\delta^{13}C$: -21.1‰

Sample: F52(a), submitted on 10 February 1994 by A Cook

Material: human bone (left femur) (S Mays 1994)

Initial comment: from a complete skeleton. The pit was disturbed by slightly later burial F53. It was uncovered in a shallow burial cut into natural Fuller's Earth, close to south side of the wall structure XS, but not disturbed by wall. The fill within the pit encapsulating the bones was clay loam with pebbles. The pit was sealed by thirteenth- to seventeenth-century contexts.

Objectives: as GU-5414

Calibrated date: *1σ:* cal AD 660–780
2σ: cal AD 650–900

Final comment: A Cook (1994), another date from this skeleton was also taken (GU-5417). The dating is within the same range as the dates obtained for samples GU-5414 and GU-5418.

Laboratory comment: English Heritage (7 July 1994), the two results on this skeleton are statistically consistent (T′=0.4; T′(5%)=3.8; v=1; Ward and Wilson 1978), and so a weighted mean can be taken (1292 ±49 BP), which calibrates to cal AD 650–870 at 95% confidence; Reimer *et al* 2004).

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

GU–5417 1330 ±80 BP

$\delta^{13}C$: -21.6‰

Sample: F52(b), submitted on 10 February 1994 by A Cook

Material: human bone (right femur) (S Mays 1994)

Initial comment: as GU-5416

Objectives: as GU-5414

Calibrated date: *1σ:* cal AD 640–770
2σ: cal AD 570–890

Final comment: see GU-5416

GU–5418 1310 ±70 BP

$\delta^{13}C$: -20.5‰

Sample: F14, submitted on 10 February 1994 by S Mays

Material: human bone (left leg) (S Mays 1994)

Initial comment: from the lower half of the skeleton; the upper half below the baulk. Uncovered in burial pit cut into natural Fuller's Earth on the north side of wall structure ZD, but not disturbed by the wall construction. The fill within the pit encapsulating the bones was clay loam with some pebbles, and larger stones in the loam above the skeleton. The pit was sealed by thirteenth- to seventeenth-century contexts.

Objectives: as GU-5414

Calibrated date: *1σ:* cal AD 650–780
2σ: cal AD 600–890

Final comment: A Cook (1994), the dating is within the same range as the dates obtained for the other samples.

Skipsea, Withow Gap, Humberside

Location: TA 18395463
Lat. 53.58.27 N; Long. 00.11.42 W

Project manager: F McAvoy (English Heritage), July 1993

Archival body: Hull and East Riding Museum and English Heritage

Description: the timbers, some of which had been gnawed by beavers, were found lying across what is assumed to have been a channel between two meres.

Objectives: dendrochronology has been applied to date these timbers but with no success so radiocarbon dating will hopefully produce a date for the beaver activity.

Final comment: A Bayliss (25 September 2012), these dates demonstrate that beaver-chewed timber of a range of ages had accumulated within the sampled section of the mere.

References: Gilbertson 1984
Hillam 1994

GU–5522 3410 ±50 BP

$\delta^{13}C$: -26.5‰

Sample: 489-602, submitted on 30 January 1995 by F McAvoy

Material: wood: *Corylus* sp. (M Taylor)

Initial comment: this timber was found at 5.07m OD, within a thick layer of peat (surface 5.40m OD).

Objectives: the principal significance of these samples lies in their association with beaver-built structures, which are potentially the earliest known in northern Europe. The broad chronology has been established by previous work but specific dating of beaver activity is required prior to publication.

Calibrated date: *1σ:* 1760–1630 cal BC
2σ: 1880–1610 cal BC

Final comment: A Bayliss (25 September 2012), this timber dates to the earlier second millennium cal BC and provides a *terminus post quem* for the mere sediments at this height.

GU–5523 5440 ±60 BP

δ13C: -27.1‰

Sample: 489-702, submitted on 30 January 1995 by F McAvoy

Material: wood: *Corylus* sp. (A Taylor)

Initial comment: this timber was found at 5.86m OD, within a thick layer of peat (surface 6.20m OD).

Objectives: as GU-5522

Calibrated date: *1σ:* 4350–4240 cal BC
2σ: 4370–4070 cal BC

Final comment: A Bayliss (25 September 2012), this timber dates to the late fifth millennium cal BC, but is from a similar height to GU-5522; it may thus have been reworked.

Stonehenge, 20th Century, Wiltshire

Location: SU 122422 (centred on)
Lat. 51.10.41 N; Long. 01.49.32 W

Project manager: see individual sites, 1910, 1919–26, 1950–64, and 1988

Description: a programme of post-excavation analysis of all the unpublished twentieth-century excavations at Stonehenge.

Objectives: the dating programme for this project was designed to address a series of specific aims: the provision of a series of reliable absolute dates and the construction of a reliable chronology for each major phase of the monument; the elucidation of the chronology and sequence of major events or sub-phases within phase 3; the assigning of specific features to a phase where other evidence was sparse; and the dating of specific cultural artefacts with intrinsic significance.

Final comment: M J Allen (17 April 1996), this project has produced or identified 52 radiocarbon determinations which are considered reliable.

References: Bayliss *et al* 1997
Bronk Ramsey and Bayliss 2000
Cleal *et al* 1995

Stonehenge, 20th Century: artefact, Wiltshire

Location: SU 122422 (centred on)
Lat. 51.10.42 N; Long. 01.49.29 W

Project manager: W Hawley (Independent), 1924

Archival body: Salisbury and South Wiltshire Museum

Description: from stonehole 8 of the Sarsen circle.

Objectives: to establish if the object (a bone point) is part of the 'Wessex' type. At the time of submission in March 1994, no known parallel was known to the project team.

References: Cleal *et al* 1995
Hedges *et al* 1996, 401–7

OxA–4885 2840 ±60 BP

δ13C: -21.1‰

Sample: 421, submitted on 11 March 1994 by M Allen

Material: animal bone (?*Bos* sp.; longbone) (D Serjeantson)

Initial comment: found in the disturbed upper fill of stonehole 8 of the Sarsen circle (C13, context 2315).

Objectives: to determine the date of this unusual form of bone point

Calibrated date: *1σ:* 1110–910 cal BC
2σ: 1210–840 cal BC

Final comment: M Allen (1996), the bone point was submitted to establish whether this object was a part of the 'Wessex Culture' artefacts, which include other fancy bone objects. At the time of submission no parallel was known. The date places the bone firmly in the middle Bronze Age and falls outside the expected range for the 'Wessex Culture'. The closest comparison for this object is from an unstratified assemblage at Hockwold, Norfolk, which was associated with middle Bronze Age pottery (Lawson 1979).

References: Lawson 1979

Stonehenge, 20th Century: Car Park 1988, Wiltshire

Location: SU 113424
Lat. 51.10.47 N; Long. 01.50.18 W

Project manager: R Trott (Wessex Archaeology), 1988

Archival body: Salisbury and South Wiltshire Museum

Description: the 1966 exacvations revealed three substantial pits. In 1988, a similar pit further east was discovered.

Objectives: to establish the Mesolithic date of both the feature and the pine charcoal.

Final comment: M J Allen (25 January 1991), all of these determinations from the postpit features in the car park fall into the eighth or late ninth millennium BC (HAR-455; 9130 ±180 BP; 8800–7790 cal BC at 95% confidence; and HAR-456; 8090 ±140 BP; 7490–6640 cal BC at 95% confidence; Reimer *et al* 2004). They cover a period of about one millennium and so it cannot be established whether these features, containing upright pine posts, were exactly contemporary and ever all stood together, but they are certainly Mesolithic and not related to the main Monument.

Laboratory comment: English Heritage (21 May 2014), three further measurements funded by English Heritage have been made on material from similar features in the carpark: GU-5109, 8880 ±120 BP (8300–7600 cal BC at 95% confidence; Reimer *et al* 2004) published in Bayliss *et al* 2013, 188; HAR-455: 9130 ±180 BP (8800–7790 cal BC at 95% confidence) and HAR-456: 8090 ±140 BP (7490–6640 cal BC at 95% confidence) published in Jordan *et al* 1994, 192.

References: Allen 1995
Allen and Bayliss 1995
Bayliss *et al* 2013
Jordan *et al* 1994
Reimer *et al* 2004

GU–5109 8880 ±120 BP

δ¹³C: -24.5‰

Sample: W243/008, submitted on 25 January 1991 by M J Allen

Material: charcoal: *Pinus* sp. (R Gale)

Initial comment: from the base of the secondary fill of postpit 9580, at *c* 0.7m depth (context 9582). The pit was cut into the chalk, with chalk rubble fill.

Objectives: a date would enable the environmental sequence and pit to be placed within the broader sequence of the Stonehenge Environs.

Calibrated date: *1σ:* 8250–7750 cal BC
2σ: 8300–7600 cal BC

Final comment: M Allen (25 January 1991), this result confirms that the feature is Mesolithic and can be included as a group with the three postholes excavated in 1966.

OxA–4919 8520 ±80 BP

δ¹³C: -25.4‰

Sample: W243-11, submitted on 16 May 1994 by M Allen

Material: charcoal: *Pinus* sp. (R Gale 1994)

Initial comment: from the secondary fill of postpit 9580, just beneath monolith tin sample (C99, context 9582). This sample relates to boreal woodland pollen at *c* 40cm.

Objectives: to ascertain whether this material is contemporary with the large charcoal pieces from same pit (context 8) dated to 8880 ±120 BP (GU-5109; 8300–7600 cal BC at 95% confidence; Reimer *et al* 2004), also *Pinus* sp., or is this material significantly later?

Calibrated date: *1σ:* 7600–7520 cal BC
2σ: 7660–7470 cal BC

Final comment: M Allen (October 2003), the determination confirms that this sample is pine from the boreal period forest.

Laboratory comment: ORAU (25 August 1995): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Hedges *et al* 1996, 401
Reimer *et al* 2004

OxA–4920 8400 ±100 BP

δ¹³C: -25.1‰

Sample: W243-14, submitted on 16 May 1994 by M Allen

Material: charcoal: *Pinus* sp. (R Gale 1994)

Initial comment: from tertiary fill of postpit 9580 at *c* 0.3m in monolith tin sample (C99, context 9585).

Objectives: does this date the occurrence of cereal pollen in the sequence and is this contemporary or earlier than phase 1, or is this residual and related to the date in the main fills (GU-5109; 8880 ±120 BP; 8300–7600 cal BC at 95% confidence; Reimer *et al* 2004)?

Calibrated date: *1σ:* 7580–7340 cal BC
2σ: 7600–7180 cal BC

Final comment: M Allen (October 2003), this result is much too early to be related to the cereal pollen, it must be residual charcoal from the boreal period forest and so relates to OxA-4919.

Laboratory comment: ORAU (25 August 1995): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Hedges *et al* 1996, 401
Reimer *et al* 2004

Stonehenge, 20th Century: Phase 1, Wiltshire

Location: SU 122422
Lat. 51.10.42 N; Long. 01.49.29 W

Project manager: W Hawley (Office of Works), 1920, 1922, 1924, and 1925

Archival body: Salisbury and South Wiltshire Museum

Description: phase 1b: the construction of the main ditch and banks, the deposition of 'structured deposits' within them, the primary silting of the ditch, and the activity which took place on top of this silting.

Objectives: to determine if the excavation of the ditch was an event and relate the date of construction to the acquisition of 'structured deposits', ie specifically placed items on the ditch.

References: Allen and Bayliss 1995
Atkinson 1979

OxA–4833 4550 ±60 BP

δ¹³C: -22.5‰

Sample: AB122, WA2469, submitted on 11 March 1994 by M Allen

Material: animal bone: *Cervus elaphus*, right tibia (D Serjeantson 1994)

Initial comment: this is from the ditch excavation of 1924 (C26, context 3928) - the length around the southern causeway. Hawley's diary entry (16.7.1924) is slightly ambiguous but it seems probable that it is phase 1. The nature of the bone - an unusually large *Cervus elaphus* tibia, and its location - close to the jaw bones flanking the causeway - suggest it may be deliberately deposited.

Objectives: are the 'ritual' bone deposits in the terminals of the henge ditch contemporary with its construction?

Calibrated date: *1σ:* 3370–3110 cal BC
2σ: 3500–3020 cal BC

Final comment: M Allen (1996), three bone items (OxA-4833, OxA-4834, and OxA-4835) were deliberately placed in the ditch terminals near the southern entrance. All three determinations were earlier than those obtained from all the antlers, thought to have been used to dig the ditch. Not only were these dates all earlier than those from the other antler tools, but in the mathematical modelling of the determinations (*see* Allen and Bayliss 1995) it was shown that all the placed items were earlier than the digging of the ditch and that their acquisition took place between *50 and 850 years before* the digging of the ditch. This places great importance on these objects and provides a strong argument for the deliberate strategic placing of collected and curated objects.

References: Allen and Bayliss 1995
Hedges *et al* 1996, 401

OxA–4834 4460 ±45 BP

$\delta^{13}C$: -23.1‰

Sample: AB126, WA2477, submitted on 11 March 1994 by M Allen

Material: animal bone: *Bos* sp., right jaw with teeth (D Serjeantson 1994)

Initial comment: from eastern terminal of ditch (C26.6, F75, context 3929) at southern causeway - at bottom (label: 2nd crater). Dated 24.7.1924 in Hawley's diary.

Objectives: as OxA-4833

Calibrated date: *1σ:* 3330–3020 cal BC
2σ: 3360–2920 cal BC

Final comment: see OxA-4833

References: Hedges *et al* 1996, 401

OxA–4835 4455 ±40 BP

$\delta^{13}C$: -22.4‰

Sample: AB131, WA2480, submitted on 11 March 1994 by M Allen

Material: animal bone: *Bos* sp., right jaw with three teeth (D Serjeantson 1994)

Initial comment: from western terminal of southern causeway at bottom and labelled 'crater 3', (C26.7, F78, context 2480). Dated 26.7.1924 in Hawley's diary. This bone, and a similar one (OxA-4834) in the ditch terminal on the eastern side of the causeway, are interpreted as deliberate depositions early in the use of the ditch.

Objectives: as OxA-4833

Calibrated date: *1σ:* 3330–3020 cal BC
2σ: 3350–2920 cal BC

Final comment: see OxA-4833

References: Hedges *et al* 1996, 401

OxA–4837 3995 ±60 BP

$\delta^{13}C$: -21.2‰

Sample: 4849, WA1131, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus* (D Serjeantson 1994)

Initial comment: from stonehole E, one of a pair with stonehole D in the main entrance. One described as having a 'reak tine' in the diary entry for 27.5.1920, which can be identified as this sample. On label: 'deep hole near Slaughter Stone, on bottom', (C3, context 1131). In original packing of the stonehole.

Objectives: is the construction of stonehole E contemporary with the construction of the henge ditch?

Calibrated date: *1σ:* 2580–2460 cal BC
2σ: 2840–2340 cal BC

Final comment: M Allen (1996), stonehole E, in the entrance of the enclosure, was originally considered to be a part of the phase 1 monument on the basis of its location (Atkinson 1979), but the two radiocarbon determinations place it firmly within phase 3 and broadly contemporary with the other stone settings of the monument.

References: Atkinson 1979
Hedges *et al* 1996, 402

OxA–4838 3885 ±40 BP

$\delta^{13}C$: -23.9‰

Sample: 4848, WA1131, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus* (D Serjeantson 1994)

Initial comment: from stonehole E, one of a pair with stonehole D in the main entrance. Noted in diary 27.5.1920, stone not *in situ*, but original packing probably still in place in part. On label 'deep hole near Slaughter Stone, on bottom', (C3, context 1131). In the original packing of the stonehole.

Objectives: as OxA-4837

Calibrated date: *1σ:* 2470–2290 cal BC
2σ: 2480–2200 cal BC

Final comment: see OxA-4837

References: Hedges *et al* 1996, 402

UB–3787 4375 ±19 BP

$\delta^{13}C$: -23.1 ±0.2‰

Sample: 1556c, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, unshed (D Serjeantson 1994)

Initial comment: from the bottom of the ditch (C20, context 2801), label dated 5.5.1921. No evidence of heat treatment.

Objectives: are the 'ritual' bone deposits in the terminals of the henge ditch contemporary with its construction?; is the cutting of the henge ditch contemporary with the backfilling of the Aubrey holes?; how long is phase 1? Is it really an event of less than 25 years?; is the construction of stonehole E contemporary with the construction of the main ditch?; is the deliberate backfilling of the ditch distinguishable from its construction in terms of radiocarbon dating? This sample dates the construction of the henge ditch.

Calibrated date: *1σ:* 3025–2920 cal BC
2σ: 3085–2910 cal BC

Final comment: M Allen (1996), the results from the seven antlers on the floor of the ditch beneath the primary fill form a consistent group of unparalleled precision. Each of the antlers were securely located from archive records and is thought to have been used in the digging of the ditch and placed on the base of the ditch soon afterwards, before the accumulation of any primary fill. The dates also fall within the range of the two previous dates from the same stratigraphic location: BM-1583, 4410 ±60 BP (3340–2900 cal BC at 95% confidence; Reimer *et al* 2004) and BM-1617, 4390 ±60 BP ((3340–2890 cal BC at 95% confidence; Reimer *et al* 2004; Burleigh *et al* 1982). The ditch can be considered to have been dug in *c* 2950 cal BC. This date is late within the British middle Neolithic rather than falling into the late Neolithic. Chronologically this falls between dates for causewayed enclosures and henges. The segmented nature of the Ditch and the characteristics of the phase 1 monument also fall between these two traditions.

References: Burleigh *et al* 1982, 234

UB–3788 4381 ±18 BP

δ¹³C: -22.5 ±0.2‰

Sample: 1808a, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, unshed (D Serjeantson 1994)

Initial comment: from the bottom of the ditch (C28, context 2804). An antler pick with the pedicle burnt and chopped in antiquity.

Objectives: as UB-3787

Calibrated date: *1σ:* 3025–2920 cal BC
2σ: 3090–2915 cal BC

Final comment: see UB-3787

UB–3789 4330 ±18 BP

δ¹³C: -23.1 ±0.2‰

Sample: 4606, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, unshed (D Serjeantson 1994)

Initial comment: the sample was an antler pick showing localised heat treatment (burning). It was found 'below ground level 64' on floor of ditch at foot of counterscarp', (C22, context 2799). Dated 25.3.1922 in Hawley's diary. The description given of the pick, having a broken tine, matches the object, in addition to matching the number on the label attached to bone. The pedicle and tines had sooting and heat treatment.

Objectives: as UB-3787

Calibrated date: *1σ:* 2925–2905 cal BC
2σ: 3010–2895 cal BC

Final comment: see UB-3787

UB–3790 4367 ±18 BP

δ¹³C: -23.0 ±0.2‰

Sample: 4608, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, shed (D Serjeantson 1994)

Initial comment: pick, on bottom of the ditch (C22, context 2800). Dated 29.3.1922 in Hawley's diary. Possibly heat-treated by tines.

Objectives: as UB-3787

Calibrated date: *1σ:* 3020–2915 cal BC
2σ: 3080–2910 cal BC

Final comment: see UB-3787

UB–3791 4397 ±18 BP

δ¹³C: -21.5 ±0.2‰

Sample: 4710, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, shed (D Serjeantson 1994)

Initial comment: 'a large stag horn pick was found in the cast in chalk' (C25, context 1552). Dated 7.10.1922 in Hawley's diary). This is the deliberate backfill layer in the western terminal of the main entrance. Also the object matches description given in the diary. Heat-treated to remove tine and beam in antiquity.

Objectives: how much earlier is the deliberate backfilling of the henge ditch than the beginning of phase 2?; is this event distinguishable from the construction of the ditch in terms of radiocarbon dating? This sample dates deliberate backfilling of henge ditch.

Calibrated date: *1σ:* 3085–2930 cal BC
2σ: 3095–2920 cal BC

Final comment: see UB-3787

UB–3792 4365 ±18 BP

δ¹³C: -22.9‰

Sample: 4727, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, unshed (S Serjeantson 1994)

Initial comment: described on the label as 'on the bottom', north of the main causeway, (C25, context 2935).

Objectives: as UB-3787

Calibrated date: *1σ:* 3020–2915 cal BC
2σ: 3080–2910 cal BC

Final comment: see UB-3787

UB–3793 4393 ±18 BP

δ¹³C: -23.4 ±0.2‰

Sample: 4735, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, shed (D Serjeantson 1994)

Initial comment: from bottom of the ditch segment west of the western terminal at the main entrance (C25, context 2934). Dated 9.11.1922 in Hawley's diary. Heat treatment on tine; sooting on main branch.

Objectives: as UB-3787

Calibrated date: *1σ:* 3085–2925 cal BC
2σ: 3095–2920 cal BC

Final comment: see UB-3787

UB–3794 4432 ±22 BP

$\delta^{13}C$: -23.7‰

Sample: 4736, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, crown (D Serjeantson 1994)

Initial comment: a possible rake found on the bottom of the ditch (C25.4, context 2934), in the segment west of the western terminal of the main entrance. Hawley's diary 9.11.1922.

Objectives: as UB-3787

Calibrated date: *1σ:* 3260–3020 cal BC
2σ: 3310–2945 cal BC

Final comment: see UB-3787

Stonehenge, 20th Century: Phase 2, Wiltshire

Location: SU 122422
Lat. 51.10.42 N; Long. 01.49.29 W

Project manager: W Hawley (Office of Works) R Atkinson (Ministry of Works), 1921, 1926, and 1954

Archival body: Salisbury and South Wiltshire Museum

Description: phase 2 includes the secondary silting of the main ditch, the wooden post settings within the monument, and the Aubrey Holes.

Objectives: to determine how long it took for the ditch to silt up, and whether this phase of activity overlapped with the stone settings of phase 3.

Final comment: M Allen (1996), the selected material was distributed from the base of the secondary fills (OxA-4904) to the upper portion (OxA-4881). The dating of the occurrence of the secondary fills largely constitutes phase 2 of the history of the monument, in the absence of any suitable material from the wooden settings in the interior. The results indicate that despite careful selection, some of the submitted material is probably residual from phase 1, *see* OxA-4904, the determination for which is not significantly different from the determinations obtained from the antlers used in the digging of the ditch. The dates cover a period of about 550 years. The date of ditch construction (phase 1) and the presence of the Beaker-age burial cut into the ditch provide constraints for the mathematical modelling of phase 2 (*see* Allen and Bayliss 1995) and allow this phase to be ascribed to 2900–2600 cal BC.

References: Allen and Bayliss 1995
Hedges *et al* 1996, 401–7

OxA–4841 4295 ±60 BP

$\delta^{13}C$: -19.6‰

Sample: S54.77, WA3893, submitted on 11 March 1994 by M Allen

Material: animal bone: *Bos* sp., right ulna (D Serjeantson 1994)

Initial comment: from the upper (secondary) fill of the main ditch in the 1954 ditch cuttings, west of the main entrance to the enclosure, (C41, context 3895).

Objectives: to determine how long it took for the ditch to silt up, and whether this phase of activity overlapped with the stone settings of phase 3.

Calibrated date: *1σ:* 2930–2880 cal BC
2σ: 3090–2760 cal BC

Final comment: M Allen (1996), the extra archive of the 1954 excavations which became available after the submission shows that this piece came from the upper part of the secondary fill.

OxA–4842 4520 ±100 BP

$\delta^{13}C$: -23.8‰

Sample: AB41, WA2624, submitted on 11 March 1994 by M Allen

Material: animal bone: *Bos primigenius*, skull (D Serjeantson 1994)

Initial comment: found in a feature cut through the ditch silts to within a few inches of the bottom of the ditch. The ox skull lay at the bottom of the feature - located in the southern part of the ditch circuit, close to, though not at the terminal of, the southern entrance (to the west of the southern entrance) (C29, context 3930).

Objectives: as OxA-4841

Calibrated date: *1σ:* 3370–3020 cal BC
2σ: 3620–2910 cal BC

Final comment: M Allen (1996), the resultant date was significantly earlier than expected for phase 2, and was also earlier than all of the determinations for the antlers used in the digging of the ditch. Initially this was considered a problem. However, since the extra archive became available, it seems likely that the skull lay below the feature, rather than in it. As the skull is significantly earlier than the digging of the ditch it can be considered to be another deliberately selected and placed object which was also curated prior to its final formal deposition. This skull is therefore one of four dated deliberately placed objects (together with OxA-4833, OxA-4834, and OxA-4835) all of which were collected and curated prior to the digging of the ditch.

OxA–4843 4315 ±60 BP

$\delta^{13}C$: -22.3‰

Sample: S54.72, WA3893, submitted on 11 March 1994 by M Allen

Material: animal bone: *Bos* sp., left part of pelvis (D Serjeantson 1994)

Initial comment: from a cut in the upper (secondary) fill of the main ditch, west of the main entrance (C41, context 3893).

Objectives: as OxA-4841

Calibrated date: *1σ:* 3010–2880 cal BC
2σ: 3100–2870 cal BC

Final comment: see OxA-4841

OxA–4844 4220 ±60 BP

δ¹³C: -22.1‰

Sample: S54.833, WA3898, submitted on 11 March 1994 by M Allen

Material: animal bone: *Bos* sp., large ox axis vertebra (D Serjeantson 1994)

Initial comment: from the upper fill (secondary) of the main ditch, probably within a feature cut during the formation of the secondary fills, ie the secondary fill had started to form before it was cut and went on forming afterwards (C42, context 3898).

Objectives: as OxA-4841

Calibrated date: *1σ:* 2900–2700 cal BC
2σ: 2920–2620 cal BC

Final comment: M Allen (1996), the extra archive of the 1954 excavations which became available after submission shows that this piece came from an upper part of the secondary fill, but was probably within the badger burrow which also disturbed the Beaker-age burial. OxA-4844, OxA-4879, and OxA-4903 are now unsatisfactory on purely locational grounds, and may have been intrusive through animal burrows or mixing. Had this information been available earlier these items would not have been selected.

OxA–4879 3885 ±55 BP

δ¹³C: -20.4‰

Sample: S54.29, WA3893, submitted on 11 March 1994 by M Allen

Material: animal bone: *Sus* sp., left pig tibia (fused) (D Serjeantson 1994)

Initial comment: from the upper (secondary) fill of the main ditch, west of the main entrance (C41, near top of context 3893).

Objectives: as OxA-4841

Calibrated date: *1σ:* 2470–2280 cal BC
2σ: 2550–2190 cal BC

Final comment: M Allen (1996), the extra archive of the 1954 excavations, which became available after submission, makes it uncertain whether this piece came from 'the rainwash' (context 3893) or from the subsoil. *See* also OxA-4844.

OxA–4880 3875 ±55 BP

δ¹³C: -20.7‰

Sample: S54.57, WA3893, submitted on 11 March 1994 by M Allen

Material: animal bone: *Sus* sp., large pig or wild boar (*Sus scrofa*); radius and ulna (D Serjeantson 1994)

Initial comment: from the upper (secondary) fill of the main ditch, west of the main entrance (C41, context 3893).

Objectives: as OxA-4841

Calibrated date: *1σ:* 2470–2210 cal BC
2σ: 2490–2150 cal BC

Final comment: see OxA-4841

OxA–4881 4300 ±60 BP

δ¹³C: -21.6‰

Sample: S54.818, WA3899, submitted on 11 March 1994 by M Allen

Material: animal bone: *Cervus elaphus*, proximal end of butchered metatarsal (D Serjeantson 1994)

Initial comment: from the upper (secondary) fill in the main ditch, west of the main entrance (C42, context 3899).

Objectives: as OxA-4841

Calibrated date: *1σ:* 2930–2880 cal BC
2σ: 3090–2770 cal BC

Final comment: see OxA-4841

OxA–4882 4270 ±65 BP

δ¹³C: -23.2‰

Sample: S54.79, WA3893, submitted on 11 March 1994 by M Allen

Material: animal bone: *Bos* sp., ox femur (D Serjeantson 1994)

Initial comment: from secondary fill of the main ditch, west of the main entrance (C41, context 3893).

Objectives: as OxA-4841

Calibrated date: *1σ:* 2920–2870 cal BC
2σ: 3030–2680 cal BC

Final comment: see OxA-4841

OxA–4883 4300 ±70 BP

δ¹³C: -21.4‰

Sample: 1593A, WA2475, submitted on 11 March 1994 by M Allen

Material: animal bone: *Bos* sp., probably; long bone (D Serjeantson 1994)

Initial comment: found in the upper part of the eastern terminal of the ditch at the southern causeway, almost certainly from a cut within the secondary fill, (C26.5, context 2475). The object (object 23) is a known later Neolithic/early Bronze Age type of artefact, from a chisel.

Objectives: as OxA-4841

Calibrated date: *1σ:* 3010–2880 cal BC
2σ: 3100–2700 cal BC

Final comment: M Allen (1996), chisels of this type are known in southern England and Scotland from the middle Neolithic through the Bronze Age. This result is consistent with this evidence. *See* also OxA-4841.

OxA–4903 3980 ±45 BP

δ¹³C: -23.2‰

Sample: S54.810, WA3899, submitted on 11 March 1994 by M Allen

Material: animal bone: *Bos* sp., ox scapula (D Serjeantson 1994)

Initial comment: from the upper (secondary) fill of the main ditch, west of the main entrance (C42, context 3899).

Objectives: as OxA-4841

Calibrated date: *1σ:* 2570–2460 cal BC
2σ: 2620–2340 cal BC

Final comment: M Allen (1996), the extra archive of the 1954 excavations which became available after submission shows that this piece came from rabbit disturbance. *See* also OxA-4844.

OxA–4904 4365 ±55 BP

δ¹³C: -22.4‰

Sample: S54.85, WA3893, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, tine (D Serjeantson 1994)

Initial comment: from the upper (secondary) fill of the main ditch, west of the main entrance (C41, context 3893).

Objectives: as OxA-4841

Calibrated date: *1σ:* 3090–2900 cal BC
2σ: 3270–2880 cal BC

Final comment: M Allen (1996), the extra archive of the 1954 excavations, which became available after the submission, shows that this piece came from the base of the secondary fill. It is possible this sample is a broken tine from one of the antler tools which were used to dig the ditch and are buried within the primary fill, and so is residual from phase 1 rather than providing an early date for phase 2.

Stonehenge, 20th Century: Phase 2-2, Wiltshire

Location: SU 122422
Lat. 51.10.42 N; Long. 01.49.29 W

Project manager: W Hawley (Office of Works) R Atkinson (Ministry of Works), 1920–21, and 1954

Archival body: Salisbury and South Wiltshire Museum, Wessex Archaeology

Description: phase 2 includes the secondary silting of the main ditch, the wooden post settings within the monument, and the Aubrey Holes.

Objectives: to determine how long it took for the ditch to silt up, and whether this phase of activity overlapped with the stone settings of phase 3.

Final comment: M Allen (1996), these two additional samples were submitted in an attempt to provide dates from the secondary fills of the ditch, which could not be residual and so could be used to provide a tightened constrained date for both the event of the digging of the ditch and the phase of the accumulation of the secondary fills (2900–2400 cal BC) given in Allen and Bayliss (1995); the ditch fills of which are described by Cleal (in Cleal *et al* 1995). The submitted samples were both of articulated or semi-articulated material which could not considered to be residual. The provenance of the artefacts was relatively accurately known from the site archives.

References: Allen and Bayliss 1995
Bayliss *et al* 1997
Bronk Ramsey and Bayliss 2000
Cleal *et al* 1995
Hedges *et al* 1996, 401–7
Hedges *et al* 1997, 252

OxA–5981 4220 ±35 BP

δ¹³C: -21.2‰

Sample: AB49, AB50, submitted on 28 September 1995 by M Allen

Material: animal bone: *Sus* sp., piglet (D Serjeantson 1995)

Initial comment: articulated, post cranial skeleton of piglet (?wild boar), from earlier secondary ditch fills.

Objectives: a part of the programme to construct the *terminus ante quem* date for the digging of the phase 1 ditch. This item is submitted because it is part of an articulated skeleton and so cannot be residual.

Calibrated date: *1σ:* 2900–2770 cal BC
2σ: 2910–2690 cal BC

Final comment: M Allen (1996), part of an articulated piglet from a located position in the secondary fills of the ditch provides a date which falls in the earlier part of phase 2.

OxA–5982 4405 ±30 BP

δ¹³C: -23.0‰

Sample: S54: 862, 834, 854, submitted on 29 September 1995 by M Allen

Material: animal bone: *Bos* sp., cattle vertebra (D Serjeantson 1995)

Initial comment: articulated axis and lumber vertebrae of a large bovid (cattle) from the ditch (secondary fills). Located in section and plan by Atkinson's records.

Objectives: as OxA-5981

Calibrated date: *1σ:* 3100–2930 cal BC
2σ: 3270–2910 cal BC

Final comment: M Allen (1996), articulated cattle vertebrae from a recorded location in the secondary (phase 2) ditch fills provides a date very early in the published phase 2 sequence. In fact, this date overlaps the range of high precision dates for the dated event of the digging of the ditch (phase 1) of 2950–2900 cal BC. There is little chance that this material was residual because the bones were articulated or semi-articulated which indicated that they contained sinew when entering the ditch and therefore cannot have been residual for any considerable length of time. The size of these bovine vertebrae discounts any re-working by animals. This date therefore helps refine the model of the phase 1 event; ie digging forthcoming.

Final comment: P Marshall (2011), examination of the archive revealed that the three vertebrae were not articulated, or even all from the same animal.

Stonehenge, 20th Century: Phase 3, Wiltshire

Location: SU 122422
Lat. 51.10.42 N; Long. 01.49.29 W

Project manager: W Hawley (Office of Works) R Atkinson and J Evans (Ministry of Works), 1920, 1923, 1956, 1964, and 1978

Archival body: Salisbury and South Wiltshire Museum

Description: phase 3 includes a burial cut into the top of the secondary fill of the main ditch, the Sarsen and Bluestone settings, the Y and Z Holes, and the Avenue.

Objectives: to determine the relative date of these features compared to the other settings of phase 3, and to estimate the duration of this phase.

References: Allen and Bayliss 1995
Kinnes *et al* 1991
Richards 1990

OxA–4836 3540 ±45 BP

δ[13]C: -21.2‰

Sample: 4068B, WA3774, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, shed, no obvious burning (D Serjeantson 1994)

Initial comment: from Z hole 29 on the east side of the hole extending up the side with the burr resting on the bottom (Hawley's diary 27.6.23). The Z holes are the inner of two circles of holes surrounding the Sarsen settings in the middle of the monument. They may have been intended as stoneholes but clearly have not been used as such.

Objectives: to determine the relative date of these features compared to the other settings of phase 3, and to estimate the duration of this phase.

Calibrated date: *1σ:* 1940–1770 cal BC
2σ: 2020–1740 cal BC

Final comment: M Allen, one determination was obtained from Z hole 29 to provide a date for this element within phase 3. The date falls late within phase 3 and a best estimated date for this element was calculated at *2030–1750 cal BC* (Allen and Bayliss 1995).

References: Allen and Bayliss 1995
Hedges *et al* 1996, 402

OxA–4839 3860 ±40 BP

δ[13]C: -21.3‰

Sample: S56.52, WA2452, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, crown (D Serjeantson 1994)

Initial comment: from the 'ramp fill', (C17, F1268a, context 2452). This is almost certainly the erection ramp from Trilithon Stone 56, the uncertainty only being because there is not a continuous section between the stone and the ramp in the area from which the sample derived. It is reasonable to assume that they are the same feature.

Objectives: is the construction of the Trilithon settings contemporary with the construction of the following: the Sarsen ring, the Q holes, the bluestone horseshoe, the Y holes, the Z holes?; how long is phase 3?; do phases 2 and 3 overlap?

Calibrated date: *1σ:* 2460–2210 cal BC
2σ: 2470–2200 cal BC

Final comment: M Allen (1996), two new determinations were obtained from Trilithon stonehole 53/54 and 57 and are not significantly different at 95% confidence. One previous determination from Sarsen Trilithon 56 (BM-46, 3670 ±150 BP; Barker and Mackey 1960) provided a comparable date (2480-1680 cal BC) but with a relatively large error range. The Sarsen Trilithons are broadly contemporary with the Beaker-age burial.

Final comment: P Marshall (2011), further analysis of the archive suggests that the deposit which contained the samples dated by OxA-4839 and BM-56 may not be the ramp for stone 56, but is rather a large pit, WA2448, cut against the stone after its erection as part of the Sarsen Trilithon, but prior to the construction of the Bluestone Horseshoe.

References: Barker and Mackey 1960, 27
Hedges *et al* 1996, 402

OxA–4840 3985 ±45 BP

δ[13]C: -23.4‰

Sample: S64.21, WA3516, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, tine tip (D Serjeantson 1994)

Initial comment: from the 'very bottom of stonehole' 53 or 54 (C56, context 2427). These stones are the uprights of a single Trilithon and so obviously contemporary, consequently the fact that the sample cannot be assigned to one of the two stoneholes does not affect the usefulness of the result.

Objectives: as OxA-4839

Calibrated date: *1σ:* 2570–2460 cal BC
2σ: 2620–2340 cal BC

Final comment: see OxA-4839

References: Hedges *et al* 1996, 402

OxA–4877 3695 ±55 BP

δ[13]C: -21.3‰

Sample: S64.29, WA3511, submitted on 11 March 1994 by M Allen

Material: antler (fragment) (D Serjeantson 1994)

Initial comment: from the fill of stonehole 63a, part of the Bluestone Horseshoe (C56, context 3511).

Objectives: is the construction of the Bluestone horseshoe contemporary with the construction of the following: the Bluestone circle, the Trilithon settings, the Sarsen ring, the Q holes, Y holes or Z holes; how long is phase 3?; do phases 2 and 3 overlap?

Calibrated date: *1σ:* 2200–1980 cal BC
2σ: 2280–1930 cal BC

Final comment: M Allen (1996), only one sample of antler (OxA-4877) was suitable for submission; it gave a date of 2280–1940 cal BC. Statistical analysis provides a best estimate from the construction of this setting of *2270–1930 cal BC* (Allen and Bayliss 1995).

References: Allen and Bayliss 1995
Hedges *et al* 1996, 402

OxA–4878 3740 ±40 BP

δ¹³C: -21.8‰

Sample: S56.35, WA2427, submitted on 11 March 1994 by M Allen

Material: animal bone (carnivor (canid) ulna) (D Serjeantson 1994)

Initial comment: from the fill of stonehole 40c, C17, context 2427), part of the Bluestone Circle. The stump of this stone is still *in situ*, so it may be assumed that the sample is from the packing, although this is not explicitly stated.

Objectives: is the construction of the bluestone circle contemporary with the construction of the Trilithon setting, the Sarsen ring, the bluestone horseshoe, the Y holes or Z holes?; how long is phase 3?; do phases 2 and 3 overlap?

Calibrated date: *1σ:* 2210–2040 cal BC
2σ: 2290–2020 cal BC

Final comment: M Allen (1996), the two new determinations from stonehole 40c (OxA-4878 and OxA-4900) provide the only results from the Bluestone Circle; the ranges overlap and mathematical modelling of these dates indicates a best estimated date for the construction of the Bluestone Circle of *2270–1930 cal BC* (Allen and Bayliss 1995).

References: Allen and Bayliss 1995
Hedges *et al* 1996, 402

OxA–4886 3960 ±60 BP

δ¹³C: -21.2‰

Sample: WA4028, submitted on 16 May 1994 by M Allen

Material: human bone (right femur) (M Allen 1994)

Initial comment: an inhumation cut into the secondary fills of the ditch, C61.1, context 4028.

Objectives: this burial constrains the end of phase 2, so a more precise estimate of its date is desirable.

Calibrated date: *1σ:* 2570–2400 cal BC
2σ: 2620–2290 cal BC

Final comment: M Allen (1996), four determinations were obtained (OxA-4886, OxA-5044–6) from the remaining femur in order to obtain a tight date for this event and provide a *terminus ante quem f*or the completion of the secondary fills which could be used in the statistical modelling of the events at Stonehenge (Allen and Bayliss 1995). OxA-4886 was considered to be very early within the dated British Beaker events (Kinnes *et al* 1991). The others, however, fall well within the expected range for Beaker burials and are tightly grouped and close to the previous determination (BM-1582; 3715 ±70 BP; Burleigh *et al* 1982). A weighted mean of 3817 ±22 BP (2450–2140 cal BC at 95% confidence; Reimer *et al* 2004) is only slightly earlier than the original determination. The new dates demonstrate that the Beaker age burial is an event within phase 3 and provides a secure date for the end of phase 2. The range shown by the four new determinations reinforce the dangers of relying on a single result for events which are to be compared with other determinations and is temporally crucial to the history of the site.

Laboratory comment: English Heritage (1995), the five radiocarbon results from this burial (OxA-4886, OxA-5044–6, and BM-1582) are statistically consistent (T′=8.7; T′(5%)=9.5; v=4; Ward and Wilson 1978), and so a weighted mean was taken before calibration and statistical modelling (3817 ±22 BP).

References: Allen and Bayliss 1995
Burleigh and Matthews 1982
Hedges *et al* 1996, 402
Ward and Wilson 1978

OxA–4900 3865 ±50 BP

δ¹³C: -23.1‰

Sample: WA2427, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, tine (D Serjeantson 1994)

Initial comment: from 'original stonehole fill' of stonehole 40c (C17, context 2427), part of the Bluestone Circle. This is packing around the stone, which is still *in situ*.

Objectives: as OxA-4878

Calibrated date: *1σ:* 2470–2210 cal BC
2σ: 2480–2150 cal BC

Final comment: M Allen (1996), the results for OxA-4900 and OxA-4878 provide the only dates for the Bluestone settings, archaeological structures of Bluestones are unparalleled in British archaeology.

References: Hedges *et al* 1996, 402

OxA–4901 3800 ±45 BP

δ¹³C: -20.7‰

Sample: S64.49, WA3813, submitted on 11 March 1994 by M Allen

Material: animal bone: *Sus* sp., immature pig humerus (D Serjeantson 1994)

Initial comment: from a Q hole, noted as 'in fill near top of hole', (context 3813). These holes are stoneholes which have been backfilled after the stones were removed, the sample therefore being associated with the backfilling. They appear to be the earliest stone settings on the site, ie other than individual stones.

Objectives: is the construction of the Q holes contemporary with the construction of the bluestone horseshoe?; what is the length of phase 3?; do phases 2 and 3 overlap?; when does phase 3 start? This sample dates the Q holes.

Calibrated date: 1σ: 2300–2140 cal BC
2σ: 2460–2050 cal BC

Final comment: M Allen (1996), if the stratigraphic information that the Q Holes must be earlier than the Sarsen Circle and the Bluestone Circle is included in the mathematical model of phase 3, then the model has poor agreement. Thus, either this result is anomalous, or the three dates from the Sarsen Circle and Bluestone Circle are all from residual material. Re-examination of the archive did not produce any further information relating to the context of this sample, and so we suggest that the dated item may in fact have come from a feature which was wrongly described as a Q Hole by Prof. Atkinson.

Laboratory comment: Ancient Monuments Laboratory (1996), although this result appears not to relate to the Q Holes, there is nothing to suggest that the result is scientifically anomalous, consequently it can be regarded as a reliable determination on a (unprovenanced) pig *humerus*.

References: Hedges *et al* 1996, 407

OxA–4902 5350 ±80 BP

$\delta^{13}C$: -21.7‰

Sample: S64.41, WA3547, submitted on 11 March 1994 by M Allen

Material: animal bone (long bone fragment) (D Serjeantson 1994)

Initial comment: from stonehole 27 of the Sarsen Circle, noted as from among the packing stones, context 3547. The Sarsen Circle is stratigraphically later than the Q Holes.

Objectives: is the construction of the Sarsen Ring contemporary with the construction of the Q Holes, the Trilithon settings, the Bluestone Horseshoe?; how long is phase 3?; do phases 2 and 3 overlap?

Calibrated date: 1σ: 4330–4040 cal BC
2σ: 4350–3970 cal BC

Final comment: M Allen (1996), the result was a surprise as it is earlier than the dates for the digging of the first phase monument (phase 1: digging of the ditch *c* 2950 cal BC), and must therefore be residual from an earlier phase of activity. It is significant because there is virtually no other evidence in the vicinity for activity of this date (Richards 1990; Cleal *et al* 1995). It indicates evidence of human activity in the earlier Neolithic, suggesting persistent but sporadic activity before the construction of the monument.

References: Cleal *et al* 1995
Hedges *et al* 1996, 401
Richards 1990

OxA–5044 3785 ±70 BP

$\delta^{13}C$: -20.7‰

Sample: WA4028, submitted on 14 September 1994 by M Allen

Material: human bone (right femur) (M Allen 1994)

Initial comment: a Beaker burial cut into secondary fills and the ditch, C61.1, context 4028. A replicate of OxA-4886.

Objectives: as OxA-4886

Calibrated date: 1σ: 2300–2060 cal BC
2σ: 2470–1980 cal BC

Final comment: see OxA-4886

Laboratory comment: see OxA-4886

References: Hedges *et al* 1996, 402

OxA–5045 3825 ±60 BP

$\delta^{13}C$: -20.6‰

Sample: WA4028, submitted on 14 September 1994 by M Allen

Material: human bone (right femur) (M Allen 1994)

Initial comment: as OxA-5044

Objectives: as OxA-5044

Calibrated date: 1σ: 2440–2150 cal BC
2σ: 2470–2040 cal BC

Final comment: see OxA-4886

Laboratory comment: see OxA-4886

References: Hedges *et al* 1996, 402

OxA–5046 3775 ±55 BP

$\delta^{13}C$: -20.6‰

Sample: WA4028, submitted on 14 September 1994 by M Allen

Material: human bone (right femur) (M Allen 1994)

Initial comment: as OxA-5044

Objectives: as OxA-5044

Calibrated date: 1σ: 2290–2130 cal BC
2σ: 2440–2030 cal BC

Final comment: see OxA-4886

Laboratory comment: see OxA-4886

References: Hedges *et al* 1996, 402

UB–3821 4023 ±21 BP

$\delta^{13}C$: -22.9 ±0.2‰

Sample: 236A, submitted on 16 May 1994 by M Allen

Material: antler: *Cervus elaphus* (D Serjeantson 1994)

Initial comment: from the top of the fourth layer at the base of Stonehole 1 (C2.1, context 1093). This is a stonehole of the Sarsen Circle.

Objectives: is the construction of the Sarsen Circle contemporary with the construction of the Q holes, the Trilithons or the Bluestone Horseshoe?; how long is phase 3?; do phases 2 and 3 overlap?

Calibrated date: *1σ:* 2575–2485 cal BC
2σ: 2580–2470 cal BC

Final comment: M Allen (1996), only one determination provides a date for the Sarsen Circle setting. This date indicates that this is the earliest dated event in phase 3.

UB–3822 3341 ±22 BP

δ¹³C: -22.3 ±0.2‰

Sample: 3101D, submitted on 16 May 1994 by M Allen

Material: antler: *Cervus elaphus* (D Serjeantson 1994)

Initial comment: from antler stacked on the base of Y Hole 30, (C34, context 3927).

Objectives: to determine the relative date of these feature compared to the other settings of phase 3, and to estimate the duration of the phase.

Calibrated date: *1σ:* 1660–1610 cal BC
2σ: 1690–1545 cal BC

Final comment: M Allen (1996), these antlers were stacked on the base of Y Hole 30 and so were deliberately placed as a single event. However, they are statistically significantly different at more than 95% confidence (Ward and Wilson 1978). The high precision of these results enables us to demonstrate that some of these items were collected and curated before deposition. This provides positive evidence of curation continuing at the monument into the Bronze Age.

References: Ward and Wilson 1978

UB–3823 3300 ±19 BP

δ¹³C: -22.5 ±0.2‰

Sample: 3101E, submitted on 16 May 1994 by D Serjeantson

Material: antler: *Cervus elaphus* (D Serjeantson 1994)

Initial comment: stacked on the base of Y 30, (C34, context 3927), 32" below ground level.

Objectives: as UB-3823

Calibrated date: *1σ:* 1620–1530 cal BC
2σ: 1630–1515 cal BC

Final comment: see UB-3822

UB–3824 3449 ±24 BP

δ¹³C: -22.6 ±0.2‰

Sample: 3101F, submitted on 16 May 1994 by M Allen

Material: antler: *Cervus elaphus* (D Serjeantson 1994)

Initial comment: stacked on the base of Y Hole 30, (C34, context 3927).

Objectives: as UB-3823

Calibrated date: *1σ:* 1865–1695 cal BC
2σ: 1880–1685 cal BC

Final comment: see UB-3822

Stonehenge, 20th Century: The Avenue 2, Wiltshire

Location: SU 122421
Lat. 51.10.42 N; Long. 01.49.29 W

Project manager: W Hawley (Office of Works), 1923 and 1967

Archival body: Salisbury and South Wiltshire Museum

Description: the Avenue.

Objectives: to provide a date for the construction of the Avenue.

References: Hedges *et al* 1996, 401–7

OxA–4884 3935 ±50 BP

Sample: 47/63, WA1912, submitted on 11 March 1994 by M Allen

Material: antler: *Cervus elaphus*, shed tine with modern damage (D Serjeantson 1994)

Initial comment: found lying on the bottom of the north-western Avenue ditch, 8ft 4in from the Stonehenge terminal, (C6, context 1912), 2ft below ground level.

Objectives: to determine if the Avenue beyond the elbow was constructed within phase 3, and whether this section of the feature is contemporary with the section closer to the monument itself.

Calibrated date: *1σ:* 2490–2340 cal BC
2σ: 2580–2280 cal BC

Final comment: M Allen (1996), the two new dates OxA-4884 and OxA-4905 can be compared with two previous acceptable determinations (HAR-2013, 3720 ±70 BP (Jordan *et al* 1994, 192) and BM-1164, 36678 ±68 BP; Burleigh and Hewson 1979, 341–2). The results indicate that the Avenue may have been constructed over several centuries during phase 3 of the monument. There is, however, no indication that one section was built earlier than another as the results from each end overlap. The construction of the Avenue is therefore considered to be a single, rather than a bipartite event. The results from phase 3 indicate that the Avenue should be considered a part of phase 3 and provides the data used for determining the order of the constructional events as well as the duration of the construction, setting and re-setting of the stone elements of Stonehenge.

References: Burleigh and Hewson 1979, 341–2
Jordan *et al* 1994, 192

OxA–4905 3865 ±40 BP

δ¹³C: -22.1‰

Sample: 9716/Bp, submitted on 11 March 1994 by M Allen

Material: animal bone: *Bos* sp., pelvis (D Serjeantson)

Initial comment: found lying on bottom of the southern Avenue ditch, 0.9km from the Avon terminal (C86, context 9716), beyond the elbow.

Objectives: to determine if the Avenue beyond the elbow was constructed within phase 3, and whether this section of the feature is contemporary with the section closer to the monument itself.

Calibrated date: *1σ:* 2460–2230 cal BC
2σ: 2470–2200 cal BC

Final comment: see OxA-4884

Stonehenge: underpass, Wiltshire

Location: SU 12254219
Lat. 51.10.42 N; Long. 01.49.29 W

Project manager: F de M Vatcher (Ministry of Public Buildings and Works), 1967

Archival body: Salisbury and South Wiltshire Museum

Description: the palisade ditch runs to the west and north of Stonehenge. This feature lies outside the ditches enclosure and has no direct stratigraphic link with any feature of the monument itself. Skeleton WA 9470 was excavated from the ditch terminal.

Objectives: to provide a date for the palisade ditch.

References: Cleal *et al* 1995

UB–3820 2468 ±27 BP

$\delta^{13}C$: -21.1 ±0.2‰

Sample: PUP 69, submitted on 16 May 1994 by M Allen

Material: human bone (right femur) (J McKinley)

Initial comment: an inhumation cut into the palisade ditch.

Objectives: to determine the *terminus ante quem* for the palisade ditch and to establish whether this burial is contemporary with the Beaker-age burial from the main ditch, or whether it is earlier.

Calibrated date: *1σ:* 760–510 cal BC
2σ: 770–410 cal BC

Final comment: M Allen (1995), the result demonstrates that this burial is later than that in the ditch. The palisade ditch is thought to be late Neolithic/early Bronze Age on the basis of archaeological comparison, so the *terminus ante quem* provided by the Iron Age date is unhelpful. However, the surprising Iron Age date demonstrates the presence of burials and continued use of the area almost a thousand years after the final dated construction of the monument.

Stratton: cemeteries 1 and 2, Bedfordshire

Location: TL 205438
Lat. 52.04.43 N; Long. 00.14.30 W

Project manager: D Shotliff (Bedfordshire County Archaeology Service), 1991-2

Archival body: Bedford Museum

Description: two cemeteries were identified during the course of the investigations. In cemetery 1 the graves were generally shallower than those in cemetery 2. Post-burial disturbance was also greater. Cemetery 1 contained eight inhumations (of which three were submitted for dating). No grave goods were found in the graves in cemetery 1. Cemetery 2 contained 11 inhumations (of which 8 were submitted for dating). It appears to be middle Saxon in date and lies adjacent to a contemporary settlement (*c* 200m to the south-east of cemetery 1).

Objectives: it is hoped the dating programme will ascertain whether the two cemeteries are contemporary or not, as well as assisting in understanding the chronological development of the cemeteries, and any cultural developments associated with the grave goods.

Final comment: D Shotliff (12 December 2011), the dates from these two cemeteries provided invaluable insights into how a middle-late Saxon community within a dependent township dealt with their dead in the pre-parochial era.

Laboratory comment: English Heritage (4 October 2012), thirty-six further radiocarbon measurements on samples from the Stratton excavations were undertaken after 1998.

Laboratory comment: (12 December 2011), in cemetery 1 only three of the eight graves contained sufficient bone for high-precision dating (7401, 7402 and 7403; UB-3934–46). Chronological modelling of the radiocarbon dating results was undertaken providing an estimate for the start of burial activity of *cal AD 605–885* (*95% probability*; *start_cemetery_1*) and probably in *cal AD 760–855* (*68% probability*). Furthermore, it estimates that burial ended in *cal AD 775–1060* (*95% probability*; *end_cemetery_1*) and probably in *cal AD 815–910* (*68% probability*). These estimates are though likely to suggest burial took longer than it really did as the three measurements are statistically consistent (T′=0.1; v=2; T′(5%)=6.0; Ward and Wilson 1978) and thus all three individuals could have died at the same time or within a very short space of time of each other. Seven inhumations were dated in 1995/6 from cemetery 2 (UB-3937–41 and UB-4024–5). The two samples from the same grave 16376 (7418 and 7417) are statistically consistent (T′=0.8; v=1; T′(5%)=3.8; Ward and Wilson 1978) and both individuals could therefore have died at the same time. These seven radiocarbon dates have also been modelled, estimating that the burial activity in cemetery 2 began in *cal AD 615–665* (*95% probability*; *start_cemetery_2*) and probably in *cal AD 640–660* (*68% probability*). The activity ended in *cal AD 660–725* (*95% probability*; *end_cemetery_2*) and probably in *cal AD 670–695* (*68% probability*). Further analysis of the results from cemeteries 1 and 2 demonstrated a clear chronological gap with the end of use of cemetery 2 and start of cemetery 1 being separated by *65–170 years* (*68% probability*).

References: Ward and Wilson 1978

UB–3934 1192 ±18 BP

$\delta^{13}C$: -19.7 ±0.2‰

Sample: SV91 7401, submitted on 15 March 1995 by D Shotliff

Material: human bone (long bones and pelvis) (T A Jackman 1991)

Initial comment: a grave in cemetery 1.

Objectives: to compare and contrast with the dates on burials elsewhere in this cemetery, and those in cemetery 2.

Calibrated date: *1σ:* cal AD 770–885
2σ: cal AD 770–895

Final comment: D Shotliff (12 December 2011), this date (with UB3935 and UB-3936) was invaluable in confirming the presence of a ninth-century cemetery on the site. Dating of the cemetery could not have been achieved in any other way. Stratton was a dependent township within what became the parish of Biggleswade; this cemetery illustrates how the inhabitants dealt with their dead in the period before a parochial burial ground had been established. Such evidence is rare.

UB–3935 1201 ±19 BP

δ¹³C: -19.2 ±0.2‰

Sample: SV91 7402, submitted on 15 March 1995 by D Shotliff

Material: human bone (long bones and pelvis) (T A Jackman 1991)

Initial comment: as UB-3934

Objectives: as UB-3934

Calibrated date: *1σ:* cal AD 770–885
2σ: cal AD 725–890

Final comment: see UB-3934

UB–3936 1193 ±18 BP

δ¹³C: -19.9 ±0.2‰

Sample: SV91 7404, submitted on 15 March 1995 by D Shotliff

Material: human bone (long bone, pelvis and other bones) (T A Jackman)

Initial comment: as UB-3934

Objectives: as UB-3934

Calibrated date: *1σ:* cal AD 770–885
2σ: cal AD 770–895

Final comment: see UB-3934

UB–3937 1385 ±18 BP

δ¹³C: -20.4 ±0.2‰

Sample: SV91 7409, submitted on 15 March 1995 by D Shotliff

Material: human bone (long bone) (T A Jackman 1991)

Initial comment: from a grave in cemetery 2.

Objectives: as UB-3934

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

Final comment: D Shotliff (12 December 2011), this date (with UB-3938, UB-3939, UB-3940, UB-3941, UB-4024, and UB-4025) confirmed the identification of a seventh-century 'final phase' cemetery. The dates also highlight chronological development within the cemetery. Four dates (UB-3937, UB-3838, UB-3939, and UB-3940) from the best-defined, central row of the cemetery all fell within the second to third quarters of the seventh century. An eastern outlier (UB-3941) and two burials (UB-4024 and UB-4025) in the less well-defined western row of the cemetery produced dates which modelling suggests are later in the seventh century.

UB–3938 1353 ±18 BP

δ¹³C: -20.2 ±0.2‰

Sample: SV91 7416, submitted on 15 March 1995 by D Shotliff

Material: human bone (long bones) (T A Jackman 1991)

Initial comment: from a well-defined grave in cemetery 2, containing a spearhead typologically dated to the seventh century AD.

Objectives: to date the grave and, by association, the spearhead.

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

Final comment: D Shotliff (12 December 2011), *see* UB-3937; this date also corroborates the typological date of the seventh-century spearhead.

UB–3939 1365 ±18 BP

δ¹³C: -20.2 ±0.2‰

Sample: SV91 7417, submitted on 15 March 1995 by D Shotliff

Material: human bone (long bones) (T A Jackman 1991)

Initial comment: from an inhumation in a double grave with 7418 in cemetery 2.

Objectives: to date the burial.

Calibrated date: *1σ:* cal AD 650–665
2σ: cal AD 645–675

Final comment: D Shotliff (12 December 2011), this date is statistically consistent with UB-3940 from a second individual in the same grave (T′=0.8; T′(5%)=3.8; v=1; Ward and Wilson 1978). Both individuals could therefore have died at the same time. A weighted mean (1376 ±14 BP) can therefore be taken before calibration (cal AD 650–665 at 68% confidence, and cal AD 640–670 at 95% confidence; Reimer *et al* 2004).

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

UB–3940 1388 ±19 BP

δ¹³C: -20.2 ±0.2‰

Sample: SV91 7418, submitted on 15 March 1995 by D Shotliff

Material: human bone (long bones) (T A Jackman 1991)

Initial comment: from a double inhumation grave with 7417 in cemetery 2.

Objectives: to date the burial and compare with 7417.

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

Final comment: see UB-3939

UB–3941 1277 ±21 BP

$\delta^{13}C$: -20.8 ±0.2‰

Sample: SV91 7419, submitted on 15 March 1995 by D Shotliff

Material: human bone (long bones) (T A Jackman 1991)

Initial comment: an outlier grave to the east of the main cemetery (cemetery 2).

Objectives: as UB-3935

Calibrated date: *1σ:* cal AD 680–770
2σ: cal AD 665–775

Final comment: see UB-3937

UB–4024 1327 ±19 BP

$\delta^{13}C$: -20.9 ±0.2‰

Sample: SV91 7413, submitted on 8 December 1995 by D Shotliff

Material: human bone (long bones) (T A Jackman 1991)

Initial comment: a grave in cemetery 2 truncated by post-medieval quarrying. The lower leg bones were well-preserved and undisturbed.

Objectives: to investigate the date of the western row of cemetery 2. In particular is it contemporary with the outlying grave to the east?

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

Final comment: see UB-3937

UB–4025 1312 ±19 BP

$\delta^{13}C$: -20.1 ±0.2‰

Sample: SV91 7414, submitted on 8 December 1995 by D Shotliff

Material: human bone (long bones and pelvis) (T A Jackman 1991)

Initial comment: from a grave in cemetery 2.

Objectives: to date the western row of cemetery 2. Also to ascertain if it is contemporary with the outlying grave to the east.

Calibrated date: *1σ:* cal AD 665–690
2σ: cal AD 660–770

Final comment: see UB-3937

Sutton Common: enclosures, South Yorkshire

Location: SE 563121
Lat. 53.36.08 N; Long. 01.08.57 W

Project manager: R Sydes (South Yorkshire Archaeological Unit), 1987–8

Archival body: Doncaster Museum

Description: Sutton Common is a unique type of site. A pair of irregular, multivallate enclosures astride a palaeochannel and containing a rich assemblage of waterlogged wood and organic deposits.

Objectives: although recorded in 1868, excavated in 1933–5, and scheduled in 1937, the enclosures have never been dated. Due to a lack of diagnostic finds radiocarbon dating was essential to determine their approximate date.

Laboratory comment: English Heritage (21 May 2014), four further samples were dated before 1993 (HAR-8914–7; Bayliss *et al* 2012, 275–6).

References: Bayliss *et al* 2012, 275–6
Parker Pearson and Sydes 1997

GU–5524 2370 ±50 BP

$\delta^{13}C$: -25.8‰

Sample: 051, submitted on 6 February 1995 by M Parker Pearson

Material: wood (waterlogged): *Quercus* sp., under 30 years of age (J Hillam 1995)

Initial comment: part of a line to timber stakes spaced closely together and lying below an Iron Age rampart in the middle of trench E. The tops of the stakes were at the base of the modern ploughsoil.

Objectives: four radiocarbon dates (HAR-8914 to HAR-8917) were obtained for associations with the smaller of two Iron Age enclosures. Bronze Age metalwork indicates earlier activity on the site and this palisade predates the enclosure's earthworks. It is the earliest identifiable structural phase within the enclosure.

Calibrated date: *1σ:* 490–390 cal BC
2σ: 740–370 cal BC

Final comment: P Buckland, M Parker Pearson, R Sydes and J Moore (1997), on the north west section of the defences, the stakes have no connection with the rampart, which they pre-date.

GU–5525 2360 ±50 BP

$\delta^{13}C$: -24.4‰

Sample: 055, submitted on 6 February 1995 by M Parker Pearson

Material: wood (waterlogged): *Quercus* sp., under 30 years of age (J Hillam 1995)

Initial comment: part of a line of closely spaced timber stakes cut and left *in situ* beneath a later rampart of Iron Age date, in the middle of trench E. The tops of the stakes were at the base of the modern ploughsoil.

Objectives: as GU-5524

Calibrated date: 1σ: 420–390 cal BC
2σ: 730–360 cal BC

Final comment: see GU-5524

Thames Foreshore Survey: Antler Mattock, Middlesex

Location: TQ 17697450
Lat. 51.27.24 N; Long. 00.18.21 W

Project manager: R Cowie (Richmond Archaeological Society), 1995

Archival body: Richmond Archaeological Society and Museum of Richmond

Description: a chance find on the Thames Foreshore approximately 2m downstream from Richmond Bridge.

Objectives: to determine whether this artefact is Mesolithic.

References: Bonsall and Smith 1989
Bronk Ramsey *et al* 2002, 53
Smith 1989

OxA–7897 1.2194 ±0.0065 fM

$\delta^{13}C$: -23.7‰

Sample: antler beam mattock, submitted in 1998 by R Cowie

Material: antler: *Cervus elaphus* (J Cotton 1995)

Initial comment: found during a foreshore survey undertaken by Richmond Archaeological Society. The artefact was seen projecting from the eroding surface at the side of a channel. Detailed examination of the site has not been undertaken, mainly because this stretch of the foreshore is submerged for most of the year, and is usually exposed for a few weeks in the autumn when Richmond lock is raised.

Objectives: few laterally perforated antler-beam mattocks recovered from the Thames have been successfully dated (C Bonsall *pers comm*). It is to be hoped that new Richmond find will provide confirmation of the late Mesolithic date usually ascribed to these artefacts. If successful, the date will also add to the small but growing number of radiocarbon determinations available for objects/stratigraphic horizons on the Thames foreshore.

Calibrated date: 1σ: cal AD 1960-1984
2σ: cal AD 1959-1985

Final comment: R Cowie (2001), the modern radiocarbon date for the antler object from Richmond Bridge is surprising, since typologically the object is very similar to prehistoric antler beam mattocks. Moreover the condition of the object suggested that it had been in the river for a considerable length of time. If the object is modern it brings into question the identification of similar (but as yet undated) river finds as antler beam mattocks. Nevertheless, on balance I think the object is probably a genuine artefact that has somehow been contaminated – could its poor condition and riverine environment have contributed to this?

Laboratory comment: English Heritage (7 June 2013), this result has been calibrated using the post-1950 calibration curve for the northern hemisphere atmosphere (zone 1) compiled by Hua *et al* (2013). The resultant distribution is extremely bimodal, suggesting that the sample dates either to cal AD 1959–1962 (33% probability) or to cal AD 1982–1985 (62% probability) (Stuiver and Reimer 1993).

References: Hua *et al* 2012
Stuiver and Reimer 1993

Thames Foreshore Survey: Barn Elms, Greater London

Location: TQ 23307677
Lat. 51.28.33 N; Long. 00.13.28 W

Project manager: M Webber (Museum of London), 1995

Archival body: Museum of London

Description: the middle tidal reaches of the Thames have produced large quantities of prehistoric and later material through dredging in the last century. The evidence from the excavations yielded a significant quantity and diversity of data pertaining to the exploitation of the waterfront and the changing environment since the prehistoric period.

Objectives: to date the valuable archaeological remains, before they are destroyed forever.

Final comment: M Webber (1997), these samples have provided the first dates for a fish trap on the Thames and suggest a link between it and the recently excavated dry-land settlement site of similar date at Hammersmith. They have also shown that the site at Barn Elms has at least three major prehistoric phases and so warrants further investigation. It also provides a contrasting date to peat deposits in the Southwark area - none of which produced such early dates.

GU–5626 5770 ±50 BP

$\delta^{13}C$: -27.1‰

Sample: FRM21 17, submitted in September 1995 by M Webber

Material: wood (waterlogged): *Alnus* sp., roundwood (R Gale 1995)

Initial comment: waterlogged by the River Thames, and exposed to the air at low tides.

Objectives: to provide a date for the feature and any contemporaneity with other features and deposits on the site, and to provide a date for human activity on the site. If contemporary with sample 4, this would suggest the interpretation as a brushwood and stake-built trackway or foreshore consolidation.

Calibrated date: 1σ: 4710–4540 cal BC
2σ: 4730–4490 cal BC

Final comment: M Webber (1997), this date proves that vertical timbers (probably stakes) are of a later date than the peat deposit (GU-5628 and -5629) and being so much later, represents an entirely different phase of activity on the site, not represented by associated deposits, presumably due to erosion. *See* also GU-5267.

GU–5627 8430 ±160 BP

$\delta^{13}C$: -28.9‰

Sample: FRM21 16, submitted in September 1995 by M Webber

Material: wood (waterlogged): Salicaceae, roundwood; diameter *c* 20mm - the structural condition was too poorly preserved to count the growth rings (R Gale 1995)

Initial comment: as GU-5626

Objectives: as GU-5626

Calibrated date: *1σ:* 7600–7330 cal BC
2σ: 7790–7070 cal BC

Final comment: M Webber (1997), this date is somewhat confusing. This vertical stake/root appears to have been contemporary with GU-5626. It also appears to have been later than peat deposit GU-5628. This date, however, would make this vertical timber somewhat earlier than the peat deposit through which it has grown or been driven. While it is possible that peat continued to form around this timber this seems unlikely and an error having crept in somewhere would appear to be a more likely explanation.

GU–5628 7500 ±150 BP

$\delta^{13}C$: -29.9‰

Sample: FRM21 18, submitted in 1995 by M Webber

Material: peat

Initial comment: waterlogged by the River Thames. Sands were present above and below the peat deposit, the lower sands were calcareous. It was associated with vertical stakes and a brushwood deposit/feature. It was positioned approximately 0.5m below the surface of the foreshore (exposed in large stretches at low water line).

Objectives: to provide a date for change in environmental conditions and so relative chronology for associated deposits and features.

Calibrated date: *1σ:* 6480–6220 cal BC
2σ: 6650–6050 cal BC

Final comment: M Webber (1997), this sample (with GU-5629) provided for the first time dates for the formation of peat deposits presently exposed on the Thames foreshore in West London. The late Upper Palaeolithic to Mesolithic dates were unexpectedly early and demonstrate that the Thames foreshore contains some of the largest exposed lines of some of the earliest, *in situ*, deposits in the Greater London area.

Laboratory comment: SURRC (1996): this sample was given an acid wash only, so the dated material consisted of the humic acid and humin fractions together.

GU–5629 10150 ±110 BP

$\delta^{13}C$: -30.3‰

Sample: FRM21 19, submitted in September 1995 by M Webber

Material: peat

Initial comment: waterlogged by the River Thames. Sands were present above and below the peat deposit, the lower sands were calcareous. It was associated with vertical stakes and a brushwood deposit/feature. It was positioned approximately 0.8m below the surface of foreshore (exposed in large stretches at low water line).

Objectives: as GU-5628

Calibrated date: *1σ:* 10090–9550 cal BC
2σ: 10420–9330 cal BC

Final comment: P Marshall (25 September 2012), the $\delta^{13}C$ values of the sample is significantly depleted in comparison with the expected value for and waterlogged plant macrofossils (*c* -25.0‰). Although a number of reasons for these anomalous values could be postulated (eg hard water error), the possible petrol contamination provides the most likely. If the depleted $\delta^{13}C$ value is the result of petrogenic hydrocarbons (Wakeham *et al* 2004), it would produce misleadingly old radiocarbon result, which is the case in this instance.

Laboratory comment: see GU-5628

References: Wakeham *et al* 2004

GU–5630 1350 ±60 BP

$\delta^{13}C$: -26.7‰

Sample: FRM21 20, submitted in September 1995 by M Webber

Material: wood (waterlogged): *Quercus* sp., sapwood (R Gale 1995)

Initial comment: waterlogged by the River Thames, exposed to air at the low tides.

Objectives: to provide a date for the structure, construction techniques, and water levels at a given period, and to provide a date for activity on the site.

Calibrated date: *1σ:* cal AD 640–690
2σ: cal AD 590–780

Final comment: M Webber (1997), this sample (with GU-5631) provided the first dated fishtrap on the River Thames. The date suggests that it was contemporary with the settlement at Hammersmith, recently excavated on dry land. This may suggest that similar features may also provide clues as to the location of their associated settlements.

GU–5631 1470 ±60 BP

$\delta^{13}C$: -28.3‰

Sample: FRM21 21, submitted in September 1995 by M Webber

Material: wood (waterlogged): *Quercus* sp., sapwood (R Gale 1995)

Initial comment: as GU-5630

Objectives: as GU-5630

Calibrated date: *1σ:* cal AD 540–650
2σ: cal AD 420–670

Final comment: see GU-5630

GU–5632 3400 ±80 BP

δ¹³C: -28.4‰

Sample: FRM21 03, submitted in July 1995 by M Webber

Material: wood (waterlogged): *Alnus* sp., 2 radial growth rings (R Gale 1995)

Initial comment: the wood lay within sandy clay with shell and organic inclusions. It lay above a layer of tufa. Some areas of concretion and iron panning were associated. It was waterlogged, situated below water except at the lowest tide.

Objectives: to provide a date for inundation of the river bank and associated activity.

Calibrated date: *1σ:* 1870–1610 cal BC
2σ: 1910–1500 cal BC

Final comment: M Webber (1997), this date indicates a third phase of activity on this site and shows that some time had elapsed between the growth/building of the timber verticals (GU-5626) and the deposition of these horizontal members.

GU–5688 1220 ±50 BP

δ¹³C: -24.9‰

Sample: FRM21 A102, 34, submitted on 26 February 1997 by M Webber

Material: wood (waterlogged): *Quercus* sp., slow grown, sapwood and bark (J Watson 1997)

Initial comment: timber 1504 from a fish trap associated with previously dated fish trap (GU-5630 and GU-5631), and settlement evidence for Saxon Hammersmith.

Objectives: as GU-5630

Calibrated date: *1σ:* cal AD 710–890
2σ: cal AD 670–950

Final comment: P Marshall (25 September 2012), the date indicates that this is a later fish trap than that previously dated by GU-5630 and GU-5631 and provides further evidence for Saxon exploitation of the River Thames. The two measurements on this fish trap (*see* also GU-5689) are statistically consistent (T′=0.1; v=1; T′(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age.

References: Ward and Wilson 1978

GU–5689 1240 ±50 BP

δ¹³C: -26.2‰

Sample: FRM21 A102, 35, submitted on 26 February 1997 by M Webber

Material: wood (waterlogged): *Quercus* sp., with sapwood (J Watson 1997)

Initial comment: timber 1502 from fish trap associated with a previously dated fish trap (GU-5630 and GU-5631), and settlement evidence for Saxon Hammersmith.

Objectives: as GU-5630

Calibrated date: *1σ:* cal AD 680–880
2σ: cal AD 660–940

Final comment: see GU-5688

References: Ward and Wilson 1978

Thames Foreshore Survey: Bermondsey, Greater London

Location: TQ 34347983
Lat. 51.30.03 N; Long. 00.03.52 W

Project manager: M Webber (Museum of London), 1998

Archival body: Museum of London

Description: Thames intertidal zone.

Objectives: to date the foreshore activity in relation to land-based settlement.

Final comment: P Marshall (25 September 2012), the three measurments are all post-medieval in date and are therefore not related to prehistoric settlement on the adjacent dry land.

GU–5725 110 ±50 BP

δ¹³C: -23.1‰

Sample: FSW01 9813, submitted on 6 February 1998 by M Webber

Material: wood (waterlogged; *Larix/Picea* sp.; trunk diameter 120mm, sapwood 10mm, heartwood 110mm) (R Gale 1998)

Initial comment: associated with prehistoric and later deposits.

Objectives: to relate foreshore activity to land-based settlement.

Calibrated date: *1σ:* cal AD 1680–1940
2σ: cal AD 1660–1955*

Final comment: P Marshall (25 September 2012), the radiocarbon result shows that the timber is post-medieval in date and is not associated with prehistoric settlement on the land close by.

GU–5726 140 ±50 BP

δ¹³C: -23.1‰

Sample: FSW01 9814, submitted on 6 February 1998 by M Webber

Material: wood (waterlogged; *Larix/Picea* sp.; trunk diameter 110mm, sapwood 10mm, heartwood 100mm) (R Gale 1998)

Initial comment: as GU-5725

Objectives: as GU-5725

Calibrated date: *1σ:* cal AD 1660–1950
2σ: cal AD 1650–1955*

Final comment: see GU-5725

GU–5727 150 ±50 BP

δ¹³C: -25.4‰

Sample: FSW01 9815, submitted on 6 February 1998 by M Webber

Material: wood (waterlogged; *Larix/Picea* sp.; part of trunk, minimun diameter 160mm, probably all heartwood) (R Gale 1998)

Initial comment: as GU-5725

Objectives: as GU-5725

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1650–1955*

Final comment: see GU-5725

Thames Foreshore Survey: Chelsea, Greater London

Location: TQ 26802739
Lat. 51.01.53 N; Long. 00.11.29 W

Project manager: M Webber (Museum of London), 1997

Archival body: Museum of London

Description: a sequence of deposits on the Chelsea foreshore.

Objectives: to date the valuable archaeological remains, before they are destroyed forever.

Final comment: P Marshall (25 September 2012), the results contribute to an understanding of the palaoegeography of the region in the prehistoric period.

OxA–7032 4935 ±45 BP

δ¹³C: -28.8‰

Sample: FKN01 A104 41, submitted on 26 February 1997 by M Webber

Material: peat (humin; organic silt) (A Bayliss 1997)

Initial comment: peat from an auger; pH=7.8.

Objectives: to compare with other dates from peat/submerged forest. Both up and down stream are later Upper Palaeolithic to Mesolithic sites. Downstream there are Mesolithic and Bronze Age sites and therefore the objective is also to date changes in localised environmental conditions and geography.

Calibrated date: *1σ:* 3770–3650 cal BC
2σ: 3800–3640 cal BC

Final comment: P Marshall (25 September 2012), the two measurements are statistically inconsistent (T′=6.0; v=1; T′(5%)=3.8; Ward and Wilson 1978) and this probably relflects the inhomegeneity in the peat deposit itself. OxA-7033 provides the best estimate for the date of the peat deposit as it is more likely that older material has been reworked and redeposited rather than younger material incorporated into the deposit.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1997): the humin fraction of this sample was dated.

References: Ward and Wilson 1978

OxA–7033 4770 ±50 BP

δ¹³C: -28.6‰

Sample: FKN01 A104 41, submitted on 26 February 1997 by M Webber

Material: peat (humin; organic silt) (A Bayliss 1997)

Initial comment: as OxA-7032

Objectives: as OxA-7032

Calibrated date: *1σ:* 3640–3510 cal BC
2σ: 3660–3370 cal BC

Final comment: see OxA-7032

Laboratory comment: see OxA-7032

OxA–7034 4970 ±45 BP

δ¹³C: -28.8‰

Sample: FKN01 A104 42, submitted on 26 February 1997 by M Webber

Material: peat (humin; organic silt) (A Bayliss 1997)

Initial comment: peat from an auger; pH 7.7.

Objectives: as OxA-7032

Calibrated date: *1σ:* 3800–3690 cal BC
2σ: 3940–3650 cal BC

Final comment: P Marshall (25 September 2012), the measurement provides a date for the start of peat accumulation, which the results suggest was fairly rapid.

Laboratory comment: see OxA-7032

Thames Foreshore Survey: Chelsea Harbour, Greater London

Location: TQ 26802739
Lat. 51.01.53 N; Long. 00.11.29 W

Project manager: M Webber (Museum of London), 1997

Archival body: Museum of London

Description: the site lies within the intertidal zone of the River Thames.

Objectives: to date the valuable archaeological remains, before they are destroyed forever.

Final comment: N Cohen (1 May 2014), the results of the radiocarbon dating undertaken on these timbers has allowed a clearer understanding of the archaeological remains surviving on the site (in this case, a significant mid-Saxon fish trap), and allows this feature to be understood in a wider landscape context, with regard to the discovery of other early and middle Saxon fishtraps from a number of other sites within the intertidal zone.

Laboratory comment: (25 September 2012), the results from the structure are statistically consistent and could therefore be of the same actual age. However, the latest of the dates from the structure probably provides the best estimate for its construction. The results, along with a number of scientifically dated Saxon fishtraps (Cohen 2011), suggest that the Thames was a useful resource for the population of London in this period.

References: Cohen 2003
Cohen 2011

GU–5684 1230 ±50 BP

δ¹³C: -25.8‰

Sample: FKN01 A106 Phase A 30, submitted on 28 February 1997 by M Webber

Material: wood (waterlogged): *Quercus* sp., slow grown, with sapwood (J Watson 1997)

Initial comment: exposed twice daily for 1–2 hours - otherwise below water.

Objectives: to date the construction and transgression/regression of the River Thames at this point. Documentary and cartographic research suggest a pre-sixteenth century date: toolmarks appear to be post-Roman in date, but the documentary sources suggest they could be Saxon.

Calibrated date: *1σ:* cal AD 690–890
2σ: cal AD 660–950

Final comment: P Marshall (25 September 2012), the four measurements from the structure are statistically consistent (T'=1.4; T'(5%)=7.8; v=3; Ward and Wilson 1978), and so could be of the same actual age. The results confirm the Saxon age of the structure.

References: Ward and Wilson 1978

GU–5685 1250 ±50 BP

δ¹³C: -25.6‰

Sample: FKN01 A106 Phase A 31, submitted on 26 February 1997 by M Webber

Material: wood (waterlogged): *Quercus* sp., slow grown, with sapwood (J Watson 1997)

Initial comment: as GU-5684

Objectives: as GU-5684

Calibrated date: *1σ:* cal AD 680–860
2σ: cal AD 660–900

Final comment: see GU-5684

GU–5686 1310 ±50 BP

δ¹³C: -23.1‰

Sample: FKN01 A106 Phase A 32, submitted on 26 February 1997 by M Webber

Material: wood (waterlogged): *Quercus* sp., slow grown, with sapwood (J Watson 1997)

Initial comment: as GU-5684

Objectives: as GU-5684

Calibrated date: *1σ:* cal AD 650–770
2σ: cal AD 640–780

Final comment: see GU-5684

GU–5687 1250 ±50 BP

δ¹³C: -24.2‰

Sample: FKN01 A106 Phase A 33, submitted on 26 February 1997 by M Webber

Material: wood (waterlogged): *Quercus* sp., slow-grown, with sapwood, *c* 18 rings (J Watson 1997)

Initial comment: as GU-5684

Objectives: as GU-5684

Calibrated date: *1σ:* cal AD 680–860
2σ: cal AD 660–900

Final comment: see GU-5684

Thames Foreshore Survey: Deodar Road, Greater London

Location: TQ 24577550
Lat. 51.27.51 N; Long. 00.12.24 W

Project manager: M Webber (Museum of London), 1998

Archival body: Museum of London

Description: from the Thames foreshore.

Objectives: to relate the foreshore activity to land-based settlement.

Final comment: P Marshall (25 September 2012), this structure was first identified and recorded in the early 1970s by the Wandsworth Historical society as part of a systematic survey of the inter-tidal area within the borough (Greenwood 2008). The structure lies about 150m downstream of Putney Railway Bridge, and comprises two apparently parallel rows of 49 roundwood posts set about 1m apart on an east-west alignment. It has been suggested that the structure represents one branch or arm of a V-shaped fish trap. Although no artefacts were recovered, some late Roman and early Saxon activity in the area does provide a context for the structure.

References: Greenwood 2012

GU–5719 1540 ±50 BP

δ¹³C: -27.9‰

Sample: FWW04 981, submitted on 6 February 1998 by M Webber

Material: wood (waterlogged): *Quercus* sp., part of trunk/stem, diameter 120mm; sapwood 30mm, heartwood 90mm (478g) (R Gale 1998)

Initial comment: a fish trap consisting of vertical posts and ?hurdle remains sealed in organic clay. Later deposits have built up around the posts. The Thames foreshore is waterlogged except at lowest tides - perhaps 10 days a year when exposed for *c* half an hour.

Objectives: to confirm or refute the theory that the fish trap is associated with early medieval settlement at Putney and so provide evidence for the position of the main channel and water levels at this date. Also to confirm the chronology of the upper Thames tide way fish trap typology.

Calibrated date: *1σ:* cal AD 420–580
2σ: cal AD 400–640

Final comment: P Marshall (25 September 2012), the two measurements are statistically consistent (T′=0.0; v=1; T′(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age. The date confirms the early Saxon date for the structure.

References: Ward and Wilson 1978

GU–5720 1520 ±50 BP

δ¹³C: -24.5‰

Sample: FWW04 982, submitted on 6 February 1998 by M Webber

Material: wood (waterlogged): *Ulmus* sp., sapwood, roundwood/stem, diameter 86mm (R Gale 1995)

Initial comment: as GU-5719

Objectives: as GU-5719

Calibrated date: *1σ:* cal AD 430–610
2σ: cal AD 410–650

Final comment: see GU-5719

Thames Foreshore Survey: Isleworth Church, Greater London

Location: TQ 16917608
Lat. 51.28.16 N; Long. 00.19.00 W

Project manager: M Webber (Museum of London), 1998

Archival body: Museum of London

Description: part of the Thames foreshore survey, from an area exposed at low tide.

Objectives: to confirm or refute the identification of a fish trap as that recorded in Domesday.

Final comment: P Marshall (25 September 2012), the two measurements are statistically consistent (T′=0.0; v=1; T′(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age. The dates confirm the late Saxon date for the structure, this means that it is not the fishtrap at this location recorded in the Domesday book.

References: Ward and Wilson 1978

GU–5721 1270 ±50 BP

δ¹³C: -25.2‰

Sample: FHL04 987, submitted on 6 February 1998 by M Webber

Material: wood (waterlogged): *Quercus* sp., sapwood 30mm (R Gale 1998)

Initial comment: from a worked timber exposed on the foreshore.

Objectives: as series comments.

Calibrated date: *1σ:* cal AD 670–780
2σ: cal AD 650–890

Final comment: see series comment

References: Ward and Wilson 1978

GU–5722 1250 ±50 BP

δ¹³C: -25.2‰

Sample: FHL04 988, submitted on 6 February 1998 by M Webber

Material: wood (waterlogged): *Quercus* sp., sapwood (R Gale 1998)

Initial comment: as GU-5721

Objectives: as GU-5721

Calibrated date: *1σ:* cal AD 680–860
2σ: cal AD 660–900

Final comment: see series comment

Thames Foreshore Survey: Nine Elms Cold Store, Greater London

Location: TQ 30257800
Lat. 51.29.08 N; Long. 00.07.26 W

Project manager: M Webber (Museum of London), 1998

Archival body: Museum of London

Description: from the Thames foreshore.

Objectives: to ascertain the relationship to the associated structure and stratigraphy, to form a chronology for the upper Thames tide way fishtrap typology, and to associate this activity with dry land settlement sites.

Final comment: P Marshall (25 September 2012), the two measurements are statistically consistent (T′=1.0; v=1; T′(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age. The date confirms the early Iron Age date for the structure, a period when few structures of this date from London are known.

References: Ward and Wilson 1978

GU–5723 2440 ±50 BP

δ¹³C: -25.0‰

Sample: FLM01/1 989, submitted on 6 February 1998 by M Webber

Material: wood (waterlogged): *Quercus* sp., fairly young heartwood (R Gale 1998)

Initial comment: associated with a post-built structure (?jetty FLM01/2) and stratigraphic sequence representing changes in salinity and hydrology, ie sands, clays, and peats as piled relationship uncertain.

Objectives: to ascertain the relationship to the associated structure (FLM01/2) and the stratigraphic sequence. To form a chronology for fishtraps typology in the upper Thames tidelry and to ascertain the relationship to dry-land settlement.

Calibrated date: *1σ:* 750–400 cal BC
2σ: 780–390 cal BC

Final comment: see series comment

References: Ward and Wilson 1978

GU–5724 2330 ±100 BP

δ¹³C: -28.6‰

Sample: FLM01/1 9810, submitted on 6 February 1998 by M Webber

Material: wood (waterlogged): *Alnus* sp., worked/tapered stem/roundwood, max diameter 45mm (106g) (R Gale 1998)

Initial comment: as GU-5723

Objectives: as GU-5723

Calibrated date: *1σ:* 520–250 cal BC
2σ: 780–170 cal BC

Final comment: see series comment

Thames Foreshore Survey: Richmond Lock, Greater London

Location: TQ 16927517
Lat. 51.27.46 N; Long. 00.19.00 W

Project manager: M Webber (Museum of London), 1997

Archival body: Museum of London

Description: a sequence of palaeoenvironmental deposits from the Thames foreshore.

Objectives: to provide dated horizons in the stratigraphic sequence.

Final comment: P Marshall (25 September 2012), the results indicate that these deposits are early Mesolithic in date.

GU–5729 7880 ±50 BP

δ¹³C: -27.2‰

Sample: FRM 12 9821, submitted on 6 February 1998 by M Webber

Material: wood (waterlogged): *Salix/Populus sp.*, roundwood, diameter 35mm, bark *in situ* (R Gale 1998)

Initial comment: the sample comes from under A113 on the surface of A123.

Objectives: to provide a dated horizon in the stratigraphic sequence.

Calibrated date: *1σ:* 6810–6640 cal BC
2σ: 7030–6600 cal BC

Final comment: P Marshall (25 September 2012), the two measurements are statistically consistent (T′=1.0; v=1; T′(5%)=3.8; ward and Wilson 1978) and could therefore be of the same actual age. The date confirms the early Mesolithic date for the small collection of posts.

References: Ward and Wilson 1978

GU–5730 7910 ±70 BP

δ¹³C: -26.5‰

Sample: FRM 12 9822, submitted on 6 February 1998 by M Webber

Material: wood (waterlogged): *Salix/Populus* sp., very degraded, impossible to estimate age (R Gale 1998)

Initial comment: the sample comes from the horizon between A114 and A115, partially buried in A114.

Objectives: as GU-5729

Calibrated date: *1σ:* 7030–6650 cal BC
2σ: 7060–6600 cal BC

Final comment: see GU-5729

Thames Foreshore Survey: St Paul's Boy's School, Greater London

Location: TQ 22247810
Lat. 51.29.17 N; Long. 00.14.21 W

Project manager: M Webber (Museum of London), 1998

Archival body: Museum of London

Description: from the Thames intertidal zone.

Objectives: to ascertain the relationship with the possible associated Mesolithic peat.

Final comment: P Marshall (25 September 2012), the date for the structure shows that it is not related to the Mesolithic foreshore deposits at this location on the Thames foreshore.

GU–5728 380 ±60 BP

δ¹³C: -26.4‰

Sample: FRM 20 9818, submitted on 6 February 1998 by M Webber

Material: wood (waterlogged): *Quercus* sp., sliver consisting of sapwood and heartwood (R Gale 1998)

Initial comment: the sample is possibly related to the Mesolithic foreshore deposits, but this is uncertain due to the piled nature of the structure.

Objectives: to relate the structure to the foreshore deposits which, due to its piled nature, is uncertain at present.

Calibrated date: *1σ:* cal AD 1440–1640
2σ: cal AD 1420–1650

Final comment: P Marshall (25 September 2012), the medieval/post-medieval date for the structure shows that it is not related to the Mesolithic foreshore deposits at this location on the Thames foreshore.

Thatch Project, Devon

Location: ST 2607705142
Lat. 50.50.28 N; Long. 03.02.54 W

Project manager: J Letts (University of Reading), 1995

Description: smoke blackened thatch is one of the most important archaeobotanical resources in Europe, preserving whole plants, and potentially containing a huge amount of information about medieval crops and their weeds, and unique data about harvesting techniques.

Objectives: to develop a reliable absolute dating method for soot-blackened thatch, so that the antiquity of surviving samples can be confirmed and refined independently of the circumstantial dating inferred from architectural forms.

Final comment: J Letts (10 May 2000), the base coat material examined is believed to be the original base coat at the time of construction, so the earlier date obtained fits in best with the architectural evidence which suggests a flooring over of the original open hall before the mid-to-late sixteenth century. Little appears to have been changed in terms of cereals form the medieval period to *c* AD 1650, so the evidence from the thatch itself is supportive but not actually dateable.

References: Cox and Letts 2000
Letts 2000

UB–4057 363 ±20 BP

δ¹³C: -23.8 ±0.2‰

Sample: Base coat 1; SBT E 1, submitted on 12 March 1996 by J Letts

Material: thatch (cereal straw thatch: 85% wheat, 10% rye and 5% other) (J Letts 1995)

Initial comment: the sample was taken from a base coat of thatch thought to have been applied at the time of construction in the late fifteenth century according to architectural evidence. The straw is blackened by the soot of an open fire. The open hall was covered over in the early to mid-seventeenth century in this area.

Objectives: no smoke-blackened thatch has been dated by radiocarbon dating. Dating later than the early sixteenth century would challenge firstly the architectural dating of the open hall building, and secondly suggest that the base coat of the thatch (samples) is not the original base coat applied at the time of construction. The dating of a further 50 samples of smoke-blackened thatch rests on architectural evidence.

Calibrated date: *1σ:* cal AD 1465–1620
2σ: cal AD 1450–1635

Final comment: see series comment

UB–4058 646 ±21 BP

δ¹³C: -24.3‰

Sample: Base coat 1; SBT E2, submitted on 12 March 1996 by J Letts

Material: thatch (cereal straw thatch: 85% wheat, 10% rye and 5% other) (J Letts 1995)

Initial comment: a replicate of UB-4057.

Objectives: as UB-4057

Calibrated date: *1σ:* cal AD 1290–1390
2σ: cal AD 1280–1395

Final comment: see series comments

Laboratory comment: University of Belfast (1997), this date is probably too old due to contamination from the soot which is 'old' carbon derived from the burning of fuel. The chemical pretreatments have failed to remove the contamination. It was susequently agreed that the only way to remove the soot was by stripping off the dirty outer layer of the straw to reveal a clean inner core.

Tintagel Castle, Camelford, Cornwall

Location: SX 05158920
Lat. 50.40.09 N; Long. 04.45.28 W

Project manager: R Harry (University of Glasgow), 1993 and 1994

Archival body: Royal Cornwall Museum

Description: excavations in 1991 on the Lower Terrace revealed the remains of a structure, phase W. The floor deposit contained seventeen finds of imported pottery, which provided a chronological marker in the fifth/sixth centuries AD. Immediately below the wall, a patch of charcoal was excavated and this was interpreted as a hearth because of the presence of burnt clayey scree in the matrix. These deposits were above the phase of disuse and collapse of an earlier structure with an associated floor deposit (phase U2). The stone wall of this structure had been re-used. The remains of the floor deposit comprised patches of fine clay, and contained two hearths (123/124) and (126/127), set into the scree surface below. Whereas phase W had been characterised by finds of fifth- to sixth-century imported pottery (all class B amphora), the artefactual assemblage of phase U2 was quite different, and included a collection of up to 15 sherds of hard fabric burnished pottery with scratch marks. Unlike the later pot sherds, this was less diagnostic and initial comments by specialists suggested dates around the late Roman and the fifth/sixth centuries AD. In 1994, excavation uncovered several further layers of activity beneath these deposits (phases Q1, Q2, R, and S), in the form of ephemeral floor deposits and hearths. These lay below a thick layer of shillet levelling (phase T) upon which phases U1 and U2 had been set. Phases Q1 to S were all aceramic, and of the artefacts recovered, none were chronologically diagnostic.

Objectives: the radiocarbon programme was designed to address three major aims: to determine whether the aceramic activity of phase Q2 was in fact Roman, the only dateable find being a sherd of (probably) Roman glass; to refine our understanding of when the ceramics represented within phases U2 and W were made or were imported into Cornwall. In particular the possibility that phase U2 was also late Roman needed to be investigated; and to determine whether phases Q2, U2, and W were separated by decades or by hundreds of years, which might have serious implications for the interpretation of the ephemeral remains on the Lower Terrace. In the light of the results from the first series of radiocarbon analyses (UB-3795 to UB-3799, and UB-3883), a further aim was to investigate the taphonomy of deposit 113 (phase W). The availability of large quantities of charcoal from hearths within phases Q2, U2, and W, in conjunction with a clear stratigraphic sequence, provided a rare opportunity to provide such a refined chronology.

References: Barrowman *et al* 2007
Morris and Harry 1997

OxA–6002 1490 ±50 BP

$\delta^{13}C$: -26.2‰

Sample: 113-4 and 113-5, submitted on 7 September 1995 by R Harry

Material: charcoal: *Prunus* sp. (R Gale 1995)

Initial comment: the preliminary statistical model of the first series of determinations from the site demonstrates that UB-3799 is in severe disagreement with the other five results when the stratigraphical order of the features is taken into account. This sample did cause problems during laboratory analysis. Although strenuous efforts were made to correct these, the problems were thought to have been successfully overcome. The sample analysed as UB-3799 was identified prior to submission as 35.1g short-lived species, with 2g of *Quercus* sp. which was excluded. Long-lived material thus constituted only 8% of the sample. With this in mind the fragments which were too small for identification were used to 'clean out' the preparation rig prior to the combustion of UB-3799. However, subsequent material from this context which was identified before the submission of this series proved to contain 69% *Quercus* sp., with only 4.2g of short-lived species.

Objectives: the very different compositions of these two parts of the same sample is unexplained. In the light of it, however, the possibility that the 20g of material which was not identified contained substantial amounts of long-lived species cannot be entirely excluded, although it appears unlikely. It may be that the proportion of *Quercus* sp. in the second sub-sample is disproportionately high because of a large fragment which broke up either during storage, excavation, or processing. Further samples of short-lived species are submitted for AMS dating in order to constrain the calibration of the dates from the hearths 123 (UB-3795 and UB-3796) and 126 (UB-3797 and UB-3798), and to provide a more precise and reliable estimate for the aceramic phase on the Lower Terrace at Tintagel.

Calibrated date: *1σ:* cal AD 540–630
2σ: cal AD 420–660

Final comment: C Morris and R Harry (1997), deposit 113 in Phase W is rather later than expected, cal AD 560–670 cal AD (95% confidence). This may suggest that the ceramics in Phase W are also being used for rather longer than originally anticipated. The severely abraded state of the pottery from this phase, and phases above it where pottery is found redeposited with collapse layers and scree, may be due to the acid soil conditions at the site.

Laboratory comment: Ancient Monuments Laboratory (September 1996), the five results on single fragments of short-life charcoal from this deposit (OxA-6002–6) are statistically significantly different (T′=18.3; T′(5%)=9.5; v=4; Ward and Wilson 1978), suggesting that the burnt material could have been redeposited and not burnt *in situ* as originally thought. The mean of these results is, however, compatible with the result on the bulk sample of short-lived material from this context (UB-3799).

References: Ward and Wilson 1978

OxA–6003 1550 ±45 BP

$\delta^{13}C$: -25.0‰

Sample: 113-4 8 113-5, submitted on 7 September 1995 by R Harry

Material: charcoal: *Prunus* sp. (R Gale 1995)

Initial comment: as OxA-6002

Objectives: as OxA-6002

Calibrated date: *1σ:* cal AD 420–570
2σ: cal AD 400–610

Final comment: see OxA-6002

Laboratory comment: see OxA-6002

OxA–6004 1430 ±45 BP

$\delta^{13}C$: -26.1‰

Sample: 113-1, submitted on 7 September 1995 by R Harry

Material: charcoal: *Betula* sp. (R Gale 1995)

Initial comment: as OxA-6002

Objectives: as OxA-6002

Calibrated date: *1σ:* cal AD 590–660
2σ: cal AD 540–670

Final comment: see OxA-6002

Laboratory comment: see OxA-6002

OxA–6005 1705 ±50 BP

$\delta^{13}C$: -25.5‰

Sample: 113-2, submitted on 7 September 1995 by R Harry

Material: charcoal: *Ulex/Cytisus* sp. (R Gale 1995)

Initial comment: as OxA-6002

Objectives: as OxA-6002

Calibrated date: *1σ:* cal AD 250–400
2σ: cal AD 230–430

Final comment: see OxA-6002

Laboratory comment: see OxA-6002

OxA–6006 1565 ±45 BP

$\delta^{13}C$: -26.2‰

Sample: 113-3, submitted on 7 September 1995 by R Harry

Material: charcoal: *Corylus* sp. (R Gale 1995)

Initial comment: as OxA-6002

Objectives: as OxA-6002

Calibrated date: *1σ:* cal AD 420–560
2σ: cal AD 390–600

Final comment: see OxA-6002

Laboratory comment: see OxA-6002

UB–3795 1617 ±18 BP

$\delta^{13}C$: -26.4 ±0.2‰

Sample: TTG93 2132/3, submitted on 14 March 1994 by R Harry

Material: charcoal (64.60g,36.7%) (all stem; 64.6g identified out of 176g): *Salix/Populus sp.* (2.80g); *Quercus* sp. (2.10g); *Prunus* sp. (0.70g); *Corylus* sp. (59g) (R Gale 1994)

Initial comment: charcoal retrieved by flotation of a total sample of burnt deposit 123, found *c* 0.5m from the surface. 123 was overlying hearth setting 124, a flat stone surrounded by thin upright slates. 123 and 124 were overlying/set into 121, a yellowish brown silty clay with scree. 123 was sealed by 115, shillet in dark yellowish brown clayey loam. 123 was contained within 122, a patch of dark brown clayey loam with charcoal flecks.

Objectives: dating phase U of the site is crucial due to a lack of datable artefacts. All excavations at the island from the 1930s to the present, have failed to produce any evidence for occupation earlier than the fifth/sixth centuries AD, an earlier date is therefore unparalleled. Furthermore, the presence of two hearths associated with this structural phase suggests a longer period of occupation than first anticipated. Dating would determine whether this represents decades or centuries.

Calibrated date: *1σ:* cal AD 405–430
2σ: cal AD 395–535

Final comment: C Morris and R Harry (1997), the sample provided a date of fifth to early sixth century.

Laboratory comment: Ancient Monuments Laboratory (September 1996), the two results on bulk samples of short-life charcoal from this deposit are statistically consistent (T′=0.2; T′(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

UB–3796 1605 ±20 BP

$\delta^{13}C$: -26.3 ±0.2‰

Sample: TTG93 2132/3, submitted on 14 March 1994 by R Harry

Material: charcoal (as UB-3795) (R Gale 1994)

Initial comment: a repliocate of UB-3795.

Objectives: as UB-3795

Calibrated date: *1σ:* cal AD 415–530
2σ: cal AD 395–540

Final comment: see UB-3795

Laboratory comment: see UB-3795

UB–3797 1569 ±18 BP

$\delta^{13}C$: -26.6 ±0.2‰

Sample: TTG93 2135/126, submitted on 14 March 1994 by R Harry

Material: charcoal (64g,37.9%) (64g identified out of 168.6g): *Salix/Populus sp.* (0.90g); *Ulex/Cytisus* sp. (0.90g); Rosaceae, sub-family Pomoideae (0.70g); *Prunus* sp. (4.90g); *Corylus/Alnus* sp., stem (29.10g) (R Gale 1994)

Initial comment: charcoal retrieved by flotation of a total sample of burnt deposit 126, found *c* 0.5m from the surface. 126 was overlying hearth setting 127, a depression in the scree lined by stones and clayey earth. 126 and 127 were overlying/set into 121, a yellowish brown silty clay with scree. 126 was contained within 122, a patch of dark brown clayey loam with charcoal flecks. 126 was sealed by 115, a shillet in dark yellowish brown clayey loam.

Objectives: the presence of two hearths in one structural phase (phase U) on the Lower Terrace of Site C suggests that this may represent seasonal, or related and temporary occupation at the site and is therefore a potentially extremely exciting opportunity to further our understanding of the nature of occupation at Tintagel Castle. As with context 123, dating of this feature may also prove that the structure excavated at site W is the earliest yet seen at site C.

Calibrated date: *1σ:* cal AD 425–540
2σ: cal AD 420–550

Final comment: C Morris and R Harry (1997), *see* UB-3795, but it is believed that hearth 123 was earlier than 126.

Laboratory comment: Ancient Monuments Laboratory (September 1996), the two results on bulk samples of short-life charcoal from this deposit are statistically consistent (T′=2.0; T′(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

UB–3798 1607 ±20 BP

$\delta^{13}C$: -25.4 ±0.2‰

Sample: TTG93 2135/126, submitted on 14 March 1994 by R Harry

Material: charcoal (64g,37.9) (64g identified out of 168.6g): Rosaceae, sub-family Pomoideae (0.70g); *Ulex/Cytisus* sp. (0.90g); *Salix/Populus* sp.; Corylus/Alnus sp., stem (29.10g); *Prunus* sp. (4.90g) (R Gale 1994)

Initial comment: a replicate of UB-3797.

Objectives: as UB-3797

Calibrated date: *1σ:* cal AD 410–530
2σ: cal AD 395–540

Final comment: see UB-3797

Laboratory comment: see UB-3797

UB–3799 1645 ±22 BP

$\delta^{13}C$: -26.0 ±0.2‰

Sample: TTG93 2123/113, submitted on 14 March 1994 by R Harry

Material: charcoal (13.80g,24.5%) (all stem; 13.8g identified out of 56.4g; *Rosa/Rubus* sp. (0.1g)): Rosaceae, sub-family Pomoideae, subfamily *Pomoideae* (0.50g); *Ulex/Cytisus* sp. (2.20g); *Prunus* sp., cf. *P Spinosa* (1.20g); *Betula* sp. (2.20g); *Corylus* sp. (5.60g) (R Gale 1994)

Initial comment: charcoal retrieved by flotation of a total sample of burnt deposit 113 taken on site, from *c* 110 cms from the surface. 113 was contained within possible floor deposit 111, a dark brown silty clay with shillet. 113 was set into a depression in bedrock below, and was sealed by a wall of flat slates 51, and a later floor deposit 105, a reddish brown clayey loam.

Objectives: a fifth/sixth-century AD date for 111 is suggested by the presence of five finds units of post-Roman Mediterranean imported pottery. However, this is in an abraded state and may have been in use for a longer period than first anticipated. A date from 113 will provide a *terminus ante quem* for wall 51 of the phase W structure, and this phase of occupation on the site. 113 is contemporary with 111.

Calibrated date: *1σ:* cal AD 390–420
2σ: cal AD 345–430

Final comment: C Morris and R Harry (1997), radiocarbon evidence strongly contradicts the stratigraphic position of 113, Phase W, in the sequence. In fact, the probability that the UB-3799 is later than UB-3795 to UB-3798 is less than 1 to 100. The stratigraphic position of 113 was checked and found to be reliable. This suggests that the radiocarbon measurement is inaccurate or that our interpretation of the taphonomy of the charcoal within 113 is faulty. In order to check, five further sub-samples were dated (*see* OxA-6002-6).

UB–3883 1595 ±18 BP

$\delta^{13}C$: -25.8 ±0.2‰

Sample: 171/173, submitted on 8 September 1994 by R Harry

Material: charcoal (10.70g,17%) (63g of which 10.7g (17%) identified to age and species): *Sambucus* sp. (0.10g); *Ulex/Cytisus* sp. (0.30g); Pomoideae (1.10g); bark (1.90g, 18%); *Corylus* sp. (1g); *Prunus* sp. (6.30g, 59%) (R Gale 1994)

Initial comment: from fire pit 171/173, which was a 5cm thick circular charcoal patch in the centre of the trench. It cut a concreted layer of shillet (231) up to 0.15m thick, which was given number 172 where it had burnt in the bottom of the pit. The adjacent box hearth 174, fill 175, had no determinable stratigraphical relationship to 171/173. Both features were sealed by a burnt clay and charcoal patch, 157 up to 2cms thick. Fire pit 171/173 was taken as a total sample 3083 and charcoal was retrieved by flotation.

Objectives: further excavation at Site C Lower Terrace trench C03/4 in 1994 has confirmed suggestions that deposits here belong to successive short-lived activity at the site. The only datable find associated with 171/173 was a sherd of probable Roman glass. Ephemeral structural features excavated below 231 (*see* above) suggest activity of an earlier period than previously thought at Tintagel Castle.

Calibrated date: *1σ:* cal AD 420–535
2σ: cal AD 405–540

Final comment: C Morris and R Harry (1997), the sample dated to the late Roman to post-Roman period, suggesting that the sherd of glass was already of some antiquity when deposited at the site.

Uxbridge: Three Ways Wharf, Greater London

Location: TQ 05258460
Lat. 51.33.00 N; Long. 00.28.55 W

Project manager: J Lewis (Museum of London Archaeology Service), 1986-90

Archival body: Museum of London

Description: Uxbridge is situated at the north-western periphery of Greater London. The site at Three Ways Wharf lies on a low-lying part of the floodplain of the river Colne, and produced a total of five *in situ* lithic and faunal scatters. These provide some of the most important evidence in Britain for hunter-gatherer activity and cultural life during the late Devensian and Early Flandrian periods.

Objectives: to provide a chronology for the human activities and subsistence strategies evidenced by the lithic and faunal scatters at the site, which may have implications for changing social structure in communities at the glacial/post-glacial transition.

Final comment: J Lewis and J Rackham (2011), the three results obtained from red and roe deer remains in scatter C west are statistically consistent (T'=0.5; T'(5%)=6.0; ν=2; Ward and Wilson 1978). This scatter may have been the product of a single short phase of activity in the middle of the ninth millennium cal BC. Unfortunately, no radiocarbon dates could be obtained from the reindeer fauna, some of which was cut-marked, in scatter C east.Three further radiocarbon measurements, from horse bone which may be associated with scatter A, are also available from this site (Hedges *et al* 1990; Lewis and Rackham 2011, 17).

References: Hedges *et al* 1990
Lewis *et al* 1992
Lewis 1991
Lewis 2000
Lewis and Rackham 2011
Ward and Wilson 1978

OxA–5557 9280 ±110 BP

$\delta^{13}C$: -21.4‰

Sample: FB 1930/FB 1790, submitted on 8 February 1995 by J Rackham

Material: animal bone: *Cervus elaphus*, teeth (J Rackham 1988)

Initial comment: a red deer mandible collected from layer 343 E15 N02 quadrant C, spit 3, in close association with Mesolithic flint debris and many other red deer bones. Layer 343 constitutes an old ground surface subsequently covered in the Mesolithic by alluvial sediments and sealed.

Objectives: the association between the bone debris and the flint debris on the site is very close. The flint debris in this area is typologically early Mesolithic. An absolute date is important for a consideration of this within the wider British context and would permit comparison of this site with other assemblages (flint and bone) at this site with Star Carr, Thatcham, and some European examples.

Calibrated date: *1σ:* 8700–8310 cal BC
2σ: 8800–8270 cal BC

Final comment: J Lewis and J Rackham (2011), this measurement was produced by bulking the collagen extracted from the teeth present in this mandible.

OxA–5558 9265 ±80 BP

δ¹³C: -23.0‰

Sample: FB 587/FB 588/FB 67, submitted on 8 February 1995 by J Rackham

Material: animal bone: *Capreolus capreolus*, mandibular teeth (J Rackham 1988)

Initial comment: teeth from a single roe deer mandible collected from layers 401 and 343, squares E16 N06 and E16 N0,7 in close association with Mesolithic flint debris and many bones of red deer and other roe deer bones. Layer 343 constitutes an old ground surface (layer 401 is below 343) subsequently covered in the Mesolithic period by alluvial sediments and sealed.

Objectives: the association between the bone debris and the flint debris on the site is very close. The flint debris in this northern area of the excavated trench is possibly a little different from that in the central area. An absolute date should assist in the consideration of whether the two areas are contemporary and both red and roe deer are present and being utilised at the same time.

Calibrated date: *1σ:* 8630–8330 cal BC
2σ: 8730–8290 cal BC

Final comment: see OxA-5557

OxA–5559 9200 ±75 BP

δ¹³C: -21.3‰

Sample: FB 280/FB 281/FB 282, submitted on 15 March 1995 by J Rackham

Material: animal bone: *Cervus elaphus*, maxillary teeth (J Rackham 1988)

Initial comment: the sample is a group of teeth derived from the same jaw and recovered in later 343, square E16 N01, quadrant A, spit 3. The specimens are associated with a disused scatter of flints of early Mesolithic character and other bones of red deer and roe deer. Layer 343 constitutes an old ground surface.

Objectives: two other samples have been submitted for dating that are associated with the flint and bone scatters in this part of the site. This sample derives from a second red deer individual and will increase the chances of obtaining a date from the site, and permit some slight refinement of the date of the site.

Calibrated date: *1σ:* 8550–8290 cal BC
2σ: 8630–8270 cal BC

Final comment: see OxA-5557

Wallingford Bypass: Bradford's Brook, Oxfordshire

Location: SU 59508880
Lat. 51.35.40 N; Long. 01.08.27 W

Project manager: A Barclay (Oxford Archaeological Unit), 1991

Archival body: Oxford Archaeology

Description: a multi-period settlement, consisting of pits, a waterhole, postholes, gullies, and field systems, was identified at Bradford's Brook, Cholsey. The main periods represented were late Bronze Age and Romano-British, while a small quantity of Saxon pottery indicated limited Saxon activity.

Objectives: to date the period of primary use and to date secondary activity at the waterhole.

Final comment: (16 March 2010), a large pit containing late Bronze Age pottery, a cattle skull, waterlogged wood and plant remains, a complete loomweight, and flint flakes was interpreted as a waterhole. The radiocarbon dates confirm the waterhole was in use for a long period of time.

References: Cromarty *et al* 2006

GU–5712 1950 ±70 BP

δ¹³C: -27.6‰

Sample: CHBB91-7/3, submitted on 8 December 1997 by A Barclay

Material: animal bone: *Bos* sp., skull (A Powell 1997)

Initial comment: the cattle skull had been placed within the middle, silty fill of the waterhole, and some 0.5–1.0m above a deposit of waterlogged wood.

Objectives: a radiocarbon determination for this sample should provide a date for the subsequent blocking of the waterhole. The date is expected to fall towards the end of the late Bronze Age, but could be later. Elsewhere within the Upper Thames Valley there are examples of waterholes being blocked in the late Bronze age/early Iron Age (eg Mount Farm and Eight Acre Field, Radley). Such a date would correspond with widescale changes in landscape use and social organisation.

Calibrated date: *1σ:* 40 cal BC–cal AD 130
2σ: 110 cal BC–cal AD 240

Final comment: A Barclay (2006), the cattle skull is of late Iron Age or Roman date. This is considerably later than expected and suggested that the waterhole remained as a depression in the ground for a considerable period. On archaeological grounds we suggest that a placed cattle skull is more likely to fall in the earlier part of the calibrated date range.

GU–5713 3260 ±70 BP

δ¹³C: -26.2‰

Sample: CHBB91-7/5(i), submitted on 8 December 1997 by A Barclay

Material: wood (waterlogged): Pomoideae, roundwood (M Taylor and R Gale 1998)

Initial comment: the wood deposit at the bottom of the waterhole consisted of six roundwood logs and two pieces of timber. This material was waterlogged and preserved within the basal fill of silty clay. There are other environmental remains (invertebrates and plant remains) from this layer although these are still to be analysed.

Objectives: a radiocarbon determination for this sample should provide a date when the waterhole was open. It should be broadly contemporary with the settlement evidence found elsewhere along the Bradford's Brook section of the Wallingford Bypass. The date is expected to confirm this feature as later Bronze Age. The date will enable direct comparisons to be made between the already dated environmental sequence from Whitecross Farm with the waterhole (in other words the 'island' site with one from the gravel terrace). Mark Robinson has indicated that the plant remain samples are very similar, although this awaits full analysis.

Calibrated date: *1σ:* 1630–1440 cal BC
2σ: 1730–1400 cal BC

Final comment: A Bayliss and A Barclay (2006), two pieces of wood from the bottom of the waterhole gave radiocarbon results which are statistically significantly different (T′=5.2;T′(5%)=3.8; *v*=1; Ward and Wilson 1978). Since the feature was probably middle Bronze Age, the dating for the waterhole agrees well with the recovery of a complete cylindrical loomweight from its lowest fill. From these dates the environmental sequence from this deposit can be shown to be earlier than the environmental evidence from Whitecross Farm.

References: Ward and Wilson 1978

GU–5714 3050 ±60 BP

δ¹³C: -25.3‰

Sample: CHBB91-7/5(ii), submitted on 8 December 1997 by A Barclay

Material: wood (waterlogged): *Sambucus* sp., roundwood; no bark, *c* 20 rings, outer sapwood (<10 years old) was removed for dating (M Taylor and R Gale 1998)

Initial comment: as GU-5713

Objectives: as GU-5713

Calibrated date: *1σ:* 1410–1210 cal BC
2σ: 1440–1120 cal BC

Final comment: see GU-5713

Wallingford Bypass: Grim's Ditch, Oxfordshire

Location: SU 607882
Lat. 51.35.20 N; Long. 01.07.25 W

Project manager: G Lambrick (Oxford Archaeological Unit), 1992

Archival body: Oxford Archaeology

Description: the bank of the Grim's Ditch earthwork was found to have preserved evidence of earlier settlement, dating to the Neolithic and Bronze Age, and a sequence of cultivation, including ard marks and 'cord-rig' cultivation ridges.

Objectives: to date the settlement beneath the earthwork bank and to date the construction and primary use of the earthwork.

Final comment: A Barclay (2005), pottery and radiocarbon analysis has dated the earthwork to the end of the late Iron Age or the early Roman period.

References: Cromarty *et al* 2006

OxA–7173 3765 ±40 BP

δ¹³C: -26.8‰

Sample: WBP2-133(i), submitted on 1 March 1997 by A Barclay

Material: plant macrofossils (indeterminate charred cereal remains) (M Robinson 1997)

Initial comment: the fill of the posthole was hand collected and processed for environmental remains. The posthole is one of a cluster, possibly related to a structure, sealed by the Grim's Ditch earthwork. Other structures include a possible small oval house, fencelines, four- and six-post granaries and the fragmentary remains of other houses. The identification of emmer wheat and the character of some of these structures indicated a probable later Bronze Age date and this accords well with a scatter of later Bronze age pottery also sealed by the earthwork.

Objectives: one or more radiocarbon determinations for this sample should provide a date for the structure and, by association, the settlement sealed beneath the Grim's Ditch earthwork. The date is expected to confirm the settlement as later Bronze Age and analysis of the pottery fabrics suggest that this maybe early within the sequence, perhaps pre-dating the high status site on the adjacent eyot.

Calibrated date: *1σ:* 2280–2130 cal BC
2σ: 2300–2030 cal BC

Final comment: A Bayliss and A Barclay (2005), the structures beneath the bank of Grim's Ditch are thought to be late Bronze Age date because of the six-post structure. The two radiocarbon results are not from this structure but from a cluster of postholes (D) to the east in Area A. These two results are statistically significantly different at 96% confidence (T′=9.6; T′(5%)=3.8; *v*=1; Ward and Wilson 1978), and so we feel they are likely to represent residual material in a late Bronze Age posthole. Stratigraphically earlier activity consisted of ard-marks and cultivation soils, and scattering of late Neolithic/early Bronze Age ceramics and flintwork was recovered form later cultivation horizons. However, the possibility does remain that this cluster of postholes is really of late Neolithic date.

Laboratory comment: ORAU (17 October 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Ward and Wilson 1978

OxA–7174 3600 ±35 BP

$\delta^{13}C$: -24.2‰

Sample: WBP2-133(ii), submitted on 1 March 1997 by A Barclay

Material: plant macrofossils (charred Emmer wheat) (M Robinson 1997)

Initial comment: as OxA-7173

Objectives: as OxA-7173

Calibrated date: *1σ:* 2020–1900 cal BC
2σ: 2040–1880 cal BC

Final comment: see OxA-7173

Laboratory comment: ORAU (17 October 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7175 1755 ±35 BP

$\delta^{13}C$: -20.3‰

Sample: WBP1-325/328, submitted on 1 March 1997 by A Barclay

Material: animal bone: *Canis* sp., dog (K Clark 1997)

Initial comment: the animal bone was collected by hand excavation from two fills from the base of the Grim's Ditch. There is a possibility that the ditch was recut between the deposition of the two fills, although this is not certain and alternatively the silting pattern may represent slumping. The animal bone consists of skull and jaw fragments that are very likely to have come from the same individual. This argues against the possibility of the material having be redeposited into the fill of the ditch. The occurrence of bone on both sides of the recut may indicate that the deposit was disturbed. A large fragment of Roman tile (imbrex) was recovered from near the bottom of layer 328 during environmental sampling. This layer is stratified above 325 and assuming the ditch was never cleaned out the tile must have entered the ditch not long after construction. It is not possible to give a precise date for this tile, although it is not going to be earlier than late first century AD. Environmental evidence (mollusca) indicate that conditions within the ditch were relatively dry with the possibility of some stagnant water.

Objectives: one or more radiocarbon determinations on the dog remains from near the bottom of the ditch should provide an approximate date for the construction and primary use of this earthwork. Current thinking suggests that the Grim's Ditch earthwork should be of late Iron Age date and a similar date is expected for the dog remains. A date or the earthwork construction will also provide a *terminus ante quem* for a series of cultivation ridges immediately buried beneath the earthwork bank.

Calibrated date: *1σ:* cal AD 230–340
2σ: cal AD 170–390

Final comment: A Bayliss and A Barclay (2005), the bank of Grim's Ditch sealed a cultivation horizon which contained later Iron Age pottery. This provides a more useful *terminus post quem* than the dates on the cereals. OxA-7175 provides a *terminus ante quem* for the construction because the dog remains, although recovered disarticulated were probably originally an articulated burial deposit which had been placed near the bottom of the ditch. Therefore, all we can say about the chronology of Grim's Ditch is that it was originally constructed in the later Iron Age or Roman period, and was recut at some point after the dog burial.

West Wansdyke: Binces Lane West, Avon

Location: ST 682636
Lat. 51.22.12 N; Long. 02.27.25 W

Project manager: A Young (Avon Archaeological Unit), 1995

Archival body: Avon Archaeological Unit

Description: an evaluation site adjacent to Stantonbury Hillfort.

Objectives: due to the absence of artefactual dating evidence, this is the only way of dating the site.

Final comment: J Erskine (3 January 2003), the specific objectives were not realised.

References: Gardiner 1998

OxA–6407 3100 ±40 BP

$\delta^{13}C$: -21.3‰

Sample: 10733: 400, submitted in February 1996 by A Young

Material: animal bone: *Ovis* sp., sheep metacarpal (S Davis 1996)

Initial comment: the object was recovered from a ditch fill located along the south side of the dyke. The ditch fill was homogenous although the deposit was not deep. At this location the ditch is considered to form part of the dyke at a terminal.

Objectives: the object is suggested to represent part of a digging tool - given the nature of the dyke and ditches it may represent a discarded construction tool. It is suggested that a tool formed for construction would have utilised recent/fresh bone. The object may therefore provide a relatively accurate date for the construction of the dyke at this point.

Calibrated date: *1σ:* 1430–1300 cal BC
2σ: 1450–1260 cal BC

Final comment: J Erskine (3 January 2003), the single date for an artefact from Binces lane proved unfortunately not relevant to the specific Wansdyke project questions/objectives, as there appears to be no evidence that the monument is other than post-Roman. This must represent a residual item eroded into the ditch fill after abandonment. This movement of the artefact may have been caused by either natural or agricultural processes in the early medieval period. However, on a wider perspective, this item could represent an object associated with the early occupation of the closely adjacent Stantonbury Hillfort, which has not been closely studied.

West Wansdyke: Blackrock Lane, Avon

Location: ST 620653
Lat. 51.23.06 N; Long. 02.32.46 W

Project manager: A Young (Avon Archaeological Unit)

Archival body: Avon Archaeological Unit

Description: the excavations at this site revealed a deep ditch and a complex and relatively undisturbed bank sequence, which had a foundation trench on the north side. This evidence strongly suggests (for the first time) that, at least at Blackrock and Compton Dando, the north face of the bank was revetted, and by implication possibly functioned as a military structure.

Objectives: due to the absence of artefactual dating evidence, this is the only way of dating the site.

Final comment: J Erskine (3 January 2003), the three samples from a pre-bank deposit at Blackrock produced a very consistent series of dates in the eighth century cal BC. This was unfortunately not relevant to the specific Wansdyke Project objectives, as there appears to be no evidence that the monument is other than post-Roman. This series may well be interpreted as representing possibly the use of fire to clear agricultural land adjacent to the Maes Knoll Hill fort, or even a naturally occurring fire within an oak wood, both occurring in the late Bronze Age. This could have implications for the dating of Maes Knoll, which has not been closely studied. This date was in a series of three, consistent both in material and dating and must represent a single event. The specific objectives were not realised.

References: Gardiner 1998

OxA–6544 2725 ±45 BP

$\delta^{13}C$: -27.3‰

Sample: 500 to 503, submitted on 20 February 1996 by A Young

Material: charcoal: *Quercus* sp., twig (3–4 years growth), and bark (R Gale 1996)

Initial comment: the material was recovered from a layer of silt/clay sealed beneath deposits forming the Wansdyke bank. The deposit was thin (*c* <0.05m) and of fairly uniform thickness. The carbonised material was spread throughout although some concentrations were noted.

Objectives: on the basis of stratigraphy the deposit (26) is interpreted to represent a pre-bank 'event'. It is suggested that the event may be associated with site clearance and/or the earliest ditch digging/banking. No artefactual evidence was recorded on the site to suggest that the layer reflects earlier (eg Roman) activity. The date may provide a *terminus post quem* for the deposition of the bank material. In the absence of artefactual evidence, radiocarbon dating is the only remaining dating possibility.

Calibrated date: *1σ:* 920–810 cal BC
2σ: 980–800 cal BC

Final comment: J Erskine (3 January 2003), this represents evidence for pre-bank activity of unknown purpose, possibly not human related. The specific objectives were not realised.

OxA–6545 2590 ±40 BP

$\delta^{13}C$: -24.9‰

Sample: 500 to 503, submitted on 20 February 1996 by A Young

Material: charcoal: *Quercus* sp., twig (3–4 years growth), and bark (R Gale 1996)

Initial comment: as OxA-6544

Objectives: as OxA-6544

Calibrated date: *1σ:* 810–770 cal BC
2σ: 820–670 cal BC

Final comment: see OxA-6544

OxA–6546 2530 ±45 BP

$\delta^{13}C$: -28.2‰

Sample: 500 to 503, submitted on 20 February 1996 by A Young

Material: charcoal: *Quercus* sp., twig (3–4 years growth), and bark (R Gale 1996)

Initial comment: as OxA-6544

Objectives: as OxA-6544

Calibrated date: *1σ:* 800–550 cal BC
2σ: 810–510 cal BC

Final comment: see OxA-6544

Westhampnett, West Sussex

Location: SU 877054
Lat. 50.50.27 N; Long. 00.45.15 W

Project manager: M Allen (Wessex Archaeology), 1992

Archival body: Wessex Archaeology

Description: the 2km long route of the A27 Westhampnett bypass has proved exceptionally rich in archaeological remains. No fewer than five sites were revealed by an archaeological evaluation carried out in November 1991, and these sites were subsequently excavated in 1992 in advance of road construction. The radiocarbon determinations range over a period of 11,000 years with results in the late Quaternary time span to the middle Bronze Age.

Objectives: to provide a chronological framework for the development and use of this part of the Chichester floodplain.

Final comment: M Allen (2003), as a whole this group of results indicates the surprising longevity (albeit non continuous) of the archaeological occupation of the same location on the West Sussex Coastal Plain. Perhaps the most significant is the presence of an Allerød phase buried soil from which both the radiocarbon and palaeo-environmental results accord well with other sites in southern England. This is one of the first dated occurrences of Allerød phase buried soils and palaeo-environment data from non-chalkland contexts. This evidence enhances our understanding of both the archaeology and quaternary science.

Laboratory comment: English Heritage (16 June 2012), 13 further dates were funded prior to 1994 and were published in Bayliss *et al* (2013, 216–9; GU-5307–8, -5310, and OxA-4166-75).

References: Bayliss *et al* 2013, 216–9
Fitzpatrick *et al* 2008
Wessex Archaeology 1992

AA–11769 10870 ±80 BP

δ¹³C: -26.8‰

Sample: (W474) 39061, submitted on 4 March 1993 by M Allen

Material: charcoal: Rosaceae; *Betula* sp. (R Gale 1993)

Initial comment: from context 30353; a sealed palaeosol above cryoturbations and sealed by non organic calcareous marls up to 0.98m thick. The palaeosol is an immature ranker with charcoal and flints (pollen of oak and pine).

Objectives: to date the burning episode which is presumed to be anthropogenic and associated with a single struck flint. The date will provide a chronological framework for human activity and environmental evidence - mollusca, pollen, charcoal, and soil micromorphology.

Calibrated date: *1σ:* 10840–10750 cal BC
2σ: 10940–10730 cal BC

Final comment: M Allen (2003), the three radiocarbon determinations from charcoal within the Allerød phase soil form a consistent group (with OxA-4167; 10840 ±100 BP and OxA-4166; 10880 ±110 BP (Bayliss *et al* 2013, 216–9), suggesting that the soil was formed in the first half of the eleventh millennium cal BC (ie between *c* 11,000 and *c* 10,500 cal BC).These dates also fit well into the existing dates for buried soils as reviewed by Preece (1994).

References: Preece 1994

AA–11770 8620 ±105 BP

δ¹³C: -29.1‰

Sample: (W474) 39053, submitted on 4 March 1993 by M Allen

Material: peat (humic acid) (R MacPhail 1993)

Initial comment: from context 30353; *see* AA-11769.

Objectives: to provide a date for the soil formation as well as anthropogenic activity to compare with the environmental evidence.

Calibrated date: *1σ:* 7740–7570 cal BC
2σ: 7960–7510 cal BC

Final comment: M Allen (2003), AA-11770 is statistically significantly different from GU-5310 (9210 ±90 BP; 8700–8260 cal BC at 95% confidence; Reimer *et al* 2004), although they are both dates on the humic acid fraction of the same palaeosol. Both results are significantly younger than the determinations on fragments of charcoal from the same soil (OxA-4167; 10840 ±100 BP (11,000–10,600 cal BC at 95% confidence; Reimer *et al* 2004) and OxA-4166; 10880 ±110 BP (11,200–10,600 cal BC at 95% confidence; Reimer *et al* 2004), and AA-11769). This may be explained by the migration downwards of younger humic acids (Dresser 1970). Although Shore (1988) found no significant systematic difference between dates on the humic acid and 'humin' fractions of acid peats, humic acids are soluble in alkaline environments. The pH of the Allerød soil is 8.0-8.2. A small degree of penetration by younger material would make a relatively large difference to the results because the radiocarbon concentrations in samples of late glacial date are very low. It is worth noting however, that these two results are remarkably close to the spread of the dates from the Mesolithic contexts (OxA-4168; 9120 ±90 BP (8570–8220 cal BC at 95% confidence; Reimer *et al* 2004); OxA-4170; 8880 ±100 BP (8290–7610 cal BC at 95% confidence; Reimer *et al* 2004), and OxA-4171; 8300 ±90 BP (7550–7070 cal BC at 95% confidence; Reimer *et al* 2004)). Whether this is fortuitous, or is coincidental with warmer temperatures in the early post glacial, and represents renewed pedogenesis, the humic acids from which migrated downwards into the older soil, is undetermined.

Laboratory comment: SURRC (1993): the humic acid fraction of this sample was dated.

References: Dresser 1970
Reimer *et al* 2004
Shore 1988

Wharram Percy, North Yorkshire

Location: SE 858642
Lat. 54.03.59 N; Long. 00.41.20 W

Project manager: J G Hurst (West Yorkshire Archaeology Service), 1960–70, 1972–8, 1981, 1983–5, and 1990

Description: Wharram Percy lies near the north-west scarp of the Yorkshire Wolds, about half-way between York and Scarborough and 10km (7 miles) from the Roman and medieval town of Malton. The main earthworks of the village are situated on the chalk plateau at about 150m above sea level; in the valley is the church of St Martin and the site of the medieval fishpond.

Objectives: the principal objectives of radiocarbon dating at Wharram Percy were to discover whether the phasing sequences proposed for the burials in different areas of the cemetery have chronological integrity, and to put absolute dating onto the phasing structure, and to determine the date of grain processing around the pond.

Final comment: S Wrathmell (6 December 2006), the two areas of greatest chronological uncertainty in the Wharram excavation project were the dating of grain processing activity in the vicinity of the pond, and the phases of burial activity in the churchyard. The radiocarbon dating programme has been successful in establishing chronologies for both. For the churchyard, it underpins a nationally important study of the skeletal material by Simon Mays.

References: Bell and Beresford 1987
Hayfield 1987
Jordan *et al* 1994, 208–9
Mays *et al* 2007
Stamper and Croft 2000
Treen and Atkin 2005

Wharram Percy: cemetery (Glebe), North Yorkshire

Location: SE 858642
Lat. 54.03.59 N; Long. 00.41.20 W

Project manager: C Harding and J Hurst (Medieval Village Research Group), 1972–8

Archival body: English Heritage

Description: Site 26 (the Glebe area), containing 125 burials, was excavated between 1972 and 1978. Bone from 118 of these burials survives, including one Iron Age flexed burial (Burial G305; HAR-2208), published in Jordan *et al* 1994, 208 (Mays *et al* 2007, 211).

Objectives: to understand the development of the cemetery, and to contribute to the research aims for the study of the human bones (Mays *et al* 2007, 197).

Final comment: C Harding and A Bayliss (2007), overall the burials in site 26 are well-dated. All those in period 3, phase 1, and some of those in period 3, phase 3, may be pre-Conquest as the probability that the boundary between them lies *before AD 1066 is 67%.* The burials from the other phases are high medieval, however, but almost certainly pre-date the Black Death (*more than 95% probability*) (Mays *et al* 2007, 212).

References: Jordan *et al* 1994
Mays *et al* 2007

GU–5537 910 ±50 BP

$\delta^{13}C$: -21.4‰

Sample: 26-582, submitted in February 1995 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended east-west inhumation at the south-east corner; sealed by 528 (GU-5548), but sealing burials 750 and 604 (GU-5556 and GU-5558). 80%+ of the skeleton and 80% of the skull was recovered from a depth of *c* 1.52m.

Objectives: this date, together with others in this series, will be useful for the comparative osteological sequence and for establishing the chronology of the church and its development, particularly because of its stratigraphic links to others in the series.

Calibrated date: *1σ:* cal AD 1030–1210
2σ: cal AD 1020–1230

Final comment: C Harding and A Bayliss (2007), the radiocaron dates indicated that the latest burials from period 3 were dated to *cal AD 1040–1130 (95% probability; GU-5537, GU-5539, GU-5540, GU-5541)* (Mays *et al* 2007, 61)

References: Mays *et al* 2007, 61

GU–5538 830 ±50 BP

$\delta^{13}C$: -21.3‰

Sample: 26-571, submitted in February 1995 by A Clark

Material: human bone (right femur) (S Mays)

Initial comment: an extended east-west inhumation at the northern edge of the burial zone. 80%+ of the skeleton and 80% of the skull was recovered at a depth of *c* 1.04m.

Objectives: to establish the period of maximum use of the graveyard and be useful for the comparative osteological sequence.

Calibrated date: *1σ:* cal AD 1160–1270
2σ: cal AD 1040–1280

Final comment: C Harding and A Bayliss (2007), the radicarbon date for the burial gave a posterior density estimate at 95% probability of *cal AD 1160–1270* (*95% probability*; Mays *et al* 2007, 196, table 117).

GU–5539 930 ±50 BP

$\delta^{13}C$: -21.3‰

Sample: 26-474, submitted in February 1995 by A Clark

Material: human bone (right humerus and left femur) (S Mays)

Initial comment: an extended east-west inhumation towards the centre, and sealed by 478 (GU-5549). 80% of the skeleton and 100% of the skull was recovered from a depth of *c* 1.58m.

Objectives: as GU-5537

Calibrated date: *1σ:* cal AD 1020–1170
2σ: cal AD 1010–1220

Final comment: see GU-5537

GU–5540 870 ±50 BP

$\delta^{13}C$: -21.6‰

Sample: 26-314, submitted in February 1995 by A Clark

Material: human bone (humeri, femora, and tibiae from juvenile) (S Mays)

Initial comment: an extended inhumation from adjacent to the southern edge; sealed by burials 297 and 304 (GU-5546 and GU-5545) and cutting burial 303 (GU-5541). The depth of the burial from the ground surface was *c* 1.07m.

Objectives: one of a group of skeletons from the southern edge (*see* also GU-5541, GU-5545, and GU-5546) submitted to help establish the chronology of the churchyard development with its stratagraphic relationship to others in this series. However, because the skeleton is of a juvenile it will not be part of the comparative osteological sequence.

Calibrated date: *1σ:* cal AD 1050–1230
2σ: cal AD 1020–1270

Final comment: see GU-5537

GU–5541 940 ±50 BP

$\delta^{13}C$: -21.8‰

Sample: 26-303, submitted in February 1995 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended inhumation adjacent to the southern edge, cut by burial 314 (GU-5540). 67% of the skull and 60–80% of the body was recovered at a depth of *c* 1.16m.

Objectives: one of a group of skeletons from the southern edge (*see* also GU-5540, GU-5545, and GU-5546). *See* GU-5537.

Calibrated date: 1σ: cal AD 1020–1170
2σ: cal AD 990–1220

Final comment: see GU-5537

GU–5542 1040 ±50 BP

δ¹³C: -22.5‰

Sample: 26-279, submitted in February 1995 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended east-west inhumation from the latest phase of burial in this part of the north churchyard. 60–80% of the skeleton and 75% of the skull were recovered at a depth of *c* 1.16m.

Objectives: as GU-5537

Calibrated date: 1σ: cal AD 970–1030
2σ: cal AD 890–1150

Final comment: C Harding and A Bayliss (2007), the radiocarbon dates gave a postrerior density estimate for this burial of cal AD 960–1040 (*95% probability; GU-5542*; Mays *et al* 2007; 196, table 117).

GU–5543 810 ±70 BP

δ¹³C: -24.5‰

Sample: 26-275, submitted in February 1995 by A Clark

Material: human bone (left tibia) (S Mays)

Initial comment: an extended east-west inhumation from the latest phase of burial. 80%+ of the skeleton and 80% skull was recovered from a depth of *c* 1.19m.

Objectives: as GU-5537

Calibrated date: 1σ: cal AD 1160–1280
2σ: cal AD 1030–1300

Final comment: C Harding and A Bayliss (2007), the probable date range of the burials within this phase (Period 4, Phase 5) was relatively short, *cal AD 1230–1330 (95% probability; GU-5543)* (Mays *et al* 2007, 45).

GU–5544 930 ±50 BP

δ¹³C: -21.6‰

Sample: 26-265, submitted in February 1995 by A Clark

Material: human bone (left tibia) (S Mays)

Initial comment: from an extended east-west burial from the latest phase of burial. 100% of the skull and 80%+ of the skeleton was recovered from a depth of *c* 1.07m.

Objectives: as GU-5537

Calibrated date: 1σ: cal AD 1020–1170
2σ: cal AD 1010–1220

Final comment: C Harding and A Bayliss (2007), the radiocarbon dates gave a posterior density estimate for this burial (at *95% probability*) of *cal AD 1140–1250* (*GU-5544*; Mays *et al* 2007, 196, table 117).

GU–5545 1080 ±50 BP

δ¹³C: -21.6‰

Sample: 26-304, submitted in February 1995 by A Clark

Material: human bone (humeri, tibiae, and femora from juvenile) (S Mays)

Initial comment: an extended inhumation adjacent to the southern edge. It sealed burial 314 (GU-5540), and was at a depth of *c* 1.19m.

Objectives: from a group at southern area (*see* also GU-5540, GU-5541, and GU-5546). This skeleton is a juvenile so is not part of the comparative osteological sequence. Its dating will be useful for the establishing of the chronological development of the churchyard, with its stratigraphic relationship to others in this series.

Calibrated date: 1σ: cal AD 890–1020
2σ: cal AD 780–1030

Final comment: C Harding and A Bayliss (2007), *see* the radiocarbon dates gave a posterior density estimate for this burial of *cal AD 990–1030 (95% probability*; *GU-5545*; Mays *et al* 2007, 196, table 117).

GU–5546 930 ±70 BP

δ¹³C: -20.9‰

Sample: 26-297, submitted in February 1995 by A Clark

Material: human bone (right tibia) (S Mays)

Initial comment: an extended inhumation adjacent to the southern edge, sealing burial 314 (GU-5540). 100% of the skull and 80%+ of the skeleton was recovered from a depth of *c* 1.07m.

Objectives: one of a group at the southern edge (*see* also GU-5540, GU-5541, and GU-5545). Its dating will be useful for the comparative osteological sequence and for establishing the chronology of the churchyard development.

Calibrated date: 1σ: cal AD 1020–1190
2σ: cal AD 980–1260

Final comment: C Harding and A Bayliss (2007), the radiocarbon dates gave a posterior density estimate at *95% probability* for this burial of *cal AD 1140–1260* (*GU-5546, GU-5547;* Mays *et al* 2007, 196, table 117).

GU–5547 920 ±60 BP

δ¹³C: -20.7‰

Sample: 26-278, submitted in February 1995 by A Clark

Material: human bone (right femur) (S Mays)

Initial comment: an extended east-west inhumation at the western edge. 80% of the skeleton was recovered at a depth of *c* 1.10m. There is no surviving skull.

Objectives: a date will be useful for establishing the chronology of development of the graveyard.

Calibrated date: *1σ:* cal AD 1020–1210
2σ: cal AD 990–1260

Final comment: see GU-5546

GU–5548 890 ±50 BP

δ¹³C: -20.8‰

Sample: 26-258, submitted in February 1995 by A Clark

Material: human bone (right tibia and fibula) (S Mays)

Initial comment: an extended inhumation at the south-east corner, sealing burial 582 (GU-5537). 80% of the skeleton and 80% of the skull was recovered from a depth of *c* 1.25m.

Objectives: as GU-5537

Calibrated date: *1σ:* cal AD 1040–1220
2σ: cal AD 1020–1260

Final comment: C Harding and A Bayliss (2007), the radiocarbon dates gave a posterior density estimate at *95% probability* for this burial of *cal AD 1080–1190* (*GU-5548, GU-5550, GU-5551, GU-5552*; Mays *et al* 2007, 196, table 117).

GU–5549 960 ±50 BP

δ¹³C: -22.3‰

Sample: 26-478, submitted in February 1995 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended east-west inhumation towards the centre, sealing burial 474 (GU-5539). 80% of the skull, and 80%+ of the body was recovered from a depth of *c* 1.31m.

Objectives: as GU-5537

Calibrated date: *1σ:* cal AD 1020–1160
2σ: cal AD 980–1210

Final comment: C Harding and A Bayliss (2007), the radiocarbon dates gave a posterior density estimate at *95% probability* for this burial of *cal AD 1080–1180* (*GU-5549*; Mays *et al* 2007, 196, table 117).

GU–5550 930 ±50 BP

δ¹³C: -22.7‰

Sample: 26-462, submitted in February 1995 by A Clark

Material: human bone (left tibia) (S Mays)

Initial comment: an extended east-west inhumation. 80% of the skull and body was recovered from a depth of *c* 1.34m.

Objectives: as GU-5537

Calibrated date: *1σ:* cal AD 1020–1170
2σ: cal AD 1010–1220

Final comment: see GU-5548

GU–5551 940 ±70 BP

δ¹³C: -20.6‰

Sample: 26-451, submitted in February 1995 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: extended east-west inhumation from the northern edge. 60–80% of the skeleton, and 75% of the skull was recovered from a depth of *c* 1.13m.

Objectives: to establish the period of maximum use of the graveyard and for the comparative osteological sequence.

Calibrated date: *1σ:* cal AD 1020–1170
2σ: cal AD 980–1260

Final comment: see GU-5548

GU–5552 900 ±50 BP

δ¹³C: -21.0‰

Sample: 26-385, submitted in February 1995 by A Clark

Material: human bone (right humerus, left tibia, and fibula) (S Mays)

Initial comment: an extended east-west inhumation from the centre. 80% of the skull and body was recovered from a depth of *c* 1.14m.

Objectives: as GU-5537

Calibrated date: *1σ:* cal AD 1030–1220
2σ: cal AD 1020–1260

Final comment: see GU-5548

GU–5553 760 ±60 BP

δ¹³C: -22.3‰

Sample: 26-361, submitted in February 1995 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended east-west inhumation at the western edge of the burial zone. 80% of the skeleton and 67% of the skull was recovered from a depth of *c* 1.19m.

Objectives: as GU-5537

Calibrated date: *1σ:* cal AD 1220–1290
2σ: cal AD 1160–1390

Final comment: C Harding and A Bayliss (2007), the radiocarbon dates gave a posterior density estimate at *95% probability* for this burial of *cal AD 1170–1290* (*GU-5533*; Mays *et al* 2007, 196, table 117).

GU–5554 950 ±50 BP

δ¹³C: -21.5‰

Sample: 26-601, submitted in February 1995 by A Clark

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

Initial comment: an extended east-west inhumation at the south-east corner, from the earliest phase of the burial. 80% of the skeleton and skull was recovered from a depth of *c* 1.4m. The burial was cut by burial 604 (GU-5558).

Objectives: as GU-5537

Calibrated date: *1σ:* cal AD 1020–1160
2σ: cal AD 990–1220

Final comment: C Harding and A Bayliss (2007), the radiocarbon dates gave a posterior density estimate at *95% probability* for this burial of *cal AD 980–1080* (*GU-5554*; Mays *et al* 2007, 196, table 117).

GU–5555 900 ±60 BP

δ¹³C: -21.4‰

Sample: 26-760, submitted in February 1995 by A Clark

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

Initial comment: an extended east-west inhumation from the earliest phase. 80% of the skeleton and 67% of the skull was recovered from a depth of *c* 0.94m.

Objectives: as GU-5537

Calibrated date: *1σ:* cal AD 1030–1220
2σ: cal AD 1010–1270

Final comment: C Harding and A Bayliss (2007), the radiocarbon dates gave a posterior density estimate at *95% probability* for this burial of *cal AD 990–1080* (*GU-5555*; Mays *et al* 2007, 196, table 117).

GU–5556 1000 ±50 BP

δ¹³C: -20.0‰

Sample: 26-750, submitted in February 1995 by A Clark

Material: human bone (left rib, left and right ulnae, and right radius) (S Mays)

Initial comment: an extended east-west inhumation from the earliest phase. 60–80% of the skeleton (no skull) was recovered from a depth of *c* 1.37m. It was sealed by burial 582 (GU-5537).

Objectives: as GU-5537

Calibrated date: *1σ:* cal AD 990–1120
2σ: cal AD 900–1160

Final comment: C Harding and A Bayliss (2007), the radiocarbon dates gave a posterior density estimate at *95% probability* for this burial of *cal AD 970–1070* (*GU-5556;* Mays *et al* 2007, 196, table 117).

GU–5557 770 ±50 BP

δ¹³C: -21.1‰

Sample: 26-652, submitted in February 1995 by A Clark

Material: human bone (right femur) (S Mays)

Initial comment: an extended inhumation from the earliest phase. 80% of the skeleton and skull was recovered from a depth of *c* 1.16m.

Objectives: as GU-5537

Calibrated date: *1σ:* cal AD 1220–1280
2σ: cal AD 1160–1300

Final comment: C Harding and A Bayliss (2007), *see* GU-5680 for a blind replicate. The chronological modelling estimates that this burial was made in *cal AD 1180–1270; G652*; Mays *et al* 2007, 196, table 117).

GU–5558 910 ±50 BP

δ¹³C: -20.3‰

Sample: 26-604, submitted in February 1995 by A Clark

Material: human bone (right femur) (S Mays)

Initial comment: an extended east-west inhumation from the south-east corner. 60-80% of the skeleton and 80% of the skull was recovered from a depth of *c* 1.40m. The burial was sealed by burial 582 (GU-5537) and cut burial 601 (GU-5554).

Objectives: as GU-5537

Calibrated date: *1σ:* cal AD 1030–1210
2σ: cal AD 1020–1230

Final comment: C Harding and A Bayliss (2007), the radiocarbon dates gave a posterior density estimate at *95% probability* for this burial of *cal AD 1000–1080* (*GU-5558*; Mays *et al* 2007, 196, table 117).

Wharram Percy: cemetery (nave), North Yorkshire

Location: SE 858642
Lat. 54.03.59 N; Long. 00.41.20 W

Project manager: C Harding and J Hurst (Medieval Village Research Group), 1974

Archival body: English Heritage

Description: the burials in the church nave and chancel were excavated in the 1960s and and 1970s. Burials in the several superimposed chancels were numbered as nave burials and were all prefixed with 'CN' when internal at the time of excavation.

Objectives: these two burials contained no coffin fittings, and appeared to be the stratigraphically earliest burials recovered from the church. They were submitted for dating to determine whether they were the remains of medieval burials which had been almost entirely truncated by later activity.

Final comment: C Heighway (2007), analysis of these results suggests that GU-5575 may be late medieval (the probability that it dates to before AD 1540 is 64%), which supports the hypothesis that two other burials (CN51 and CN52 from which bones do not survive in the archive), which appear to be earlier than the phase II church, are medieval. Despite this the bone assemblage from within the church can be regarded as essentially post-medieval (as demonstrated by GU-5576).

References: Mays *et al* 2007

GU–5575 400 ±50 BP

δ¹³C: -18.4‰

Sample: Nave-1 CN3, submitted on 8 March 1995 by A Clark

Material: human bone (right femur, tibiae, fibulae) (S Mays 1995)

Initial comment: an extended inhumation (north-west to south-east) located in the 1969 excavation and lifted in the 1974 season and originally named burial C. It was cut by burials D and E (CN4 and CN5). Only the legs of the skeleton survived and were recovered from a depth of *c* 0.91m from the surface, the Victorian church floor.

Objectives: although this skeleton is incomplete, its date will be useful for the comparative osteological sequence and the related archaeological sequence. Relative to the structural sequence of the church, its possible date is early fifteenth to mid sixteenth century.

Calibrated date: *1σ:* cal AD 1440–1620
2σ: cal AD 1420–1650

Final comment: C Heighway (2007), this burial dates to phase VIII-IX of the cemetery (Mays *et al* 2007, table 117, fig 124, pl 71–2). Originally the nave burials were all thought to be late medieval or post-medieval. This burial (and CN04) had unusual orientations and were cut by other post-medieval burials; nevertheless these two were early post-medieval in date.

References: Mays *et al* 2001

GU–5576 170 ±50 BP

δ¹³C: -19.9‰

Sample: Nave-1 CN44, submitted on 8 March 1995 by A Clark

Material: human bone (left tibia) (S Mays 1995)

Initial comment: an extended west-east inhumation located in 1970 (burial RR) by the present chancel arch, and lifted in 1974. The burial was probably cut by burial VV (CN 48) and was at a depth of *c* 1.52m from the surface, the Victorian church floor. Only the legs of the skeleton survived.

Objectives: relative to the structural sequence of the church its possible date is early fifteenth to seventeenth century. *See* also GU-5575.

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1640–1955*

Final comment: C Heighway (2007), this burial dates to phase VIII-X of the cemetery (Mays *et al* 2007; table 117, fig 124) and confirms its later post-medieval date.

Wharram Percy: cemetery (north of Church), North Yorkshire

Location: SE 858642
Lat. 54.03.59 N; Long. 00.41.20 W

Project manager: J Hurst and M Beresford (Medieval Village Research Group), 1962–73

Archival body: English Heritage

Description: twelve burials were chosen from the area north of the nave. Several stratigraphic sequences of burials were identified, with burials grouped into five spits by Don Brothwell.

Objectives: to establish the relationship between these spits and the date of the burials.

Final comment: C Harding and A Bayliss (2007), the radiocarbon dating program has shown that the proposed model of the churchyard contraction and expansion was too simplistic. The cemetery population can perhaps be justifiably divided into roughly pre- and post-Conquest groups on the basis of the excavated spits (Mays *et al* 2007, 209).

References: Mays *et al* 2007

GU–5637 1030 ±50 BP

δ¹³C: -22.5‰

Sample: N-Church-1, NA 233, submitted on 29 February 1996 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an east-west extended inhumation with the head to the west, at a depth of *c* 1.22m, in the south-west corner. The burial sealed and cut burial NA215 (GU-5659) and was possibly itself cut by NA199 (GU-5656).

Objectives: to establish the period of use for the south-west corner.

Calibrated date: *1σ:* cal AD 980–1030
2σ: cal AD 890–1160

Final comment: C Harding (13 October 2009), the radiocarbon date has confirmed the stratigraphic relationships that the burial is earlier than burial NA199 (GU-5656), and later than burial NA215 (GU-5659).

GU–5638 930 ±50 BP

δ¹³C: -21.9‰

Sample: N Church-1, NA223, submitted on 29 February 1996 by A Clark

Material: human bone (assorted long bones) (S Mays)

Initial comment: an extended east-west inhumation at a depth of 1.46m. The burial was within the area of the north aisle associated with period VI, and was apparently sealed by burial NA224 (GU-5657), which appears to have been cut by the west wall of the north aisle.

Objectives: to establish the period of use of the north churchyard and provide a comparative check on the construction date of the north aisle.

Calibrated date: *1σ:* cal AD 1020–1170
2σ: cal AD 1010–1220

Final comment: C Harding (13 October 2009), the radiocarbon date indicates that burial NA223 is in fact later than NA224 (GU-5657).

GU–5639 1030 ±50 BP

δ¹³C: -20.6‰

Sample: N Church-1, NA218, submitted on 29 February 1996 by A Clark

Material: human bone (right tibia) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west, at a depth of *c* 1.22m. The burial was located at the south-west corner and was sealed by NA217 (GU-5640).

Objectives: to enhance the osteological sequence and help establish the period of use for the south-west corner of the excavated area.

Calibrated date: *1σ:* cal AD 980–1030
2σ: cal AD 890–1160

Final comment: C Harding (13 October 2009), the radiocarbon dating has confirmed that burial NA218 is earlier than burial NA217 (GU-5640).

GU–5640 700 ±50 BP

δ¹³C: -21.5‰

Sample: N Church-1, NA217, submitted on 29 February 1996 by A Clark

Material: human bone (left tibia) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west, at a depth of *c* 1m. The burial sealed NA218 (GU-5639) and was located at the south-west corner of the cemetery.

Objectives: as GU-5639

Calibrated date: *1σ:* cal AD 1270–1380
2σ: cal AD 1220–1400

Final comment: see GU-5639

GU–5641 990 ±50 BP

δ¹³C: -20.8‰

Sample: N Church-1, NA2, submitted on 29 February 1996 by A Clark

Material: human bone (right femur, tibiae) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west, at a depth of 1.31m. 'Ear-muff' chalk stones were found beside the head. The burial is from an area, which links the main area north of the church with the burials further north on the Glebe terrace (*see* also GU-5642, GU-5643, and GU-5644). The burial cut through the fill of an early churchyard boundary ditch.

Objectives: to enhance the osteological sequence and help establish the period of use of this area of the churchyard and the chronology of expansion and contraction.

Calibrated date: *1σ:* cal AD 990–1150
2σ: cal AD 970–1170

Final comment: C Harding (13 October 2009), the radiocarbon dating confirmed that the burial cuts the north boundary ditch.

GU–5642 840 ±90 BP

δ¹³C: -23.1‰

Sample: N Church-1, NA6, submitted on 29 February 1996 by A Clark

Material: human bone (left humerus and left tibia) (S Mays)

Initial comment: an east-west inhumation with the head to the west, and at a depth of 1.22m. The burial is from the same area as GU-5641, GU-5643, and GU-5644 (*see* GU-5641).

Objectives: as GU-5641

Calibrated date: *1σ:* cal AD 1040–1280
2σ: cal AD 1010–1300

Final comment: see series comments

GU–5643 990 ±60 BP

δ¹³C: -20.3‰

Sample: N Church-1, NA13, submitted on 29 February 1996 by A Clark

Material: human bone (right femur and right humerus) (S Mays)

Initial comment: an east-west inhumation with the head to the west, at a depth of 1.30m. This burial is from the same area as GU-5641, GU-5642, and GU-5644 (*see* GU-4641), and cut through burial NA14 (GU-5644).

Objectives: as GU-5641

Calibrated date: *1σ:* cal AD 990–1160
2σ: cal AD 900–1170

Final comment: C Harding (13 October 2009), the radiocarbon dating has confirmed that the burial is later than burial NA14 (GU-5644).

GU–5644 940 ±70 BP

δ¹³C: -21.9‰

Sample: N Church-1, NA14, submitted on 29 February 1996 by A Clark

Material: human bone (left tibia) (S Mays)

Initial comment: an extended east-west inhumation at a depth of 1.6m. The burial was set in a deep cut or possible cist, and was cut by NA13 (GU-5643). It was from the same area as GU-5641, GU-5642, and GU-5643 (*see* GU-5641).

Objectives: to enhance the osteological sequence and help establish the period of use of this area of the churchyard as this burial is from the earliest level in this zone of the cemetery.

Calibrated date: *1σ:* cal AD 1020–1170
2σ: cal AD 980–1260

Final comment: see GU-5643

GU–5645 1000 ±60 BP

δ¹³C: -22.4‰

Sample: N Church-1, NA46, submitted on 29 February 1996 by A Clark

Material: human bone (femurs) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west, associated with sandstone blocks. The depth of the burial was not recorded, but it was located in the second layer of burial (from the top) in the north-east corner.

Objectives: to enhance the osteological sequence and establish the period of use of the north-east corner.

Calibrated date: *1σ:* cal AD 980–1150
2σ: cal AD 890–1170

Final comment: see series comments

GU–5646 1050 ±50 BP

$\delta^{13}C$: -22.1‰

Sample: N Church-1, NA94, submitted on 29 February 1996 by A Clark

Material: human bone (tibiae) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west, from the central area. The depth was not recorded but it was in the proximity of the earlier probable lime kiln.

Objectives: to enhance the osteological sequence and help establish the period of use of the central area.

Calibrated date: *1σ:* cal AD 960–1030
2σ: cal AD 880–1120

Final comment: C Harding (13 October 2009), the lime kiln or *Grubenhaus* is demonstrably pre-Conquest in date as it is cut by burials NA94 and NA104 (GU-5647 and GU-5681; Mays *et al* 2007, 215).

GU–5647 1150 ±70 BP

$\delta^{13}C$: -21.1‰

Sample: N Church-1, NA104, submitted on 29 February 1996 by A Clark

Material: human bone (left tibia) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west, associated with parts of a shroud. The depth was not recorded but it was in the proximity of the earlier probable lime kiln (as GU-5646) in the central area. *See* also GU-5681 for a replicate measurement.

Objectives: as GU-5646

Calibrated date: *1σ:* cal AD 770–990
2σ: cal AD 680–1030

Final comment: see GU-5646

Laboratory comment: see GU-5681

GU–5648 1020 ±50 BP

$\delta^{13}C$: -20.9‰

Sample: N Church-1, NA112, submitted on 29 February 1996 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west, at a depth of 1.53m. The burial was located in the north-east corner and cut into a probable early medieval ditch.

Objectives: to enhance the osteological sequence, establish the period of use of the north-east corner, and date the disuse of the ditch.

Calibrated date: *1σ:* cal AD 980–1040
2σ: cal AD 890–1160

Final comment: C Harding (13 October 2009), the radiocarbon dating confirms that this burial is later than burial NA146 (GU-5650).

GU–5649 940 ±70 BP

$\delta^{13}C$: -22.0‰

Sample: N Church-1, NA127, submitted on 29 February 1996 by A Clark

Material: human bone (clavicles, ribs, humerus, vertebrae and rib fragments) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west, from the from the latest level of burial in the north-west corner. The depth of the burial was not recorded.

Objectives: to enhance the osteological sequence and help establish the latest period of use in the north-west corner.

Calibrated date: *1σ:* cal AD 1020–1170
2σ: cal AD 980–1260

Final comment: see series comments

GU–5650 1050 ±80 BP

$\delta^{13}C$: -21.5‰

Sample: N Church-1, NA146, submitted on 29 February 1996 by A Clark

Material: human bone (tibiae) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west, at a depth of 1.98m. The burial was sealed by NA112 (GU-5648), and cut into the fill of a probable early medieval ditch at the north-east corner. *See* also GU-5679 below for a replicate measurement.

Objectives: as GU-5648

Calibrated date: *1σ:* cal AD 890–1040
2σ: cal AD 770–1170

Final comment: see GU-5648

Laboratory comment: see GU-5679

GU–5651 750 ±60 BP

$\delta^{13}C$: -20.1‰

Sample: N Church-1, NA167, submitted on 29 February 1996 by A Clark

Material: human bone (tibiae) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west. The burial was located in the central area but the depth was not recorded.

Objectives: as GU-5646

Calibrated date: *1σ:* cal AD 1220–1290
2σ: cal AD 1160–1390

Final comment: C Harding (13 October 2009), the radiocarbon dating confirms that this burial is later than burial NA173 (GU-5653).

GU–5652 1110 ±60 BP

δ¹³C: -20.4‰

Sample: N Church-1, NA170, submitted on 29 February 1996 by A Clark

Material: human bone (ulnae, radius, right femur) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west. The burial was from the earliest identified level of burial in the central area but the depth was not recorded.

Objectives: as GU-5646

Calibrated date: *1σ:* cal AD 880–1000
2σ: cal AD 770–1030

Final comment: see series comments

GU–5653 1040 ±60 BP

δ¹³C: -21.6‰

Sample: N Church-1, NA173, submitted on 29 February 1996 by A Clark

Material: human bone (tibiae) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west. The depth of the burial was not recorded but was identified by the excavator as from the earliest level of burial in the central area.

Objectives: as GU-5646

Calibrated date: *1σ:* cal AD 960–1030
2σ: cal AD 880–1160

Final comment: see GU-5651

GU–5654 750 ±50 BP

δ¹³C: -20.2‰

Sample: N Church-1, NA176, submitted on 29 February 1996 by A Clark

Material: human bone (left tibia) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west. The depth of the burial was not recorded but was located at the north-west corner of the excavated area north of the church.

Objectives: to enhance the osteological sequence and help establish the period of use of the area north of the church.

Calibrated date: *1σ:* cal AD 1240–1290
2σ: cal AD 1200–1380

Final comment: see series comments

GU–5655 860 ±100 BP

δ¹³C: -21.4‰

Sample: N Church-1, NA195, submitted on 29 February 1996 by A Clark

Material: human bone (tibiae) (S Mays)

Initial comment: an extended inhumation with the head to the west. The depth of the burial was not recorded but it was located towards the south west.

Objectives: as GU-5639

Calibrated date: *1σ:* cal AD 1030–1270
2σ: cal AD 980–1300

Final comment: see series comments

GU–5656 660 ±50 BP

δ¹³C: -20.5‰

Sample: N Church-1, NA199, submitted on 29 February 1996 by A Clark

Material: human bone (tibiae and fibulae) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west. The depth of the burial was not recorded but it was located in the second layer from the top, from the west edge of the excavated area. The burial probably cuts NA233 (GU-5637).

Objectives: to establish the period of use for the west edge of the excavated area.

Calibrated date: *1σ:* cal AD 1280–1390
2σ: cal AD 1260–1410

Final comment: see GU-5637

GU–5657 1050 ±50 BP

δ¹³C: -20.3‰

Sample: N Church-1, NA224, submitted on 29 February 1996 by A Clark

Material: human bone (left tibia) (S Mays)

Initial comment: an extended east-west inhumation at a depth of 1.31m within the area of the north aisle (church period VI), and apparently sealed by the west wall of the aisle (early-mid thirteenth century). The burial was sealed by NA223 (GU-5638). *See* GU-5677 below for a replicate measurement on this sample.

Objectives: to provide a comparative check for the construction of the north aisle.

Calibrated date: *1σ:* cal AD 960–1030
2σ: cal AD 880–1120

Final comment: C Harding (13 October 2009), this date has been useful in phasing the church structure; burials NA227 (GU-5658), and burial NA224 (GU-5657 and GU-5677), were cut or sealed by parts of the Phase VI north aisle (Mays *et al* 2007, 209).

Laboratory comment: see GU-5677

GU–5658 950 ±50 BP

δ¹³C: -20.4‰

Sample: N Church-1, NA227, submitted on 29 February 1996 by A Clark

Material: human bone (left humerus, radii, right femur) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west, at a depth of 1.68m. The burial was situated directly beneath the floor of the north aisle (church period VI) constructed in the early-mid thirteenth century and demolished in the late-fifteenth/early sixteenth century.

Objectives: to enhance the osteological sequence and provide a useful comparative check with GU-5657 for the date of the north aisle.

Calibrated date: *1σ:* cal AD 1020–1160
2σ: cal AD 990–1220

Final comment: see GU-5657

GU–5659 1150 ±70 BP

δ¹³C: -21.1‰

Sample: N Church-1, NA215, submitted on 29 February 1996 by A Clark

Material: human bone (right tibia, right ulna, left fibula) (S Mays)

Initial comment: an extended east-west inhumation with the head to the west, at a depth of *c* 1.14m. This burial was sealed/cut by NA233 (GU-5637) and located at the south-west corner.

Objectives: to establish the period use for the south-west corner of the excavated area.

Calibrated date: *1σ:* cal AD 770–990
2σ: cal AD 680–1030

Final comment: see GU-5637

Wharram Percy: cemetery (replicates), North Yorkshire

Location: SE 858642
Lat. 54.03.59 N; Long. 00.41.20 W

Project manager: Various (Medieval Village Research Group), 1950–90

Archival body: English Heritage

Description: eight samples were submitted to SURRC as blind replicates. The samples were labelled as 'Sample 1, Sample 2, etc' and the india ink markings on the bone blacked in. The laboratory was told that the samples were replicates of those already measured, but given no indication of which skeletons were represented.

Objectives: samples were not chosen for replication randomly, four were selected because the original measurements were in disagreement witht the recorded or inferred stratigraphy and/or phasing; the other four were selected because they were amongst the earliest skeletons from the site and so the additional precision provided by replication would contribute to estimating the date when the churchyard was established. This replication programme thus has a wider range of objectives than simple quality-assurance.

Final comment: A Bayliss (2014), replicate sample 1 (NA 215; GU-5659) failed to produce a result. Six of the replicate pairs that were completed are statistically consistent at 95% confidence, and the other is at 99% confidence (*see* below). This is in line with statistical expectation.

GU–5677 1020 ±50 BP

δ¹³C: -20.1‰

Sample: Replicate sample 2, submitted on 3 December 1996 by A Clark

Material: human bone (burial NA224, right femur) (S Mays)

Initial comment: a replicate of GU-5657. This sample was resubmitted because the previous measurement (GU-5657) is in significant statistical disagreement with GU-5638 (NA223) which it should post-date. GU-5657 is also in disagreement with the date of the Phase VI church (estimated from the radiocarbon results of other burials with which it has a stratigraphic relationship), which it should pre-date. This suggests that GU-5657, rather than GU-5638, may be anomalous.

Objectives: as GU-5657

Calibrated date: *1σ:* cal AD 980–1040
2σ: cal AD 890–1160

Final comment: see GU-5657

Laboratory comment: English Heritage (2014), 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 (1035 ±35 BP). The consistency of results suggests that it is the stratigraphic recording of this burial that may be in error, rather than the radiocarbon dates.

References: Ward and Wilson 1978

GU–5678 810 ±50 BP

δ¹³C: -19.6‰

Sample: Replicate sample 3, submitted on 3 December 1996 by A Clark

Material: human bone (burial WCO162, left tibia and fibula) (S Mays)

Initial comment: a replicate of GU-5517. Two samples WCO 118 and WCO 162 were resubmitted because of the results of GU-5503 and GU-5517 which are in significant statistical disagreement with their relative dating, evidenced by the recorded stratigraphy. Re-examination of the primary records suggests that the original interpretation of the stratigraphy is correct.

Objectives: as GU-5517

Calibrated date: *1σ:* cal AD 1180–1270
2σ: cal AD 1050–1290

Final comment: see GU-5517

Laboratory comment: English Heritage (2014), the two results on this skeleton are statistically consistent (T′=0.3; T′(5%)=3.8; v=1; Ward and Wilson 1978), and so a weighted mean can be taken (827 ±41 BP). *See* also GU-5682.

References: Ward and Wilson 1978

GU–5679 1000 ±70 BP

δ¹³C: -20.4‰

Sample: Replicate sample 4, submitted on 3 December 1996 by A Clark

Material: human bone (burial NA146, left femur) (S Mays)

Initial comment: a replicate of GU-5650. This sample was resubmitted because it was amongst the earliest measurements. The additional precision, which will be provided by the extra measurement, should make the estimated date of the first burial on the site more precise.

Objectives: as GU-5650

Calibrated date: *1σ:* cal AD 980–1160
2σ: cal AD 890–1190

Final comment: see GU-5650

Laboratory comment: English Heritage (2014), the two results on this skeleton are statistically consistent (T′=0.2; T′(5%)=3.8; v=1; Ward and Wilson 1978), and so a weighted mean can be taken (1022 ±53 BP).

References: Ward and Wilson 1978

GU–5680 850 ±60 BP

δ¹³C: -20.1‰

Sample: Replicate sample 5, submitted on 3 December 1996 by A Clark

Material: human bone (burial 26/652, right tibia and fibulae) (S Mays)

Initial comment: a replicate measurement of GU-5557. This sample was resubmitted because the existing measurement (GU-5557) is slightly later than might be expected on the grounds of its phasing in the Glebe. This is not statistically significant however.

Objectives: as GU-5557

Calibrated date: *1σ:* cal AD 1050–1260
2σ: cal AD 1020–1280

Final comment: see GU-5557

Laboratory comment: English Heritage (2014), the two results on this skeleton are statistically consistent (T′=1.1; T′(5%)=3.8; v=1; Ward and Wilson 1978), and so a weighted mean can be taken (803 ±38 BP).

References: Ward and Wilson 1978

GU–5681 1020 ±80 BP

δ¹³C: -20.7‰

Sample: Replicate sample 6, submitted on 3 December 1996 by A Clark

Material: human bone (burial NA104, right tibia) (S Mays)

Initial comment: a replicate measurement of GU-5647. This sample was resubmitted because it was amongst the earliest measurements. The additional precision, which will be provided by the extra measurement, should make the estimated date of the first burial on the site more precise.

Objectives: as GU-5647

Calibrated date: *1σ:* cal AD 970–1150
2σ: cal AD 780–1190

Final comment: see GU-5647

Laboratory comment: English Heritage (2014), the two results on this skeleton are statistically consistent (T′=1.5; T′(5%)=3.8; v=1; Ward and Wilson 1978), and so a weighted mean can be taken (1094 ±53 BP).

GU–5682 870 ±60 BP

δ¹³C: -19.2‰

Sample: Replicate sample 7, submitted on 3 December 1996 by A Clark

Material: human bone (burial WCO118, right tibia) (S Mays)

Initial comment: a replicate measurement of GU-5503. Two samples WCO 118 and WCO 162 were resubmitted because of the results of GU-5503 and GU-5517 which are in significant statistical disagreement with their relative dating, evidenced by the recorded stratigraphy. Re-examination of the primary records suggests that the original interpretation of the stratigraphy is correct.

Objectives: as GU-5503

Calibrated date: *1σ:* cal AD 1040–1230
2σ: cal AD 1020–1280

Final comment: see GU-5503

Laboratory comment: English Heritage (2014), the two results on this skeleton are not statistically consistent at 95% confidence (T′=5.2; T′(5%)=3.8; v=1; Ward and Wilson 1978), although they are at 99% confidence (T′(1%)=6.6). Given the stratigraphic order of the burials in this location, it is probable that the original measurement (GU-5503) was an early outlier (Mays *et al* 2007, figs 102 and 104).

References: Ward and Wilson 1978

GU–5683 1070 ±80 BP

δ¹³C: -20.3‰

Sample: Replicate sample 8, submitted on 3 December 1996 by A Clark

Material: human bone (burial EE20, right femur) (S Mays)

Initial comment: a replicate measurement of GU-5511. This sample was resubmitted because it was amongst the earliest measurements. The additional precision, which will be provided by the extra measurement, should make the estimated date of the first burial on the site more precise.

Objectives: as GU-5511

Calibrated date: *1σ:* cal AD 890–1030
2σ: cal AD 770–1160

Final comment: see GU-5511

Laboratory comment: English Heritage (2014), the two results on this skeleton are statistically consistent (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978), and so a weighted mean can be taken (1076 ±53 BP).

References: Ward and Wilson 1978

Wharram Percy: cemetery (south-east of church), North Yorkshire

Location: SE 858642
Lat. 54.03.59 N; Long. 00.41.20 W

Project manager: J Hurst (Medieval Village Research Group), 1963, 1964, 1968, 1969, 1973, 1976, and 1984

Archival body: English Heritage

Description: only a relatively small sample of existing burials have been excavated in this area. Trenches were dug close to the church in 1968, 1969, and 1973 to locate the south aisle and examine the area beneath the vestry.

Objectives: to establish the period of use of the cemetery away from the church on the east side. The dating will also provide useful comparative information for the osteological sequence.

References: Bell and Beresford 1987
Jordan *et al* 1994, 208–9
Mays *et al* 2007

GU–5452 610 ±50 BP

δ¹³C: -20.1‰

Sample: SE Church-1 EE 38, submitted in December 1994 by A Clark

Material: human bone (right humerus, scapulae) (S Mays)

Initial comment: a burial from a depth of *c* 1.52m (5ft), recorded only in section. The skeleton is adult and relatively complete (40-60%) with excellent cranial survival (100%).

Objectives: to establish the period of use of the cemetery away from the church on the east side. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1290–1410
2σ: cal AD 1280–1430

Final comment: C Harding (13 October 2009), this radiocarbon date confirms that depth of burial is no guide to dating, as this burial appeared much lower than some of the earlier ones, eg burial EE019; GU-5510 (Mays *et al* 2007, 205).

GU–5453 340 ±50 BP

δ¹³C: -20.9‰

Sample: SE Church-1 SA 002, submitted in December 1994 by A Clark

Material: human bone (right humerus and right ulna) (S Mays)

Initial comment: an extended east-west inhumation, with the head to the west, at a depth of *c* 1m (3ft 3in), and below the floor of a seventeenth century porch. This skeleton is adult and relatively complete (80%), with good cranial survival (75%).

Objectives: to examine the period of use of the cemetery close to the church on the south side and to examine the chronological relationship with the porch, dated to the seventeenth century on architectural grounds. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1460–1650
2σ: cal AD 1440–1660

Final comment: C Harding (13 October 2009), this radiocarbon date confirms that this burial is earlier than the phase X porch (Mays *et al* 2007, 206).

GU–5454 350 ±50 BP

δ¹³C: -20.9‰

Sample: SE Church-1 SA 003, submitted in December 1994 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended east-west inhumation, at a depth of *c* 1.1m (3ft 8in), and below the floor of a seventeenth century porch. The skeleton is adult and relatively complete (80%+) with good cranial survival (100%).

Objectives: as GU-5453

Calibrated date: *1σ:* cal AD 1450–1650
2σ: cal AD 1440–1660

Final comment: see GU-5453

GU–5455 890 ±50 BP

δ¹³C: -19.2‰

Sample: SE church-1 SA 012, submitted in December 1994 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended east-west inhumation, at a depth of *c* 1.07m (3ft 6in). The burial was cut by SA013 (GU-5491), probably contemporary with SA014 (GU-5456), and sealed by a fifteenth-century buttress. The skeleton is adult and relatively complete (60–80%) with good cranial survival (75%).

Objectives: to examine the period of use of the cemetery close to the church on the south side and to examine the chronological relationship with a buttress of the re-built south aisle (phase VIII), dated to the fifteenth century on architectural grounds. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: 1σ: cal AD 1040–1220
2σ: cal AD 1020–1260

Final comment: C Harding (13 October 2009), the radiocarbon date confirms that the phase VI porch is later than this burial (Mays *et al* 2007, 206).

GU–5456 760 ±50 BP

δ¹³C: -20.2‰

Sample: SE Church-1 SA 014, submitted in December 1994 by A Clark

Material: human bone (left tibia) (S Mays)

Initial comment: an extended east-west inhumation at a depth of approximately *c* 1.07m (3ft 6in); sealed by SA013 (GU-5491) and possibly contemporary with SA012 (GU-5455). The skeleton is adult and relatively complete (40-60%) with good cranial survival (80%).

Objectives: to examine the period of use of the cemetery close to the church on the south side and provide useful comparative information for the osteological sequence.

Calibrated date: 1σ: cal AD 1220–1290
2σ: cal AD 1180–1300

Final comment: C Harding (13 October 2009), this date confirms that the phase VI porch is earlier than the burial, and that the burial is earlier than burial SA013 (GU-5491) (Mays *et al* 2007, 206).

GU–5457 380 ±60 BP

δ¹³C: -19.0‰

Sample: SE Church-1 SA 033, submitted in December 1994 by A Clark

Material: human bone (right femur) (S Mays)

Initial comment: from a burial beneath the late twelfth century south aisle wall, at a depth from the surface of *c* 1.22m (4ft). The burial seals SA034 (GU-5458). The skeleton is adult and fairly complete (40-60%) although no skull was recovered.

Objectives: to examine the period of use of the cemetery close to the church on the south side and to examine the temporal relationship with the south aisle wall (phase V), dated to the late-twelfth century on architectural grounds. The date will be useful because of its stratigraphic relationships to the south aisle wall and GU-5458, rather than for osteological reasons.

Calibrated date: 1σ: cal AD 1440–1640
2σ: cal AD 1420–1650

Final comment: C Harding (14 October 2009), this date confirms that the burial is later than the south aisle wall (phase V).

GU–5458 1050 ±50 BP

δ¹³C: -19.2‰

Sample: SE Church-1 SA 034, submitted in December 1994 by A Clark

Material: human bone (left tibia) (S Mays)

Initial comment: the skeleton was sealed by the south aisle wall and cut by SA033 (GU-5457), and recovered from a depth of *c* 1.22m (4ft). The skeleton is adult and relatively complete (60-80%) with good cranial survival (75%).

Objectives: to examine the period of use of the cemetery close to the church on the south side and to examine the temporal relationship with the south aisle wall (phase V), dated to the late-twelfth century on architectural grounds. The date will also provide comparative information for the osteological sequence.

Calibrated date: 1σ: cal AD 960–1030
2σ: cal AD 880–1120

Final comment: C Harding (14 October 2009), this date confirms that the burial is is earlier than the south aisle wall (phase V).

GU–5459 780 ±50 BP

δ¹³C: -20.1‰

Sample: SE Church-1 V45, submitted in December 1994 by A Clark

Material: human bone (right femur) (S Mays)

Initial comment: an extended burial at a depth of *c* 1.52m (5ft), cut by a nineteenth-century coffined burial. The skeleton is adult and fairly complete (60-80%), with good cranial survival (75%).

Objectives: to examine the period of use of the cemetery close to the church on the south east side, and to investigate the chronological relationship with a group of nearby high-status burials of Saxo-Norman date, HAR-2460 (910 ±70 BP; cal AD 990–1280 at 95% confidence (Reimer *et al* 2004)); HAR-2462 (980 ±70 BP, cal AD 890–1220 at 95% confidence (Reimer *et al* 2004)); HAR-2631 (890 ±70 BP, cal AD 1000–1280 at 95% confidence (Reimer *et al* 2004; Jordan *et al* 1994, 208–9). The date also provides useful comparative information for the osteological sequence.

Calibrated date: 1σ: cal AD 1210–1280
2σ: cal AD 1160–1290

Final comment: C Harding and A Bayliss (2007), the radiocarbon date gave a posterior density estimate (at *95% probability*) of *cal AD 1160–1300* (*GU-5459*; Mays *et al* 2007, 194).

References: Jordan *et al* 1994, 208–9
Reimer *et al* 2004

GU–5460 600 ±50 BP

δ¹³C: -20.7‰

Sample: SE Church-1 V38, submitted in December 1994 by A Clark

Material: human bone (right tibia) (S Mays)

Initial comment: an extended burial with the head to the west at a depth of *c* 1.52m (5ft). The skeleton is adult and fairly complete (80%+) with good cranial survival (75%).

Objectives: as GU-5459

Calibrated date: *1σ:* cal AD 1290–1410
2σ: cal AD 1280–1430

Final comment: C Harding and A Bayliss (2007), the radiocarbon date gave a posterior density estimate (at *95% probability* of *cal AD 1280–1360* (*GU-5460*; Mays *et al* 2007, 194).

GU–5461 960 ±70 BP

δ¹³C: -21.5‰

Sample: SE Church-1 SA 052, submitted in December 1994 by A Clark

Material: human bone (right tibia) (S Mays)

Initial comment: an extended burial with the head to the west, cut by a nineteenth century coffin. Recovered from a depth of *c* 1.1m (3ft), the skeleton is adult and fairly complete (80%+), with good cranial survival (80%).

Objectives: to establish when the cemetery reached its maximum extent to the south-west and to provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1010–1170
2σ: cal AD 900–1230

Final comment: see GU-5463

GU–5462 930 ±50 BP

δ¹³C: -20.3‰

Sample: SE Church-1 SA 053, submitted in December 1994 by A Clark

Material: human bone (right humerus, right tibia, right fibula) (S Mays)

Initial comment: an extended burial with the head to the west from the southern extremity of the churchyard. The skeleton is adult and fairly complete (80%+) with good cranial survival (80%).

Objectives: as GU-5461

Calibrated date: *1σ:* cal AD 1020–1170
2σ: cal AD 1010–1220

Final comment: see GU-5463

GU–5463 980 ±70 BP

δ¹³C: -20.4‰

Sample: SE Church-1 SA56, submitted in December 1994 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended burial with the head to the west from the southern extremity of the churchyard. The burial was cut by a modern twentieth-century posthole and by possible tree-root disturbance. The skeleton is adult and fairly intact (60-80%) with good cranial survival (75%).

Objectives: as GU-5461

Calibrated date: *1σ:* cal AD 990–1160
2σ: cal AD 890–1220

Final comment: C Harding (14 October 2006), this date confirms that the burial belongs to period 4, phase 2, and was one of the earliest burials on the site (Mays *et al* 2007, 69).

GU–5491 630 ±50 BP

δ¹³C: -23.1‰

Sample: SE Church-1 SA 013, submitted in December 1994 by A Clark

Material: human bone (left arm bones) (S Mays)

Initial comment: an extended east-west inhumation at a depth of *c* 1.07m (3ft). The burial sealed SA012 (GU-5455) and SA014 (GU-5456) and was sealed by a fifteenth-century buttress. The skeleton is adult and although incomplete (<20%), has good cranial survival (80%).

Objectives: to examine the temporal relationship with the buttress of the rebuilt south aisle (phase VIII) dated to the fifteenth century on architectural grounds. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1280–1400
2σ: cal AD 1270–1420

Final comment: see GU-5456

GU–5506 830 ±50 BP

δ¹³C: -19.9‰

Sample: SE Church-1 EE 13, submitted in February 1995 by A Clark

Material: human bone (right femur) (S Mays)

Initial comment: an extended inhumation in a decayed wooden coffin accompanied by a chalice and patten, probably the burial of a priest. The burial was situated against the north wall of the chancel (early fourteenth to early seventeenth century) and at a depth of *c* 2.13m (7ft) from the ground surface. The skeleton is adult and fairly complete (80%+), although the skull does not survive.

Objectives: to establish the period of use of the cemetery close to the church just north of the chancel. This burial has been tentatively identified from documentary evidence as Robert Firby who died 11th November 1464. As the skull is missing the interest of the date for osteology is limited.

Calibrated date: *1σ:* cal AD 1160–1270
2σ: cal AD 1040–1280

Final comment: C Harding (14 October 2006), this date proves that the burial was not late medieval as was thought, but was added close to the time the chancel was constructed in the thirteenth century (Mays *et al* 2007, 231).

GU–5507 940 ±60 BP

$\delta^{13}C$: -21.7‰

Sample: SE Church-1 EE 3, submitted in February 1995 by A Clark

Material: human bone (left radius, left humerus) (S Mays)

Initial comment: an extended east-west inhumation with the legs in the section at the east edge of the excavated area. The burial is probably contemporary with the use of the phase III apse (early twelfth to mid-thirteenth century). The skeleton is adult and fairly complete (60-80%), with good cranial preservation (80%).

Objectives: to establish the period of use of the cemetery close to the church, just north-east of the chancel. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1020–1170
2σ: cal AD 980–1230

Final comment: C Harding (14 October 2006), the radiocarbon evidence suggests that it is perfectly possible that the burial was contemporaneous with the phase III chancel apse (Mays *et al* 2007, 205).

GU–5508 730 ±60 BP

$\delta^{13}C$: -21.0‰

Sample: SE Church-1 EE 7, submitted in February 1995 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended east-west inhumation with the legs in the section, at the east edge of the excavated area at a depth of *c* 1.98m (6ft 6in) from the ground surface. The burial is probably contemporary with the use of the phase III apse (early twelfth to mid-thirteenth century). The skeleton is adult and relatively complete (40-60%), with excellent cranial survival (100%).

Objectives: to establish the period of use of the cemetery close to the church, just east of the chancel, and to provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1250–1300
2σ: cal AD 1200–1390

Final comment: see GU-5507

GU–5509 1040 ±70 BP

$\delta^{13}C$: -21.5‰

Sample: SE Church-1 EE 26, submitted in February 1995 by A Clark

Material: human bone (humeri and right tibia) (S Mays)

Initial comment: an extended inhumation with sandstone head and footstones, at the north edge of the excavated area at a depth of *c* 1.45m (4ft 9in). The skeleton is adult and relatively complete (40–60%), with good cranial survival (80%).

Objectives: to establish the period of use of the cemetery away from the church on the north-east side, and to provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 900–1040
2σ: cal AD 780–1160

Final comment: C Harding (14 October 2009), this confirms that this burial is one of the earliest within the site.

GU–5510 1070 ±60 BP

$\delta^{13}C$: -21.8‰

Sample: SE Church-1 EE 19, submitted in February 1995 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended inhumation in the north-east corner of the excavated area, but possibly contemporary with EE20 (GU-5511). The skeleton is a complete (80%+) adult with excellent (100%) cranial survival, and was recovered from a depth of *c* 0.99m (3ft 3in).

Objectives: to establish the period of use of the cemetery away from the church on the north-east side. Described on the plan as the upper level of graves, this sample together with GU-5511 should date the latest use of this part of the cemetery. The date will also provide useful cranial information for the osteological sequence.

Calibrated date: *1σ:* cal AD 890–1030
2σ: cal AD 770–1120

Final comment: C Harding (14 October 2006), this date confirms that depth of burial is no guide to dating (Mays *et al* 2007, 205).

GU–5511 1080 ±70 BP

$\delta^{13}C$: -22.2‰

Sample: SE Church-1 EE 20, by A Clark

Material: human bone (left tibia) (S Mays)

Initial comment: an extended east-west inhumation in the north-east corner of the excavated area at a depth of *c* 0.99m (3ft 3in). The burial was cut by as well as possibly being contemporary with EE19 (GU-5510). The skeleton is a complete (80%+) adult, with excellent (100%) cranial survival. *See* GU-5683 for a replicate measurement.

Objectives: as GU-5510

Calibrated date: *1σ:* cal AD 890–1030
2σ: cal AD 770–1150

Final comment: C Harding (2007), the radiocarbon results from this burial and burial EE019 are not statistically different, confirming that it is possible that the two burials were contemporary (Mays *et al* 2007, 205).

Laboratory comment: see GU-5683

Wharram Percy: cemetery (south-east of church, V41), North Yorkshire

Location: SE 858642
Lat. 54.03.59 N; Long. 00.41.20 W

Project manager: J Hurst (Medieval Village Research Group), 1996

Archival body: Hull and East Riding Museum

Description: burial V41 (GU-5669) was sampled in 1996, because it is stratigraphically earlier than V51 (HAR-2460; Jordan *et al* 1994; 208–9).

Objectives: to provide a check on the reliability of the previous measurements from the Harwell laboratory.

Final comment: C Harding (13 October 2009), both measurements appear to be accurate.

References: Jordan *et al* 1994, 208–9

GU–5669 1010 ±60 BP

$\delta^{13}C$: -22.4‰

Sample: SE Church-2 V41, submitted in April 1996 by A Clark

Material: human bone (tibiae, fibula, left patella) (S Mays)

Initial comment: an extended east-west inhumation; at a depth of 2.59m; sealed and cut by burial V51 (HAR-2460).

Objectives: to establish the earliest phase of use of this area of the churchyard.

Calibrated date: *1σ:* cal AD 980–1120
2σ: cal AD 890–1170

Final comment: C Harding and A Bayliss (2007), this measurement and HAR-2460 (burial V51) are in good agreement with each other and with the recorded stratigraphic relationship between the burials, which increases our confidence in their accuracy (Mays *et al* 2007, 206).

References: Mays *et al* 2007, 206

Wharram Percy: cemetery (west of church), North Yorkshire

Location: SE 858642
Lat. 54.03.59 N; Long. 00.41.20 W

Project manager: J Hurst (Medieval Village Research Group), 1972

Archival body: English Heritage

Description: this area of the cemetery was excavated in one season in 1972. All 177 burials were excavated, recorded, and lifted. The comparatively neat alignment led to the hypothesis during post-excavation analysis that these burials represented one period of deposition of relatively short duration. The absence of coffins, stone setting, and post-medieval coffin fittings also seemed to lend weight to this theory.

Objectives: to test the chronological validity of this phasing, and to provide absolute dates for the relatively short part of the medieval period when this area of the site was thought to have been in use.

Final comment: C Heighway (2007), the radiocarbon dates suggest that most of the burials were medieval, however, there was a group of pre-Conquest burials and a significant group of later medieval skeletons. This area of the cemetery was thus in use from the tenth to eleventh centuries for up to seven hundred years. A distribution plan of the radiocarbon dated burials indicates that no significance can be attached to the date of burial related to its location (Mays *et al* 2007, 218).

Laboratory comment: SURRC Radiocarbon Dating Laboratory (13 February 1996), GU-5504 (WCO 183) did not produce a result because the sample was too small.

References: Mays *et al* 2007, 218

GU–5492 430 ±70 BP

$\delta^{13}C$: -22.0‰

Sample: W Church-1 WCO 170, submitted in February 1995 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended inhumation in a wooden coffin with the head to the west; close to the tower of the church at a depth of *c* 1.13m. The skeleton is adult and fairly complete (60–80%) with good cranial survival.

Objectives: to establish the period of use of the cemetery close to the tower to the west. This is the only coffined burial from this zone of the cemetery. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1420–1620
2σ: cal AD 1390–1650

Final comment: C Harding (14 October 2009), this date confirms the burial as one of the latest in the cemetery.

GU–5493 570 ±50 BP

$\delta^{13}C$: -22.8‰

Sample: W Church-1 WCO 130, submitted in December 1994 by A Clark

Material: human bone (left humerus and left femur) (S Mays)

Initial comment: an extended inhumation with the head to the west, from the north-east corner at a depth of *c* 0.91m. This burial seals burial 183 (GU-5504). The skeleton is adult and relatively complete (60–80%) with good cranial survival (80%).

Objectives: to establish the period of use of the cemetery to the north-west of the church and the absolute date of this burial in relation to GU-5504 which it seals. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1310–1420
2σ: cal AD 1290–1440

Final comment: C Harding (14 October 2009), one of the later burials within the cemetery.

GU–5494 920 ±60 BP

δ¹³C: -21.1‰

Sample: W Church-1 WCO 70, submitted in December 1994 by A Clark

Material: human bone (left scapula, first thoracic vertebra, humeri, clavicles, left first rib) (S Mays)

Initial comment: extended inhumation at the south edge, at a depth of *c* 0.91m, and cut by burial WCO 118 (GU-5503). The skeleton is adult, and although rather incomplete (20–40%), has good cranial survival (75%).

Objectives: to establish the period of use of the cemetery away from the church to the south-west and to compare the date of this burial with that of burial 118 (GU-5503). The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1020–1210
2σ: cal AD 990–1260

Final comment: C Harding (14 October 2009), the date indicates this to be one of the earlier medieval burials.

GU–5495 320 ±60 BP

δ¹³C: -21.2‰

Sample: W Church-1 WCO 44, submitted in December 1994 by A Clark

Material: human bone (right leg bones) (S Mays)

Initial comment: an extended inhumation with the head to the west; the burial WCO 138 (GU-5499) and was cut by an eighteenth-century conduit.

Objectives: to establish the period of use of the cemetery away from the church at the west end, and to compare the date with GU-5499 and the eighteenth-century conduit which cuts it. The skeleton is of a child and so the date is useful for stratigraphic reasons rather than for osteology.

Calibrated date: *1σ:* cal AD 1470–1650
2σ: cal AD 1440–1800

Final comment: C Harding (14 October 2009), this date confirms the burial is later than burial WCO138 (GU-5499).

GU–5496 530 ±70 BP

δ¹³C: -20.9‰

Sample: W Church-1 WCO 156, submitted in December 1994 by A Clark

Material: human bone (left femur) (S Mays)

Initial comment: an extended east-west inhumation at a depth of *c* 1.37m, and cut by burial WCO 153 (GU-5497). The skeleton is adult and relatively complete (60–80%), although the skull is missing.

Objectives: to establish the period of use of the cemetery to the west of the church and to establish an absolute date of this burial in comparison with burial WCO 153 (GU-5497) which cuts it. The date will be useful because of its stratigraphic relationship rather than for osteological reasons.

Calibrated date: *1σ:* cal AD 1320–1450
2σ: cal AD 1290–1470

Final comment: C Harding (14 October 2009), this date confirms that this burial is earlier than burial WCO153 (GU-5497).

GU–5497 350 ±50 BP

δ¹³C: -21.9‰

Sample: W Church-1 WCO 153, submitted in December 1994 by A Clark

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

Initial comment: an extended east-west inhumation sealed by burial WCO 45 (GU-5516) and cutting burial WCO 156 (GU-5496), and at a depth of *c* 1.37m. The skeleton is adult but incomplete (20–40%) and without a skull.

Objectives: to establish the period of use of the cemetery to the west of the church and to establish an absolute date of this burial in comparison with burial WCO 45 (GU-5516) which seals it, and burial WCO 156 (GU-5496) which it cuts. A date will be useful because of its stratigraphic relationships rather than for the osteological sequence.

Calibrated date: *1σ:* cal AD 1450–1650
2σ: cal AD 1440–1660

Final comment: C Harding (14 October 2009), this date confirms this burial to be one of the later burials within the cemetery, being later than burial WCO156 (GU-5496).

GU–5498 790 ±60 BP

δ¹³C: -20.5‰

Sample: W Church-1 WCO 139, submitted in December 1994 by A Clark

Material: human bone (left humerus, left ulna, and left radius) (S Mays)

Initial comment: an extended inhumation with the head to the west; from a depth of *c* 1.28m and cut by burial WCO 138 (GU-5499). The skeleton is adult, and although rather incomplete (20–40%), has good cranial preservation (80%).

Objectives: to establish the period of use of the cemetery away from the church at the west end and to establish an absolute date of the burial in relation to burial WCO 138 (GU-5499) which cuts it. A date will also provide useful information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1200–1280
2σ: cal AD 1050–1300

Final comment: C Harding (14 October 2009), this date confirms that this is one of the earlier medieval burials.

GU–5499 550 ±60 BP

δ¹³C: -21.6‰

Sample: W Church-1 WCO 138, submitted in December 1994 by A Clark

Material: human bone (right humerus, right radius, ulnae) (S Mays)

Initial comment: an extended inhumation with the head to the west, adjacent to the westerly limit of the excavation and at a depth of *c* 1.28m. This burial cuts burial WCO 139 (GU-5498), is sealed by burial WCO 44 (GU-5495), and is cut by the eighteenth-century conduit. The skeleton is adult and fairly complete (60–80%), with a complete skull (100%).

Objectives: to establish the period of use of the cemetery away from the church at the west end, and to establish an absolute date to compare with burial WCO 44 (GU-5495 which seals it, and burial WCO 139 (GU-5498) which it cuts. A date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1310–1440
2σ: cal AD 1290–1450

Final comment: C Harding (14 October 2009), this date confirms this burial as being one of the later burials within the cemetery.

GU–5500 550 ±50 BP

δ^13C: -21.1‰

Sample: W Church-1 WCO 181, submitted in February 1995 by A Clark

Material: human bone (right femur) (S Mays)

Initial comment: an extended east-west inhumation at a depth of *c* 1.1m and cut by burial WCO 179 (GU-5501). The skeleton is adult and is poorly preserved (20–40%) with no skull.

Objectives: to establish the period of use of the cemetery around the tower to the west of the church, and to establish the absolute date of this burial in relation to burial WCO 179 (GU-5501) which cuts it. Its importance lies in its spatial and sequential positions.

Calibrated date: *1σ:* cal AD 1310–1430
2σ: cal AD 1290–1450

Final comment: C Harding (14 October 2006), this result amongst others have demonstrated that there is no relationship between chronology and the preliminary phasing (Mays *et al* 2007, 208), with this being one of the later medieval burials within this part of the cemetery.

GU–5501 820 ±70 BP

δ^13C: -21.0‰

Sample: W Church-1 WCO 179, submitted in February 1995 by A Clark

Material: human bone (left humerus, right ulna, right tibia) (S Mays)

Initial comment: an extended east-west inhumation close to the tower of the church; at a depth of *c* 1.1m, and cutting burial WCO 181 (GU-5500). The skeleton is adult and fairly complete (60–80%), with good cranial survival (75%).

Objectives: to establish the period of use of the cemetery around the tower to the west of the church and to establish the absolute date of this burial in relation to burial WCO 181 (GU-5500) which it cuts. It is also the only datable specimen from period V of the church sequence. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1160–1280
2σ: cal AD 1030–1290

Final comment: C Harding (20 October 2009), this date confirms the burial as being one of the earliest in this part of the cemetery.

GU–5502 1030 ±70 BP

δ^13C: -22.0‰

Sample: W Church-1 WCO 119, submitted in December 1994 by A Clark

Material: human bone (tibiae) (S Mays)

Initial comment: an extended inhumation at the southern edge at a depth of *c* 0.94m. The burial cuts burial WCO 118 (GU-5503) and seals burial WCO 162 (GU-5517). The skeleton is adult, and although rather incomplete (20–40%), has good cranial preservation (80%).

Objectives: to establish the period of use of the cemetery away from the church to the south-west and to establish the absolute date of this burial in comparison to burial 118 (GU-5503) which it cuts and burial 162 (GU-5517) which it seals. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 960–1040
2σ: cal AD 880–1170

Final comment: C Harding and A Bayliss (20 October 2009), this radiocarbon date has identified this as being one of the earliest burials, and is of pre-Conquest date. In light of this result, the burial was re-examined, as the result is in disagreement with the stratigraphic information (A=21.4%; Bronk Ramsey 1995). Osteological examination indicated that the bones came from a single individual, although the plan suggests the bones may represent an earlier disturbed burial (Mays *et al* 2007, 208).

GU–5503 1080 ±70 BP

δ^13C: -21.1‰

Sample: W Church-1 WCO 118, submitted in December 1994 by A Clark

Material: human bone (right humerus and right femur) (S Mays)

Initial comment: an extended inhumation at the southern edge of the excavated area, at a depth of *c* 0.94m; cut by burial WCO 119 (GU-5502) and cutting into burial WCO 70 (GU-5494). The skeleton is adult and relatively complete (40–60%) with excellent cranial survival (100%). *See* GU-5682 for a replicate measurement.

Objectives: to establish the period of use of the cemetery away from the church to the south-west and to provide an absolute date of this burial in comparison to burial WCO 70 (GU-5494) which it cuts, and burial WCO 119 (GU-5502) which cuts it. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 890–1030
2σ: cal AD 770–1150

Final comment: C Harding (20 October 2009), one of the earliest burials forming a small isolated group of pre-Conquest date.

Laboratory comment: see GU-5682

GU–5512 610 ±60 BP

δ¹³C: -21.0‰

Sample: W Church-1 WCO 28, submitted in December 1994 by A Clark

Material: human bone (forearm bones, right humerus) (S Mays)

Initial comment: an extended inhumation at the north-west corner of the excavated area at a depth of *c* 1.07m. The skeleton is fairly well-preserved (60–80%), with good cranial survival (80%).

Objectives: to establish the period of use of the cemetery at the north-west corner of the excavated area away from the church, and to provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1290–1410
2σ: cal AD 1270–1440

Final comment: C Harding (20 October 2009), one of the later medieval burials that occur all over the area west of the church.

GU–5513 400 ±50 BP

δ¹³C: -22.3‰

Sample: W Church-1 WCO 10, submitted in December 1994 by A Clark

Material: human bone (left and right humeri) (S Mays)

Initial comment: an extended inhumation at the south-west corner of the excavated area, at a depth of *c* 1.22m, and cut by pit I (pre-eighteenth century and pre-conduit). The skeleton is fairly complete (60–80%), with a complete skull (100%).

Objectives: to establish the period of use of the cemetery to the west of the church at the south-west corner of the excavated area. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1440–1620
2σ: cal AD 1420–1650

Final comment: C Harding (20 October 2009), one of the later medieval burials within this area of the cemetery.

GU–5514 740 ±50 BP

δ¹³C: -21.4‰

Sample: W Church-1 WCO 184, submitted in February 1995 by A Clark

Material: human bone (right tibia) (S Mays)

Initial comment: an extended east-west inhumation close to the tower of the church at a depth of *c* 1.9m. The skeleton is an adult, fairly complete (80%+), and with a complete skull (100%).

Objectives: to establish the period of use of this cemetery around the tower, to the west of the church. The date will also provide useful information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1250–1290
2σ: cal AD 1210–1390

Final comment: C Harding (20 October 2009), one of the earlier burials within the area west of the church.

GU–5515 680 ±50 BP

δ¹³C: -21.1‰

Sample: W Church-1 WCO 9, submitted in February 1995 by A Clark

Material: human bone (right femur) (S Mays)

Initial comment: an extended east-west inhumation from the latest phase, at a depth of *c* 0.82m. The skeleton is adult and relatively complete (40–60%), although cranial preservation is poor (10%).

Objectives: to establish the period of use of the cemetery to the west of the church. This burial is the only datable specimen from the latest period. It is not particularly important for osteological reasons.

Calibrated date: *1σ:* cal AD 1270–1390
2σ: cal AD 1250–1400

Final comment: C Harding (20 October 2009), one of the later medieval burials within the area west of the church.

GU–5516 230 ±50 BP

δ¹³C: -21.7‰

Sample: W Church-1 WCO 45, submitted in December 1994 by A Clark

Material: human bone (right femur) (S Mays)

Initial comment: an extended inhumation with the head to the west, sealing burial WCO 153 (GU-5497), and at a depth of *c* 1.22m. The skeleton is adult and fairly complete (80%+), with *c* 75% of the skull remaining.

Objectives: to establish the period of use of the cemetery to the west of the church and the absolute date of this burial in comparison to burial WCO 153 (GU-5497) which seals it. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1640–1955*
2σ: cal AD 1520–1955*

Final comment: C Harding (20 October 2009), one of the later medieval burials within the cemetery.

GU–5517 860 ±70 BP

δ¹³C: -20.8‰

Sample: W Church-1 WCO 162, submitted in December 1994 by A Clark

Material: human bone (right tibia and right fibula) (S Mays)

Initial comment: an extended inhumation at the south edge of the excavated area at a depth of *c* 0.94m and sealed by burial WCO 119 (GU-5502). The skeleton is adult and relatively complete (60–80%), with a complete skull (100%). *See* also GU-5678 for a replicate measurement.

Objectives: to establish the period of use of the cemetery away from the church to the south-west and to establish the absolute date of this burial in comparison with burial WCO 119 (GU-5502) which seals it. The date will also provide useful comparative information for the osteological sequence.

Calibrated date: *1σ:* cal AD 1040–1260
2σ: cal AD 1020–1280

Final comment: C Harding (20 October 2009), in light of this and other radiocarbon results the relationships between the burials were re-examined, however, it would still seem likely that this burial is earlier than burial WCO 119 (*see* GU-5502).

Laboratory comment: see GU-5678

Wilsford Barrows, Wiltshire

Location: SU 11114163
Lat. 51.10.24 N; Long. 01.50.28 W

Project manager: E Proudfoot (St Andrews Heritage Services), 1960

Archival body: Wiltshire Museums Service

Description: Wilsford G1 is a bowl barrow, 50ft in diameter and 1ft 3in in height, situated a little to the west of the main Normanton barrow group on Normanton Down. The central burial had at least two inhumations and a cremation burial. Fragments of Bell Beaker were also recovered with the burnt and inhumed bones in the original grave fill. The total excavation discovered eleven burials, all situated on the north side of the barrow.

Objectives: to assist in the understanding of the arrival of Beaker pottery in Britain, early Beaker burial practices, and the relationship between early flat graves and the first round barrows.

Final comment: P Marshall (25 September 2012), Wilsford G1 is a key barrow and cemetery for our understanding of the arrival of Beaker pottery in Britain, early Beaker burial practices, and the relationship between early flat graves and the first round barrows.

References: Field 1961

OxA–7329 3890 ±45 BP

δ¹³C: -20.1‰

Sample: N60 V, submitted on 14 March 1997 by E Proudfoot

Material: human bone (left femur, right tibia and left radius) (C B Denston)

Initial comment: burial V was placed in a grave at the side of the early ditch, head down, with an undecorated small Beaker near the knees. Lack of silt indicated that this deposit occurred when the ditch was being dug/before it began to silt up.

Objectives: burial V, a small child, with its miniature undecorated Beaker, is one of a series of probably very closely grouped burials associated with the early stages of site development, ditch/mound 1. Its date could help with the overall dating of the Wilsford Barrow G1 as well as having wider implications for Beaker deposits.

Calibrated date: *1σ:* 2470–2290 cal BC
2σ: 2480–2200 cal BC

Final comment: P Marshall (25 September 2012), the date provides a date for the death of the individual, burial V and its accompayning minature undecorated Beaker. The radiocarbon result is in agreement with the current accepted currency for Beakers in England (Healy 2012).

References: Healy 2012

OxA–7330 3555 ±40 BP

δ¹³C: -21.0‰

Sample: N60 IV, submitted on 14 March 1997 by E Proudfoot

Material: human bone (right femur and tibia) (C B Denston)

Initial comment: burial of a young child accompanied by miniature urn in a grave on the chalk, near the centre of the barrow mound. The mound had been severely ploughed. No clean sign of grave cut has led to the identification of this burial as a primary deposit (but not the central deposit).

Objectives: burial IV was accompanied by a small urn, unlike the other burials on this site, which were accompanied by Beakers, all tightly similar on typological analysis and probably close in date. The urn could be expected to be of later date, but because of its location close to the centre of the barrow, and because too little of the mound survived in which to detect a grave cut, this deposit could be one of the earliest in the group. If the date were early it would be valuable in the dating on miniature urns on Beaker sites, but if later it would offer a date and one reason for the expansion of the site by adding the second mound.

Calibrated date: *1σ:* 1950–1830 cal BC
2σ: 2030–1760 cal BC

Final comment: P Marshall (25 September 2012), the date provides a date for the death of the individual, burial IV, and its accompayning small urn. The radiocarbon result indicates that this burial is later than the Beaker use of the site and that the burial is a later insertion into barrow mound and could be related to the expansion of the site by adding the second mound.

OxA–7331 3840 ±40 BP

δ13C: -20.3‰

Sample: N60 VI, submitted on 14 March 1997 by E Proudfoot

Material: human bone (left radius, right ulna, long bone fragment, and tibia) (C B Denston)

Initial comment: burial VI survived as a partial burial, with a Beaker in the north ditch terminal. It lay over a very small amount of silt and has been assumed to be part of the general sequence of closely similar Beaker burials from the site.

Objectives: burial VI is one of a close group of burials from G1, related to the first phase ditch/mound. Its date could help with the overall dating of the Wilsford Barrow G1 as well as having wider implications for Beaker deposits. VI is placed later in the sequence, after V, VII, and VIII, only because of the small amount of silt on which it lay.

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

Final comment: P Marshall (25 September 2012), the date provides a date for the death of the individual, burial VI and its accompayning Beaker. The radiocarbon result is in agreement with the current accepted currency for Beakers in England (Healy 2012).

References: Healy 2012

OxA–7332 3950 ±40 BP

δ13C: -20.8‰

Sample: N60 IX, submitted on 14 March 1997 by E Proudfoot

Material: human bone (right tibia, left and right humeri) (C B Denston)

Initial comment: burial XI lay beyond ditch 1 and was not cut by ditch 2. While it has no direct stratigraphic relationship with phase 1 its location in relation to the site as a whole has led the excavator to place it early in the sequence, as the Beaker accompanying the burial suggests.

Objectives: burial XI is integral with the others of phase 1 and its Beaker is one of a tight archaeological grouping. A radiocarbon date would be valuable in helping to place this group in particular, and similar beakers, into a more securely dated framework.

Calibrated date: *1σ:* 2490–2450 cal BC
2σ: 2570–2300 cal BC

Final comment: P Marshall (25 September 2012), the date provides a date for the death of the individual, burial IX, and its accompanying Beaker. The radiocarbon result is in agreement with the current accepted currency for Beakers in England (Healy 2012).

References: Healy 2012

OxA–7333 3805 ±40 BP

δ13C: -20.6‰

Sample: N60 X, submitted on 14 March 1997 by E Proudfoot

Material: human bone (left femur) (C B Denston)

Initial comment: burial X lies outside the phase 2 ditch, which ran between it and IX, destroying part of IX. Burial X cut the flint cairn over burial XI. It was sealed only by ploughsoil.

Objectives: burial X was accompanied by a Beaker, tusk earring, and belt loop, all of archaeological date similar to the rest of those from the site. A radiocarbon date could help to confirm the archaeological dating and would have wider implications for the dating this difficult material (Beaker/barrow).

Calibrated date: *1σ:* 2300–2150 cal BC
2σ: 2440–2130 cal BC

Final comment: P Marshall (25 September 2012), the date provides a date for the death of the individual, burial X and its accompayning Beaker, tusk ear-ring, and belt loop. The radiocarbon result is in agreement with the current accepted currency for Beakers in England (Healy 2012).

References: Healy 2012

OxA–7454 3810 ±45 BP

δ13C: -21.2‰

Sample: N60 VII, submitted on 14 March 1997 by E Proudfoot

Material: human bone (right humerus) (C B Denston)

Initial comment: burial VII lay in a grave across the causeway between the terminals of the ditch of phase 1. A Beaker at its feet and a baby/foetus (VIII) with undecorated Beaker, was behind the head. This was assumed to be a primary deposit, relating to the construction phase of the site. Because of the open area excavation, no section crossed the grave to show the precise stratigraphy.

Objectives: burial VII is one of a close group of burials from G1, related to the first ditch/mound. Its date could help with the overall dating of the Wilsford G1 as well as having wider implications for Beaker deposits. Burial VII is considered to be part of the primary deposit in view of its causeway location and because burial VIII accompanied it.

Calibrated date: *1σ:* 2330–2150 cal BC
2σ: 2460–2130 cal BC

Final comment: P Marshall (25 September 2012), the date provides a date for the death of the individual, burial VII and its accompanying Beaker. The radiocarbon result is in agreement with the current accepted currency for Beakers in England (Healy 2012). The measurement is statistically consistent (T′=1.2; v=1; T′(5%)=3.8; Ward and Wilson 1978) with that from burial VIII (OxA-7455) that was buried with it.

References: Healy 2012
Ward and Wilson 1978

OxA–7455 3740 ±45 BP

δ^{13}C: -20.2‰

Sample: N60 VIII, submitted on 14 March 1997 by E Proudfoot

Material: human bone (right clavicle and long bone fragments) (C B Denston)

Initial comment: as OxA-7454; both were in the same grave. Burial VIII lay behind the head of burial VII.

Objectives: as OxA-7454

Calibrated date: *1σ:* 2210–2040 cal BC
2σ: 2290–2020 cal BC

Final comment: see OxA-7454

UB–4154 3778 ±24 BP

δ^{13}C: -21.0 ±0.2‰

Sample: N60 XI, submitted on 14 March 1997 by E Proudfoot

Material: human bone (left femur) (C B Denston)

Initial comment: burial XI was at the bottom of a deep 'shaft' grave, probably in a wooden box (the evidence was difficult to interpret), as there were four postholes and a shelf for a lid. The skeleton was of a young adult, in the crouched position and lying on the right side. The burial was covered with chalk among which were carefully placed Beaker sherds. From ground level the burial was covered by flint, Beaker sherds, and in a cairn. The cairn was cut by burial X. Grave XI lay beside X beyond the outer ditch, which it pre-dated. The ditch had weathered back to the cairn but very little flint had fallen into the ditch.

Objectives: burial XI is important as part of the N60 series. Its Beaker is very fine and it belongs archaeologically in the tight group from the site. A radiocarbon date would help with the dating for the site and would have wider implications for the period.

Calibrated date: *1σ:* 2275–2140 cal BC
2σ: 2290–2135 cal BC

Final comment: P Marshall (25 September 2012), the date provides a date for the death of the individual, burial XI and its accompaying Beaker. The radiocarbon result is in agreement with the current accepted currency for Beakers in England (Healy 2012).

Laboratory comment: Belfast (25 September 1997): this sample was combusted and converted to benzene using the small sample high-precision system described by Wilson *et al* (1996).

References: Healy 2012
Wilson *et al* 1996

Wootton-Quarr, Isle of Wight

Location: SZ 5593
Lat. 50.44.00 N; Long. 01.13.00 W

Project manager: D L Motkin (Isle of Wight County Council)

Description: the project comprised a survey funded by English Heritage which combined intertidal survey with a study of the hinterland and the offshore zone of this stretch of coast between Wootton Creek and Ryde Pier. Many timber structures were surveyed, ranging from early Neolithic to post-medieval in date. Neolithic trackways were noted at the low water mark below Quarr and Binstead. Prehistoric settlement remains and evidence of a Roman/early medieval/medieval harbour site (incorporating an anchorage, watering place, and stone shipment depot) were also found at Wootton Creek.

Objectives: the project has combined hinterland, intertidal, and offshore survey with a range of environmental analyses including pollen and plant macrofossil analysis, diatom, insect, and sedimentological studies, and radiocarbon and dendrochronological dating. The main objectives of the survey were to provide an overview of the archaeological potential and the sea-level chronology of the Solent, to investigate in detail the Wootton-Quarr coastline chronology (including evidence for prehistoric and later subsistence, trading, and maritime activities), and to develop survey and recording techniques, threat assessment methodologies, and management options for intertidal archaeology.

Final comment: D L Motkin (1993), information obtained from pollen and diatom analysis plus select radiocarbon dating was used to reconstruct the vegetational history of north east Wight and to produce a sea-level curve for the Solent area. The Wootton-Quarr survey has combined hinterland, intertidal, and offshore surveys into a fully integrated assessment of the archaeology of a stretch of coastline. This should assist in the identification of the specific survey, recording, and management needs of this coastal zone.

Laboratory comment: English Heritage (21 May 2014), further radiocarbon dates from Wootton-Quarr: 92A (GU-5248–63), Wootton-Quarr: 92B (GU-5298–5300), Wootton-Quarr: Wootton Creek (GU-5051), and Wootton-Quarr: Wootton Creek B (UB-3271–4) have been published by Bayliss *et al* (2013, 224–31).

References: Bayliss *et al* 2013, 224–31
Loader *et al* 2002
Tomalin *et al* 2012

Wootton-Quarr: 93A, Isle of Wight

Location: SZ 5769993239 to SZ 5769993239
Lat. 50.43.34 N; Long. 01.24.30 W, to
Lat. 50.44.07 N; Long. 01.10.56 W

Project manager: D Tomalin (Isle of Wight County Archaeological Centre), 1993

Archival body: Isle of Wight County Museums Service

Description: a multi-period site consisting of a palimpsest of post structures on the intertidal shore of the Solent.

Objectives: to determine the chronology of sea-level rise and the human response to it, and to assist in the calculation of the scale and pace of coastal change and heritage loss.

Final comment: D Tomalin (1993), six of the dates in this series relate to Neolithic and Bronze Age human activity on a submerged land surface on the Wight shore of the eastern

Solent. They concern small timber structures seemingly erected on the margins of Holocene palaeovalleys during a period coincident with lower sea level and the generation of saltmarsh and succeeding peat. The seventh date, GU-5341, identifies contemporary Neolithic activity on a now submerged land surface of the western Solent at Newtown.

References: Loader *et al* 2002
Tomalin *et al* 2012

GU–5335 4890 ±70 BP

δ¹³C: -26.8‰

Sample: 2027 9019, submitted on 20 May 1993 by D Motkin

Material: wood (waterlogged): *Quercus* sp. (C Dickson 1993)

Initial comment: from intertidal site Q4; a fragment of horizontal timber lying at a depth of 65cm in compact marine sediment on the intertidal zone.

Objectives: this fragment of timber is perceived to lie on the interface between the Neolithic peaty silt stratum and the overlying marine sediment. Elsewhere in the survey area this interface has been destroyed by recent wave action. A date in the third or second millennium BC is predicted for this timber. A later date will determine the need to pursue an alternative and untruncated peat sequence by means of extensive augering during the remaining low tide windows.

Calibrated date: *1σ:* 3710–3630 cal BC
2σ: 3900–3520 cal BC

Final comment: D Tomalin (1993), the date seems generally compatible with a dendrochronology date of 3200 BC for neighbouring exposures of the peat horizon but it fails to date the transgression of the peat and its associated woodland. (This event is certainly later than 2600 BC according to dendrochronology and it is thought to post-date tree 182 at Wootton which is dated at 1757–1754 BC and is corroborated by UB-3271 (3528 ±37 BP; which calibrates to 1970–1740 cal BC at 95% confidence; Reimer *et al* 2004). The date of this item suggests that the peat is either still truncated at this location or that the wood fragment was re-deposited in antiquity.

References: Reimer *et al* 2004

GU–5336 3270 ±70 BP

δ¹³C: -29.1‰

Sample: 2027 1000942, submitted on 20 May 1993 by D Motkin

Material: wood (waterlogged): *Quercus* sp. (C Dickson 1993)

Initial comment: from intertidal feature Q22: this is a discrete cluster of wooden posts driven into the estaurine silt of the Quarr palaeochannel. It has been subject to marine processes including the action of bore worms. The post protrudes from the silt at 1.94m OD.

Objectives: this is a typical component of a number of discrete post clusters in the Quarr palaeochannel. A nearby cluster has been dated at 4040–3780 cal BC at 95% confidence (GU-5251; 5100 ±60 BP; Reimer *et al* 2004). This cluster has been chosen to establish the date range of the palimpsest of structures sited in this area. The sample is urgently required to determine the strategy of the inter-tidal fieldwork programme.

Calibrated date: *1σ:* 1630–1450 cal BC
2σ: 1740–1410 cal BC

Final comment: D Tomalin (1993), a typical oak component of one of a number of small post clusters now identified on the Holocene fill of the Quarr palaeochannel. This early Bronze Age date contrasts with the early-middle Neolithic dates obtained for adjacent structures of similar size. This date proves structure Q24 (GU-5251) was not contemporary with this structure, Q22.

GU–5337 3710 ±60 BP

δ¹³C: -27.5‰

Sample: 2027 1001072, submitted on 20 May 1993 by D Motkin

Material: wood (waterlogged): *Corylus* sp. (C Dickson 1993)

Initial comment: from intertidal structure B49; a wooden stake driven into marine sediment in the intertidal zone and subject to marine processes including weed growth and attack by bore worms. The stake was one of a number of small distinctive parallel-sided structures located below mean low water mark on Binstead beach. The post protrudes from the silt at 1.95m OD.

Objectives: this is a component timber of a specific type of symmetrical wooden structure which has been truncated in the intertidal zone. An urgent date is required to determine fieldwork priorities and to decide whether some or all of these structures should be recorded in detail.

Calibrated date: *1σ:* 2200–2020 cal BC
2σ: 2290–1930 cal BC

Final comment: D Tomalin (1993), these structures are now generally attributed to the late Neolithic and early Bronze Age. A complementary late Neolithic date comes from feature F31 lying some 3km to the west at Wootton Haven (GU-5051). This date suggests that the stakes were made at an early stage in the development of metal tools, or that palstaves were being used earlier than had been assumed. *See* also GU-5601 (Wootton 95A) for a measurement on another post from structure B49.

GU–5338 3590 ±50 BP

δ¹³C: -26.8‰

Sample: 2027 1001264, submitted on 20 May 1993 by D Motkin

Material: wood: *Corylus* sp. (C Dickson 1993)

Initial comment: from intertidal structure B66; a post sampled from a small distinctive enclosed wooden structure protruding from silt at a level of 1.93m OD on Binstead beach. The sample was subject to marine processes including bore worms.

Objectives: this is a component of a typical symmetrical stake-built structure which is one of several on Binstead Beach. An urgent date is required in order to determine the strategy of the intertidal fieldwork programme.

Calibrated date: *1σ:* 2030–1880 cal BC
2σ: 2130–1770 cal BC

Final comment: D Tomalin (1993), this structure appears to be a more complex version of structure B49 (GU-5337). *See* GU-5600 (Wootton 95A) for a measurement on another post from this structure.

GU–5339 2570 ±60 BP

$\delta^{13}C$: -27.5‰

Sample: 2027 1001494, submitted on 20 May 1993 by D Motkin

Material: wood (waterlogged): *Fraxinus* sp. (C Dickson 1993)

Initial comment: from intertidal feature B79; an ash post component of small long parallel-sided enclosed structure located beyond mean low-water mark on Binstead beach, protruding from the silt at 1.64m OD. The post was subject to marine processes including weed growth and attack by bore worms.

Objectives: this is a component timber of a specific type of long symmetrical wooden structure which has since been truncated in the intertidal zone. An urgent date is required to determine fieldwork priorities and decide whether some or all of these structures should be recorded in detail.

Calibrated date: *1σ:* 810–670 cal BC
2σ: 830–530 cal BC

Final comment: D Tomalin (1993), the later Bronze Age date for this structure complements later Bronze sherds found nearby on the same submerged surface.

Laboratory comment: English Heritage (21 May 2014), a second determination was subsequently made on a sample of fast-grown oak sapwood from feature B79 (Wootton-Quarr: 95A; GU-5577). This produced a later, early Iron age date, which perhaps suggests that the ash post that formed this sample had an old-wood offset of some decades.

GU–5340 4270 ±70 BP

$\delta^{13}C$: -28.1‰

Sample: 2027 1001550, submitted on 20 May 1993 by D Motkin

Material: wood (waterlogged): *Corylus* sp. (C Dickson 1993)

Initial comment: from intertidal feature B46; a sampled hazel post from cross-shore fence or trackway situated beyond mean low water mark. The timber protruded from the silt at -1.84m OD, and was subject to marine processes including attack by weed growth and bore worms.

Objectives: this is a typical component of a large linear timber feature situated at extreme low tide and extending offshore. An urgent date is required to determine the fieldwork priority for recording this and other similar features during a very limited intertidal window.

Calibrated date: *1σ:* 2920–2870 cal BC
2σ: 3090–2670 cal BC

Final comment: D Tomalin (1993), the early-middle Neolithic date complements post clusters K19 (GU-5257; 4350 ±50 BP; 3090–2890 cal BC at 95% confidence; Reimer *et al* 2004) and K20 (GU-5259; 4340 ±50 BP; 3100–2790 cal BC at 95% confidence; Reimer *et al* 2004) which are located some 300–400m west. *See* GU-5582 for another date from feature B46.

References: Reimer *et al* 2004

GU–5341 4160 ±70 BP

$\delta^{13}C$: -26.9‰

Sample: 2175 1001716, submitted on 20 May 1993 by D Motkin

Material: wood: *Corylus* sp. (C Dickson 1993)

Initial comment: from 'timber platform B', a Newtown intertidal feature on the East Spit; an *in situ* hazel spar component from a small laid platform or residual portion of trackway.

Objectives: this is a horizontal component of a timber platform of suspected Neolithic date. The configuration of this structure seems comparable with structures B66 (GU-5338) and B79 (GU-5339) at Binstead Beach. This particular structure potentially offers far greater structural detail including the platform element. An urgent date is required in order that the structures at the two locations can be compared and recording priorities determined.

Calibrated date: *1σ:* 2890–2620 cal BC
2σ: 2910–2490 cal BC

Final comment: D Tomalin (1993), the assay attests early-middle Neolithic activity perhaps set on a waterlogged intertidal land surface at 1.60m OD. Complementary dates on the Solent shore are Yarmouth West (GU-5260; 4220 ±60 BP; 2930–2610 cal BC at 95% confidence; Reimer *et al* 2004) and Wootton-Quarr structures K19 (GU-5257; 4350 ±50 BP; 3090–2890 cal BC at 95% confidence; Reimer *et al* 2004), K20 (GU-5259; 4340 ±50 BP; 3100–2790 cal BC at 95% confidence; Reimer *et al* 2004) and B46 (GU-5340, 4270 ±70 BP; 3040–2620 cal BC at 95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004

Wootton-Quarr: 94A, Isle of Wight

Location: SZ 5381694128 to SZ 5843493146
Lat. 50.44.37 N; Long. 01.14.14 W, Lat. 50.44.04 N; Long. 01.10.19 W

Project manager: D Tomalin (Isle of Wight County Archaeological Centre), 1993 and 1994

Archival body: Isle of Wight County Museums Service

Description: part of the Wootton-Quarr project, which is a coastal and hinterland field survey with a principal archaeological assessment of some 5km of inter-tidal wetland on the Solent coast.

Objectives: to determine the chronology of sea-level rise and human response to it, and to assist in the calculation of the scale and pace of coastal change and heritage loss.

Final comment: D Tomalin (2012), F119, a group of wooden studs on the western side of the slipway at Fishbourne is dated by GU-5410. The longshore post alignment B17 at Quarr/Binstead Beach was on the same alignment as Q14, Q15, K16, and Q137 and is dated by GU-5400. The longshore alignment B42 is dated by GU-5401. Post alignment B48 is part of fishtrap B48/B102/B110 and is dated by GU-5339. B110 is a double alignment of posts, part of fish weir B48/102/110 and dated by GU-5398. A double alignment of posts, K43, at Keys Beach is dated by GU-5409. Cluster of posts P98 at Pelhamfield is dated by GU-5406, and a possible cross-shore alignment P101 is dated by GU-5384. Longshore alignment apparently crossing a small inlet at Pelhamfield is dated by GU-5411 and GU-5592. Post alignment Q44 at Quarr is dated by GU-5402. Q87 is a rectangular/oval group of posts, part of group Q85-94, and is dated by GU-5408. Q90 forms part of a group of posts Q85-94, and is dated by GU-5412. Q114 is a cross-shore post alignment dated by GU-5407. Q113 is a cross-shore alignment dated by GU-5383 and GU-5593. S121 from King's Quay, an outer alignment of posts, is dated by GU-5403. GU-5421 and GU-5422 date the palaeoenvironmental sequence at Ranelagh Spit. GU-5483 dates peat at the top of an exposed tree-trunk at Pelhamfield, and GU-5424 the peat at Newnham bog.

References: Loader *et al* 2002
Tomalin *et al* 2012

GU–5383 500 ±50 BP

$\delta^{13}C$: -28.2‰

Sample: 2027.500113.1001656, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Corylus* sp., stem diameter 2.5cm, 12+ annual rings, bark *in situ* (R Gale)

Initial comment: from stake no. 1656, a component of cross-shore alignment Q113, consisting of hurdle stakes driven into intertidal silt. The sample was partially embedded but may have been affected by the boring of marine organisms.

Objectives: to establish a provisional date for the intertidal feature located at SZ 5692693204.

Calibrated date: *1σ:* cal AD 1400–1450
2σ: cal AD 1310–1460

Final comment: P Marshall (25 September 2012), the result provides a date for the inter-tidal feature, an alignment of hurdle stakes on the east margin of the Quarr palaeochannel, and shows that use of the intertidal zone took place from the prehistoric to post-medieval period.

GU–5384 3840 ±50 BP

$\delta^{13}C$: -28.4‰

Sample: 2027.500101.1002309, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Corylus* sp., stem fragment, diameter ?4.5cm (R Gale)

Initial comment: from post no. 2309, a component of post alignment P101 driven into intertidal silt. The truncated top of the post was covered with marine growth and has since been removed. The sample was taken from the embedded portion of the post but may have been bored by marine organisms.

Objectives: to establish a provisional date for the intertidal feature located at SZ 5831593192.

Calibrated date: *1σ:* 2450–2200 cal BC
2σ: 2470–2130 cal BC

Final comment: P Marshall (25 September 2012), the result provides a date for the cross-shore alignment at Pelhamfield, and shows that use of the intertidal zone took place from the prehistoric to post-medieval period.

GU–5398 1100 ±50 BP

$\delta^{13}C$: -27.8‰

Sample: 2027.500110.1002457, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Alnus* sp., stem diameter 8.5 × 7cm, 9+ annual rings (R Gale)

Initial comment: from post 2457, a component of cross-shore post alignment B110. The top of the post was covered with marine growth and has since been removed. The sample is taken from the lower embedded portion of the post but may have been susceptible to boring by marine organisms.

Objectives: to establish a provisional date for this particular offshore structure located at SZ 5777793300.

Calibrated date: *1σ:* cal AD 890–1000
2σ: cal AD 770–1030

Final comment: P Marshall (25 September 2012), the result provides a date for the medieval cross-shore alignment, and shows that use of the intertidal zone took place from the prehistoric to post-medieval period.

GU–5399 1040 ±50 BP

$\delta^{13}C$: -27.7‰

Sample: 2027.500048.1001047, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Acer* sp., stem diameter 8.5 × 7cm, *c* 7 annual rings (R Gale)

Initial comment: from post no. 1047, a component of post alignment B48 driven into intertidal silt. The truncated top, now removed, was covered with marine growth. The sample was taken from the embedded position of the post but may have been subject to boring by marine organisms.

Objectives: to establish a provisional date for this intertidal structure located at SZ 5767593266.

Calibrated date: *1σ:* cal AD 970–1030
2σ: cal AD 890–1150

Final comment: P Marshall (25 September 2012), the result provides a date for the medieval cross-shore alignment cutting across Binstead sewer outfall, and shows that use of the intertidal zone took place from the prehistoric to post-medieval period.

GU–5400 1390 ±50 BP

δ¹³C: -26.2‰

Sample: 2027.500017.1000853, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Fraxinus* sp., stem diameter 11.5 × 13.5cm, *c* 13 annual rings (R Gale)

Initial comment: from post no. 1025, a component of cross-shore alignment B17. The truncated top, now removed, was covered with marine growth. The sample was taken from the embedded position of the post but could have been subject to boring by marine organisms.

Objectives: to establish a provisional date for this intertidal structure located at SZ 5760993208.

Calibrated date: *1σ:* cal AD 610–670
2σ: cal AD 570–690

Final comment: P Marshall (25 September 2012), the result provides a date for the Saxon cross-shore alignment between Binstead Hard and Binstead outfall, and shows that use of the intertidal zone took place from the prehistoric to post-medieval period. *See* also GU-5254.

GU–5401 240 ±50 BP

δ¹³C: -26.7‰

Sample: 2027.500042.1001025, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Ulmus* sp. (R Gale)

Initial comment: from post no. 1025 of alignment B42, embedded *in situ* in intertidal silt. The truncated top, now removed, was covered with marine growth. The sample has been extracted from the embedded position of the post but could have been subjected to boring by marine organisms.

Objectives: to establish a provisional date for this intertidal structure located at SZ 5758493036.

Calibrated date: *1σ:* cal AD 1640–1955*
2σ: cal AD 1510–1955*

Final comment: P Marshall (25 September 2012), the result provides a date for the post-medieval longshore alignment near Binstead Fishing Club, and shows that use of the intertidal zone took place from the prehistoric to post-medieval period.

GU–5402 1010 ±50 BP

δ¹³C: -25.7‰

Sample: 2027.500044.1002212, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Fagus* sp., trunk diameter 25+ cm, 41+ annual rings (R Gale)

Initial comment: from a post from cross-shore alignment Q44, driven into intertidal silt. The truncated top, now removed, was covered with marine growth. The sample has been extracted from the embedded position of the post but could have been subjected to boring by marine organisms.

Objectives: to establish a provisional date for this intertidal structure located at SZ 5698493299.

Calibrated date: *1σ:* cal AD 980–1040
2σ: cal AD 900–1160

Final comment: D Tomalin (2012), the plan of the middle alignment gave some grounds to suspect that it may have been built in two phases, a possibilty which could not be resolved by the radiocarbon dating as the two determinations are not statistically significantly different (T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). It is thought that these structures are related to the deserted medieval settlement of Shoflet and may represent fishing activities.

Final comment: P Marshall (25 September 2012), the result provides a date for the medieval cross-shore alignment below mean low water mark on Quarr beach, and shows that use of the intertidal zone took place from the prehistoric to post-medieval period.

References: Ward and Wilson 1978

GU–5403 740 ±50 BP

δ¹³C: -27.8‰

Sample: 2197.500121.1002073, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., stem diameter 7cm, *c* 21 annual rings (R Gale)

Initial comment: from a longshore post alignment from King's Quay embedded in intertidal silt with the exposed top subject to marine growth. The sample has been extracted from the embedded portion of the post but has been subject to boring by marine organisms.

Objectives: to date an intertidal alignment of posts which is one of a number of such structures; located at SZ 5388394112.

Calibrated date: *1σ:* cal AD 1250–1290
2σ: cal AD 1210–1390

Final comment: P Marshall (25 September 2012), the result provides a date for the outer alignment of medieval posts across the mouth of the creek at King's Quay, and shows that use of the intertidal zone took place from the prehistoric to post-medieval period.

GU–5404 500 ±50 BP

δ¹³C: -27.7‰

Sample: 2197.500122.1002154, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Acer* sp., stem diameter 5cm, *c* 20 annual rings (R Gale)

Initial comment: as GU-5403

Objectives: to date an intertidal alignment of posts which is one of a number of such structures; located at SZ 5388194097.

Calibrated date: *1σ:* cal AD 1400–1450
2σ: cal AD 1310–1460

Final comment: P Marshall (25 September 2012), the result provides a date for the eastern section of the middle alignment of post-medieval posts across the mouth of the creek at King's Quay, and shows that use of the intertidal zone took place from the prehistoric to post-medieval period. The two measurements from the structure are statistically consistent (T′=1.0; v=1; T′(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age.

References: Ward and Wilson 1978

GU–5405 460 ±50 BP

δ¹³C: -28.1‰

Sample: 2197.500124.1002075, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Corylus* sp., stem diameter 6cm, annual rings not visible (R Gale)

Initial comment: as GU-5403

Objectives: to date an intertidal alignment of posts which is one of a number of such structures; located at SZ 5381694128.

Calibrated date: *1σ:* cal AD 1420–1460
2σ: cal AD 1400–1620

Final comment: see GU-5404

GU–5406 3660 ±60 BP

δ¹³C: -32.1‰

Sample: 2027.500098.1001863, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Corylus* sp., stem diameter ?7cm (incomplete), *c* 18 annual rings (R Gale)

Initial comment: from post structure P98 driven into the submerged land surface and intertidal sediment west of a funnel-shaped embayment. The truncated top of the post was covered with marine growth and has since been removed. The sample was taken from the embedded portion of the post but may be affected by the borings of marine organisms.

Objectives: to date an intertidal alignment of posts which is one of a number of such structures; located at SZ 5836593122.

Calibrated date: *1σ:* 2140–1940 cal BC
2σ: 2210–1880 cal BC

Final comment: P Marshall (25 September 2012), the result provides a date for a group of Bronze Age stakes just above mean low-water mark at Pelhamfield.

GU–5407 3370 ±60 BP

δ¹³C: -27.2‰

Sample: 2027.500114.1001712, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., fragment from ?heartwood (R Gale)

Initial comment: from post no. 1712, a component of a cross-shore post alignment Q114 driven into palaeochannel silt. As with other samples in this series, it is been susceptible to boring by marine organisms.

Objectives: to provide a date for this particular feature, located at SZ 5694593197, which is part of a palimpsest of structures in the intertidal zone.

Calibrated date: *1σ:* 1750–1610 cal BC
2σ: 1880–1500 cal BC

Final comment: P Marshall (25 September 2012), the result provides a date for Bronze Age cross-shore alignment on the east side of the Quarr palaeochannel.

GU–5408 3590 ±50 BP

δ¹³C: -26.8‰

Sample: 2027.500087.1001816, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Alnus* sp., stem diameter *c* 7cm × 7cm, *c* 9 annual rings (R Gale)

Initial comment: from post no. 1816, a component of the small cluster of posts Q87 driven into organic silt at extreme low-water. The sample has been exposed to marine organisms.

Objectives: to establish a provisional date for this feature, located at SZ 5675493251, which was in close proximity to an extensive scatter of worked and burnt flint.

Calibrated date: *1σ:* 2030–1880 cal BC
2σ: 2130–1770 cal BC

Final comment: P Marshall (25 September 2012), the result provides a date for a small Bronze Age structure near mean low-water north of Q99 on Quarr beach.

GU–5409 500 ±50 BP

δ¹³C: -30.2‰

Sample: 2027.500043.1001396, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Alnus* sp., stem diameter *c* 7cm, 9+ annual rings (R Gale)

Initial comment: from post no. 1396, a component of a cross-shore post alignment K43. The sample was embedded in intertidal silt and has been susceptible to boring by marine organisms.

Objectives: to establish a provisional time bracket for a cross-shore post alignment, located at SZ 5724893115, which is tentatively attributed to a boat canal serving the medieval and post-medieval stone quarries at Binstead.

Calibrated date: *1σ:* cal AD 1400–1450
2σ: cal AD 1310–1460

Final comment: P Marshall (25 September 2012), the result provides a date for a medieval intertidal boat harbour or canal probably serving Binstead-Quarr stone quarries.

GU–5410 290 ±50 BP

δ¹³C: -23.2‰

Sample: 1526.500119.1002477, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Ulmus* sp., fast-grown ?stem/trunk (incomplete) (R Gale)

Initial comment: one of a complex of tightly grouped vertical studs which form a supportive platform and which appear to have served an archaic boat-building or boat-repairing slip at 'Bull's Bay'.

Objectives: to date a wooden boat-building or boat-repairing slip, located at SZ 5573093093, which is associated with a large scatter of foreign stone ballast. Quantities of Roman and medieval ceramics are scattered in the vicinity.

Calibrated date: *1σ:* cal AD 1510–1660
2σ: cal AD 1460–1955*

Final comment: P Marshall (25 September 2012), the result provides a date for a post-medieval boatyard stocks site close to mean low-water mark on the beach at Bulls Bay, Fishbourne.

GU–5411 1450 ±50 BP

δ¹³C: -27.5‰

Sample: 2027.500103.1002245, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Fraxinus* sp., stem diameter >13cm (incomplete), 15+ annual rings (R Gale)

Initial comment: from a post in longshore alignment P103 driven into intertidal sediment in a perceived funnel-shaped channel exposed at extreme low tide. The truncated top of the post has been exposed to marine growth. The sample has been removed lower down from the embedded portion of the post.

Objectives: to provide a provisional date for a significant alignment which is one of several such structures on this beach; located at SZ 5843493146. Their dates range from the late Bronze Age to medieval periods.

Calibrated date: *1σ:* cal AD 560–650
2σ: cal AD 530–670

Final comment: P Marshall (25 September 2012), the result provides a date for a Saxon longshore alignment north of a group of submerged trees at Pelhamfield. *See* also GU-5592.

GU–5412 3560 ±50 BP

δ¹³C: -28.5‰

Sample: 2027.500090.1001792, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Salix/Populus sp.*, stem (incomplete) (R Gale)

Initial comment: from post no. 1792, one of the small cluster of posts Q90 driven into organic silt at extreme low water. The post was subject to marine processes including bore worms.

Objectives: this is a component of a typical structure, located at SZ 5673693246, which is one of several on Quarr Beach. Similar structures have been dated on Binstead Beach and a comparison would be useful. The structures at Quarr are in close proximity to an extensive scatter of worked and burnt flint.

Calibrated date: *1σ:* 1960–1820 cal BC
2σ: 2040–1740 cal BC

Final comment: P Marshall (25 September 2012), the result provides a date for a an irregular group of Bronze Age stakes on Quarr beach.

Laboratory comment: English Heritage (17 December 2012), a replicate measurement (GrN-32296; 3520 ±20BP) on this sample was carried out in 2010, in order to quantify any possible contamination of the timber's radiocarbon age as a result of deterioration resulting from long-term storage. The two results are statistically consistent (T′=0.6; T′=3.8; v=1; Ward and Wilson 1978) and their weighted mean (3526 ±19 BP) calibrates to 1925–1770 cal BC at 95% confidence; Reimer *et al* 2004).

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

GU–5421 3120 ±50 BP

δ¹³C: -29.1‰

Sample: IWCAC: 2172..2004, submitted in March 1994 by D Tomalin

Material: peat (humic acid)

Initial comment: the sample has been recovered by hand excavation from a buried peat horizon, located at SZ 55439300, on the intertidal slope of a shingle spit. The sample is from the top of the uppermost peat below Ranalagh Spit North, bore hole RN [strat. unit 2]. It was overlain by 20cm of marine clay.

Objectives: to provide a date for the final phase of peat accretion at this site. The sample is directly associated with prehistoric lithic material. Its dating is critical to the establishment of the inundation history of this site and its environs.

Calibrated date: *1σ:* 1440–1300 cal BC
2σ: 1500–1260 cal BC

Final comment: P Marshall (25 September 2012), the result provides a *terminus post quem* for the inundation of the area by the sea and suggsts that the flint assemblage may be residual. This result, along with others from the peat sequence (GU-5428, GU-5422, OxA-7164, GU-5421, and OxA-7163) provide an indication of peat accumulation from the middle Neolithic to the end of the Bronze Age.

Laboratory comment: SURRC (1994): the humic acid fraction of this sample was dated.

GU–5422 4200 ±100 BP

δ¹³C: -29.5‰

Sample: IWCAC: 2172.2005, submitted in March 1994 by D Tomalin

Material: peat (humic acid)

Initial comment: extracted by a gouge auger from a bore hole through intertidal silt beneath a shingle spit, located at SZ 55419301. The sample is from the top basal peat, Ranalagh Spit, bore hole F, [strat. unit 2].

Objectives: to establish the upper date for the first phase of peat accretion at the site prior to the onset of marine conditions.

Calibrated date: *1σ:* 2910–2620 cal BC
2σ: 3030–2490 cal BC

Final comment: P Marshall (25 September 2012), the result provides a *terminus ante quem* for the first phase of peat accumulation at the site. This, along with others from the peat sequence (GU-5428, GU-5422, OxA-7164, GU-5421, and OxA-7163), provide an indication of peat accumulation from the middle Neolithic to the end of the Bronze Age.

Laboratory comment: see GU-5421

GU–5423 4540 ±50 BP

$\delta^{13}C$: -29.0‰

Sample: IWCAC: 2027.9025, submitted in March 1994 by D Tomalin

Material: peat (humic acid)

Initial comment: from a peat surface formerly exposed by wave action and since shallowly buried by sand; located at SZ 58299315 and vulnerable to boring by marine organisms. The sample came from the top of the exposed peat at trunk 6, Pelham Fields.

Objectives: to establish the upper date of coastal peat prior to environmental change and perceived sea-level rise.

Calibrated date: *1σ:* 3370–3110 cal BC
2σ: 3490–3090 cal BC

Final comment: P Marshall (25 September 2012), the result provides a *terminus post quem* for the inundation of the area by the sea and provides a seal-level index point. It also dates 'trunk 6', undated dendrochronological sample 2027.1835.

Laboratory comment: see GU-5421

GU–5424 4160 ±50 BP

$\delta^{13}C$: -28.7‰

Sample: IWCAC: 1455.1001, submitted in March 1994 by D Tomalin

Material: peat (humic acid)

Initial comment: removed from the base of the peat deposit at Newnham bog, 55cm below the surface, and located at SZ 56359162. Some earthworm activity was observed.

Objectives: to establish a *terminus post quem* for the beginning of peat accretion at this site and the commencement of the palynological sequence.

Calibrated date: *1σ:* 2880–2630 cal BC
2σ: 2900–2570 cal BC

Final comment: P Marshall (25 September 2012), the result provides a *terminus post quem* for the start of peat accumulation in the late Neolithic and a chronology for the palynological sequence.

Laboratory comment: see GU-5421

GU–5428 4340 ±60 BP

$\delta^{13}C$: -29.6‰

Sample: 2172.2006, submitted in March 1994 by D Tomalin

Material: peat (humic acid)

Initial comment: from basal peat beneath Ranalgh Spit, bore hole B (=2); across a peat deposit 21cm thick, located at SZ 55409302. Elsewhere the projected accretion of this peat has been dated by dendrochronology to 3200–2600 BC.

Objectives: to establish a provisional date for the accretion of a coastal peat deposit within the mouth of Wootton Haven. Elsewhere this horizon has been disturbed by wave action.

Calibrated date: *1σ:* 3030–2890 cal BC
2σ: 3270–2870 cal BC

Final comment: P Marshall (25 September 2012), the result provides a *terminus post quem* for the start of coastal peat accumulation and is in agreement with tree-ring dates for the start of peat accumulation elsewhere in the area that has been dated to 3200-2600 BC.

Laboratory comment: see GU-5421

Wootton-Quarr: 95A, Isle of Wight

Location: SZ 54878827
Lat. 50.41.27 N; Long. 01.13.23 W

Project manager: D Tomalin (Isle of Wight County Archaeological Centre), 1994

Archival body: Isle of Wight County Museums Service

Description: a series of waterlogged timber structures were recorded in the intertidal zone off the north-east coast of the Isle of Wight. Further features were recorded as part of on-shore field survey of the adjacent farmland.

Objectives: to provide a chronology for the use of structures in the intertidal zone, allowing them to be interpreted within the context of activity on-shore.

Final comment: D Tomalin (2012), the earliest structures revealed were two Neolithic trackways found at the extreme low-water mark (B46, GU-5582, and Q152, GU-5596). Two examples of a distinctive type of Bronze Age structure were also identified (B49, GU-5601 and B66, GU-5600). Two burnt mounds discovered during field-walking also date to this period (OxA-5483-6). Late Bronze Age activity is also attested by a range of wooden structures (F34, GU-5598, B81, GU-5584, B79, GU-5577, B18, GU-5583, and B80, GU-5599). The Saxon period saw the construction of a number of substantial post-alignemnts (P103, GU-5592, K16, GU-5591, and Q137, GU-5597). Those constructed during the medieval period (Q113, GU-5593, Q11, UB-3913–5, and Q12, UB-3916–7 and UB-3943) may have related to nearby Quarr Abbey.

Further cross-shore alignments attest to activity on the foreshore during the post-medieval period (Q130, GU-5578–9, and B135, GU-5580–1).

References: Tomalin *et al* 2012

GU–5577 2390 ±50 BP

$\delta^{13}C$: -26.1‰

Sample: IWCAC:2027..1001489, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., fast grown sapwood (J Watson)

Initial comment: from feature B79, one of a setting of posts driven into intertidal silt. The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: to confirm a previous date for this structure (Wootton 93A; GU-5339) which is of a distinctive type.

Calibrated date: *1σ:* 540–390 cal BC
2σ: 750–380 cal BC

Final comment: D Tomalin (2012), this result confirms that this structure (B79) is broadly contemporary with structures B77, B78, B80, and B81, all falling within the late Bronze Age/early Iron Age as indicated by the pottery assemblage found amongst the stakes.

Laboratory comment: see GU-5339

GU–5578 320 ±50 BP

$\delta^{13}C$: -28.3‰

Sample: IWCAC:2027..1002494, submitted in December 1994 by D Tomalin

Material: wood (waterlogged): *Corylus* sp., roundwood with surviving bark edge (J Watson)

Initial comment: a component of the line of small posts Q130 driven into intertidal silt. The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: to establish a date for this structure and compare it with GU-5579.

Calibrated date: *1σ:* cal AD 1480–1650
2σ: cal AD 1440–1790

Final comment: D Tomalin (2012), this result dates Q130 (along with GU-5579) to the medieval/post-medieval period.

GU–5579 310 ±50 BP

$\delta^{13}C$: -28.5‰

Sample: IWCAC:2027..1002493, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Fraxinus* sp., small roundwood of *c* 15 years growth (J Watson)

Initial comment: as GU-5578

Objectives: as GU-5578

Calibrated date: *1σ:* cal AD 1480–1650
2σ: cal AD 1450–1800

Final comment: see GU-5578

GU–5580 140 ±50 BP

$\delta^{13}C$: -26.6‰

Sample: IWCAC:2027..1002904, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): unidentified, roundwood with bark edge (J Watson)

Initial comment: from cross-shore feature B135 Binstead Hard, comprising large vertical planks and split timbers, and round posts with interwoven brushwood, possibly indicating two phases. The sample was taken from an embedded portion of the post but may have been subject to marine processes.

Objectives: to provide a date for this significant intertidal feature and establish whether it maybe connected with the local stone quarrying industry of the medieval period. This date should be confirmed by GU-5581.

Calibrated date: *1σ:* cal AD 1660–1950
2σ: cal AD 1650–1955*

Final comment: D Tomalin (2012), the dates provided by GU-5580 and GU-5581 on the two wooden posts do not support the theory that the hard was a landing place for ships employed in the medieval export of limestone from the Binstead quarries.

GU–5581 110 ±50 BP

$\delta^{13}C$: -28.2‰

Sample: IWCAC:2027..1002906, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): unidentified, roundwood with bark edge or *c* 4 years growth (J Watson)

Initial comment: as GU-5580

Objectives: as GU-5580

Calibrated date: *1σ:* cal AD 1680–1940
2σ: cal AD 1660–1955*

Final comment: see GU-5580

GU–5582 4140 ±50 BP

$\delta^{13}C$: -28.0‰

Sample: IWCAC:2027..1001555, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): unidentified, roundwood with bark edge (J Watson)

Initial comment: one of the double alignment of small posts B46 driven into intertidal organic silt. The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: to confirm a previous date for this structure (Wootton 93A; GU-5340).

Calibrated date: *1σ:* 2880–2620 cal BC
2σ: 2890–2500 cal BC

Final comment: D Tomalin (2012), this extensive trackway (GU-5340 and GU-5582) appears to have been constructed in an intertidal area about 500 years after Q153, Q190, and Q152 (GU-5663, -5662, and -5660 respectively), further to the east.

GU–5583 2250 ±50 BP

δ¹³C: -28.1‰

Sample: IWCAC:2027..1000925, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., slow grown, sapwood visible (only sapwood dated) (J Watson)

Initial comment: one of the alignment of posts B18 driven into intertidal silt. The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: to confirm a previous date for this structure (Wootton 92A; GU-5253).

Calibrated date: *1σ:* 400–200 cal BC
2σ: 410–190 cal BC

Final comment: D Tomalin (2012), this result provides a middle Iron Age date for structure B18. This is a particularly weak period in the tree-ring record, and remains undated by dendrochronology.

Laboratory comment: English Heritage (21 May 2014), *see* Bayliss *et al* 2013, 226 for GU-5353.

References: Bayliss *et al* 2013, 226

GU–5584 2500 ±50 BP

δ¹³C: -27.2‰

Sample: IWCAC:2027..1001520, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., with *c* 25 years of sapwood and ?>6 years of heartwood; only sapwood dated (J Watson)

Initial comment: one of the setting of posts B81 driven into intertidal silt. The sample has been taken from the embedded portion of the post but may have been subjected to marine processes.

Objectives: to provide a date for this structure which is adjacent to, and of the same distinctive type as, B79 (GU-5577 above and GU-5339; Wootton 93A). If they are contemporary, it is reasonable to assume that other such post settings may be of a similar date.

Calibrated date: *1σ:* 790–530 cal BC
2σ: 800–410 cal BC

Final comment: *see* GU-5599

GU–5591 1370 ±50 BP

δ¹³C: -26.3‰

Sample: IWCAC:2027..1000702, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): unidentified, branch of <15 years growth, outer 5 rings with bark edge (D de Moulins)

Initial comment: from post alignment K16 at low water, driven into intertidal silt. The sample has been taken from the embedded portion of the stake but may have been subject to marine processes.

Objectives: to confirm the previous dates for this structure (Wootton 92A; GU-5254–5; Bayliss *et al* 2013, 226) and check its relationship with alignments Q138, Q14, Wootton 92A; GU-5256, Q15, B17; Wootton 92A; GU-5252; Wootton 94A; GU-5400; and P103 (GU-5592 below) and Wootton 94A; GU-5411.

Calibrated date: *1σ:* cal AD 640–680
2σ: cal AD 590–770

Final comment: D J Tomalin (1993), one of three sampled posts from an extensive middle Saxon, long-shore post-alignment which approximately follows the present mean low-water line.

References: Bayliss *et al* 2013, 226

GU–5592 1320 ±50 BP

δ¹³C: -26.6‰

Sample: IWCAC:2027..1002268, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., sapwood (J Watson)

Initial comment: one of the alignment of posts P103 driven into intertidal silt, apparently across the mouth of an inlet. The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: to confirm a previous date for this structure (Wootton 94A; GU-5411) which appears to represent a period of intensive activity with longshore post alignments being constructed for some 1km at the present low water mark.

Calibrated date: *1σ:* cal AD 650–770
2σ: cal AD 640–780

Final comment: D Tomalin (2012), this result dates the discontinuous longshore aligment to the post-Roman/Saxon period. This line of stakes (P103) produced statistically consistent results with those formed by the largest structure on the beach (*see* GU-5254) and so may be part of the same episode of construction (T′=4.8; T′(5%)=12.6; v=6; Ward and Wilson 1978).

References: Ward and Wilson 1978

GU–5593 490 ±50 BP

δ¹³C: -27.6‰

Sample: IWCAC:2027..1001630, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): unidentified, roundwood with bark edge (D de Moulins)

Initial comment: one of the alignment of small posts Q113 driven into intertidal silt. The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: to confirm a previous date for this structure (Wootton 94A; GU-5383).

Calibrated date: *1σ:* cal AD 1410–1450
2σ: cal AD 1320–1470

Final comment: see GU-5383

GU–5596 4790 ±50 BP

$\delta^{13}C$: -28.0‰

Sample: IWCAC:2027..1002910, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Betula* sp., roundwood of *c* 10 years growth with bark edge (D de Moulins)

Initial comment: an upright stake from the corduroy trackway Q152 at extreme low water. The sample has been taken from the embedded portion of the stake but may have been subject to marine processes.

Objectives: this feature is one of the furthest structures from the shore and at the lowest level OD yet recorded in this area, and as such is of great importance in relation to sea-level changes in the Solent.

Calibrated date: *1σ:* 3650–3520 cal BC
2σ: 3660–3380 cal BC

Final comment: D Tomalin (2012), this result confirms the Neolithic date of the structure. *See* also GU-5561; Wootton 96A below.

Laboratory comment: English Heritage (17 December 2012), a replicate measurement (GrN-32297; 4855 ±30BP) on this sample was carried out in 2010, in order to quantify any possible contamination of the timber's radiocarbon age as a result of deterioration. The two results are statistically consistent (T′=1.2; T′=3.8; v=1; Ward and Wilson 1978) and their weighted mean (4838 ±26BP) calibrates to 3660–3530 cal BC at 95% confidence; Reimer *et al* 2004).

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

GU–5597 1380 ±50 BP

$\delta^{13}C$: -26.3‰

Sample: IWCAC:2027..1002611, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): unidentified, wood, *c* 25 rings to bark edge (J Watson)

Initial comment: one of the alignment of posts Q137 at mean low water. The sample has been taken from the embedded portion of the post but may have been subjected to marine processes.

Objectives: this line of posts may mark the westerly extent of a series of alignments at mean low water, comprising Q14 (Wootton 92A; GU-5256), Q15, K16 (Wootton 92A; GU-5254; GU-5255; GU-5256; Wootton 95A; GU-5591 above) B17 (Wootton 92A; GU-5252: Wootton 94A; GU-5400) and P103 (GU-5592 above and Wootton 94A; GU-5411), which have all been dated to the Saxon period and which reflect intensive activity in the area at a time for which little other evidence has been found on the Isle of Wight.

Calibrated date: *1σ:* cal AD 630–670
2σ: cal AD 580–770

Final comment: D Tomalin (2012), this was the most extensive structure on the beach between Quarr and Binstead, and was originally recorded as five individual alignments (Q137, GU-5997; Q14, GU-5256; Q15, GU-5254; K16, GU-5255 and GU-5591; and B17, GU-5400), until the radiocarbon results from each segment were found to be broadly contemporary in the middle Saxon period. All the radiocarbon determinations are consistent with the hypothesis that the structure was all built at once (T′=1.3; T′(5%)=9.5; v=4; Ward and Wilson 1978).
See also GU-5592.

References: Ward and Wilson 1978

GU–5598 2470 ±50 BP

$\delta^{13}C$: -27.6‰

Sample: IWCAC:1526..1002907, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., sapwood including bark (J Watson)

Initial comment: one of the alignment of posts F34 at mean low water. The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: to confirm a previous date for this structure (Wootton 92A; GU-5261).

Calibrated date: *1σ:* 770–430 cal BC
2σ: 800–400 cal BC

Final comment: D J Tomalin (1993), a typical oak post from a Bronze Age long-shore post-alignment now following the line of the approximate mean low-water mark.

GU–5599 2250 ±50 BP

$\delta^{13}C$: -27.3‰

Sample: IWCAC:2027..1001515, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): unidentified, roundwood of *c* 8 years growth with ?bark (D de Moulins)

Initial comment: one of the long rectangular setting of posts B80 driven into intertidal silt. The sample has been taken from the embeded portion of the post but may have been subject to marine processes.

Objectives: to provide a date for this structure which is adjacent to, and of the same distinctive type as, B79 (GU-5577 above; Wootton 93A; GU-5339) and B81 (GU-5584 above). If the three are contemporary it is reasonable to assume that other such post settings may be of similar date.

Calibrated date: *1σ:* 400–200 cal BC
2σ: 410–190 cal BC

Final comment: D Tomalin (2012), the radiocarbon determinations for these structures (B80; GU-5599 and B81; GU-5884) are statistically significantly different (T′=12.5; T′(5%)=3.8; v=1; Ward and Wilson 1978). However, matching tool signatures on stakes from the different structures indicate that the same tool was used to sharpen stakes from both B80 and B81, suggesting the structures were constructed at the same time (Tomalin *et al* 2012, 205).

References: Ward and Wilson 1978

GU–5600 3450 ±50 BP

δ¹³C: -28.7‰

Sample: IWCAC:2027..1001277, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): unidentified, roundwood of *c* 4 years growth with bark edge (D de Moulins)

Initial comment: one of a setting of posts B66 driven into intertidal silt. The sample has been taken from the embedded portion of the post but may have been subject to marine proceses.

Objectives: to confirm a previous date for this structure (Wootton 93A; GU-5338), which is of a distinctive type.

Calibrated date: *1σ:* 1880–1680 cal BC
2σ: 1900–1620 cal BC

Final comment: D Tomalin (2012), this result and GU-5338 date structure B66 to the Bronze Age.

GU–5601 3480 ±50 BP

δ¹³C: -27.1‰

Sample: IWCAC:2027..1001075, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): unidentified, branch of *c* 20 years growth with bark edge (D de Moulins)

Initial comment: one of the setting of posts B49 driven into intertidal silt. The sample has been taken from the embedded portion of the post but may have been subject to marine proceses.

Objectives: to confirm a previous date for this structure (Wootton 93A; GU-5337), which is of a distinctive type.

Calibrated date: *1σ:* 1890–1690 cal BC
2σ: 1940–1660 cal BC

Final comment: D Tomalin (2012), these structures are now generally attrobuted to the late Neolithic and early Bronze Age.

Laboratory comment: English Heritage (17 December 2012), a replicate measurement (GrN-32295; 3575 ±35BP) on this sample was carried out in 2010, in order to quantify any possible contamination of the timber's radiocarbon age as a result of deterioration. The two results are statistically consistent (T′=2.4; T′=3.8; v=1; Ward and Wilson 1978) and their weighted mean (3544 ±29BP) calibrates to 1960–1770 cal BC at 95% confidence; Reimer *et al* 2004).

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

OxA–5483 3715 ±55 BP

δ¹³C: -25.9‰

Sample: IWCAC: 2216 1003, submitted on 1 March 1995 by D J Tomalin

Material: charcoal: Salicaceae; *Corylus*/*Alnus* sp. (R Gale)

Initial comment: extracted from a bulk sample from the lower fill of a pit exposed in the side of an excavated section. Burnt material was seen on the surface but this feature appeared to be sealed.

Objectives: this was one of several sites observed during fieldwalking comprising dense scatters of burnt flint but little or no dateable material. A trench was cut through it, revealing small irregular pits containing burnt flint and charcoal. Similar features, as yet undated but thought to be prehistoric, are also seen in the intertidal zone.

Calibrated date: *1σ:* 2200–2020 cal BC
2σ: 2290–1940 cal BC

Final comment: D Tomalin (2002), the calibrated date range of the radiocarbon result confirms the initial interpretation that the site may represent a Bronze Age burnt mound. This contrasts with similar sites in the intertidal zone that are of Mesolithic-early Neolithic date.

Laboratory comment: English Heritage (21 May 2014), the two samples of bulk charcoal from this feature produced statistically consistent radiocarbon measurements (T′=0.8; T′(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–5484 3640 ±65 BP

δ¹³C: -24.5‰

Sample: IWCAC: 2216 1003, submitted on 1 March 1995 by D J Tomalin

Material: charcoal: Salicaceae; *Corylus*/*Alnus* sp. (R Gale)

Initial comment: extracted from the same bulk sample as OxA-5483.

Objectives: as OxA-5483

Calibrated date: *1σ:* 2140–1920 cal BC
2σ: 2200–1780 cal BC

Final comment: *see* OxA-5483

Laboratory comment: *see* OxA-5483

OxA–5485 2860 ±50 BP

$\delta^{13}C$: -26.3‰

Sample: IWCAC: 2234 1003, submitted on 1 March 1995 by D J Tomalin

Material: charcoal: ?*Prunus* sp.; *Corylus* sp. (R Gale)

Initial comment: extracted from a sample taken from a shallow pit at Combley Farm. It had a fill of dense burnt flint in a matrix of dark silty soil, exposed in the side of a drainage ditch. It was sealed by a layer containing Roman pottery.

Objectives: this feature appears to be a sealed version of a site encountered often during field walking comprising dense scatters of burnt flint but little or no dateable material. Similar features have been observed in the intertidal zone.

Calibrated date: *1σ:* 1120–930 cal BC
2σ: 1210–900 cal BC

Final comment: see OxA-5483

Final comment: R Loader (1999), the calibrated date range of the radiocarbon result confirms the initial interpretation that the site may represent a Bronze Age burnt mound. This contrasts with similar sites in the intertidal zone that are of Mesolithic-early Neolithic date.

Laboratory comment: English Heritage (21 May 2014), the two samples of bulk charcoal from this feature produced statistically consistent radiocarbon measurements (T′=0.0; T′(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–5486 2860 ±50 BP

$\delta^{13}C$: -26.3‰

Sample: IWCAC: 2234 1003, submitted on 1 March 1995 by D Tomalin

Material: charcoal: ?*Prunus* sp.; *Corylus* sp. (R Gale)

Initial comment: extracted from the same sample as OxA-5485. See above.

Objectives: as OxA-5485

Calibrated date: *1σ:* 1120–930 cal BC
2σ: 1210–900 cal BC

Final comment: see OxA-5485

Laboratory comment: see OxA-5485

UB–3913 632 ±18 BP

$\delta^{13}C$: -26.3 ±0.2‰

Sample: IWCAC:2027..1000190, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Fraxinus* sp., with sapwood and ?bark edge (J Watson)

Initial comment: a component of post alignment Q11 driven into intertidal silt. The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: one post each from alignments Q11 and Q12 have previously been dated and found to be roughly contemporary (GU-5250 and GU-5249; both from Wootton 92A; Bayliss *et al* 2013, 224–8). A further series of ten posts from each structure have been sampled to establish with more certainty how alignments Q11 and Q12 relate to each other. Are they contemporary features or do they indicate a specific rise in sea level, with Q11 being replaced by Q12?

Calibrated date: *1σ:* cal AD 1295–1390
2σ: cal AD 1290–1395

Final comment: D Tomalin (2012), this confirms a medieval date for this longshore alignment, which may have been associated with Quarr Abbey. *See* GU-5250.

Laboratory comment: Belfast (3 January 1996): this sample was pre-treated to holocellulose (Green 1963).

References: Bayliss *et al* 2013, 224-8
Green 1963

UB–3914 602 ±18 BP

$\delta^{13}C$: -27.9 ±0.2‰

Sample: IWCAC:2027..1000191, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., with sapwood (J Watson)

Initial comment: as UB-3913

Objectives: as UB-3913

Calibrated date: *1σ:* cal AD 1305–1400
2σ: cal AD 1295–1410

Final comment: see GU-5250

Laboratory comment: Belfast (6 September 1995): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963

UB–3915 618 ±17 BP

$\delta^{13}C$: -27.7 ±0.2‰

Sample: IWCAC:2027..1000193, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., with sapwood (J Watson)

Initial comment: as UB-3913

Objectives: as UB-3913

Calibrated date: *1σ:* cal AD 1300–1395
2σ: cal AD 1295–1400

Final comment: see GU-5250

Laboratory comment: Belfast (9 October 1995): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963

UB–3916 600 ±17 BP

$\delta^{13}C$: -25.2 ±0.2‰

Sample: IWCAC:2027..1000104, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., with sapwood and bark edge (J Watson)

Initial comment: a component of post alignment Q12 driven into intertidal silt. The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: as UB-3913

Calibrated date: *1σ:* cal AD 1310–1400
2σ: cal AD 1300–1410

Final comment: see GU-5249

Laboratory comment: Belfast (9 October 1995): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963

UB–3917 610 ±17 BP

$\delta^{13}C$: -27.0 ±0.2‰

Sample: IWCAC:2027..1000105, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., with sapwood (J Watson)

Initial comment: as UB-3916

Objectives: as UB-3913

Calibrated date: *1σ:* cal AD 1305–1395
2σ: cal AD 1295–1405

Final comment: see GU-5249

Laboratory comment: Belfast (9 October 1995): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963

UB–3943 665 ±17 BP

$\delta^{13}C$: -27.5 ±0.2‰

Sample: IWCAC:2027..1000113, submitted in March 1995 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., with sapwood and bark edge (J Watson)

Initial comment: as UB-3916

Objectives: as UB-3913

Calibrated date: *1σ:* cal AD 1285–1385
2σ: cal AD 1280–1390

Final comment: see GU-5249

Laboratory comment: Belfast (9 October 1995): this sample was pre-treated to holocellulose (Green 1963).

References: Green 1963

Wootton-Quarr: 96A, Isle of Wight

Location: SZ 5650693344 to SZ 5866093200
Lat. 50.44.11 N; Long. 01.11.57 W, to
Lat. 50.44.06N; Long. 01.10.07W

Project manager: D Tomalin (Isle of Wight County Archaeological Centre), 1996

Archival body: Isle of Wight County Museums Service

Description: archaeological investigations into wooden structures along the coastline at Wootton.

Objectives: to date the structures individually and to compare with each other to determine any contemporaneity.

Final comment: D J Tomalin (2012), it is difficult to suggest why three virtually contemporary trackways were constructed so close to each other (Q152, GU-5596, -5661; Q153, GU-5663, -5664; and Q190, GU-5662, -5660). Although the radiocarbon determinations are statistically consistent with each other (T′=1.8; T′(5%)=11.1; v=5; Ward and Wilson 1978), the fact that they are all of different construction might imply that they were not contemporary (Tomalin *et al* 2012, 196). They may have been constructed in response to shoreline recession, one replacing another as each became inaccessible. A fourth, similar structure (Q180, GU-5565–6) is of Bronze Age date.

References: Tomalin *et al* 2012
Ward and Wilson 1978

GU–5660 4770 ±50 BP

$\delta^{13}C$: -29.6‰

Sample: IWCAC:2027..1003106, submitted in March 1996 by D Tomalin

Material: wood (waterlogged): *Betula* sp., branch with bark edge (D de Moulins)

Initial comment: an upright post from trackway Q190 at extreme low water, possibly associated with two other trackways, Q153 (GU-5663 and GU-5664) and Q152 (GU-5661). The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: this sample is from one of three trackways at extreme low water, within less than 150m of each other. They are at the lowest recorded level OD in the intertidal zone at Quarr and as such have important implications for the study of sea-level change in the Solent. The relationship of the three structures to each other may also be clarified if they are dated.

Calibrated date: *1σ:* 3640–3510 cal BC
2σ: 3660–3370 cal BC

Final comment: D Tomalin (2012), the two structures (Q190 and Q152) were situated fairly close to one another and were roughly similar in date (GU-5660, -5662, -5340, and -5661). This result indicates that this structure was one of the earliest Neolithic trackways at Quarr, constructed during a phase of marine incursion.

GU–5661 4780 ±60 BP

$\delta^{13}C$: -28.2‰

Sample: IWCAC:2027..1003102, submitted in March 1996 by D Tomalin

Material: wood (waterlogged): *Betula* sp., branch with bark (D de Moulins)

Initial comment: an upright post from corduroy trackway Q152 at extreme low water, possibly associated with two other trackways Q153 (GU-5663 and GU-5664) and Q190 (GU-5660 and GU-5662). The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: to compare with a previous date for this structure GU-5596.

Calibrated date: *1σ:* 3650–3510 cal BC
2σ: 3660–3370 cal BC

Final comment: see GU-5596

GU–5662 4800 ±60 BP

$\delta^{13}C$: -28.0‰

Sample: IWCAC:2027..1003105, submitted in March 1996 by D Tomalin

Material: wood (waterlogged): unidentified, young roundwood (D de Moulins)

Initial comment: as GU-5660

Objectives: as GU-5660

Calibrated date: *1σ:* 3650–3520 cal BC
2σ: 3700–3370 cal BC

Final comment: D Tomalin (2012), this result dates the trackway and the top of the sediment sequence/pollen profile at -2.75m OD, placing it firmly in the early Neolithic. *See* GU-5660.

GU–5663 4860 ±70 BP

$\delta^{13}C$: -31.1‰

Sample: IWCAC:2027..1003103, submitted in March 1996 by D Tomalin

Material: wood (waterlogged): unidentified, branch with bark (D de Moulins)

Initial comment: an upright post from trackway Q153 at extreme low water, possibly associated with two other trackways Q152 (GU-5661) and Q190 (GU-5660 and GU-5662). The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: as GU-5660

Calibrated date: *1σ:* 3710–3540 cal BC
2σ: 3790–3510 cal BC

Final comment: see GU-5660

GU–5664 4730 ±80 BP

$\delta^{13}C$: -29.6‰

Sample: IWCAC:2027..1003104, submitted in March 1996 by D Tomalin

Material: wood (waterlogged): unidentified, branch with bark (D de Moulins)

Initial comment: as GU-5663

Objectives: as GU-5663

Calibrated date: *1σ:* 3640–3370 cal BC
2σ: 3660–3350 cal BC

Final comment: D Tomalin (2012), this results confirms the structure is of Neolithic date. *See* GU-5663.

GU–5665 3150 ±50 BP

$\delta^{13}C$: -28.2‰

Sample: IWCAC:2027..1003035, submitted in March 1996 by D Tomalin

Material: wood (waterlogged): *Betula* sp. (R Gale)

Initial comment: an upright post from double alignment (Q180) with horizontal hurdling. The sample has been taken from the embedded portion of the post but may have been subject to marine processes.

Objectives: this structure is composed of a double alignment of upright posts with horizontal hurdling crossing an area of very soft silt. Similar structures in the intertidal zone have been interpreted as trackways and dated to the Neolithic-Bronze Age. Dating of this structure would confirm whether it is of similar age or whether it is associated with the later nearby alignment P103 (GU-5592).

Calibrated date: *1σ:* 1500–1390 cal BC
2σ: 1510–1280 cal BC

Final comment: D Tomalin (2012), originally thought to be contemporary with the adjacent Saxon longshore alignment P103, this result (and GU-5666) confirms that structure P180 actually dates to the Bronze Age.

GU–5666 3090 ±50 BP

$\delta^{13}C$: -29.5‰

Sample: IWCAC:2027..1003050, submitted in March 1996 by D Tomalin

Material: wood (waterlogged): *Alnus* sp. (R Gale)

Initial comment: as GU-5665

Objectives: as GU-5665

Calibrated date: *1σ:* 1420–1280 cal BC
2σ: 1490–1210 cal BC

Final comment: see GU-5665

Wootton-Quarr: 96B, Isle of Wight

Location: SZ 574932
Lat. 50.44.06 N; Long. 01.11.11 W

Project manager: R Scaife (Isle of Wight Museum), 1992-4

Archival body: Isle of Wight Museum

Description: a series of cores to investigate the palaeoenvironmental record at Wootton.

Objectives: to provide a chronological framework for the environmental analysis.

References: Tomalin *et al* 2012

OxA–6350 4670 ±65 BP

δ¹³C: -26.3‰

Sample: Trunk 6 (0–1cm), submitted on 9 March 1996 by R Scaife

Material: peat (humin; dry/poor fen peat) (R Scaife 1996)

Initial comment: this sample comes from the top of a core of the best preserved foreshore peat deposits. It is considered to be much less eroded than many peat areas because of its close proximity to preserved tree trunks. The peat is highly detrital but may contain small rootlets. These were not seen during sampling.

Objectives: an assessment pollen profile has been produced. Full pollen analysis of this sequence and comparable ones in the foreshore zone will be carried out. Environmentally, the peat appears to represent the final stages of the fen peat accumulation under relatively dry fen wood conditions. This was subsequently subject to marine inundation. The date will thus have relevance for eustatic changes and for dating this vegetation phase.

Calibrated date: *1σ:* 3630–3360 cal BC
2σ: 3640–3340 cal BC

Final comment: D Tomalin (2012), this sample provides a date for the upper peat, although unfortunately the adjacent tree trunk remains undated by dendrochronology.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1997): the humin fraction of this sample was dated.

Wootton-Quarr: 97A, Isle of Wight

Location: SZ 55929322
Lat. 50.44.07 N; Long. 01.12.27 W

Project manager: D Tomalin (Isle of Wight County Archaeological Centre), 1997

Archival body: Isle of Wight Museum

Description: a series of palaeoenvironmental samples taken from a sequence through peat deposits at Fishbourne Beach, and posts from two, potentially Neolithic, structures (K45 and Q176).

Objectives: to provide a chronological framework for the environmental analysis and confirm the dating of the timber structures.

References: Tomalin *et al* 2012

GU–5693 4470 ±80 BP

δ¹³C: -27.0‰

Sample: IWCAC:1526..8029, submitted in March 1997 by D Tomalin

Material: peat (humic acid)

Initial comment: the sample was extracted from a gouge auger from a borehole through intertidal silt pH=2.2.

Objectives: the sample provides a *terminus post quem* for a key transgressive contact marking the onset of marine conditions and the cessation of a detailed palynological sequence. It fixes a key point in the reconstruction of the regional sea-level curve.

Calibrated date: *1σ:* 3350–3010 cal BC
2σ: 3490–2900 cal BC

Final comment: D Tomalin (2012), this result providea a Neolithic date for the onset of marine conditions.

Laboratory comment: SURRC (1997): the humic acid fraction of this sample was dated.

GU–5694 4830 ±80 BP

δ¹³C: -29.6‰

Sample: IWCAC:1526..8030, submitted in March 1997 by D Tomalin

Material: peat (humic acid)

Initial comment: the sample was extracted from a gouge auger from a borehole through intertidal silt pH=3.9.

Objectives: the sample provides a *terminus ante quem* for the cessation of marine conditions and the onset of coastal peat formation at a key point in the regional sea-level curve.

Calibrated date: *1σ:* 3700–3520 cal BC
2σ: 3780–3370 cal BC

Final comment: D Tomalin (2012), this result dates the commencement of peat accumulation in this incised channel, and accords or slightly precedes the onset of tree growth on the adjacent coastal peats.

Laboratory comment: see GU-5693

GU–5695 4180 ±50 BP

δ¹³C: -27.3‰

Sample: IWCAC:2027..1003193, submitted in March 1997 by D Tomalin

Material: wood (waterlogged): *Fraxinus* sp., 20 rings heartwood; 6 rings sapwood including bark (R Gale 1997)

Initial comment: an upright post from a trackway (K45) at extreme low water. The sample has been taken from the embedded portion of the post but may have been subject to marine processes, eg boring by marine organisms.

Objectives: to provide a date for this structure and to establish how it compares with the other trackways Q152, Q153, Q190, and B46. These are dated structures of known function which have some of the lowest levels OD recorded during the project and as such have important implications for the Solent sea-level chronology.

Calibrated date: *1σ:* 2890–2670 cal BC
2σ: 2900–2580 cal BC

Final comment: D Tomalin (2012), this results confirms the Neolithic date of this structure, along with GU-5696.

GU–5696 4120 ±60 BP

δ^13C: -27.7‰

Sample: IWCAC:2027..1003194, submitted in March 1997 by D Tomalin

Material: wood (waterlogged): *Fraxinus* sp., 27 rings heartwood; *c* 6 rings sapwood (R Gale 1997)

Initial comment: as GU-5695

Objectives: as GU-5695

Calibrated date: *1σ:* 2880–2570 cal BC
2σ: 2890–2480 cal BC

Final comment: see GU-5695

GU–5697 4120 ±70 BP

δ^13C: -29.4‰

Sample: IWCAC:2027..1002912, submitted in March 1997 by D Tomalin

Material: wood (waterlogged): *Fraxinus* sp., 17 rings heartwood; 6 rings sapwood (R Gale 1997)

Initial comment: one of a group of posts driven into intertidal silt (structure Q176). The sample was taken from the embedded portion of the post but may have been subject to boring by marine organisms.

Objectives: to provide a date for this structure (the points of the posts appear stone cut) and to establish whether it relates to the Neolithic trackways, which are found seaward of this complex of posts and to confirm the date of marine waterlogging at a higher sea level.

Calibrated date: *1σ:* 2880–2570 cal BC
2σ: 2900–2470 cal BC

Final comment: D Tomalin (2012), it was originally thought that structure Q176 might have formed part of a more extensive network of walkways and platforms contemporary with the trackways located 100m away (Q152, Q153, and Q190), but this radiocarbon dating has proved the trackways are earlier.

GU–5698 3790 ±50 BP

δ^13C: -27.8‰

Sample: IWCAC:2027..1002913, submitted in March 1997 by D Tomalin

Material: wood (waterlogged): *Fraxinus* sp., 23 rings heartwood (R Gale 1997)

Initial comment: as GU-5697

Objectives: to provide a date for this structure (the points of the posts appear stone cut) and to establish whether it relates to the Neolithic trackways, which are found seaward of this complex of posts, where marine inundation is evident at a lower level.

Calibrated date: *1σ:* 2300–2140 cal BC
2σ: 2460–2030 cal BC

Final comment: see GU-5697

Wootton-Quarr: Duxmore Combe, Ryde, Isle of Wight

Location: SZ 55278748
Lat. 50.41.02 N; Long. 01.13.03 W

Project manager: D Tomalin (Isle of Wight County Archaeological Centre), 1991

Archival body: Isle of Wight Museum

Description: the site lies at the head of one of the three principal streams which feed the catchment of Wootton Creek. The combe is a small, narrow, north facing scarp-slope valley in the Sandown anticline at Arreton Down. The valley floor is less than 60m wide and 200m long and rises sharply with steep parallel sides. It comprises almost 3m of post-glacial deposit resting on weathered Upper Chalk on the valley sides and chalky periglacial solifluction material in the valley floor.

Objectives: to date a Beaker period postpit revealed in section beneath *c* 2m of colluvium.

References: Bronk Ramsey *et al* 1999, 200
Tomalin *et al* 2012

OxA–7182 3620 ±60 BP

δ^13C: -24.5‰

Sample: IWAC:2129.26.1513, submitted in March 1997 by D Tomalin

Material: charcoal: *Corylus* sp. (R Gale 1997)

Initial comment: extracted from a hearth/pit revealed in section beneath 2m of colluvium at Duxmore Combe at the head of the Wootton stream.

Objectives: the sample would date the contact between the mature Holocene palaeosoil and the onset of the colluvial sequence at the head of the Wootton stream. It serves to fix a master environmental event which may serve to explain the siltation at the river mouth at Wootton haven.

Calibrated date: *1σ:* 2120–1890 cal BC
2σ: 2200–1770 cal BC

Final comment: R Loader (1999), this sample provides a date for the first phase of human activity within the combe, and the onset of a humanly induced colluvial sequence which can be compared with the alluvial events in the estuarine section of the Wootton valley.

Final comment: D Tomalin (2012), the date confirms that structures were erected on the floor of the combe at the opening of the second millennium cal BC. The date also agreeably compliments the typological dating of the Beaker pottery found in the context.

Laboratory comment: ORAU (8 December 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

Wootton-Quarr: Newton 94C, Isle of Wight

Location: SZ 41819194
Lat. 50.43.30 N; Long. 01.24.27 W

Project manager: D J Tomalin (Isle of Wight County Council), 1994

Archival body: Isle of Wight Museum

Description: up to 15m of fluvio-marine sediments at the mouth of Newton Creek in the Western Yar Valley.

Objectives: to provide a chronology for the sequence of eustatic change that was first established by Devoy (1979).

Final comment: P Marshall (25 September 2012), the samples come from core 3 retrived from Yarmouth West Spit. The western Yar is a ria inlet similar to Wooton Haven, containing a similar pattern of sedimentation. Four cores were cut in the Yar using a combination of techniques. Core 3 was pressed to bedrock at a depth of -12.3m OD. The core identified a total of 21 stratigraphic units including four horizons of peat.

References: Devoy 1979
Tomalin *et al* 2012

GU–5425 5060 ±70 BP

$\delta^{13}C$: -27.3‰

Sample: IWCAC: 2175 1014, submitted in March 1994 by D Tomalin

Material: peat (humic acid)

Initial comment: this sample represents the uppermost 16cm of a peat horizon with a total thickness of 39cm, [stratigraphic unit 2]. It has been extracted by gouge auger at a depth of -3.15m OD.

Objectives: to establish the close of peat accretion and the onset of salt marsh conditions and the establishment of a subsequent Neolithic activity. This is a significant environmental change in the coastal and sea-level history of the site.

Calibrated date: *1σ:* 3960–3770 cal BC
2σ: 3990–3690 cal BC

Final comment: D Tomalin (1994), this date, although rechecked by the laboratory, is strangely old for the strata above GU-5423 (Wootton-Quarr: 94A).

Laboratory comment: SURRC (1994): the humic acid fraction of this sample was dated.

GU–5426 4390 ±50 BP

$\delta^{13}C$: -28.0‰

Sample: IWCAC: 2175 1015, submitted in March 1994 by D J Tomalin

Material: peat (humic acid)

Initial comment: the sample represents a peat horizon [stratigraphic unit 4] with a thickness of 10cm. It is succeeded after a short silt influx by an upper horizon [stratigraphic unit 2]. The sample has been extracted at a depth of *c* -4m OD from river/estuary silts.

Objectives: to date the cessation of marine conditions and the onset of peat accretion. It proffers a date for a significant stand-still in the sea-level and coastal history of the Solent.

Calibrated date: *1σ:* 3100–2910 cal BC
2σ: 3330–2900 cal BC

Final comment: D Tomalin (1994), this date accords well with GU-5419 from nearby Yarmouth (*see* Wootton-Quarr: Yar 94B, below), and dates the onset of peat formation.

Laboratory comment: see GU-5425

GU–5427 7570 ±0 BP

$\delta^{13}C$: -29.4‰

Sample: 2175.16.1017, submitted in March 1994 by D Tomalin

Material: sediment (humic acid; organic silt, gyttja) (R Scaife 1994)

Initial comment: extracted at a depth of -13m OD in a borehole. It was overlain by sandy silt followed by peaty silt.

Objectives: to establish a *terminus post quem* for still water conditions at this site and a *terminus ante quem* for the accretion of peaty silt in which early human activity is suspected. It also provides critical evidence for the formulation of the regional coastal morphology model and sea-level change chronology.

Calibrated date: *1σ:* 6445–6430 cal BC
2σ: 6455–6425 cal BC

Final comment: D Tomalin (1994), this date compares well with GU-5397 and GU-542 (WoottonQuarr: Yar 94B, below).

Laboratory comment: see GU-5425

OxA–4778 4570 ±65 BP

$\delta^{13}C$: -27.1‰

Sample: IWCAC: 2175 1016, submitted in March 1994 by D J Tomalin

Material: peat (humin)

Initial comment: the sample represents a thin peat horizon (stratigraphic unit 7) at a depth of -7.50m in river/estuary alluvium.

Objectives: to date the short period of environmental stability closely preceding the onset of marine conditions and perceived sea-level rise.

Calibrated date: *1σ:* 3490–3120 cal BC
2σ: 3520–3090 cal BC

Final comment: D Tomalin (1994), the date has provided an index point with which to reconstruct past sea-level change.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1994): the humin fraction of this sample was dated.

Wootton-Quarr: Q4, Isle of Wight

Location: SZ 5689593082
Lat. 50.44.02 N; Long. 01.11.37 W

Project manager: R Scaife (Isle of Wight County Archaeological Centre), 1992–4

Archival body: Isle of Wight County Museums Service

Description: a Romano-British brushwood and timber feature situated on the margins of the Quarr palaeochannel 180m from the coastline at Quarr. Below the timber structure, the palaeochannel comprises homogeneous grey marine/silt marsh clay overlying an organic peat/silt with some wood fragments.

Objectives: an interdisciplinary environmental study was made of the sediments down to the underlying peat sequence. Dating of a horizon from the stratigraphic sequence that shows evidence of a marine transgression will provide an index point for reconstructing past sea-level change in the region.

References: Tomalin *et al* 2012

OxA–6351 4740 ±65 BP

δ¹³C: -26.3‰

Sample: Q4-82/83, submitted on 9 March 1996 by D J Tomalin

Material: peat (humin; silty)

Initial comment: this sample (82.5–83.5cm) is taken from a sediment profile underlying a dated Romano-British structure. The date required comes from the changing stratigraphy from peat to marine sediments. Pollen analysis has been carried out to detail this environmental change.

Objectives: the stratigraphical boundary change from lower peat to marine sediments is accompanied by rising Chenopodiaceae values. This is a clear change to marine conditions and consequent environmental changes which influenced greatly the prehistoric activity which took place on the foreshore at Quarr. Biostratigraphy, OD height, and radiocarbon dating will provide an important sea-level change dating point.

Calibrated date: *1σ:* 3640–3370 cal BC
2σ: 3660–3360 cal BC

Final comment: D Tomalin (1996), dating of the horizon, which represents an important and final marine transgression, has provided an index point for reconstructing sea-level change in the region.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1997): the humin fraction of this sample was dated.

Wootton-Quarr: Quarr Site Q99, Isle of Wight

Location: SZ 574932
Lat. 50.44.06 N; Long. 01.11.11 W

Project manager: R Scaife (Isle of Wight County Council), 1992–4

Archival body: Isle of Wight Museum

Description: a large concentration of burnt flint and debitage situated in the western margin of the Quarr palaeovalley. It lies on the mean low water mark immediately north of the Quarr Abbey gate.

Objectives: to provide a chronological framework for palynological analysis that was undertaken on a core from the site, and to characterise the environment of the flint scatter.

References: Tomalin *et al* 2012

OxA–6352 5300 ±65 BP

δ¹³C: -25.1‰

Sample: Q99-36, submitted in March 1996 by R Scaife

Material: peat (humin; silty)

Initial comment: the sample represents a stratigraphical change accompanied by pollen assemblage changes. The stratigraphy changes from less organic silts to more organic silts representing changing marine conditions. This is paralleled as by fluctuating Chenopodiaceae pollen values. Possible contaminants may include rootlets but the sample appears to be largely organic detritus.

Objectives: to provide a valuable sea-level change dating point. This will form part of the anticipated sea-level change curve which will span the last 8000 years. The date has a direct relevance to understanding the rise of the pollen/vegetational history of the region.

Calibrated date: *1σ:* 4240–4000 cal BC
2σ: 4330–3970 cal BC

Final comment: D Tomalin (2012), the date provides an important reference point for marine regression or standstill caused by eustatic changes in the region. As a basal sample from the peat, it provides a *terminus post quem* for the cessation of the silt accretion and scattering of burnt flint on the top of this profile. It confirms that the gathering and heating of flint had, in all probability, taken place in the late fifth millennium cal BC.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1997): the humin fraction of this sample was dated.

OxA–6353 5145 ±65 BP

δ¹³C: -27.1‰

Sample: Q99-78, submitted in March 1996 by R Scaife

Material: peat (humin)

Initial comment: from basal organic material resting on basal bedrock/soil. This is the lowest part of the best preserved foreshore peat/sediment sequence. It marks the start of organic deposition in the archaeological zone being investigated.

Objectives: to provide a dated and surveyed dating point for major environmental changes of this region. Because of its importance full and detailed pollen analysis will be carried out. The results will be especially relevant to vegetation change and fluctuations in base level.

Calibrated date: *1σ:* 4040–3810 cal BC
2σ: 4050–3780 cal BC

Final comment: D Tomalin (2012), the date has provided an index point for the initial inundation of the interfluves from the adjacent palaeochannels and development of a saltmarsh at the Quarr foreshore. It confirms that the gathering and heating of flint had, in all probability, taken place in the late fifth millennium cal BC.

Laboratory comment: see OxA-6352

OxA–7183 4645 ±65 BP

δ¹³C: -26.0‰

Sample: IWCAC: 2027 9047, submitted in March 1997 by D J Tomalin

Material: charcoal: *Quercus* sp., sapwood; Salicaceae (R Gale 1997)

Initial comment: charcoal extracted from sealed context beneath peat in intertidal zone. Vulnerable to boring by marine organisms.

Objectives: to provide a date for human activity at Site Q99 at the termination of the saltmarsh phase prior to peat accretion. This has important implications for the Solent sea-level chronology.

Calibrated date: *1σ:* 3520–3350 cal BC
2σ: 3640–3130 cal BC

Final comment: R Loader (1999), the sample provides a date for the transition from saltmarsh to woodland at this location and a *terminus ante quem* for the lithics, but a date for material more closely associated with the flintwork is still required.

Laboratory comment: ORAU (8 December 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Bronk Ramsey *et al* 1999, 200

Wootton-Quarr: Ranalagh Spit, Ryde, Isle of Wight

Location: SZ 55439300
Lat. 50.44.00 N; Long. 01.12.52 W

Project manager: R Scaife (Isle of Wight Museum), 1993

Archival body: Isle of Wight Museum

Description: the site lies in the position of the spit in the mouth of Wootton Creek at a point mid-way between the 'up-valley' sequence at Firestone Copse and the coastal foreshore zone between Wootton Haven and Quarr. Coring revealed a thick sequence of sediments with peat filled channels.

Objectives: as the sedimentary sequence at the site is considered to be one of the key environmental sites in the project zone dates were required from key horizons as part of the reconstruction of past Solent sea levels.

Final comment: R Loader (1999), samples OxA-7161–4 were recovered from cores taken through up to 10m of sediment at Ranelagh Spit at the mouth of Wootton Creek. This site provides one of the key sequences for coastal evolution and sea-level rise in the eastern Solent. The four dates for peat/sediment contacts have been used in the creation of a sea-level curve for the Solent area.

References: Bronk Ramsey *et al* 1999, 200
Tomalin *et al* 2012

OxA–7161 4400 ±60 BP

δ¹³C: -28.2‰

Sample: IWAC:2172..2007, submitted in March 1997 by R Scaife

Material: sediment (humin; organic silt) (R Scaife 1997)

Initial comment: the sample was extracted by gouge auger from a borehole beneath a shingle spit at a depth of -2.06m OD (pH=3.4).

Objectives: to provide a date for the horizon of increased *Chenopodium*-type pollen, identifying the threshold of marine conditions. This has important implications for the Solent sea level chronology.

Calibrated date: *1σ:* 3270–2910 cal BC
2σ: 3340–2890 cal BC

Final comment: R Loader (1999), the date obtained corresponds with the general range of late Neolithic-early Bronze age peats from Fishbourne/Wootton Haven, Quarr, and Binstead.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1997): the humin fraction of this sample was dated.

Laboratory comment: ORAU (8 December 1997): this sample was pre-treated using an acid-base-acid protocol with a bleaching step (Brock *et al* 2010, table 1; pre-treatment code UV).

References: Brock *et al* 2010

OxA–7162 4210 ±55 BP

δ¹³C: -27.8‰

Sample: IWAC:2172..2008, submitted in March 1997 by R Scaife

Material: sediment (humin; organic silt) (R Scaife 1997)

Initial comment: the sample was extracted by gouge auger at a depth of -1.54m OD (pH=2.7).

Objectives: this sample will provide a date for the transition to full estuarine conditions at the mouth of Wootton Creek.

Calibrated date: *1σ:* 2900–2700 cal BC
2σ: 2920–2620 cal BC

Final comment: R Loader (1999), the date obtained has provided a date for the transition to full estuarine conditions at the mouth of Wootton Creek.

Laboratory comment: see OxA-7161

Laboratory comment: ORAU (8 December 1997): this sample was pre-treated using an acid-base-acid protocol with a bleaching step (Brock *et al* 2010, table 1; pre-treatment code UV).

References: Brock *et al* 2010

OxA–7163 2680 ±60 BP

$\delta^{13}C$: -27.5‰

Sample: IWAC:2172..2009, submitted in March 1997 by R Scaife

Material: peat (humin) (R Scaife 1997)

Initial comment: sample taken from gouge auger core. It represents the top of upper peat layer beneath estuarine silt and may have been subject to boring by marine organisms (pH=3.5).

Objectives: the sample provides a *terminus post quem* for the transition to marine conditions due to sea-level rise above 0m OD. It is a context providing evidence of prehistoric human activity and palynological evidence of coastal environmental change. The dating of this context provides a key point in environmental reconstruction.

Calibrated date: *1σ:* 900–800 cal BC
2σ: 970–780 cal BC

Final comment: R Loader (1999), the calibrated date has provided a *terminus post quem* for the transition to marine sedimentation. The date contrasts with that from core D (12m further from the shoreline) where the transition to marine conditions takes place at 1520–1260 cal BC (GU-5421; 3120 ±60 BP; Reimer *et al* 2004).

Final comment: D Tomalin (2012), the series of results from the peat sequence (GU-5421–2, GU-5428, and OxA-7163–4; Wootton-Quarr 94A) provide an indication of the peat accumulation from the middle Neolithic to end of the Bronze Age.

Laboratory comment: see OxA-7161

References: Reimer *et al* 2004

OxA–7164 3800 ±60 BP

$\delta^{13}C$: -28.3‰

Sample: IWAC:2172..2009, submitted in March 1997 by R Scaife

Material: peat (humin; organic silt) (R Scaife 1997)

Initial comment: a sample taken from a gouge auger core in a sea-water environment (pH=3.8 from the base of the upper peat).

Objectives: the sample provides a *terminus post quem* for the onset of brackish wetland conditions and cessation of marine conditions above -1m OD. It provides a key date in the regional sea-level curve and a baseline date for the interpretation of a detailed palynological sequence.

Calibrated date: *1σ:* 2340–2140 cal BC
2σ: 2470–2030 cal BC

Final comment: R Loader (1999), the calibrated date has provided a *terminus post quem* for the onset of brackish wetland conditions. *See* also OxA-7163.

Laboratory comment: see OxA-7161

Wootton-Quarr: trackway Q190, Ryde, Isle of Wight

Location: SZ 5653193338
Lat. 50.44.11 N; Long. 01.11.56 W

Project manager: R Scaife (Isle of Wight County Archaeological Centre), 1996

Archival body: Isle of Wight Museum

Description: five Neolithic trackways have been exposed in foreshore sediments between Quarr and Ryde. A core was taken from sediments underlying track Q190 to provide information about the environment in which the trackways were constructed.

Objectives: to provide a chronological framework for palaeoenvironmental work at the site.

References: Bronk Ramsey *et al* 1999, 200
Tomalin *et al* 2012

OxA–7165 5470 ±80 BP

$\delta^{13}C$: -27.6‰

Sample: IWAC:2027..9048, submitted in March 1997 by R Scaife

Material: peat (humin; organic silt) (R Scaife 1996)

Initial comment: the sample was extracted from a Russian auger column taken through Neolithic trackway, Q190 (GU-5660; GU-5662; Wootton-Quarr 96A). It represents the top 3cm of peat which underlies the marine silt across which the trackway was constructed (pH=3.7) at a height of -3.07 to -3.10m.

Objectives: the sample seeks to date the change from fen conditions to saltmarsh environment beneath Neolithic trackway Q190, revealed by palynology and thus date a stage in the sea-level chronology of the Solent.

Calibrated date: *1σ:* 4370–4250 cal BC
2σ: 4460–4070 cal BC

Final comment: R Loader (1999), the sample provides an acceptable date for the change from damp woodland to saltmarsh in this sequence, which eventually necessitated the construction of the trackway. The calibrated date for the change to a saltmarsh environment from fen conditions at the site is an important index point for reconstruction past sea-level change in the Solent.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (1997): the humin fraction of this sample was dated.

Wootton-Quarr: Yar 94B, Isle of Wight

Location: SZ 34988965 to SZ 370905
Lat. 50.42.17 N; Long. 01.30.16 W, to
Lat. 50.42.45N; Long. 01.28.33W

Project manager: D Tomalin (Isle of Wight County Archaeological Centre), 1993–4

Archival body: Isle of Wight Museum

Description: a palaeoenvironmental sequence through peat deposits.

Objectives: to provide a chronological framework for the environmental analysis.

GU–5382 5680 ±100 BP

$\delta^{13}C$: -27.9‰

Sample: 2241.1002, submitted in February 1994 by D Tomalin

Material: peat (humic aid) (R Scaife)

Initial comment: the sample comprises the basal 10cm rim of a peat layer with a total thickness of 94cm.

Objectives: to provide a provisional date for the onset of peat accretion on the Solent coast prior to marine inundation.

Calibrated date: *1σ:* 4680–4370 cal BC
2σ: 4770–4330 cal BC

Final comment: P Marshall (25 September 2012), the dates provides a *terminus ante quem* for the deposition of organic silt below peat layer (unit 10) at -6.5m OD.

Laboratory comment: SURRC (1994): the humic acid fraction of this sample was dated.

GU–5397 7230 ±110 BP

$\delta^{13}C$: -27.3‰

Sample: 2241.1001, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Quercus* sp., heartwood (C Dickson)

Initial comment: recovered from a depth of 10.30-10.45m in the palaeovalley fill of the Western Yar River. It marks a transition tentatively ascribed to a change from low-energy deposition of laminated silts to possible brackish water conditions.

Objectives: to provide a general date for a significant environmental change in the early inundation of the Yar River and a stage in the sea-level chronology of the Solent.

Calibrated date: *1σ:* 6230–6000 cal BC
2σ: 6370–5890 cal BC

Final comment: P Marshall (25 September 2012), the date provides a date for stratigraphic unit 17 (lower peat) at -9.3m OD.

GU–5419 4730 ±50 BP

$\delta^{13}C$: -30.0‰

Sample: IWCAC:2241.1003, submitted in March 1994 by D Tomalin

Material: peat (humic aid)

Initial comment: extracted from gouge auger at a depth of 6.6m below a coastal sandspit. The overlying deposit was ancient marine silt.

Objectives: to provide a *terminus ante quem* for the onset of marine conditions and perceived sea-level rise.

Calibrated date: *1σ:* 3640–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: P Marshall (25 September 2012), the date provides a *terminus post quem* for the deposition of marine silt above peat layer (unit 10) at -5.6m OD.

Laboratory comment: see GU-5382

GU–5420 7440 ±60 BP

$\delta^{13}C$: -25.4‰

Sample: 36016.0002.5004, submitted in February 1994 by D Tomalin

Material: wood (waterlogged): *Quercus* sp. (C Dickson)

Initial comment: from a tree bole which is one of many rooted into a deeply submerged peat land surface sampled by divers at Bouldnor.

Objectives: the dating of this land surface should provide a *terminus post quem* for an episodic flooding of the Solent valley.

Calibrated date: *1σ:* 6400–6230 cal BC
2σ: 6440–6210 cal BC

Final comment: P Marshall (25 September 2012), the date provides a date for the oak tree bole, one of many rooted in a peat land-surface at the foot of the underwater cliff at approximately -12m OD

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: Bell and Hey 1996
Hey *et al* 1999
Hey *et al* 2011

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 × 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).

References: Bayliss *et al* 2013, 235–6
Hey *et al* 2011
Hey 2004

GU–5715 2600 ±60 BP

$\delta^{13}C$: -27.8‰

Sample: YFP92 115 (a) (W24), submitted on 23 January 1998 by C Bell

Material: wood (waterlogged): *Quercus* sp., roundwood, coppice (M Taylor)

Initial comment: from a piece of wood, sample W24, from layer 115 of waterlogged silt within a palaeochannel. The wood was taken from a clearly defined layer of woodworking debris sealed within the stratigraphic sequence of the channel deposits. The level at which this deposit occurred in the sequence suggests a Bronze Age date for this activity. The channel itself was sealed beneath a deep build-up of alluvium.

Objectives: to establish the date of the woodworking activity and add to the chronology of the stratified sequence of deposits within the channel, which are otherwise poorly dated.

Calibrated date: *1σ:* 810–770 cal BC
2σ: 890–540 cal BC

Final comment: G Hey (12 October 2004), the combined date from this sample and GU-5716, and their position in the chronological sequence of the channel, suggest an early Iron Age date for this woodworking debris. This is later than anticipated, given the proximity of Bronze Age settlement evidence, and suggests that the debris belongs to activity associated with the Iron Age settlement site 400m away on the second gravel terrace. It may have formed part of a drovers river crossing.

GU–5716 2520 ±50 BP

$\delta^{13}C$: -26.0‰

Sample: YFP92 115 (b) (W34), submitted on 23 January 1998 by C Bell

Material: wood (waterlogged): *Quercus* sp., roundwood, coppice (M Taylor)

Initial comment: the sample consists of two pieces of wood, sample W34, from layer 115 of the waterlogged silt within the palaeochannel.

Objectives: as GU-5715

Calibrated date: *1σ:* 800–540 cal BC
2σ: 810–430 cal BC

Final comment: see GU-5715

GU–5717 2520 ±50 BP

$\delta^{13}C$: -25.9‰

Sample: YFP92 119 (a) (W76), submitted on 23 January 1998 by C Bell

Material: wood (waterlogged): *Quercus* sp., sapwood (M Taylor)

Initial comment: the sample consists of two pieces of wood, sample W76, from layer 119 of the waterlogged silt within the palaeochannel.

Objectives: as GU-5715

Calibrated date: *1σ:* 800–540 cal BC
2σ: 810–430 cal BC

Final comment: G Hey (12 October 2004), the combined date from this sample and GU-5718, and their position in the chronological sequence of the channel, suggest a late Bronze Age/early Iron Age date for this woodworking debris. This may support the suggestion that there was activity within the channel associated with the adjacent Bronze Age settlement evidence. Alternatively this material may have been generated during the life of the Iron Age settlement site 400m away on the second gravel terrace. It may have formed part of a drovers river crossing.

GU–5718 2570 ±60 BP

δ¹³C: -25.1‰

Sample: YFP92 119 (b) (W77), submitted on 23 January 1998 by C Bell

Material: wood (waterlogged): *Quercus* sp., roundwood (M Taylor)

Initial comment: the sample consists of two pieces of wood, sample W77, from later 119 of the waterlogged silt within the palaeochannel.

Objectives: as GU-5718

Calibrated date: *1σ:* 810–670 cal BC
2σ: 830–530 cal BC

Final comment: see GU-5717

UB–4060 2465 ±18 BP

δ¹³C: -26.7 ±0.2‰

Sample: YFP92 W63 (C112), submitted on 7 March 1996 by C Bell

Material: wood (waterlogged): *Quercus* sp., sapwood (M Taylor)

Initial comment: from a piece of wood, sample W63, which formed part of a double row of wooden uprights which crossed a palaeochannel at right angles, and these appeared to represent the remains of a wooden structure, possibly some form of crossing platform, bridge or jetty. The level at which the uprights were driven in through the channel deposits indicated that the structure most probably dates from the late Bronze Age.

Objectives: to establish the date of the wooden structure and, in conjunction with other dates, to date the stratified sequence of deposits within the channel, which are otherwise poorly dated. This information would then also be used to establish the relationship between the various activities associated with the palaeochannel and the Bronze Age occupation activity in the areas adjacent to the channel.

Calibrated date: *1σ:* 750–535 cal BC
2σ: 760–485 cal BC

Final comment: G Hey (12 October 2004), this result, in combination with UB-4676 (2424 ±16 BP; 730–405 cal BC at 95% confidence; Reimer *et al* 2004) 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, 2585 ±75 BP, UB-4060, UB-4676, 2424 ±16 BP, and UB-4677; T′=116.9; T′(5%)=7.8; *v*=3; Ward and Wilson 1978). OxA-3644 is slightly earlier than UB-4060 and UB-4677, which are statistically consistent (T′=2.9; T′(5%)=3.8; *v*=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

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.

References: Hey *et al* 2011

OxA–7360 1675 ±55 BP

δ¹³C: -24.5‰

Sample: Oxey Mead 3/7, submitted in July 1997 by G Hey

Material: waterlogged plant macrofossils (seeds of plants without underwater leaves including *Crataegus* sp., *Ranunculus repens, Polygonum persicaria, Rumex* spp., *Hyoscyamus niger*, *Iris pseudacorus*) (M Robinson)

Initial comment: from 0.85m to 0.95m below the base of the modern ploughsoil, within a layer of greenish-brown silt (3/7).

Objectives: to shed light on the date of the sedimentary sequence in this part of the channel and, therefore, the macrobotanical and pollen evidence found within it. In particular, it is is important to estimate the date at which the hay meadow (as opposed to pasture) was established in this part of the Thames floodplain.

Calibrated date: *1σ:* cal AD 260–420
2σ: cal AD 240–540

Final comment: G Hey (29 January 2001), this sample came from inorganic deposits beneath the Saxon organic layers. It supports a Roman date for the influx of quantities of sediment which probably resulted from intensive arable agriculture. The sample provided a useful result for constraining the date ranges of the Saxon dates below.

References: Bronk Ramsey *et al* 2002, 50

Yarnton Iron Age and Roman: site 2 (alluviation), Oxfordshire

Location: SP 474108
Lat. 51.47.36 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeological Unit), 1992–3

Archival body: Oxfordshire County Museums Service

Description: site 2, measuring 100m × 60m, was a low-lying area to the south of an old river channel on the Yarnton floodplain. It was excavated to examine linear ditches and alignments of pits and slots running down to the channel. The site was overlain by alluvium at a comparatively early date.

Objectives: to provide a chronology for the ditch, which forms an important element of a presumed ceremonial site of Neolithic and early Bronze Age date. The ditch cut through the ground surface up on which an important assemblage of finds was deposited.

Final comment: G Hey (12 October 2004), this series provides two important dates for the accumulation of alluviation over this very low-lying part of the floodplain. Inorganic sediment accumulated in open features from the middle Iron Age, and over the ground surface in general from the late Iron Age to early Roman period. These dates are much as anticipated, but help to provide an absolute chronological framework within which to reconstruct environmental change. What is of greater surprise is the difference in deposition within the top of a ditch (inorganic) and the bottom of the adjacent palaeochannel (organic at section B) in the middle Iron Age. This inconsistency remains to be resolved, but may be associated with localised ground disturbance next to the ditch at this time.

References: Hey *et al* 2011

OxA–6616 2215 ±45 BP

$\delta^{13}C$: -27.0‰

Sample: YFP 2835 a, submitted on 7 March 1996 by G Hey

Material: waterlogged plant macrofossils (mixed aerial species, seeds) (M Robinson)

Initial comment: from a soil sample taken from the upper fill of the latest cut of a linear ditch (context group 72). The material was preserved in a waterlogged condition and must have been at or near the water table at the time of deposition.

Objectives: to show the date at which the ditch was finally filled. As the deposit seems to be of an alluvial nature it should also demonstrate the date of the earliest alluvium on the site.

Calibrated date: *1σ:* 380–200 cal BC
2σ: 400–160 cal BC

Final comment: G Hey (12 October 2004), this result indicates that this linear ditch, which was cut in the middle Bronze Age period, finally silted with overbank alluvium in the middle Iron Age. This is perhaps surprising given that the lowest organic sediment in the adjacent channel (section A) was of a similar date. The differences in deposition remain to be resolved, but may indicate that the inorganic soil content derived from the immediate area of the ditch, and suggests ground disturbance at this time.

Laboratory comment: ORAU (17 April 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

OxA–6618 1975 ±40 BP

$\delta^{13}C$: -26.5‰

Sample: YFP 2004 (a), submitted on 7 March 1996 by G Hey

Material: waterlogged plant macrofossils (seeds of aerial-leaved plants) (M Robinson)

Initial comment: from a soil sample taken from alluvium adjacent to the possibly Neolithic ditch and overlying a buried ground surface. The material was preserved in a waterlogged condition and must have been at or near the water table at the time of deposition.

Objectives: to show the date at which alluvium began to be deposited on the site and provide a *terminus ante quem* for the ceremonial features.

Calibrated date: *1σ:* 40 cal BC–cal AD 70
2σ: 60 cal BC–cal AD 130

Final comment: G Hey (12 October 2004), the result shows that there was widespread overbank alluviation from the late Iron Age to early Roman period on this very low-lying part of the floodplain. This date is much as anticipated, but helps to provide an absolute chronological framework within which to reconstruct environmental change.

Laboratory comment: ORAU (17 April 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

Yarnton Iron Age and Roman: Worton, Rectory Farm, cemetery, Oxfordshire

Location: SP 474113
Lat. 51.47.52 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeological Unit), 1990

Archival body: Oxfordshire County Museums Service

Description: the early to late Iron Age settlement at Yarnton lay on the edge of the gravel terrace overlooking the floodplain of the Thames. This was one of a string of small settlements located on this topography, spaced at intervals of around 1.5km, between the river Evenlode and an old course of the river Cherwell. Six cremation burials and 46 inhumation burials were recorded, but only a single urned cremation burial within an early Roman vessel could be securely dated by conventional means.

Objectives: the dating programme was set up to test whether the burials were contemporary with the late Roman or early phase of Anglo-Saxon activity.

Final comment: G Hey (12 October 2004), the results successfully dated nine of the crouched inhumations in different parts of the small cemetery. These were all middle Iron Age in date, a result that was surprising given the paucity of evidence for burial in cemeteries in Britain at this time. All the dated individuals could have been buried within a relatively short period of time, begging the question of whether this was a short-lived practice or whether other middle Iron Age inhumation cemeteries exist but are not commonly found, either because evaluation techniques are poor at locating flat graves with unaccompanied burials, or because archaeologists do not look in the right place.

Laboratory comment: English Heritage (2011), chronological modelling of the results suggests that burial started in *420–230 cal BC (95% probability)*, and ended in *290–150 cal BC (95% probability)*, spanning a period of *1–220 years (95% probability)* (fig. 13.1B; Hey *et al* 2011). It is most likely, however, that this cemetery was used for a relatively short period during the third century BC (fig. 13.1A; Hey *et al* 2011).

References: Hey *et al* 1999
Hey *et al* 2011
Hey 2004

UB–3776 2250 ±21 BP

$\delta^{13}C$: -20.6 ±0.2‰

Sample: SK1681 CB/5, submitted on 18 February 1994 by G Hey

Material: human bone (right and left femur, left humerus, ribs, vertebrae) (A Boyle)

Initial comment: from burial 1681, located in an area of late Iron Age and Roman activity. The burial overlay a series of late Romano-British ditches.

Objectives: the potential of all the inhumations from Yarnton, which are mostly unaccompanied, depends largely on more precise dating. They may be late-Roman/sub-Roman/Romano-Saxon/Anglo-Saxon. It is hoped that dates will establish whether or not there are chronological differences between the distinct groups of inhumations across the site.

Calibrated date: *1σ:* 380–230 cal BC
2σ: 395–205 cal BC

Final comment: G Hey (12 October 2004), the dated individual was one of 35 crouched inhumations placed within a small cemetery to the south-east of the Yarnton Iron Age and Roman settlement. The middle Iron Age date was surprising given the paucity of evidence for cemeteries of this date in Britain. The burial lay amongst outliers at the edge of the Roman settlement, but appeared to be of similar age to other burials from the cemetery.

UB–3777 1743 ±21 BP

$\delta^{13}C$: -20.1 ±0.2‰

Sample: SK2076 CB/6, submitted on 18 February 1994 by G Hey

Material: human bone (right femur, tibia, fibula, and foot; left femur, tibia, fibular, patella, and foot) (A Boyle)

Initial comment: the sample comes from a burial which is one of a group of eleven, all of which are orientated approximately west–south. It lay west of ditch 2012 and was overlaid by dog burial 2043. Two sherds of early Romano-British pottery were recovered from the grave fill. Both the dog and the skeleton were located within the same grave cut. The skeleton appears to have been decapitated. *See* UB-3922 and UB-3923 for further measurements from this group.

Objectives: as UB-3776

Calibrated date: *1σ:* cal AD 250–340
2σ: cal AD 235–385

Final comment: G Hey (12 October 2004), the dated individual provided a later Roman date. Decapitated burials are not uncommon in this period in the region and the date is not surprising.

UB–3778 2207 ±21 BP

$\delta^{13}C$: -20.2 ±0.2‰

Sample: SK2717 CB/7, submitted on 18 February 1994 by G Hey

Material: human bone (right and left femur and tibia) (A Boyle)

Initial comment: the burial derives from a group of 13, which is located in an area of late Roman and early Anglo-Saxon activity. Three of the group are orientated east-west, and the remainder north-south. This skeleton, 2717, was positioned east-west. *See* UB-3779, UB-3919, UB-3920, and UB-3924 for further measurements from this group.

Objectives: as UB-3776

Calibrated date: *1σ:* 360–200 cal BC
2σ: 365–195 cal BC

Final comment: G Hey (12 October 2004), the dated individual was one of 35 crouched inhumations placed within a small cemetery to the south-east of the Yarnton Iron Age and Roman settlement. The middle Iron Age date was surprising given the paucity of evidence for cemeteries of this date in Britain. The burial lay amongst the northern group of burials, but appeared to be of similar age to other burials from the cemetery.

UB–3779 2224 ±21 BP

δ¹³C: -20.0 ±0.2‰

Sample: SK2713 CB/8, submitted on 18 February 1994 by G Hey

Material: human bone (right and left femur, tibia, fibula, foot, right and left humerus, ulna, right radius) (A Boyle)

Initial comment: the sample derives from a burial, which is one of a group of 13. Three of the group are orientated east-west, and the remainder are orientated north-south. Grave 2713 is orientated north-south. The grave was located in an area of late Roman and early Anglo-Saxon activity. *See* also UB-3778, UB-3919, UB-3920, and UB-3924 for further measurements from this group.

Objectives: as UB-3776

Calibrated date: *1σ:* 365–205 cal BC
2σ: 380–200 cal BC

Final comment: see UB-3778

UB–3782 2237 ±20 BP

δ¹³C: -20.0 ±0.2‰

Sample: SK376/2 CB/4, submitted on 18 February 1994 by G Hey

Material: human bone (right leg, femur, tibia, fibula, patella, foot, and left femur) (A Boyle)

Initial comment: from a burial located in an oval pit, the fill of which contained one sherd of middle Iron Age date and one of late-Roman date. The grave cut pit 389.

Objectives: as UB-3776

Calibrated date: *1σ:* 370–210 cal BC
2σ: 385–205 cal BC

Final comment: see UB-3776

UB–3919 2168 ±21 BP

δ¹³C: -20.0 ±0.2‰

Sample: SK2710, submitted on 10 March 1995 by G Hey

Material: human bone (left and right femur, tibia, fibula, and left radius and ulna) (A Boyle)

Initial comment: from a group of north-south burials, two of which have already been dated, UB-3778 and UB-3779. *See* also UB-3920 and UB-3924 for further measurements from this group.

Objectives: to assess the extent of the middle Iron Age and Roman cemeteries and to test the hypothesis that crouched inhumations are Iron Age and extended inhumations are Roman.

Calibrated date: *1σ:* 350–180 cal BC
2σ: 355–165 cal BC

Final comment: see UB-3778

UB–3920 2234 ±20 BP

δ¹³C: -19.9 ±0.2‰

Sample: SK2718, submitted on 10 March 1995 by G Hey

Material: human bone (all long bones, left and right: femur, tibia, fibula, humerus, radius, ulna; and the pelvis) (A Boyle)

Initial comment: from a group of west-south burials, two of which have already been dated, UB-3778 and UB-3779. *See* also UB-3919 and UB-3924 for further measurements from this group.

Objectives: as UB-3919

Calibrated date: *1σ:* 370–210 cal BC
2σ: 385–205 cal BC

Final comment: see UB-3778

UB–3921 1796 ±21 BP

δ¹³C: -19.8 ±0.2‰

Sample: SK2005, submitted on 10 March 1995 by G Hey

Material: human bone (left and right femur, tibia and fibula) (A Boyle)

Initial comment: this burial was one of a pair of broadly west-east/south-west burials. The skeleton was damaged by machine. No grave cut was apparent.

Objectives: as UB-3919

Calibrated date: *1σ:* cal AD 215–250
2σ: cal AD 130–325

Final comment: G Hey (12 October 2004), the mid-to-late Roman date of this individual shows that the area just to the south of the Iron Age cemetery was used for burial into the Roman period. The extent to which the Roman inhabitants would have recognised the earlier cemetery is unknown.

UB–3922 2268 ±20 BP

δ¹³C: -20.0 ±0.2‰

Sample: SK2069, submitted on 10 March 1995 by G Hey

Material: human bone (all long bones, left and right: femur, tibia, fibula, humerus, radius and ulna) (A Boyle)

Initial comment: from within grave 2070 which belongs to a group of broadly west-south orientated burials. One of this group has already been dated, UB-3777. Compare also with UB-3922.

Objectives: as UB-3919

Calibrated date: *1σ:* 390–360 cal BC
2σ: 395–230 cal BC

Final comment: G Hey (12 October 2004), the dated individual was one of 35 crouched inhumations placed within a small cemetery to the south-east of the Yarnton Iron Age and Roman settlement. The middle Iron Age date was surprising given the paucity of evidence for cemeteries of this date in Britain. The burial lay amongst the southern group of burials, but appeared to be of similar age to other burials from the cemetery.

UB–3923 2267 ±22 BP

$\delta^{13}C$: -19.9 ±0.2‰

Sample: SK2041, submitted on 10 March 1995 by G Hey

Material: human bone (left and right femur, tibia, fibula, humerus, radius, ulna; pelvis and associated epiphyses) (A Boyle)

Initial comment: from within grave 2042, one of a group of broadly north-south orientated burials, one of which has already been dated, UB-3777. *See* also UB-3922 for a further measurement from this group. The skeleton was damaged by machine.

Objectives: as UB-3919

Calibrated date: *1σ:* 390–265 cal BC
2σ: 400–230 cal BC

Final comment: see UB-3922

UB–3924 2220 ±23 BP

$\delta^{13}C$: -20.0 ±0.2‰

Sample: SK2569, submitted on 10 March 1995 by G Hey

Material: human bone (left and right femur, tibia, fibula) (A Boyle)

Initial comment: from within grave 2570, one of a group of north-south burials, two of which have already been dated, UB-3778 and UB-3779.

Objectives: as UB-3919

Calibrated date: *1σ:* 365–205 cal BC
2σ: 380–200 cal BC

Final comment: see UB-3778

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 cremated human bone. Two further samples of cremated 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* 2011
Hey *et al* forthcoming
Hey and Muir 1997b
Moffett *et al* 1989

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 95% confidence; Reimer *et al* 2004, and OxA-11919; 4193 ±34 BP, 2900–2660 cal BC at 95% confidence; 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 95% confidence; Reimer *et al* 2004).

Laboratory comment: English Heritage, 12 further radiocarbon measurements were obtained from this structure after 1998 (OxA-11460, -11875–7, -11880—1, -11919–20, -11934–5, -14479, and SUERC-5689).

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.

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

OxA–6772 4970 ±60 BP

δ¹³C: -24.4‰

Sample: YFPB 96 4574, submitted on 30 October 1996 by C Bell

Material: charcoal: Pomoideae (M Robinson)

Initial comment: the material was retrieved from a soil sample taken from postpipe 45747 within postpit 4580, which formed part of an apparent large, sub-rectangular, post-built structure. All of the features on the site comprise non-stratified deposits cut into floodplain gravel. There is no evidence of occupation activity later than prehistoric on the Yarnton floodplain.

Objectives: examples of Neolithic and Bronze Age timber halls are rare, and the character and function of these structures is poorly understood. The closest parallels to the Yarnton structure lie within the early Neolithic. However, later Neolithic features comprising a hearth containing Peterborough Ware pottery, and pits containing Grooved Ware pottery were found within the apparent structure, and circular Bronze Age structures and a well also lay in close proximity. This preliminary date is therefore required to establish the date of this important and unusual structure.

Calibrated date: *1σ:* 3900–3660 cal BC
2σ: 3950–3640 cal BC

Final comment: G Hey (28 November 2012), this result aided in the identification of this structure as being early Neolithic in date.

Laboratory comment: ORAU (18 April 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al*

OxA–6773 4180 ±55 BP

$\delta^{13}C$: -26.0‰

Sample: YFPB 96 4389, submitted on 30 October 1996 by C Bell

Material: charcoal: *Prunus* sp. (M Robinson)

Initial comment: from postpipe 4389 in postpit 4391 within area of building 3871.

Objectives: as OxA-6772

Calibrated date: *1σ:* 2890–2660 cal BC
2σ: 2910–2570 cal BC

Final comment: G Hey (28 November 2012), this result indicates that there were further phases of activity post-dating the initial use of the building in the early Neolithic, and that small items from this activity had found their way into the postpipe of the earlier building.

Laboratory comment: ORAU (18 April 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al*

Yarnton Neolithic and Bronze Age: Bronze Age activity, site 1, 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: a Bronze Age occupation site was uncovered on site 1 in the east of the Yarnton floodplain, consisting of six post-built structures which appeared to comprise three pairs of buildings. A placed deposit was excavated in the bottom of shallow pit 1047. This feature also yielded 84 sherds of Biconical Urn, and was sealed by Roman alluvium. A hearth pit also lay within structure 1363 in the north-west of the site. Two postholes (1387 and 1648) formed part of structure 1875, and a stakehole (1413) lay within the building. Well 1810, lay to the south-east of the settlement site.

Objectives: to date the individual features on the site and to establish whether the Bronze Age occupation on the site represents a single phase of occupation or several separately defined phases.

Final comment: A Bayliss and G Hey (2005), it had been hoped to determine whether the six post-built structures were sequential, or contemporary and part of a single phase of occupation. Unfortunately, insufficient suitable material was available and only two oval post-built structures and a well were dated by radiocarbon. These suggest that the settlement was in use in the third quarter of the second millennium cal BC. Structures 1363 and 1875 appear to be broadly contemporary falling in the third quarter of the second millennium cal BC. It is possible, however, that their use was separated by some decades, but there are insufficient measurements to provide a more precise chronology.

References: Hey *et al* forthcoming

OxA–6409 3170 ±45 BP

$\delta^{13}C$: -26.6‰

Sample: YFP92 1289a, submitted on 7 March 1996 by C Bell

Material: charcoal: Pomoideae; *Alnus* sp. (M Robinson)

Initial comment: retrieved from within a spread of burnt stone and charcoal (burnt spread 1289) filling hollow 1345 in structure 1363. The hollow was surrounded by a small number of features also filled with this type of material, and also a cluster of apparently associated postholes. This group of features appeared to be representing a specific activity, possibly related to cooking and has been provisionally dated to the middle Bronze Age.

Objectives: to confirm the date of the occupation activity represented by this group of features.

Calibrated date: *1σ:* 1500–1410 cal BC
2σ: 1530–1300 cal BC

Final comment: G Hey (28 November 2012), the result confirmed the assessment of the occupation as being middle Bronze Age in character.

Laboratory comment: English Heritage (2005), the hearth pit lying within structure 1363 in the north-west of the site produced three statistically consistent radiocarbon measurements (T'=2.5; T'(5%)=6.0; ν=2; Ward and Wilson 1978), falling in the third quarter of the second millennium cal BC (OxA-6409, -6623, and -6681).

References: Ward and Wilson 1978

OxA–6410 3745 ±55 BP

$\delta^{13}C$: -24.9‰

Sample: YFP92 1049a, submitted on 7 March 1996 by C Bell

Material: charcoal: *Corylus* sp. (M Robinson)

Initial comment: retrieved from the bottom fill 1049 within pit 1047, of apparently early Bronze Age date, which was one of a small number of possibly contemporary pits confined to one area of the site which were of an unusual ‘kidney’ shape and which contained what appeared to be deliberate deposits of finds and other material.

Objectives: pits 1047 and 1088 were rich in finds, and carbonised plant and food remains, and the unusual, and atypical character of these deposits suggested that this material had been deliberately (ie possibly ritually) deposited.

Calibrated date: *1σ:* 2280–2040 cal BC
2σ: 2340–1970 cal BC

Final comment: G Hey (28 November 2012), this sample appears to be residual.

OxA–6411 1300 ±45 BP

δ¹³C: -25.1‰

Sample: YFP92 1049b, submitted on 7 March 1996 by C Bell

Material: carbonised plant macrofossil (*Corylus* sp. nutshells) (M Robinson)

Initial comment: as OxA-6410

Objectives: as OxA-6410

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–780

Final comment: A Bayliss and G Hey (2005), this sample provided a highly anomalous Anglo-Saxon date. The pit was sealed by Roman alluvium and is nowhere near any known Anglo-Saxon activity. It is believed that this sample has been misnumbered.

OxA–6414 2915 ±45 BP

δ¹³C: -26.1‰

Sample: YFP92 1649a, submitted on 7 March 1996 by C Bell

Material: charcoal (sloe) (M Robinson)

Initial comment: from posthole 1648, fill 1649, which formed part of a layout of postholes apparently representing oval post-built structure 1875, provisionally dated to the middle Bronze Age. This structure appeared to be clearly defined, and was almost exactly the same size and shape as three other structures in the same area of the site, which along with this structure formed an east-west aligned row.

Objectives: to confirm the date of this apparent structure in order to establish its relationship to other Bronze Age activity on the site. The dating of this structure will also be used to infer a date of the three other structures in this area of the site, which are almost exactly the same in character, but which did not produce any material for dating.

Calibrated date: *1σ:* 1210–1010 cal BC
2σ: 1260–970 cal BC

Final comment: G Hey (28 November 2012), this result is in line with the expected middle Bronze Age date for this oval structure.

Laboratory comment: English Heritage (2005), four statistically inconsistent radiocarbon determinations (T′=10.7; T′(5%)=7.8; ν=3; Ward and Wilson 1978) were obtained on material from two postholes (1387 and 1648) forming part of structure 1875, and stakehole 1413 lying within the building. All the dates fall in the second half of the second millennium cal BC. Three of the determinations (OxA-6414, -6415, and -6624) are statistically consistent (T′=5.7; T′(5%)-6.0; ν=2; Ward and Wilson 1978), and so by excluding OxA-6547 on the basis it was likely redeposited, the building could have been in use for a relatively short time.

References: Ward and Wilson 1978

OxA–6415 3020 ±45 BP

δ¹³C: -25.8‰

Sample: YFP92 1649b, submitted on 7 March 1996 by C Bell

Material: charcoal (sloe) (M Robinson)

Initial comment: as OxA-6414

Objectives: as OxA-6414

Calibrated date: *1σ:* 1380–1210 cal BC
2σ: 1410–1120 cal BC

Final comment: see OxA-6414

Laboratory comment: see OxA-6414

OxA–6547 3175 ±75 BP

δ¹³C: -22.1‰

Sample: YFP92 1386, submitted on 7 March 1996 by C Bell

Material: grain: indeterminate cereal (M Robinson)

Initial comment: from posthole 1387, fill 1386, part of the layout of postholes apparently representing oval post-built structure 1875.

Objectives: as OxA-6414

Calibrated date: *1σ:* 1510–1390 cal BC
2σ: 1620–1260 cal BC

Final comment: see OxA-6414

OxA–6548 3255 ±70 BP

δ¹³C: -23.1‰

Sample: YFP92 1823, submitted on 7 March 1996 by C Bell

Material: grain: *Cereal indet* (M Robinson)

Initial comment: from the bottom of a deep pit (waterhole 1810, fill 1823), which may in fact have been a well. This feature was unique on the site and has been provisionally dated to the late Bronze Age. It lay within close proximity to two post-built structures though it is uncertain whether these are contemporary.

Objectives: to confirm the date of this unique feature, establish its relationship to the other Bronze Age features, and in particular to ascertain whether this possible well is contemporary with any of the post-built structures.

Calibrated date: *1σ:* 1620–1440 cal BC
2σ: 1690–1400 cal BC

Final comment: G Hey (28 November 2012), this result is in line with the expected middle Bronze Age date for this waterhole, and provides a more precise date for a warm phase in the middle Bronze Age which it documents.

Laboratory comment: English Heritage (2005), this waterhole provided two statistically consistent radiocarbon measurements (T′=2.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978) from the two basal fills (OxA-6548 and -6549). These demonstrate that it is broadly contemporary with the dated structures.

References: Ward and Wilson 1978

OxA–6549 3115 ±70 BP

δ¹³C: -23.3‰

Sample: YFP92 1824, submitted on 7 March 1996 by C Bell

Material: grain: *Cereal indet* (M Robinson)

Initial comment: from fill 1824 of waterhole 1810.

Objectives: as OxA-6458

Calibrated date: *1σ:* 1450–1280 cal BC
2σ: 1520–1210 cal BC

Final comment: see OxA-6548

OxA–6623 3095 ±30 BP

δ¹³C: -27.5‰

Sample: YFP92 1289b, submitted on 7 March 1996 by C Bell

Material: charcoal: Pomoideae; *Alnus* sp. (M Robinson)

Initial comment: as OxA-6409

Objectives: as OxA-6409

Calibrated date: *1σ:* 1420–1300 cal BC
2σ: 1440–1270 cal BC

Final comment: see OxA-6409

Laboratory comment: see OxA-6409

OxA–6624 3070 ±50 BP

δ¹³C: -26.2‰

Sample: YFP92 1412, submitted on 7 March 1996 by C Bell

Material: charcoal: unidentified, short-lived species (M Robinson)

Initial comment: from stakehole 1413, fill 1412, one of four stakeholes clustered together within, and almost certainly associated with oval post-built structure 1875.

Objectives: as OxA-6414

Calibrated date: *1σ:* 1420–1260 cal BC
2σ: 1440–1200 cal BC

Final comment: G Hey (28 November 2012), the result was in line with expectations, based on the character of the occupation.

Laboratory comment: see OxA-6414

OxA–6681 3060 ±75 BP

δ¹³C: -25.6‰

Sample: YFP92 1289c, submitted on 7 March 1996 by C Bell

Material: charcoal: Pomoideae; *Alnus* sp. (M Robinson)

Initial comment: as OxA-6409

Objectives: as OxA-6409

Calibrated date: *1σ:* 1420–1210 cal BC
2σ: 1500–1110 cal BC

Final comment: see OxA-6409

Laboratory comment: see OxA-6409

OxA–7714 3320 ±45 BP

δ¹³C: -25.7‰

Sample: YFP92 1049c, submitted on 23 January 1998 by C Bell

Material: charcoal: *Corylus* sp. (M Robinson)

Initial comment: from bottom fill 1049, from pit 1047 of apparently early Bronze Age date, which was one of a small number of possibly contemporary pits confined to one area of the site, which were of an unusual 'kidney' shape and which contained what appeared to be deliberate deposits of finds.

Objectives: to confirm the date of a large assemblage of finds associated with the pit, including over fifty sherds of pot, consisting mostly of Biconical Urn, but also including part of a mini decorated vessel, and a flint knife, which was similar to one recovered from another of the pits in this group.

Calibrated date: *1σ:* 1660–1520 cal BC
2σ: 1740–1500 cal BC

Final comment: G Hey (28 November 2012), this date is consistent with the presence of Biconical Urn in the pit and helps to provide evidence of the period of time over which pits with placed deposits were excavated on the floodplain.

Laboratory comment: English Heritage (2005), the two dates OxA-7714 and -7715 from the pit are consistent (T′=0.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and suggest that it dates to the second quarter of the second millennium cal BC.

Laboratory comment: ORAU (9 June 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Ward and Wilson 1978

OxA–7715 3370 ±45 BP

$\delta^{13}C$: -26.8‰

Sample: YFP92 1049d, submitted on 23 January 1998 by C Bell

Material: charcoal: *Corylus* sp. (M Robinson)

Initial comment: as OxA-7714

Objectives: as OxA-7714

Calibrated date: *1σ:* 1740–1610 cal BC
2σ: 1760–1530 cal BC

Final comment: see OxA-7714

Laboratory comment: see OxA-7714

Laboratory comment: ORAU (9 June 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

Yarnton Neolithic and Bronze Age: Bronze Age linear ditches on site 2, Oxfordshire

Location: SP 47041053
Lat. 51.47.26 N; Long. 01.19.05 W

Project manager: G Hey (Oxford Archaeology), 1992

Archival body: Oxfordshire County Museums Service

Description: two parallel linear ditches were exposed on site 2 to the south of the Yarnton floodplain.

Objectives: to provide a chronology for the ditches, which form an important element of a presumed ceremonial site of Neolithic and early Bronze Age date. The ditch (2239) cut through the ground surface upon which an important assemblage of finds was deposited.

Final comment: G Hey and A Bayliss (2005), the ditches were initially cut in *1560–1370 cal BC (90% probability; cut_linear_ditches*; Fig 14.11; Bayliss and Hey forthcoming), when conditions were sufficiently wet to allow the preservations of leaves, seeds and twigs in the bottom of the ditch. The west linear ditch (2239) was recut on two occasions within the first century of its use, the second recut dating to *1500-1360 cal BC (92% probability; recut_2239*). The ditches had largely filled by *1410–1240 cal BC (95% probability; fill_linear_ditches*). This primary use of the features falls within the third quarter of the second millennium cal BC. There then followed a period of stabilisation until the ditches finally filled with inorganic sediment in the middle Iron Age. They were covered by overbank alluvium in the late Iron Age to early Roman period. The linear ditches contained exclusively Neolithic finds and, in consequence, the results of the dating programme were a surprise. They entailed a reassessment of the phasing of activity on this site and the range of middle Bronze Age activity on the Yarnton floodplain more generally.

References: Hey *et al* forthcoming

OxA–6287 3200 ±60 BP

$\delta^{13}C$: -26.2‰

Sample: YFP92 2833a, submitted on 7 March 1996 by G Hey

Material: waterlogged plant macrofossils (*Iris* sp., seeds) (M Robinson)

Initial comment: recovered from a soil sample, which was taken from the lowest fill of a cut of linear ditch (2239). The material was preserved in a waterlogged condition and must have been at or just below the water table at the time of deposition.

Objectives: to show the date at which the linear ditch was in use and being cleaned out.

Calibrated date: *1σ:* 1530–1410 cal BC
2σ: 1620–1310 cal BC

Final comment: G Hey (28 November 2012), the sample was derived from lower deposits in the west of a pair of linear ditches which were thought to be Neolithic. The middle Bronze Age result was, thus, a surprise (*see* series comments), although it is more in keeping with the expected period at which the water table would have been sufficiently high to preserve organic material.

OxA–6288 3145 ±60 BP

$\delta^{13}C$: -28.4‰

Sample: YFP92 2935a, submitted on 7 March 1996 by G Hey

Material: waterlogged plant macrofossil: *Prunus*/*Crataegus* sp., thorn (M Robinson)

Initial comment: from a soil sample taken from the lowest fill (2935) of the second cut of the ditch (3081). The material was preserved in a waterlogged condition and must have been at or just below the water table at the time of deposition.

Objectives: the ditch is believed to be contemporary with the ditch to the west. The sample is intended to show the date at which the linear ditch was in use and being cleaned out. It is also intended to demonstrate its contemporaneity with the western ditch.

Calibrated date: *1σ:* 1500–1310 cal BC
2σ: 1530–1260 cal BC

Final comment: G Hey (28 November 2012), the sample was derived from lower deposits in the east of a pair of linear ditches which were thought to be Neolithic. The middle Bronze Age result was, thus, a surprise (*see* series comments and OxA-6287). It did, however, demonstrate that the two ditches were contemporary.

Laboratory comment: ORAU (17 April 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

OxA–6347 3175 ±65 BP

δ¹³C: -27.9‰

Sample: YFP92 2833b, submitted on 7 March 1996 by G Hey

Material: wood (waterlogged): *Alnus* sp., twigs (M Robinson)

Initial comment: from a soil sample taken from the lowest fill of the final cut of linear ditch (2239). The material was preserved in a waterlogged condition and must have been at, or just below, the water table at the time of its deposition.

Objectives: as OxA-6287

Calibrated date: *1σ:* 1510–1400 cal BC
2σ: 1620–1280 cal BC

Final comment: see OxA-6287

OxA–6348 3005 ±60 BP

δ¹³C: -25.9‰

Sample: YFP92 2833d, submitted on 7 March 1996 by G Hey

Material: waterlogged plant macrofossils (seeds of aerial-leaved plants) (M Robinson)

Initial comment: from a soil sample from the lowest fill of the final cut of a linear ditch (2339). The material was preserved in a waterlogged condition and must have been at or just below the water table at the time of its deposition.

Objectives: as OxA-6287

Calibrated date: *1σ:* 1380–1120 cal BC
2σ: 1420–1040 cal BC

Final comment: see OxA-6287

OxA–6349 3130 ±60 BP

δ¹³C: -26.8‰

Sample: YFP92 2834a, submitted on 7 March 1996 by G Hey

Material: waterlogged plant macrofossils (seeds of aerial-leaved plants) (M Robinson)

Initial comment: from a soil sample taken from the middle fill of the latest cut of linear ditch (2339). The material was preserved in a waterlogged condition and must have been at or near the water table at the time of deposition.

Objectives: to show the date at which the linear ditch was being filled. It was probably still in use at this time.

Calibrated date: *1σ:* 1490–1300 cal BC
2σ: 1510–1230 cal BC

Final comment: see OxA-6287

OxA–6408 3060 ±55 BP

δ¹³C: -27.1‰

Sample: YFP92 2833c, submitted on 7 March 1996 by G Hey

Material: waterlogged plant macrofossils: *Prunus/Crataegus* sp., thorns (M Robinson)

Initial comment: from a soil sample taken from the lowest fill of the final cut of linear ditch (2239). The material was preserved in a waterlogged condition and must have been at or just below the water table at the time of its deposition.

Objectives: as OxA-6287

Calibrated date: *1σ:* 1410–1230 cal BC
2σ: 1440–1120 cal BC

Final comment: see OxA-6287

Laboratory comment: ORAU (17 April 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

OxA–6615 3130 ±45 BP

δ¹³C: -26.3‰

Sample: YFP92 2834b, submitted on 7 March 1996 by G Hey

Material: waterlogged plant macrofossils (seeds of aerial-leaved plants) (M Robinson)

Initial comment: from a soil sample taken from the middle fill (2834) of the final cut of linear ditch (2239). The material was preserved in a waterlogged condition and must have been at or near the water table at the time of deposition.

Objectives: to show the date at which the linear ditch was being filled. It was probably still in use at this time.

Calibrated date: *1σ:* 1440–1310 cal BC
2σ: 1500–1280 cal BC

Final comment: see OxA-6287

Laboratory comment: ORAU (17 April 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

OxA–6617 3045 ±40 BP

δ¹³C: -26.8‰

Sample: YFP92 2935b, submitted on 7 March 1996 by G Hey

Material: waterlogged plant macrofossils (seeds of aerial-leaved plants) (M Robinson)

Initial comment: from a soil sample taken from the lowest fill (2935) of the second cut of linear ditch (3081). The material was preserved in a waterlogged condition and must have been at or just below the water table at the time of deposition.

Objectives: as OxA-6288

Calibrated date: *1σ:* 1390–1230 cal BC
2σ: 1420–1130 cal BC

Final comment: see OxA-6288

Laboratory comment: ORAU (17 April 1997): this sample was pre-treated using an acid-base-acid protocol without a bleaching step (Brock *et al* 2010, table 1; pre-treatment code WW).

References: Brock *et al* 2010

OxA–7702 3155 ±60 BP

$\delta^{13}C$: -27.1‰

Sample: YFP92 2779a, submitted on 23 January 1998 by C Bell

Material: waterlogged plant macrofossils (waterlogged oak leaves and seeds from aerial-leaved plants) (M Robinson)

Initial comment: from a soil sample taken from the primary fill (2279) of the first cut of linear ditch (2239) believed to be of late Neolithic date. This material was preserved in a waterlogged condition and must have been at or near the water table at the time of deposition.

Objectives: the sample comes from a ditch, which forms an important element of a ceremonial site of Neolithic, and Bronze Age date. It was cut through a ground surface upon which an important assemblage of finds was deposited. The sample is intended to show the date at which the linear ditch was being filled. It was probably still in use at this time.

Calibrated date: *1σ:* 1500–1320 cal BC
2σ: 1600–1270 cal BC

Final comment: see OxA-6287

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), four further dates from this series were dated after 1998 (OxA-11513–4, -14447, and SUERC-5686).

References: Hey *et al* forthcoming

NZA–8679 4672 ±57 BP

$\delta^{13}C$: -22.8‰

Sample: YFP92 1154d, submitted on 23 January 1998 by C Bell

Material: carbonised plant macrofossil (M Robinson)

Initial comment: from pit 1088, bottom fill 1154. Pit 1088 was an unusual 'kidney' shape/ritual pit similar to pit 1047. It contained over two hundred flints, including a large knife, which was similar to one recovered from another of the pits (*see* OxA-6410).

Objectives: to date the associated assemblage of flints and the unusual and important survival of the 'bread'.

Calibrated date: *1σ:* 3630–3360 cal BC
2σ: 3640–3350 cal BC

Final comment: G Hey (28 November 2012), the date of the bread came as a surprise, given the probable late Neolithic/early Bronze Age date of a flint knife from this pit. As already stated in the laboratory comments above, it seems unlikely that items as fragile as bread and hazelnut shells could have been residual, and more likely that the pit, which had an adjacent marker post, was an early Neolithic feature which had been reused (whether deliberately or accidentally).

Laboratory comment: English Heritage (2005), a barley grain and four indeterminate cereals could be discerned in the bread matrix. Two statistically-consistent radiocarbon measurements (OxA-6412 and NZA-8679) were obtained on the bread (T'=0.0; $T'(5\%)$=3.8; ν=1; Ward and Wilson 1978), dating it to 3630–3350 cal BC (95% confidence; Reimer *et al* 2004). Two fragments of charred hazelnut shell from this deposit were also dated (OxA-6413 and OxA-7716). One produced a result which is consistent with those from the bread (OxA-7716), but the other result is significantly later (T'=33.6; $T'(5\%)$=7.8; ν=3; Ward and Wilson 1978), probably as much as 400 years later (OxA-6413). The reason for this anomaly is not known. We believe that the most reliable estimate of the date of this pit is provided by the three consistent results because the fragile nature of the bread makes it unlikely to have been residual, suggesting that the feature dates to the middle of the fourth millennium cal BC.

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

OxA–4661 4310 ±80 BP

$\delta^{13}C$: -24.5‰

Sample: YWRF 1495/1, submitted on 28 January 1994 by G Hey

Material: carbonised plant macrofossil (*Corylus* sp., nutshell) (M Robinson)

Initial comment: from the middle fill of pit 1495 containing Peterborough Ware pottery in the Mortlake sub-style. The top of the pit had been truncated by recent ploughing and it had also been cut away to the east by early Roman ditches.

Objectives: Mortlake ware is a poorly dated pottery style and few dates have been obtained for it in the Upper Thames valley, and none from pit groups. A date on the hazelnut shells, which were probably deliberately deposited with the vessel(s), will thus not only date early activity on the terrace site, but also contribute to research on the period regionally. The significance is enhanced by the discovery of contemporary material on the adjacent floodplain area.

Calibrated date: *1σ:* 3020–2880 cal BC
2σ: 3270–2690 cal BC

Final comment: G Hey (28 December 2012), the result provided a very broad date range, the earlier part of which would be consistent with the anticipated date of the Peterborough Ware pottery. This feature represents the earliest dated activity on the gravel terrace at Yarnton.

Laboratory comment: English Heritage (2005), pit 1495 excavated on the gravel terrace at Yarnton (YWRF) produced two statistically-inconsistent measurements (T′=6.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The earlier result (OxA-4462), however, was obtained on a fragment of oak charcoal and so the rings dated may well be several decades or centuries older than the time when the tree died. The most reliable date for the pit is, therefore, provided by OxA-4661.

References: Ward and Wilson 1978

OxA–4662 4605 ±80 BP

δ¹³C: -25.4‰

Sample: YWRF 1495/2, submitted on 28 January 1994 by G Hey

Material: charcoal: *Quercus* sp. (M Robinson)

Initial comment: as OxA-4661

Objectives: as OxA-4661

Calibrated date: *1σ:* 3510–3140 cal BC
2σ: 3630–3090 cal BC

Final comment: G Hey (28 November 2012), the result provided a very broad date range, the later part of which would be consistent with the anticipated date of the Peterborough Ware pottery.

Laboratory comment: see OxA-4661

OxA–6412 4675 ±70 BP

δ¹³C: -22.5‰

Sample: YFP92 1154a, submitted on 7 March 1996 by C Bell

Material: carbonised plant macrofossil (M Robinson)

Initial comment: as NZA-8679

Objectives: as NZA-8679

Calibrated date: *1σ:* 3630–3360 cal BC
2σ: 3640–3340 cal BC

Final comment: see NZA-8679

Laboratory comment: see NZA-8679

OxA–6413 4355 ±55 BP

δ¹³C: -24.0‰

Sample: YFP92 1154b, submitted on 7 March 1996 by C Bell

Material: carbonised plant macrofossil (*Corylus* sp. nutshells) (M Robinson)

Initial comment: as OxA-6412

Objectives: as OxA-6412

Calibrated date: *1σ:* 3080–2900 cal BC
2σ: 3270–2880 cal BC

Final comment: G Hey (28 November 2012), this result was much more in line with the expected date of the late Neolithic/early Bronze Age knife deposited in the top of the pit. The presence of hazelnut shells of quite different dates (compare OxA-6413 and OxA-7716) must indicate some mixing in this feature.

Laboratory comment: see OxA-6412

OxA–7716 4760 ±45 BP

δ¹³C: -24.0‰

Sample: YFP92 1154c, submitted on 23 January 1998 by C Bell

Material: carbonised plant macrofossil (*Corylus* sp. nutshells) (M Robinson)

Initial comment: from bottom fill 1154 of ‘ritual’ pit 1088.

Objectives: to confirm the date of the large assemblage of finds associated with the pit, including over two hundred flints, a large knife, and the survival of bread.

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3650–3370 cal BC

Final comment: see NZA-8679

Laboratory comment: see OxA-6412

Laboratory comment: ORAU (9 June 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

Yarnton Neolithic and Bronze Age: early Bronze Age circular structure 5716, Oxfordshire

Location: SP 474109
Lat. 51.47.38 N; Long. 01.18.46 W

Project manager: G Hey (Oxford Archaeology), 1992

Archival body: Oxfordshire County Museums Service

Description: a sub-circular structure, 5716, was excavated on site 3. Thirty-four sherds of Biconical Urn were recovered from three of the postholes.

Objectives: although groups of Neolithic postholes have been discovered on the site, the formation of postholes from which these samples were taken probably represents the earliest recognisable structure to have been found at Yarnton. The rarity of structures of this date make this of national importance. The structure was dated by associated Biconical Urn to the early Bronze Age, however this style of pottery is poorly understood, and the dating of this structure by this method is therefore tenuous.

Final comment: G Hey (28 November 2012), whichever model (above) is correct, structure 5716, which produced Biconical Urn pottery, dates to the first half of the second millennium cal BC. It is circular in shape and represents the start of a long tradition of roundhouse construction which lasts until the Romano-British period.

Laboratory comment: English Heritage (2005), two fragments of short-lived charcoal were dated from each of two postholes (5111 and 5579). These results are not statistically consistent (T'=18.8; T'(5%)=7.8; ν=3; Ward and Wilson 1978), suggesting either that the structure was in use for some time, or that residual and/or intrusive material has been dated. If OxA-6621 relates to the use of the structure, then it was constructed in the decades around 2000 cal BC. If, however, this sample was residual from earlier activity, then the building was probably constructed rather later, perhaps as late as *c* 1800 cal BC. The taphonomy of the dated material is, therefore, critical in our assessment of when during the earlier part of the second millennium the structure was in use.

References: Ward and Wilson 1978

OxA–6620 3505 ±55 BP

$\delta^{13}C$: -24.7‰

Sample: YFP92 5754 b, submitted on 7 March 1996 by C Bell

Material: charcoal: *Corylus/Alnus* sp. (M Robinson 1996)

Initial comment: from posthole 5579, lower fill 5754, which formed part of early Bronze Age building 5716.

Objectives: to confirm the early date of the structure in order to authenticate an important and rare example of an early post-built structure. This would also provide evidence relating to the question of whether the Bronze Age occupation on the site represents a single phase of activity or several separately defined phases.

Calibrated date: *1σ:* 1910–1740 cal BC
2σ: 1980–1680 cal BC

Final comment: G Hey (28 November 2012), this result supports a date for the house in the seventeenth or eighteenth century cal BC.

OxA–6621 3615 ±25 BP

$\delta^{13}C$: -24.3‰

Sample: YFP92 5512 a, submitted on 7 March 1996 by C Bell

Material: charcoal (sloe/hawthorn/hazel) (M Robinson 1996)

Initial comment: from posthole 5511, lower fill 5512, part of early Bronze Age building 5716.

Objectives: as OxA-6620

Calibrated date: *1σ:* 2030–1930 cal BC
2σ: 2040–1890 cal BC

Final comment: G Hey (28 November 2012), it seems most likely that this date comes from a residual piece of charcoal. Although it is possible that the house was long-lived, there is nothing in the physical evidence to suggest long use, for example repositioning of posts.

OxA–6622 3525 ±25 BP

$\delta^{13}C$: -25.6‰

Sample: YFP92 5512 b, submitted on 7 March 1996 by C Bell

Material: charcoal (sloe/hawthorn/hazel) (M Robinson 1996)

Initial comment: as OxA-6621

Objectives: as OxA-6620

Calibrated date: *1σ:* 1900–1770 cal BC
2σ: 1940–1760 cal BC

Final comment: see OxA-6620

OxA–6736 3355 ±60 BP

$\delta^{13}C$: -25.6‰

Sample: YFP92 5754 a, submitted on 7 March 1996 by C Bell

Material: charcoal: *Corylus/Alnus* sp. (M Robinson 1996)

Initial comment: as OxA-6620

Objectives: as OxA-6620

Calibrated date: *1σ:* 1740–1560 cal BC
2σ: 1870–1500 cal BC

Final comment: G Hey (28 November 2012), this result supports a date for the house in the first half of the second millennium cal BC.

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), two further radiocarbon measurements from this series were submitted after 1998 (OxA-12040 and OxA-12110).

References: Hey *et al* forthcoming

OxA–4663 4330 ±90 BP

$\delta^{13}C$: -21.8‰

Sample: YWRF 3830/1, submitted on 28 January 1994 by G Hey

Material: animal bone: *Sus* sp., humerus (P Smith)

Initial comment: from the lower fill of pit 3830 cut into the second gravel terrace in the area of Saxon occupation. Few contemporary features were found in the area. The pit contained much flintwork bearing similarities to Grooved Ware assemblages on the adjacent floodplain area. A small cremation sat in/was cut in the top of the pit, and was probably contemporary with it.

Objectives: to enhance the assessment of the chronological range of early activity on the second gravel terrace. It will help to date an assemblage of flints, which have parallels on the floodplain area. Its relationship to the cremation will elucidate the nature of the deposit and its time span.

Calibrated date: *1σ:* 3090–2880 cal BC
2σ: 3340–2690 cal BC

Final comment: G Hey (28 November 2012), the upper fill was a placed deposit of cremated animal bone, and this seems most likely to provide a reliable date for the pit (OxA-4665), placing it in the first half of the third millennium cal BC, which would be consistent with the late Neolithic flintwork found in the feature. Of the samples from the underlying layer, OxA-4663 appears to be residual, and OxA-4664 is either intrusive or a statistical outlier.

Laboratory comment: English Heritage (2005), the three radiocarbon results from this pit (OxA-4663, -4664, and -4665) are statistically inconsistent (T′=8.5; T′(5%)=6.0; ν=2; Ward and Wilson 1978) and in poor agreement with the relative stratigraphic order of the contexts from which the samples were recovered. This is difficult to explain.

References: Ward and Wilson 1978

OxA–4664 3985 ±80 BP

$\delta^{13}C$: -25.8‰

Sample: YWRF 3830/2, submitted on 28 January 1994 by G Hey

Material: charcoal: *Corylus* sp. (M Robinson)

Initial comment: as OxA-4663, from the middle fill of pit 3830.

Objectives: as OxA-4663

Calibrated date: *1σ:* 2580–2450 cal BC
2σ: 2860–2230 cal BC

Final comment: see OxA-4663

Laboratory comment: see OxA-4663

OxA–4665 4190 ±75 BP

$\delta^{13}C$: -20.2‰

Sample: YWRF 3829/1, submitted on 28 January 1994 by G Hey

Material: animal bone: *Sus* sp. (P Smith)

Initial comment: from a deliberate deposit of burnt animal bone of mixed species placed within a small depression/pit in the top of pit 3830. The pit contained a considerable amount of flintwork, possibly Grooved Ware associated. The top of the feature had been truncated.

Objectives: to enable an assessment of the chronological range of early activity on the second gravel terrace and may help to explain the anomalous result obtained from the Saxon timber hall (OxA-3179). It will clarify the relationship between the burnt deposit and the pit, over which it lay and thus shed light on the nature of structured deposits of this period. The presence of similar deposits on the adjacent floodplain enhances the significance of this deposit.

Calibrated date: *1σ:* 2900–2630 cal BC
2σ: 2920–2500 cal BC

Final comment: see OxA-4663

Laboratory comment: see OxA-4663

OxA–6619 4070 ±55 BP

$\delta^{13}C$: -22.7‰

Sample: YFP92 5730b, submitted on 7 March 1996 by C Bell

Material: carbonised plant macrofossil (apple pip) (M Robinson)

Initial comment: from pit 5731 on the Yarnton floodplain (site 3), lying just outside an early Bronze Age roundhouse. The sample was taken from the main fill (5730).

Objectives: to date a pit with a placed deposit which was thought to be associated with an adjacent circular structure.

Calibrated date: *1σ:* 2840–2490 cal BC
2σ: 2880–2470 cal BC

Final comment: G Hey (28 November 2012), the dating demonstrated that this pit formed part of the scatter of Grooved Ware pits excavated on this site, rather than the adjacent building.

Laboratory comment: English Heritage (2005), a small pit, 5731, on the Yarnton Floodplain (site 3), lying just outside an early Bronze Age roundhouse, provided two statistically-consistent radiocarbon results (T′=2.2; T′(5%)=3.8; ν=1; ward and Wilson 1978). This pit probably dates to the second quarter of the third millennium cal BC, and may be part of a scatter of Grooved Ware pits excavated on this site.

References: Ward and Wilson 1978

OxA–6774 4195 ±65 BP

δ¹³C: -26.6‰

Sample: YFP92 5730a, submitted in July 1996 by C Bell

Material: carbonised plant macrofossil (*Corylus* sp. nuts) (M Robinson)

Initial comment: as OxA-6619

Objectives: as OxA-6619

Calibrated date: *1σ:* 2900–2670 cal BC
2σ: 2920–2570 cal BC

Final comment: see OxA-6619

Laboratory comment: see OxA-6619

Laboratory comment: ORAU (15 May 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

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), six further radiocarbon measurements from this series were obtained after 1998 (GU-5850, GU-5855, OxA-10709–10, OxA-10713, and OxA-10739).

References: Hey *et al* 2011
Hey *et al* forthcoming

UB–4061 3646 ±19 BP

δ¹³C: -28.1 ±0.2‰

Sample: YFP92 W126 (context 116), submitted on 7 March 1996 by C Bell

Material: wood (waterlogged): Pomoideae (M Taylor)

Initial comment: from a piece of wood, sample W126, which formed part of a small cluster of wooden uprights and postholes on the south edge of a palaeochannel, which appeared to represent the remains of a wooden structure, possibly some form of revetment. The structure was found towards the bottom of the stratigraphic sequence of the channel deposits and has therefore been provisionally dated to the Bronze Age.

Objectives: to establish the date of the wooden structure and, in conjunction with other dates, to date the stratified sequence of deposits within the channel, which are otherwise poorly dated. This information would then also be used to establish the relationship between the various activities associated with the palaeochannel and the Bronze Age occupation activity in the areas adjacent to the channel.

Calibrated date: *1σ:* 2035–1975 cal BC
2σ: 2125–1945 cal BC

Final comment: G Hey (28 November 2012), although this piece of wood must have been reused in the late Bronze Age structure, 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.

References: Hey *et al* 2011

UB–4062 2567 ±18 BP

δ¹³C: -27.0 ±0.2‰

Sample: YFP92 W125 (context 116), submitted on 7 March 1996 by C Bell

Material: wood (waterlogged): *Corylus* sp. (M Taylor)

Initial comment: as UB-4061, from a piece of wood, sample W125, which formed part of a small cluster of wooden uprights and postholes on the south edge of a palaeochannel.

Objectives: as UB-4061

Calibrated date: *1σ:* 795–770 cal BC
2σ: 800–765 cal BC

Final comment: G Hey (28 November 2012), the dates of the wooden structures from the channel were later than anticipated, and most belong to the Iron Age period (Hey *et al* 2011), but this small structure is more likely to be late Bronze Age and contemporary with the latest occupation on the adjacent settlement site.

Yarnton Saxon and medieval, Oxfordshire

Location: SP 4711
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 1991
Hey 1994
Hey 2004
Hey and Muir 1997a

Yarnton Saxon and medieval: Cresswell Field settlement, Oxfordshire

Location: SP 470114
Lat. 51.47.56 N; Long. 01.19.06 W

Project manager: C Bell (Oxford Archaeological Unit), 1995

Archival body: Oxfordshire County Museums Service

Description: a post-built hall, four sunken-featured buildings, pits, and fencelines were discovered amongst the features of an Iron Age site. The Saxon settlement produced very few finds.

Objectives: the Saxon settlement at Cresswell Field produced only four sherds of pottery and so the aims of the radiocarbon dating were: were the SFBs at Cresswell Field contemporary with the hall, or earlier? Was the settlement on Cresswell Field contemporary with occupation at Yarnton and if so which phase, or was it in use between Yarnton phases 1 and 2? How did the occupation relate to the Saxon activity at Worton?

Final comment: G Hey (2001), the radiocarbon results are in statistical agreement with the hypothesis that occupation on this site was uninterrupted. It seems likely that the features dated are not all contemporary, and that one of the sunken-featured buildings was earlier than the other structures. This structure appears to be contemporary with the early Saxon phase of occupation on the Yarnton Saxon site.

References: Hey 2004

OxA–6448 1300 ±50 BP

$\delta^{13}C$: -22.0‰

Sample: YCF95 7972 (same as 7326) (b), submitted on 24 October 1996 by C Bell

Material: animal bone (thread picker) (L Allen)

Initial comment: from the backfill at the bottom of sunken-featured building SFB 7325.

Objectives: to establish the date of this structure which is not otherwise clearly dated. This information would then be used to establish whether this structure, and the two other sunken-featured buildings on the site, are contemporary with the timber hall which was also discovered, or represented a separate, earlier, phase.

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 640–860

Final comment: G Hey (2001), the result from this sample provides a very broad date range. It probably indicates a later date than a bone comb submitted from the same feature (OxA-6827), and this would be of interest as it may suggest that a fairly mixed range of material accumulated in this sunken-featured building, possibly over some time, even though the character of the fill was homogenous. The date range of the sample is not incompatible with the suggestion that the sunken-featured building (SFB 7325) and the nearby timber hall (B 8567) were contemporary.

References: Bronk Ramsey *et al* 2002, 49-50

OxA–6449 1140 ±50 BP

δ¹³C: -24.7‰

Sample: YCF95 8564 (a), submitted on 24 October 1996 by C Bell

Material: carbonised plant macrofossil (cereal) (R Pelling)

Initial comment: from a soil sample taken from a posthole which formed part of a Saxon timber hall (B 8567).

Objectives: to establish a date for the timber hall. This information would then be used to establish whether this structure forms part of a contemporary phase, or is later than a number of sunken-featured buildings also found on the site and also to compare the date of the structure to other timber halls found on the second gravel terrace at Yarnton.

Calibrated date: *1σ:* cal AD 770–980
2σ: cal AD 730–1020

Final comment: G Hey (2001), once again the date range for this sample at 95% confidence is very wide, and in itself is not very informative. It does, however, indicate that the use of this structure was not early Saxon, and could be contemporary with some of the structures on the adjacent Yarnton site.

Laboratory comment: ORAU (17 February 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Bronk Ramsey *et al* 2002, 49-50

OxA–6453 3125 ±55 BP

δ¹³C: -25.8‰

Sample: YCF95 8576 (a), submitted on 24 October 1996 by C Bell

Material: carbonised plant macrofossil (cereal) (R Pelling)

Initial comment: as OxA-6449

Objectives: as OxA-6449

Calibrated date: *1σ:* 1450–1300 cal BC
2σ: 1510–1230 cal BC

Final comment: G Hey (2001), this sample demonstrates the presence of middle Bronze Age activity on this site. One or two pits of this date were excavated elsewhere on the site, but not in the vicinity of the Saxon hall. It underlines the problems of dating multi-period sites, even where the samples are chosen with great care. The origin of the seed (and other pieces of charcoal of Bronze Age date, OxA-6829 and OxA-6830) remains enigmatic, but it is of interest that none of the three Bronze Age dates are contemporary.

Laboratory comment: ORAU (17 February 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Bronk Ramsey *et al* 2002, 49-50

OxA–6456 1255 ±50 BP

δ¹³C: -22.9‰

Sample: YCF95 8586 (a), submitted on 24 October 1996 by C Bell

Material: carbonised plant macrofossil (cereal) (R Pelling)

Initial comment: as OxA-6449

Objectives: as OxA-6449

Calibrated date: *1σ:* cal AD 670–800
2σ: cal AD 650–890

Final comment: G Hey (2001), this sample was one of four which provided extremely useful evidence for the date of the use of hall building B 8567.

References: Bronk Ramsey *et al* 2002, 49-50

OxA–6556 1230 ±50 BP

δ¹³C: -25.7‰

Sample: YCF95 8586 (b), submitted on 24 October 1996 by C Bell

Material: charcoal: Pomoideae (R Pelling)

Initial comment: as OxA-6449

Objectives: as OxA-6449

Calibrated date: *1σ:* cal AD 690–890
2σ: cal AD 660–950

Final comment: see OxA-6456

Laboratory comment: ORAU (17 February 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–6825 1520 ±55 BP

δ¹³C: -21.0‰

Sample: YCF95 7396 (a), submitted on 24 October 1996 by C Bell

Material: animal bone: *Bos* sp., cattle skull (K Ayres)

Initial comment: from the lower fill of sunken-featured building SFB 7395.

Objectives: as OxA-6448

Calibrated date: *1σ:* cal AD 430–610
2σ: cal AD 410–650

Final comment: G Hey (2001), the skull from which this sample derived was probably part of a deliberate deposit in the base of the backfill of SFB 7395, as was OxA-6826. Although, it is potentially earlier than the other skull this seems improbable. Both skulls, and by analogy the structure within which they lay, would seem to pre-date the construction of hall building B 8567 and the backfill of the other sunken-featured building dated on this site. This is anaomalous as the layout of the settlement suggests a single phase of occupation; the absence of contemporary pottery is also surprising. An alternative, but less plausible hypothesis is that the deposit, along with the Roman pottery, was of some antiquity when it was placed here.

Laboratory comment: English Heritage (21 May 2014), the measurements on the two cattle skulls from the base of SFB 7395 are not statistically significantly different (T′=1.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and so could be of the same actual age.

References: Bronk Ramsey *et al* 2002
Ward and Wilson 1978

OxA–6826 1425 ±55 BP

$\delta^{13}C$: -21.1‰

Sample: YCF95 7396 (b), submitted on 24 October 1996 by C Bell

Material: animal bone: *Bos* sp., cattle skull (K Ayres)

Initial comment: as OxA-6825

Objectives: as OxA-6825

Calibrated date: *1σ:* cal AD 590–660
2σ: cal AD 540–680

Final comment: see OxA-6825

Laboratory comment: see OxA-6825

References: Bronk Ramsey *et al* 2002

OxA–6827 1435 ±55 BP

$\delta^{13}C$: -20.9‰

Sample: YCF95 7326 (a), submitted on 24 October 1996 by C Bell

Material: animal bone (double-sided comb) (L Allen)

Initial comment: from the backfill at the bottom of sunken-featured building SFB 7325.

Objectives: as OxA-6448

Calibrated date: *1σ:* cal AD 570–660
2σ: cal AD 530–680

Final comment: see OxA-6448

References: Bronk Ramsey *et al* 2002

OxA–6828 1555 ±55 BP

$\delta^{13}C$: -21.2‰

Sample: YCF95 7129, submitted on 24 October 1996 by C Bell

Material: animal bone (double-sided comb) (L Allen)

Initial comment: from a posthole which formed part of a Saxon timber hall (B 8567). This particular posthole was cut into the top of an Iron Age pit.

Objectives: as OxA-6449

Calibrated date: *1σ:* cal AD 420–570
2σ: cal AD 390–620

Final comment: G Hey (2001), the date range suggested by this sample was problematic. It was incompatible with other dates from the postholes of hall building B 8567, and was earlier than the parallels suggested by the specialist analysing the bone artefacts from the site. Submission of another piece of the same bone from the same artefact (OxA-7372) showed that concerns about the validity of this result were well grounded.

Laboratory comment: English Heritage (2004), the two samples from a bone comb from fill 7178, an object identified as being of probable seventh- or eighth-century AD date, are statistically significantly different (T′=11.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The two measurements are on the same piece of bone, so at least one of the measurements must be scientifically anomalous. OxA-7372 has been accepted as it is statistically consistent with the other results from the structure (T′=5.7; T′(5%)=7.8; ν=3; Ward and Wilson 1978). It is also the accepted date for this type of bone comb.

References: Bronk Ramsey *et al* 2002
Ward and Wilson 1978

OxA–6829 2850 ±55 BP

$\delta^{13}C$: -24.7‰

Sample: YCF95 8564 (b), submitted on 24 October 1996 by C Bell

Material: charcoal: *Prunus* sp. (R Pelling)

Initial comment: as OxA-6449

Objectives: as OxA-6449

Calibrated date: *1σ:* 1120–920 cal BC
2σ: 1210–890 cal BC

Final comment: G Hey (2001), this sample demonstrates the presence of mid-to-late Bronze Age activity on this site. One or two pits of this period were excavated elsewhere on the site, but not in the vicinity of the Saxon hall. It underlines the problems of dating multi-period sites, even where the samples are chosen with great care. The origin of this wood charcoal (and other pieces of charcoal and charred seeds of Bronze Age date, OxA-6453 and OxA-6830) remains enigmatic, but it is of interest that none of the three Bronze Age dates are contemporary.

References: Bronk Ramsey *et al* 2002, 49-50

OxA–6830 3410 ±60 BP

$\delta^{13}C$: -24.8‰

Sample: YCF95 8576 (b), submitted on 24 October 1996 by C Bell

Material: charcoal: *Prunus* sp. (R Pelling)

Initial comment: as OxA-6449

Objectives: as OxA-6449

Calibrated date: *1σ:* 1770–1620 cal BC
2σ: 1890–1530 cal BC

Final comment: G Hey (2001), this sample demonstrates the presence of early Bronze Age activity on this site. One or two pits of this period were excavated elsewhere on the site, but not in the vicinity of the Saxon hall. It underlines the problems of dating multi-period sites, even where the samples are chosen with great care. The origin of this wood charcoal (and other pieces of charcoal and charred seeds of Bronze Age date, OxA-6453 and OxA-6829) remains enigmatic, but it is of interest that none of the three Bronze Age dates are contemporary.

References: Bronk Ramsey *et al* 2002, 49-50

OxA–7372 1305 ±50 BP

δ¹³C: -21.5‰

Sample: YCF95 7129, submitted on 19 August 1997 by C Bell

Material: animal bone (double-sided comb) (L Allen)

Initial comment: a replicate of OxA-6828.

Objectives: as OxA-6449

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 640–800

Final comment: G Hey (2001), this sample was submitted when a result from the same piece of bone provided a curiously early date (*see* above, OxA-6828). OxA-7372 provided a result much more in line with the date expected by the bone artefact specialist, and a result compatible with the other Saxon dates from postholes of timber hall B 8567. It provided an important contribution to estimating the date of use of the structure. The reason for statistically anomalous dates from the same item is uncertain.

Laboratory comment: see OxA-6828

References: Bronk Ramsey *et al* 2002, 49-50

Yarnton Saxon and medieval: floodplain channel, Oxfordshire

Location: SP 47361084
Lat. 51.47.38 N; Long. 01.18.48 W

Project manager: G Hey (Oxford Archaeological Unit)

Archival body: Oxfordshire County Museums 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 (2001), the introduction of large quantities of mineral sediment in levels 5 and 6 appears to date to the Roman period. The cessation of this alluviation probably reflects the ending of intensive arable cultivation at the end of the Roman period. The organic deposits, which built up above these sediments are early and middle Saxon in date. The deposition of inorganic alluvium resumed in the later Saxon period, perhaps indicating renewed emphasis on arable agriculture.Over this period of time the evidence from pollen, invertebrate, and waterlogged plant remains suggests that the floodplain was used for pasture throughout. There is no suggestion of woodland regeneration, not even the presence of scrub. Roman settlement at Yarnton has been excavated immediately to the west of the Saxon site and fields on the floodplain would have been farmed from here. The deposition of organic material correlates with phases 1 and 2 of the Yarnton Saxon settlement. Although the evidence for early Saxon occupation is slight, it is apparent that there was continued grazing on the floodplain. The onset of alluviation in the later Saxon period is more difficult to relate to particular phases of occupation on the gravel terrace because the dating evidence is too imprecise.The results of the OSL dating programme are in excellent agreement with the independent sequence provided by the stratigraphy and the absolute dating evidence provided by radiocarbon. This method of dating appears to be highly suitable for slowly deposited floodplain sediments, and provides a method for directly dating the deposition of sediments (especially where organic preservation is poor and few samples are available for radiocarbon), but care must be taken for layers, which may have been deposited very rapidly.

Laboratory comment: English Heritage (21 May 2014), one further measurement was obtained from this series before 1993 and was published in Bayliss *et al* (2013, 236–7; OxA-4816).

References: Bayliss *et al* 2013, 236–7
Bronk Ramsey *et al* 2002, 50-51
Hey 2004
Rees-Jones 1995

OxA–7361 1640 ±50 BP

δ¹³C: -25.6‰

Sample: YFP sample 6a, submitted in July 1997 by G Hey

Material: waterlogged plant macrofossils (waterlogged macroscopic plant remains, small thorny twig fragments of *Crataegus/Prunus* sp., seeds of plants which do not have underwater leaves including *Ranunculus repens*, *Rumex maritimus*, *Rumex conglomeratus*, *Aethusa cyriapium*, *Rubus* sp., *Iris pseudacorus*, *Polygonum persicaria*) (M Robinson)

Initial comment: from a sample taken for macrobotanical remains through a sequence of buried-channel sediments within the floodplain on the Thames (and on the north edge of a Neolithic and Bronze Age site). It came from 0.50–0.62m above the base of the channel, within a layer of slightly organic grey-brown clay with some fine sand and shell (layer 6). This layer lay below a deposit, which is believed to represent a Saxon pond and from which Saxon optical dates were obtained.

Objectives: to shed light on the date of the sedimentary sequence in this part of the channel, and, therefore, the macrobotanical and pollen evidence found within it. In particular, it is important to identify the layers deposited from the late Roman to earlier Saxon period, as the environmental evidence appears to indicate that there was continued human intervention on the floodplain throughout this time period.

Calibrated date: *1σ:* cal AD 350–510
2σ: cal AD 250–550

Final comment: G Hey (2001), the result confirmed the expected date of this deposit.

Laboratory comment: English Heritage (2004), level 6 (layer 6) has two radiocarbon measurements which are not statistically different (T′=1.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The estimated date range for this level is *cal AD 250–430* (*at 95% probability*; Hey 2004, 265).

References: Hey *et al* 2011, 265
Ward and Wilson 1978

OxA–7362 1730 ±50 BP

δ¹³C: -27.0‰

Sample: YFP sample 6b, submitted in July 1997 by G Hey

Material: waterlogged plant macrofossils (small thorny twig fragments of *Crataegus/Prunus* sp., seeds of plants which do not have underwater leaves including *Ranunculus repens, Rumex maritimus, Rumex conglomeratus, Aethusa cyriapium, Rubus sp., Iris pseudacorus, Polygonum persicaria*) (M Robinson)

Initial comment: as OxA-7361

Objectives: as OxA-7361

Calibrated date: *1σ:* cal AD 240–390
2σ: cal AD 140–420

Final comment: see OxA-7361

Laboratory comment: see OxA-7361

OxA–7363 1390 ±50 BP

δ¹³C: -26.5‰

Sample: YFP sample level 7 (layer 5), submitted in July 1997 by G Hey

Material: waterlogged plant macrofossils (*Crataegus/Prunus sp.* thorn, seeds of plants without underwater leaves including *Rumex maritimus, Rumex conglomeratus, Polygonum lapathifolium, P. persicaria, Iris pseudacorus, Carex* spp., *Atriplex* sp., *Potentilla anserina*) (M Robinson)

Initial comment: taken from 0.62–0.75m above the base of the channel, within a layer of organic dark brown clay (layer 5). It was taken from a sample taken for macrobotanical remains through a sequence of buried-channel sediments within the floodplain on the Thames (and on the north edge of a Neolithic and Bronze Age site). This layer lay below a deposit, which is believed to represent a Saxon pond and from which Saxon optical dates were obtained.

Objectives: to shed light on the date of the sedimentary sequence in this part of the channel, and, therefore, the macrobotanical and pollen evidence found within it. In particular, it is important to identify the layers deposited from the late Roman to earlier Saxon period, as the environmental evidence appears to indicate that there was continued human intervention on the floodplain throughout this time period.

Calibrated date: *1σ:* cal AD 610–670
2σ: cal AD 570–690

Final comment: G Hey (2001), the result confirmed that the organic deposits that built up over inorganic sediment were early to mid Saxon in date. This indicates diminution in the extent of arable land in the Upper Thames valley in the post-Roman period. Pollen, beetles, snails, and waterlogged plants indicate that this part of the floodplain continued to be used as pasture. The result is consistent with the OSL date from this deposit of AD 540–900 (957c).

OxA–7364 1155 ±50 BP

δ¹³C: -26.5‰

Sample: YFP sample level 8 (layer 5), submitted in July 1997 by G Hey

Material: waterlogged plant macrofossils (*Crataegus/Prunus* sp. thorn, seeds of plants which do not have underwater leaves including *Ranunculus repens, Rumex hydrolapathum, Rumex maritimus, Solarium dulcamara, Atriplex* sp., *Iris pseudacorus*) (M Robinson)

Initial comment: taken from 0.75–0.86m above the base of the channel, within a layer of organic dark brown clay (layer 5). Otherwise as OxA-7363.

Objectives: as OxA-7363

Calibrated date: *1σ:* cal AD 770–970
2σ: cal AD 720–1000

Final comment: G Hey (2001), the results from this sample indicate that organic sediment continued to accumulate within the channel in the mid-Saxon period. Pollen, beetles, snails, and waterlogged plants indicate that this part of the floodplain continued to be used as pasture. The OSL dates indicate that inorganic sedimentation resumed in the late Saxon period (Hey 2004, table 13.2).

References: Hey 2004, table 13.2

Yarnton Saxon and medieval: Oxey Mead channel, Oxfordshire

Location: SP 47901095
Lat. 51.47.41 N; Long. 01.18.19 W

Project manager: G Hey (Oxford Archaeological Unit)

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 it has 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.

Final comment: G Hey (29 January 2001), the objectives of the dating programme were met in that it provided a date for the introduction of the hay meadow at *cal AD 650-850 (OxA-3643*; Hey 2004, fig 13.8). This is most likely to be contemporary with the middle Saxon settlement at Yarnton.

Laboratory comment: English Heritage (21 May 2014), one further date was funded prior to 1993 and was published in Bayliss *et al* (2013, 237-8; OxA-3643).

References: Bayliss *et al* 2013, 237-8
Hey 2004

OxA–7359 1300 ±65 BP

$\delta^{13}C$: -25.6‰

Sample: Oxey Mead 3/5, submitted in July 1997 by G Hey

Material: waterlogged plant macrofossils (capsules of *Linum usitatissimum and Camelina* sp., seeds of plants without underwater leaves including *Humulus lupulus, Sambucus nigra, Ranunculus repens*) (M Robinson 1997)

Initial comment: from a pollen column taken through a sequence of buried-channel sediments on the north edge of a medieval hay meadow. It came from 0.70–0.75m below the base of the modern ploughsoil, at the bottom of a layer of dark brown silt with organic material (3/5). This layer lay above a deposit, which contained a flax-retting bundle of mid Saxon date. The deposit would have been waterlogged in a calcareous environment.

Objectives: to shed light on the date of the sedimentary sequence in this part of the channel and, therefore, the macrobotanical and pollen evidence found within it. In particular, it is important to estimate the date at which hay meadow (as opposed to pasture) was established in this part of the Thames floodplain; this may have implications for the date at which medieval communal organisation of the field system began. Beetles recovered from the deposit containing the flax suggest that hay meadow was established when the channel was open at this level. A date from the layer above will assist in reducing the date range of the radiocarbon determination already obtained.

Calibrated date: *1σ:* cal AD 650–780
2σ: cal AD 630–890

Final comment: G Hey (29 January 2001), the result from this sample is consistent with that provided by the flax bundle (OxA-3643). Together they indicate that changes in the invertebrate remains, suggesting the beginnings of hay meadow, occurred within the mid Saxon period in this part of the floodplain.

References: Bronk Ramsey *et al* 2002, 50

Yarnton Saxon and medieval: settlement, burials, Oxfordshire

Location: SP 474113
Lat. 51.47.52 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeological Unit), 1990 and 1991

Archival body: Oxfordshire County Museums Service

Description: burials were found adjacent to, and within, the Yarnton middle Saxon settlement. A group of six extended, west-east inhumation burials was found approximately 100m west of the settlement, covering an area of around 15m × 10m. They were all adults. Immediately south of the burials were two small, post-built structures which initially were believed to be part of the early Saxon occupation which lay in this area. Three human bodies and a collection of disarticulated human bone, all sub-adults, were found on the settlement. They lay within the ditches of the enclosure system. One body was tied up and placed prone over parts of the skulls of four other individuals.

Objectives: were the west–east burials part of a single, contemporary (cemetery) group; and, with which phase of occupation were the burials contemporary?

Final comment: G Hey (2001), there was initial surprise at the date of the skeletons in the cemetery, and the apparently contemporary date of a post-built structure adjacent to it (*see* below OxA-7365, OxA-7371). The results suggest that the west-east burials were part of a single cemetery, which seems to belong to the latest middle Saxon phase (phase 3) of the Yarnton settlement.

Laboratory comment: English Heritage (2004), the results from these three skeletons are statistically indistinguishable (T'=2.0; T'(5%)=6.0; ν=2; Ward and Wilson 1978), and are all likely to date to between the end of the eighth century AD and the end of the ninth century AD. These results also suggest that at least one of the burials is likely to be contemporary with building B 2730 (dated by OxA-7371 and OxA-7365), located to the south of the burials and thought to be associated with the cemetery.

References: Hey 2004
Ward and Wilson 1978

UB–3780 1206 ±20 BP

$\delta^{13}C$: -20.3 ±0.2‰

Sample: context 2519, submitted on 18 February 1994 by G Hey

Material: human bone (right leg, femur, tibia, fibula, patella, foot and left femur) (A Boyle)

Initial comment: this burial is one of a group of six, orientated approximately west-east, located near Anglo-Saxon sunken featured buildings and late Roman ditches. One Romano-British sherd was found in the grave fill.

Objectives: the potential of all the inhumations from Yarnton, which are mostly unaccompanied, depends largely on more precise dating. They may be late Roman/sub-Roman/Roman/Romano-Saxon/Anglo-Saxon. It is hoped that dates will establish whether or not there are chronological differences between the distinct groups of inhumations across the site.

Calibrated date: *1σ:* cal AD 770–880
2σ: cal AD 725–890

Final comment: G Hey (2001), the result of this sample was initially surprising as mid-Saxon burials are very unusual. The burial appears to be contemporary with another inhumation in this group (UB-3918), suggesting a single, and possibly short-lived cemetery belonging to the middle Saxon, phase 3 Yarnton settlement. It also seems likely to be associated with adjacent, post-built structure B 2730 (OxA-7365 and OxA-7371). It indicates the potential for recovering middle Saxon cemeteries away from settlement sites.

UB–3781 1185 ±19 BP

δ¹³C: -19.8 ±0.2‰

Sample: context 3842, submitted on 18 February 1994 by G Hey

Material: human bone (right and left femur, tibia, fibula, humerus, ulna, and right radius) (A Boyle)

Initial comment: this prone burial was within a pit located in the 'Saxon' area of the site. It both cut, and was cut by, a series of east-west Saxon ditches. The burial overlay a possible charnel pit which contained the skulls of at least two sub-adults.

Objectives: it is hoped that the dating of this burial will determine whether or not it is Saxon in date and therefore contemporary with the activity in that area of the site. There are three existing dates for the timber hall to the north (first half of the seventh century AD) and wood from the bottom of a well to the south.

Calibrated date: *1σ:* cal AD 780-890
2σ: cal AD 775-895

Final comment: G Hey (2001), this result is consistent with the expected date range of the burials, and helps to refine the chronological sequence of events on the settlement site. It is broadly contemporary with the use of the timber hall (B 3620) to the north, and the small cemetery to the west. The burial is also of significance because of its unusual position and gruesome associations, and its dating will contribute to an understanding of the growing corpus of bizarre burial customs at this time.

UB–3918 1223 ±19 BP

δ¹³C: -19.2 ±0.2‰

Sample: 2545, submitted on 10 March 1995 by G Hey

Material: human bone (left and right femur, tibia and fibula) (A Boyle)

Initial comment: the skeleton lay within grave 2546, in a small west-east orientated group.

Objectives: to assess the extent of the middle Saxon cemetery.

Calibrated date: *1σ:* cal AD 725–855
2σ: cal AD 710–885

Final comment: G Hey (2001), the result of this sample confirmed the middle Saxon date of this cemetery group and its chronological relationship to the middle Saxon, Phase 3 Yarnton settlement. It also seems likely to be associated with adjacent, post-built structure B 2730 (OxA-7365 and OxA-7371). It indicates the potential for recovering middle Saxon cemeteries away from settlement sites.

Yarnton Saxon and medieval: settlement, halls, Oxfordshire

Location: SP 474113
Lat. 51.47.52 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeological Unit), 1990–1

Archival body: Oxfordshire County Museums Service

Description: the middle Saxon Yarnton settlement spread over *c* 3ha and showed evidence of spatial planning. The hall buildings mainly lay in the centre of the site, east of an area of sunken-featured buildings and a granary, and west and north of animal enclosures and a trackway through the settlement.

Objectives: what were the absolute dates between which the settlement was occupied?; to what extent were phases chronologically distinct?; what was the spatial organisation of major structures in the settlement by phase?; was the occupation at Yarnton contemporary with other settlements on the adjacent gravel terrace or did it replace them?

Final comment: G Hey (2001), the estimated date range for the use of the hall buildings was in phases 2 and 3, the middle Saxon phases of the site. The beginning of phase 2/3 is *cal AD 670–850* (*at 95% probability*; *start_23*; Hey 2004, fig 13.3), and for its end is *cal AD 790–920* (*at 95% probability*; *end_23*; Hey 2004, fig 13.3). The estimated date range for the end of phase 4 of the Yarnton Saxon settlement is *cal AD 910–1160* (*at 95% probability*; *last smithy*; Hey 2004, fig 13.4). The phase 2/3 settlement appears to have been occupied for up to 220 years (*at 95% probability*). Twelve of the radiocarbon determinations obtained are regarded as being useful for dating the occupation of the post-built structures. The results suggest that it is unlikely that all the buildings were in use at any one time. Although there are too few measurements to suggest reliably the order in which the buildings were constructed or demolished, general trends can be seen in the estimated dates. For example, it is likely that building B 3348 was demolished after buildings B 3959 and B 3619 (*89% probability*), and that its use overlapped with that of building 3620 (*over 95% probability*).

Laboratory comment: English Heritage (21 May 2014), five further radiocarbon measurements were funded prior to 1993 and were published in Bayliss *et al* (2013, 238–9; OxA-3177–80 and OxA-3914).

References: Bayliss *et al* 2013, 238–9
Hey 2004, 255-66

OxA–4679 1215 ±60 BP

δ¹³C: -24.1‰

Sample: YWRF 3317/A, submitted on 28 February 1994 by G Hey

Material: grain: *Hordeum* sp., charred (C Stevens)

Initial comment: from a posthole of timber hall building B 3348. The feature had been cut into the natural gravel and the top had been truncated by ploughing, but the upper fill of the posthole was removed before the sample was collected.

Objectives: the Saxon timber halls are unique in the Oxford region but, in common with similar structures elsewhere in the county, finds are scarce and not clearly datable. Radiocarbon dating is vital for constructing the chronology of the site. At first it was believed that the Saxon layout at Yarnton was broadly contemporary, but a few radiocarbon dates have shown that this may not be the case. In order to understand the spatial organisation and status of the settlement at any one time in its history, it is essential to establish the temporal relationships of the halls.

Calibrated date: *1σ:* cal AD 690–890
2σ: cal AD 660–980

Final comment: G Hey (2001), this result is similar to others from this structure, and together they indicate that this hall was in use at a later date than others found within the settlement. Thus the settlement does not seem to be of a single phase.

References: Bronk Ramsey *et al* 2002, 50-51

OxA–4680 1135 ±60 BP

δ¹³C: -21.9‰

Sample: YWRF 3317/B, submitted on 28 February 1994 by G Hey

Material: grain: *Triticum* sp., charred, free-threshing (C Stevens)

Initial comment: as OxA-4679

Objectives: as OxA-4679

Calibrated date: *1σ:* cal AD 770–990
2σ: cal AD 720–1030

Final comment: see OxA-4679

References: Bronk Ramsey *et al* 2002, 50-51

OxA–4681 835 ±60 BP

δ¹³C: -25.6‰

Sample: YWRF 3332, submitted on 28 February 1994 by G Hey

Material: charcoal: *Quercus* sp. (M Robinson)

Initial comment: from the posthole of timber hall building B3348. The feature had been cut into natural silty loam. The top had been truncated by ploughing, but the sample was removed from the central portion of the posthole in order to avoid contamination.

Objectives: as OxA-4679

Calibrated date: *1σ:* cal AD 1150–1270
2σ: cal AD 1030–1290

Final comment: G Hey (2001), this result from hall B 3348 is anomalous. Although the material submitted was oak, which could potentially result in a date too old for the structure, this determination is too young. Reasons may include the introduction of later material in dry weather when soils on this geology crack, or by animal disturbance.

References: Bronk Ramsey *et al* 2002, 50-51

OxA–4682 1165 ±60 BP

δ¹³C: -23.5‰

Sample: YWRF 3309/A, submitted on 28 February 1994 by G Hey

Material: charcoal: *Quercus* sp. (M Robinson)

Initial comment: as OxA-4681

Objectives: as OxA-4679

Calibrated date: *1σ:* cal AD 770–970
2σ: cal AD 680–1020

Final comment: G Hey (2001), although this result is not inconsistent with the use of the structure, the sample was from oak which could potentially be of some antiquity when felled. The result was, therefore, excluded from analysis of the date of the structure.

Laboratory comment: ORAU (29 April 1994): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Bronk Ramsey *et al* 2002, 50-51

OxA–4683 1255 ±65 BP

δ¹³C: -22.7‰

Sample: YWRF 3693, submitted on 28 February 1994 by G Hey

Material: grain: *Hordeum* sp., charred (C Stevens)

Initial comment: from the backfill of pit 3693 which was open when the adjacent timber hall burnt down and was demolished. The pit was filled with a considerable amount of charcoal and charred seed.

Objectives: this sample is closely associated with the destruction of the Saxon hall which has not been dated with confidence. The date of its destruction will be of considerable assistance in establishing the chronological relationship of the hall and other halls on this site. The potential to elucidate the spatial organisation of the settlement and its status will also be enhanced.

Calibrated date: *1σ:* cal AD 670–880
2σ: cal AD 650–950

Final comment: G Hey (2001), this result is not statistically different from others associated with B 3348. It seems to be compatible with the expected date of destruction of the hall building.

References: Bronk Ramsey *et al* 2002, 50-51

OxA–4684 1335 ±60 BP

δ¹³C: -24.5‰

Sample: YWRF 3442, submitted on 28 February 1994 by G Hey

Material: charcoal: *Quercus* sp. (M Robinson)

Initial comment: from the posthole of timber hall building B3620. The feature had been cut into natural silty loam, and the top had been truncated by ploughing. The sample was recovered from the central portion of the posthole in order to avoid contamination.

Objectives: as OxA-4679

Calibrated date: *1σ:* cal AD 640–770
2σ: cal AD 600–780

Final comment: see OxA-4682

References: Bronk Ramsey *et al* 2002, 50-51

OxA–4685 1185 ±65 BP

δ¹³C: -25.6‰

Sample: YWRF 3422, submitted on 28 February 1994 by G Hey

Material: charcoal: *Prunus spinosa* (M Robinson)

Initial comment: from posthole of B3620 (C), as OxA-4684.

Objectives: as OxA-4679

Calibrated date: *1σ:* cal AD 720–950
2σ: cal AD 670–1000

Final comment: G Hey (2001), this result was compatible with other determinations from hall B 3620. Its recovery from a posthole in the latest phase of this structure has enabled the final use of the building to be more accurately assessed.

References: Bronk Ramsey *et al* 2002, 50-51

OxA–4686 1155 ±65 BP

δ¹³C: -23.4‰

Sample: YWRF 3466, submitted on 28 February 1994 by G Hey

Material: charcoal: *Corylus/Alnus* sp. (M Robinson)

Initial comment: from posthole B3620 (C), as OxA-4684.

Objectives: as OxA-4679

Calibrated date: *1σ:* cal AD 770–980
2σ: cal AD 680–1020

Final comment: see OxA-4685

References: Bronk Ramsey *et al* 2002, 50-51

OxA–4687 1235 ±60 BP

δ¹³C: -24.4‰

Sample: YWRF 3198, submitted on 28 February 1994 by G Hey

Material: charcoal: *Quercus* sp., sapwood (M Robinson)

Initial comment: from posthole B 3619 which was cut by a another posthole probably associated with the same structure but which contained no finds.

Objectives: as OxA-4679

Calibrated date: *1σ:* cal AD 680–890
2σ: cal AD 650–970

Final comment: G Hey (2001), the two samples submitted from this hall building (*see* OxA-4688) provided similar results and indicate that this structure was in use during the first phase of middle Saxon settlement.

References: Bronk Ramsey *et al* 2002, 50-51

OxA–4688 1285 ±60 BP

δ¹³C: -22.7‰

Sample: YWRF 3192, submitted on 28 February 1994 by G Hey

Material: grain: *Hordeum* sp., charred (C Stevens)

Initial comment: as OxA-4679

Objectives: as OxA-4679

Calibrated date: *1σ:* cal AD 660–780
2σ: cal AD 640–890

Final comment: see OxA-4687

References: Bronk Ramsey *et al* 2002, 50-51

OxA–4689 1205 ±70 BP

δ¹³C: -26.7‰

Sample: YWRF 3903, submitted on 28 February 1994 by G Hey

Material: charcoal: unidentified, uncertain identification, but definitely not *Quercus* sp., probably less than 20 years (M Robinson)

Initial comment: from posthole B3959. The feature had been cut into natural silty loam, and the top had been truncated by ploughing. The sample was recovered from the central portion of the posthole in order to avoid contamination.

Objectives: as OxA-4679

Calibrated date: *1σ:* cal AD 690–940
2σ: cal AD 660–990

Final comment: G Hey (2001), together with the other radiocarbon determination on this structure (OxA-4737), this result suggests that structure B3959 was in use during the first phase of middle Saxon settlement.

References: Bronk Ramsey *et al* 2002, 50-51

OxA–4737 1360 ±55 BP

δ¹³C: -20.1‰

Sample: YWRF 3871, submitted on 28 February 1994 by G Hey

Material: animal bone (sheep/goat left humerus) (P Smith)

Initial comment: from posthole B3959. The feature had been cut into natural silty loam, and the top had been truncated by ploughing. The sample was recovered from the central portion of the posthole in order to avoid contamination.

Objectives: as OxA-4679

Calibrated date: *1σ:* cal AD 640–690
2σ: cal AD 590–770

Final comment: see OxA-4689

References: Bronk Ramsey *et al* 2002, 50-51

OxA–5468 1210 ±50 BP

δ¹³C: -23.1‰

Sample: YWRF 3738, submitted on 14 March 1995 by G Hey

Material: grain: *Cereal indet* (C Stevens)

Initial comment: retrieved from within the posthole of timber structure B3620 (A). This structure appears to have been rebuilt on at least one occasion and the posthole was probably part of the earliest build.

Objectives: to test the hypothesis that one of the structures is long-lived, by dating occupation activity from the earliest part of the building.

Calibrated date: *1σ:* cal AD 710–890
2σ: cal AD 670–970

Final comment: G Hey (2001), this result is not statistically different from others considered reliable from this hall building and has enabled the earliest use of this structure to be more accurately estimated.

References: Bronk Ramsey *et al* 2002, 50-51

OxA–5469 820 ±50 BP

δ¹³C: -26.1‰

Sample: YWRF 3436, submitted on 14 March 1995 by G Hey

Material: grain (cereal chaff and weed seeds) (C Stevens)

Initial comment: from posthole of B3620, as OxA-5468.

Objectives: as OxA-5468

Calibrated date: *1σ:* cal AD 1160–1270
2σ: cal AD 1050–1280

Final comment: G Hey (2001), this result is clearly anomalous, being much younger than other determinations from this hall building. It may have been introduced when soils cracked in dry weather, or by animal disturbance.

References: Bronk Ramsey *et al* 2002, 50-51

Yarnton Saxon and medieval: settlement, other features, Oxfordshire

Location: SP 474113
Lat. 51.47.52 N; Long. 01.18.45 W

Project manager: G Hey (Oxford Archaeological Unit), 1990–1

Archival body: Oxfordshire County Museums Service

Description: a characteristic of the Yarnton middle Saxon settlement was the wide range of archaeological features present, that included not only timber halls and sunken-featured buildings, but also small post-built structures, wells/waterholes, pits, and a smithy.

Objectives: this element of the dating programme aimed to understand the chronological and spatial development of the site by submitting samples from a range of these features. The period of use of certain crops and the associations of environmental and economic evidence from the waterholes was also addressed by this suite of determinations.

Final comment: G Hey (2001), the waterholes were situated in the south-east of the settlement. A wooden object waterlogged in the bottom of 3029 was made of oak and it seems likely that the result has a significant age-at-death offset, and so is older than the date of manufacture of the object. For this reason the result is not useful for dating the waterhole. Two samples of charred cereals from the adjacent waterhole 3043 produced an estimated date range for this feature of *cal AD 760–970* (*at 95% probability*; *last_3043*; Hey 2004, fig 13.3). Two samples, one of cereal, and one of unidentified charcoal from hearth 3666 of smithy 3926, suggested an estimated date range of *cal AD 910–1160* (*at 95% probability; smithy*; Hey 2004, fig 13.4) for the use of the smithy.

Laboratory comment: English Heritage (12 December 2012), two further radiocarbon dates were funded prior to 1993 and were published in Bayliss *et al* (2013, 239–40; GU-5138 and OxA-3915).

References: Bayliss *et al* 2013, 239–40
Hey 1991
Hey 2004

OxA–5467 1055 ±55 BP

δ¹³C: -21.3‰

Sample: YWRF 3666, submitted on 13 March 1995 by G Hey

Material: grain: *Hordeum* sp. (C Stevens)

Initial comment: recovered from the hearth of a smithy in the Saxon settlement during the removal of the stone base of the hearth. Although the smithy floor lay immediately beneath the ploughsoil, the structure had been thoroughly cleaned several times before any sampling was undertaken. The smithy overlay ditches of an earlier enclosure of mid Saxon date.

Objectives: Saxon smithies are extremely rare in the archaeological record and the Yarnton example is accompanied by slag and microslag, such as hammer-scale, which is shedding considerable light on Saxon smithing techniques. It is important, therefore, to accurately date this structure in order to place it in its national context. Additionally, a date from the smithy will assist in dating phase 4 of the Saxon settlement.

Calibrated date: *1σ:* cal AD 900–1030
2σ: cal AD 880–1120

Final comment: G Hey (2001), the result was not statistically significantly different from another sample from the smithy (OxA-3915; 1040 ±65 BP; cal AD 880–1160 at 95% confidence; Reimer *et al* 2004). It was within the expected date range for a structure known to be stratigraphically later than most other features on the site.

References: Bronk Ramsey *et al* 2002, 51
Reimer *et al* 2004

OxA–5470 1200 ±45 BP

$\delta^{13}C$: -23.4‰

Sample: YWRF 3043/2, submitted on 13 March 1995 by G Hey

Material: grain: indeterminate cereal (C Stevens)

Initial comment: from the layer beneath the top fill of a waterhole 3043 in the south-east of the site. The sandy silt sides and fills of these features suggest they were not open for long. Charcoal flecks were found throughout the fill. This well cut another deep, pit-like feature.

Objectives: the sample came from a well in the south east of the site where very little dating material was found. A date from the well is needed in order to date features found in this part of the site, which appear to be associated with animal husbandry, and to place them in the main site phasing. This will supplement a date already obtained from an oak structure (YWRF CB/1, GU-5138; 1390 ±50 BP; cal AD 570–690 at 95% confidence; Reimer *et al* 2004) in an adjacent well.

Calibrated date: *1σ:* cal AD 720–890
2σ: cal AD 680–970

Final comment: G Hey (2001), the two radiocarbon determinations from this waterhole were consistent (*see* also OxA-5471). They suggest that this feature, and probably others in this area, were in use in the second phase of the middle Saxon settlement.

References: Bronk Ramsey *et al* 2002, 51
Reimer *et al* 2004

OxA–5471 1205 ±50 BP

$\delta^{13}C$: -24.2‰

Sample: YWRF 3043/2, submitted on 13 March 1995 by G Hey

Material: grain: indeterminate cereal (C Stevens)

Initial comment: as OxA-5470

Objectives: as OxA-5470

Calibrated date: *1σ:* cal AD 720–890
2σ: cal AD 670–970

Final comment: see OxA-5470

References: Bronk Ramsey *et al* 2002, 51

OxA–7365 1225 ±50 BP

$\delta^{13}C$: -20.2‰

Sample: 2616b, submitted on 19 August 1997 by G Hey

Material: grain: *Triticum dicoccum* (M Robinson)

Initial comment: from a grain-rich deposit within a posthole. The posthole appeared to form part of a rectangular wooden structure which resembled a granary, and which lay in an area of Saxon features. The feature was dug into calcareous gravel

Objectives: the charred deposit from which the sample derived was initially believed to be entirely of spelt wheat, and came from a wooden structure which was early Saxon in date. An argument for continuity of arable farming practices from the Roman period was developed, as spelt wheat was retrieved from several Saxon features, but the only substantial deposit, which could confidently be claimed not to be residual, was the grain from this particular feature. The subsequent identification of some of the spelt as emmer wheat has cast serious doubt on the date of this feature and the structure to which it appears to belong. Could it be late Roman in date, and prove a re-emergence of the cultivation of emmer wheat in the later Roman period?

Calibrated date: *1σ:* cal AD 690–890
2σ: cal AD 660–950

Final comment: G Hey (2001), the middle Saxon date of this sample was a great surprise. As explained above, the archaeological evidence indicated an early Saxon date, and the botanical evidence suggested late Roman. The recovery of emmer wheat in the late Saxon period is significant, especially as it appears to represent re-introduction rather than continuity. Emmer wheat has also been identified in a middle Saxon pit at Lake End Road, Dorney in the Middle Thames valley (Ruth Pelling, pers comm), showing that this is not an isolated case. A further implication of this date is that the structure (B2730) is potentially in contemporary use with the cemetery, throwing into question its function.

References: Bronk Ramsey *et al* 2002, 51

OxA–7371 1190 ±35 BP

$\delta^{13}C$: -21.3‰

Sample: 2616a, submitted on 19 August 1997 by G Hey

Material: grain: *Triticum spelta* (M Robinson)

Initial comment: as OxA-7365

Objectives: as OxA-7365

Calibrated date: *1σ:* cal AD 770–890
2σ: cal AD 710–960

Final comment: G Hey (2001), the middle Saxon date of this sample was a great surprise. It is consistent with the other radiocarbon date from structure B2730 (OxA-7365), indicating that the building was potentially in contemporary use with the cemetery. The function of the building is uncertain.

Laboratory comment: ORAU (18 February 1998): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010
Bronk Ramsey *et al* 2002, 51

Yarnton Saxon and medieval: settlement, sunken-featured buildings, Oxfordshire

Location: SP 475113
Lat. 51.47.52 N; Long. 01.18.40 W

Project manager: G Hey (Oxford Archaeological Unit), 1990

Archival body: Oxfordshire County Museums Service

Description: an area of sunken-featured buildings (SFBs), associated with traces of small post-built structures, fencelines and a granary, was located between the Yarnton Roman site and the middle Saxon settlement. It covered approximately 1ha.

Objectives: to date the earliest Saxon occupation of the site, test the hypothesis that the settlement continued to shift from west to east with time, resolve (as far as possible) the extent of the settlement at any one time, and establish whether any of the sunken-featured buildings could be contemporary with the halls.

Final comment: G Hey (2001), seven of the determinations from the ten samples submitted are regarded as providing useful information for the purposes of dating these buildings. Buildings 2652 and 2556 each produced two radiocarbon dates, and one came from each of 2689, 888, and 2577. Strictly these represent *termini post quos* for the disuse of these SFBs. The estimated date range for the beginning of phase 1 of the Yarnton Saxon settlement is *AD 370–550 (at 95% confidence; start_Yarnton;* Hey 2004, fig 13.1*)*. Although the pattern was more complex than originally perceived, the radiocarbon results tend to support a broad shift in settlement from west to east through the Saxon period. The radiocarbon results show that these structures were probably not all in contemporary use. Those from buildings 2689, 2652, and 888 are significantly earlier than 2556 and 2577. The preliminary phasing, which placed all of these buildings in phase 1 and was supported by the finds data then available, had to be abandoned. Firstly it became apparent that not all the SFBs were of the same date, and secondly that the period of use of the later ones appeared to overlap with the use of the halls.

References: Bronk Ramsey *et al* 2002, 51-2
Hey 1991
Hey 2004

OxA–5472 1195 ±50 BP

$\delta^{13}C$: -22.5‰

Sample: 2577/1, submitted on 13 March 1995 by G Hey

Material: grain: indeterminate cereal (C Stevens)

Initial comment: from the fill (probably the earliest fill), of sunken-featured building SFB2577 in the east of the early Saxon site. The layer is thought to have been deposited shortly after the building became disused. The structure was discrete. It contained 16 sherds of Saxon pottery, including seven sherds thought to date to the sixth to eighth century AD.

Objectives: one of a series of ten from within sunken-featured buildings (SFBs). They are being submitted in order to date the earliest Saxon occupation of the site.

Calibrated date: *1σ:* cal AD 720–900
2σ: cal AD 680–980

Final comment: G Hey (2001), the comparatively late date of this sample came initially as a surprise, especially in the light of the pottery recovered. Further analysis suggests that some of the structures on this part of the site were part of the middle Saxon settlement to the east, and this (SFB 2577) seems to have been one of the latest sunken-featured buildings on the site.

OxA–5473 180 ±45 BP

$\delta^{13}C$: -26.5‰

Sample: YWRF 2577/2, submitted on 13 March 1995 by G Hey

Material: grain (weeds and culm nodes) (C Stevens)

Initial comment: as OxA-5472

Objectives: as OxA-5472

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1640–1955*

Final comment: G Hey (2001), this result clearly derives from intrusive material. This may have been introduced when soils cracked in dry weather, or by animal disturbance.

OxA–5474 1220 ±50 BP

$\delta^{13}C$: -23.3‰

Sample: 2556/1, submitted on 13 March 1995 by G Hey

Material: grain: indeterminate cereal (C Stevens)

Initial comment: from the latest fill of sunken-featured building SFB 2556, in the centre of the early Saxon site. This layer is thought to have been deposited shortly after the building became disused. The structure cut an earlier sunken featured building. It yielded a single sherd of pottery with vegetable-tempered fabric.

Objectives: as OxA-5472

Calibrated date: *1σ:* cal AD 710–890
2σ: cal AD 670–950

Final comment: G Hey (2001), this result was one of two determinations from the backfill of SFB 2556 (also OxA-5475), which demonstrated the use of some sunken-featured buildings in this area during the middle Saxon period.

OxA–5475 1310 ±50 BP

δ^13^C: -21.3‰

Sample: 2556/2, submitted on 13 March 1995 by G Hey

Material: grain: indeterminate cereal (C Stevens)

Initial comment: as OxA-5474

Objectives: as OxA-5472

Calibrated date: *1σ:* cal AD 650–770
2σ: cal AD 640–780

Final comment: see OxA-5474

OxA–5476 1395 ±55 BP

δ^13^C: -21.9‰

Sample: YWRF 888/1, submitted on 13 March 1995 by G Hey

Material: grain: indeterminate cereal (C Stevens)

Initial comment: from a layer of trample at the bottom of sunken featured building SFB 430. This structure was the most westerly of the sunken featured buildings located on the site and lay within a Roman enclosure, close to an area of late Roman activity. Eight sherds of pottery probably came from the building, including two sherds of shelly ware which is believed to be the earliest Saxon pottery fabric in the region.

Objectives: as OxA-5472

Calibrated date: *1σ:* cal AD 600–670
2σ: cal AD 560–770

Final comment: G Hey (2001), this determination was later than expected, and around 200 years later than the Roman enclosure within which it lay. It is uncertain, therefore, whether its location was fortuitous or whether the enclosure was still defined by a low bank or, perhaps, a hedge. The result indicates that this structure was significantly later than the two earliest sunken-featured buildings dated on the site (SFB 2652 and SFB 2689), but significantly earlier than the middle Saxon settlement excavated to the east. It is broadly contemporary, however, with the material retrieved from the adjacent Saxon cemetery in the nineteenth century. It supports the hypothesis that settlement in this area was very small-scale and shifted around the gravel terrace as new buildings were constructed.

OxA–5477 2015 ±55 BP

δ^13^C: -22.9‰

Sample: YWRF 888/2, submitted on 13 March 1995 by G Hey

Material: grain: indeterminate cereal (C Stevens)

Initial comment: as OxA-5476

Objectives: as OxA-5472

Calibrated date: *1σ:* 90 cal BC–cal AD 60
2σ: 180 cal BC–cal AD 90

Final comment: G Hey (2001), this result must derive from residual material. Its presence is not surprising given the siting of this sunken-featured building within a Roman enclosure where late Iron Age features were also located.

OxA–5479 1485 ±45 BP

δ^13^C: -23.5‰

Sample: YWRF 2689/1, submitted on 13 March 1995 by G Hey

Material: grain: indeterminate cereal (C Stevens)

Initial comment: from the only fill of sunken featured building SFB 2689 to the west of the early Saxon site. This layer is thought to have been deposited shortly after the building became disused. There appeared to be a trampled surface at the bottom of the structure which showed signs of burning. The building was discrete and contained 55 sherds of Saxon pottery, 46 of which were in vegetable-tempered fabrics and nine in quartz-tempered fabrics.

Objectives: as OxA-5472

Calibrated date: *1σ:* cal AD 540–630
2σ: cal AD 430–660

Final comment: G Hey (2001), this radiocarbon determination was broadly in line, or marginally later than the expected date. Its importance lies in demonstrating the presence of early Saxon settlement in this area, even though this appears to have been very small scale. The structure lay adjacent to another early sunken-featured building (SFB 2652), and they may have been contemporary.

OxA–5480 1685 ±45 BP

δ^13^C: -23.5‰

Sample: YWRF 2689/2, submitted on 13 March 1995 by G Hey

Material: grain: indeterminate cereal (C Stevens)

Initial comment: as OxA-5479

Objectives: as OxA-5472

Calibrated date: *1σ:* cal AD 260–410
2σ: cal AD 240–430

Final comment: G Hey (2001), this result is too early to be contemporary with the structure from which it came, and is statistically significantly different to the other sample which derived from the backfill of the building (OxA-5479). This structure lay next to a Roman trackway ditch, and the presence of residual Roman material is not surprising.

OxA–5481 1560 ±45 BP

δ¹³C: -23.0‰

Sample: YWRF 2652/1, submitted on 13 March 1995 by G Hey

Material: grain: indeterminate cereal (C Stevens)

Initial comment: from the only fill of sunken featured building SFB 2652 to the west of the early Saxon site. This layer is thought to have been deposited shortly after the building became disused. The building cut a Roman pit and a later Roman ditch. It yielded 11 sherds of Saxon pottery, mostly with vegetable-tempered fabrics which are thought to pre-date the quartz-tempered pots on the site.

Objectives: as OxA-5472

Calibrated date: *1σ:* cal AD 420–560
2σ: cal AD 390–610

Final comment: G Hey (2001), this radiocarbon determination was broadly in line with the expected date, and consistent with the other sample submitted from the backfill of the sunken-featured building (SFB 2652). Its importance lies in demonstrating the presence of early Saxon settlement in this area, even though this appears to have been very small scale. The structure lay adjacent to another early sunken-featured building (SFB 2689), and they may have been contemporary.

OxA–5482 1585 ±45 BP

δ¹³C: -24.6‰

Sample: YWRF 2652/2, submitted on 13 March 1995 by G Hey

Material: grain: indeterminate cereal (C Stevens)

Initial comment: as OxA-5481

Objectives: as OxA-5472

Calibrated date: *1σ:* cal AD 410–550
2σ: cal AD 380–580

Final comment: see OxA-5481

Yarnton Saxon and medieval: Worton settlement, Oxfordshire

Location: SP 459113
Lat. 51.47.53 N; Long. 01.20.04 W

Project manager: G Hey (Oxford Archaeological Unit), 1996

Archival body: Oxfordshire County Museums Service

Description: this settlement site lies *c* 150m west of Yarnton, and is largely known through air photographs. It is not under threat, but parts of it have been evaluated as part of the Yarnton-Cassington project. This work suggest that occupation of the late Iron Age, early- and late-Roman, and early and middle Saxon periods are present. The Saxon elements include a post-in-trench building, sunken-featured buildings, and other postholes and pits.

Objectives: Saxon hall buildings have seldom been excavated in Oxfordshire and are not common nationally; post-in-trench buildings are even rarer. A radiocarbon date for this structure will contribute to the national record on the period over which such buildings were constructed. In addition, the aim of dating samples from the Worton settlement was to assess whether the post-in-trench structure at Worton was contemporary with the occupation at Yarnton and Cresswell Field, and if so with which phase?

Final comment: G Hey (29 January 2001), one sample appears to be intrusive, the other suggests that the Worton structure was in use in the middle Saxon period, probably during the earlier middle Saxon phase at Yarnton.

References: Bronk Ramsey *et al* 2002, 50
Hey 1994
Hey 2004
Hey and Muir 1997a

OxA–7092 145 ±35 BP

δ¹³C: -22.1‰

Sample: CWRF 96 50, submitted on 17 March 1997 by G Hey

Material: grain (single entity): *Hordeum* sp., charred (M Robinson 1997)

Initial comment: from the base of a wall trench of a building which was constructed in the post-in-trench manner. It lay at a depth of 0.5-0.6m from the modern ground surface. There were no visible contaminants.

Objectives: elucidation of the Saxon settlement pattern is a major research aim of the Yarnton-Cassington Project, as the quality and range of evidence for this period is particularly good. The Worton structure lies among other Saxon settlement features, 0.5km to 1km west of timber halls excavated at Yarnton. Providing a chronological framework for these sites is crucial to the understanding of the processes of change within the settlement pattern. Although some Saxon pottery was recovered from the structure it cannot be dated more closely that early/mid Saxon period.

Calibrated date: *1σ:* cal AD 1670–1950
2σ: cal AD 1660–1955*

Final comment: G Hey (29 January 2001), this seed was obviously of recent date. It may have been introduced as a result of soils cracking in dry weather, or possibly animal activity. The land has been used for agriculture over a long period of time, and there would have been many opportunities for post-medieval and modern cereals to be incorporated.

Laboratory comment: ORAU (2 October 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

OxA–7140 1300 ±55 BP

δ¹³C: -22.8‰

Sample: CWRF 96 71, submitted on 17 March 1997 by G Hey

Material: grain (single entity): indeterminate cereal (M Robinson 1997)

Initial comment: from the base of a post pit which was located within wall trench B108 in a building which was constructed in the post-in-trench manner. It lay at a depth of 0.7m from the modern ground surface. There were no visible contaminants.

Objectives: as OxA-7092

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 640–880

Final comment: G Hey (29 January 2001), the result from this sample was within the date range anticipated, although it was too broad to allow much precision. It suggests that the structure from which it came (B108), was in use during the Yarnton settlement (phases 2/3).

Laboratory comment: ORAU (2 October 1997): this sample was pre-treated using acid only (Brock *et al* 2010, 108; pre-treatment code RR).

References: Brock *et al* 2010

Bibliography

Adamson, C, and Abramson, P, 1997 *Excavation of a cemetery at Seaham Hall Lodge, County Durham, rep 97/47*, unpubl rep, Northern Archaeol Associates

Alcock, L, 1972 *'By South Cadbury is that Camelot… ': the excavation of Cadbury Castle 1966–70*, London: Thames and Hudson

Alcock, L, 1980 The Cadbury Castle sequence in the first millennium BC, *Bull Board Celtic Stud*, **28**, 656–718

Alcock, L, 1995 *Cadbury Castle, Somerset: the early medieval archaeology*, Cardiff: Univ Wales Press

Allen, J R L, and Rippon, S J, 1996 The historical simplification of coastal flood defences: four case histories from the Severn Estuary Levels, S W Britain, *Trans Bristol Gloucestershire Archaeol Soc*, **113**, 73–88

Allen, M J, 1995 Before Stonehenge: Mesolithic human activity in a wildwood landscape, in *Stonehenge in its landscape: twentieth-century excavations* (R Cleal, K E Walker, R Montague, and M J Allen), Engl Heritage Archaeol Rep, **10**, 470–473 London: Engl Heritage

Allen, M J, and Bayliss, A, 1995 Appendix 2: the radiocarbon dating programme, in *Stonehenge in its landscape: twentieth century excavations* (eds R M J Cleal, K E Walker, and R Montague), Engl Heritage Archaeol Rep, **10**, 511–35, London: Engl Heritage

Ambers, J, Bowman, S G E, Garwood, P, Hedges, R, and Houseley, R, 1999 Appendix 1: Radiocarbon dating, in *Excavations at Barrow Hills, Radley, Oxfordshire, Vol. 1* (A Barclay and C Halpin), Thames Valley Landscapes Monogr, **11**, 330–9 Oxford: Oxford Univ Comm Archaeol

Arneborg, J, Heinemeier, J, Lynnerup, N, Nielsen, H L, Rud, N, and Sveinbjörnsdóttir, Á E, 1999 Change of diet of the Greenland Vikings determined from stable carbon isotope analysis and ^{14}C dating of their bones, *Radiocarbon*, **41**, 157–68

Ames, H S, 1975 A note on the results of recent excavations at Camber Castle, Sussex, *Post-medieval Archaeol*, **9**, 233–6

Annis, R, 1997 *Early Bronze Age burials at Windmill Fields, Ingleby Barwick, Stockton on Tees (IWF 96): interim report*, unpubl rep, Tees Archaeol

Archibald, M, 2009 Coin dating in the light of radiocarbon dating, in *Early medieval (late 5th–to early 8th centuries AD) cemeteries at Boss Hall and Buttermarket, Ipswich, Suffolk* (C Scull), Soc Medieval Archaeol Monogr, **27**, 267–9 Leeds: Maney Publishing

Ashmore, P, 1999 Radiocarbon dating: avoiding errors by avoiding mixed samples, *Antiquity*, **73**, 124–30

Atkinson, R J C, 1952–3 Excavations in Barrow Fields, Radley, Berks, 1944–45: the Romano-British inhumation cemetery, *Oxoniensia*, **17-18**, 1–35

Atkinson, R J C, 1979 *Stonehenge*, Harmondsworth: Penguin Books

Avery, M, 1982 The Neolithic causewayed enclosure, Abingdon, in *Settlement patterns and the Oxford region: excavations at the Abingdon causewayed enclosure and other sites* (H J Case and A W R Whittle), CBA Res Rep, **44**, 10–50 London: CBA

Balkwill, N D, and Silvester, R J, 1976 Earthworks on Sourton Down, near Okehampton, *Proc Devon Archaeol Soc*, **34**, 86–9

Barclay, A, and Halpin, C, 1999 *Excavations at Barrow Hills, Radley, Oxfordshire. Volume 1: the Neolithic and Bronze Age monument complex*, Thames Valley Landscapes Monogr, **11**, Oxford: Oxford Univ Comm Archaeol

Barclay, A, Boyle, A, and Keevill, G D, 2001 A prehistoric enclosure at Eynsham Abbey, Oxfordshire, *Oxoniensia*, **66**, 105–62

Bard, E, Arnold, M, Fairbanks, R G, and Hamelin, B, 1993 ^{230}Th-^{234}U and ^{14}C ages obtained by mass spectrometry on corals, *Radiocarbon*, **35**, 191–200

Barker, H, and Mackey, C J, 1960 British Museum natural radiocarbon measurements II, *Radiocarbon*, **2**, 26–30

Barrett, J, Bradley, R, and Green, M, 1991 *Landscape, monuments and society: the prehistory of Cranborne Chase*, Cambridge: Cambridge Univ Press

Barrett, J, Freeman, P W M, and Woodward, A, 2000 *Cadbury Castle, Somerset: the later prehistoric and early historic archaeology*, Engl Heritage Archaeol Rep, **20**

Barrowman, R C, Batey, C E, and Morris, C D, 2007 *Excavations at Tintagel Castle, Cornwall, 1990–1999*, London: Soc Antiq London

Bartlett, J E, and Riley, D N, 1958 The Roman fort at Scaftworth, near Bawtry, *Trans Thoroton Soc Nottinghamshire*, **62**, 23–35

Bates, S, 1992 Excavation of a burnt mound at Feltwell Anchor, Norfolk, 1992, *Norfolk Archaeology*, **43**, 389–414

Bayliss, A, 1995 Radiocarbon dates, in Duckpool, Morwenstow: a Romano-British and early medieval industrial site and harbour (J Ratcliffe), *Cornish Archaeol,* **34,** 81–171

Bayliss, A, 1998 Radiocarbon dates, in *Wetland Heritage of the Ancholme and Lower Trent valleys: an archaeological survey* (R Van de Noort and S Ellis), 305–8, Hull: Humber Wetlands Project

Bayliss, A, 1999 On the taphonomy of charcoal samples for radiocarbon dating, in Actes du 3ème congres international <<Archaeologie et ^{14}C>> Lyon, 6–10 Avril 1998 (eds J Evin, C Oberlin, J P Daugas, and J F Salles), Revue d'Archeometrie Suppl 1999 et Soc Prehist Fr Memoire, **26**, 243–8

Bayliss, A, 2005 The radiocarbon dates, in *Sherborne Abbey and School excavations 1972-76 and 1990* (L Keen and P Ellis), Dorset Natur Hist Archaeol Soc Monogr, **16**, 133–5

Bayliss, A, 2009 Rolling out Revolution: using radiocarbon dating in archaeology, *Radiocarbon*, **51**, 123–47

Bayliss, A, and Orton, C, 1994 Strategic consideration in dating, or 'How many dates do I need?', *Inst Archaeol Bull*, **31**, 151–65

Bayliss, A, and Harry, R, 1997 The radiocarbon dating programme, in Excavations on the lower terrace, site C, Tintagel island 1990-94 (R Harry and C Morris), *The Antiquaries J*, 77, 108–15

Bayliss, A, and Hey, G, 2004 Chapter 13: Scientific dating, in *Yarnton Saxon and Medieval Settlement and Landscape* (G Hey), Thames Valley Landscape Monogr, **20**, 255–66

Bayliss, A, and Hey, G, 2011 Absolute Chronology, in *Yarnton: Iron Age and Romano-British settlement and landscape* (G Hey, P Booth, and J Timby), Thames Valley Landscapes, **35**, 333–43, Oxford (Oxford Archaeology)

Bayliss, A, and Hey, G, forthcoming Chapter 14: Scientific Dating, in *Yarnton: Neolithic and Bronze Age Settlement and Landscape* (G Hey, C Bells, and C Dennis), Thames Valley Landscape Monograph, Oxford: Oxford Archaeology

Bayliss, A, and Pryor, F, 2001 Radiocarbon and absolute chronology, in *The Flag Fen basin: archaeology and environment of a Fenland landscape* (F Pryor), Engl Heritage Archaeol Rep, 390–9 London: Engl Heritage

Bayliss, A, Bronk Ramsey, C, Barclay, A, and Boyle, A, 2001 The radiocarbon dating, in A prehistoric enclosure at Eynsham Abbey, Oxfordshire (A Barcaly, A, Boyle and G D, Keevill), *Oxoniensia*, **66**, 105–62

Bayliss, A, Cook, G T, McCormac, F G, and Pettitt, P, 2002 The radiocarbon determinations, in *Downland Settlement and Landuse: the archaeology of the Brighton Bypass* (ed D Rudling), UCL Field Archaeol Unit Monogr, **1**, 239–48, London (Archetype and English Heritage)

Bayliss, A, McCormac, F G, van der Plicht, J, 2004e An illustrated guide to measuring radiocarbon from archaeological samples, *Physics Education,* **39**, 137–44

Bayliss, A, Bronk Ramsey, C, Cook, G, and van der Plicht, J, 2007a *Radiocarbon dates from samples funded by English Heritage under the Aggregates Levy Sustainability Fund 2002–04*, Swindon: Engl Heritage

Bayliss, A, Bronk Ramsey, C, Cook, G, McCormac, F G, Otlet, R, and Walker, A J, 2013 *Radiocarbon dates from samples funded by English Heritage between 1988 and 1993*, Swindon: English Heritage

Bayliss, A, Bronk Ramsey, C, Crowson, A, and McCormac, F G, 2004a Interpreting chronology, in *Hot rocks in the Norfolk Fens: the excavation of a burnt flint mound at Northwold, Norfolk, 1994–5* (A Crowson), E Anglian Occas Pap, **16**, 27–32 Dereham: Norfolk Museums and Archaeol Service

Bayliss, A, Groves, C, McCormac, F G, Bronk Ramsey, C, Baillie, M G L, Brown, D, Cook, G G, and Switsur, R, 2004b Dating, in *The Dover Bronze Age Boat* (ed P Clark), 250–5, Swindon: Engl Heritage

Bayliss, A, and Bronk Ramsey, C, 2004d Pragmatic Bayesians: a decade integrating radiocarbon dates into chronological models, in *Tools for constructing chronologies: tools for crossing disciplinary boundaries* (eds C E Buck and A R Millard), 25–41, London (Springer)

Bayliss, A, Healy, F, Bronk Ramsey, C, McCormac, F G, Cook, G T, and Harding, J, 2011 Absolute chronology, in *The Raunds Area Project: a Neolithic and Bronze Age landscape in Northamptonshire. Volume 2. Supplementary Studies* (eds J Harding and F Healy), 866–85, Swindon: Engl Heritage

Bayliss, A, Healy, F, Bronk Ramsey, C, McCormac, F, and Mercer R 2008a *Interpreting chronology,* in Hambledon Hill, Dorset, England. Excavation and survey of a Neolithic monument complex and its surrounding landscape (Engl Heritage Archaeol Rep) (eds R Mercer and F Healy), 378–411, Swindon: Engl Heritage

Bayliss, A, Hedges, R, Otlet, R, Switsur, R, and Walker, A J, 2012 *Radiocarbon dates from samples funded by English Heritage between 1981 and 1988*, Swindon: English Heritage

Bayliss, A, Lane, T, Bronk Ramsey, C, McCormac, F G, and Thompson, M M, 2010 Radiocarbon dating, in *Fluid landscapes and human adaptation: excavations on prehistoric sites on the Lincolnshire Fen Edge 1991–1994* (T Lane and D Trimble), 291–5, Heckington: Heritage Trust for Lincolnshire

Bayliss, A, Scull, C, McCormac, F G, Bronk Ramsey, C, and Athfield Beavan, N, 2009a Radiocarbon dating, in *Early Medieval (late 5th–early 8th centuries AD) cemeteries at Boss Hall and Buttermarket, Ipswich, Suffolk* (C Scull), Soc Medieval Archaeol Monogr, **27**, 261–7

Bayliss, A, Scull, C, McCormac, F G, Bronk Ramsey, C, and Athfield Beavan, N, 2009b Radiocarbon dating, in *Early medieval (late 5th–early 8th centuries AD) cemeteries at Boss Hall and Buttermarket, Ipswich, Suffolk* (C Scull), Soc Medieval Archaeol Monogr, **27**, 261–7 Leeds: Maney Publishing

Bayliss, A, Shepherd Popescu, E, Beavan-Athfield, N, Bronk Ramsey, C, Cook, G T, and Locker, A, 2004c The potential significance of dietary offsets for the interpretation of radiocarbon dates: an archaeologically significant example from medieval Norwich, *J Archaeol Sci*, **2004**, 563–75

Beavan-Athfield, N, 2000 *Amino Acid and Stable Isotope Analyses of skeletons from St Stephen's Lane and Buttermarket, Ipswich, Suffolk*, Ancient Monuments Lab Rep, **82**

Bell, C, and Hey, G, 1996 Yarnton Cresswell Field, *S Midlands Archaeol*, **26**, 63

Bell, R D, and Beresford, M W, 1987 *Wharram: a study of settlement on the Yorkshire Wolds, 3: Wharram Percy: the church of St Martin*, Soc Medieval Archaeol Monogr Ser, **11**, London: Soc Medieval Archaeol

Biddle, M, Hale, J R, and Summerson, J, 1982 The history of the King's works, in *volume 4, 1485–1660 (Part II)* (H M Colvin), 565–9, London: HMSO

Biddle, M, Hiller, J, Scott, I, and Streeten, A, 2001 *Henry VIII's coastal artillery fort at Camber Castle, Rye, East Sussex: an archaeological, structural and historical investigation*, Oxford: Oxford Archaeol Unit

Bowman, S, 1990 *Radiocarbon dating*, London (British Museum)

Birge, R T, 1932 The calculation of errors by the method of least squares, Physical Review, 40, 207–80

Bonsall, C, 1984 Low Hauxley, Northumberland, *Proc Prehist Soc*, **50**, 398

Bonsall, C, and Smith, C, 1989 Late Palaeolithic and Mesolithic bone and antler artifacts from britain: first reactions to accelerator dates, *Mesolithic Miscellany*, **10**, 33–8

Bradley, R, 1992 The excavations of an oval barrow beside the Abingdon causewayed enclosure, Oxfordshire, *Proc Prehist Soc*, **58**, 127–43

Bradshaw, R H W, Coxon, P, Greig, J R A, and Hall, A R, 1981 New fossil evidence for the past cultivation and processing of hemp (*Cannabis sativa L.)* in Eastern England, *New Phytol*, **89**, 503–10

Brock, F, Higham, T, Ditchfield, P, and Bronk Ramsey, C, 2010 Current pretreatment methods for AMS radiocarbon dating at the Oxford Radiocarbon Accelerator Unit (ORAU), Radiocarbon, **52**, 103–12

Bronk Ramsey, C, 1994 Analysis of chronological information and radiocarbon calibration: the program Oxcal, *Archaeol Computing Newsl*, **41**, 11–16

Bronk Ramsey, C, 1995 Radiocarbon calibration and analysis of stratigraphy: the OxCal program, *Radiocarbon*, **36**, 425–30

Bronk Ramsey, C, 1998 Probability and dating, *Radiocarbon*, **40**, 461–74

Bronk Ramsey, C, 2000 Comment on 'The Use of Bayesian Statistics for ^{14}C dates of chronologically ordered samples: a critical analysis', Radiocarbon, 42, 199–202

Bronk Ramsey, C, 2001 Development of the radiocarbon calibration program OxCal, *Radiocarbon*, **43**, 355–63

Bronk Ramsey, C, 2008 Deposition models for chronological records, *Quaternary Science Review*, **27**, 42–60

Bronk Ramsey, C, 2009a Bayesian analysis of radiocarbon dates, *Radiocarbon*, **51**, 37–60

Bronk Ramsey, C, 2009b Dealing with outliers and offsets in radiocarbon dating, *Radiocarbon*, **51**, 1023–45

Bronk Ramsey, C, and Bayliss, A, 2000 Dating Stonehenge, in *CAA96: computer applications and quantitative methods in archaeology* (eds K Lockyear, T J T Sly, and V Michailescu-Birliba), BAR Int Ser, **845**, 29–39, Oxford: Archaeopress

Bronk Ramsey, C, and Hedges, R E M, 1997 Hybrid ion sources: radiocarbon measurements from microgram to milligram, *Nuclear Instruments and Methods in Physics Research B,* **123**, 539–45

Bronk Ramsey, C, and Lee, S, 2013 Recent and planned developments of the program OxCal, *Radiocarbon*, **55**, 720–30

Bronk Ramsey, C, Higham, T F G, Owen, D C, Pike, A W G, and Hedges, R E M, 2002 Radiocarbon Dates from the Oxford AMS System: Archaeometry Datelist 31, *Archaeometry*, **44**, 1–149

Bronk Ramsey, C, Pettitt, P B, Hedges, R E M, and Hodgins, G W L, 1999 Radiocarbon dates from the Oxford AMS system: Archaeometry Datelist 27, *Archaeometry*, **41**, 197–206

Bronk Ramsey, C, Pettitt, P B, Hedges, R E M, Hodgins, G W L, and Owen, D C, 2000a Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 30, *Archaeometry*, **42**, 459–79

Bronk Ramsey, C, Pettitt, P B, Hedges, R E M, Hodgins, G W L, and Owen, D C, 2000b Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 29, *Archaeometry*, **42**, 243–54

Bronk Ramsey, C, van der Plicht, J, and Weninger, B, 2001 'Wiggle matching' radiocarbon dates, *Radiocarbon*, **43**, 381–9

Bronk Ramsey, C, Higham, T F G, Owen, D C, Pike, A W G, and Hedges, R E M, 2002 Radiocarbon Dates from the Oxford AMS System: Archaeometry Datelist 31, *Archaeometry*, **44**, 1–149

Bronk Ramsey, C, Higham, T F G, Bowles, A, and Hedges, R, 2004 Improvements to the pretreatment of bone at Oxford, *Radiocarbon*, **46**, 155–63

Brown, A G, 1999 Characterising prehistoric lowland environments using local pollen assemblages, *Quat Proc*, **7**, 585–94

Brown, A P, 1977 Late-Devensian and Flandrian vegetational history of Bodmin Moor, Cornwall, *Phil Trans Royal Soc London B*, **276**, 251–320

Buck, C E, and Christen, J A, 1998 A novel approach to selecting samples for radiocarbon dating, *J Archaeol Sci*, **25**, 303–10

Buck, C E, Kenworthy, J B, Litton, C D, and Smith, A F M, 1991 Combining archaeological and radiocarbon information: a Bayesian approach to calibration, *Antiquity*, **65**, 808–21

Buck, C E, Litton, C D, and Smith, A F M, 1992 Calibration of radiocarbon results pertaining to related archaeological events, *J Archaeol Sci*, **19**, 497–512

Buck, C E, Cavanagh, W G, and Litton, C D, 1996 *Bayesian Approach to Interpreting Archaeological Data*, Chichester

Burgess, C, 1986 Urnes of no small variety: collared urns reviewed, *Proc Prehist Soc*, **52**, 339–51

Burleigh, R, and Hewson, A, 1979 British Museum natural radiocarbon measurements XI, *Radiocarbon*, **21**, 339–52

Burleigh, R, and Matthews, K, 1982 British Museum natural radiocarbon measurements XIII, *Radiocarbon*, **24**, 151–70

Burleigh, R, Matthews, K, and Ambers, J, 1982 British Museum radiocarbon measurements XIV, *Radiocarbon*, **24**, 229–61

Burnham, B C, Keppie, L J F, and Esmonde Cleary, A S, 1994 Roman Britain in 1994, *Britannia*, **26**, 349

Butler, C, 2000 *Saxon settlement and earlier remains at Friars Oak, Hassocks, West Sussex*, BAR Brit Ser, **295**, Oxford: Archaeopress

Callow, W J, Baker, M J, and Hassall, G I, 1965 National Physical Laboratory Radiocarbon measurements III, *Radiocarbon*, **7**, 156–61

Campbell, J A, Baxter, M S, and Alcock, L, 1979 Radiocarbon dates for the Cadbury [Somerset] massacre, *Antiquity*, **53**, 31–8

Canti, M, Heal, V, McDonnell, R, Straker, V, and Jennings, S, 1996 Archaeological and palaeoenvironmental evaluation of Porlock Bay and Marsh, *Archaeol Severn Estuary*, **6**, 49–69

Christen, J A, and Litton, C D, 1995 A Bayesian approach to wiggle-matching, *J Archaeol Sci*, **22**, 719–25

Clark, P, 2004a *The Dover Bronze Age Boat*, Swindon: Engl Heritage

Clark, P, 2004b *The Dover Bronze Age boat in context: society and water transport in prehistoric Europe*, Oxford: Oxbow Books

Clarke, M, 1977 The northern levels in Roman times - recent evidence, *J Banwell Soc Archaeol*, **13**, 41–2

Clarke, M, 1979 The northern levels in Roman times - recent evidence, *Axbridge Archaeol Local Hist Soc News Sheet*, **29**, 2–3

Cleal, R, Walker, K E, Montague, R, and Allen, M J, 1995 *Stonehenge in its landscape: twentieth-century excavations*, Engl Heritage Archaeol Rep, **10**, London: Engl Heritage

Cohen, N, 2003 Boundaries and Settlements on the River Thames, in *Early Medieval Britain* (D Griffiths, A Reynolds, and S Semple), Anglo-Saxon Studies in Archaeology and History, **12**, 9–20 Oxford: Oxford University School of Archaeology

Cohen, N, 2011 Early Anglo-Saxon fish traps on the River Thames, in *Studies in early Anglo-Saxon art and archaeology: papers in honour of Martin G Welch* (S Brookes, S Harrington, and A Reynolds), BAR Brit Ser, **527**, 131–8 Oxford: Archaeopress

Cook, A M, and White, P R, 2015 *Sherborne Old Castle: Castleton, Dorset. A report on investigations at the castle 1968–1996*, London (Soc of Antiq)

Cook, G T, and Bayliss, A, 1994 The radiocarbon determinations, in Excavation of the Deeping St Nicholas barrow complex, South Lincolnshire (C A I French), Lincs Archaeol and Heritage Rep Ser, 1, 42–6, Sleaford (Heritage Trust of Lincolnshire)

Cook, A M and White, P R, 2015 Sherborne Old Castle: Castleton, Dorset. a report on investigations at the castle 1968–1996, London: Soc Antiq

Cook, G T, Bonsall, C, Hedges, R E M, McSweeney, K, Boronean, V, and Pettitt, P B, 2001 A Freshwater diet-derived ^{14}C reservoir effect at the stone age sites in the Iron Gates Gorge, *Radiocarbon*, **43**, 453–60

Cowell, R W, and Innes, J B, 1994 *North West Wetlands Survey 1: the wetlands of Merseyside*, Lancaster Imprints, **2**, Lancaster: Lancaster Univ Archaeol Unit

Cowgill, J, and Trimble, R, 1995 *Romano-British iron smelting site at Creeton Quarry, Lincolnshire: assessment report and updated project design, Report No 168*, unpubl rep, City of Lincoln Archaeol Unit

Cox, J, and Letts, J, 2000 *Thatch: thatching in England 1940–1994*, Engl Heritage Res Trans, **6**, London: Engl Heritage

Cromarty, A M, Barclay, A, Lambrick, G, and Robinson, M, 2006 *Late Bronze Age ritual and habitation on a Thames eyot at Whitecross Farm, Wallingford: the archaeology of the Wallingford bypass, 1986–92*, Thames Valley Landscapes Monogr, **22**, Oxford: Oxford Univ Comm Archaeol

Crowson, A, and Bayliss, A, 1999 Dating a burnt mound and its Beakers at Northwold, Norfolk, in Actes du 3eme congres international <<Archaeologie et ^{14}C>> Lyon, 6–10 Avril 1998, *Revue d'Archeometrie Suppl 1999 et Soc Prehist Fr Memoire*, **26**, 243–8

Crowson, A, Lane, T, and Reeve, J, 2000 *Fenland Management Project Excavations 1991–1995*, Lincolnshire Archaeol Heritage Rep Ser, **3**, Sleaford: Heritage Trust for Lincolnshire

Darvill, T, and Wainwright, G, 2009 Stonehenge excavations 2008, *Antiq J*, **89**, 1–19

Darvill, T, Marshall, P, Parker Pearson, M and Wainwright, G, 2012 Stonehenge remodelled, *Antiquity*, **86**, 1021–40

Davis, S J M, 1997 Animal bones from the Roman site Redlands Farm, Stanwick, Northants, 1990 excavation, Anc Mon Lab Rep, **106/1997**

Dearne, M J, 1997 The Roman ?fortlet and timber causewayed road at scaftworth, Nottinghamshire: the excavations of 1980, 1983 and 1991, *Trans Hunter Archaeol Soc*, **19**, 12–31

De Niro, M J, 1985 Postmortum preservation and alteration of *in vivo* bone collagen isotope ratios in relation to palaeodietary reconstruction, *Nature*, **317**, 806–9

Dee, M, and Bronk Ramsey, C, 2000 Refinement of graphite target production at ORAU, *Nuclear Instruments and Methods in Physics Research B*, **172**, 449–53

Devoy, R J N, 1979 Flandrian sea level changes and vegetational history of the lower Thames estuary, *Phil Trans Roy Soc London*, B, **285**, 355–407

Dinn, J, Greig, J, Limbrey, S, Milln, J, and de Rouffignac, C, 2006 Three Long Mynd earthworks: excavations and assessment of environmental potential, *Trans Shropshire Archaeol Soc*, **79**, 65–81

Dix, B, 1987 The Raunds Area project: second interim report, *Northamptonshire Archaeol*, **21**, 3–30

Dodd, A, 2003 *Oxford before the university: the late Saxon and Norman archaeology of the Thames crossing, the defences and the town*, Thames Valley Landscapes Monogr, **17**, Oxford: Oxford Univ School Archaeol

Dresser, Q, 1970 *A study of sampling and pretreatments of materials for radiocarbon dating*, unpubl PhD thesis, Queens Univ Belfast

Elson, P, 1990 *Camber Castle, East Sussex: strategy report*, London: Engl Heritage

Emery, P A, 2007 *Norwich Greyfriars: pre-Conquest town and medieval friary*, E Anglian Archaeol Rep, **120**, Dereham: Norfolk Museums and Archaeol Service

Evans, C, 1994 Sampling settlement: investigations at Lingwood Farm, Cottenham and Eye Hill Farm, Soham, *Fenland Res*, **8**, 26–30

Evans, C, 1999 The Lingwood Wells: waterlogged remains from a first millennium BC settlement at Cottenham, Cambridgeshire, *Proc Cambs Antiq Soc*, **87**, 11–30

Evans, J G, 1986 Radiocarbon dates from the Pitstone Soil at pitstone, Buckinghamshire, in *Archaeological results from accelerator dating* (eds J A J Gowlett and R E M Hedges), Oxford Univ Comm Archaeol Monogr, **11**, 91–3, Oxford: Oxford Univ Comm Archaeol

Fenwick, V, 1995 A paddle from the North Ferriby foreshore (Vale of York), in *First annual report, Humber Wetlands Survey (1994–5)* (ed R Van de Noort), 16–18, Hull: Humber Wetlands Survey

Fernandes, R, Millard, A R, Brabeck M, Nadeau, M-J, and Grootes, P, 2014 Food Reconstruction Using Isotopic Transferred Signals (FRUITS): a Bayesian model for diet reconstruction, *PLoS ONE*, **9**, e87436

Ferris, I, 2010 *The beautiful rooms are empty: excavations at Binchester Roman fort, County Durham, 1976–1981 and 1986–1991*, Durham: Durham County Council

Field, E V, 1961 Excavations and fieldwork in Wiltshire, *Wiltshire Archaeol Natur Hist Mag*, **58**, 30–1

Fitzpatrick, A P, Powell, A B, and Allen, M J, 2008 *Archaeological excavations on the route of the A27 Westhampnett Bypass, West Sussex, 1992, volume 1: Late Upper Palaeolithic-Anglo-Saxon*, Wessex Archaeol Rep, **21**

Frank, R, 1982 A Holocene peat and dune-sand sequence on the coast of north-east England preliminary report, *Quat Newsletter*, **36**, 24–32

French, C A I, 1991 Excavation of Deeping St Nicholas Barrow Site 28, Lincolnshire, *Antiquity*, **65**, 580–2

French, C A I, 1994 *Excavation of the Deeping St Nicholas barrow complex, South Lincolnshire*, Lincolnshire Archaeol Heritage Rep Ser, **1**, Sleaford: Heritage Trust of Lincolnshire

French, C A I, and Becu, B, 2010 Micromorphological analysis of the channel fills and buried soils, in Fluid Landscapes and Human Adaptation: Excavations on the Lincolnshire Fen Edge For The Fenland Management Project 1991–1994 (eds T Lane and G Trimble)

Fulford, M G, Allen, J R L, and Rippon, S J, 1994 The settlement and drainage of the Wentlooge level, Gwent: excavation and survey at Rumney Great Wharf 1992, *Britannia*, **25**, 175–211

Fulford, M G, Powell, A B, Entwistle, R, and Raymond, F, 2006 *Iron Age and Romano-British settlements and landscapes of Salisbury Plain*, Wessex Archaeol Rep, **20**, Salisbury: Wessex Archaeol

Gardiner, K S, 1998 The Wansdyke diktat? a discussion paper, *Bristol Avon Archaeol*, **15**, 57–65

Garton, D, 2009 *The North Peak ESA: archaeological survey of the high moorland*, unpubl rep, Trent and Peak Archaeol Trust

Gearey, B R, 1996 *Human-environment relations on Bodmin Moor during the Holocene*, unpubl PhD thesis, Univ Plymouth

Gearey, B R, Charman, D J, and Kent, M, 1994 Palaeoenvironmental research on Bodmin Moor, *Cornish Archaeol*, **33**, 223–4

Gearey, B R, Charman, D J, and Kent, M, 2000a Palaeoecological evidence for the prehistoric settlement of Bodmin Moor, Cornwall, southwest England, Part 1: the status of woodland and early human impacts, *J Archaeol Sci*, **27**, 423–38

Gearey, B R, Charman, D J, and Kent, M, 2000b Palaeoecological evidence for the prehistoric settlement of Bodmin Moor, Cornwall, southwest England, Part 2: land use changes from the Neolithic to the present, *J Archaeol Sci*, **27**, 493–508

Gearey, B R, Hall, A R, Kenward, H, Bunting, M J, Lillie, M C, and Carrott, J, 2005 Recent palaeoenvironmental evidence for the processing of hemp (*Cannabis sativa L.*) in eastern England during the medieval period, *Medieval Archaeol*, **49**, 317–22

Gelfand, A E, and Smith, A F M, 1990 Sampling approaches to calculating marginal densities, *J Amer Stat Assoc*, **85**, 398–409

Gerloff, S, 1975 *The early Bronze Age daggers of Great Britain and a reconsideration of the Wessex Culture*, Prähistorishe Bronzefunde, **6**, Munich: C H Beck

Gilbertson, D D, 1984 Early Neolithic utilisation and management of alder carr at Skipsea Withow Mere, Holderness, *Yorkshire Archaeol J*, **56**, 17–22

Gilbertson, D D, and Blackman, A, 1985 Scaftworth Roman 'fortlet', in *Peak District and northern dukeries field guide* (D J Briggs, D D Gilbertson, and R D S Jenkinson), 111–27, Sheffield: Quat Res Ass

Gilks, W R, Richardson, S, and Spiegelhalther, D J, 1996 *Markov Chain Monte Carlo in practice*, London: Chapman and Hall

Gray, A, and Ashbee, P, 1972 Prehistoric habitation sites on the Isles of Scilly, *Cornish Archaeol*, **11**, 19–49

Green, J W, 1963 Wood cellulose, in Methods in *Carbohydrate Chemistry 3* (ed R L Whistler), New York (Academic Press), 9–21

Greenwood, P, 2012 *An archaeology of the Wandsworth foreshore. A report based on the work of Wandsworth Historical Society and others*, unpubl rep, independent

Greig, J R A, 1991 The Botanical Remains, in *Excavation and salvage at Runnymede Bridge 1978: the Late Bronze Age waterfront site* (ed S Needham), 234–61, London: British Museum

Griffiths, S, 2011 *Chronological modelling of the mesolithic-neolithic transition in the north and midlands of England and Wales*, unpubl PhD thesis, Univ Cardiff

Hall, D, Wells, C E, and Huckerby, E, 1995 *North West Wetlands Survey 2: the wetlands of Greater Manchester*, Lancaster Imprints, **3**, Lancaster: Lancaster Univ Archaeol Unit

Hardiman, M A, Fairchild, J E, and Longworth, G, 1992 Harwell radiocarbon measurements XI, *Radiocarbon*, **34**, 47–70

Harding, A F, 1981 Excavations in the prehistoric ritual complex near Milfield, Northumberland, *Proc Prehist Soc*, **47**, 87–135

Harding, A F, and Lee, G E, 1987 *Henge monuments and related sites of Great Britian: air photographic evidence and catalogue*, BAR Brit Ser, **175**, Oxford: BAR

Harding, J, and Healy, F, 2007 *The Raunds Area Project: a Neolithic and Bronze Age landscape in Northamptonshire. Volume 1.*, Swindon: Engl Heritage

Harding, J, and Healy, F, 2011 *The Raunds Area Project: a Neolithic and Bronze Age landscape in Northamptonshire. Volume 2. Supplementary Studies*, Swindon: Engl Heritage

Hardy, A, 2003 *Eynsham: a village and its abbey*, Oxford: Oxford Archaeol Unit

Hardy, A, Dodd, A, and Keevill, G D, 2003 *Aelfric's Abbey: excavations at Eynsham Abbey, Oxfordshire, 1989–92*, Thames Valley Landscapes Monogr, **16**, Oxford: Oxford Univ School Archaeol

Haselgrove, C, Armit, I, and Champion, T, 2001 *Understanding the British Iron Age: an agenda for action*, Salisbury (Prehistoric Society and Wessex Archaeology)

Hayfield, C, 1987 *An archaeological survey of the Parish of Wharram Percy*, BAR Brit Ser, **172**, Oxford: BAR

Healy, F, 2004 Hambledon Hill and its implications, in *Monuments and Material Culture. Papers in Honour of an Avebury Archaeologist: Isobel Smith* (eds R Cleal and J Pollard), 15–38, East Knoyle: Hobnob Press

Healy, F, 2012 Chronology, corpses, ceramics, copper, and lithics, in Is there a British Chalcolithic? People, place, and polity in the late third millennium, *Prehist Soc Res Pap*, **4**, 144–63

Healy, F, Harding, J, and Bayliss, A, 2007 Chapter 3: the development of the monuments, in *The Raunds Area Project: a Neolithic and Bronze Age landscape in Northamptonshire* (J Harding and F Healy), 37–198, Swindon (English Heritage)

Hedges, R E M, and Law, I H, 1989 The radiocarbon dating of bone, *Applied Geochemistry*, **4**, 249–53

Hedges, R E M, and Reynard, L M, 2007 Nitrogen isotopes and the trophic level of humans in archaeology, *Journal of Archaeological Science*, **34**, 1240–51

Hedges, R E M, Bronk, C R and Housley, R A 1989 The Oxford Accelerator Mass Spectrometry facility: technical developments in routine dating, *Archaeometry*, **31**, 99–113

Hedges, R E M, Humm, M J, Foreman, J, Klinken, G J van, and Bronk, C R, 1992 Developments in sample combustion to carbon dioxide, and in the Oxford AMS carbon dioxide ion source system, *Radiocarbon*, **34**, 306–11

Hedges, R E M, Housley, R A, Bronk Ramsey, C, and van Klinken, G J, 1993 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 16, *Archaeometry*, **35**, 147–67

Hedges, R E M, Housley, R A, Bronk Ramsey, C, and van Klinken, G J, 1994 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 18, *Archaeometry*, **36**, 337–74

Hedges, R E M, Housley, R A, Bronk Ramsey, C, and Van Klinken, G J, 1995 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 20, *Archaeometry*, **37**, 417–30

Hedges, R E M, Pettit, P B, Bronk Ramsey, C, and van Klinken, G J, 1998 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 26, Archaeometry, 40, 437–55

Hedges, R E M, Housley, R A, Bronk, C R, and van Klinken, G J, 1990 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 11, *Archaeometry*, **32**, 211–37

Hedges, R E M, Housley, R A, Bronk, C R, and van Klinken, G J, 1991 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 13, *Archaeometry*, **33**, 279–96

Hedges, R E M, Pettitt, P B, Bronk Ramsey, C, and Van Klinken, G J, 1996 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 22, *Archaeometry*, **38**, 391–415

Hedges, R E M, Pettitt, P B, Bronk Ramsey, C, and Van Klinken, G J, 1997 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 23, *Archaeometry*, **39**, 247–62

Hedges, R E M, Pettitt, P B, Bronk Ramsey, C, and van Klinken, G J, 1998 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 26, Archaeometry, 40, 437–55

Hedges, R E M, Clement, J G, Thomas, C D L, and O'Connell, T C, 2007 Collagen turnover in the adult femoral mid-shaft: modeled from anthropogenic radiocarbon tracer measurements, American Journal of Physical Anthropology, 133, 808–16

Hey, G, 1991 Yarnton Worton Rectory Farm, *S Midlands Archaeol*, **21**, 86–92

Hey, G, 1994 Yarnton Cassington evaluation, *S Midlands Archaeol*, **24**, 49–52

Hey, G, 2004 *Yarnton: Saxon and medieval settlement and landscape: results of excavations 1990–1996*, Thames Valley Landscapes Monogr, **20**, Oxford: Oxford Univ School of Archaeol

Hey, G, and Muir, J, 1997a Cassington Worton Rectory Farm, *S Midlands Archaeol*, **27**, 55–8

Hey, G, and Muir, J, 1997b *Yarnton Cassington Project: Yarnton floodplain B 1996 post-excavation assessment*, unpubl rep, Oxford Archaeol and Engl Heritage

Hey, G, Bayliss, A, and Boyle, A, 1999 Iron Age inhumation burials at Yarnton, Oxfordshire, *Antiquity*, **73**, 551–62

Hey, G, Bell, C, Dennis, C, and Robinson, M, forthcoming *Yarnton Neolithic and Bronze Age settlement and landscape*, Thames Valley Landscapes Monogr, **35**, Oxford

Hey, G, Booth, P, and Timby, J, 2011 *Yarnton: Iron Age and Romano-British settlement and landscape*, Thames Valley Landscapes Monogr, **35**, Oxford: Oxford Univ School Archaeol

Hibbert, F A, Switsur, V R, and West, R G, 1971 Radiocarbon dating of Flandrian pollen zones at Red Moss, Lancashire, *Proc Roy Soc London, B*, **177**, 161–76

Hillam, J, 1994 *The dendrochronological potential of timbers from Withow Gap, Skipsea, Humberside*, Anc Mon Lab Rep, **31/94**

Hillam, J, Groves, C M, Brown, D M, Baillie, M G L, Coles, J M, and Coles, B P L, 1990 Dendrochronology of the English Neolithic, *Antiquity*, **64**, 210–20

Hillam, J, Morgan, R A, and Tyers, I, 1987 Sapwood estimates and the dating of short ring sequences, in *Applications of tree-ring studies* (ed R G W Ward), BAR Int Ser, **333**, 165–85, Oxford: BAR

Hodgkinson, D, Huckerby, E, Middleton, R, and Wells, C E, 2000 *North West Wetlands Survey 6: the lowland wetlands of Cumbria*, Lancaster Imprints, **8**, Lancaster: Lancaster Univ Archaeol Unit

Hooke, D, 1981 *Anglo-Saxon landscapes of the West Midlands: the charter evidence*, BAR Brit Ser, **95**, Oxford: BAR

Howard-Davis, C, Stocks, C, and Innes, J B, 1988 *Peat and the past: a survey and assessment of the prehistory of the lowland wetlands of north-west England*, Lancaster: Lancaster Univ

Hua, Q, Barbetti, M, and Rakowski, A Z, 2012 Atmospheric radiocarbon for the period 1950–2010, *Radiocarbon*, **55**, 2059–72

International Study Group, 1982 An inter-laboratory comparison of radiocarbon measurements in tree-rings, *Nature*, **298**, 619–23

Jennings, S, Orford, J D, Canti, M, Devoy, R J N, and Straker, V, 1998 The role of relative sea-level rise and changing sediments supply on Holocene gravel barrier development: the example of Porlock, Somerset, UK, *The Holocene*, **8**, 165–81

Johnson, N, and Rose, P, 1994 *Bodmin Moor: an archaeological survey, Volume 1: the human landscape to c 1800*, Engl Heritage Archaeol Rep (Royal Comm Hist Monuments Engl Suppl Ser), **24 (11)**, London: Engl Heritage

Johnson, N, and Rose, P, 2008 *Bodmin Moor: an archaeological survey, Volume 1: the human landscape to c 1800*, Swindon: Engl Heritage

Jordan, D, Haddon-Reece, D, and Bayliss, A, 1994 *Radiocarbon dates from samples funded by English Heritage and dated before 1981*, London: Engl Heritage

Keen, L, and Ellis, P, 2005 *Sherborne Abbey and School: excavations 1972–76 and 1990*, Dorset Natur Hist Archaeol Soc Monogr, **16**, Dorchester: Dorset Natur Hist Archaeol Soc

Keevill, G D, 1992 Life on the edge: archaeology and alluvium at Redlands Farm Stanwick, Northants, in *Alluvial Archaeology in Britain* (S Needham and M G Macklin), Oxbow Monogr, **27**, 177–83 Oxford: Oxbow Books

Keevill, G D, and Williams, R J, 1995 The excavation of a Roman road and a medieval causeway at Ditchford Pit, Wellingborough, Northamptonshire, *Northamptonshire Archaeol*, **26**, 47–77

Kennedy, D, 1984 Floating road: timber-rafted Roman causeway at Scaftworth, near Bawtry, South Yorkshire, *Popular Archaeol*, **5**, 20–1

Kinnes, I, 1979 *Round barrows and ring-ditches in British Neolithic*, Brit Mus Occas Pap, **7**, London: Brit Mus

Kinnes, I, Gibson, A, Ambers, J, Bowman, S, Leese, M, and Boast, R, 1991 Radiocarbon dating and British Beakers: the British Museum programme, *Scott Archaeol Rev*, **8**, 35–78

Kromer, B, and Becker, B, 1993 German oak and pine ^{14}C calibration, 7200–9400 BC, *Radiocarbon*, **35**, 125–36

Lageard, J, Chambers, F, and Roberts, L, 1996 A prehistoric pine woodland at Lindow Moss, near Wilmslow, *Cheshire Hist*, **37**, 2–4

Lane, T, and Morris, E L, 2001 *A millennium of saltmaking: prehistoric and Romano-British salt production in the Fenland*, Lincolnshire Archaeol Heritage Rep Ser, **4**, Sleaford: Heritage Trust for Lincolnshire

Lanting, J N, and van der Plicht, J, 1998 Reservoir effects and apparent ages. *The Journal of Irish Archaeology*, **9**, 151–65

Law, I H, and Hedges, R E M, 1989 A semi-automated pretreatment system and the pretreatment of older and contaminated samples, *Radiocarbon*, **31**, 247–53

Lawson, A J, 1979 A bone point from Hockwold-cum-Wilton, *Norfolk Archaeol*, **37**, 216–7

Leah, M D, 1997 *North west wetlands survey 4: the wetlands of Cheshire*, Lancaster Imprints, **5**, Lancaster: Lancaster Univ Archaeol Unit

Leah, M D, Wells, C E, Stamper, P, Huckerby, E, and Welch, C, 1996 *The wetlands of Shropshire and Staffordshire*, North West Wetlands Survey, **5**, Lancaster: Lancaster University Archaeological Society

Letts, J B, 2000 *Smoke blackened thatch: a unique source of late medieval plant remains from southern England*, London: Univ Reading

Lewis, J S C, 1991 Excavation of a Late Glacial and early Postglacial site at Three Ways Wharf, Uxbridge, England: interim report, in *The Late Glacial in north-west Europe: human adaptation and environmental change at the end of the Pleistocene* (eds R N E Barton, R J Roberts, and D A Roe), CBA Res Rep, 77, 246–55 London: CBA

Lewis, J S C, 2000 The Upper Palaeolithic and Mesolithic periods, in *The archaeology of Greater London: An assessment of archaeological evidence for human presence in the area now covered by Greater London* (ed D A Roe MoLAS), 45–62, London: Museum London Archaeol Services

Lewis, J S C, and Rackham, J, 2011 *Three Ways Wharf, Uxbridge: a late glacial and early Holocene hunter-gatherer site in the Colne valley*, Museum London Archaeol Monogr, **51**, London: Museum of London

Lewis, J S C, Wiltshire, P E J, and MacPhail, R, 1992 A Late Devensian/Early Flandrian site at Three Ways Wharf, Uxbridge: environmental implications, in *Alluvial archaeology in Britain: proceedings of a conference sponsored by the RMC Group plc, 3–5 January 1991*, Oxbow Monogr, **27**, 235–47 Oxford: Oxbow

Lindley, D V, 1985 *Making decisions*, 2nd edn, London: Wiley

Linick, T W, Jull, A J T, Toolin, L J, and Donahue, O J, 1986 Operation of the NSF Arizona Accelerator facility for radioisotope analysis and results from selective collaborative research projects, *Radiocarbon*, **28**, 522–33

Loader, R, Westmore, I, and Tomalin, D, 2002 *Time and tide: an archaeological survey of the Wootton-Quarr coast*, Newport, Isle of Wight: Isle of Wight Council

Locker, A, Davis, S J M, and Connell, B, 1997 *Animal bones from Camber Castle, East Sussex, 1963–1983*, Anc Mon Lab Rep, **107/1997**

Longin, R, 1971 New method of collagen extraction for radiocarbon dating, *Nature*, **230**, 241–2

Longworth, I H, 1984 *Collared urns of the Bronze Age in Great Britain and Ireland*, Cambridge: Cambridge Univ Press

Macphail, R I, and Goldberg, P, 1990 The micromorphology of tree subsoil hollows: their significance to soil science and archaeology, in *Soil Micromorphology: a basic and applied science* (L A Douglas), Developments in Soil Science, **19**, 425–9 Amsterdam: Elsevier

Malim, T, 1996 New evidence on the Cambridgeshire Dykes and Worsted Street Roman road, *Proc Cambridge Antiq Soc*, **1996**, 27–122

Marshall, P D, Meadows, J, Bayliss, A, Sparks, R, Bronk Ramsey, C, and Beavan-Athfield, N, 2010 Scientific Dating, in *The Beautiful Rooms are Empty: excavations at Binchester Roman Fort, County Durham, 1976–1981 and 1986–1991* (I Ferris), 527–38, Durham (Durham County Council)

Marshall, P D, Darvill, T, Parker Pearson, M, and Wainwright, W, 2012 *Stonehenge, Amesbury, Wiltshire: chronological modelling, scientific dating report*, English Heritage Research Report, **1/2012**

Mays, S, Harding, C, and Heighway, C, 2007 *Wharram: a study of settlement on the Yorkshire Wolds, 11: the churchyard*, York Univ Archaeol Pub, **13**, York: York Univ Dept Archaeol

Mays, S, Rogers, J, and Watt, I, 2001 A possible case of Hyperparathyroidism in a burial of 15–17th century AD Date from Wharram Percy, England, *Int J Osteoarchaeol*, **11**, 329–35

McAvoy, F, 1991 Godmanchester, Cambridgeshire, *Conserv Bull*, **14**, 16–8

McCormac, F G, 1992 Liquid scintillation counter characterisation, optimisation, and benzene purity correction, *Radiocarbon*, **34**, 37–45

McCormac, F G, Kalin, R M, and Long, A, 1993 Radiocarbon Dating beyond 50,000 years by liquid scintillation counting, in *Liquid Scintillation Spectrometry 1992* (eds J E Noakes, F Schönhofer, and H Polach), Tucson (Radiocarbon), 125–33

McCormac, F G, Reimer, P J, Bayliss, A, Thompson, M M, Beavan, N, Brown, D, and Hoper, S T, 2011 *Laboratory and Quality Assurance Procedures at the Queen's University, Belfast Radiocarbon Dating Laboratory for Samples dated for the Anglo-Saxon Chronology Project,* English Heritage Research Department Report Series, **89/2011**

Meadows, J, 2011 Case study 3: palaeoenvironmental reconstruction: building better age-depth models, in *Environmental archaeology: a guide to the theory and practice of methods from sampling and recovery to post-excavation (second edition)* (ed D M Jones), 31–3, Swindon: Engl Heritage

Mercer, J, 1988 Hambledon Hill, Dorset, England, in *Enclosures and defences in the Neolithic of western Europe* (eds C Burgess, P Topping, C Mordant, and M Maddison), BAR Int Ser, **403**, 89–106 Oxford: Brit Archaeol Rep

Mercer, R J, 1980 *Hambledon Hill: a Neolithic landscape*, Edinburgh: Edinburgh Univ Press

Mercer, R J, 1987 A flint quarry in the Hambledon Hill Neolithic enclosure complex, in *The human uses of flint and chert: proceedings of the fourth international flint symposium held at Brighton Polytechnic 10–15 April 1983* (eds G de G Sieveking and M H Newcomer), 160–3, Cambridge: Cambridgeshire Univ Press

Mercer, R, and Healy, F, 2008 *Hambledon Hill, Dorset, England: excavation and survey of a Neolithic monument and its surrounding landscape*, Swindon: Engl Heritage

Middleton, R, Tooley, M J, and Innes, J B, forthcoming *The wetlands of south-west Lancashire*, Oxford: Oxbow Books

Middleton, R, Wells, C E, and Huckerby, E, 1995 *The wetlands of North Lancashire*, North West Wetlands Survey, **3**, Lancaster: Lancaster Univ Archaeol Unit

Moffett, L, Robinson, M A, and Straker, V, 1989 Cereals, fruit and nuts: charred plant remains from Neolithic sites in England and Wales and the Neolithic economy, in *The beginnings of agriculture* (A Miles, D Williams, and N Gardener), BAR Internat Ser, **496**, 243–61 Oxford: BAR

Mook, W G, 1986 Business meeting: Recommendations/ Resolutions adopted by the Twelfth International Radiocarbon Conference, *Radiocarbon*, **28**, 799

Mook, W G, and Waterbolk, H T, 1985 *Radiocarbon Dating*, Handbook for Archaeologists, **3**, Strasbourg (European Science Foundation)

Mook, W G, and van der Plicht, J, 1999 Reporting ^{14}C activities and concentrations, *Radiocarbon*, **41**, 227–40

Morris, C D, and Harry, R, 1997 Excavations on the Lower Terrace, Site C, Tintagel Island, 1990–94, *Antiq J*, **77**, 1–143

Murphy, P, 1998 *Fenland Management Project. Plant macrofossils (wood, fruits and seeds) from an Early Iron Age site at Lingwood Farm, Cottenham, Cambridgeshire (LWF 92/3: TL 452 712)*, Anc Mon Lab Rep, **49/98**

Naylor, J C, and Smith, A F M, 1988 An archaeological inference problem, *Journal of the American Statistical Association*, **83**, 588–95

Needham, S P, 1991 *Excavation and salvage at Runnymede Bridge 1978: the Late Bronze Age waterfront site*, London: Brit Mus Press

Neumann, H, 1998 The palaeoenvironmental survey of the Ancholme valley, in *Wetland Heritage of the Ancholme and Lower Trent valleys: an archaeological survey* (eds R Van de Noort and S Ellis), 75–101, Kingston upon Hull: Humber Wetlands Project

Niu M, Heaton, T J, Blackwell, P G, and Buck, C E, 2013 The Bayesian approach to radiocarbon calibration curve estimation: the IntCal13, Marine13, and SHCal13 methodologies, *Radiocarbon*, **55**, 1905–22

Noakes, J E, Kim, S M, and Stipp, J J, 1965 Chemical and counting advances in Liquid Scintillation Age dating, in *Proceedings of the Sixth International Conference on Radiocarbon and Tritium Dating* (eds E A Olsson and R M Chatters), 68–92, Washington DC

Noel, M, 1996 Archaeomagnetic analysis of samples from a bell pit at Greyfriars, Norwich, Anc Mon Lab Rep, **63/96**

Olsson, I U, 1979 The importance of the pretreatment of wood and charcoal samples, in *Radiocarbon Dating: Proceedings of the 9th International Radiocarbon Conference*, 135–46, Los Angeles and San Diego (Univ California Press)

Oswald, A, Dyer, C, and Barber, M, 2001 *The creation of monuments: Neolithic causewayed enclosures in the British Isles*, Swindon: Engl Heritage

Otlet, R L, 1977 Harwell radiocarbon measurements II, *Radiocarbon*, **19**, 400–23

Otlet, R L, 1979 An assessment of laboratory errors in liquid scintillation methods of ^{14}C dating, in *Proceedings of the ninth International Radiocarbon Conference* (eds R Berger and H E Suess), 256–67, Univ California Press

Otlet, R L, and Slade, B S, 1974 Harwell radiocarbon measurements I, *Radiocarbon*, **16**, 178–91

Otlet, R L, and Warchal, R M, 1978 Liquid scintillation counting of low-level ^{14}C dating, *Liquid Scintillation Counting*, **5**, 210–18

Otlet, R L, Walker, A J, Hewson, A D, and Burleigh, R, 1980 ^{14}C interlaboratory comparison in the UK: experiment design, preparation, and preliminary results, *Radiocarbon*, **22**, 936–46

Otlet, R L, Huxtable, G, Evans, G V, Humphreys, D G , Short, T D, and Conchie, S J, 1983 Development and operation of the Harwell small counter facility for the measurement of ^{14}C in very small samples, *Radiocarbon*, **25**, 565–75

Owen, E, and Frost, M, 2000 *The Dover Bronze Age boat gallery guide*, Dover: Dover District Council

Parfitt, K, 1993 *Dover Bronze Age boat*, Canterbury: Canterbury Archaeol Trust

Parker Pearson, M, and Sydes, R E, 1997 The Iron Age enclosures and Prehistoric landscape of Sutton Common, South Yorkshire, *Proc Prehist Soc*, **63**, 221–59

Parker Pearson, M, and Cox Wills, C, 2010 Burials and builders of Stonehenge: social identities in Late Neolithic and Chalcolithic Britain, in Megalithis and Identities (ed M Furholt), http://www.junsteinsite.unikiel.de/2010_MSG/Parker%20Pearson_MSG_2010_low.pdf

Parker Pearson, M, Cleal, R, Marshall, P, Needham, S, Pollard, J, Richards, C, Ruggles, C, Sheridan, A, Thomas, J, Tilley, C, Welham, K, Chamberlain, A, Chenery, C, Evans, J, Knüsel, C, Linford, N, Martin, L, Montgomery, J, Payne, A, and Richards, M, 2007 The age of Stonehenge, Antiquity, 81, 617–39

Parker Pearson, M, Chamberlain, A, Jay, M, Marshall, P, Pollard, J, Richards, C, Thomas, J, Tilley, C, and Welham, K, 2009 Who was buried at Stonehenge? *Antiquity*, **83**, 23–39

Parnell, A C, Inger, R, Bearhop S, and Jackson, A L, 2010 Source partitioning using stable isotopes: coping with too much variation, *PLoS ONE*, 5, e9672

Parry, S, 2006 *Raunds Area Survey: an archaeological study of the landscape of Raunds, Northamptonshire 1985–94*, Oxford: Oxbow Books

Pearson, G W, 1984 *The development of high-precision ^{14}C measurement and its application to archaeological time-scale problems*, unpubl PhD thesis, Queens Univ Belfast

Pearson, G W, 1987 How to cope with calibration, Antiquity, **61**, 98–103

Pearson, G W, and Stuiver, M, 1986 High-precision calibration of the radiocarbon timescale, 500–2500 BC, *Radiocarbon*, **28**, 839–62

Pearson, G W, Becker, B, and Qua, F, 1993 High-precision ^{14}C measurements of German and Irish oaks to show the natural ^{14}C variations from 7890 to 5000 BC, *Radiocarbon*, **35**, 93–104

Phillips, D, and Gregg, J W, 2003 Source partitioning using stable isotopes: coping with too many sources, *Oecologia*, **136**, 261–9

PPG16 1990 *Planning Policy Guidance: Archaeology and Planning*, Department of the Environment

Preece, R C, 1994 Radiocarbon dates from the 'Allerød Soil' in Kent, *Proc Geol Ass*, **105**, 111–23

Prendergast, D M, 2000 The problems raised by small charcoal samples for radiocarbon analysis, *J Field Archaeol*, **27**, 237–9

Pryor, F, 1992a Introduction to current research at Flag Fen, Peterborough, *Antiquity*, **66**, 439

Pryor, F, 1992b Discussion: the Fengate/Northey landscape, in Current research at Flag Fen, *Antiquity*, **66**, 518–31

Pryor, F, 2001 *The Flag Fen basin: archaeology and environment of a fenland landscape*, Engl Heritage Archaeol Rep, London: Engl Heritage

Rahtz, P A, 1992 *Cadbury Congresbury 1968–73: a later/post-Roman hilltop settlement in Avon*, BAR Brit Ser, **223**, Oxford: Tempus Reparatum

Ratcliffe, J, 1995 Duckpool, Morwenstow: a Romano-British and early medieval industrial site and harbour, *Cornish Archaeol*, **34**, 81–171

Ratcliffe, J, and Straker, V, 1996 *The early environment of Scilly: palaeoenvironmental assessment of cliff-face and intertidal deposits, 1989–1993*, Truro: Cornwall County Council, Cornwall Archaeol Unit

RCHME, 1997 *Royal Commission on the Historical Monuments of England annual report 1996/7*, Swindon: RCHME

Rees-Jones, J, 1995 *Optical dating of selected archaeological sediments*, unpubl DPhil thesis, Univ of Oxford

Reimer, P J, Baillie, M G L, Bard, E, Bayliss, A, Beck, J W, Bertrand, C J H, Blackwell, P G, Buck, C E, Burr, G S, Cutler, K B, Damon, P E, Edwards, R L, Fairbanks, R G, Friedrich, M, Guilderson, T P, Hogg, A G, Hughen, K A, Kromer, B, McCormac, F G, Manning, S, Bronk Ramsey, C, Reimer, R W, Remmele, S, Southon, J R, Stuiver, M, Talamo, S, Taylor, F W, van der Plicht, J, and Weyhenmeyer, C E, 2004 IntCal04 Terrestrial Radiocarbon Age Calibration, 0–26 cal kyr BP, *Radiocarbon*, **46**, 1029–58

Reimer, P J, Baillie, M G L, Bard, E, Bayliss, A, Beck, J W, Blackwell, P G, Bronk Ramsey, C, Buck, C E, Burr, G S, Edwards, R L, Friedrich, M, Grootes, P M, Guilderson, T P, Hajdas, I, Heaton, T J, Hogg, A G, Hughen, K A, Kaiser, K F, Kromer, B, McCormac, F G, Manning, S W, Reimer, R W, Richards, D A, Southon, J R, Talamo, S, Turney, C S M, van der Plicht, J, and Weyhenmeyer, C E, 2009 IntCal09 and Marine09 radiocarbon age calibration curves, 0–50,0000 Years cal BP, *Radiocarbon*, **51**, 1111–50

Reimer, P J, Bard, E, Bayliss, A, Beck, W, Blackwell, P G, Bronk Ramsey, C, Buck, C E, Cheng, H, Edwards, R L, Friedrich, M, Grootes, P M, Guilderson, T P, Haflidason, H, Hajdas, I, Hatte, C, Heaton, T J, Hoffman, D L, Hogg, A G, Hughen, K A, Kaiser, K F, Kromer, B, Manning, S W, Niu, M, Reimer, R W, Richards, D A, Scott, E M, Southon, J R, Staff, R A, Turney, C S M, and van der Plicht, J, 2013 INTCAL13 and MARINE13 radiocarbon age calibration curves 0-50,000 years cal BP, *Radiocarbon*, **55**, 1869–87

Reynolds, P, 1995 The life and death of a post hole, in *Interpreting stratigraphy* (ed E Shepherd), 21–5, Norwich: Norfolk Archaeol Unit

Richards, J C, 1990 *The Stonehenge Environs Project*, EH Archaeol Rep, **16**

Ripper, S, 2004 *Bodies, burnt mounds and bridges: a riverine landscape at Watermead Park, Birstall, Leicestershire*, ULAS report, **2004–48**

Ripper, S and Beamish, M, 2012 Bogs, bodies, and burnt mounds: visits to the Soar wetlands in the Neolithic and Bronze Age, Proc Prehist Soc, 78, 173–206

Rippon, S, 2006 *Landscape, community and colonisation: the North Somerset Levels during the first to second millennia AD*, CBA Res Rep, **152**, London: CBA

Roberts, I, 2002 *Pontefract Castle: archaeological excavations 1982–86*, Yorkshire Archaeol, **8**, Wakefield: W Yorkshire Archaeol Service

Rozanski, K, Stichler, W, Gonfiantini, R, Scott, E M, Beukens, R P, Kromer, B, and van der Plicht, J, 1992 The IAEA ^{14}C intercomparison exercise 1990, *Radiocarbon*, **34**, 506–19

Rudling, D, 2002 *Downland settlement and land-use: the archaeology of the Brighton Bypass*, UCL Fld Archaeol Unit Monogr, **1**, Institute of Archaeol, Univ College London

Russel, A D, 1990 Two Beaker burials from Chilbolton, Hampshire, *Proc Prehist Soc*, **56**, 153–72

Salisbury, C R, 1995 The excavation of Hemington Fields, *Curr Archaeol*, **145**, 34–5

Salisbury, C R, 1996 Hemington Fields - a Medieval landscape, *Newswarp*, **19**, 24–32

Scott, E M, Aitchison, T C, Harkness, D D, Cook, G T, and Baxter, M S, 1990 An overview of all three stages of the international radiocarbon intercomparison, *Radiocarbon*, **32,** 309–19

Scott, E M, 2003 The Third International Radiocarbon Intercomparison (TIRI) and the Fourth International Radiocarbon Intercomparision (FIRI) 1990–2002: results, analyses, and conclusions, *Radiocarbon*, **45**, 135–408

Scull, C, 2009 *Early medieval (late 5th-early 8th centuries AD) cemeteries at Boss Hall and Buttermarket, Ipswich, Suffolk*, Soc Med Archaeol Monogr, **27**, Leeds: Soc Med Archaeol

Scull, C, and Bayliss, A, 1999a Radiocarbon dating and Anglo-Saxon graves, in *Völker an Nord – und Ostsee und die Franken: Akten des 48. Sachsensymposiums in Mannheim vom 7. bis 11. September 1997* (eds U von Freeden, U Koch, and A Wieczorek), 39–50, Bonn: Dr. Rudolf Habelt

Scull, C, and Bayliss, A, 1999b Dating burials of the seventh and eighth centuries: a case study from Ipswich, Suffolk, in *The pace of change: studies in early medieval chronology* (eds J Hines, K Hoilund Nielsen, and F Siegmund), 80-8, Oxford: Oxbow

Shepherd Popescu, E, 2009b *Norwich Castle: excavations and historical survey 1987-98*, E Anglian Archaeol Rep, **132**, Norfolk: E Anglian Archaeol

Shore, J S, 1988 *The radiocarbon dating of peat fractions in relation to pollen analysis*, unpubl PhD thesis, Univ Leeds

Slota Jr, P J, Jull, A J T, Linick, T W and Toolin, L J, 1987 Preparation of small samples for ^{14}C accelerator targets by catalytic reduction of CO, *Radiocarbon*, **29**, 303–6

Smith, C, 1989 British Antler Mattocks, in *The Mesolithic in Europe: papers presented at the 3rd International Symposium, Edinburgh 1985* (ed C Bonsall), 272–83, Edinburgh

Smith, R A, 1911 Lake dwellings in Holderness, Yorkshire, *Archaeologia*, **62**, 593–610

Spikins, P, 1999 *Mesolithic northern England environment, population and settlement*, BAR Brit Ser, **283**

Stafford, T W, Brendal, K, and Duhamel, R C, 1988 Radiocarbon, ^{13}C and ^{15}N analysis of fossil bone: removal of humates with SAD-2 resin, *Geochimica et Cosmochimica Acta*, **52**, 2257–67

Stamper, P A, and Croft, R A, 2000 *Wharram: a study of settlement on the Yorkshire Wolds, 8: the south manor area*, York Univ Archaeol Pub, **10**, York: Univ York, Dept Archaeol

Steier, P, and Rom, W, 2000 The use of Bayesian statistics for ^{14}C dates of chronologically ordered samples: a critical analysis, *Radiocarbon*, **42**, 183–98

Stenhouse, M J, and Baxter, M S, 1983 ^{14}C dating reproducibility: evidence from routine dating of archaeological samples, *PACT*, **8**, 147–61

Stuiver, M, and Kra, R S, 1986 Editorial comment, *Radiocarbon*, **28(2B)**, ii

Stuiver, M, and Polach, H A, 1977 Reporting of ^{14}C data, *Radiocarbon*, **19**, 355–63

Stuiver, M, and Pearson, G W, 1986 High-precision calibration of the radiocarbon timescale, AD 1950–2500 BC, *Radiocarbon*, **28**, 805–38

Stuiver, M, and Reimer, P J, 1986 A computer program for radiocarbon age calculation, *Radiocarbon*, **28**, 1022–30

Stuiver, M, and Braziunas T F, 1993 Modeling atmospheric ^{14}C influences and ^{14}C ages of marine samples back to 10,000 BC, *Radiocarbon*, **35**, 137–89

Stuiver, M, and Reimer, P J, 1993 Extended ^{14}C data base and revised CALIB 3.0 ^{14}C age calibration program, *Radiocarbon*, **35**, 215–30

Stuiver, M, Reimer, P J, Bard, E, Beck, J W, Burr, G S, Hughen, K A, Kromer, B, McCormac, F G, van der Plicht, J, and Spurk, M, 1998 INTCAL98 radiocarbon age calibration, 24,000–0 cal BP, *Radiocarbon*, **40**, 1041–84

Switsur, R, 1972 Combustion bombs for radiocarbon dating, in *Proceedings of the 8th International ^{14}C Conference, Vol 1, B11–B23*, 11–23, Wellington: Royal Soc New Zealand

Switsur, V R, Burleigh, R, Meeks, N, and Cleland, J M, 1974 A new sample combustion bomb for radiocarbon dating, *International J Applied Radiation and Isotopes*, **25**, 113–7

Switzur, R, 1989 Early English boats, *Radiocarbon*, **31**, 1010–8

Tabor, R, 2008 *Cadbury Castle: the hillfort and landscapes*, Stroud: The History Press

Tallis, J, 1991 Forest and moorland in the South Pennine Uplands in the mid-Flandrian period III: the spread of moorland, local, regional and national, *J Ecology*, **79**, 749–56

Tamers, M A, 1965 Routine carbon-14 dating using liquid scintillation techniques, in *Radiocarbon and tritium dating: proceedings of the sixth international conference on radiocarbon and tritium dating* (eds R M Chatters and E A Olson), 53–67, Washington D.C.

Tomalin, D J, Loader, R D, and Scaife, R G, 2012 *Coastal archaeology in a dynamic environment: a Solent case study*, BAR Brit Ser, **568**, Engl Heritage

Treen, C, and Atkin, A, 2005 *Wharram: a study of settlement on the Yorkshire Wolds, 10: water resources and their management*, York Univ Archaeol Publ, **12**, York: Univ York, Dept Archaeol

Van de Noort, R, 2004 *The Humber Wetlands: the archaeology of a dynamic landscape*, Macclesfield: Windgather Press

Van de Noort, R, and Ellis, S, 1995a *Wetland heritage of Holderness: an archaeological survey*, Hull: Humber Wetlands Project

Van de Noort, R, and Ellis, S, 1995b *Humber Wetlands Survey: first annual report (1994–95)*, Hull: Humber Wetlands Project

Van de Noort, R, and Ellis, S, 1996 *Humber Wetlands Survey second annual report (1995–6)*, Hull: Humber Wetlands Project

Van de Noort, R, and Ellis, S, 1997 *Wetland heritage of the Humberhead Levels: an archaeological survey*, Hull: Humber Wetlands Project

Van de Noort, R, and Ellis, S, 1998a *Wetland heritage of the Ancholme and lower Trent valleys: an archaeological survey*, Hull: Humber Wetlands Project

Van de Noort, R, and Ellis, S, 1998b *Humber Wetlands Survey: third annual report (1996–97)*, Hull: Humber Wetlands Project

Van de Noort, R, and Ellis, S, 1999a *Wetland heritage of the Vale of York: an archaeological survey*, Hull: Humber Wetlands Project

Van de Noort, R, and Ellis, S, 1999b *Humber Wetlands Survey: fourth annual report (1997–98)*, Hull: Humber Wetlands Project

Van de Noort, R, and Ellis, S, 2000a *Wetland heritage of the Hull valley: an archaeological survey*, Hull: Humber Wetlands Project

Van de Noort, R, and Ellis, S, 2000b *Humber Wetlands Survey: fifth annual report (1998–99)*, Hull: Humber Wetlands Survey

Van de Noort, R, and Ellis, S, 2000c *Humber Wetlands Survey: sixth annual report (1999–2000)*, Hull: Wetland Archaeology and Environments Research Centre

Van de Noort, R, Davies, P, and Ellis, S, 1993 *Wetland heritage: an archaeological assessment of the Humber Wetlands*, Hull: Humber Wetlands Project, Univ Hull

Van de Noort, R, Middleton, R, Foxon, A, and Bayliss, A, 1999 The 'Kilnsea-boat', and some implications from the discovery of England's oldest plank boat remains, *Antiquity*, **73**, 131–5

Varley, W J, 1968 Barmston and the Holderness Crannogs, *E Riding Archaeol*, **1**, 12–26

Waddington, C, 1997a Coupland: the earliest henge-type monument in Britain, *Archaeol Aeliana*, **25**, 144–5

Waddington, C, 1997b Earliest henge and other updates: the Milfield Basin Archaeological Landscape Project (MBALP). In 1997, *Archaeol North*, **13**, 8–13

Waddington, C, 1999 *A landscape archaeological study of the Mesolithic-Neolithic in the Milfield Basin, Northumberland*, BAR Brit Ser, **291**, Oxford: Archaeopresss

Wait, G A, 1991 *Fleam Dyke, 1991 - Interim Report: report no 49*, unpubl rep, Cambridgeshire Archaeol

Wakeham, S G, Forrest, J, Masiello, C A, Gelinas, Y, Alexander, C R, and Leavitt, P R, 2004 Hydrocarbons in Lake Washington sediments: a 25-year retrospective in an urban lake, *Environmental Sci Technology*, **38**, 431–9

Walker, A J, Williams, N, and Otlet, R L, 1990 Harwell radiocarbon measurements VIII, *Radiocarbon*, **32**, 165–96

Walker, A J, Young, A W, and Otlet, R L, 1991a Harwell radiocarbon measurements X, *Radiocarbon*, **33**, 87–113

Wallis, H, 2002 *Roman routeways across the fens: excavations at Morton, Tilney St Lawrence, Nordelph and Downham Market*, E Anglian Occ Pap, **10**, Dereham: Norfolk Museums and Archaeol Service

Ward, G K, and Wilson, S R, 1978 Procedures for comparing and combining radiocarbon age determinations: a critique, *Archaeometry*, **20**, 19–31

Waterbolk, H T, 1971 Working with radiocarbon dates, *Proc Prehist Soc*, **37**, 15–33

Waughman, M, 1995 The Carr House Sands Project Summary Report, unpubl rep, Tees Archaeol

Waughman, M, 1996 Excavation of a Mesolithic site at Highcliff Nab, Guisborough, *Durham Archaeol J*, **12**, 1–15

Weddell, P J, and Reed, S J, 1997 Excavations at Sourton Down, Okehampton 1986-1991: Roman Broad deserted medieval hamlet and other landscape features, *Devon Archaeol Soc Proc*, **55**, 39–147

Wessex Archaeology, 1992 *Westhampnett from the Ice Age to the Romans*, Salisbury: Wessex Archaeol

Whittle, A, Healy, F, and Bayliss, A, 2011 *Gathering time: dating the early Neolithic enclosures of southern Britain and Ireland*, Oxford: Oxbow Books

Wild, C, Wells, C, Anderson, D, Boardman, J, and Parker, A, 2001 Evidence for medieval clearance in the Seathwaite Valley, Cumbria, *Trans Cumberland Westmorland Antiq Archaeol Soc*, 3, **1**, 53–68

Williams, D, 2004 Franks' Sandpit, Betchworth, Surrey: a site of special significance?, in *Towards a New Stone Age: aspects of the Neolithic in south-east England* (J Cotton and D Field), CBA Res Rep, **137**, 164–7 York: CBA

Williams, P, and Newman, R, 2006 *Market Lavington, Wiltshire, and Anglo-Saxon cemetery and settlement: excavations at Grove Farm, 1986–90*, Wessex Archaeol Rep, **19**, Salisbury: Wessex Archaeol

Wilson, J E, McCormac, F G, and Hogg, A G, 1995 Small sample high-precision ^{14}C dating: characterisation of vials and counter optimisation, in *Liquid Scintillation Spectrometry 1994* (eds G T Cook, D D Harkness, A B MacKenzie, B F Miller, and E M Scott), Tuscon, Arizona (Radiocarbon), 59–65

Wiltshire, P J, and Bayliss, A, 2006 The Easterton Brook palaeochannel, in *Market Lavington, Wiltshire: an Anglo-Saxon cemetery and settlement* (P Williams and R Newman), Wessex Archaeol Rep, **19**, 118–21

Windell, D, Chapman, A, and Woodiwiss, J, 1990 *From barrows to bypass: excavations at West Cotton, Raunds, Northamptonshire 1985–1989*, Northampton: Northamptonshire Archaeol Unit

Wohlfarth, B, Skog, G, Possnert, G, and Holmquist, B, 1998 Pitfalls in the AMS radiocarbon dating of terrestrial macrofossils, *J Quat Sci*, **13**, 137–45

Zondervan, A, and Sparks, R J, 1997 Development plans for the AMS facility at the Institute of Geological and Nuclear Sciences, New Zealand, *Nuclear Instruments and Methods in Physics Research Section B*, 123, 79–83

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RADIOCARBON DATES

This volume holds a datelist of 1063 radiocarbon determinations carried out between 1993 and 1998 on behalf of the Ancient Monuments Laboratory 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: Wharram Percy cemetery excavations. (© Wharram Research Project)

Back cover: The Scientific Dating Research Team visiting Stonehenge as part of Science, Engineering, and Technology Week, March 1996.
Left to right: Stephen Hoper (The Queen's University, Belfast), Christopher Bronk Ramsey (Oxford University), Gerry McCormac (The Queen's University, Belfast), Alex Bayliss (English Heritage), Michael J Allen and Julie Gardiner (Wessex Archaeology). (© The Queen's University, Belfast)

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