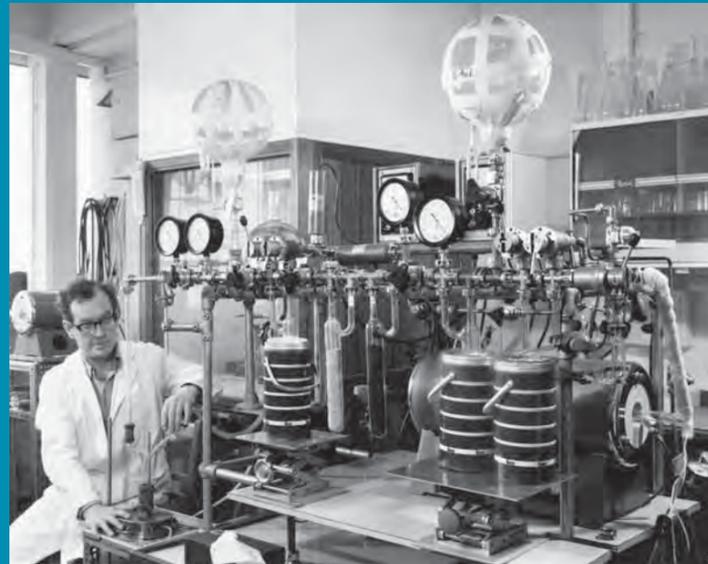


RADIOCARBON DATES

This volume holds a datelist of 1285 radiocarbon determinations carried out between 1981 and 1988 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 published, although, when many of these measurements were produced, high-precision calibration was not possible. At this time, there was also only a limited range of statistical techniques available for the analysis of radiocarbon dates. Methodological developments since these measurements were made may allow revised archaeological interpretations to be constructed on the basis of these dates, and so 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: Excavations at Avebury Henge, 1908 (© English Heritage. NMR)
Back cover: Curly Humphries. Benzene synthesis from carbon dioxide at AERE Harwell
(© NDA, reproduced with permission from the NDA)*

Product Code: 51762 ISBN: 978-1-84802-130-3



ENGLISH HERITAGE

RADIOCARBON DATES

Alex Bayliss, Robert Hedges, Robert Otlet, Roy Switsur, and Jill Walker



RADIOCARBON DATES

*from samples funded by English Heritage
between 1981 and 1988*



Alex Bayliss, Robert Hedges, Robert Otlet,
Roy Switsur, and Jill Walker



ENGLISH HERITAGE

RADIOCARBON DATES

*from samples funded by English Heritage
between 1981 and 1988*

RADIOCARBON DATES

*from samples funded by English Heritage
between 1981 and 1988*

Alex Bayliss, Robert Hedges, Robert Otlet,
Roy Switsur, and Jill Walker



ENGLISH HERITAGE

Published by English Heritage, The Engine House, Fire Fly Avenue, Swindon SN2 2EH
www.english-heritage.org.uk

English Heritage is the Government's statutory adviser on all aspects of the historic environment.

© English Heritage 2012

All images, unless otherwise specified, are either © English Heritage or © Crown copyright. NMR. The negative numbers for English Heritage and NMR images are noted in square brackets in the captions where possible.

First published 2012

10 9 8 7 6 5 4 3 2 1

ISBN 978-1-84802-130-3

Product Code 51762

British Library Cataloguing in Publication Data
A CIP catalogue record for this book is available from the British Library.

All rights reserved

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage or retrieval system, without permission in writing from the publisher.

Application for the reproduction of images should be made to the National Monuments Record. Every effort has been made to trace the copyright holders and we apologise in advance for any unintentional omissions, which we would be pleased to correct in any subsequent edition of this book.

The National Monuments Record is the public archive of English Heritage.
For more information, contact NMR Enquiry and Research Services, National Monuments Record, The Engine House, Fire Fly Avenue, Swindon SN2 2EH; telephone (01793) 414600.

Edited and brought to publication by David M Jones, Publishing, English Heritage, The Engine House, Fire Fly Avenue, Swindon SN2 2EH.

Cover design and page layout by www.farrbott.com
Indexed by Alan Rutter
Printed by 4Edge Ltd, Hockley. www.4edge.co.uk

Contents

<i>Radiocarbon Dates funded by English Heritage between 1981 and 1988 by Alex Bayliss</i>	vii
<i>Introduction</i>	vii
<i>History of this volume</i>	viii
<i>Sample selection and characterisation</i>	xi
<i>Laboratory methods</i>	xiv
<i>Fractionation and radiocarbon ages</i>	xvi
<i>Calibration</i>	xvii
<i>Quality assurance</i>	xix
<i>Statistical modelling</i>	xxii
<i>Using the datelist</i>	xxiv
<i>Acknowledgements</i>	xxiv
<i>Charcoal and wood identification of samples dated before 1981 by Rowena Gale</i>	xxvi
<i>Datelist</i>	1
<i>Bibliography</i>	325
<i>Index of laboratory codes</i>	344
<i>General index</i>	363

Radiocarbon Dates funded by English Heritage between 1981 and 1988

Introduction

This volume presents a detailed catalogue of the radiocarbon dates funded by English Heritage between April 1981 and March 1988. A few results from samples submitted before April 1981, which were not published by Jordan *et al* (1994), are also included. In total details of 1285 determinations are provided.

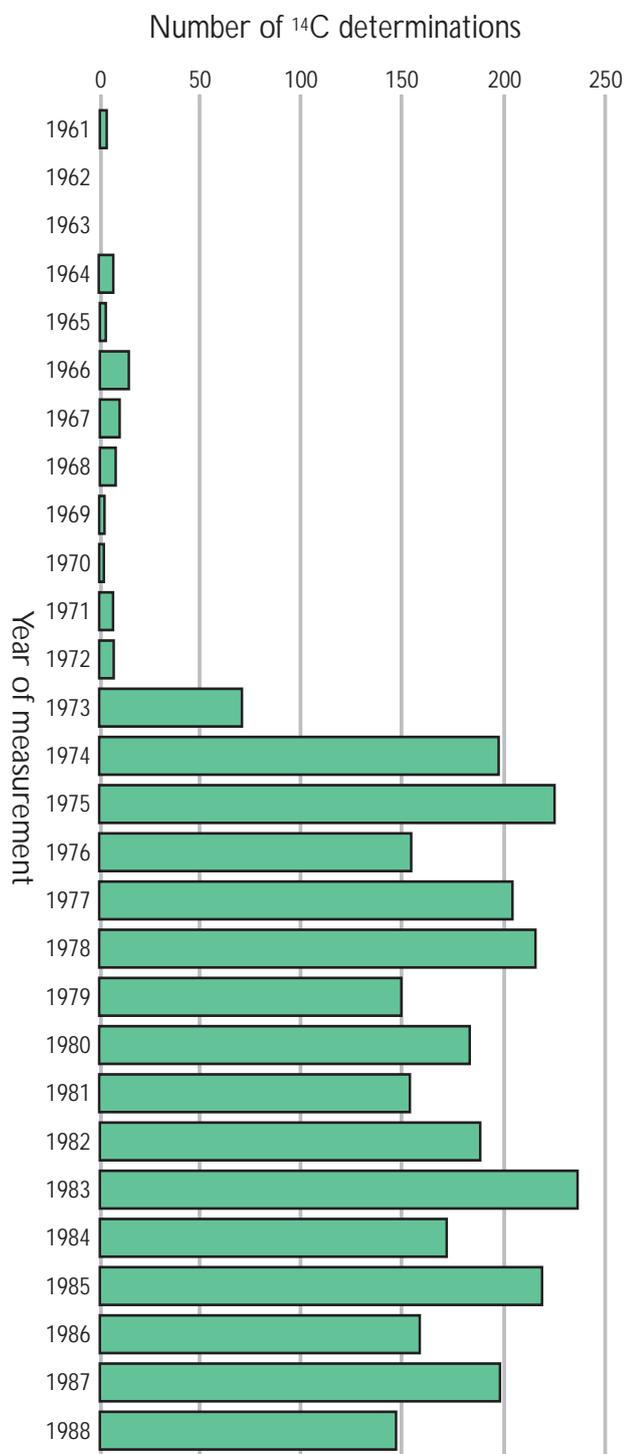


Fig 1. Radiocarbon measurements from English sites funded by English Heritage, the Department of the Environment, the Ministry of Public Buildings & Works, and the Ministry of Works (1961–88).

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 most were from excavations undertaken by others in advance of development. This volume covers a period before the wide-scale availability of archaeological funding from developers, which followed the adoption of new planning guidance in the early 1990s (PPG16 1990). Other samples were submitted from archaeological research programmes undertaken by the staff of the Ancient Monuments Laboratory and their university-based contractors. For example, a number of dates were funded to aid the development of oak master chronologies for dendrochronology in England, often in connection with early attempts to provide tree-ring dates for timberwork in buildings under repair.

The 1970s and 1980s saw the expansion of ‘rescue’ archaeology undertaken in advance of construction projects (Rahtz 1974). This expansion is mirrored in the number of samples submitted for dating by English Heritage and its predecessors¹ (Fig 1). The establishment of the radiocarbon dating laboratory at AERE Harwell in the early 1970s allowed larger numbers of samples to be processed using liquid scintillation counting, but, despite stringent vetting arrangements, samples appropriate for dating always exceeded capacity.

The major limitation of conventional radiocarbon dating is the sample size that is necessary to provide a statistically viable number of decay counts for age calculation. Typically 300g of bone, 200g of peat, or 15g of charcoal was required. This had an inevitable effect on the number and nature of the samples that could be selected for dating (see below). It also meant that when the Harwell laboratory constructed a miniature gas-proportional counter, which could date

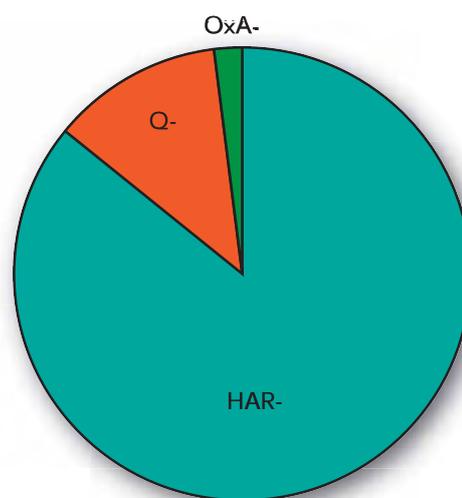


Fig 2. Proportion of radiocarbon measurements included in this volume processed by each collaborating facility (HAR-, AERE Harwell; Q-, The Godwin Laboratory, University of Cambridge; OxA-, Oxford Radiocarbon Accelerator Unit).

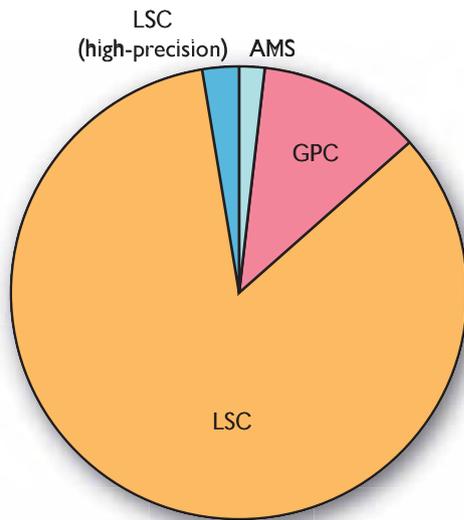


Fig 3. Techniques of radiocarbon dating used for the measurements reported in this volume (LSC, liquid scintillation counting; GPC, gas-proportional counting; AMS, accelerator mass spectrometry).

much smaller samples (typically 10g of bone, 6g of peat, or 1g of charcoal), it was in great demand. This facility was initially established in 1981, but development took rather longer than expected and, by the time the small-sample counter became fully operational, there was a long queue of samples.

In 1983 this need to date a wider range of smaller samples was further met by the dating by the Oxford Radiocarbon Accelerator Unit of the first samples for English Heritage. At this time, dating by accelerator mass spectrometry was still experimental, and so only a handful of samples could be dated each year. The range of radiocarbon measurements that could be provided was extended further in 1985 when a larger-sample, higher-precision liquid scintillation dating facility came into operation at Harwell.

Between February 1984 and March 1988, the Godwin Laboratory of the University of Cambridge undertook a total of 159 determinations on samples from the Fenland Project (Fig 2). Partially, this was an attempt to reduce the press of samples at Harwell, allowing the backlog that had built up over the previous few years to be addressed, but this was also a pertinent research collaboration as many of the Fenland peats contained considerable amounts of sulphur which produced technical challenges in dating that were of interest to the Cambridge laboratory (see below).

The majority of the results detailed in this volume (84%) were measured using liquid scintillation counting either at AERE Harwell or at the Godwin Laboratory (Figs 2 and 3). Much smaller numbers of measurements were made using the miniature gas-proportional counter at Harwell (12%), the higher-precision liquid scintillation facility at Harwell (2%), and the accelerator mass spectrometer at the Oxford Radiocarbon Accelerator Unit (2%). A general introduction to methods of measuring the radiocarbon content of archaeological samples is provided by Bayliss *et al* (2004).

History of this volume

The compilation of this volume began in 1994.

From April 1985, the Harwell Laboratory produced a series of datelists in the journal *Radiocarbon* detailing measurements made under its contract with English Heritage (Walker and Otlet 1988; Walker *et al* 1988; 1990; 1991a–b; Hardiman *et al* 1992). The great majority of samples dated during this period appear in these datelists, although samples dated between April 1981 and March 1985 were only published in this way erratically.

Although this initiative was highly laudable, especially in the promptness of publication, it was limited in a number of ways. First, the space restrictions imposed by journal publication meant that only very brief details of sample character and provenance could be provided, even though much fuller information had often been provided by archaeologists on the submission of the sample. Second, the published radiocarbon ages were not calibrated. Third, most of the projects from which results were reported were still ongoing at the time of publication, and so archaeological interpretation of the dates could not be provided with the benefit of post-excavation analysis.

For these reasons, in 1994 it was decided to include fuller details of radiocarbon dates that had already appeared in summary form in the Harwell datelists in *Radiocarbon* in future volumes of *Radiocarbon Dates*.

This decision was reinforced in 1995 when the Ancient Monuments Laboratory retrieved both the paper archive and the remaining physical samples from Harwell on the demolition of the laboratory building (the laboratory itself had closed in 1990).

The receipt of these archives has enriched this volume immeasurably, although it also led to a hiatus in its production as several years were spent rationalising and cataloguing the mass of material received. This task was largely completed by Sarah Hill. Of particular value was the retrieval of excess material from many of the wood and charcoal samples that had been dated. It was now possible to identify the age and species of wood represented in the material remaining after dating, thus allowing an assessment of the age-at-death of this material to be made in the interpretation of the relevant dates. Rowena Gale examined this material between 1996 and 2000.

The data published here was gathered by collating information from the archives of both the Ancient Monuments Laboratory and the dating laboratories concerned, and reconciling this as far as possible with information in published sources. 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, although almost all these comments have been made on calibrated dates (it is noted where this is not the case), the sophistication of the statistical techniques available for their interpretation has changed markedly since this volume was first mooted. In some cases, comments have been taken from published sources. Most notably, this is the case for the results from

the Fenland Project, where Martyn Waller kindly checked the entire précised catalogue and provided updated comments where appropriate.

No effort has been made to amend the submitters' interpretation of their radiocarbon dates. Consequently, the reader is warned that some treatments of results and views about them may be inaccurate and reflect misunderstandings about radiocarbon dating, statistics, and calibration. Sometimes, scientific understanding has simply moved on in the period since the comments were original drafted. This is particularly true of some of the laboratory comments made in the 1980s, which have nonetheless been included as they sometimes explain interpretations of the data published in archaeological reports.

Archaeological interpretation and scientific understanding develop through time, and so too will the interpretation of the radiocarbon dates presented in this volume. The key objective in the publication of this catalogue is to ensure that the basic data is available in sufficient detail to allow new interpretations and chronological models to be constructed.

Sample selection and characterisation

Almost all the samples included in this volume were dated by the detection of radiocarbon decay events using either liquid scintillation spectrometry or gas-proportional counting (Fig 3). The size of the samples necessary for the available measurement techniques (Table 1) was usually the limiting factor in the selection of samples for dating.

Table 1. Typical quantities of material required for different radiocarbon measurement techniques in 1981–88

Material	LSC	miniature GPC	AMS
Charcoal	15g	0.5g	30mg
Wood (wet)	100g	2g	200mg+
Wood (dry)	20g	0.5g	50mg
Peat (wet)	200g	6g	2g+
Bone & antler	300g+	10g	2g–
Marine Shell	75g	1g	50mg

Whilst a wide range of organic materials could be dated (Fig 4), bone and antler (23%), charcoal and other charred plant remains (37%), peat and other sediments (19%), and waterlogged wood (18%) constituted the majority of samples. Non-waterlogged wood, mostly from standing buildings, formed a smaller class of dated samples (2%), whilst marine shell, leather, ground-water, and unspecified organic concretions were dated only occasionally.

During the period when these measurements were undertaken, calcined bone could not be dated reliably using radiocarbon, as the cremation process either destroys the protein component of the bone entirely or denatures it to the point that contaminating exogenous carbon from the burial environment cannot be removed reliably during laboratory processing (making the resultant date unreliable). This is demonstrated by the single measurement on burnt bone

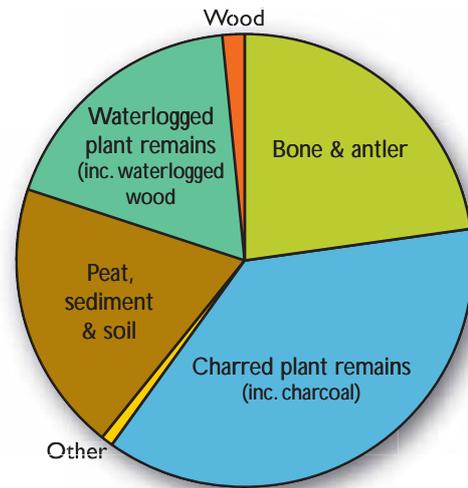


Fig 4. Types of material dated

reported in this volume (HAR-5962 from Maryport, Ewanrigg), which appears to be anomalously recent.

The sample size required for conventional radiocarbon dating meant that, in the majority of cases (65%), material which originally derived from different living organisms had to be bulked together to make up a sample of sufficient size for dating (Fig 5). 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 sample will always date to the latest material within it, however, such samples should provide reliable *termini post quos* for the contexts from which they were recovered.

It is clear, however, that some types of material produced single-entity samples that were sufficiently large for conventional dating more frequently than other materials (Fig 6). This variation ranges from 100% of peat and sediment samples, which by definition are bulk materials, to human bone, where 97% of the dates reported in this volume derive from a single individual (although in many cases more than one bone had to be sampled for dating). Finds of antler

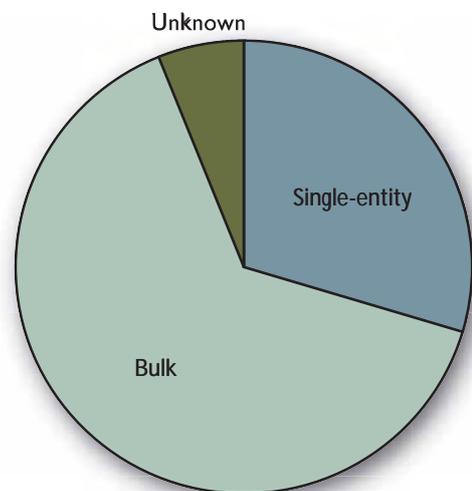


Fig 5. Single-entity and bulk samples

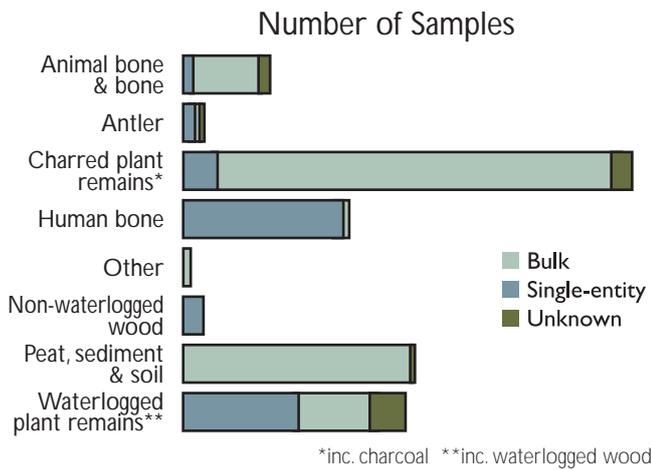


Fig 6. Single-entity and bulk samples by material type

(67%), non-waterlogged wood (100%), and waterlogged wood (53%) were also frequently large enough to provide single-entity samples for conventional dating. In contrast, charred plant remains and animal bone almost always had to be bulked together to provide the required weight for analysis, although occasionally timbers charred *in situ* or single animal bones were large enough for dating on their own. These instances, however, only provide 7% of charcoal samples and 10% of animal bone and unidentified bone samples respectively.

Charred plant remains provided the largest group of dates reported in this volume (Fig 4), although only nine of these samples were of charred grain and two were of charred hazelnut shell. One sample (HAR-5104, from North Shoebury) was of unspecified charred plant remains, and four (from Stafford: St Mary's Grove) were of unidentified charcoal bulked with unspecified charred plant remains. The remainder of the samples of charred plant remains were of charcoal, of which 33% were identified before submission for dating. Rowena Gale has been able to identify a further 36% of these samples from excess material which remained in the archive at AERE Harwell. These retrospective identifications have not, of course, been undertaken on the actual charcoal that was combusted and dated, but it is reasonable to suggest that the excess material constitutes a random sample from the charcoal originally submitted for dating. This assumption is, of course, far more reliable when a relatively large sub-sample can be identified than if the amount of surviving material is very small. Compare, for example, HAR-4405, from Beeston Castle, where 36.8g of charcoal survived and 2.5g was identified to age and species, with HAR-8277, from Tintagel Castle: Lower Ward, where only 0.04g survived (although all this could be identified).

Identification of charcoal samples to age and species before dating 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

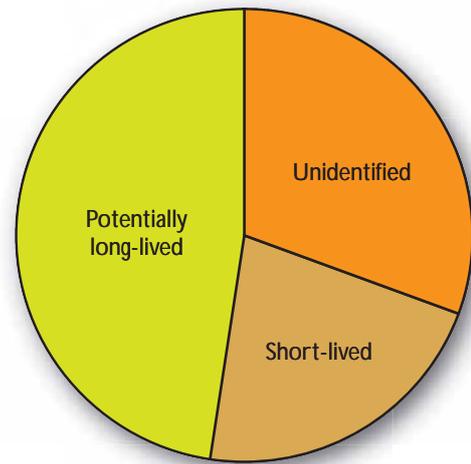


Fig 7. Identification of charcoal samples

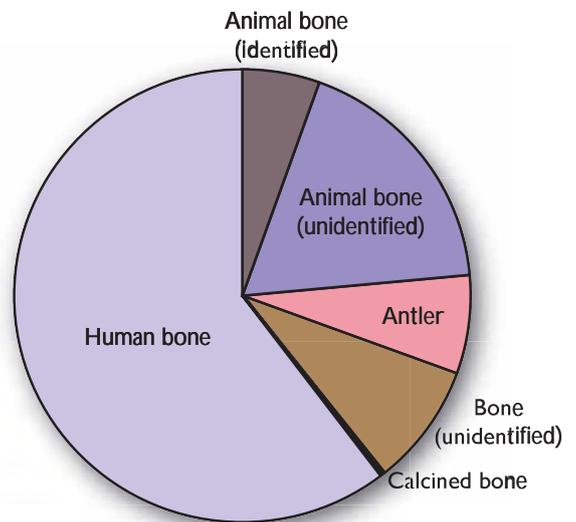


Fig 8. Identification of bone and antler samples

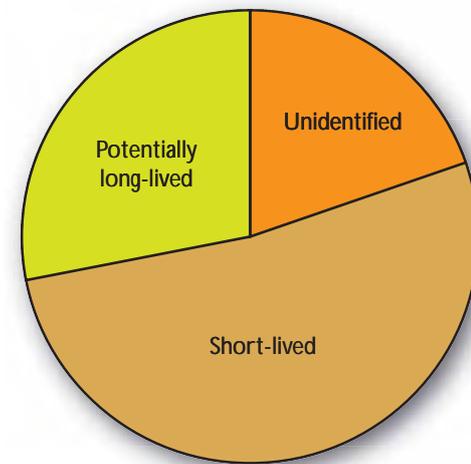


Fig 9. Identification of waterlogged wood samples

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.

Of the 69% of charcoal samples included in this volume that have been identified, 31% were probably composed of species of tree and shrub (eg hazel or birch) that are relatively short-lived. The age-at-death of these samples is therefore unlikely to have been more than a few decades. The other 69% of the identified charcoal samples either consisted of a species of tree which lives to some age (eg oak or ash), or contained a component of such a species. 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, even when a mature tree was dated, the majority of the wood would have derived from the later rings, rather than the centre pith. It should be noted that most charcoal samples were divided at the Ancient Monuments Laboratory into short-lived material and longer-lived material, and that the longer-lived charcoal was only added if a larger sample weight was needed for dating. 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. Overall 79% of the measurements reported on charcoal samples in this volume fall into this category (Fig 7).

Bone and antler samples form the next most numerous type of material dated (Fig 4). Over 60% of these samples were of human bone (Fig 8). On contextual grounds, most of the undifferentiated bone samples were probably of animal, rather than human, bone (although this was not specifically recorded). Even when samples were identified as animal bone, only around a quarter were identified to species before dating.

Peat, sediment, and soil constitute another frequently dated type of sample, although only in the Fenland Project was this material 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.

Of the waterlogged plant macrofossils submitted for dating, only three samples (HAR-5732 and HAR-8369 from the Hullbridge Survey, and HAR-6182 from London: Fulham Palace) were short-lived herbaceous plant remains and not waterlogged wood. Overall, 80% of the waterlogged wood samples reported in this volume have been identified (Fig 9): 55% before submission of the material for dating, and 25% from excess material which remained in the archive at AERE Harwell. These retrospective identifications have also been undertaken by Rowena Gale. Of the dated waterlogged wood samples that have been identified, 65% consisted of relatively short-lived material with an age-at-death of no more than a few decades, and 35% consisted of longer-lived material, which could potentially have an old-wood offset of several centuries.

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.

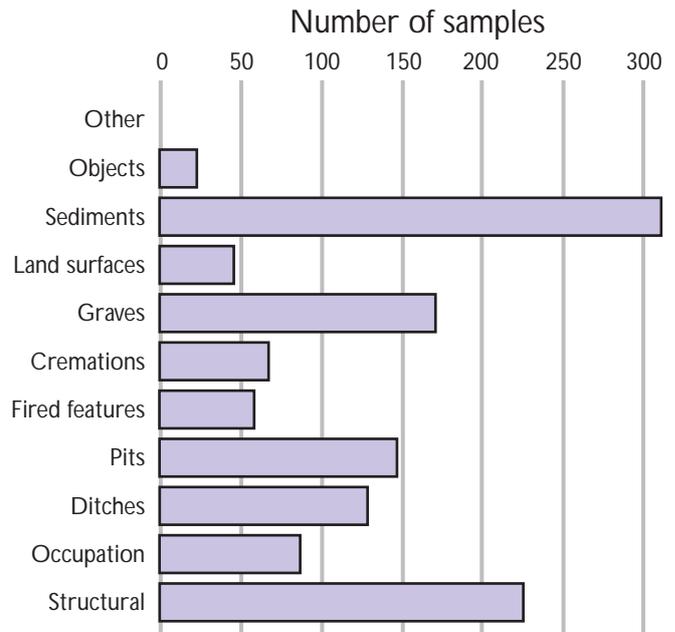


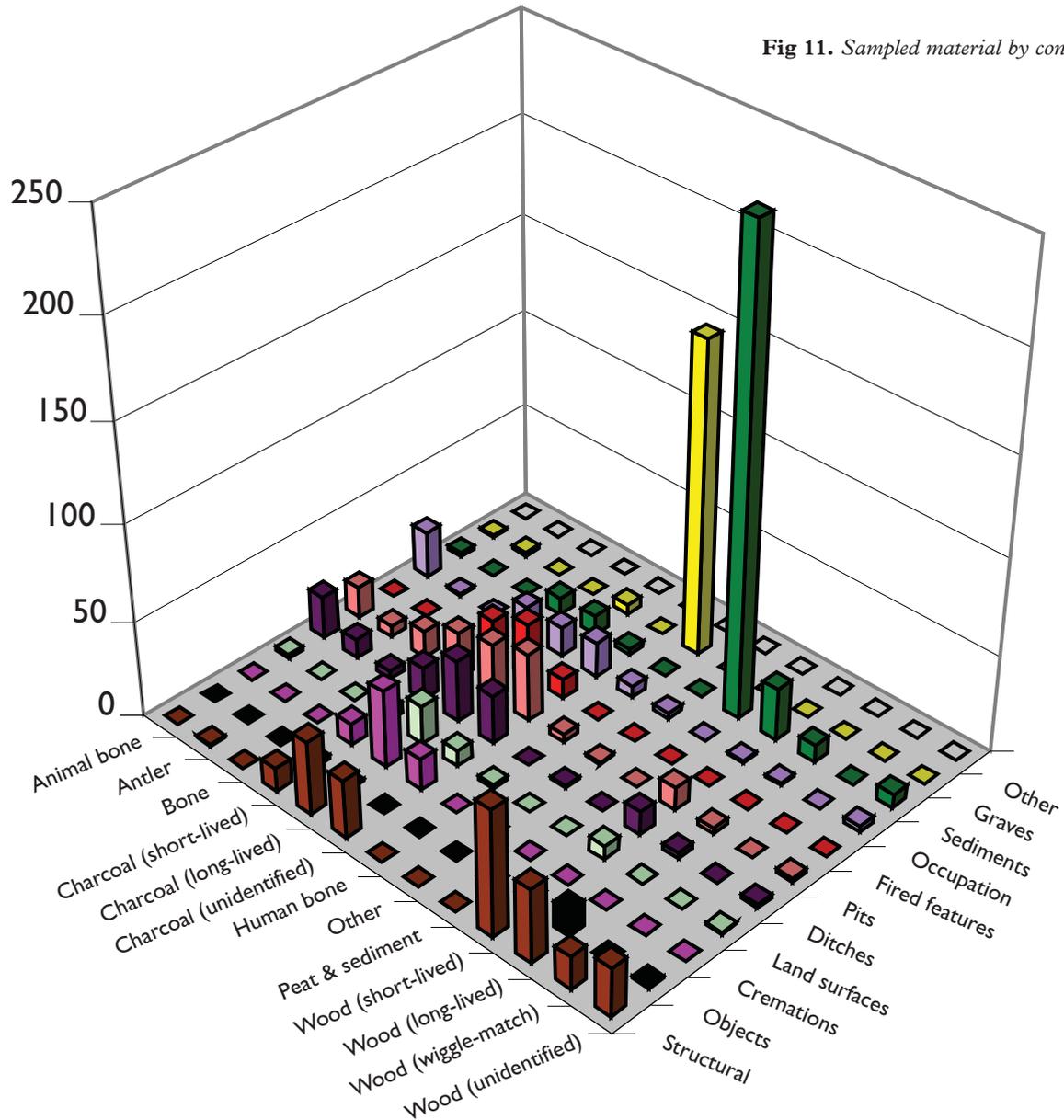
Fig 10. Contexts of dated samples

The importance of considering the taphonomy of dated material has been long known (Waterbolk 1971), although during the period covered by this volume the sample size requirement was a major restriction on sample choice (see again, Table 1). It simply was not possible to date a single seed or a single fragment of charcoal. When dating a cremation deposit, for example, short-lived charcoal fragments may have been present (eg HAR-6560 from Bromfield, Shropshire) but often a sufficient weight of charcoal was only available if the longer-lived material was added to the sample.

The types of context which provided the samples considered here are shown in Figure 10. The largest group of samples is provided by sedimentary units. In the majority of cases (78%) 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 wood, charcoal, or animal bone were isolated from a deposit and dated (Fig 11). Even when dating sediment itself, however, the relationship between the dated material and the archaeological event that is of interest has to be considered. Not all the material within a sediment necessarily dates 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).

A smaller number of samples were dated from old land surfaces (Fig 10). Here the objective was often to provide a *terminus post quem* for the construction of an overlying earthwork (eg HAR-10063 from Avebury, Wiltshire), rather than to date the activity on the old land surface itself². Most samples from this type of context were of charcoal (Fig 11), and so may incorporate an old-wood offset.

Fig 11. Sampled material by context type



Structural contexts are the second most frequent type of deposit sampled for radiocarbon dating in the period covered by this datelist (Fig 10). Here, there is a direct functional relationship between the dated material and the archaeological structure that is of interest (Fig 12). Almost all samples from structural contexts are of wood or charcoal (Fig 11) and so dates from such material are disproportionately affected by old-wood. Even in the absence of identification of the dated material, however, sometimes detailed consideration of a context can give an indication of the scale of such a potential offset. For example, unidentified wood from a waterlogged hurdle (eg HAR-5135 from Leintwardine, Hereford and Worcester) is likely to have been roundwood, whereas an unidentified charred post (eg HAR-4454 from Wrekin Hillfort, Shropshire) was probably of larger scantling and so older. Further complications can arise with structural timbers. Although most wood was not seasoned before use, as this makes it much harder to work, building timber was a valuable resource which could be, 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 dating more than one timber from a structure.

Pits and ditches make up about 20% of sampled contexts (Fig 10), with most samples being composed of charcoal or disarticulated animal bone (Fig 11). Although the concentration of material can sometimes indicate a discrete disposal event in the context (eg HAR-8917 at Sutton Common: enclosures, South Yorkshire), often all the material from a fill or feature had to be bulked together to provide the required sample weight (eg HAR-4323 from Poldowrian, Cornwall). In these circumstances material of diverse ages may have been present in the sample. Similar taphonomic considerations apply to samples from occupation deposits, such as middens.

Approximately 10% of all samples (and a quarter of all charcoal samples) derive from contexts where the dated charcoal may have been fuel related to specific archaeological activities. Such contexts include fired features, such as hearths and kilns, and deposits associated with cremation (Fig 13).



Fig 12. *Brushwood structure from the Hullbridge Survey: Blackwater 18, Tollesbury, Essex (HAR-7055) (© Essex County Council)*



Fig 13. *Cremation burial from Chysauster, Cornwall (HAR-6651). (© English Heritage. NMR)*



Fig 14. *Beaker burial from Balksbury Camp, Hampshire (HAR-5124). (© Hampshire County Council)*



Fig 15. *Effigy thought to be Archdeacon Sponne (died AD 1448). (© Crown Copyright. NMR)*

Although the dated material was probably produced by the archaeological event that is of interest, the old-wood effect can make the resultant radiocarbon date older than the time when the deposit formed.

Almost all radiocarbon dates on human bone reported in this datelist come from graves containing articulated human skeletons (Fig 11). Here the articulation of the bones (Fig 14) provides good evidence that the individual had recently died when they were buried, and so the radiocarbon dates should be close in age to that of the burial.

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 samples range from the waterlogged late Mesolithic arrow-shaft from Seamer Carr, North Yorkshire (HAR-6498) to a carbonised Neolithic wooden shovel from West Heslerton: prehistoric, North Yorkshire (HAR-6498). Other examples include waterlogged wooden items such as the Bronze Age buckets from the Wilsford Shaft, Wiltshire (OxA-1216-17), an Iron Age dovetail joint from Fengate: 38, Cat's Water, Cambridgeshire (HAR-3196), and Roman barrels from Droitwich: Old Bowling Green, Worcestershire (HAR-5879 and HAR-5883). Medieval objects of intrinsic interest include a skull exhibiting signs of syphilis from York (Aldwark, Ebor Brewery, North Yorkshire; HAR-6887) and an effigy thought to belong to the tomb of Archdeacon Sponne from Towcester: church, Northamptonshire (HAR-6674-5; Fig. 15).

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 AERE Harwell were pretreated using the standard acid-base-acid protocol (Otlet and Slade 1974). Once roots and other obviously intrusive material had been physically removed (Fig 16), samples were placed in (3 molar) hydrochloric acid and heated for 30 minutes, thus removing carbonates. Contamination by humic acids was removed by heating samples in (1 molar) sodium hydroxide for 30 minutes. After this the material was washed to neutral pH and then given a final cold wash in (3 molar) hydrochloric acid to remove any carbonate that might have been present in the washing water or produced by absorption of atmospheric carbon dioxide. The sample was finally rinsed to neutral pH with distilled water and oven dried. The solid acid- and alkali-insoluble residue was then combusted and dated.

For soils, which contained charcoal or wood, this pretreatment process was only undertaken on the bulk material if the charcoal was so finely divided that it could not be extracted physically from the sample. In these cases the acid-base-acid protocol outlined above was used, but after oven drying the sample consisted of charcoal in a matrix of pure sand. The charcoal was then separated as far as



Fig 16. Removing rootlets from a sample of charcoal for conventional radiocarbon dating at AERE Harwell. (© NDA)

possible from this 'sand' before combustion.

For bone samples, the collagen fraction was isolated and dated. Bones were washed and cut into small pieces then put into (1 molar) hydrochloric acid. The acid was changed daily until titration showed there was no further reaction. A cold (0.08 molar) sodium hydroxide wash was used to remove any humic acid contamination and a final rinse in (1 molar) hydrochloric acid was then given. The sample was then washed in distilled water until neutral pH and oven-dried.

For samples dated by liquid scintillation spectrometry, the sample was then combusted to carbon dioxide (Fig 17) 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). All samples processed at Harwell were dated using these methods, unless there is a laboratory comment in the datelist specifying otherwise.

Thirty-three samples were dated using a new higher-precision liquid scintillation system, which had been developed during the early 1980s and came into operation in 1985. These methodological developments are described by Otlet and Polach (1990). Where samples were dated using these higher-precision protocols, this is noted in the datelist entry.

From November 1981 small samples were dated at AERE Harwell in the miniature gas proportional counter. These samples were also pretreated and combusted to

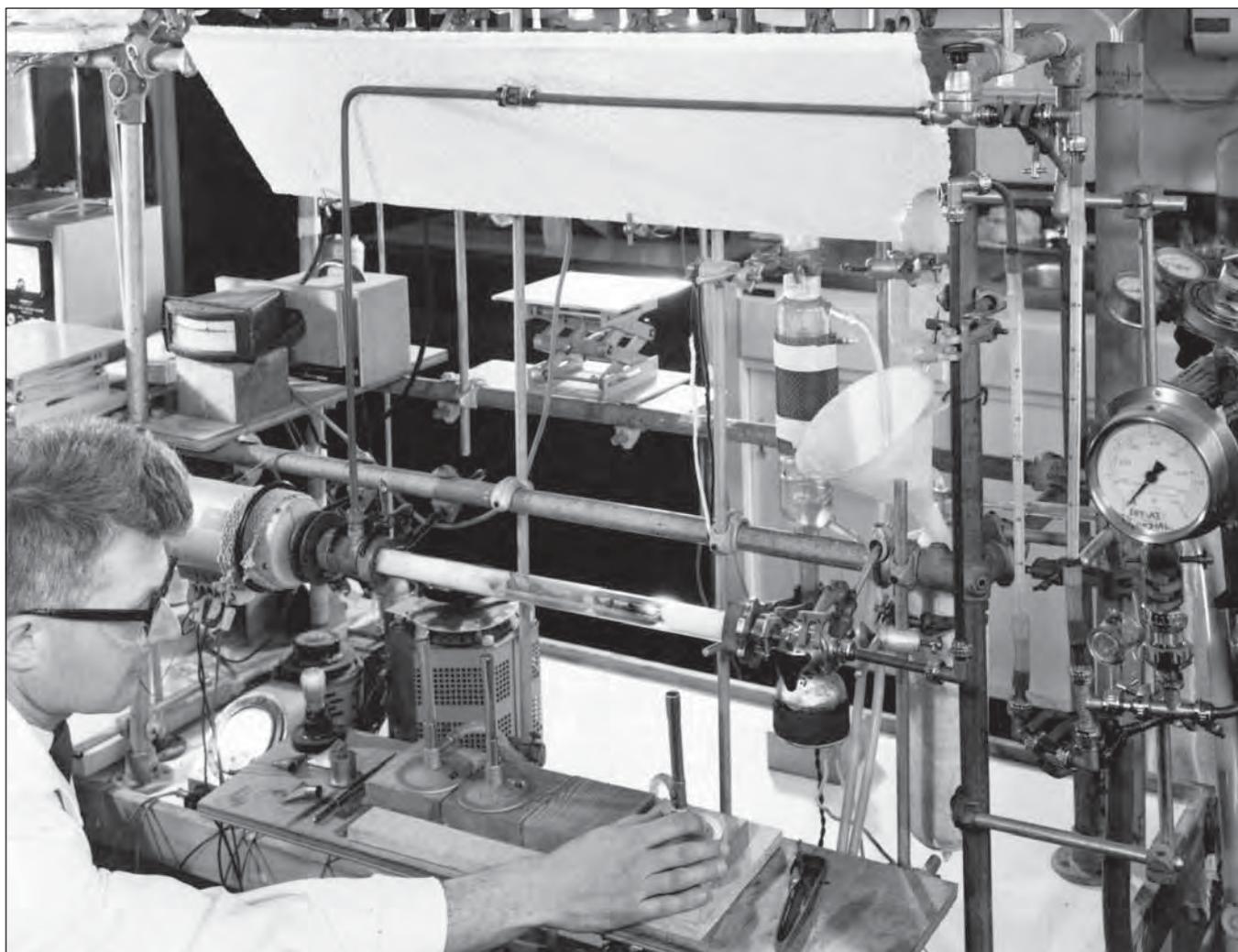


Fig 17. Brian Slade combusting a sample to carbon dioxide at AERE Harwell. (© NDA)

carbon dioxide as outlined by Otlet and Slade (1974). Procedures for gas purification, counter filling, and gas proportional counting are described by Otlet and Evans (1983) and Otlet *et al* (1983; 1986).

Methods used for the processing and dating of samples dated for the Etton Landscape and Fenland Projects by the Godwin Laboratory, University of Cambridge have been described by Switsur (1994). The vast majority of the samples were bulk organic sediments, although some wood and charcoal was also dated. These materials were pretreated using the acid-alkali-acid protocol (Mook and Waterbolk 1985). For sediment samples both the acid-insoluble, alkali-soluble ('humic acid') fraction and the alkali- and acid-insoluble ('humins') fraction could be selected for dating, depending on the specific characteristics of the particular sample. It is not known which fraction was dated for each of the measurements reported, although the acid-soluble ('fulvic acid') fraction was never dated, as by the time the dates in this volume were made, this fraction was known often to produce anomalous ages (Dresser 1970).

Most samples were combusted to carbon dioxide in the high-pressure oxygen combustion bomb described by Switsur

(1972), Switsur and West (1973), and Switsur *et al* (1974). Samples which were highly contaminated with sulphurous compounds, particularly organic sediments from low altitudes where the 'humins' fraction had been selected for dating, could not be combusted in this way. They were converted to carbon dioxide by open-tube combustion, and further purified before conversion to benzene (Switsur 1994, 30; Switsur and Waterhouse 1989).

Samples were then converted to benzene using a chromium-base catalyst following the method initially described by Tamers *et al* (1965), and dated by liquid scintillation spectrometry (Switsur 1994, 31–2).

The radiocarbon ages were corrected for fractionation (see below). Quoted errors include the measured errors on the counting rates of the samples, standards, and background as described by Callow *et al* (1965).

At the Oxford Radiocarbon Accelerator Unit, samples were pretreated as described by Wand *et al* (1984) and Gillespie *et al* 1984. They were then combusted to carbon dioxide, converted to graphite targets, and dated by accelerator mass spectrometry (Fig 18; Gillespie *et al* 1983; 1985; Hedges 1981).

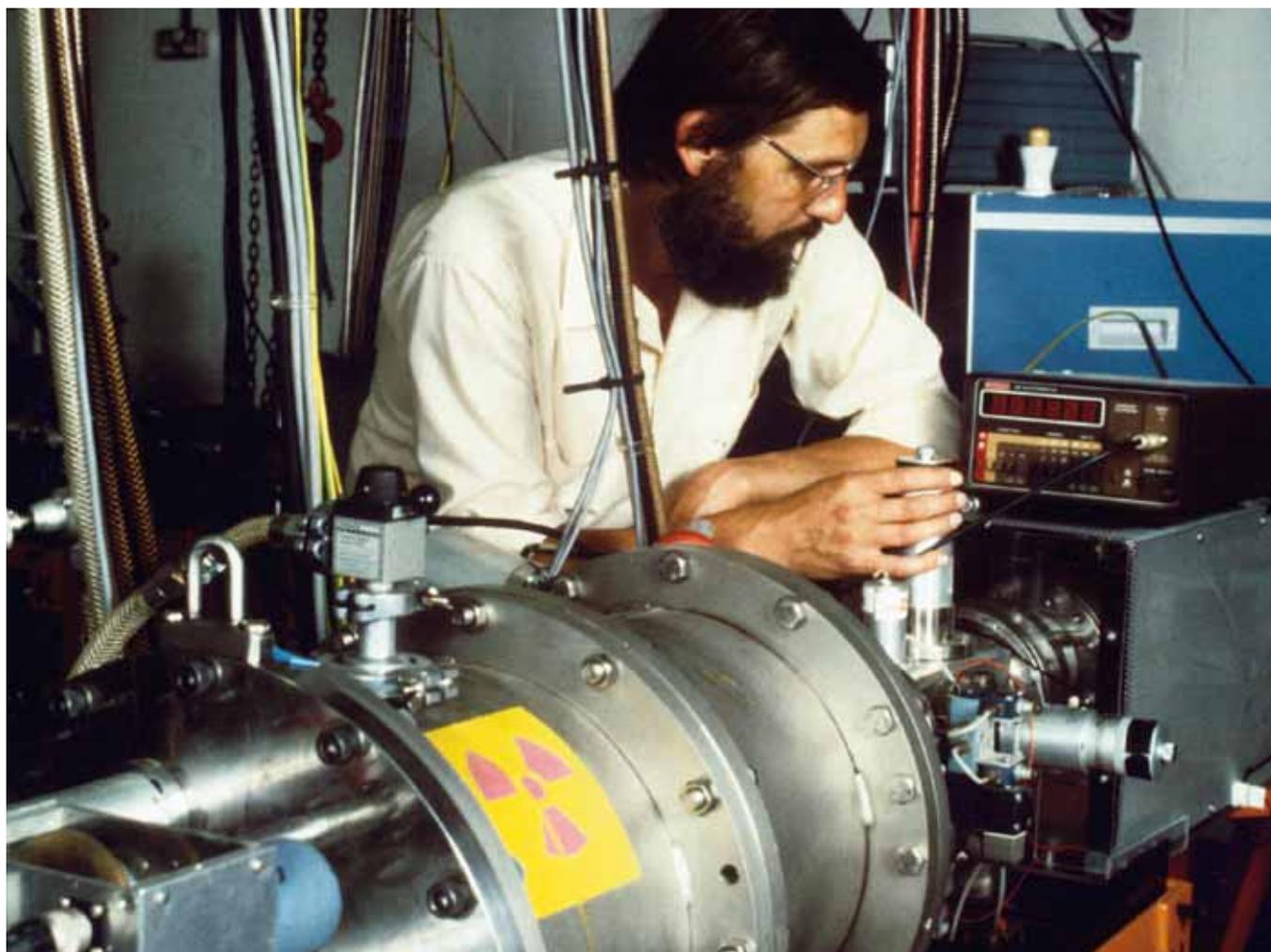


Fig 18. Robert Hedges undertaking maintenance on the first accelerator mass spectrometer at the Oxford Radiocarbon Accelerator Unit. (© ORAU)

Fractionation and radiocarbon ages

The conventions for quoting radiocarbon dates 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 so have been corrected for fractionation. Some material dates to after AD 1950. The radiocarbon content of these samples is expressed as a fraction of modern carbon (Mook and van der Plicht 1999). HAR-8790, from Maryport: Ewanrigg, Romano-British settlement, Cumbria, is a preliminary measurement, only reported as 'approximately 30,000 BP'.

Most of the radiocarbon ages contained in this datelist have been calculated using measured $\delta^{13}\text{C}$ values. For a small proportion (3%) of the samples dated at AERE Harwell, measured values could not be obtained and so ages were calculated using estimated values. For wood and charcoal a $\delta^{13}\text{C}$ value of -25.0‰ was assumed. For human bone samples from Henley Wood, Somerset (HAR-5589) and Wraysbury, Berkshire (HAR-5865) a $\delta^{13}\text{C}$ value of -20.0‰ was assumed;

for other human bone samples a value of $\delta^{13}\text{C} -21.0\text{‰}$ was assumed. For animal bone $\delta^{13}\text{C}$ values of either -19.0‰ or -21.0‰ were assumed (this is specified in the datelist entries), and for antler samples either -21.0‰ or -22.0‰ (similarly specified). The ground water sample from Seamer Carr (HAR-5579) was calculated using a $\delta^{13}\text{C}$ value of -25.0‰ . It should be noted that the effect of the $\delta^{13}\text{C}$ correction on a final result is very small, and so the estimated values will give virtually the same result as a measured value for measurements of the precision of those included in this datelist.

Unfortunately, the measured values used to calculate the ages at the Godwin Laboratory, Cambridge were not reported, and we have been unable to trace them in the laboratory archive.

During the period covered by this datelist, mass spectrometry facilities were not available at the Oxford Radiocarbon Accelerator Unit, and so all radiocarbon ages reported by the laboratory were calculated using estimated $\delta^{13}\text{C}$ values: -25.0‰ for wood and charcoal samples, and -19.0‰ or -20.0‰ for bone samples from Bury St Edmunds: Abbey, Suffolk and Wilsford Shaft, Wiltshire respectively.

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).

Calibration

Radiocarbon results are not true calendar ages, but have to be converted to calendar time using a calibration curve made up of radiocarbon measurements on samples of wood whose age is known through dendrochronology (Pearson 1987). Calibrated date ranges provided in the datelist have been calculated using the maximum intercept method (Stuiver and Reimer 1986), OxCal v4.1 (Bronk Ramsey 1995; 1998; 2001; 2009), and the dataset for terrestrial samples from the Northern hemisphere published by Reimer *et al* (2004). This is identical to the currently internationally agreed atmospheric dataset for the Northern hemisphere (Reimer *et al* 2009) back to 10,050 cal BC. For samples which calibrate before this date, the updated IntCal09 has been used.³

Two classes of measurements have not been calibrated using these atmospheric datasets. First, are those where the radiocarbon measurement is more recent than AD 1950⁴. These results may show the affect of the radiocarbon produced by the atmospheric testing of nuclear weapons between AD 1945 and AD 1980, and so have been calibrated using the atmospheric data of Kueppers *et al* (2004). Second, are the handful of samples which derive from a fully marine environment⁵. Since it takes some time for the radiocarbon produced in the upper atmosphere to be incorporated in the oceans, the sea is appreciably depleted in radiocarbon in comparison with the terrestrial biosphere (Bowman 1990, 24–5). For this reason, such samples have to be calibrated using a marine calibration curve and an offset which accounts for local variation in radiocarbon content of the marine environment, known as a ΔR value. In this volume, fully marine samples have been calibrated using the marine dataset of Hughen *et al* (2004) and a ΔR value of -5 ± 40 BP for the coastal waters of England (Stuiver and Braziunas 1993; Harkness 1983).

The importance of correctly applying marine calibration can be appreciated using an example. A sample of oyster shell from Hamworthy, Shipwright's Arms, Dorset (p137–8) produced a radiocarbon measurement of 1280 ± 80 BP (HAR-3464). Using the northern hemispherical terrestrial calibration curve (Reimer *et al* 2004), this result calibrates to cal AD 615–950 (95% confidence). Correctly calibrated using the marine curve and local ΔR correction, however, it calibrates to cal AD 935–1295 (95% confidence).

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). For modern results, calibrated using the data of Keuppers *et al* (2004), date ranges have been rounded outwards to the nearest year. Ranges in the datelist itself are quoted at 68% and 95% confidence; the calibrated date ranges referred to in the commentaries are those for 95% confidence unless otherwise specified.

At the time the measurements reported in this datelist were produced, the calibration of the radiocarbon timescale was much less well understood. The need for calibration had become apparent during the 1960s (Willis *et al* 1960; Suess 1967), and a variety of calibration curves were proposed

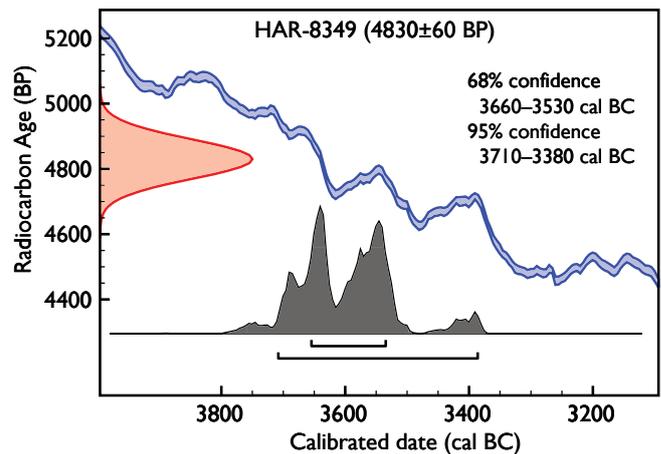


Fig 19. Calibrated radiocarbon date for HAR-8349

during the 1970s. For English archaeological samples the most commonly used curves were those of Ralph *et al* (1973) and Clark (1975). Calibration was usually undertaken manually, either from conversion tables (eg Clark 1975, table 8), or graphically (eg Pearson 1987, fig 3).

The first internationally agreed consensus calibration data were not issued until 1986. These data covered the period from AD 1950 to 2500 BC. They comprised replicate high-precision radiocarbon measurements from laboratories in Belfast and Seattle on bi-decadal or decadal samples of wood which had been independently dated by dendrochronology (Stuiver and Pearson 1986; Pearson and Stuiver 1986). Beyond this period the calendar timescale was covered by measurements from Belfast between 2500 BC and 5210 BC (Pearson *et al* 1986), and from various laboratories between 5210 BC and 7210 BC (Linick *et al* 1985; Stuiver *et al* 1986; Kromer *et al* 1986).

Along with the new consensus calibration curve, came user-friendly personal computer software for the calibration of radiocarbon results (Stuiver and Reimer 1986). This software employed the maximum intercept method of calibration, which included the uncertainty on the radiocarbon age in the calculation of the calibrated date range. This program (CALIB v1.3) also made calibrated dates widely available to archaeologists.

This method has also been used for the calibrated dates provided in this datelist and, whilst it is hoped that readers will find the calibrations provided in 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 HAR-8349, a determination on an antler in the base of the cairn infill at Hazleton, Gloucestershire (see below p144). This measurement (4830 ± 60 BP) calibrates to 3710–3380 cal BC (at 95% confidence) and 3660–3530 cal BC (at 68% confidence) using the maximum intercept method. The calibration of this sample using the probability method (Stuiver and Reimer 1993) is shown in Figure 19. It can be seen that some parts of the calibrated range are more probable than others. It is not so much that the

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 counting; AMS = accelerator mass spectrometry; GPC = miniature gas-proportional counting; HP = higher-precision liquid scintillation spectrometry.

Site	Material	Laboratory Number	Radiocarbon Age (BP)	Method	Ward and Wilson (1978)
Avebury	bone & antler	HAR-10502	4300±90	LSC	T'=8.1;T'(5%)=6.0; v=2
		OxA-12555	4036±34	AMS	
		OxA-12556	4043±34	AMS	
Berinsfield: Mount Farm	bone & antler	HAR-4673	4460±90	LSC	T'=7.2;T'(5%)=3.8; v=1
		OxA-15748	4738±35	AMS	
Berinsfield: Mount Farm	bone & antler	HAR-4792	3710±90	LSC	T'=1.7;T'(5%)=3.8; v=1
		OxA-15747	3836±32	AMS	
Burythorpe: Whitegrounds Barrow	bone & antler	HAR-4931	4250±80	LSC	T'=8.1;T'(5%)=3.8; v=1
		HAR-5318	4590±90	LSC	
Burythorpe: Whitegrounds Barrow	bone & antler	HAR-4932	4670±110	LSC	T'=1.8;T'(5%)=3.8; v=1
		HAR-5507	4480±90	LSC	
		HAR-9135	1700±60	LSC	
Cannington	bone & antler	Birm-186a	1320±160	GPC	T'=6.2;T'(5%)=6.0; v=2
		Birm-186b	1370±230	GPC	
		HAR-9136	1530±70	LSC	
Cannington	bone & antler	Birm-194	1685±100	GPC	T'=1.6;T'(5%)=3.8; v=1
		HAR-9137	1730±70	LSC	
Cannington	bone & antler	BM-469	1334±67	LSC	T'=16.7;T'(5%)=3.8; v=1
		HAR-9138	1370±80	LSC	
Wenlock Priory	bone & antler	Birm-193	1610±105	GPC	T'=3.3;T'(5%)=3.8; v=1
		HAR-6446	1100±80	LSC	
West Heslerton: Vale of Pickering	bone & antler	HAR-6910	1760±100	LSC	T'=27.0;T'(5%)=3.8; v=1
		HAR-6516	1690±70	LSC	
West Heslerton: Vale of Pickering	bone & antler	UB-4641	1510±19	LSC	T'=6.3;T'(5%)=3.8; v=1
		HAR-6907	1840±90	GPC	
York: Aldwark, Ebor Brewery	bone & antler	UB-4642	1487±19	LSC	T'=20.1;T'(5%)=3.8; v=1
		HAR-6887	680±80	LSC	
Brean Down	carbonised plant macrofossil	OxA-24162	434±24	AMS	T'=8.9;T'(5%)=3.8; v=1
		HAR-7021	2600±90	LSC	
Bury St Edmunds: Abbey	carbonised plant macrofossil	HAR-8992	2770±90	LSC	T'=1.8;T'(5%)=3.8; v=1
		HAR-4503	1240±70	LSC	
Hallshill	carbonised plant macrofossil	HAR-4506	1070±80	LSC	T'=2.5;T'(5%)=3.8; v=1
		HAR-4788	2520±70	LSC	
Hayling Island: Iron Age & Roman Temple	carbonised plant macrofossil	HAR-4789	2560±60	LSC	T'=0.2;T'(5%)=3.8; v=1
		HAR-8536	1440±90	GPC	
Helman Tor	carbonised plant macrofossil	HAR-8537	1720±100	LSC	T'=4.3;T'(5%)=3.8; v=1
		HAR-8820	4490±70	LSC	
Helman Tor	carbonised plant macrofossil	HAR-8821	4240±70	LSC	T'=6.4;T'(5%)=3.8; v=1
		HAR-8822	4780±70	LSC	
Kingsteighton: Berry Meadow	carbonised plant macrofossil	HAR-8823	4750±70	LSC	T'=0.1;T'(5%)=3.8; v=1
		HAR-8664	1350±70	LSC	
Kingsteighton: Berry Meadow	carbonised plant macrofossil	HAR-8665	1320±70	LSC	T'=0.1;T'(5%)=3.8; v=1
		HAR-8666	1110±110	LSC	
Kingsteighton: Berry Meadow	carbonised plant macrofossil	HAR-8667	1300±80	LSC	T'=1.9;T'(5%)=3.8; v=1

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, and currently Reimer *et al* 2009). It is thus certain that the calibrated dates quoted here will become outdated, and that

the measurements listed here will need to be recalibrated. It is one of the major objectives of this datelist to provide easy access to the information needed for such re-calibration so that these data can be used in future research. It is for this reason that it is so important that users cite both the unique laboratory identifier for each measurement and the uncalibrated radiocarbon age when using the results listed in this volume—this is a courtesy and convenience to the readers of your publications who will themselves need to recalibrate the results in due course!

Introduction

Site	Material	Laboratory Number	Radiocarbon Age (BP)	Method	Ward and Wilson (1978)
Leintwardine	carbonised plant macrofossil	HAR-8677	1910±70	LSC	T'=1.2;T'(5%)=3.8; v=1
		HAR-8678	2020±70	LSC	
Northampton: Briar Hill	carbonised plant macrofossil	HAR-2284	3460±120	LSC	T'=0.3;T'(5%)=3.8; v=1
		HAR-2389	3540±90	LSC	
Orsett: Rectory Road	carbonised plant macrofossil	HAR-4527	2110±80	LSC	T'=5.1;T'(5%)=3.8; v=1
		HAR-4635	2350±70	LSC	
Prudhoe Castle	carbonised plant macrofossil	HAR-4643	1110±80	LSC	T'=3.1;T'(5%)=3.8; v=1
		HAR-4644	910±80	LSC	
Prudhoe Castle	carbonised plant macrofossil	HAR-4837	1020±70	LSC	T'=0.0;T'(5%)=3.8; v=1
		HAR-4645	1000±60	LSC	
Rowden	carbonised plant macrofossil	HAR-5698	2920±80	LSC	T'=0.1;T'(5%)=3.8; v=1
		HAR-5548	2940±70	LSC	
Shrewton	carbonised plant macrofossil	HAR-4827	3120±100	LSC	T'=0.1;T'(5%)=3.8; v=1
		HAR-4828	3170±90	LSC	
Snail Down: Site III	carbonised plant macrofossil	HAR-61(S)	3540±140	LSC	T'=0.1;T'(5%)=3.8; v=1
		HAR-130(S)	3500±110	LSC	
Stafford: St Mary's Grove	carbonised plant macrofossil	HAR-7039	1270±70	LSC	T'=3.5;T'(5%)=6.0; v=2
		HAR-7040	1120±70	LSC	
		HAR-7041	1310±90	LSC	
Stafford: Tipping Street	carbonised plant macrofossil	HAR-8237	1150±40	HP	T'=0.0;T'(5%)=3.8; v=1
		HAR-8238	1140±40	HP	
Stafford: Tipping Street	carbonised plant macrofossil	HAR-8239	1140±40	HP	T'=0.1;T'(5%)=3.8; v=1
		HAR-8240	1120±40	HP	
Stow Church	carbonised plant macrofossil	HAR-6748	1110±40	LSC	T'=11.5;T'(5%)=3.8; v=1
		HAR-6749	1410±80	GPC	
Thetford: Fison Way	carbonised plant macrofossil	HAR-5073	1510±50	LSC	T'=1.1;T'(5%)=6.0; v=2
		HAR-5074	1470±60	LSC	
		HAR-5075	1430±80	LSC	
Upwich	carbonised plant macrofossil	HAR-9118	1550±60	LSC	T'=1.4;T'(5%)=3.8; v=1
		HAR-9119	1450±60	LSC	
Upwich	carbonised plant macrofossil	HAR-9120	1520±50	LSC	T'=0.4;T'(5%)=3.8; v=1
		HAR-9121	1570±60	LSC	
Westward Ho!	carbonised plant macrofossil	HAR-5632	6580±150	GPC	T'=2.2;T'(5%)=3.8; v=1
		HAR-5645	6320±90	LSC	
London: Peninsular House	sediment	HAR-5648	8950±110	LSC	T'=1.8;T'(5%)=3.8; v=1
		HAR-5649	9160±110	LSC	
Holme-on-Spalding Moor: Hasholme Farm	waterlogged wood	HAR-6394	2350±90	LSC	T'=4.6;T'(5%)=6.0; v=2
		HAR-6395	2550±100	LSC	
		HAR-6441	2280±80	LSC	
Barton-upon-Humber: St Peter's Church	waterlogged wood bone & antler	HAR-6501	900±70	LSC	T'=0.6;T'(5%)=3.8; v=1
		UB-4655	959±17	LSC	
Rye Bay: sternpost rudder	waterlogged wood	HAR-8939	560±40	HP	T'=0.1;T'(5%)=3.8; v=1
		HAR-8980	580±50	HP	
Rye Bay: steering oar	waterlogged wood	HAR-8940	920±40	HP	T'=0.1;T'(5%)=3.8; v=1
		HAR-8981	900±40	HP	
Towcester Church	non-waterlogged wood	HAR-6574	290±70	GPC	T'=0.3;T'(5%)=3.8; v=1
		HAR-6575	240±70	GPC	

Quality assurance

Radiocarbon dating laboratories have been attentive to the accuracy and reproducibility of their measurements since the early years of the method. Groups of radiocarbon laboratories were exchanging and dating known-age materials in the 1950s (eg Willis *et al* 1960), and much effort went into the establishment of internationally agreed standard materials (Olsson 1970; Polach 1972; Mann 1983).

In the late 1970s, the British laboratories then in operation

participated in a formal inter-comparison study in which samples of benzene of known activities were distributed and dated (Otle *et al* 1980). The laboratories at AERE Harwell and Cambridge both contributed to this study, which demonstrated excellent reproducibility in the counting and combustion stages of the dating process.

The early international inter-comparison studies, undertaken during the 1980s, present a rather different picture. The first, in which the Godwin laboratory participated, was based on the dating of a series of decadal

tree-ring samples from a waterlogged bog oak. This study suggested that quoted error estimates were in many cases too low to account for the total error on the measurements, and that there was clear evidence of systematic laboratory bias in some facilities (International Study Group 1982).

Further analysis of these data, along with published radiocarbon dates on timbers, which had been subsequently dated by dendrochronology during the initiative to establish a prehistoric tree-ring chronology for England (Hillam *et al* 1990), supported the conclusions of this study (Baillie 1990).

A larger, three-stage, study undertaken between 1986 and 1990, provided a more detailed assessment of the variability between laboratories in different stages of the dating process (Scott *et al* 1990). Generally, quoted errors were seen to adequately describe the precision of a result internally within a laboratory, but to underestimate the total inter-laboratory variation. Again, there was evidence of systematic bias within some laboratories. None of the laboratories whose dates are listed in this volume participated in this study.

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. All sets of replicate measurements relevant to dated samples reported in this volume are listed in Table 2. Some of these replicate measurements were undertaken at the time the original results were produced as part of the internal quality assurance procedures at AERE Harwell, others are replicate measurements that have been undertaken on these samples subsequently. No replicate measurements are reported from samples dated at the Godwin laboratory or the Oxford Radiocarbon Accelerator Unit.

Of the 43 samples for which replicate measurements are available, in 13 cases the groups of repeat measurements are statistically significantly different at 95% confidence (Table 2; Ward and Wilson 1978). This is far more than the 1 in 20 cases that would be expected simply on statistical grounds. The inconsistent replicate groups are not distributed evenly amongst sample types; nine of the 13 inconsistent groups are on bone and antler samples, with the other four being on samples of carbonised plant macrofossils. All groups of measurements on waterlogged wood, non-waterlogged wood, and peat samples are statistically consistent.

The differences between groups of measurements on the same material is illustrated in Figure 20. The within-laboratory reproducibility of measurements of charred and waterlogged plant material is comparatively good, with only four out of 28 groups of measurements being statistically inconsistent at 95% confidence. Given the potential inhomogeneity within bulk samples of carbonised material, these results may support the contention that the quoted errors largely describe the intra-laboratory error on these measurements (as suggested by the inter-comparison studies of Otlet *et al* (1980) and Scott *et al* (1990)). This said, there is only one case where a replicate group on material of this sample type contains a measurement from a second laboratory. A sample of human bone dated in Belfast (UB-4655) from the body buried inside the waterlogged wooden

coffin dated by HAR-6501 from Barton-upon-Humber: St Peter's Church, produced a statistically indistinguishable measurement (Table 2).

In contrast, ten of the 13 replicate groups on antler or bone samples include measurements from a second laboratory. Recent AMS measurements from the Oxford Radiocarbon Accelerator Unit are significantly younger than the original Harwell measurements for a sample of antler from Avebury and a sample of human bone from York: Aldwark, Ebor Brewery; but older than, in one case significantly older than, two measurements from Berinsfield: Mount Farm (Table 2). Two measurements on human bone from West Heslerton: Vale of Pickering are significantly older than replicates undertaken in the mid-1990s by the Belfast Radiocarbon Dating Laboratory (Table 2). Harwell also produced measurements on human bone samples that are significantly older than those produced by the laboratories at Birmingham University (HAR-9135) and the British Museum (HAR-9137). Other replicates were undertaken specifically because an original measurement was considered problematic (eg HAR-4931 and HAR-5318).

It is hard to assess how far these replicate groups reflect the actual accuracy of measurements made on bone and antler samples at AERE Harwell. The large sample size needed for conventional dating (Table 1) meant that the number of replicate measurements made on archaeological samples was severely constrained by the availability of sufficient material. This was particularly true for antler and bone samples, which often had to be almost entirely destroyed to provide even a single measurement. This is reflected in the low number of intra-laboratory replicates for this sample type listed in Table 2. Additional material was often only made available if there was perceived to be a problem with the original measurement. In these circumstances, it is probably true to say that the measurements on antler and bone from AERE Harwell reported

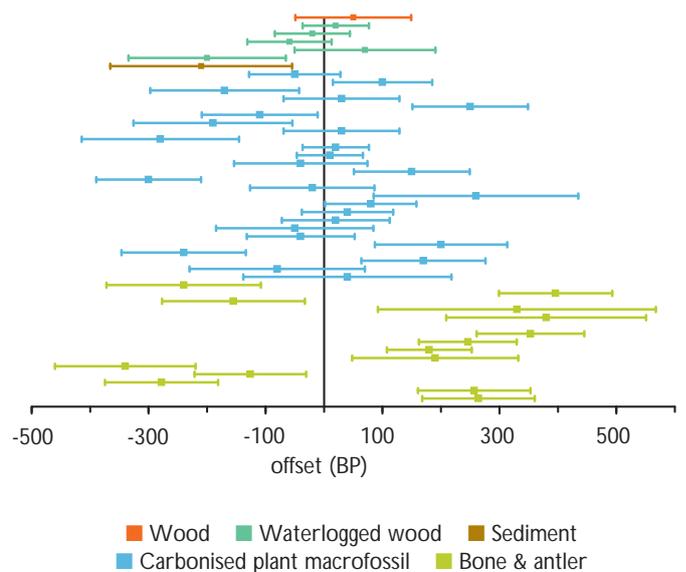


Fig 20. Offsets between replicate pairs of radiocarbon results on samples considered in this study (where there are more than two measurements, the first measurement listed in Table 2 is compared with each succeeding measurement).

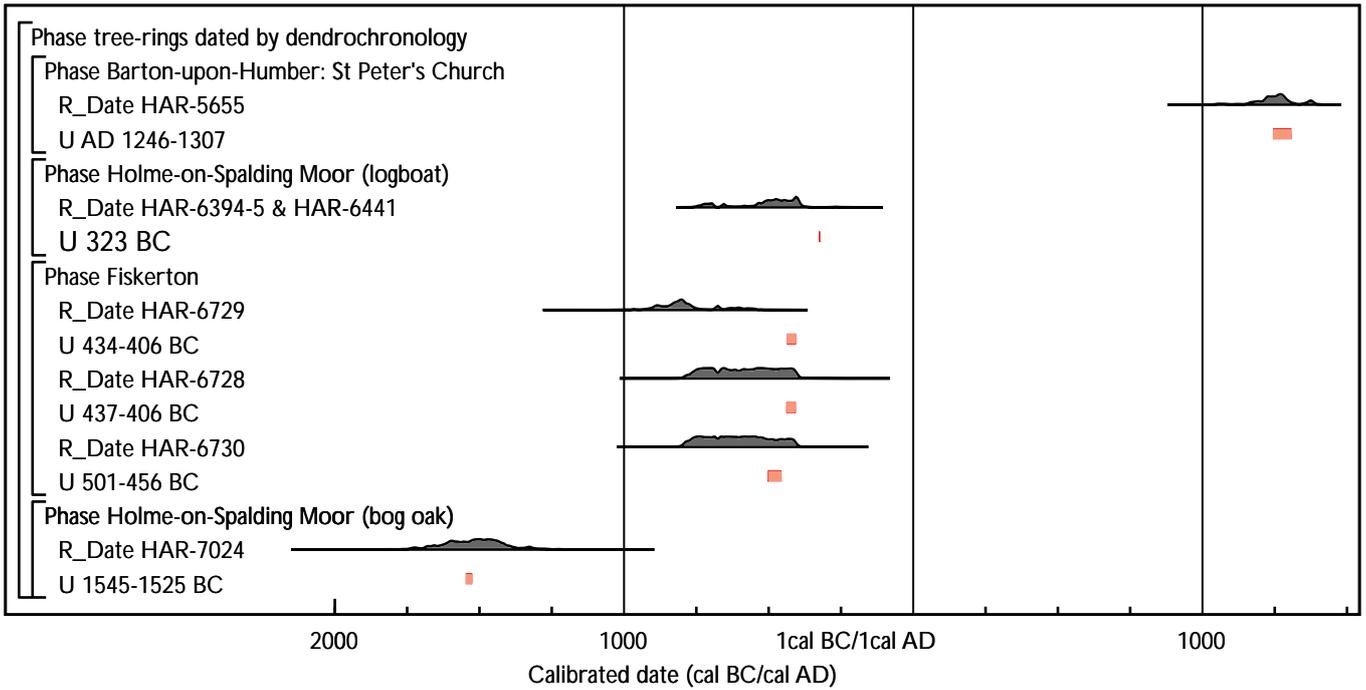


Fig 21. Calibrated radiocarbon dates from samples dated by dendrochronology.

in this volume have a higher probability of being inaccurate than measurements on other samples types. It is also probably true to say that such inaccurate measurements on antler and bone samples are more likely to be anomalously old than anomalously recent (Fig 20). It is, however, difficult to estimate the scale of this problem accurately from what is not a random set of replicate measurements.

The accuracy of a small number of the radiocarbon dates listed in this volume can be assessed in relation to independent dating information. The power of this test, however, crucially depends on the association between the material that was sent for radiocarbon dating and the independent dating evidence.

Most reliable are samples of wood where we know which tree-rings were sampled for radiocarbon dating, and where a dendrochronological date is now available for these rings. Six samples fall into this category (Fig 21): four of the calibrated radiocarbon dates from these samples include the actual years spanned by the dated material, but in two cases the calibrated radiocarbon date is slightly too old.

Seven more samples come from timbers which now have dendrochronological dates, although the exact tree-rings that were included in the radiocarbon samples are unclear. Six of these samples produced radiocarbon dates which include the dates of the sampled timbers known from dendrochronology, although the seventh measurement may be again slightly too old (Fig 22).

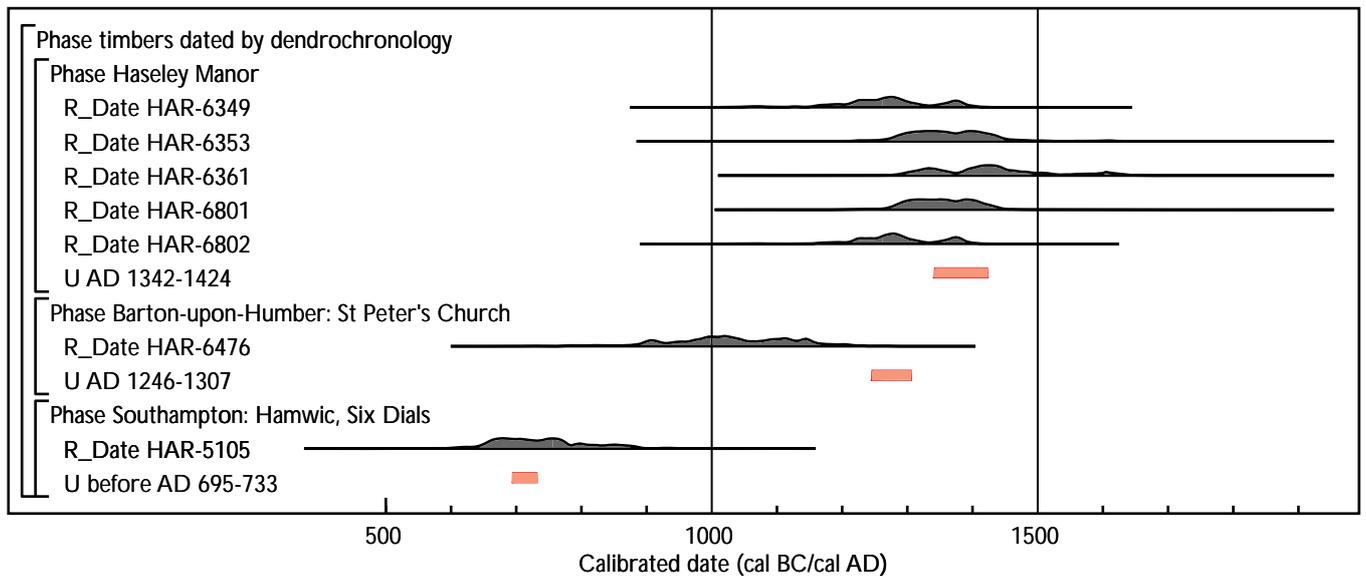


Fig 22. Calibrated radiocarbon dates from timbers dated by dendrochronology.

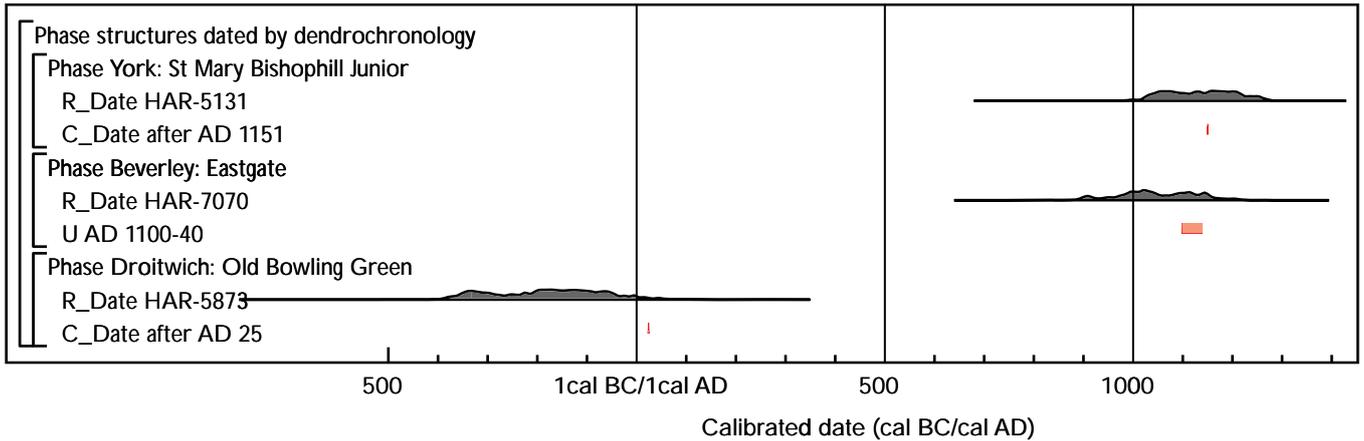


Fig 23. Tree-ring dates from timbers associated with samples dated by radiocarbon.

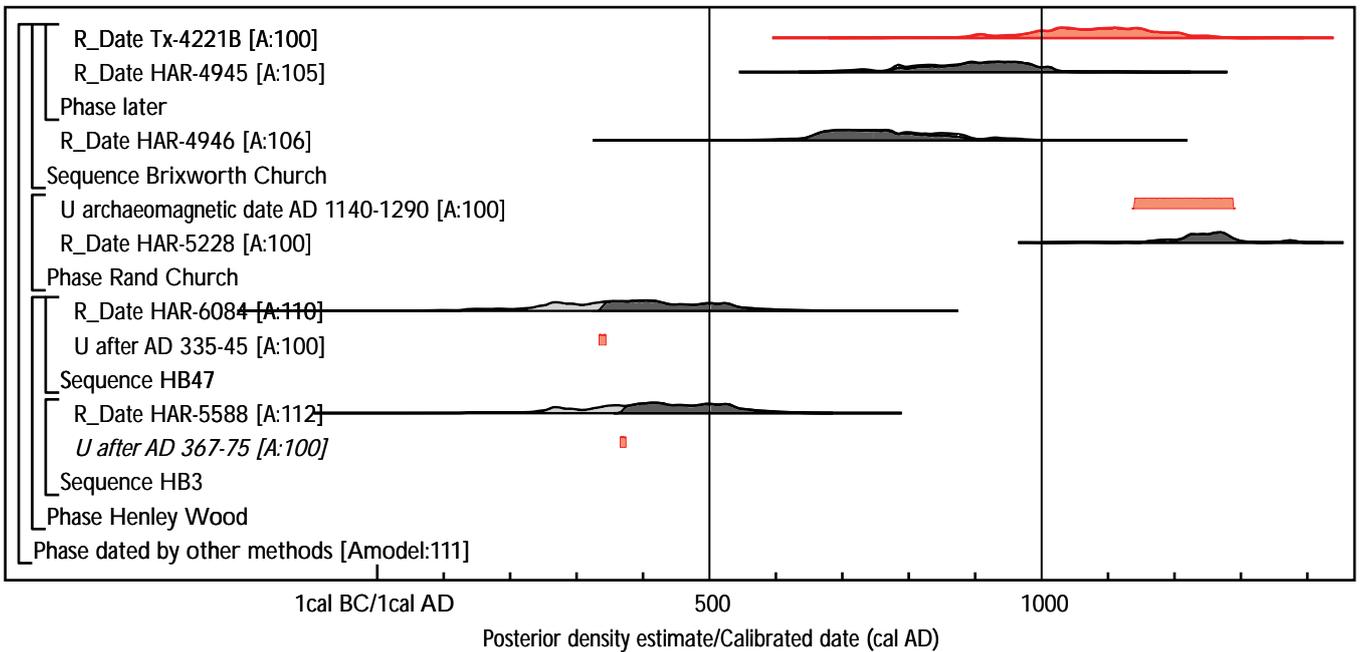


Fig 24. Radiocarbon dates associated with independent dates not derived from dendrochronology.

Rather more loosely associated with dendrochronological dates are three more radiocarbon samples (Fig 23). HAR-7070 from Beverley: Eastgate, Humberside was from a hurdle fence, phased as contemporary with a plank dated by dendrochronology to AD 1100–40. The radiocarbon date is compatible with this interpretation. Waterlogged twigs from a timber-lined pit at Droitwich: Old Bowling Green, Worcestershire were dated by radiocarbon (HAR-5873). An analogous pit from the site has a tree-ring date of after AD 25. The radiocarbon date may be slightly earlier than this. Finally, a radiocarbon date on a timber from the roof of York: St Mary Bishophill Junior, North Yorkshire (HAR-5131) is compatible with a felling date of after AD 1151 produced from rafters from the structure.

Five samples can be associated, with varying degrees of reliability, with calendar dating derived from other sources of evidence. Two samples of articulated human bone from Henley Wood, Somerset are stratigraphically later than coins struck in AD 335–45 and AD 367–75 respectively. Both radiocarbon

dates are in good agreement with these coin dates (Fig 24; A: 110 and 112 respectively; Bronk Ramsey 1995, 425). A sample of charcoal, which probably represented the fuel from a furnace but which contained a component of what may have been long-lived material, was dated from Rand Church, Lincolnshire (HAR-5228). This furnace has an archaeomagnetic date of AD 1140–1290 (95% confidence), with which the radiocarbon date is entirely compatible. From Brixworth Church, Northamptonshire, a radiocarbon date from the blocking of a doorway between the *porticus* and choir (Tx-4221B) has good agreement with the relative structural phasing of the church fabric and HAR-4945–6 (Fig 24; A: 100).

Statistical modelling

During the period in which the radiocarbon dates reported in this volume were measured, statistical techniques for the analysis of results were limited. The statistical consistency



Fig 25. Timber 16N1 from Bushmead Priory, Bedfordshire. (© Crown Copyright. NMR)

of groups of measurements could be assessed using the (X^2 -test) (Ward and Wilson 1978), but, until the issues of radiocarbon calibration were resolved, little further analysis was possible.

Weighted means of replicate radiocarbon measurements should be taken before calibration for samples which ceased exchanging carbon with the atmosphere at exactly the same time. Most commonly these are replicate samples from the same living organism (eg from two bones of the same human skeleton). For example, the weighted mean of the two measurements on the central human inhumation from Burythorpe: Whitegrounds Barrow, Yorkshire (East Riding) (HAR-4932 and HAR-5507) is 4558 ± 70 BP, which calibrates to 3520–3020 cal BC (95% confidence).

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. At the time the samples listed in this volume were submitted for dating, such assumptions were largely unavoidable. 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.

The first type of application where statistical manipulation of radiocarbon dates in relation to the calibration curve was attempted was for the wiggle-matching of floating tree-ring sequences (Pearson 1986). Here, the relative calendrical position of the samples was known from tree-ring analysis, but their absolute position on the calendar scale had to be determined through radiocarbon dating.

Pioneering applications of this technique to the archaeology of standing buildings undoubtedly led to the submission of a number of series of samples from tree-ring sequences which were undated by dendrochronology. For example, two samples were submitted from timber 16N1 (AML-813989; Fig 25), which had been removed from the refectory of Bushmead Priory, Bedfordshire when it was undergoing repairs in 1981. This timber was formed from a whole timber of only 30-years' growth (Groves and Locatelli 2004, table 1). HAR-6629 consisted of rings 1–10 of this timber and HAR-6628 consisted of rings 11–20. The centre of HAR-6629 (ring 5) is consequently known to be 10 years earlier than the centre of HAR-6628 (ring 15). We also know that the timber (which does not retain sapwood or a heartwood/sapwood boundary), must have been felled at least 15 years after the centre of HAR-6628, as there are 30 rings in the timber. Combining all this information with the radiocarbon dates (Fig 26) allows us to estimate a felling date for this timber of after *cal AD 1295–1345* (54% probability) or after *cal AD 1370–1415* (41% probability).

This analysis has not been undertaken using the wiggle-matching approach suggested by Pearson (1986), which was available at the time when these samples were submitted for dating. Rather, the probabilistic, Bayesian approach to wiggle-matching initially formulated by Christen and Litton (1995) has been implemented. This has the advantage of quantifying the errors on the date estimate.

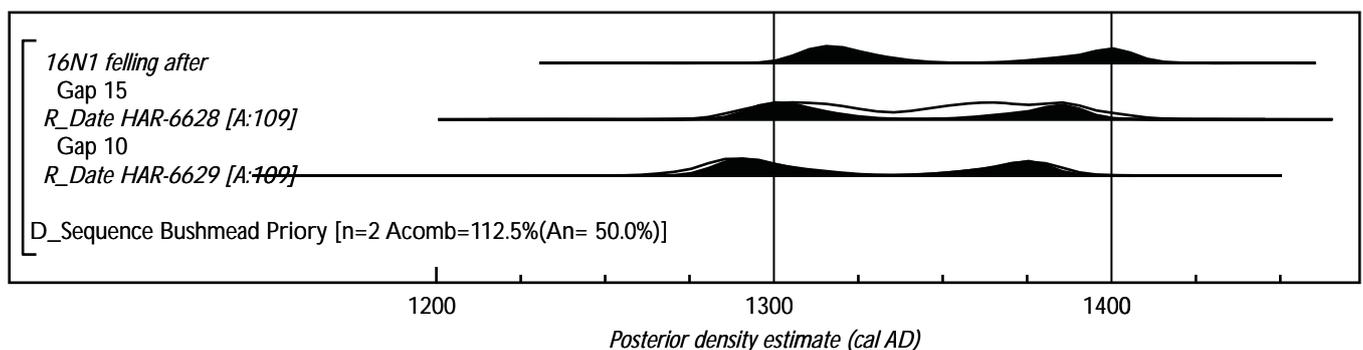


Fig 26. Bayesian wiggle-match for timber 16N1 from Bushmead Priory, Bedfordshire.

This brings us to the potential for incorporating the radiocarbon dates detailed in this volume in formal, Bayesian chronological models (Buck *et al* 1996). Formal statistical modelling of archaeological chronologies has been a major, if not revolutionary, development in our ability to interpret radiocarbon dates over the past twenty years, and has become widely used in English archaeology (Bayliss and Bronk Ramsey 2004; Bayliss 2009)⁶.

Post-excavation analysis and publication of most of the sites and radiocarbon dates listed in this volume occurred before this methodology was developed and widely implemented (eg Buck *et al* 1991; 1992; 1994a–b; Bronk Ramsey 1995). Over the succeeding decades, however, measurements included in this volume have been incorporated in sophisticated chronological models for individual sites and, more recently, in wider synthetic studies.

Site-based Bayesian models include those presented for Barton-upon-Humber: St Peter's Church, Humberside (Bayliss and Atkins 2011), Berinsfield: Mount Farm, Oxfordshire (Hamilton *et al* 2010), Binchester cemetery, Co. Durham (Marshall *et al* 2010), Catterick: Baines Farm, North Yorkshire (Bayliss 2002), Drayton: Cursus, Oxfordshire (Bayliss *et al* 2003), Hambledon Hill, Dorset (Bayliss *et al* 2008), Hazleton, Gloucestershire (Meadows *et al* 2007), Northampton: Briar Hill, Northamptonshire (Meadows 2003), Sutton Common: Enclosures, South Yorkshire (Marshall and Hamilton 2007), and Thirlings: Wooler, Northumberland (Hamilton *et al* 2009).

In wider synthetic studies of radiocarbon dates associated with earlier Neolithic material culture, Whittle *et al* (2011) and Griffiths (2012) present a number of additional site-based models and a series of more interpretative models for aspects of early Neolithic 'things and practices' across England.

Further chronological models are under construction, both for particular sites, and for analysis of wider archaeological questions. Already-published models in due course will be reinterpreted and remodelled. 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.

The measurements reported in this volume were undertaken before the series of formal international radiocarbon inter-comparison exercises enabled radiocarbon laboratories to more accurately estimate the scale of inter-laboratory variation. The first inter-comparison exercise (International Study Group 1982) suggested that quoted measurement errors may be too low. It is difficult, however, to do anything except take the quoted measurement errors in this volume at their face value. Although some may be too low, and some measurements may not be entirely accurate, in practice the dates included in this datelist are likely to constitute a small proportion of the data in any Bayesian chronological model. For example, of the 146 radiocarbon dates included in the model for the chronology of early Neolithic activity at Hambledon Hill (Bayliss *et al* 2008),

only 27 (18%) were measured before 1990, and 20 of these are included as *termini post quos*. In these circumstances, any slight bias in these measurements, or under-estimation of total error, is unlikely to affect the resultant modelled chronologies substantively.

Using the datelist

Radiocarbon determinations are identified by a unique laboratory code. So, for example, HAR was the code for the Atomic Energy Research Establishment Laboratory at Harwell, Oxfordshire, and HAR-8544 was the 8,544th measurement produced by the laboratory. This code is the internationally agreed identifier by which every radiocarbon determination can be traced. HAR-8544 refers to the result produced on a bulk sample of mature oak charcoal from the burial soil beneath the Tiverton: Long Barrow, Devon, 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 Mildenhall Ware).

Acknowledgments

This datelist has been compiled and edited successively by Kate Cullen, Amanda Grieve, Sarah Hill, Henriette Johansen, and Isabelle Parsons, on the basis of information provided by the submitters of the samples dated and by the radiocarbon laboratories. The mammoth task of cataloguing the paper and material archive from AERE Harwell, which was retrieved by English Heritage on the demolition of the laboratory building in 1995, was undertaken with exemplary patience and care by Sarah Hill. We are all grateful to all the submitters of the samples included in this datelist, who have generously responded to our requests for information and comments on their dates often many years after the initial submission of the samples.

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

I am particularly indebted to Robert Hedges, Bob Otlet, and Jill Walker, 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 Geoff Bradburn, Curly Humphries, and Brian Slade for processing the samples dated at AERE Harwell, to

John Bounden and Alan Ward for similarly processing and dating the samples dated at the Godwin Laboratory, and to Angela Bowles, Angie Bryan (née Stoker), John Foreman, Richard Gillespie, John Gowlett, Teddy Hall, Evelyn Hendy, Martin Humm, and Colin Perry for undertaking the measurements at the Oxford Radiocarbon Accelerator Unit. David Haddon-Reece and David Jordan ran the radiocarbon dating programme for the Ancient Monuments Laboratory of English Heritage during the period when the samples listed in this volume were submitted for dating.

Alex Bayliss

*English Heritage, 1 Waterhouse Square,
138–142 Holborn, London, EC1N 2ST*

1 The Department of the Environment (1970–80), the Ministry of Public Buildings and Works (1962–70), and the Ministry of Works (1944–62).

2 This was not always the case. At Nancekuke: Penhale barrow, Cornwall, for example, a discrete deposit of charcoal, plausibly from a fire on the old land surface sealed by the barrow, was dated (HAR-8097).

3 HAR-5117, HAR-5242–3, HAR-5787, HAR-6366, HAR-8356, and HAR-8789.

4 HAR-6296 and HAR-7059.

5 HAR-3464–5, HAR-5545, and HAR-5958.

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

Charcoal and wood identification of samples dated before 1981

In 1994 the first volume of *Radiocarbon Dates* funded by English Heritage was published (Jordan *et al* 1994). This included details of 1420 radiocarbon measurements, 578 of which were on samples of bulk charcoal, with a further 397 on samples of, mostly waterlogged, wood. Of the charcoal samples, 335 (58%) were identified to age and species before dating, as were 259 (65%) of the wood samples. A substantial minority of such samples (39%), however, were unidentified.

In 1995, on the demolition of the laboratory building at AERE Harwell, English Heritage retrieved the paper and physical archive of the archaeological samples that had been dated by the laboratory. This included excess material from a large number of the dated samples. The residues of the charcoal and wood used for radiocarbon dating in the 1970s and 1980s, could thus be identified to age and species retrospectively. The identifications of material for radiocarbon dates funded by English Heritage between 1981 and 1988 are provided in this volume, and those for samples funded between 1988 and 1989 are provided in Bayliss *et al* (2012). This paper lists the retrospective identifications of the excess material from samples reported in Jordan *et al* (1994), and should be used in conjunction with that volume.

The material that remained in the Harwell archive was in a range of states of preservation. Some samples consisted mostly of soil, in which a small amount of charcoal remained. Some samples appeared to have gone through at least some of the stages of chemical pretreatment in the laboratory and were very clean, but extremely friable. Almost all the samples of originally waterlogged wood were desiccated and structurally collapsed.

The identification of this material, which originates from numerous English sites, was undertaken between 1995 and 2000.

The samples were prepared using standard methods (Gale and Cutler 2000). For waterlogged/desiccated wood: thin samples were removed by hand from the transverse, radial, and tangential longitudinal surfaces using a double-sided razor blade. These were mounted on microscope slides in 70% glycerin. For charcoal: similar surfaces were prepared by fracturing and the resulting fragments supported in washed sand.

Anatomical structures were examined using either transmitted light (for wood) or incident light (for charcoal) on a Nikon Labophot-2 compound microscope at magnifications up to $\times 400$ and matched to prepared reference slides of modern wood. When possible, the maturity of the wood was assessed (ie heartwood/sapwood) and stem diameters recorded. It should be noted that during the charring process wood may be reduced in volume by up to 40%.

To avoid repetition, identification will refer to the following list of taxa which gives species, generic, and family names. It is not usually possible to identify to species level. The anatomical similarity of some related species and/or genera makes it difficult to distinguish between them with any certainty, eg members of the Pomoideae, Rosoideae, Leguminosae, and Salicaceae. In addition, some unrelated taxa can look very similar in poorly preserved material, eg ivy (*Hedera*) and elder (*Sambucus*). Classification is according to *Flora Europaea* (Tutin *et al* 1964–80).

Following identification the excess material has been reunited with the relevant site archive (as listed in the datelist entry). A small number of samples, where this has not yet been possible, are currently in the care of English Heritage at Fort Cumberland, Fort Cumberland Road, Eastney, Portsmouth, PO4 9LD.

Broadleaf taxa:

Aceraceae	<i>Acer</i> sp., maple or sycamore
Aquifoliaceae	<i>Ilex</i> sp., holly
Araliaceae	<i>Hedera</i> sp., ivy
Betulaceae	<i>Alnus</i> sp., alder; <i>Betula</i> sp., birch; <i>Carpinus</i> sp., hornbeam
Buxaceae	<i>Buxus</i> sp., box
Caprifoliaceae	<i>Lonicera</i> sp., honeysuckle; <i>Sambucus</i> sp., elder; <i>Viburnum</i> spp., guelder rose and wayfaring tree
Cornaceae	<i>Cornus</i> sp., dogwood
Corylaceae	<i>Corylus</i> sp., hazel
Ericaceae	<i>Calluna vulgaris</i> (L.) Hull, ling; <i>Erica</i> sp., heather. These genera cannot be separated using anatomical features.
Fagaceae	<i>Castanea</i> sp., sweet chestnut; <i>Fagus</i> sp., beech; <i>Quercus</i> sp., oak
Leguminosae	<i>Ulex</i> sp., gorse and/or <i>Cytisus</i> sp., broom. These genera are anatomically similar.
Oleaceae	<i>Fraxinus</i> sp., ash
Ranunculaceae	<i>Clematis</i> sp., traveller's joy
Rhamnaceae	<i>Frangula alnus</i> L., alder buckthorn; <i>Rhamnus cathartica</i> L., purging buckthorn
Rosaceae	Pomoideae: <i>Crataegus</i> sp., hawthorn; <i>Malus</i> sp., apple; <i>Pyrus</i> sp., pear; <i>Sorbus</i> spp., rowan, service tree and whitebeam. These genera are anatomically similar.
Prunoideae:	<i>Prunus</i> spp., which includes <i>P. avium</i> , wild cherry; <i>P. padus</i> , bird cherry; <i>P. spinosa</i> , blackthorn. The anatomical features of these genera are overlapping and it is sometimes difficult or impossible to differentiate between the species.
Rosoideae:	<i>Rosa</i> sp., briar rose; <i>Rubus</i> sp., blackberry/bramble. These genera are anatomically similar.
Salicaceae	<i>Salix</i> sp., willow; <i>Populus</i> sp., poplar. These genera are anatomically similar.
Tiliaceae	<i>Tilia</i> sp., lime

Ulmaceae	<i>Ulmus</i> sp., elm
Conifers and taxads:	
Pinaceae	<i>Larix</i> sp., larch; <i>Picea</i> sp., spruce. These genera are anatomically similar. <i>Pinus</i> sp., pine (<i>sylvestris</i> group)
Taxaceae	<i>Taxus</i> sp., yew

ALDWINCLE

HAR-1185	charcoal, remaining subsample identified; <i>Quercus</i> sp., heartwood, 2.28g (97.0%); <i>Quercus</i> sp., sapwood, 0.05g (2.1%); <i>Prunus</i> spp., 0.02g (0.9%); unidentified, 0.41g (1998)
HAR-1411	charcoal, remaining subsample identified; <i>Quercus</i> sp., probably all heartwood, 1.14g (100%); unidentified, 0.79g (1998)

BALKSBURY

HAR-443	charcoal and bone, remaining subsample identified; <i>Corylus</i> sp. including roundwood measuring 15mm in diameter when charred, 7.1g (79%); <i>Quercus</i> sp., probably including heartwood, 1.1g (12%); bone, 0.7g (8%); ? <i>Frangula alnus</i> , 0.08g (1%); unidentified, 16.9g (1997)
HAR-444	charcoal, remaining subsample identified; Pomoideae, 10.34g (85.6%); <i>Fraxinus</i> sp., 1.17g (9.7%); <i>Prunus</i> sp., 0.21g (1.7%); <i>Acer</i> sp., 0.18g (1.5%); <i>Quercus</i> sp., 0.15g (1.2%); <i>Alnus</i> sp., 0.03g (0.3%); unidentified, 203.3g (1997)

BARTON-UNDER-NEEDWOOD: CATHOLME

HAR-953	charcoal, remaining subsample very friable; <i>Quercus</i> sp., twiggy material, sapwood and heartwood, 2.8g (85%); <i>Betula</i> sp., 0.5g (15%); unidentified, 78.5g (1998)
HAR-954	charcoal, remaining subsample very friable; <i>Quercus</i> sp., twiggy material, sapwood and heartwood, 2.8g (85%); <i>Betula</i> sp., 0.5g (15%); unidentified, 43.8g (1998)
HAR-1501	charcoal, remaining subsample identified; <i>Quercus</i> sp., heartwood, extremely slow-grown, 4.3g (100%); unidentified, 6.7g (1998)
HAR-1502	charcoal, remaining subsample identified; <i>Quercus</i> sp., heartwood, 1.19g (92%); <i>Corylus</i> sp., 0.05g (4%); Salicaceae, 0.05g (4%); unidentified, 15.3g (1998)
HAR-1506	charcoal, remaining subsample identified; <i>Quercus</i> sp., mainly sapwood, 1.10g (92%); <i>Corylus</i> sp., 0.10g (8%); unidentified, 7.2g (1998)
HAR-1507	charcoal, remaining subsample very friable and comminuted, all suitable material examined; <i>Quercus</i> sp., sapwood and heartwood, 10.5g (100%) (1998)

BECKFORD

HAR-3951	charcoal, remaining subsample of very small fragments identified: <i>Quercus</i> sp., 0.02g (66.7%); <i>Corylus</i> sp., 0.01g (33.3%); unidentified including charred cereal grain, 0.14g (1998)
HAR-3952	charcoal, remaining subsample identified; <i>Fraxinus</i> sp., 0.01g (100%); unidentified, 0.04g (1998)
HAR-3955	charcoal, remaining subsample consisted of charred cereal grain, insufficient charcoal for identification (1998)
HAR-4001	charcoal, remaining subsample identified; <i>Quercus</i> sp., heartwood, 0.06g (100%); unidentified charred cereal grain, 0.22g (1998)

BIDFORD-ON-AVON

HAR-3069 waterlogged wood, remaining subsample now dry; Salicaceae, probably a segment from roundwood (100%) (1998)

BRANDON

HAR-4086 charcoal, remaining subsample consists of narrow stems (diameters up to 5mm); *Erica/Calluna* sp., 7.84g (99.0%); ?*Prunus spinosa* seeds, 0.08g (1.0%); unidentified, 10.25g (1998)

BROMFIELD

HAR-3968 charcoal, remaining subsample very comminuted and friable, the fragments are mostly too small to identify; *Quercus* sp., sapwood, 0.03g (60%); *Corylus* sp., 0.02g (40%); unidentified, 8.43g (1998)

BURGHFIELD: KNIGHT'S FARM

HAR-1011 charcoal, remaining subsample identified; *Corylus/Alnus* sp., 0.02g, (66.7%); *Quercus* sp., 0.01g (33.3%); unidentified, 0.02g (1998)

HAR-1012 charcoal, remaining subsample identified; *Quercus* sp., 0.13g (52.0%); *Prunus spinosa*, 0.12g (48.0%), unidentified, 0.18g (1998)

HAR-1013 charcoal, remaining subsample identified; *Quercus* sp., 0.02g (100%); unidentified, 0.20g (1998)

HAR-2929 partially charred wood, remaining subsample identified; *Quercus* sp., 3.04g (100%); unidentified, 3.67g (1998)

CRAWLEY: BROADFIELDS

HAR-970 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 10.3g (100%); unidentified, 0.78g (1998)

HAR-971 charcoal, *Quercus* sp, heartwood, 4.73g (100%); unidentified, 15.74g (1998)

HAR-972 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 0.67g (77.0%); *Quercus* sp., sapwood, 0.19g (21.8%); cf. *Acer* sp., less than 0.01g (<1.2%); unidentified, 0.26g (1998)

HAR-973 charcoal, remaining subsample identified; *Quercus* sp. heartwood, 1.25g (91.9%); *Quercus* sp., sapwood, 0.11g (8.1%); unidentified, 1.77g (1998)

HAR-974 charcoal, remaining subsample identified; *Quercus* sp. heartwood, 1.40g (95.9%); *Quercus* sp., sapwood, 0.05g (3.4%); a small amount of *Corylus/Alnus* sp., but too fragmented to verify, 0.01g (0.7%); unidentified, 0.41g (1998)

HAR-975 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 6.91g (59.4%); *Quercus* sp., sapwood, 4.73g (40.6%); unidentified, 18.10g (1998)

DANEbury

HAR-963 charcoal, remaining subsample consists of a large quantity of small fragments, a high proportion were too small to identify; *Quercus* sp., heartwood, 6.64g (91.7%); *Quercus* sp., sapwood, 0.60g (8.3%); unidentified, 49.41g (1998)

HAR-2564 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 4.81g (72.4%); *Corylus* sp., 0.81g (12.2%); *Quercus* sp., sapwood, 0.73g (11.0%); *Fraxinus* sp., 0.25g (3.8%); *Prunus* sp., 0.04g (0.6%); unidentified, 14.21g (1998)

HAR-2568 charcoal, remaining subsample identified; *Quercus* sp., sapwood, 1.54g (56.6%); *Quercus* sp., heartwood, 1.08g (39.7%); *Corylus* sp., 0.1g (3.7%); unidentified, 10.49g (1998)

- HAR-2571 charcoal, remaining subsample identified; *Quercus* sp. heartwood, 2.44g (75.8%); *Quercus* sp., sapwood, 0.78g (24.2%); unidentified, 8g (1998)
- HAR-2581 charcoal, remaining subsample identified; *Ulmus* sp., sapwood and heartwood, 26.12g (93.9%); *Alnus* sp., 0.94g (3.4%); Pomoideae, 0.63g (2.3%); *Ilex* sp., 0.11g (0.4%); unidentified, 11.78g (1998)
- HAR-2586 charcoal, remaining subsample sparse; *Quercus* sp., probably sapwood, 0.01g (100%); unidentified, 0.22g (1998)
- HAR-2974 remaining subsample identified; charred grain, probably of mixed species, 100% (1998)

DURHAM: SADDLER STREET, SUTTON SALE ROOMS

- HAR-599 dried wood, remaining subsample identified; roundwood or in long slivers; *Quercus* sp., heartwood, 32.97g (54.4%); *Corylus* sp., roundwood and nutshell, 23.94g (39.5%); *Quercus* sp., roundwood (6 growth rings), 2.27g (3.8%); Salicaceae, roundwood, 1.42g (2.3%); unidentified, 102.07g (1998)
- HAR-602 waterlogged wood, remaining subsample consists of dry and structurally collapsed slivers, previously waterlogged; *Quercus* sp., heartwood, some slow-grown, 1.74g (91.6%); *Corylus* sp., nutshell, 0.16g (8.4%); unidentified, 12.87g (1998)
- HAR-828 waterlogged wood, remaining subsample now dried and structurally collapsed; *Quercus* sp., sapwood, small fragments probably from narrow roundwood, 6.03g (100%); unidentified, 9.71g (1998)
- HAR-829 waterlogged wood, remaining subsample now dried and structurally very collapsed, composed of numerous slivers possibly from narrow roundwood but most too degraded to identify; *Corylus* sp., 4.07g (100%); unidentified, 53.60g (1998)
- HAR-830 waterlogged wood, remaining subsample now dry and structurally very degraded and collapsed. Impossible to identify, could be bark rather than wood (1998)
- HAR-831 wood and charcoal, remaining subsample of wood consists of thin slivers, previously waterlogged; *Quercus* sp., dessicated heartwood, 1.34g (91.8%); *Betula* sp., roundwood, diameter 9mm, 0.07g (4.8%); *Quercus* sp., heartwood, charcoal, 0.05g, (3.4%); unidentified, 3.09g (1998)

FENCOTT: IVY FARM

- HAR-4203 wood, remaining subsample identified; *Quercus* sp., heartwood (1998)

FISHERWICK

- HAR-2469 waterlogged wood, remaining subsample now dry and mostly too collapsed to identify; *Quercus* sp., 1.89g (61.2%); *Salix/Populus* sp., 0.83g (26.9%); ?*Rosa /Rubus/Prunus* sp., 0.37g (11.9%); unidentified, 27.14g (1998)
- HAR-2470 waterlogged wood, remaining subsample now dry and mostly too collapsed to identify; *Salix/Populus* sp., 8.72g (83.8%); *Quercus* sp., 1.54g (14.8%); *Prunus* sp., 0.14g (1.4%); unidentified, 48.14g (1998)
- HAR-2471 waterlogged wood, remaining subsample now dry and mostly too collapsed to identify; *Salix/Populus* sp., 4.33g (100%); unidentified, 11.29g (1998)

GLOUCESTER: 1 WESTGATE STREET

- HAR-1658 charred and semi-charred wood, remaining subsample structurally collapsed and poorly preserved, consists of diffuse-porous structure but insufficient diagnostic information to identify, 3.76g (100%); unidentified 8.32g (1998)

GREAT YARMOUTH: FULLER'S HILL

HAR-1079 charcoal, remaining subsample identified; *Alnus* sp., roundwood, diameters up to 5mm (charred), 7.94g (77.2%); *Quercus* sp., heartwood, 1.49g (14.5%); *Fraxinus* sp., 0.61g (5.9%); *Quercus* sp., sapwood, 0.25g (2.4%); unidentified, 136.16g (1998)

HASCOMBE: HILLFORT

HAR-1698 charcoal, remaining subsample identified; *Quercus* sp. heartwood, 0.63g (35.0%); *Fraxinus* sp. heartwood, 0.59g (32.8%); *Betula* sp., 0.50g (27.8%); *Corylus* sp., 0.08g (4.4%); unidentified, 73.12g (1998)

HAR-1699 charcoal, remaining subsample friable; *Quercus* sp., heartwood, 1.22g (99.2%); *Quercus* sp., sapwood, >0.01g (>0.8%); unidentified, 14.03g (1998)

HEREFORD: CASTLE GREEN

HAR-413 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 6.19g (99%); *Quercus* sp., sapwood, 0.06g (1%); unidentified, 44.57g (1998)

HAR-414 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 8.40g (97.3%); *Quercus* sp., sapwood, 0.23g (2.7%); unidentified, 41.44g (1998)

JARROW: ST. PAUL'S

HAR-960 charcoal, remaining comminuted subsample identified; *Quercus* sp., heartwood, 4.69g (95.1%); *Quercus* sp. sapwood, 0.24g (4.9%); unidentified, 69.27g (1998)

KIMPTON: KALIS CORNER

HAR-4316 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 0.38g (100%); unidentified, 0.22g (1998)

HAR-4317 charcoal; remaining subsample sparse; Pomoideae, 0.07g (100%); unidentified, 0.16g (1999)

LAUNCESTON: CASTLE

HAR-981 charcoal, remaining subsample sparse, friable, and comminuted, and the fragments are mostly too small to identify; *Alnus/Corylus* sp., 0.02g (40%); ?cereal grain or large grass seed, 0.02g (40%); *Quercus* sp., 0.01g (20%); unidentified, 0.81g (1999)

LEVINGTON

HAR-3706 charcoal, remaining subsample consists of fragments up to 30mm in length; *Quercus* sp., heartwood, some slow-grown, 52.17g (96.1%); *Quercus* sp., sapwood, 2.12g (3.9%); unidentified, 22.55g (1998)

HAR-3741 charcoal, remaining subsample friable and comminuted; *Quercus* sp., heartwood, 2.52g (91.3%); *Quercus* sp., sapwood, 0.17g (6.2%); *Prunus* sp., 0.07g (2.5%); unidentified, 27.07g

HAR-3742 charcoal, remaining subsample poorly preserved and comminuted; *Quercus* sp., heartwood, 1.15g (100%); unidentified, 42.72g

LINCOLN: SILVER STREET

HAR-447 charcoal, remaining subsample consists of four very small pieces; Pomoideae, 0.008g (100%) (1999)

LITTLE HALLINGBURY: MIDFIELD

HAR-865 charcoal, remaining subsample very sparse and mostly too fragmented to identify; *Quercus* sp., 0.017g (100%); unidentified, 0.17g (1998)

LITTLE WALTHAM

- HAR-1082 charcoal; remaining subsample sparse; *Quercus* sp., heartwood, 0.17g (100%); unidentified, 0.22g (1999)
- HAR-1087 charcoal, remaining subsample sparse and very poorly preserved; *Alnus/Corylus* sp., 0.10g (100%); unidentified, 0.10g (1999)
- HAR-1088 charcoal; remaining subsample identified; *Quercus* sp., sapwood and heartwood, including some fast-grown material. The charcoal consists of chunks up to 20mm in (incomplete) radius, probably from relatively wide poles/branches; *Quercus* sp., heartwood, 32.89g (94.4%); *Quercus* sp., sapwood, 1.84g (5.3%); Salicaceae, 0.12g (0.3%); unidentified, 65.96g (1999)

LONDON: BAYNARD'S CASTLE

- HAR-1083 charcoal, remaining subsample comminuted and powdery and mostly too poorly preserved to identify; ?*Quercus* sp., 0.10g (100%); unidentified, 4.84g (1998)

LONDON: HAMPSTEAD, WEST HEATH SPA

- HAR-4115 charcoal, remaining subsample friable and comminuted and mostly impossible to identify; *Quercus* sp., heartwood, 0.30g (85.7%); *Betula* sp., 0.03g (8.6%); *Quercus* sp., sapwood, 0.02g (5.7%); unidentified, 11.39g (1998)

LONDON: SOUTHWARK, 213 BOROUGH HIGH STREET

- HAR-2499 charred and semi-charred wood, remaining subsample poorly preserved with structural distortion and mostly impossible to identify; *Betula* sp., 9.24g (100%); unidentified, 7.75g (1998)

LONDON: WESTMINSTER, CROMWELL GREEN

- HAR-2692 dried-waterlogged wood, remaining subsample identified; *Quercus* sp., heartwood (100%) (1998)
- HAR-2696 dried-waterlogged wood, remaining subsample identified; *Quercus* sp., heartwood (100%) (1998)

LONDON: WESTMINSTER, JEWEL TOWER

- HAR-1433 ?charred sawdust or shreds of wood and other material; remaining subsample too macerated to identify with certainty but LS surfaces match *Ulmus* sp., 7.90g (100%) (1998)

LONDON: WESTMINSTER, NEW PALACE YARD

- HAR-329 waterlogged-wood, remaining subsample consists of collapsed slivers, now dry; *Alnus* sp., 0.66g (100%); unidentified, 9.77g (1998)
- HAR-332 waterlogged-wood, remaining subsample now dry and too collapsed to identify; some pieces include a diffuse-porous vessel distribution (1998)

MARC 3: MICHELDEVER WOOD R4

- HAR-1042 charcoal, remaining subsample identified: *Quercus* sp., late wood, 0.012g (80%); *Fraxinus* sp., 0.003g (20%); unidentified, 0.034g (1997)
- HAR-2799 charcoal, remaining subsample identified: *Quercus* sp., sapwood, 0.33g (92%); *Quercus* sp., heartwood, 0.03g (8%); unidentified, 1.47g (1997)

MARC 3: MICHELDEVER WOOD R27

- HAR-2693 charcoal, remaining subsample identified: *Corylus* sp., 0.67g (46%); *Viburnum/Cornus* sp., 0.55g (37%); *Rhamnus cathartica*, 0.18g (12%); *Quercus* sp., sapwood, 0.06 (4%); unidentified, 5.93g (1997)

MILDENHALL: WEST ROW FEN, MNL-137

HAR-2690 charcoal; remaining subsample identified; *Fraxinus* sp., 8.45g (73.22%); *Corylus/Alnus* sp., 1.96g (16.98%); *Tilia* sp., 0.69g (5.98%); *Alnus* sp., 0.3g (2.6%); *Corylus* sp., 0.05g (0.43%); *Ulmus* sp., 0.05g (0.43%); *Quercus* sp., sapwood, 0.04g (0.35%); unidentified, 28.15g (1999)

MILTON KEYNES: HARTIGAN'S GRAVEL PIT, MK-23

HAR-860 charcoal, remaining subsample rather comminuted; *Quercus* sp., heartwood, 0.28g (100%); unidentified, 0.43g (1998)

MUCKING

HAR-451 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 12.64g (100%); unidentified, 37.44g (1998)

HAR-2337 charcoal, remaining subsample comminuted; *Corylus* sp., 0.05g (100%); unidentified, 3.50g (1998)

HAR-2339 waterlogged wood and soil, remaining subsample now dried, collapsed, and degraded; few fragments were suitable for identification; unidentified cylinders of bark from roundwood, 2.82g (71.76%); *Corylus/Alnus* sp., 0.49g (12.47%); *Corylus* sp., nutshell, 0.33g (8.39%); unidentified plates of bark from larger poles/branches, 0.29g (7.38%); unidentified, 128.23g (1999)

HAR-2340 charcoal, remaining subsample sparse; *Quercus* sp., probably sapwood, 0.09g (100%); unidentified, 0.04g (1998)

HAR-2341 charcoal, remaining subsample identified; *Quercus* sp. heartwood, 6.51g (99.5%); *Quercus* sp., sapwood, 0.03g (0.5%); unidentified, 14.69g (1998)

HAR-2342 charcoal, remaining subsample sparse; *Quercus* sp., >0.01g (100%); unidentified, 0.03g (1998)

HAR-2343 charcoal, remaining subsample identified; *Quercus* sp., 0.10g (52.63%); *Acer* sp., 0.05g (26.32%); *Ilex* sp., 0.04g (21.05%); unidentified, 0.85g (1999)

HAR-2344 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 0.50g (100%); unidentified, 0.64g (1998)

NORTHAMPTON: BRIAR HILL

HAR-2283 charcoal, remaining subsample very comminuted; Salicaceae, 0.37g (45.3%); *Fraxinus* sp., 0.19g (23.3%); Pomoideae, 0.14g (17.2%); *Prunus* spp., 0.09g (11.0%); *Acer* sp., 0.02g (2.5%); *Quercus* sp., 0.006g (0.7%); unidentified, 21.15g (1999)

HAR-3208 charcoal, remaining subsample identified; *Prunus spinosa*, 1.05g (100%); unidentified, 2.67g (1999)

HAR-4065 charcoal, remaining subsample very comminuted; probably all *Quercus* sp., heartwood, but fragments too small to verify, 0.44g (100%); unidentified, 11.19g (1999)

NORTHAMPTON: ST PETER'S STREET

HAR-1225 charcoal, remaining subsample identified; *Corylus* sp., 0.33g (57.9%); *Quercus* sp., 0.14g (24.5%); *Acer* sp., 0.05g (8.8%); *Fraxinus* sp., 0.05g (8.8%); unidentified, 1.43g (1999)

NORTHCHURCH

HAR-448 wood, remaining subsample identified; *Quercus* sp., 6.06g (100%); unidentified, 10.30g (1999)

NORWICH: ANGLIA TV

- HAR-3585 charcoal; remaining subsample identified; *Quercus* sp., heartwood, 18.06g (94.7%); *Fraxinus* sp., 0.60g (3.1%); *Quercus* sp., sapwood, 0.42g (2.2%); unidentified, 115.98g (1999)
- HAR-3656 charcoal, remaining subsample identified; *Quercus* sp., including some heartwood, 4.83g (100%); unidentified, 36.53g (1999)
- HAR-3707 charcoal; remaining subsample identified; *Quercus* sp., heartwood, 0.37g (82.22%); *Fraxinus* sp., 0.06g (13.33%); Pomoideae, 0.02g (4.44%); unidentified, 1.33g (1999)
- HAR-3722 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 17.48g (100%); unidentified, 15.19g (1999)

NORWICH: BOWTHORPE

- HAR-3611 charcoal, remaining subsample mostly too comminuted to identify; *Quercus* sp., 0.05g (100%); unidentified, 0.56g (1999)
- HAR-3630 charcoal, remaining subsample very comminuted and friable; *Quercus* sp., including some heartwood, 0.62g (100%); unidentified 11.1g (1999)

OAKLEY

- HAR-4064 charcoal, remaining subsample comminuted; *Quercus* sp., heartwood, 2.03g (56.6%); *Tilia* sp., 0.78g (21.7%); *Corylus* sp., 0.54g, (15.0%); Pomoideae, 0.24g (6.7%); unidentified, 13.03g (1998)

ODELL

- HAR-1038 wood, remaining subsample of charred shredded slivers of wood mostly too thin to identify and in poor condition; *Quercus* sp., 0.66g (100%); unidentified, 31.34g (1999)
- HAR-1096 charcoal, remaining subsample very comminuted; *Quercus* sp., 0.17g (100%); unidentified 1.41g (1999)

OVING

- HAR-4252 charcoal, remaining subsample identified; *Quercus* sp., heartwood probably from fairly mature wood, 26.04g (69.98%); *Acer* sp., 8.90g (23.92%); *Quercus* sp., sapwood, 1.17g (3.14%); *Corylus* sp., 0.68g (1.83%); *Sorbus* sp., 0.42g (1.13%); unidentified, 190.74g (1999)

PETERBOROUGH

- HAR-1092 charcoal, remaining very subsample comminuted; *Corylus* sp., 0.20g (55.5%); *Quercus* sp., 0.15g (41.7%); Pomoideae, 0.01g (2.8%); unidentified, 20.99g (1998)

PITCHBURY RAMPARTS

- HAR-452 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 7.31g (100%); unidentified 12.89g (1999)

POUNDBURY

- HAR-993 charcoal, remaining subsample very friable with many fragments too small to identify: *Quercus* sp., 3.0g (100%); unidentified, 21.3g (1997)
- HAR-994 charcoal, remaining subsample very friable with many fragments too small to identify; Pomoideae, 0.16g (76%); *Quercus* sp., 0.05g (24%); unidentified, 5.91g (1997)

HAR-995 charcoal, remaining subsample poorly preserved; *Quercus* sp., sapwood, 1.5g (46%); *Quercus* sp., heartwood, 0.9g (27%); ?*Betula* sp., 0.6g (18%); ?*Corylus/Alnus* sp., 0.3g (9%); unidentified, 2.0g (1997)

HAR-996 charcoal, remaining subsample identified: *Quercus* sp., sapwood, 0.5g (53%); *Alnus* sp., 0.4g (43%); *Quercus* sp., heartwood, 0.04g (4%); unidentified, 1.0g (1997)

PRUDHOE CASTLE

HAR-3937 charcoal, remaining subsample identified; *Quercus* sp., 1.76g (88%); *Betula* sp., 0.24g (12%); unidentified 2.28g (1999)

HAR-3938 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 3.87g (99.23%); *Quercus* sp., sapwood, 0.03g (0.77%); unidentified 8.05g (1999)

HAR-3939 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 12.19g (87.51%); *Alnus* sp., 1.74g (12.49%); unidentified 5.97g (1999)

RAMSBURY: HIGH STREET

HAR-1626 charcoal, remaining subsample identified; *Corylus* sp., 0.62g (46.27%); *Quercus* sp. heartwood, 0.29g (21.64%); *Quercus* sp. sapwood, 0.22g (16.42%); *Prunus spinosa*, 0.17g (12.69%); *Acer* sp., 0.04g (2.98%); unidentified, 3.19g (1999)

HAR-1704 charcoal, remaining subsample of small pieces identified; *Quercus* sp., heartwood, 0.59g (96.72%); *Quercus* sp., sapwood, 0.01g (1.64%); Salicaceae, 0.01g (1.64%); unidentified, 1.94g (1999)

RINGMER

HAR-3616 charcoal, remaining subsample very powdery and comminuted and the fragments mostly too small to identify; cf. *Fagus* sp. but insufficient material to identify positively, 0.06g (40%); *Quercus* sp. heartwood, 0.05g (33.33%); *Quercus* sp., roundwood, 0.02g (13.33%); Pomoideae, 0.02g (13.33%); unidentified, 9.66g (1999)

ROXTON

HAR-711 charcoal, remaining subsample very comminuted and friable, and mostly impossible to identify; *Prunus spinosa*, 0.54g (100%); unidentified, 5.82g (1999)

HAR-1002 charcoal, remaining subsample identified; *Quercus* sp., 0.38g (92.7%); *Acer* sp., 0.03g (7.3%); unidentified, 1.23g (1999)

RUNCORN: NORTON PRIORY

HAR-3885 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 1.59g (65.7%); *Alnus* sp., 0.8g (33.1%); *Quercus* sp., sapwood, 0.03g (1.2%); unidentified, 3.8g (1999)

RUNNYMEDE BRIDGE

HAR-1834 charcoal, remaining subsample very comminuted; *Quercus* sp., 1.25g (100%); unidentified, 9.32g (1998)

HAR-3112/3 charcoal, remaining subsample consisted of a large quantity of charcoal and sooty material; *Quercus* sp., sapwood, 12.32g (70.0%); *Quercus* sp., heartwood plus some of unknown maturity, 3.91g (22.2%); *Corylus* sp., 1.37g (7.8%); unidentified, 850g (1999)

HAR-3114 charcoal, remaining subsample consisted of a large quantity of very crumbly and dusty charcoal, some compacted; *Quercus* sp., probably sapwood (100.0%) (1999)

- HAR-3115 semi-charred wood, remaining subsample fragmented but almost certainly from a single piece; *Quercus* sp., sapwood (100.0%) (1999)
- HAR-3116 wood and charcoal, remaining subsamples identified; wood - waterlogged, dried, collapsed and in poor condition; *Quercus* sp., roundwood, diameter 40mm, 28.68g (96.6%); charcoal - *Quercus* sp., probably narrow roundwood, 0.67g (2.3%); *Corylus* sp., roundwood, diameter 15mm, 0.33g (1.1%); unidentified, 35.62g (1998)
- HAR-3117 waterlogged wood, remaining subsample now dry and collapsed; *Quercus* sp., probably sapwood, minimum diameter 80mm (100%) (1998)
- HAR-3750 waterlogged wood, remaining subsample now dry and collapsed; *Quercus* sp., fast-grown roundwood, minimum number of 8 growth rings (100%) (1998)
- HAR-3751 waterlogged wood, remaining subsample now dry and collapsed; probably *Corylus* sp. or *Alnus* sp., but impossible to verify (100%) (1998)
- HAR-3752 waterlogged wood, remaining subsample now dry and very hard with collapsed tissues; *Alnus/Corylus* sp. (100%) (1999)
- HAR-3759 waterlogged wood, remaining subsample now dry and collapsed; *Quercus* sp. (100%) (1998)
- HAR-3761 waterlogged wood, remaining subsample now dry and collapsed; *Quercus* sp., sapwood, roundwood, minimum diameter 60mm (100%) (1998)
- HAR-3762 wood, remaining subsample identified; *Quercus* sp. (100%) (1999)
- HAR-4257 wood, remaining subsample identified; *Quercus* sp. (100%) (1999)
- HAR-4264 wood, remaining degraded subsample identified; *Quercus* sp. (100%) (1999)
- HAR-4265 wood, remaining subsample identified; *Quercus* sp. (100%) (1999)
- HAR-4267 waterlogged wood, remaining subsample wet and very degraded; *Quercus* sp. (100%) (1999)
- HAR-4268 wood, remaining subsample identified; *Quercus* sp. (100%) (1999)
- HAR-4269 wood, remaining damp subsample identified; *Quercus* sp., including sapwood and heartwood, roundwood, diameter 140mm (probably complete), approx. 25 growth rings (100%) (1999)
- HAR-4270 wood, remaining subsample identified; *Quercus* sp. (100%) (1999)
- HAR-4272 wood, remaining subsample identified; *Quercus* sp. (100%) (1999)
- HAR-4273 wood, remaining subsample identified; *Quercus* sp. (100%) (1999)
- HAR-4274 wood, remaining damp subsample identified; *Quercus* sp., sapwood, roundwood, diameter 130mm, approx. 11 growth rings (100%) (1999)
- HAR-4275 waterlogged wood, remaining subsample now dry and collapsed; *Quercus* sp., roundwood or trunkwood, minimum diameter 100mm, impossible to assess maturity (100%) (1998)
- HAR-4277 wood, remaining subsample identified; *Quercus* sp. (100%) (1999)
- HAR-4340 waterlogged wood, remaining subsample now dry and collapsed; *Quercus* sp., probably sapwood (100%) (1998)
- HAR-4341 waterlogged wood, remaining subsample now dry and collapsed; *Quercus* sp., probably sapwood but too collapsed to verify (100%) (1998)

HAR-4413 waterlogged wood, remaining subsample now dry and collapsed; *Quercus* sp., sapwood and heartwood (100%) (1998)

ST. KEW TREGILDERS

HAR-2227 charcoal, remaining subsample identified; *Quercus* sp., sapwood, 0.68g (57.1%); *Quercus* sp., heartwood, 0.41g (34.5%); *Fraxinus* sp., 0.10g (8.4%); unidentified, 1.38g (1999)

ST. STEPHEN-IN-BRANNEL: WATCH HILL

HAR-655 charcoal, remaining subsample very comminuted; *Corylus* sp., 0.66g (47.8%); Pomoideae, 0.53g (38.5%); *Alnus* sp., 0.19g (13.8%); unidentified, 15.06g (1999)

SHAUGH MOOR: CAIRN FIELD, SITE 10

HAR-2213 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 23.36g (93.44%); *Quercus* sp., sapwood, 1.48g (5.92%); *Corylus* sp., 0.16g (0.64%); unidentified, 2.44g (1999)

HAR-2214 charcoal, remaining subsample in poor condition; *Quercus* sp., heartwood, 2.46g (100%); unidentified, 103.4g (1999)

HAR-2216 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 3.56g (91.5%); *Quercus* sp., sapwood, 0.33g (8.5%); unidentified, 5.16g (1999)

HAR-2219 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 8.83g (99.7%); *Corylus* sp., 0.03g (0.3%); unidentified 135.24g (1999)

HAR-2220 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 2.30g (100%); unidentified, 0.68g (1999)

HAR-2221 charcoal, remaining subsample very comminuted and the fragments are mostly too small to identify; *Quercus* sp., heartwood, 0.71g (77.2%); *Quercus* sp., sapwood, 0.16g (17.4%); *Salix/Populus* sp., 0.03g (3.2%); *Corylus* sp., 0.02g (2.2%); unidentified, 26.75g (1999)

SHAUGH MOOR: ENCLOSURE 15, SITE 15

HAR-2473 charcoal, remaining subsample very comminuted; *Corylus* sp., 0.12g (48%); *Ulex/Cytisus* sp., 0.07g (28%); *Quercus* sp., narrow roundwood, 0.06g (24%); unidentified, 2.03g (1998)

SHAUGH MOOR: WOOPER PLAYGROUND, SITE 201

HAR-2669 charcoal, remaining subsample very comminuted; *Quercus* sp., heartwood, 0.40g (58.8%); *Quercus* sp., sapwood, 0.28g (41.2%); unidentified, 4.30g (1998)

SMALLBURGH: WAYFORD BRIDGE

HAR-1719 waterlogged wood, remaining subsample now dry and collapsed; *Quercus* sp. (100%) (1999)

SOMERSET LEVELS: ASHCOTT HEATH, ROLAND'S TRACK

HAR-1383 carbonised material, remaining subsample consists of compressed leaf fragments; unidentified monocotyledonous material, eg rushes, grasses (1999)

SOMERSET LEVELS: ASHCOTT HEATH, SIGNAL POLE GROUND

HAR-4739 waterlogged wood, remaining subsample identified; damp roundwood pole in several fragments, minimum diameter 45mm; *Betula* sp. (100%), (1999)

SOMERSET LEVELS: EAST MOORS, ASHCOTT HEATH

- HAR-3447 waterlogged wood, remaining subsample consisted of damp roundwood of various diameters up to c. 6mm; *Corylus* sp., (100%) (1999)
- HAR-3448 waterlogged wood, remaining subsample now dry, collapsed, and very degraded; *Corylus* sp., (100%) (1999)
- HAR-3449 waterlogged wood, remaining subsample consisted of damp roundwood with diameters up to c. 15mm; *Corylus* sp., (100%) (1999)

SOMERSET LEVELS: MEARE HEATH, DIFFORDS SITE 1

- HAR-1842 waterlogged wood, remaining subsample now dry, collapsed, and too degraded to identify (100%) (1999)

SOMERSET LEVELS: MEARE LAKE VILLAGE WEST

- HAR-3740 charcoal/waterlogged wood, remaining subsample now dry and in poor condition; *Quercus* sp. (100%), (1999)
- HAR-3745 charcoal, remaining poorly preserved subsample identified; *Corylus* sp., 2.06g (62.6%); Pomoideae, 0.34g (10.3%); *Fraxinus* sp., 0.31g (9.4%); *Acer* sp., 0.28g (8.5%); *Prunus spinosa*, 0.14g (4.3%); Salicaceae, 0.11g (3.3%); *Quercus* sp., heartwood, 0.05g (1.5%); unidentified, 4.6g (1999)

SOMERSET LEVELS: MEARE, MEARE HEATH FIELD 12.3

- HAR-2428 waterlogged wood, remaining subsample consisted of one large piece, now dry and collapsed; *Alnus* sp. (100%) (1999)

SOMERSET LEVELS: MEARE, STILEWAY

- HAR-4477 waterlogged wood, remaining subsample now dry and very collapsed; cf. *Alnus/Corylus* sp. (100%) (1999)

SOMERSET LEVELS: SEDGEMOOR, CHEDZOY, TRACK 5

- HAR-4375 waterlogged wood, remaining subsample now dry and collapsed, shredded, and too degraded to identify positively; Salicaceae/*Alnus/Corylus* sp. (100%) (1999)

SOMERSET LEVELS: SHAPWICK HEATH, SWEET TRACK TERMINAL SITE 1

- HAR-2772 waterlogged wood, remaining subsample consists of one piece; *Alnus* sp. (100%) (1999)

SOMERSET LEVELS: SHARPHAM, TINNEY'S GROUND

- HAR-681 waterlogged wood, remaining subsample now dried, collapsed, and degraded; *Alnus/Betula* sp., 5.62g (100%); unidentified, 22.11g (1999)
- HAR-684 waterlogged wood, remaining subsample now dried, collapsed, and degraded; ?*Corylus/Alnus* sp., 6.77g (100%); unidentified, 31.81g (1999)
- HAR-3388 waterlogged wood, remaining subsample now dry and degraded; *Corylus* sp., roundwood (100%) (1999)

SOMERSET LEVELS: WALTON HEATH, BISGROVE

- HAR-4078 waterlogged wood, remaining subsample now dry and collapsed and very fragmented; *Betula* sp. (100%) (1999)

SOMERSET LEVELS: WALTON HEATH, GARVINS TRACK

- HAR-1219 waterlogged wood, remaining subsample now dry, collapsed, and very fragmented; *Alnus/Corylus* sp., probably a mixture of roundwood (100%) (1999)
- HAR-1222 waterlogged wood, remaining subsample now dry, collapsed, and very fragmented, and too degraded to identify (1999)
- HAR-3387 waterlogged wood, remaining subsample now dry; *Betula* sp. (100%), (1999)

SOMERSET LEVELS: WALTON HEATH, JONE'S TRACK

- HAR-3078 waterlogged wood, remaining subsample now dry and collapsed; *Betula* sp., 102.4g (65.8%); *Fraxinus* sp., 53.3g (34.2%); both consisting of roundwood of various diameters; unidentified, 40.4g (1999)
- HAR-3386 waterlogged wood, remaining subsample now dry and collapsed; narrow roundwood but too degraded to identify (1999)

SOMERSET LEVELS: WALTON HEATH, WALTON MEARE

- HAR-1220 waterlogged wood, remaining subsample identified; *Corylus* sp., damp roundwood diameter 40mm, 272.2g (96.6%); roundwood, probably *Alnus* sp., but now dry and collapsed and too degraded to identify positively, 9.7g (3.4%); unidentified, 1.7g (1999)

SOMERSET LEVELS: WESTHAY LEVEL, BAKER PLATFORM

- HAR-2846 waterlogged wood, remaining damp subsample consist of several pieces of roundwood with diameters up to 30mm; *Corylus* sp. (100%) (1999)

SOUTHAMPTON: HAMWIIH

- HAR-328 wood, remaining subsample identified; *Quercus* sp., probably heartwood (100%) (1998)
- HAR-570 waterlogged wood, remaining subsample now dried and mostly too degraded to identify; unidentified bark, 14.73g (56.74%); *Alnus* sp., 10.08g (38.83%); *Quercus* sp., 1.15g (4.43%); unidentified, 177.66g (1999)
- HAR-572 waterlogged wood, charcoal, and bone. Wood, remaining subsample now dry and collapsed; *Corylus* sp., roundwood, diameter up to *c* 20mm; 182.54g (93.9%); unidentified bark from much wider trunk/branch, 10.61g (5.5%). Charcoal, remaining subsample identified as *Corylus* sp., 1.15g (0.6%); unidentified, 110.31g. Bone, remaining subsample appeared to consist of fragments from long bones, 53.22g (1999)
- HAR-573 wood, remaining subsample previously waterlogged but now dry and structurally collapsed. Sample consists of six large bundles of twigs, roundwood, fragments from wide diameter roundwood and bark, mostly very fragmented and degraded. Representative fragments examined from each bundle: *Quercus* sp., *Alnus* sp., *Fraxinus* sp., *Salix/Populus* sp. (1999)
- HAR-728 waterlogged wood and charcoal. Wood, remaining subsample now dry and collapsed; *Quercus* sp., 6.16g (99.4%). Charcoal, *Alnus* sp., 0.04g (0.6%); unidentified, 48.85g (1999)
- HAR-1164 charcoal, remaining subsample identified; *Quercus* sp., heartwood and unknown maturity, 5.31g (70.3%); *Quercus* sp., sapwood, 2.08g (27.6%); *Corylus* sp., 0.16g (2.1%); unidentified, 186.22g (1999)
- HAR-1165 charcoal, remaining subsample identified; *Fraxinus* sp., 1.34g (100%); unidentified, 2.21g (1999)
- HAR-1166 charcoal, remaining subsample consists of thin slivers; *Quercus* sp., heartwood and unknown maturity, 3.62g (59.05%); *Quercus* sp., sapwood, 2.51g (40.95%); unidentified, 121.27g (1999)

- HAR-1167 wood, remaining subsample identified; *Quercus* sp., heartwood, probably from widish roundwood or trunk (100%) (1998)
- HAR-1853 charcoal, remaining subsample identified; *Quercus* sp., heartwood, slow-grown, 1.25g (78.6%); *Corylus* sp., 0.20g (12.6%); *Fraxinus* sp., 0.14g (8.8%), unidentified, 37.22g (1998)
- SOUTHAMPTON: UPPER BUGLE STREET**
- HAR-2090 charcoal, remaining subsample comminuted and friable; *Quercus* sp., 14.23g (100%); unidentified, 25.23g (1999)
- STAMFORD: CASTLE**
- HAR-2275 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 1.96g (100%); unidentified, 7.52g (1999)
- TARRABY**
- HAR-2024 waterlogged wood, remaining subsample now dry and collapsed and consisting of numerous slivers; *Quercus* sp., 26.94g (100%); unidentified, 34.86g (1999)
- TEWKSBURY: HOLME CASTLE, WINDMILL HILL**
- HAR-1192 charcoal, remaining subsample very clean and probably residue from radiocarbon; Pomoideae, 1.68g (55.6%); *Acer* sp., 1.29g (42.7%); *Prunus* sp., 0.05g (1.7%); unidentified, 4.06g. A further subsample was also examined but consisted mostly of lumps of soil with few fragments of charcoal and probably was not used for radiocarbon; Pomoideae, 1.48g (65.2%); *Acer* sp., 0.64g (28.2%); *Prunus* sp., 0.15g (6.6%); unidentified, 395.5g (1997)
- THIRLINGS: EWART**
- HAR-845 charcoal, remaining subsample identified; *Fraxinus* sp., sapwood, 2.29g (100%); unidentified, 4.56g (1999)
- UPPER TEESDALE: SIMY FOLDS BOG**
- HAR-3791 waterlogged wood, remaining subsample of small slivers now dried and collapsed; *Alnus/Betula* sp., 13.01g (98.26%); *Alnus* sp., 0.14g (1.06%); *Betula* sp., 0.09g (0.68%); unidentified, 48.10g (1999)
- HAR-4076 waterlogged wood, remaining subsample now desiccated and structurally collapsed, mostly too degraded to identify; *Quercus* sp., 3.21g (95.5%); bark, 0.15g (4.5%); unidentified, 29.78g (2000)
- WEEKLEY**
- HAR-1725 charcoal, remaining subsample very comminuted; Pomoideae, 1.14g (52.78%); *Corylus* sp., 0.27g (12.5%); *Acer* sp., 0.44g (20.37%); *Prunus* sp., 0.14g (6.48%); *Quercus* sp., heartwood, 0.14g (6.48%); *Quercus* sp., sapwood, 0.03g (1.38%); unidentified, 13.65g (1999)
- WENSLEYDALE, OLD GAYLE LANE**
- HAR-3748 charcoal and waterlogged wood, remaining subsample identified; dried and collapsed wood - probably *Corylus/Alnus* sp., 4.12g (87.6%); charcoal - *Corylus/Alnus* sp., 0.39g (8.3%); *Prunus* spp., 0.07g (1.5%); *Salix/Populus* sp., 0.07g (1.5%); *Corylus* sp., 0.05g (1.1%); unidentified, 39.66g (1998)
- WILMINGTON: GRAVEL PIT**
- HAR-1226 waterlogged material, bark and charcoal, remaining subsample now dry and in an extremely poor state of preservation and mostly too degraded to identify; bark, 0.35g (92.1%); charcoal, *Fraxinus* sp., 0.03g (7.9%); unidentified, 8.15g (1999)

WINKLEBURY

- HAR-1764 charcoal, remaining subsample very comminuted and degraded and slightly vitrified; *Quercus* sp., 2.86g (100%); unidentified, 13.6g (1999)
- HAR-1765 charcoal, remaining subsample identified; *Prunus* spp., 0.4g (81.6%); *Acer* sp., 0.05g (10.2%); *Quercus* sp., heartwood, 0.04 (8.2%); unidentified, 1.64g (1999)
- HAR-1778 charcoal, remaining subsample comminuted and friable, mostly too small to identify; Pomoideae, 0.22g (34.4%); *Prunus spinosa*, 0.20g (31.2%); *Quercus* sp., 0.11g (17.2%); Salicaceae, 0.10g (15.6%); *Fraxinus* sp., 0.01g (1.6%); unidentified, 3.96g (1999)
- HAR-1794 charcoal, remaining subsample comminuted and sparse; *Quercus* sp., 0.2g (80%); ?*Prunus spinosa*, 0.05g (20%); unidentified, 1.47g (1999)

YORK: MINSTER

- HAR-551 wood, remaining subsample consisted of a large quantity of wood fragments, extremely hard and structurally collapsed, *Quercus* sp., heartwood and sapwood (100%) (1998)
- HAR-2105 charcoal, remaining subsample identified; *Pinus sylvestris*, 48.8g (100%) (1998)
- HAR-2111 charcoal, remaining subsample identified; *Quercus* sp., heartwood including some very slow-grown wood, 13.4g (100%) (Rowena Gale 1998)
- HAR-2113 charcoal, *Quercus* sp., heartwood, 9.55g (98.7%); *Quercus* sp., sapwood, 0.13g (1.3%); unidentified, 11.47g (1998)
- HAR-2114 charcoal, remaining powdery subsample identified; *Calluna/Erica* sp., 0.29g (30.5%); *Hedera* sp., 0.22g (23.2%); *Acer* sp., 0.2g (21.0%); *Alnus* sp., 0.09g (9.5%); *Corylus* sp., 0.08g (8.4%); *Quercus* sp., sapwood, 0.05g (5.3%); *Salix/Populus* sp., 0.02g (2.1%); unidentified, 14.02g (1998)
- HAR-2118 charcoal, remaining subsample friable; *Pinus* sp., *sylvestris* group, which includes Scots pine, 4.33g (100%); unidentified, 7.75g (1998)
- HAR-2122 charcoal, remaining subsample friable; *Quercus* sp., probably mostly heartwood, 2.1g (93.75%); *Corylus* sp., 0.14g (6.25%); unidentified, 8.91g (1998)
- HAR-2235 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 12.46g (99.1%); *Quercus* sp., sapwood, 0.11g, (0.9%); unidentified, 18.78g (1998)
- HAR-2236 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 10.35g (100%); unidentified, 52.95g (1998)
- HAR-2237 charcoal, remaining subsample identified; *Quercus* sp., heartwood, 2.98g (96.4%); *Quercus* sp., sapwood, 0.11g (3.6%); unidentified, 15.02g (1998)

YORK: 58-9 SKELDERGATE, BISHOPHILL 1

- HAR-1728 wood, remaining subsample identified; *Quercus* sp., heartwood (100%), (1998)
- HAR-1729 wood, remaining subsample identified; *Quercus* sp., heartwood (100%), (1998)

Rowena Gale,
Bachefield House,
Kimbolton, Leominster,
Herefordshire, HR6 0EP

Abingdon Pigotts: Downhall Gatehouse, Cambridgeshire

Location: TL 304437
Lat. 52.04.33 N; Long. 00.05.49 W

Project manager: D Sherlock (English Heritage), 1986

Archival body: Cambridgeshire County Council

Description: the sample was taken from the gateway's west gable oak tiebeam, which was removed *c* 1980 when a new tiebeam was inserted.

Objectives: to confirm or otherwise the late medieval dating for the gatehouse.

Final comment: D Sherlock (27 April 1995), the radiocarbon dates from this site were too imprecise to be helpful. Scholars will need more radiocarbon dates from Bedfordshire and adjoining counties before meaningful dating of the development of carpentry can be obtained. Dendrochronology would seem to be more promising than radiocarbon dating.

Laboratory comment: AERE Harwell (1987), the three results are from the same beam. The mean result of all three results is 735 ±20 BP, which calibrates to cal AD 1260–1280 at 68% confidence, and cal AD 1250–1290 at 95% confidence (Stuiver and Pearson 1986).

References: Stuiver and Pearson 1986

HAR-8256 700 ±40 BP

$\delta^{13}\text{C}$: -25.4‰

Sample: AP86-1, submitted in September 1986 by D Sherlock

Material: wood: *Quercus* sp., heartwood (D Haddon-Reece 1986)

Initial comment: from a west gable tiebeam from a late medieval gatehouse. The beam was taken down *c* 1980 when a new tiebeam was inserted.

Objectives: to confirm an expected fourteenth/fifteenth century AD date.

Calibrated date: 1σ: cal AD 1270–1300
2σ: cal AD 1260–1390

Final comment: D Haddon-Reece (13 April 1987), the result should be further modified by allowing for the length of rings included in the sample, and for the missing sapwood. Firstly, the result gives a mean date for a series of about 14 rings whose median ring lies 29 rings in from the existing edge of the wood. The limits of the ranges should be brought forward by 30 years (29 rounded up), giving cal AD 1290–1310 for the 68% confidence limits and cal AD 1280–1320 for the 95% range (Stuiver and Pearson 1986). Directed by the radiocarbon dating, I have attempted to dendrochronologically date the sample, despite its shortage of rings (only 50 could be counted and measured). When confining the search to the range AD 1250–1350, no positive fits emerged, but when that constraint was relaxed, several master curves responded with matches at AD 1585 and AD 1591. Nonetheless, as both dates cannot be right, I think we must disregard them, in the absence of further evidence.

Final comment: A Bayliss (17 July 2007), the three results from this timber are statistically consistent ($T'=2.1$; $T'(5\%)=6.0$; $\nu=2$; Ward and Wilson 1978). Their weighted mean, 735 ±20 BP, can be offset by 29 years to provide an estimate for the last dated ring in the tree-ring sequence, and then by the probability distribution for the number of missing sapwood rings in English oak described by Bayliss and Tyers (2004, table 1). This suggests that the gable tiebeam was felled after *cal AD 1295–1355 (95% probability)*, or *cal AD 1310–1340 (68% probability)*.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

Laboratory comment: English Heritage (29 July 2009), this sample was originally submitted as HAR-8179.

References: Bayliss and Tyers 2004
Hardiman *et al* 1992, 53
Stuiver and Pearson 1986
Walker *et al* 1990, 193
Ward and Wilson 1978

HAR-8505 730 ±30 BP

$\delta^{13}\text{C}$: -25.1‰

Sample: AP86-2, submitted in September 1986 by D Sherlock

Material: wood: *Quercus* sp., heartwood (D Haddon-Reece 1986)

Initial comment: from a west gable tiebeam from a late medieval gatehouse.

Objectives: a replicate sample to compare with HAR-8256.

Calibrated date: 1σ: cal AD 1260–1290
2σ: cal AD 1250–1300

Final comment: see HAR-8256

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Walker *et al* 1991a, 95

HAR-8506 780 ±40 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: AP86-3, submitted in September 1986 by D Sherlock

Material: wood: *Quercus* sp., heartwood (D Haddon-Reece 1986)

Initial comment: from a west gable tiebeam of a late medieval gatehouse.

Objectives: a replicate sample to compare with HAR-8256 and HAR-8505.

Calibrated date: 1σ: cal AD 1210–1280
2σ: cal AD 1180–1290

Final comment: see HAR-8256

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Walker *et al* 1991a, 95

Alcester: Coulter's Garage, Warwickshire

Location: SP 090575
Lat. 52.12.52 N; Long. 01.52.11 W

Project manager: J Greig (University of Birmingham), 1979

Archival body: Warwickshire Museum

Description: part of the defences of the Roman town, excavated in advance of the building of a supermarket.

Objectives: to provide dating information for this site.

References: Booth 1989
Booth and Evans 2001
Cracknell 1996

HAR-4905 2410 ±110 BP

Sample: ACG-7, submitted in May 1980 by J R A Greig

Material: wood (waterlogged; remaining subsample now dried and collapsed): bark, large unidentified plates (11.16g, 91.7%); unidentified (5.08g); wood fragments, too degraded to identify (1.01g, 8.3%) (R Gale 1999)

Initial comment: zone CG1, site Period I; from the base of a deposit associated with a Roman site, which has no artefactual evidence for dating the peat. A pollen diagram has been prepared from the profile, and plant macrofossils and insect remains studied from this layer (layer 7).

Objectives: to provide a date for layer 7.

Calibrated date: 1 σ : 770–390 cal BC
2 σ : 810–200 cal BC

Final comment: J Greig (7 October 2004), the date places the start of an organic sequence at Alcester in the Iron Age, 810–200 cal BC, the earliest date from this group of sites. Another channel fill from there was also dated to the Iron Age (Greig 1994). These show that the Roman town was set in a landscape of old river channels, which may have provided defence, and which was more wooded than later. The sequence may go on up to the medieval period. There are some other partly dated sequences from Alcester, mainly with Roman dates. Such environmental sequences are very rare in Warwickshire (and other parts of the Midlands). They provide information on the development of the occupied landscape alongside a developing town, with some dates, that is not available from elsewhere. Cracknell (1996, 36–41) discusses the relationship of these marshy areas to archaeological evidence of the development of Roman Alcester.

Laboratory comment: English Heritage (2004), this result is only provisional. No final certificate has been located.

References: Cracknell 1996
Greig 1994

Alcester: site AL18, Warwickshire

Location: SP 091574
Lat. 52.12.52 N; Long. 01.52.00 W

Project manager: S Cracknell (Warwickshire Museum), 1986

Archival body: Warwickshire Museum

Description: site AL18 is the examination of the town defences of Alcester, primarily around the Gateway supermarket development site.

Objectives: radiocarbon dates were obtained from four samples of wood piling, two samples from the wall and two samples from the tower foundations. Due to this series of samples failing to date by dendrochronology, radiocarbon dating was used instead.

Final comment: C Groves (5 December 1994), the two samples of *Quercus* sp., HAR-8522 and HAR-8523, were stratigraphically slightly earlier in date than the two samples of *Alnus* sp., HAR-8524 and HAR-8525. This is not, however, apparent from the results. The results do show that the samples may be from late Roman contexts, as suggested by the other archaeological evidence.

Final comment: A Bayliss (17 July 2007), incorporating the relative felling dates of the timbers known from tree-ring analysis, with the stratigraphic sequence of these samples (on the assumption that green timber was used in construction), we can suggest that structure 628 was built in cal AD 260–400 (95% probability), probably in cal AD 265–310 (34% probability) or cal AD 335–370 (33% probability) or cal AD 375–385 (1% probability). The same analysis suggests that structure 861 was constructed in cal AD 275–325 (18% probability) or cal AD 330–435 (77% probability), probably in cal AD 340–415 (68% probability). These samples remain undated by dendrochronology (in 2009).

References: Booth 1989
Booth and Evans 2001
Groves 1987
Walker *et al* 1991a, 98–9

HAR-8522 1730 ±40 BP

$\delta^{13}C$: -29.1‰

Sample: 628A, submitted on 25 March 1987 by J Hillam

Material: wood (waterlogged): *Quercus* sp., roundwood (J Hillam 1987)

Initial comment: from context 628, found in the foundation trench of the mid fourth-century town wall. This sample is 55 years old, and was felled in year 55; the outer 20 rings were dated. It was felled at the same time as HAR-8523.

Objectives: this series of samples failed to date by dendrochronology therefore radiocarbon dating is required.

Calibrated date: 1 σ : cal AD 240–390
2 σ : cal AD 220–420

Final comment: C Groves (5 December 1994), HAR-8522 and HAR-8523 have not been absolutely dated by dendrochronology but were thought to date to the mid fourth century AD. The results show that the timber is from a period for which there is relatively little dendrochronological data.

Final comment: A Bayliss (17 July 2007), the two results from the outer 20 rings of separate timbers that are known to have been felled in the same year through tree-ring analysis (Groves 1987) are statistically consistent ($T'=0.3$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). The best estimate

of their felling date is therefore provided by the calibration of the weighted mean of these measurements, 1715 ±28 BP, offset by 10 years as the centre-points of the dated samples are 10 years earlier than the felling of the timbers. This analysis suggests that the timbers may have been felled in *cal AD 250–400 (95% probability)*, or *cal AD 255–295 (24% probability)* or *cal AD 320–385 (44% probability)*.

Laboratory comment: AERE Harwell (1988), this sample was processed using the larger sample, higher precision liquid scintillation system.

HAR-8523 1700 ±40 BP

$\delta^{13}\text{C}$: -27.5‰

Sample: 628C, submitted on 25 March 1987 by J Hillam

Material: wood (waterlogged): *Quercus* sp., roundwood (J Hillam 1987)

Initial comment: from context 628, a 45-year-old stem felled in year 45. The outer 20 rings were dated. This sample is contemporary with HAR-8522.

Objectives: as HAR-8522

Calibrated date: 1 σ : cal AD 250–410
2 σ : cal AD 240–430

Final comment: see HAR-8522

Laboratory comment: AERE Harwell (1988), this sample was processed using the larger sample, higher precision liquid scintillation system.

HAR-8524 1680 ±70 BP

$\delta^{13}\text{C}$: -30.8‰

Sample: 861J, submitted on 25 March 1987 by J Hillam

Material: wood (waterlogged): *Alnus glutinosa*, roundwood (J Hillam 1987)

Initial comment: from context 861, found in the foundation trench for the bastion, which was added to the town wall in the late fourth century. The sample is 41 years old and was felled in year 41. The sample was felled at the same time as HAR-8525.

Objectives: as HAR-8522

Calibrated date: 1 σ : cal AD 250–430
2 σ : cal AD 210–550

Final comment: C Groves (5 December 1994), HAR-8524 and HAR-8525 are *Alnus glutinosa* and therefore cannot be dated using current dendrochronological techniques.

Final comment: A Bayliss (17 July 2007), the two results from separate timbers that known to have been felled in the same year through tree-ring analysis (Groves 1987) are statistically consistent ($T'=0.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). The best estimate of their felling date is therefore provided by the calibration of the weighted mean of these measurements, 1703 ±35 BP, offset by 19.5 years as the centre-points of the dated samples are 19.5 years earlier than the felling of the timbers. This analysis suggests that the timbers may have been felled in *cal AD 250–415 (95% probability)*, or *cal AD 255–285 (15% probability)* or *cal AD 320–395 (53% probability)*.

Laboratory comment: AERE Harwell (1988), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Hardiman *et al* 1992, 58

HAR-8525 1710 ±40 BP

$\delta^{13}\text{C}$: -30.8‰

Sample: 861G, submitted on 25 March 1987 by J Hillam

Material: wood (waterlogged): *Alnus glutinosa*, roundwood (J Hillam 1987)

Initial comment: from context 861, the sample was 37 years old and was felled at the same time as HAR-8524.

Objectives: as HAR-8522

Calibrated date: 1 σ : cal AD 250–400
2 σ : cal AD 230–430

Final comment: see HAR-8524

Laboratory comment: AERE Harwell (1988), this sample was processed using the larger sample, higher precision liquid scintillation system.

Amberley Wild Brooks, West Sussex

Location: TQ 03701450
Lat. 50.55.12 N; Long. 00.31.28 W

Project manager: K E Barber (University of Southampton), 1980

Archival body: University of Southampton

Description: derelict raised bog (2.5m in depth) overlying estuarine clays (1.5m in depth), 1km north of South Downs chalk escarpment. The deposit has an area of about 1km².

Objectives: to determine the development and composition of the middle post-glacial primary forest and the nature of its clearance.

References: Waton 1982
Waton 1983

HAR-4234 1360 ±80 BP

$\delta^{13}\text{C}$: -28.5‰

Sample: AWB-1/1, submitted on 28 January 1981 by P V Waton

Material: peat

Initial comment: from a depth of 0.92m–1.02m from a level of *Fagus* rise.

Objectives: to confirm expected date of AD 500–600. In 1963 a sample from c1.5m deeper produced radiocarbon result Q-690 (2620 ±110 BP; 1010–400 cal BC at 95% confidence) (Reimer *et al* 2004).

Calibrated date: 1 σ : cal AD 610–770
2 σ : cal AD 540–860

Final comment: P V Waton (1982), the dated horizon shows evidence for renewed clearance marked by increasing herbs, grasses, and a continuous curve for cereal pollen. Beech

pollen is also represented by a continuous curve for the first time. The increase in *Fagus* perhaps reflects the fact that only the scarp foot zone was being utilised and not the clays and sands of the Weald.

References: Reimer *et al* 2004

Amble: Low Hauxley, Northumberland

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

Project manager: R Tipping (University of Edinburgh),
1986

Archival body: Edinburgh University

Description: fine detrital lacustrine mud from a *c* 0.6m thick organic sequence overlying freshwater silts was exposed in a sea-cliff, *c* 70m north of a multicomponent (Mesolithic, Bronze Age) archaeological site near Low Hauxley. The sediment sequence was approximately 270m south of Low Hauxley (Innes and Frank 1988; Bonsall 1984).

A Bronze Age cairn overlying a much earlier midden deposit containing Mesolithic artefacts which has been exposed by the erosion of the sand cliff, was seen with a laterally extensive deposit of peat to the north; the peat deposit extends for approximately 500m.

Objectives: to provide a chronological framework for the pollen diagram, date key stratigraphic horizons, and allow the calculation of pollen influx values.

Final comment: R Tipping (1992), this series relates to a detailed pollen profile of the sediments. With one exception, the series agrees in age with the pollen spectra, post-elm decline, and with two radiocarbon dates from closely comparable sediment and pollen stratigraphy at Low Hauxley (Innes and Frank 1988).

References: Bonsall 1984
Frank 1982
Hardiman *et al* 1992, 65–6
Innes and Frank 1988

HAR-8973 2330 ±60 BP

$\delta^{13}C$: -30.3‰

Sample: LHB5, submitted in February 1987 by R Tipping

Material: peat (amorphous with occasional roots, possibly contemporaneous)

Initial comment: the sediment lies at the top of the peat profile exposed in a low cliff-face *c* 70m north of the archaeological site (Bonsall 1984; sect. 5). The peat accumulation is likely, on soil-stratigraphical relationships and radiocarbon dating of comparable deposits in the area (Frank 1982; sect. 5), to be contemporaneous with the Bronze Age activity recorded at the archaeological site.

Objectives: this sample dates the top of the organic sequence and encroachment of dune-sand accumulation, which must have signalled the abandonment of agricultural activity in the area.

Calibrated date: 1 σ : 410–380 cal BC
2 σ : 710–210 cal BC

Final comment: R Tipping (1992), the beginning of a phase of lowered pond level is dated by HAR-8976, and the resumption of raised water levels by HAR-8975; a small oscillation in sea level in inducing this change is suspected, but is difficult to demonstrate. A reduction in willow around the pond is dated to *c* 3280 BC (HAR-8974), suggesting an increase in agricultural activity. The covering of the pond by an advancing sand sheet is dated by HAR-8973; the comparable date at Low Hauxley is 2810 ±40 BP (SRR-1420; 1010–910 cal BC at 68% confidence; 1070–850 cal BC at 95% confidence; Pearson and Stuiver 1986).

References: Bonsall 1984
Frank 1982
Pearson and Stuiver 1986

HAR-8974 3280 ±60 BP

$\delta^{13}C$: -29.4‰

Sample: LHB4, submitted in February 1987 by R Tipping

Material: peat (amorphous with occasional roots, possibly not contemporaneous)

Initial comment: the sediment lies in the middle of the peat profile.

Objectives: this sample dates the pollen zone boundary 2/3 and the decline in willow, either through local anthropogenic activity or water table fluctuations, which had an effect on agricultural activity.

Calibrated date: 1 σ : 1630–1490 cal BC
2 σ : 1740–1430 cal BC

Final comment: see HAR-8973

HAR-8975 3360 ±70 BP

$\delta^{13}C$: -29.4‰

Sample: LHB3, submitted in February 1987 by R Tipping

Material: peat (amorphous with occasional roots, possibly not contemporaneous)

Initial comment: the sediment lies in middle of the peat profile.

Objectives: this sample dates the end of the phase of lowered water level of possible regional climatic significance, and the first appearance of sand in sediment column, which had an effect on agricultural activity.

Calibrated date: 1 σ : 1750–1530 cal BC
2 σ : 1880–1490 cal BC

Final comment: see HAR-8973

HAR-8976 4700 ±70 BP

$\delta^{13}C$: -29.5‰

Sample: LHB2, submitted in February 1987 by R Tipping

Material: peat (amorphous with occasional roots, possibly not contemporaneous)

Initial comment: the sediment lies near the base of the peat profile. This sample is particularly closely related to anthropogenic activity in the area.

Objectives: this sample dates the beginning of the phase of lowered water level of possible regional climatic significance, and also brackets the commencement of pastoral agricultural activity in the region.

Calibrated date: 1 σ : 3640–3370 cal BC
2 σ : 3650–3350 cal BC

Final comment: R Tipping (1992), HAR-8977 dates the change from fluvial sedimentation to ponding, tentatively related to a small rise in sea level. The date is significantly younger at 95% confidence than overlying HAR-8976. Internal evidence does not support this ‘date reversal’, but peat developed at Low Hauxley (Innes and Frank 1988) at 4720 \pm 50 BP (SRR-1421; 3630–3370 cal BC at 68% confidence; 3640–3360 cal BC at 95% confidence; Pearson *et al* 1986); whether this implies HAR-8977 to be ‘too young’ is unclear.

References: Innes and Frank 1988
Pearson *et al* 1986

HAR-8977 4280 \pm 100 BP

$\delta^{13}\text{C}$: -30.6‰

Sample: LHB1, submitted in February 1987 by R Tipping

Material: peat (amorphous with occasional roots, possibly not contemporaneous)

Initial comment: the sediment lies at base of the peat profile overlying freshwater silts.

Objectives: this sample dates the change from fluvial conditions to valley bog development and possible climatic deterioration; a date here would also allow the calculation of pollen influx values through the peat.

Calibrated date: 1 σ : 3020–2770 cal BC
2 σ : 3320–2580 cal BC

Final comment: see HAR-8976

Amesbury: New Barn Down, Wiltshire

Location: SU 17834237
Lat. 51.10.47 N; Long. 01.44.42 W

Project manager: P Ashbee (Archaeology Centre of East Anglian Studies, University of East Anglia), July to September 1956

Archival body: Salisbury and South Wiltshire Museum

Description: four barrows on New Barn Down were selected for excavation because of sustained plough damage (Amesbury 58, 61a, 61, and 72).

Objectives: to provide absolute dating for the construction and use of a bell barrow (Amesbury 58), a bowl barrow (Amesbury 61), and a saucer barrow (Amesbury 72), and the associated Beaker and Wessex cultures.

Laboratory comment: English Heritage (2003), HAR-1237 was published in the first volume of *Radiocarbon Dates* (Jordan *et al* 1994, 5). See also Milton Hill Farm, Milton Lilbourne, Wiltshire.

References: Ashbee 1978
Ashbee 1979–80
Ashbee 1984
Ashbee 1992
Jordan *et al* 1994
Piggott 1973a
Piggott 1973b

HAR-6225 3550 \pm 80 BP

$\delta^{13}\text{C}$: -24.5‰

Sample: PIT2AM61 or NBB3(A), submitted on 15 August 1984 by P Ashbee

Material: charcoal: *Fraxinus* sp.

Initial comment: from Barrow 61. Charcoal fragments were mingled with adult cremated bone fragments housed in an oval pit dug into the ancient soil beneath the barrow at the northern interior edge of the sub-mound stake circle.

Objectives: it has been an implicit assumption that the charcoal, mingled with cremated bone, is from the funerary fire. Statistically it should be inseparable from the other proposed date, HAR-6227. The barrow is associated with Beaker sherds dating to c 2000 BC. The barrow is part of the Stonehenge surround.

Calibrated date: 1 σ : 2020–1760 cal BC
2 σ : 2140–1680 cal BC

Final comment: P Ashbee (1985), the two dates for Barrow 61 (HAR-6225 and HAR-6227) are significantly different from the solitary one from Barrow 58 (HAR-6226), but clearly extended argument cannot be based on them. Nonetheless, they illustrate the general premise regarding the priorities of the region (Piggott 1973a, 354). Barrow 61, of Beaker affinity, a simple bowl-shaped mound, covering cremation and inhumation graves, preceded Barrow 58, a bell-barrow, a large mound with a berm separating it from its surrounding ditch, built over a dagger-furnished cremation grave. In addition, they conform to the emergent pattern available for the Beaker and Wessex Culture phases of the region.

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: Ancient Monuments Laboratory (1985), the statistical test reported by Ward and Wilson (1978) shows no significant difference between the dates from Barrow 61 (HAR-6225 and HAR-6227). In other words, there is no evidence that these dates are not simply replicate determinations of the same chronological event. They can therefore be combined by extending the same statistical procedure, as 3540 \pm 60 BP, which calibrates to 1970–1770 cal BC at 68% confidence, and 2100–1740 cal BC at 95% confidence (Clark 1975).

References: Ashbee 1979–80, 32
Clark 1975
Otlet *et al* 1983
Ward and Wilson 1978

HAR-6226 3310 \pm 80 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: COREARM58 or B139(C), submitted on 15 August 1984 by P Ashbee

Material: charcoal: *Acer* sp., fragments

Initial comment: from Barrow 58. The sample consists of charcoal fragments incorporated into the loam core of a bell barrow.

Objectives: to date the bell barrow, one of a principal cemetery. The wood ash from the burial was considered unsuitable for radiocarbon dating. The barrow is a part of the Stonehenge surround. The charcoal is thought to have been incorporated during the building of the barrow and is associated with a burial with dagger dating to *c* 1850 BC.

Calibrated date: 1 σ : 1690–1490 cal BC
2 σ : 1780–1420 cal BC

Final comment: see HAR-6225

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: Ancient Monuments Laboratory (1985), by applying the statistical test reported by Ward and Wilson (1978) to compare the two barrows, a real difference emerges, and any suggestion that they are contemporaneous may be rejected.

References: Otlet *et al* 1983
Ward and Wilson 1978

HAR-6227 3520 \pm 100 BP

$\delta^{13}C$: -24.6‰

Sample: 26B3AM61 or B426(B), submitted on 15 August 1984 by P Ashbee

Material: charcoal: *Fraxinus* sp.

Initial comment: from Barrow 61; from a massive comminuted spread of charcoal beneath the mound and upon the surface of the ancient soil. Patches of charcoal were also peripheral to the stake circle.

Objectives: to date a bowl barrow which was one of a principal linear cemetery, containing bell, disc, and triple barrows, at no great distance from Stonehenge. The bowl barrow is associated with Beaker sherds dating to *c* 2000 BC.

Calibrated date: 1 σ : 2010–1690 cal BC
2 σ : 2140–1610 cal BC

Final comment: see HAR-6225

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Anslow's Cottages, Berkshire

Location: SU 693710
Lat. 51.26.00 N; Long. 01.00.11 W

Project manager: S Lobb (Wessex Archaeology), 1985–6

Archival body: Reading Museum

Description: a later Bronze Age settlement adjacent to an old river channel, within which were revealed several timber structures. The site lies on the floodplain of the river Kennet

about 150m from the present course of the river, although the excavated river channel joins an abandoned loop of the river only 40m to the east. The site was excavated prior to sand and gravel extraction.

Objectives: to establish a chronology for the site.

Final comment: J Gardiner (18 October 1993), the samples sent for dating were all from wood taken from a series of waterfront and river channel structures associated with a former channel of the River Kennet. A series of structures were apparent on excavation but there was no means of dating them. Dates confirm waterside activity contemporary with nearby Bronze Age settlement and elucidate a lengthy sequence of revetment and water channel management during the Saxon period culminating in the construction of possible fish weir and the presence of a wicker fish trap.

References: Butterworth and Lobb 1992

HAR-9179 1670 \pm 60 BP

$\delta^{13}C$: -29.7‰

Sample: W100 T26, submitted in August 1987 by S J Lobb

Material: wood (waterlogged)

Initial comment: from a stake with five facets and a pencil point; part of a timber setting within a round depression in the gravel, interpreted as a possible trap. All the timbers were angled towards the adjacent bank, which may be the northern edge of the river channel. This is probably one of the earliest features in this area of the river channel.

Objectives: to establish whether this activity is contemporary with the adjacent Bronze Age settlement.

Calibrated date: 1 σ : cal AD 260–430
2 σ : cal AD 230–540

Final comment: J Gardiner (18 October 1993), this timber was unstratified in the base of the river channel close to the known Bronze Age settlement and possible trackway. The date proves it does not relate to prehistoric activity but to be part of a mid-Saxon phase of river channel revetment and activity.

HAR-9180 930 \pm 60 BP

$\delta^{13}C$: -31.0‰

Sample: W100 T358, submitted in August 1987 by S J Lobb

Material: wood (waterlogged)

Initial comment: from a stake with a pencil point; part of a row of stakes running along the northern edge of the small gully within the river channel.

Objectives: this timber comes from a stratigraphically later phase than T345 (HAR-9181), but earlier than T77 (HAR-9184). If the dates produced by HAR-9184 and HAR-9186 are vastly different from the dates produced by the other samples then this sample will provide an essential refinement to the chronology.

Calibrated date: 1 σ : cal AD 1020–1180
2 σ : cal AD 990–1230

Final comment: J Gardiner (18 October 1993), this sample came from a stake-and-plank setting placed across the late Saxon river channel, which also contained the remains

of a wicker fish trap with a closely associated date (OxA-2126; 1060 ±80 BP; cal AD 880–1020 at 68% confidence, cal AD 1770–1160 cal AD at 95% confidence; Stuiver and Pearson 1986). Presumably it is associated with channel or fishery management.

References: Stuiver and Pearson 1986

HAR-9181 1030 ±60 BP

$\delta^{13}C$: -29.8‰

Sample: W100 T345, submitted in August 1987 by S J Lobb

Material: wood (remaining subsample of a few slivers of dry wood from previously waterlogged wood with very collapsed tissues identified) (R Gale 1997)

Initial comment: from a plank shaped on four sides and with a pencil point; from a timber setting including a horizontal plank with holes carved out to take vertical timbers, interpreted as a possible sluice gate for water control.

Objectives: to establish the date of this structure within the phasing of the site.

Calibrated date: 1 σ : cal AD 970–1040
2 σ : cal AD 880–1160

Final comment: J Gardiner (18 October 1993), this sample came from the same plank and stake setting as HAR-9180 with a closely comparable date. It confirms a Saxon date for river channel management.

HAR-9182 1370 ±60 BP

$\delta^{13}C$: -32.3‰

Sample: W100 T366, submitted in August 1987 by S J Lobb

Material: wood (remaining subsample of a large quantity of dry wood from previously waterlogged wood and now structurally collapsed, compressed, and difficult to examine) (R Gale 1997)

Initial comment: from a stake with a pencil point; part of a cluster of upright stakes and posts within a small gully in the river channel. The interpretation and relationship of this group to the group further east from which timber T345 (HAR-9181) comes is uncertain. It is possible that this timber may date an earlier phase of water control than that represented by HAR-9181.

Objectives: to establish whether this structure is contemporary with the nearby structure (*see* HAR-9181) and also whether it is contemporary with the adjacent Bronze Age settlement.

Calibrated date: 1 σ : cal AD 630–680
2 σ : cal AD 570–780

Final comment: J Gardiner (18 October 1993), this date confirms both the suspected date of this phase of activity and the sequence of structures.

HAR-9183 1390 ±60 BP

$\delta^{13}C$: -32.0‰

Sample: W100 T139, submitted in August 1987 by S J Lobb

Material: wood (waterlogged)

Initial comment: from a stake with a pencil point; part of an oval timber setting in a shallow depression, possibly the remains of an animal or fish trap, within the river channel.

Objectives: to establish whether this structure is contemporary with the suggested landing stage (HAR-9185) and adjacent later Bronze Age settlement. This sample is probably later than HAR-9185.

Calibrated date: 1 σ : cal AD 600–670
2 σ : cal AD 550–770

Final comment: J Gardiner (18 October 1993), this result is statistically very close to HAR-9182 and confirms the date of this phase of activity.

HAR-9184 1300 ±60 BP

$\delta^{13}C$: -30.1‰

Sample: W100 T77, submitted in August 1987 by S J Lobb

Material: wood (waterlogged)

Initial comment: from a plank (*c.* 0.25m section) with a possible chisel point; from a flood deposit sealing many of the timber structures within the river channel, containing large quantities of haphazardly deposited timbers, branches, and brushwood.

Objectives: to date the abandonment and final collapse of the riverine structures prior to the twelfth century AD.

Calibrated date: 1 σ : cal AD 650–780
2 σ : cal AD 640–890

Final comment: J Gardiner (18 October 1993), this dates a loose piece of worked wood from a silty deposit sealing Romano-British levels. It is important for dating the silting within the channel and the first phases of Saxon waterfront structures.

HAR-9185 2570 ±70 BP

$\delta^{13}C$: -29.7‰

Sample: W100 T94, submitted in August 1987 by S J Lobb

Material: wood (waterlogged)

Initial comment: from a stake with a pencil point; part of a bank revetment at the southern edge of the river channel which is adjacent to, and associated with, the earliest phase of the Bronze Age settlement; interpreted as a possible landing stage for small boats.

Objectives: this date will provide a *terminus ante quem* for the adjacent settlement.

Calibrated date: 1 σ : 810–590 cal BC
2 σ : 840–420 cal BC

Final comment: J Gardiner (18 October 1993), this timber formed part of a double post alignment and provides the only means of dating the timber structure, which lies closest to known Bronze Age settlement activity. It dates the earliest known structure within the river channel.

HAR-9186 1030 ±70 BP

$\delta^{13}C$: -29.3‰

Sample: W100 T31, submitted in August 1987 by S J Lobb

Material: wood (waterlogged)

Initial comment: from a stake with three facets and a pencil point; an upright timber *in situ* on the southern side of a small gully within the river channel. This is possibly associated with the feature containing T345 (HAR-9181), but may be part of another structure, which would have been destroyed by a later medieval ditch.

Objectives: to establish the chronological relationship of this phase of activity with the other features within the river channel.

Calibrated date: 1 σ : cal AD 900–1040
2 σ : cal AD 880–1170

Final comment: J Gardiner (18 October 1993), this timber forms part of a late Saxon stake and timber structure, probably a fish weir or similar structure. The date is statistically significant in relation to HAR-9180 and HAR-9181 from the same structure. It dates the latest phase of Saxon water channel management and associated wicker fish trap.

Ardleigh, Essex

Location: TM 052277
Lat. 51.54.34 N; Long. 00.59.01 E

Project manager: J Hinchcliffe (Central Excavation Unit), 1980

Archival body: Colchester Museum

Description: a large Bronze Age cropmark complex on extensive gravel deposits, the main focus of which is the Deverel-Rimbury cemetery.

Objectives: to date major elements in the cropmark complex, to provide a context for the urnfield cemetery recorded by Erith (Erith and Longworth 1960), and to assess the effects of cultivation on archaeological deposits.

Laboratory comment: Ancient Monuments Laboratory (1995), one further date from this site, HAR-3908, has been published in first volume of *Radiocarbon Dates* (Jordan *et al* 1994, 6).

References: Brown 1999
Erith and Longworth 1960
Jordan *et al* 1994

HAR-5126 2870 \pm 80 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: 29-1939, submitted in August 1982 by J Hinchcliffe

Material: charcoal: *Quercus* sp. (N Balaam)

Initial comment: from the lower fill of enclosure ditch 1912.

Objectives: to confirm the attribution of the ditch, within the cropmark complex at Ardleigh, to the Bronze Age.

Calibrated date: 1 σ : 1200–920 cal BC
2 σ : 1310–830 cal BC

Final comment: N Brown (20 April 1995), the result confirms a Bronze Age date and conforms well with HAR-5128 from the same ditch.

References: Walker *et al* 1988, 336

HAR-5128 2940 \pm 70 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: 29-1937, submitted in August 1982 by J Hinchcliffe

Material: charcoal: *Quercus* sp. (N Balaam)

Initial comment: from the lower fill of ditch 1912.

Objectives: as HAR-5126

Calibrated date: 1 σ : 1270–1020 cal BC
2 σ : 1390–930 cal BC

Final comment: N Brown (20 April 1995), the results confirm a Bronze Age date and conform well with HAR-5126 from the same ditch.

References: Walker *et al* 1988, 337

HAR-5129 3050 \pm 70 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: 29-7542, submitted in August 1982 by J Hinchcliffe

Material: charcoal: *Crataegus* sp. (N Balaam)

Initial comment: from the southern ditch, 7503, in area 11: a ditch of a possible cursus. The ditch was up to 1.9m wide and 0.8m deep; V-profiled and with a broadly uniform fill sequence throughout its length. Sandy loam fills succeeded deep (up to 0.3m) clayey, sandy silt, primary fill.

Objectives: as HAR-5126

Calibrated date: 1 σ : 1420–1210 cal BC
2 σ : 1460–1110 cal BC

Final comment: N Brown (20 April 1995), the result confirms a Bronze Age date.

References: Walker *et al* 1988, 337

HAR-5743 3020 \pm 100 BP

$\delta^{13}\text{C}$: -28.9‰

Sample: 29-7245, submitted on 19 September 1983 by N Balaam

Material: charcoal: *Alnus glutinosa*, mature timbers (N Balaam)

Initial comment: from a Bronze Age cremation; cremation 7245 in area 7.

Objectives: to confirm a middle Bronze Age date for an unurned cremation burial within a cropmark ring ditch cemetery. It is of great importance to the understanding of the function of the site that the relationship of this enclosure to the cemetery site be tested by dating.

Calibrated date: 1 σ : 1420–1120 cal BC
2 σ : 1500–970 cal BC

Final comment: N Brown (20 April 1995), the date is in line with expectations and accords well with HAR-5744 and HAR-5745.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5744 2880 ±70 BP $\delta^{13}\text{C}$: -27.6‰

Sample: 29-7249, submitted on 19 September 1983 by N Balaam

Material: charcoal: *Alnus glutinosa*, mature timbers (N Balaam)

Initial comment: from a Bronze Age cremation; cremation 7249.

Objectives: as HAR-5743

Calibrated date: 1 σ : 1200–930 cal BC
2 σ : 1300–890 cal BC

Final comment: N Brown (20 April 1995), the date is in line with expectations and accords well with HAR-5743 and HAR-5745.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 303

HAR-5745 2810 ±120 BP $\delta^{13}\text{C}$: -25.6‰

Sample: 29-7270, submitted on 19 September 1983 by N Balaam

Material: charcoal: unidentified (N Balaam)

Initial comment: from a Bronze Age cremation; cremation 7210 within area 7.

Objectives: as HAR-5743

Calibrated date: 1 σ : 1130–820 cal BC
2 σ : 1380–780 cal BC

Final comment: N Brown (20 April 1995), the date is in line with expectations and accords well with HAR-5743 and HAR-5744.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Walker and Otlet 1988, 303

Asheldham Camp, Essex

Location: TL 972012
Lat. 51.40.28 N; Long. 00.51.08 E

Project manager: O Bedwin (Essex County Council), 1985

Archival body: Colchester Museum

Description: a univallate enclosure about 3.5ha in extent. It lies roughly in the centre of the Dengie peninsula, at c 20m OD. It is generally classified as a hillfort, although it is located in a plateau setting, rather than on a hill top.

Objectives: Asheldham Camp is a Scheduled Ancient Monument and, in 1984, was the subject of a Scheduled Monument Consent application, the intention being to

plough up the interior of the camp. As little was known about the camp, it was decided to carry out a limited archaeological investigation. This took the form of a detailed contour survey, followed by a number of trial trenches to assess the survival of archaeological deposits. With this information available, it was felt it would be easier to draw up a scheme for suitable future management of the site.

Final comment: O Bedwin (6 December 1994), all the dates were provided by samples taken from large, clean, assemblages of charred grain within a few metres of each other in the interior of the hill fort. The two middle Iron Age dates (HAR-6701 and HAR-6702) are sufficiently close for them to have derived from a single episode of burning, eg a granary burning down. The third date, HAR-6700, is a problem, since it does not match the other two, and is incompatible with the associated pottery.

References: Bedwin 1991
Walker and Otlet 1988, 315–6

HAR-6700 1980 ±80 BP $\delta^{13}\text{C}$: -24.4‰

Sample: AC8563, submitted in July 1985 by P Murphy

Material: grain (with charcoal): *Triticum* sp. (P Murphy)

Initial comment: from the lower fill of pit 62 in trench F.

Objectives: the sample is associated with probable Neolithic pottery. A date is required to confirm or refute this.

Calibrated date: 1 σ : 60 cal BC–cal AD 120
2 σ : 200 cal BC–cal AD 230

Final comment: O Bedwin (6 December 1994), this seems to have been a 'rogue' date, being considerably later than the large chunks of unabraded pottery found in this context.

HAR-6701 2190 ±70 BP $\delta^{13}\text{C}$: -24.8‰

Sample: AC8538, submitted in July 1985 by P Murphy

Material: grain (with some charcoal): *Triticum* sp., carbonised (P Murphy)

Initial comment: from the fill of context 37.

Objectives: the sample is associated with probable middle Iron Age pottery of a form not well dated (a pot with curvilinear decoration). Dating is required to help establish the time span of settlement at the site.

Calibrated date: 1 σ : 380–160 cal BC
2 σ : 400–40 cal BC

Final comment: O Bedwin (6 December 1994), this provided a good middle Iron Age date compatible with the assemblage of pottery from this context.

HAR-6702 2280 ±80 BP $\delta^{13}\text{C}$: -24.4‰

Sample: AC8534, submitted in July 1985 by P Murphy

Material: grain (with charcoal): *Triticum* sp., carbonised (P Murphy)

Initial comment: from the fill of pit 32.

Objectives: no pottery was recovered, only a single flint flake. Dating of this feature would help to establish the span of settlement at the site.

Calibrated date: 1 σ : 410–200 cal BC
2 σ : 520–160 cal BC

Final comment: O Bedwin (6 December 1994), a sound middle Iron Age date from a feature not otherwise dated. This helped to tie in the feature (a posthole) to a structure, interpreted as a granary, which probably burnt down during the middle Iron Age.

Avebury, Wiltshire

Location: SU 103699
Lat. 51.25.39 N; Long. 01.51.07 W

Project manager: M W Pitts (Avebury Museum), 1984–5

Archival body: National Trust

Description: a late Neolithic henge monument.

Objectives: between 1966 and 1971 G Wainwright directed a programme of rescue excavations for the Department of the Environment on an unusual and important class of late Neolithic enclosures. Discoveries at Durrington Walls, Marden, and Mount Pleasant indicated that these three sites should be linked to the better preserved complex at Avebury, and that the whole group could be seen as a manifestation of the far-reaching developments occurring in mid third millennium BC Wessex (Burleigh *et al* 1972). A crucial aspect of this work was the successful application of radiocarbon analysis to samples obtained from a range of contexts at the three sites explored. There were no radiocarbon dates however for Avebury. M Pitts, then curator of Avebury Museum, was asked to see if any material, suitable for dating, remained from the excavations at Avebury.

Final comment: M Pitts (23 May 1995), this is the first series of samples from the Avebury megalithic monuments to be dated. Given the age of most of the archaeological excavations (1914, 1934, and 1938) and the small number of samples, the exercise has been extremely rewarding. Stratigraphic indications of a two-phase henge earthwork are tentatively supported, and the whole appears to be slightly older than the other major Wessex henges. The suggestion that the great stone circle may be later than the earthwork is also new. Archaeological dating of an activity area on the West Kennet Avenue is confirmed. Two determinations raise the possibility of Iron Age activity at the megaliths.

References: Burleigh *et al* 1972
Evans *et al* 1985
Gray 1935
Hardiman *et al* 1992, 59–63
Pitts and Whittle 1992
Smith 1965

HAR-9694 5780 \pm 80 BP

$\delta^{13}\text{C}$: -27.3‰

Sample: WK2/AK17, submitted in 1984 by M W Pitts

Material: charcoal: unidentified

Initial comment: from hole 1 in occupation area on West Kennet Avenue. Excavated by Keiller in 1934; cutting VII²R, layer 2 (Smith 1965).

Objectives: HAR-9694, HAR-9695, and HAR-10501 were chosen to throw light on the ‘occupation area’ on the West Kennet Avenue, which is thought to be possibly older than the Avenue itself.

Calibrated date: 1 σ : 4730–4530 cal BC
2 σ : 4830–4450 cal BC

Final comment: M Pitts (23 May 1995), HAR-9694 is apparently too old to be relevant to this feature.

References: Hardiman *et al* 1992, 62
Smith 1965

HAR-9695 4260 \pm 80 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: WK3/AK13, submitted in 1984 by M W Pitts

Material: charcoal: unidentified

Initial comment: from hole 4 in the occupation area on West Kennet Avenue. Excavated by Keiller in 1934 (Smith 1965).

Objectives: as HAR-9694

Calibrated date: 1 σ : 2920–2770 cal BC
2 σ : 3090–2620 cal BC

Final comment: M Pitts (23 May 1995), the determinations for HAR-9695 and HAR-10501 are consistent with the notion that the ‘occupation area’ on West Kennet Avenue is possibly older than the Avenue itself.

References: Hardiman *et al* 1992, 61
Smith 1965

HAR-9696 2080 \pm 110 BP

$\delta^{13}\text{C}$: -28.2‰

Sample: AV10/AK1, submitted in 1984 by M W Pitts

Material: charcoal: unidentified

Initial comment: from ash layer in stonehole 44 of the outer stone circle, north-west quadrant. Excavated by Keiller in 1937 (Smith 1965).

Objectives: HAR-9696, HAR-10061, HAR-10062, and HAR-10327 were all chosen in an attempt to date the construction of the great stone circle.

Calibrated date: 1 σ : 350 cal BC–cal AD 50
2 σ : 400 cal BC–cal AD 140

Final comment: M Pitts (23 May 1995), HAR-9696 and HAR-10061 are too recent to be associated with the construction of the great stone circle, but may hint at hitherto unsuspected ritual activity at the site at a later date.

References: Hardiman *et al* 1992, 63
Smith 1965

HAR-10061 2430 \pm 70 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: AV13/3-4, submitted in 1984 by M W Pitts

Material: charcoal: unidentified

Initial comment: from stakeholes on the edge of stonehole 8 of the outer stone circle, south-west quadrant. Excavated by Keiller in 1938 (Smith 1965).

Objectives: as HAR-9696

Calibrated date: 1 σ : 760–400 cal BC
2 σ : 790–380 cal BC

Final comment: see HAR-9696

References: Hardiman *et al* 1992, 62
Smith 1965

HAR-10062 4130 \pm 90 BP

$\delta^{13}\text{C}$: -27.5‰

Sample: AV12/AK2, submitted in 1984 by M W Pitts

Material: charcoal (remaining subsample contained insufficient material to identify) (R Gale 1997)

Initial comment: from the bottom of stonehole 41 of the outer stone circle, north-west quadrant. Excavated by Keiller in 1937 (Smith 1965).

Objectives: as HAR-9696

Calibrated date: 1 σ : 2880–2500 cal BC
2 σ : 2910–2470 cal BC

Final comment: M Pitts (23 May 1995), HAR-10062 and HAR-10327 appear to provide realistic determinations for the erection of megaliths in a circle always assumed to have been built as a single event. There is a suggestion this may have been later than the second phase of the henge earthwork.

References: Hardiman *et al* 1992, 62
Smith 1965

HAR-10063 4380 \pm 80 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: AV1, submitted in 1984 by M W Pitts

Material: charcoal (remaining very friable subsample identified): unidentified (0.45g); Pomoideae (0.09g, 100%) (R Gale 1997)

Initial comment: from the old land surface under the henge bank; south-east sector, cutting X. Excavated by Gray in 1914 (Gray 1935).

Objectives: to date pre-henge activity.

Calibrated date: 1 σ : 3270–2900 cal BC
2 σ : 3350–2880 cal BC

Final comment: M Pitts (23 May 1995), HAR-10063, HAR-10500, and HAR-10325 are from the old land surface buried by a large henge earthwork, at widely separated points. There are stratigraphic indications of two major earthwork phases. It is not possible to tell which phase buried sample HAR-10063, although it may be that at that point the first phase bank was not present.

References: Gray 1935
Hardiman *et al* 1992, 62

HAR-10064 3690 \pm 80 BP

$\delta^{13}\text{C}$: -25.4‰

Sample: AV9/247h, submitted in 1984 by M W Pitts

Material: charcoal (remaining subsample identified): unidentified (0.23g); *Taxus* sp. (0.06g, 100%) (R Gale 1997)

Initial comment: from a deposit of burnt material beneath a 'dwarf' burial in the secondary fill of the henge ditch, 1.8–2.1m below the modern surface of the ditch; from the south-east quadrant east of the south entrance. Excavated by Gray in 1914, cutting IX, find no. 247h (Gray 1935).

Objectives: to date the burial in the ditch and establish the ditch silting rate.

Calibrated date: 1 σ : 2200–1950 cal BC
2 σ : 2300–1880 cal BC

Final comment: M Pitts (23 May 1995), this is a useful lone determination for the secondary fill of the henge ditch, associated with a human burial. It is slightly earlier than a determination from a similar context at Mount Pleasant.

References: Gray 1935
Hardiman *et al* 1992, 62

HAR-10325 4640 \pm 70 BP

$\delta^{13}\text{C}$: -24.8‰

Sample: AV3/9BA, submitted in 1984 by M W Pitts

Material: animal bone: unidentifiable

Initial comment: from the old land surface under the henge bank; north-west sector, trench 2, LZ. Excavated in 1982 (Evans *et al* 1985).

Objectives: to date pre-henge activity.

Calibrated date: 1 σ : 3520–3350 cal BC
2 σ : 3640–3120 cal BC

Final comment: M Pitts (23 May 1995), HAR-10325 is from the old land surface under the henge bank in the area of interface between the two bank phases. The oldest of the three samples from under the bank (*see* also HAR-10063 and HAR-10500), HAR-10325 may hint at a *terminus post quem* for phase 1.

Final comment: F Healy (26 July 2011), 'Find nos GBA 82 + 61 to GBA 82 + 63' on the submission form indicates that this was a bulk sample.

References: Evans *et al* 1985
Hardiman *et al* 1992, 62

HAR-10326 4160 \pm 90 BP

$\delta^{13}\text{C}$: -24.5‰

Sample: AV4/AK7, submitted in 1984 by M W Pitts

Material: antler: *Cervus elaphus*

Initial comment: from the bank make-up of the henge, above a supposed revetment trench. Excavated by Keiller in 1937 (Smith 1965).

Objectives: to date the extension to the henge bank.

Calibrated date: 1 σ : 2890–2580 cal BC
2 σ : 2920–2470 cal BC

Final comment: M Pitts (23 May 1995), HAR-10326 is an antler fragment from the body of the phase 2 henge bank, and compares favourably with the similar determination HAR-10500, from beneath the phase 2 bank.

References: Hardiman *et al* 1992, 62
Smith 1965

HAR-10327 3870 ±90 BP

$\delta^{13}\text{C}$: -21.5‰

Sample: AV11/K10, submitted in 1984 by M W Pitts

Material: animal bone: *Sus* sp.

Initial comment: from the bottom of stonehole 44 of the outer stone circle, north-west quadrant. Excavated by Keiller in 1937 (Smith 1965).

Objectives: as HAR-9696

Calibrated date: 1 σ : 2480–2200 cal BC
2 σ : 2580–2040 cal BC

Final comment: see HAR-10062

References: Hardiman *et al* 1992, 63
Smith 1965

HAR-10500 4190 ±90 BP

$\delta^{13}\text{C}$: -26.2‰

Sample: AV2, submitted in June 1985 by M W Pitts

Material: charcoal: unidentified

Initial comment: from the old land surface under the henge bank; south-west sector behind stone 14 (excavated by Keiller in 1938 (Smith 1965)).

Objectives: to date pre-henge activity.

Calibrated date: 1 σ : 2900–2620 cal BC
2 σ : 3010–2490 cal BC

Final comment: M Pitts (23 May 1995), HAR-10500 is from the old land surface under the second phase of the henge earthwork. HAR-10063 and HAR-10500 are consistent with a small find of Grooved Ware under the bank and may together provide a *terminus post quem* for phase 2.

References: Hardiman *et al* 1992, 63
Smith 1965

HAR-10501 4280 ±100 BP

$\delta^{13}\text{C}$: -24.3‰

Sample: WK1/AK1, submitted in June 1985 by M W Pitts

Material: antler

Initial comment: from pit 1 in the occupation area on West Kennet Avenue. Excavated by Keiller in 1934 (Smith 1965).

Objectives: as HAR-9694

Calibrated date: 1 σ : 3020–2770 cal BC
2 σ : 3320–2580 cal BC

Final comment: see HAR-9695

Final comment: F Healy (26 July 2011), Smith (1965, 213) notes antler as 1 fragment from red deer, 1 from roe, both slain.

References: Hardiman *et al* 1992, 62
Smith 1965

HAR-10502 4300 ±90 BP

$\delta^{13}\text{C}$: -23.9‰

Sample: AV5/136, submitted in June 1985 by M W Pitts

Material: antler

Initial comment: from the primary fill of the henge ditch, west of the south causeway; gray cutting I. Excavated by Gray in 1909, find no. 136, (Gray 1935).

Objectives: to date the primary fill.

Calibrated date: 1 σ : 3020–2870 cal BC
2 σ : 3320–2640 cal BC

Final comment: M Pitts (23 May 1995), this is the only sample analysed from the primary fill of the henge ditch, which would be expected to be contemporary with the phase 2 bank. HAR-10502 and HAR-10326 place the henge in the same era as the other Wessex henges, such as Mount Pleasant and Durrington Walls, but with a suggestion of slightly greater age.

Laboratory comment: English Heritage (28 September 2011), replicate measurements on this antler subsequently undertaken by AMS (OxA-12555, 4036 ±34 BP and OxA-12556, 4043 ±34 BP; Pollard and Cleal 2004) are statistically significantly different from this result ($T'=8.1$, $T'(5\%)=6.0$, $v=2$; Ward and Wilson 1978), suggesting that it may be an early outlier.

References: Gray 1935
Hardiman *et al* 1992, 62
Pollard and Cleal 2004
Ward and Wilson 1978

Aydon Castle, Northumberland

Location: NZ 00146631
Lat. 54.59.31 N; Long. 01.59.52 W

Project manager: M Ellison (Department of the Environment), 1975

Archival body: Museum of Antiquities of the University and the Society of Antiquaries Newcastle

Description: a scheduled medieval fortified manor house whose elements include a variety of upstanding domestic, ancillary and defensive buildings arranged within three courtyards surrounded by a curtain wall. The medieval defensive ditch outside the north-west curtain wall is also included within the scheduling, together with the buried remains of a timber-framed hall which preceded the construction of the fortified house. Because the curtain wall appears never to have been a strong defensive line and because there was no gatehouse at the castle entrance, it was rapidly surrendered to the Scots in 1315.

Objectives: to date this section of the curtain wall.

References: Boyson 1995
Ellison 1976
Hedges *et al* 1991b, 290

OxA-1057 700 ±80 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: Lintel B, sample 2, submitted in 1986 by D Haddon-Reece

Material: wood: unidentified

Initial comment: from the lintel in the north-west corner of the curtain wall.

Objectives: to date the construction of the curtain wall.

Calibrated date: 1 σ : cal AD 1260–1390
2 σ : cal AD 1180–1420

Final comment: K Cullen (26 July 2010), this result correlates well with historical sources which suggest a construction date of AD 1305 for the castle.

References: Hedges *et al* 1991b, 290

Aylesbury: George Street, Buckinghamshire

Location: SP 818139
Lat. 51.49.02 N; Long. 00.48.47 W

Project manager: D Allen (Buckinghamshire County Museum), June 1981

Archival body: Buckinghamshire County Museum

Description: the excavation took place in advance of an office development. The earliest evidence found was traces of a middle Iron Age settlement. In the middle Saxon period the area lay within a Christian cemetery. Eighteen graves were discovered, but the quantity of human bone from the site showed that they were the surviving fraction of a much greater number. From the late twelfth century onwards the site lay in back-plots and contained thirty medieval and ten post-medieval pits.

Objectives: to find evidence for Iron Age occupation and ascertain if the skeletal remains, several of which had come from immediately adjacent areas, could be dated and interpreted.

References: Allen and Dalwood 1983

HAR-4937 1700 ±80 BP

$\delta^{13}\text{C}$: -26.6‰

Sample: AGS158, submitted on 14 April 1982 by D Allen

Material: charcoal: unidentified

Initial comment: from a gully containing middle Iron Age pottery and quantity of animal bone. Other Iron Age pits and possible postholes were present in the vicinity.

Objectives: to support the suggested middle Iron Age dating for the structure suggested by the ceramic evidence.

Calibrated date: 1 σ : cal AD 240–430
2 σ : cal AD 130–550

Final comment: D Allen and H Dalwood (1983), the radiocarbon date is at odds with the middle Iron Age pottery sherds. This discrepancy is presumably attributed to later disturbances in the vicinity of the gully, which resulted in contamination of the radiocarbon sample.

HAR-4938 1190 ±70 BP

$\delta^{13}\text{C}$: -23.1‰

Sample: AGS605, submitted on 14 April 1982 by D Allen

Material: human bone

Initial comment: from grave 607 located in the cemetery of east/west orientation containing unaccompanied burials. Grave 607 cuts grave 610, which produced HAR-4939 from burial 605.

Objectives: the stratigraphic evidence placed the graves between the middle Iron Age and the early medieval periods, whilst the few residual finds provides a *terminus post quem* in the Saxon period. In view of the paucity of closely datable evidence, four samples were submitted for radiocarbon determinations. This refers to HAR-4938 to HAR-4941.

Calibrated date: 1 σ : cal AD 710–950
2 σ : cal AD 660–1000

Final comment: D Allen and H Dalwood (1983), these dates are statistically indistinguishable and suggest that the cemetery, or part of it at least, was in use by the ninth century.

HAR-4939 1150 ±80 BP

$\delta^{13}\text{C}$: -21.9‰

Sample: AGS608, submitted on 14 April 1982 by D Allen

Material: human bone

Initial comment: from grave 610 located in the cemetery of east/west orientation containing unaccompanied burials. Grave 610 was cut by grave 607, which produced sample HAR-4938 from burial 605.

Objectives: as HAR-4938

Calibrated date: 1 σ : cal AD 770–990
2 σ : cal AD 670–1030

Final comment: see HAR-4938

HAR-4940 1180 ±80 BP

$\delta^{13}\text{C}$: -20.9‰

Sample: AGS617, submitted on 14 April 1982 by D Allen

Material: human bone

Initial comment: from grave located in the cemetery of east/west orientation containing unaccompanied burials.

Objectives: as HAR-4938

Calibrated date: 1 σ : cal AD 710–970
2 σ : cal AD 660–1020

Final comment: see HAR-4938

HAR-4941 1170 ±70 BP

$\delta^{13}\text{C}$: -22.7‰

Sample: AGS581, submitted on 14 April 1982 by D Allen

Material: human bone

Initial comment: from grave 582 located in the cemetery of east/west orientation containing unaccompanied burials.

Objectives: as HAR-4938

Calibrated date: 1 σ : cal AD 770–980
2 σ : cal AD 670–1020

Final comment: see HAR-4938

Baldock: Upper Walls Common, Hertfordshire

Location: TL 250340
Lat. 51.59.24 N; Long. 00.10.46 W

Project manager: G R Burleigh (Letchworth Museum), 1982

Archival body: North Hertfordshire District Council Museums Service

Description: excavations at the Iron Age and Romano-British settlement of Baldock have shown occupation from the early first century BC (or earlier) continuing into the late fifth or sixth century AD. Major excavations in 1968–72 and 1978–94 focused largely on areas peripheral to the core, including an unprecedented number and range of cemeteries, with more than 2000 burials recorded in at least 22 separate cemeteries to date. The core of the settlement appears to have focused around a religious complex, with well-preserved remains known from geophysical survey and aerial photography. Originating as a late Iron Age oppidum, the settlement covered almost 50ha by the second century AD and contracted during the fourth century to around 30ha; it was never walled and the only public buildings so far identified are temples and a possible *mansio*. Lead sealings reading C.VIC appear to record a town council.

Objectives: the scientific dating programme was designed to establish the date at which burial activity began at a site on Clothall Common, where a large and deep (<2.2m) doline was the focus for rituals associated with burial in the first century BC. Excavation of the site took place between 1980 and 1985, with the doline partly excavated in 1982–3. The evidence included two graves, which appear to have been reused on a number of occasions, a multi-phase timber structure thought to have been a mortuary house and deposits that included residual human bone and a significant number of pottery spindle whorls. This activity was sealed in the later first century AD by a layer of cobbles, creating a sunken paved area adjacent to a crossroads. The residual bone was chosen for dating as it presented a very weathered appearance.

Final comment: K Matthews (18 December 2008), the radiocarbon dates suggest that burial activity began in the doline significantly earlier than the earliest deposits excavated, which belong to the second half of the first century BC. However, excavation of the doline was not completed when excavation of the area finished in 1985 and earlier deposits remain in its base: the site is still undeveloped, although it is designated for housing. A nearby doline to the north-north-east was excavated between 1986 and 1989, with evidence for burial in the late first century BC and residual middle Iron Age pottery. Although no definite earlier middle Iron Age features have been found in the settlement, a late middle Iron Age pit alignment runs for at least 1.5km from the Ivel Springs towards the hills east of

the town and it may be conjectured that there was occupation contemporary with the residual pottery and human bone. The reused graves in the doline suggest that bodies were buried to allow the flesh to decay and the bone collected later for disposal or curation elsewhere; the residual bone may derive from similar activity stretching back much further in time.

Laboratory comment: AERE Harwell (1984), a third sample, WFA 12252 (HAR-5963) failed.

References: Burgess and Fitzpatrick-Matthews forthcoming
Burleigh 1982
Burleigh and Fitzpatrick-Matthews 2009

HAR-5964 1990 \pm 110 BP

$\delta^{13}C$: -21.0‰

Sample: UWCA2224, submitted in September 1983 by J C Drake

Material: animal bone

Initial comment: from the primary silt of a major north-south ditch of a large agricultural enclosure.

Objectives: to provide a starting date for a series of intersecting enclosures, and hence date the subdivision of the land around the late Iron Age/Roman settlement for agricultural purposes, and also to help narrow the date range of associated pottery.

Calibrated date: 1 σ : 160 cal BC–cal AD 130
2 σ : 360 cal BC–cal AD 250

Final comment: K Matthews (8 June 2005), lack of contextual information on the origin of this sample prevents detailed comment. It is likely that this comes from one of a series of agricultural enclosures established on Upper Walls Common during the first half of the first century AD (ceramic evidence), so the date is entirely consistent with that.

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Hardiman *et al* 1992, 60
Otlet *et al* 1983
Walker *et al* 1991a, 90

HAR-5965 2380 \pm 130 BP

$\delta^{13}C$: -23.6‰

Sample: UWCA1641, submitted in September 1983 by J C Drake

Material: human bone

Initial comment: from the earliest archaeological context in a solution hollow in which there are at least ten phases of activity from the late Iron Age to the seventh century AD.

Objectives: to permit tighter dating of the pre-Roman phases and the associated pottery.

Calibrated date: 1 σ : 760–360 cal BC
2 σ : 810–170 cal BC

Final comment: K Matthews (8 June 2005), three discrete phases of Iron Age activity were recognised within the silts of a large solution hollow, sealed by an early Roman cobbled surface. The earliest phase can be dated to the middle Iron Age, with the lowest excavated silts containing this weathered human bone. Elements from the skeletons of a neonate, a child, and an adult were recovered from these earliest silts. No formal burials belonging to this primary phase were identified, suggesting either that the focus for burial lay at a higher level or that some other means of disposal, such as excarnation, was practised. The quantity of child bone - all from the left side of the individual - suggests that most if not all of the body had been present in the dell at some time.

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Burleigh 1982
Otlet *et al* 1983

Balksbury Camp, Hampshire

Location: SU 351446
Lat. 51.11.56 N; Long. 01.29.51 W

Project manager: G J Wainwright (Department of the Environment) and S Davies (Wessex Archaeology), 1981

Archival body: Hampshire County Museum Service

Description: an Iron Age plateau enclosure situated at the junction of the River Anton and Pillhill Brook, excavated in advance of housing development. Excavations in 1973 and 1981 revealed site occupation and use from the late Neolithic/Beaker to the late Roman period. A sequence of late Bronze to early Iron Age defence construction and modification, subsequently further modified in the Romano-British period, was established.

Objectives: to date the construction of the hillfort.

Final comment: G Wainwright and S Davies (1995), there are too few radiocarbon dates to construct an independent chronology for the earliest part of the first millennium BC at Balksbury. This is particularly unfortunate because the ceramic sequence is similar to that from Danebury, where the lack of earlier material from the hillfort may mean that the suggested dates of 550–450 BC for ceramic phases 1–3 (Cunliffe 1984) is unrealistically late.

Laboratory comment: Ancient Monuments Laboratory (1994), five further dates (HAR-442 to HAR-446) from this site were funded prior to 1981 and were published in the first volume of *Radiocarbon Dates* (Jordan *et al* 1994, 7–8).

References: Cunliffe 1984
Jordan *et al* 1994, 7–8
Wainwright and Davies 1995
Walker *et al* 1988, 335–6

HAR-5124 3530 ±80 BP

$\delta^{13}\text{C}$: -23.5‰

Sample: 36-326, submitted in August 1982 by N Balaam

Material: human bone

Initial comment: from a Beaker crouched inhumation; burial 2286, context 2326.

Objectives: to date the Beaker burial, which was accompanied by a complete Beaker vessel, which has been assigned to Step 2.

Calibrated date: 1 σ : 1960–1740 cal BC
2 σ : 2130–1670 cal BC

Final comment: G Wainwright and S Davies (1995), HAR-5124 provides a secure date for the Beaker burial. This is an extremely late date for a Beaker of Step 2, which Lanting and van der Waals (1972, 44) considered as most likely to occupy the period 3900–3800 BP.

References: Lanting and van der Waals 1972

HAR-5127 2800 ±70 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: 36-1465, submitted in August 1982 by N Balaam

Material: charcoal: *Quercus* sp., small quantity; *Fagus* sp., small quantity; *Populus* sp., small quantity; *Fraxinus* sp., main component (N Balaam)

Initial comment: from a small pit filled with charcoal and early Iron Age pottery; posthole 3464, layer 3465, context 2326.

Objectives: to provide absolute dating for the earliest part of the sequence at Balksbury.

Calibrated date: 1 σ : 1030–840 cal BC
2 σ : 1190–810 cal BC

Final comment: G Wainwright and S Davies (1995), HAR-5127 and HAR-442 (2740 ±170 BP; 1400–400 cal BC at 95% confidence; Reimer *et al* 2004) were both from contexts, which have been independently ascribed to the late Bronze Age to earliest Iron Age period on the basis of stratigraphic relationships and associated pottery, and therefore can be used to date that phase.

References: Reimer *et al* 2004

Bantham Ham, Devon

Location: SX 66264358
Lat. 50.16.35 N; Long. 03.52.38 W

Project manager: F Griffith (Devon County Council), 1982

Archival body: Devon County Council

Description: a sub-Roman/Dark Age coastal site lying at the mouth of the river Avon in South Devon. Drainage work at the southern end of Bantham beach exposed archaeological material.

Objectives: to date an exposed hearth feature.

References: Griffith 1986
Walker and Otlet 1988, 303

HAR-5775 1690 ±80 BP

$\delta^{13}\text{C}$: -23.0‰

Sample: BANTH02, submitted on 11 October 1982 by F Griffith

Material: bone

Initial comment: from a possibly post-Roman hearth at the bottom of the lowest visible band in the central section on the south side of the trench, approximately 4.5m below the ground surface. An unabraded body sherd of Bii amphora was found *in situ* immediately above the hearth.

Objectives: to date the hearth.

Calibrated date: 1 σ : cal AD 240–430
2 σ : cal AD 130–550

Final comment: F M Griffith (1986), the variation in the two dates obtained from the hearth (HAR-5775 and HAR-5776) requires some consideration. The later date (HAR-5776) must be taken to represent more closely the date of the feature. In view of the large volume of well-preserved bone apparently all around the site, it is suggested that the earlier date (HAR-5775) represents the incorporation of some residual bone in the hearth at the time of burning.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5776 1440 \pm 90 BP

$\delta^{13}\text{C}$: -24.0‰

Sample: BANTH01, submitted on 11 October 1982 by F Griffith

Material: charcoal (mostly unidentifiable): *Quercus* sp. (A Caseldine)

Initial comment: from the same context as HAR-5775.

Objectives: as HAR-5775

Calibrated date: 1 σ : cal AD 540–670
2 σ : cal AD 420–770

Final comment: see HAR-5775

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Barnard Castle: Moss Mire, Durham

Location: NZ 0516 approximately
Lat. 54.32.21 N; Long. 01.55.22 W

Project manager: A Donaldson (University of Durham), 1978

Archival body: University of Durham

Description: a peat bog. The site is important since it lies between the lowlands and uplands in Teesdale, both of which have a number of pollen diagrams, and at the moment is a unique site in a fairly rich agricultural region in the valley of the Middle Tees Basin.

Objectives: the three samples HAR-6804, HAR-6805, and HAR-9028 (3070 \pm 90 BP; 1520–1050 cal BC at 95% confidence; Reimer *et al* 2004) represent the early forest

clearance phases in the diagram and are extremely important for fixing a chronology onto the extension of agricultural activities into the valley bottom in this area. As a guide to the vegetation changes and agriculture in the area these samples will be invaluable to regional archaeologists.

Final comment: G Campbell (3 September 2007), it appears that the work on this pollen diagram was never completed and no physical archive has survived at Durham University (September 2007). As such the value of these dates is greatly reduced. The date for initial clearance (HAR-6804) agrees well with other sites from Lowland Durham.

Laboratory comment: Ancient Monuments Laboratory (1994), three dates from this site (HAR-3073, HAR-3074, and HAR-3075) were funded prior to 1981 and were published in the first volume of *Radiocarbon Dates* (Jordan *et al* 1994, 9–10). A further two dates (HAR-6804 and HAR-6805) are published below. HAR-4747, HAR-4748, and HAR-6845 were held in the small sample queue and later abandoned; HAR-9028 was subsequently dated.

References: Austin 1980
Jordan *et al* 1994, 9–10
Reimer *et al* 2004
Walker and Otlet 1988, 316

HAR-6804 2170 \pm 110 BP

$\delta^{13}\text{C}$: -29.5‰

Sample: MM192, submitted on 11 January 1979 by A M Donaldson

Material: peat

Initial comment: taken to provide a date for the beginning of the phase of forest clearance.

Objectives: to provide a chronology for a pollen diagram.

Calibrated date: 1 σ : 390–50 cal BC
2 σ : 410 cal BC–cal AD 60

Final comment: J Huntley (18 December 2006), seems a reasonable date for the beginning of the phase of forest clearance for this region. Most other sites in lowland Durham show a similar clearance during the later part of the Iron Age.

Laboratory comment: Ancient Monuments Laboratory (1995), this sample number is misquoted in Walker and Otlet (1988, 316) as being MM220.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-6805 4720 \pm 130 BP

$\delta^{13}\text{C}$: -30.9‰

Sample: MM260, submitted in January 1979 by A M Donaldson

Material: peat

Initial comment: the lowest datable sample from the forested period preceding the first major clearance.

Objectives: as HAR-6804.

Calibrated date: 1 σ : 3650–3360 cal BC
2 σ : 3780–3090 cal BC

Final comment: G Campbell (3 September 2007), this presumably gives a date for the inception of peat growth (but see series comments).

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-9028 3070 \pm 90 BP

$\delta^{13}\text{C}$: -29.1‰

Sample: MM220, submitted on 11 January 1979 by A M Donaldson

Material: peat

Initial comment: from the forested period preceding the first major clearance.

Objectives: as HAR-6804

Calibrated date: 1 σ : 1440–1210 cal BC
2 σ : 1520–1050 cal BC

Final comment: G Campbell (3 September 2007), this date presumably provides a date for a change in pollen spectra or stratigraphy or possibly just a half-way point (see series comments).

Laboratory comment: English Heritage, this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Hardiman *et al* 1992, 58
Otlet *et al* 1983

Barton-upon-Humber: St Peter's Church, Humberside

Location: TA 035219
Lat. 53.40.59 N; Long. 00.25.58 W

Project manager: W Rodwell (Consultant), 1978 and 1981

Archival body: English Heritage

Description: an Anglo-Saxon and medieval church and cemetery.

Objectives: to refine the dating of the cemetery sequence and clarify the chronology of the surviving church fabric.

Final comment: W Rodwell (9 March 1995), two samples concern the dating of the late Saxon tower, and its subsequent alterations (see also HAR-2865, HAR-2863, HAR-2864, and HAR-3106), giving precision to art-historical conclusions. The other samples all relate to two areas of late Saxon and Norman cemetery to the east of the tenth-century church; they confirm that the preserved timber coffins here belong to a tenth–twelfth century sequence, and that there is likely to have been a phase of pre-church burial in one area.

Laboratory comment: Ancient Monuments Laboratory (1995), four further dates from this site (HAR-2863, HAR-2864, HAR-2865, and HAR-3106) were funded prior to 1981 and were published in Jordan *et al* (1994, 11).

References: Jordan *et al* 1994, 11
Rodwell and Atkins 2011
Rodwell and Rodwell 1982

HAR-5655 750 \pm 70 BP

$\delta^{13}\text{C}$: -26.4‰

Sample: BH04, submitted on 4 August 1978 by W Rodwell

Material: wood: *Quercus* sp., heartwood

Initial comment: from one of the north–south timbers of the base frame of the former, possibly Norman, spire.

Objectives: to determine the structural phasing of the relict spire on the west tower.

Calibrated date: 1 σ : cal AD 1220–1290
2 σ : cal AD 1160–1390

Final comment: W Rodwell (9 March 1995), this sample, taken from the fragmentary base-frame of a former spire on the west tower, establishes that the structure was added during a phase of thirteenth-century enlargement of the church, and is not relict from the Saxo-Norman tower roof. This sample relates to HAR-2863 and HAR-2864.

Final comment: A Bayliss (20 July 2007), this timber (22) was later sampled for tree-ring analysis, and consisted of 61 rings surviving to the heartwood/sapwood boundary, which formed in AD 1307 (Tyers 2001a, tables 1 and 4). The radiocarbon determination is consistent with this known age, and so demonstrably accurate.

References: Tyers 2001a

HAR-6476 1010 \pm 80 BP

$\delta^{13}\text{C}$: -27.6‰

Sample: BH08, submitted in July 1984 by W Rodwell

Material: wood (waterlogged): *Quercus* sp. (D Haddon-Reece)

Initial comment: from the lid of coffin F4181.

Objectives: to date the coffin.

Calibrated date: 1 σ : cal AD 970–1160
2 σ : cal AD 880–1220

Final comment: W Rodwell (9 March 1995), from a coffin from one of the primary burials in the cemetery just south-east of the late Saxon church. This date confirms that the graves in this area are contemporaneous with the church, and not associated with an earlier phase of burial.

Final comment: A Bayliss (20 July 2007), this sample came from an unknown part of board 814591. The calibrated date range is, however, consistent with the felling date of AD 1130 provided by dendrochronology of other timbers from this coffin (Tyers 2001b, 86).

References: Tyers 2001b
Walker and Otlet 1988, 306

HAR-6501 900 \pm 70 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: BH07, submitted in July 1984 by W Rodwell

Material: wood (waterlogged): *Quercus* sp. (D Haddon-Reece)

Initial comment: part of coffin F3564 shaped in the dug-out manner. The sample contains about seven rings, of *c* 3mm average width. From the curvature of the sample and the coffin's construction, it is probable that the rings are near the outside of the tree.

Objectives: to date the tree from which the coffin was made.

Calibrated date: 1 σ : cal AD 1030–1220
2 σ : cal AD 990–1270

Final comment: W Rodwell (9 March 1995), the only preserved timber coffin of dug-out form on the site, and dated partly for its intrinsic interest, and also because it lay at the base of a long sequence of burials. It was suspected of being early (ie Saxon) in date, but would now appear to be Norman. It lay in the cemetery immediately north-east of the late Saxon and Norman church.

Final comment: A Bayliss (20 July 2007), tree-ring analysis confirmed that the sample consisted of a decadal block of wood probably ending in the heartwood/sapwood boundary from the dug-out coffin. This timber remains undated by dendrochronology (Tyers 2001b, 20). A statistically consistent radiocarbon measurement (UB-4655; 959 \pm 17 BP; (T'=0.6, T'(5%)=3.8, v=1; Ward and Wilson 1978) was obtained subsequently from the skeleton buried in this coffin.

References: Walker and Otlet 1988, 306
Ward and Wilson 1978

HAR-6838 900 \pm 100 BP

$\delta^{13}C$: -28.1‰

Sample: BH800554, submitted in 1985 by W Rodwell

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

Initial comment: part of a wicker basket handle found in a putlog hole on the inside of the tower wall. This will be a small sample, and may very well be contaminated.

Objectives: to give a date for this basket, which is presumed contemporary with the building of the tower.

Calibrated date: 1 σ : cal AD 1020–1260
2 σ : cal AD 900–1290

Final comment: W Rodwell (9 March 1995), from a fragment of a basket-work handle incorporated in the construction mortar of the upper part of the late Saxon church tower. It was believed that the fragment belonged to the late tenth century, which the result does just admit. It could possibly be argued that the basket was introduced during the late eleventh century alterations to the tower, but the context is not convincing in a structural sense. This sample relates to HAR-3106.

Final comment: A Bayliss (20 July 2007), this sample was measured using the mini gas-proportional counter (Otlet *et al* 1983; 1986). The accuracy of this result is supported by the good agreement of this date with the sequence of dates from the church structure (Rodwell with Atkins 2011, 753–88).

References: Otlet *et al* 1983
Otlet *et al* 1986
Rodwell with Atkins 2011
Rodwell and Rodwell 1982
Walker and Otlet 1988, 306

Basingstoke: Buckskin Barrows, Hampshire

Location: SU 60435118
Lat. 51.15.22 N; Long. 01.08.02 W

Project manager: M Morris (Winchester Archaeology), 1967

Archival body: Hampshire County Museum Service

Description: a Bronze Age barrow.

Objectives: there is a series of pits, postholes, and stakeholes, which survived in the central area of the mound. It is hoped that radiocarbon dating will be able to assist in the interpretation of these features in relation to the mound's construction. There is no other dating evidence from these features and only HAR-8370 produced a reasonable amount of charcoal.

Final comment: M Allen (June 1995), the radiocarbon programme was successful at demonstrating the cremation was a secondary burial. The date for pre-mound activity has highlighted a possible synchronicity of similar structures and graveless barrows in southern England. The weakness in this series of dates (apart from some reservations about sample HAR-8374, despite an acceptable and useful date) is the quoted errors eg HAR-8372, 3220 \pm 130 BP, which gives a calibrated date at 95% confidence spanning 700 years (1880–1210 cal BC; Pearson and Stuiver 1986). Nevertheless, from an excavation conducted in 1967, the date from stored and archived soil samples provided the chronological framework for detailed interpretation of ritual events and highlights the similarity in form and date of this site with a number of others in southern England.

Laboratory comment: Ancient Monuments Laboratory (2003), another sample 4B521 (HAR-8373) failed to date.

References: Allen *et al* 1995
Pearson and Stuiver 1986

HAR-8370 3590 \pm 100 BP

$\delta^{13}C$: -27.1‰

Sample: 1BS7, submitted in August 1986 by M Morris

Material: charcoal: unidentified (*c* 260g)

Initial comment: from posthole F7 beneath the core of the mound.

Objectives: to date the pre-mound activity and establish its relationship with the barrow itself.

Calibrated date: 1 σ : 2130–1770 cal BC
2 σ : 2210–1680 cal BC

Final comment: M Allen (June 1995), charcoal from this central post is considered contemporary with two rings of stakeholes, secondary series Collared Urns and feasting. The early Bronze Age date is statistically indistinguishable at 95% confidence (Ward and Wilson 1978) from dates of stake circles at Amesbury 61 (HAR-6227; 3520 \pm 100 BP; 2140–1620 cal BC at 95% confidence; Ashbee 1984), Amesbury 71 (NPL-75; 3590 \pm 90 BP; 2200–1700 cal BC at 95% confidence; Christie 1967), Gallibury (BM-2232R; 3590 \pm 120 BP; 2300–1670 cal BC at 95% confidence; Tomalin 1988), and West Heath III (HAR-647; 3630 \pm 100

BP; 2300–1740 cal BC at 95% confidence; Drewett 1976; Pearson and Stuiver 1986). This indicates contemporaneity of these structures in southern England. It provides an acceptable date within the range of dates given by Longworth (1984, 79) for secondary series Collared Urns. At Buckskin this dates the pre-mound ritual activity and feasting.

References: Ashbee 1984
Christie 1967
Drewett 1976
Longworth 1984
Pearson and Stuiver 1986
Tomalin 1988
Walker *et al* 1990, 195
Ward and Wilson 1978

HAR-8371 3200 ±80 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: 2BS137, submitted in August 1986 by M Morris

Material: charcoal (and soil (c 2kg), remaining subsample wet sieved (2mm) and identified): unidentified (0.04g); *Acer* sp. (0.03g, 100%) (R Gale 1997)

Initial comment: HAR-8371 and HAR-8372 are from F137, a ritual pit containing cremated human bone, located towards the periphery of the mound. It is not clear if it was a secondary insertion.

Objectives: to establish the chronological relationship between the barrow mound and the pre-barrow features.

Calibrated date: 1 σ : 1530–1410 cal BC
2 σ : 1670–1300 cal BC

Final comment: M Allen (June 1995), both HAR-8371 and HAR-8372 are considered to sample the same charcoal population. The dates are not significantly different at 95% confidence (Ward and Wilson 1978) and give a weighted mean of 3205 ±70 BP (1670–1320 cal BC at 95% confidence; Pearson and Stuiver 1986). These determinations are several centuries later than that from the central posthole and stake rings beneath the mound (HAR-8370). It therefore has been established that F137 is a secondary cremation burial inserted in the mound, possibly as much as 400 years after the mound. The dates fall within the typical range of secondary cremation activity and probably also date the phase of clearance detected from snails in the ditch fills.

Laboratory comment: AERE Harwell (1990), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Pearson and Stuiver 1986
Walker *et al* 1991a, 93
Ward and Wilson 1978

HAR-8372 3220 ±130 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: 3BS137, submitted in August 1986 by M Morris

Material: charcoal (and soil (c 1.75kg))

Initial comment: as HAR-8731

Objectives: as HAR-8731

Calibrated date: 1 σ : 1640–1390 cal BC
2 σ : 1870–1130 cal BC

Final comment: see HAR-8731

References: Walker *et al* 1991a, 93

HAR-8374 4360 ±90 BP

$\delta^{13}\text{C}$: -28.0‰

Sample: 5BS21, submitted in August 1986 by M Morris

Material: charcoal (and soil (c 130g))

Initial comment: mound core material from layer 21.

Objectives: to indicate the date of construction of the mound in the absence of artefactual dating, and to obtain an idea of the time-scale of the pre-barrow features, barrow construction and F137, ie the period of use of the site as a funerary monument.

Calibrated date: 1 σ : 3100–2890 cal BC
2 σ : 3350–2770 cal BC

Final comment: M Allen (June 1995), the soil sample and charcoal from a turf platform under the barrow was thought to belong to pre-mound ritual activity (bonfires, feasting, a Collared Urn). Examination of the turves showed two episodes of burning; one with reddened soil relating to ritual activity and a second lens of charcoal within the turves, possibly the earlier clearance phase indicated by molluscan evidence. The date would fit clearances, occurrence of Peterborough sherd and the oblique arrowhead. The date must be used with some caution because the sample may include charcoal from both episodes.

References: Walker *et al* 1991a, 93–4

Bawsey: Mintlyn Wood, Norfolk

Location: TF 658198
Lat. 52.45.00 N; Long. 00.27.24 E

Project manager: J Wymer (Norfolk Archaeological Unit), 1984

Archival body: Norfolk County Museum

Description: a Bronze Age round barrow, excavated prior to its destruction; complete and discovered in July 1980. Bawsey revealed seven secondary cremations in the east of the mound and evidence of a primary burial.

Objectives: to date the construction of the barrow and additionally to date the subsequent secondary burial inclusions.

Final comment: T Ashwin (7 February 1995), the determinations for HAR-6569 and HAR-6614 provide a *terminus ante quem* for the primary burial beneath the barrow (for which no determination is available), and suggest that secondary cremations may have been inserted over a period of two hundred years or more. They are consistent with the Collared Urn typology of Burgess (1980; 1986) and similar to many other dates from Norfolk barrows (Lawson 1986, fig 1). However it should be noted that more recent determinations associated with Collared Urn from barrows on the Norwich Southern Bypass (GU-5184: 4090 ±50 BP; 2880–2490 cal BC

at 95% confidence, GU-5187: 3740 ±80 BP; 2460–1930 cal BC at 95% confidence (Pearson and Stuiver 1986; Pearson *et al* 1986), and others (without direct ceramic association) have produced significantly earlier results.

References: Burgess 1986
Lawson 1986
Pearson *et al* 1986
Pearson and Stuiver 1986
Walker and Otlet 1988, 311
Wymer 1985

HAR-6569 3560 ±80 BP

$\delta^{13}C$: -26.7‰

Sample: SML33, submitted in November 1984 by P Murphy

Material: charcoal: *Quercus* sp. (P Murphy 1984)

Initial comment: from beneath a Bronze Age barrow; within a concentration of charcoal associated with a pot and spoon-like artefact.

Objectives: to ascertain when the barrow mound was constructed.

Calibrated date: 1 σ : 2030–1770 cal BC
2 σ : 2140–1690 cal BC

Final comment: T Ashwin (7 February 1995), from the secondary cremation within the barrow mound. The result is consistent with many determinations from barrows from similar contexts in Norfolk.

HAR-6614 3440 ±80 BP

$\delta^{13}C$: -26.3‰

Sample: SML17, submitted in November 1984 by P Murphy

Material: charcoal: *Quercus* sp., larger fragments (P Murphy 1984)

Initial comment: from beneath a Bronze Age barrow; in a deposit of burnt flint, calcined bone, and pottery fragments.

Objectives: to ascertain when the barrow mound was constructed.

Calibrated date: 1 σ : 1890–1630 cal BC
2 σ : 1960–1520 cal BC

Final comment: T Ashwin (7 February 1995), from an unaccompanied secondary cremation within the barrow mound. The result appears consistent with many determinations from similar contexts in Norfolk barrows.

Beeston Castle, Cheshire

Location: SJ 538593
Lat. 53.07.43 N; Long. 02.41.26 W

Project manager: P Hough, 1980, 1983

Archival body: English Heritage

Description: a medieval fortress. The thirteenth-century ruin of Beeston Castle is located on a rocky summit 500ft above the Cheshire plain with views of the Pennines in the east and the Welsh mountains in the west.

Objectives: to establish a series of dates for successive phases of defence.

Final comment: P Ellis (3 January 1995), the chief group of dates (HAR-4402 (2380 ±100 BP), HAR-4405, HAR-5609, HAR-5610 (1890 ±120 BP), HAR-6459, HAR-6464, HAR-6465, HAR-6468, HAR-6469, HAR-6503, and HAR-6504) is from the rampart found beneath the outer curtain of the medieval castle or from its collapse downslope. The earliest date (HAR-4405) ought to be compatible with that of the Ewart Park bronzes suggested to be a foundation deposit. The latest (HAR-5610; 1890 ±120 BP) could be argued to carry the sequence up to the Roman period. The long date range is compatible with the stratigraphic evidence. The outer ward dates (HAR-4401 and HAR-4406) suggest that a prehistoric settlement there spanned the first millennium BC. Radiocarbon dating of the plant remains might provide a clearer chronology. The Neolithic dates (HAR-6461 and HAR-6462) are supported by early to middle Neolithic pottery finds. Two date (HAR-8101 and HAR-8102) were taken in conjunction with pollen sampling.

Laboratory comment: Ancient Monuments Laboratory (2 October 2003), four samples BCOWC05 (HAR-9021), 0657/621 (HAR-6463 and HAR-9020), BC0519 (HAR-6460 and HAR-9098), and HAR-4497 were submitted for dating but failed to produce results. Three further samples were dated in the mini gas proportional counter at AERE Harwell in 1989/90 (Otlet *et al* 1983).

References: Ellis 1993
Hough 1984
Otlet *et al* 1983

HAR-4401 2620 ±90 BP

$\delta^{13}C$: -25.0‰

Sample: BCOWRC04, submitted on 28 July 1980 by P Hough

Material: charcoal: unidentified

Initial comment: from the postpipe of a posthole in 10m² trench situated in the central area of the outer ward of the castle.

Objectives: to date the posthole structure.

Calibrated date: 1 σ : 840–760 cal BC
2 σ : 980–510 cal BC

Final comment: P Ellis (3 January 1995), the prehistoric settlement sequence in the outer ward was not fully understood. This date suggests that some of the buildings indicated by postholes can be placed in the first half of the first millennium BC (*see* HAR-4406).

HAR-4405 2860 ±80 BP

$\delta^{13}C$: -25.8‰

Sample: BCOGRC02, submitted in October 1980 by P Hough

Material: charcoal (remaining subsample identified): unidentified (36.79g); *Quercus* sp., sapwood (0.16g, 6.35%); *Quercus* sp., heartwood (2.36g, 93.65%) (R Gale 1999)

Initial comment: from a very rich deposit within a supposed bank at the top of the ditch of the outer ward defences, from context BC0160.

Objectives: to date the earliest rampart.

Calibrated date: 1 σ : 1190–910 cal BC
2 σ : 1300–830 cal BC

Final comment: P Ellis (3 January 1995), the earliest date for the rampart sequence. This is slightly earlier than the bronzes argued to represent a foundation deposit and an alternative interpretation of the sequence or of the function of the bronzes is possible.

HAR–4406 2280 \pm 80 BP

$\delta^{13}\text{C}$: -24.0‰

Sample: BCOWRC01, submitted in October 1980 by P Hough

Material: charcoal (remaining subsample of thin slivers identified): unidentified (19.11g); *Quercus* sp., sapwood (0.78g, 14.9%); *Quercus* sp., heartwood (4.47g, 85.1%) (R Gale 1999)

Initial comment: from a postpipe of a posthole in a supposed prehistoric occupation site. The sample is part of the carbonised wooden post apparently *in situ*. Only the eastern 30% of the probably round post survived. The posthole was one of a number, many of which produced small quantities of charcoal. Although no definite single structures can yet be identified, several phases of construction are suspected.

Objectives: to date the posthole structure.

Calibrated date: 1 σ : 410–200 cal BC
2 σ : 520–160 cal BC

Final comment: P Ellis (3 January 1995), a date in the second half of the first millennium BC for a structure in the prehistoric settlement in the outer ward. This date can be compared with HAR-4401.

HAR–5609 2400 \pm 70 BP

$\delta^{13}\text{C}$: -26.1‰

Sample: BCOGRC06, submitted in June 1983 by P Hough

Material: charcoal (remaining subsample identified): unidentified (0.20g); *Fraxinus* sp. (0.01g, 1.03%); *Corylus* sp. (0.96g, 98.97%) (R Gale 1999)

Initial comment: part of a burnt vertical timber *in situ* in the stone rampart stratified below foundation level; context BC0376.

Objectives: to date the stone rampart.

Calibrated date: 1 σ : 740–390 cal BC
2 σ : 780–370 cal BC

Final comment: P Ellis (3 January 1995), from a displaced fragment of wood, the date suggests that this was material from the Iron Age hillfort rampart.

Laboratory comment: English Heritage (14 March 2012), this sample appears to have consisted largely of a single hazel timber, although a small component of charcoal from other timbers may have been present.

HAR–6459 2480 \pm 100 BP

$\delta^{13}\text{C}$: -27.7‰

Sample: BCO323, submitted in July 1984 by P Hough

Material: charcoal: *Quercus* sp. (D Haddon-Reece 1984)

Initial comment: sample 41; from beneath one of a series of very large boulders which had collapsed out of an early phase of the rampart to seal the latest pre-castle road surface. The sample is from the outer part of a very narrow-ringed tree.

Objectives: to date the sealing of the final phase of the prehistoric castle road system.

Calibrated date: 1 σ : 800–400 cal BC
2 σ : 830–380 cal BC

Final comment: P Ellis (3 January 1995), the wood sample was found in a stratigraphically uncertain position downslope from the rampart. The date suggests that this is material from the collapse of the rampart.

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 304–5

HAR–6462 5140 \pm 90 BP

$\delta^{13}\text{C}$: -27.8‰

Sample: BCO546, submitted in July 1984 by P Hough

Material: charcoal: unidentified (D Haddon-Reece)

Initial comment: sample 86; from the lowest fill of the earliest cut of the northern prehistoric ditch, sealed in part by colluvial sand.

Objectives: to give an earliest cutting date for the ditch.

Calibrated date: 1 σ : 4040–3800 cal BC
2 σ : 4230–3710 cal BC

Final comment: P Ellis (3 January 1995), the evidence suggests that this cannot be the date of the ditch, but that the dating comes from Neolithic occupation material which has fallen into the ditch (see HAR-8102).

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 304–5

HAR–6464 2300 \pm 80 BP

$\delta^{13}\text{C}$: -25.1‰

Sample: BC0621/D, submitted in July 1984 by P Hough

Material: charcoal: *Quercus* sp. (D Haddon-Reece)

Initial comment: sample 222; structural timbers from the rampart consisting of 40–50 rings, including some sapwood.

Objectives: to date the construction of the rampart.

Calibrated date: 1 σ : 410–230 cal BC
2 σ : 730–170 cal BC

Final comment: P Ellis (3 January 1995), from a large timber incorporated in the Iron Age rampart, together with HAR-6468, HAR-6469, and HAR-6503. At 95% confidence this should provide, with the others, a date between 520 and 250 cal BC.

Laboratory comment: English Heritage (14 March 2012), the two radiocarbon measurements from this timber are statistically consistent ($T'=0.0$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978) and their weighted mean (2294 ± 53 BP) calibrates to 420–200 cal BC at 95% confidence (Reimer *et al* 2004).

References: Reimer *et al* 2004
Walker and Otlet 1988, 304–5
Ward and Wilson 1978

HAR-6465 2430 \pm 70 BP

$\delta^{13}C$: -25.0‰

Sample: BCO624AA, submitted in July 1984 by P Hough

Material: charcoal: *Fraxinus excelsior* (D Haddon-Reece)

Initial comment: sample 232, containing *c* 60 rings.

Objectives: as HAR-6464

Calibrated date: 1 σ : 760–400 cal BC
2 σ : 790–380 cal BC

Final comment: P Ellis (3 January 1995), if this is a timber of the same date with HAR-6464 then the two may be dated between 520 and 390 cal BC at 95% confidence.

References: Walker *et al* 1990, 166

HAR-6468 2290 \pm 70 BP

$\delta^{13}C$: -25.3‰

Sample: BCO621/B, submitted in July 1984 by P Hough

Material: charcoal: *Quercus* sp. (D Haddon-Reece)

Initial comment: sample 254; timber from the rampart. The sample contains 20–30 rings of small diameter, which probably represent most of the radius of a young tree.

Objectives: to date the construction of the rampart.

Calibrated date: 1 σ : 410–230 cal BC
2 σ : 520–190 cal BC

Final comment: P Ellis (3 January 1995), from the same timber as HAR-6464 and compatible with it.

Laboratory comment: see HAR-6464

References: Walker and Otlet 1988, 305

HAR-6469 2370 \pm 80 BP

$\delta^{13}C$: -24.4‰

Sample: BCO621/C, submitted in July 1984 by P Hough

Material: charcoal: *Quercus* sp. (D Haddon-Reece)

Initial comment: sample 255; a timber from the rampart. The sample contains many rings and came from a mature tree

Objectives: to date the construction of the rampart.

Calibrated date: 1 σ : 710–380 cal BC
2 σ : 770–210 cal BC

Final comment: see HAR-6464

References: Walker and Otlet 1988, 305

HAR-6503 2350 \pm 70 BP

$\delta^{13}C$: -26.0‰

Sample: BCO621/Q, submitted in July 1984 by P Hough

Material: charcoal: *Quercus* sp. (D Haddon-Reece)

Initial comment: sample 226; a structural timber from the rampart. The sample has about 40 rings plus some sapwood and came from a mature tree.

Objectives: to date the rampart construction.

Calibrated date: 1 σ : 490–380 cal BC
2 σ : 760–210 cal BC

Final comment: see HAR-6464

References: Walker and Otlet 1988, 305

HAR-6504 2310 \pm 70 BP

$\delta^{13}C$: -25.3‰

Sample: BCO234, submitted in July 1984 by P Hough

Material: charcoal: *Quercus* sp. (D Haddon-Reece)

Initial comment: sample 56; sealed into a roadway leading into the hill-fort entrance. The roadway seals the ditch from which sample 86 (HAR-6462) was taken. The material is possibly the result of site clearance.

Objectives: to date a (potential) site clearance.

Calibrated date: 1 σ : 410–260 cal BC
2 σ : 710–200 cal BC

Final comment: P Ellis (3 January 1995), this date from material overlying the entrance trackway seems unlikely to represent its disuse, and probably derives from the collapsed rampart.

References: Walker and Otlet 1988, 305

HAR-8101 1230 \pm 90 BP

$\delta^{13}C$: -27.9‰

Sample: BEEbAh, submitted in November 1984 by R I MacPhail

Material: charcoal (remaining subsample identified): unidentified (8.30g); *Quercus* sp., heartwood (3.11g, 97.2%); *Corylus* sp. (0.03g, 0.9%); *Betula* sp. (0.06g, 1.9%) (R Gale 1999)

Initial comment: for a pollen profile through the bank and ditch fill, which include a stable phase leading to organic matter deposition, and an old land surface phase. Humic A horizon; formed *in situ*.

Objectives: to date a standstill phase in the soil pollen sequence will be a major contribution to the environmental study of the site. Only a broad date is necessary to confirm Iron Age or medieval ancestry. If neither HAR-8101 or HAR-8102 contain enough carbon they can be combined as there is already a good series of charcoal dates from the site.

Calibrated date: 1 σ : cal AD 670–900
2 σ : cal AD 640–1000

Final comment: P Ellis (3 January 1995), from the sealing of the Iron Age ditch, this date might suggest its Romano-British clearance. But this seems unlikely. The date should be read as indicating a slow process of infilling from erosion and weathering.

References: Walker *et al* 1990, 166

HAR-8102 2480 \pm 70 BP

$\delta^{13}\text{C}$: -28.3‰

Sample: BEEbAh, submitted in November 1984 by R I MacPhail

Material: charcoal (remaining tiny subsample identified): unidentified (0.21g); *Alnus* sp. (0.01g, 33.3%); *Quercus* sp. (0.02g, 66.7%) (R Gale 1999)

Initial comment: as HAR-8101. The sample is mainly peaty and does not contain old residual material. It represents the onset of the secondary ditch fill.

Objectives: as HAR-8101

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

Final comment: P Ellis (3 January 1995), a date for primary filling in this ditch suggests an Iron Age feature (see HAR-6462).

References: Walker *et al* 1991a, 93

Beeston with Bittering, Norfolk

Location: TF 92441735
Lat. 52.43.09 N; Long. 00.50.58 E

Project manager: A Rogerson (Norfolk Archaeological Unit), 1980

Archival body: Norfolk Castle Museum

Description: Beaker pits in a gravel pit east of Launditch (SMR 15995).

Objectives: salvage excavation of subsoil features after topsoil stripping prior to gravel extraction.

References: Healy 1988

HAR-4636 3540 \pm 70 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: BEESTON2, submitted in November 1980 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (1.21g); *Quercus* sp., sapwood (0.01g, 2.5%); *Quercus* sp., heartwood (0.34g, 85%) (R Gale 1999)

Initial comment: from Pit 2, containing Beaker sherds.

Objectives: to date Beaker material.

Calibrated date: 1 σ : 1960–1760 cal BC
2 σ : 2120–1690 cal BC

Final comment: J Wymer and F Healy (1996), although the determinations for HAR-4636 and HAR-4637 overlap only at 95% confidence, the pits were contemporary on the evidence of the homogeneity of fabric, form, and decoration among the pottery and of the tight grouping of the features themselves. Later material may have become incorporated in layer 4, which consisted of the upper silts of pit 3. While both determinations are within the range of those for British Beakers (Kinnes *et al* 1991); the earlier one, HAR-4637, is compatible with most of the available determinations for stylistically comparable material in East Anglia (Healy 1988, table 62 (microfiche)). It must not be forgotten, however, that the assemblage has some very late stylistic traits, and is in many ways comparable with the larger collection from Cottage Field, Wattisfield, Suffolk (Bamford 1982, figs 40–1; Gibson 1982, figs WAT.1-3), which may relate to a determination of 3250 \pm 150 BP (BM-77; 1900–1160 cal BC at 95% confidence; Pearson and Stuiver 1986).

References: Bamford 1982
Gibson 1982
Healy 1988
Kinnes *et al* 1991
Pearson and Stuiver 1986
Wymer and Healy 1996

HAR-4637 3760 \pm 80 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: BEESTON4, submitted in November 1980 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (0.49g); *Quercus* sp., sapwood (0.03g, 25%); *Quercus* sp., heartwood (0.08g, 66.7%); *Corylus* sp. (<0.01g, 8.3%) (R Gale 1999)

Initial comment: from Pit 3, containing Beaker sherds.

Objectives: to date Beaker material.

Calibrated date: 1 σ : 2300–2030 cal BC
2 σ : 2470–1940 cal BC

Final comment: see HAR-4637

Belle Tout, East Sussex

Location: TV 557956
Lat. 50.44.19 N; Long. 00.12.25 E

Project manager: O Bedwin (Institute of Archaeology, London), 1980

Archival body: Institute of Archaeology, Museum of Sussex Archaeology

Description: in 1971, a cliff fall exposed a vertical shaft *c* 45m deep. The top of the shaft lies within the area of a Beaker and early Bronze Age settlement excavated by Bradley (1970). Since the original exposure, further erosion had removed much of the shaft fill, so by the summer of 1980 relatively little remained. Two soil samples were taken; the first from a greyish-white fill *c* 20m down, which contained a sherd of heavily flint-gritted pottery, belonging to the middle Bronze Age. The second sample was taken from the mid-brown fill *c* 8m from the top.

Objectives: to determine the date and purpose of the shaft as there had been no datable information produced from the shaft.

References: Bradley 1970
Drewett 1982
Hardiman *et al* 1992, 54
Walker *et al* 1991a, 89

HAR-3969 1020 ±80 BP

$\delta^{13}\text{C}$: -22.5‰

Sample: BT580501, submitted in July 1980 by O R Bedwin

Material: animal bone: *Bos* sp.

Initial comment: from near the base of the shaft exposed in the cliff section, c 15.2m above the beach. One end may be contaminated through long exposure: c 150g in weight; very small after pretreatment.

Objectives: to date the shaft and associated pottery, and relate it to adjacent Neolithic/Bronze Age/Iron Age sites on Belle Tout.

Calibrated date: 1 σ : cal AD 900–1150
2 σ : cal AD 870–1210

Final comment: O Bedwin (12 May 1995), the excavation presented irreconcilable results. From primary ditch silts all the flintwork was Neolithic, the snail fauna contained species thought to have been present only post-AD 43, and the radiocarbon date was in the late Saxon range.

Berinsfield: Mount Farm, Oxfordshire

Location: SU 584968
Lat. 57.39.59 N; Long. 01.09.20 W, 1

Project manager: G H Lambrick (Oxfordshire
Archaeological Unit), 1978

Archival body: NMRC (microfiche), Ashmolean
Museum, Oxford

Description: a multi-phased site from which the series of samples put forward for radiocarbon dating span from early-mid Neolithic activity through to Saxon, including an oval barrow with middle Neolithic and Beaker burials; early to late Neolithic pits; an early Bronze Age ring ditch with cremations and inhumations of children and young people; mid-to-late Bronze Age activity associated with the ring ditch and a waterhole cutting it; and a more or less continuous sequence of early Iron Age to later Roman and some Saxon domestic and farming activity, including domestic pits and enclosures, fields, waterholes, and wells.

Objectives: to date accurately the phasing of the site to confirm (or otherwise) the evidence provided during excavation of particular features including burials and further pits and a water hole, including a series of palaeo-environmental deposits.

Final comment: G H Lambrick (21 February 2007), the early Mesolithic determination is anomalous in relation to the presence of cereals and remains inexplicable. Although various ways in which the sample might not reflect the overall character of the deposit or how other errors could

have occurred might be envisaged, it is not possible from the records to establish how the anomaly arose. All the determinations spanning the early Neolithic to later Bronze Age are consistent with other more recent determinations and with the artefactual and stratigraphic evidence, and they provide a very valuable overall sequence for the site, materially enhancing understanding of the structural, artefactual, and palaeo-environmental evidence. The Iron Age determinations present some problems in relation to the dates that would be expected from the pottery but they have very wide 2 σ margins. In one instance (MF 652) there is an interesting possibility of a deposit of articulated animal bone being significantly later than the pottery with which it was associated, perhaps suggesting the pottery was redeposited with soil containing cultural debris not associated with the bones. But in general it is well known that the Iron Age presents particular problems for radiocarbon dating and these determinations were not made with the benefit of more recent significant methodological improvements in pre-treatments and other technical aspects of radiocarbon dating. Although more recent determinations have proved valuable on other Iron Age sites in the region, those from Mount Farm do not either materially help establish the site sequence or provide much help in dating regional pottery characteristics. The one Saxon determination provides another useful date for the long sequence of palaeo-environmental evidence from Mount Farm.

References: Hardiman *et al* 1992
Lambrick 1978
Lambrick 1979
Lambrick 2010

HAR-4673 4460 ±90 BP

$\delta^{13}\text{C}$: -22.9‰

Sample: MF602i, submitted in May 1981 by G H Lambrick

Material: human bone (ribs, sternum, clavicles, and remains of right arm)

Initial comment: from a burial almost certainly contemporary with HAR-4792.

Objectives: to date the burial and thus to compare to the burial represented by HAR-4792.

Calibrated date: 1 σ : 3350–2920 cal BC
2 σ : 3500–2890 cal BC

Final comment: G H Lambrick (21 February 2007), this determination is not contemporary with HAR-4792, but is consistent with an associated assemblage of early to middle Neolithic flints and confirms an interesting addition to a cluster of middle Neolithic inhumation burials in the Stanton Harcourt to Dorchester section of the Upper Thames Valley.

Laboratory comment: Ancient Monuments Laboratory (28 September 2011), a replicate measurement subsequently undertaken on this skeleton (OxA-15748; 4738 ±35 BP) is not statistically consistent with this result ($T'=7.2$, $T'(5\%)=3.8$, $v=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978

HAR-4674 2130 ±80 BP

$\delta^{13}\text{C}$: -23.3‰

Sample: MF328i, submitted in May 1981 by G H Lambrick

Material: animal bone

Initial comment: from a pit apparently containing little redeposited material and is from the same context as MF328ii. Three samples of carbonised residue on pottery from this context have been submitted for dating.

Objectives: to date context within the pit.

Calibrated date: 1 σ : 360–40 cal BC
2 σ : 390 cal BC–cal AD 50

Final comment: G H Lambrick (21 February 2007), the early Iron Age character of the pottery from this pit would suggest a date at the beginning of, or earlier than, the 2 σ date range. The second sample was not processed and no results emerged from the material submitted (it is understood these and other sherds with carbonised residue were used for testing pre-treatment procedures).

HAR-4790 2210 ±80 BP

$\delta^{13}\text{C}$: -23.0‰

Sample: MF1181(1), submitted in May 1981 by G H Lambrick

Material: bone

Initial comment: from a pit containing a useful group of pottery with little sign of redeposited material being present.

Objectives: to assist pottery dating of the pit contents.

Calibrated date: 1 σ : 390–170 cal BC
2 σ : 410–40 cal BC

Final comment: G H Lambrick (21 February 2007), the early Iron Age character of the pottery from this pit would suggest a date in the earlier part of the 2 σ date range (or earlier).

HAR-4791 3170 ±70 BP

$\delta^{13}\text{C}$: -23.2‰

Sample: MF161i, submitted in May 1981 by G H Lambrick

Material: human bone (ribs, sternum, clavicles, and feet bones)

Initial comment: from a burial possibly contemporary with HAR-4796, but stratigraphically later than HAR-4819 (MF160i) which failed.

Objectives: to check if it is contemporary with HAR-4796.

Calibrated date: 1 σ : 1510–1390 cal BC
2 σ : 1620–1290 cal BC

Final comment: G Lambrick (1992), a bone from one inhumation was dated to 3710 ±100 BP (HAR-4791; calibrated date: 1 σ : 2290–1970 cal BC, 2 σ : 2460–1820 cal BC; Pearson and Stuiver 1986), whereas charcoal from a cremation in a small middle Bronze Age urn yielded an earlier date (HAR-4822; 3380 ±100 BP; calibrated date: 1 σ : 1870–1520 cal BC, 2 σ : 1940–1440 cal BC; Pearson and Stuiver 1986). However, the second date may be too early, as it is one of four charcoal samples in the sequence, of which the other three are anomalously early.

Final comment: G H Lambrick (21 February 2007), further determinations on burials associated with the ring ditch and specialist analysis of the pottery indicate that this determination is consistent with the other dates associated with the ring ditch.

References: Hardiman *et al* 1992, 57
Pearson and Stuiver 1986

HAR-4792 3710 ±90 BP

$\delta^{13}\text{C}$: -23.9‰

Sample: MF618i, submitted in May 1981 by G H Lambrick

Material: human bone (ribs, sternum, clavicles and feet bones)

Initial comment: from a burial contemporary with HAR-4673.

Objectives: to date the burial and avail results for comparison to HAR-4673.

Calibrated date: 1 σ : 2280–1970 cal BC
2 σ : 2460–1880 cal BC

Final comment: G H Lambrick (21 February 2007), consistent with a Beaker and other grave goods, including other determinations from the burial (OxA-15747; 3814 ±34 BP) and from an associated boars tusk pendant (OxA-15787; 3836 ±32 BP).

HAR-4793 1980 ±90 BP

Sample: MF652i, submitted in May 1981 by G H Lambrick

Material: human bone

Initial comment: these bones were articulated and are therefore most unlikely to be redeposited from earlier periods; this pit also produced sample MF652ii stratified immediately below it. A good group of pottery was found associated with MF652i.

Objectives: to date an Iron Age deposit with an unusual group of articulated bones as well as a useful group of pottery as part of a number of samples seeking to provide absolute dating for the Iron Age activity at Mount Farm.

Calibrated date: 1 σ : 90 cal BC–cal AD 130
2 σ : 210 cal BC–cal AD 240

Final comment: G H Lambrick (21 February 2007), the middle Iron Age or later date for this assemblage of bones is unexpected relative to the anticipated early Iron Age date for the pottery assemblage. Unfortunately MF652ii was not dated. If the radiocarbon date is correct, it suggests that the deposition of the articulated bones was a separate event from the period when most of the pottery entered the ground. This is quite plausible if the pottery was derived from an area of early Iron Age activity redeposited in the soil used to backfill the pit. The result indicates a need to be cautious in assuming the 'special' deposits of articulated bone in discrete features are contemporary with the contents of the soil used to bury them, and that there may be difficulties in detecting patterns of redeposition from Iron Age pottery.

HAR-4794 2100 ±80 BP

$\delta^{13}\text{C}$: -22.5‰

Sample: MF505i, submitted in May 1981 by G H Lambrick

Material: animal bone (unidentified)

Initial comment: from a recut ditch containing a high concentration of contemporary rubbish. Sample MF505ii is from another part of the same deposit. Two samples of pottery with organic inclusions were also submitted for dating.

Objectives: to provide dating to the deposit of this pit.

Calibrated date: 1 σ : 350 cal BC–cal AD 1
2 σ : 380 cal BC–cal AD 70

Final comment: G H Lambrick (21 February 2007), the later middle Iron Age character of the pottery from this ditch is consistent with the middle to latter end of the part of the 2 σ date range. The second sample was not processed and no results emerged from the material submitted (it is understood these and other sherds with carbonised residue were used for testing pre-treatment procedures).

HAR-4795 2330 ±70 BP

Sample: MF676i, submitted in May 1981 by G H Lambrick

Material: bone

Initial comment: this sample is from a layer in the top of a sequence of waterholes, which contained a useful group of pottery incorporating little or no redeposited material. Carbonised residue from one pottery vessel was submitted for dating.

Objectives: to contribute to the dating of assemblages of Iron Age pottery, in this case form one of a series of waterholes.

Calibrated date: 1 σ : 410–370 cal BC
2 σ : 740–200 cal BC

Final comment: G H Lambrick (21 February 2007), The result is consistent with the expected middle Iron Age date for the pottery assemblage, but the probability range is much too broad, even at 1 σ , to provide any useful clarification.

HAR-4796 3080 ±90 BP

$\delta^{13}\text{C}$: -20.4‰

Sample: MF101i, submitted in May 1981 by G H Lambrick

Material: animal bone (unidentified)

Initial comment: from a ring ditch, which contained fragments of a middle Bronze Age bucket urn and surrounded several burial deposits.

Objectives: to date and thus provide information with which to correlate to other findings in the stratigraphic context of the ring ditch; also to check if contemporaneous with HAR-4791.

Calibrated date: 1 σ : 1440–1210 cal BC
2 σ : 1530–1050 cal BC

Final comment: G H Lambrick (1992), the ring ditch was stratigraphically earlier than a late Bronze Age waterhole dated to 3000 ±90 BP (HAR-4797). Thus, HAR-4796 entirely agrees with other dates in the sequence on samples

of bone and waterlogged wood. Very few middle Bronze Age ring ditches in the upper Thames Valley have been dated; good stratigraphic and artefactual associations of the site make this date a valuable contribution to the chronology of the region.

Final comment: G H Lambrick (21 February 2007), this determination was on animal bone which appeared to be debris from domestic or possibly feasting activity in the secondary fill of the ditch. It is consistent with slightly earlier dates for the funerary deposits within the ring ditch, which is likely to make it somewhat earlier Bronze Age in origin.

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Hardiman *et al* 1992, 57
Otlet *et al* 1983

HAR-4797 3000 ±80 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: MF162i, submitted in May 1981 by G H Lambrick

Material: wood (waterlogged; possibly *Quercus* sp., consisting of sapwood and some heartwood cover, approximately 5–10 rings)

Initial comment: the outer part of a large piece of wood (possibly *Quercus* sp.) consisting of sapwood and some heartwood cover approximately 5–10 rings. HAR-4798 is from the same context and may be part of the same tree. These samples are stratigraphically later than HAR-4796 and are from the bottom of a waterhole.

Objectives: to provide dating to the stratigraphic unit thought to be a late Bronze Age waterhole.

Calibrated date: 1 σ : 1390–1120 cal BC
2 σ : 1440–1000 cal BC

Final comment: G H Lambrick (1992), a satisfactory date; confirming the mid to late Bronze age date for the waterhole.

HAR-4798 2850 ±70 BP

$\delta^{13}\text{C}$: -26.2‰

Sample: MF162ii, submitted in May 1981 by G H Lambrick

Material: wood (waterlogged; remaining subsample now dried and collapsed) (R Gale 1999)

Initial comment: as HAR-4797. This sample is from the outer part of a tree (possibly *Quercus* sp.) and consists of c 10–15 rings, though with less sapwood than HAR-4797.

Objectives: to provide accurate dating to the stratigraphic unit of the late Bronze Age waterhole.

Calibrated date: 1 σ : 1130–910 cal BC
2 σ : 1260–830 cal BC

Final comment: G H Lambrick (1992), a satisfactory dating result for the waterhole, confirming mid to late Bronze Age date.

Final comment: A Bayliss (25 July 2007), the two radiocarbon results from the base of waterhole MF162 are statistically consistent (T'=2.0; T'(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

HAR-4799 1420 ±80 BP

Sample: MF821i, submitted in May 1981 by G H Lambrick

Material: wood (waterlogged): unidentified, c 10 rings

Initial comment: stakes from a wattle-lined well (part retained for identification). Bark visible c 10 rings each.

Objectives: to date a Saxon wattle-lined well from which useful palaeo-environmental data were recovered.

Calibrated date: 1σ: cal AD 560–670
2σ: cal AD 430–770

Final comment: G H Lambrick (21 February 2007), the result is consistent with the probable date of a general pottery assemblage from other features which provide evidence of some domestic activity on the site, and is useful in confirming the date of the palaeo-environmental evidence.

Laboratory comment: English Heritage (3 January 2012), this result is reported in a letter from AERE Harwell to the submitter, but no certificate has been found. It is unclear whether this was a preliminary result.

HAR-4819 5120 ±110 BP

Sample: MF160i, submitted in August 1981 by G H Lambrick

Material: charcoal: unidentified

Initial comment: stratigraphically earlier than MF161I.

Objectives: to date Neolithic activity on the site represented by a significant assemblage of flintwork, carbonised plant remains, and some animal bones in a pit F160 which was spatially related to a post ring, and stratigraphically earlier than a burial (MF161 is thought to be contemporary with a surrounding ring ditch, MF101).

Calibrated date: 1σ: 4040–3780 cal BC
2σ: 4240–3650 cal BC

Final comment: G H Lambrick (21 February 2007), the results provide very useful clarification that the pit and its contents were early to middle Neolithic, which is consistent with character of the flintwork, and adds confirmation of the use of the site at this period, also reflected in the similar result for MF38, and the somewhat younger dates for middle Neolithic burial MF602.

Laboratory comment: English Heritage (3 January 2012), this result is reported in a letter from AERE Harwell to the submitter, but no certificate has been found. It is unclear whether this was a preliminary result.

HAR-4820 8960 ±100 BP

$\delta^{13}\text{C}$: -25.2‰

Sample: MF343i, submitted in August 1981 by G H Lambrick

Material: charcoal (remaining subsample contained insufficient material for identification): unidentified (R Gale 1999)

Initial comment: this sample is from a pit.

Objectives: to contribute to the dating of a series of Neolithic pits containing carbonised plant remains.

Calibrated date: 1σ: 8290–7960 cal BC
2σ: 8320–7750 cal BC

Final comment: G H Lambrick (21 February 2007), this pit produced a bone pin and five grains of six-row barley and seven of wheat, and 640 fragments of hazelnut (identified by M Jones). The carbonised remains are very consistent in character with other Neolithic samples from the site. It is perhaps conceivable that these were intrusive in a small hollow with Mesolithic charcoal, or that the pit disturbed a pre-existing deposit containing Mesolithic charcoal, or that there was some other problem with this sample. The result is substantially inconsistent with the presence of cereals in this deposit. With one exception, there was no Mesolithic flintwork from the site. The date is best treated as anomalous.

HAR-4821 5030 ±90 BP

Sample: MF38i, submitted in August 1981 by G H Lambrick

Material: charcoal: unidentified

Initial comment: from a pit with Neolithic flintwork.

Objectives: to date Neolithic activity on the site represented by a significant assemblage of flintwork, carbonised plant remains, and some animal bones in a pit F38.

Calibrated date: 1σ: 3960–3700 cal BC
2σ: 4040–3640 cal BC

Final comment: G H Lambrick (21 February 2007), the result provides very useful clarification that the pit and its contents were early to middle Neolithic, which is consistent with character of the flintwork, and adds confirmation of the use of the site at this period, also reflected in the similar result for MF160, and the somewhat younger dates for middle Neolithic burial MF602.

HAR-4822 3380 ±100 BP

Sample: MF121i, submitted in August 1981 by G H Lambrick

Material: charcoal: unidentified

Initial comment: from a cremation burial within a ring ditch.

Objectives: to contribute (with other determinations) to the dating of the use of the ring ditch F101 as a burial place.

Calibrated date: 1σ: 1870–1520 cal BC
2σ: 1940–1440 cal BC

Final comment: G H Lambrick (21 February 2007), the result is consistent with other indications (eg MF161) of the use of the ring ditch for burials in the early to middle Bronze Age, which is consistent with the character of the small urns accompanying some of the burials and cremations, including this one.

Laboratory comment: English Heritage (3 January 2012), this result is reported in a letter from AERE Harwell to the submitter, but no certificate has been found. It is unclear whether this was a preliminary result.

Beverley: Eastgate, Humberside

Location: TA 03803935
Lat. 53.50.23 N; Long. 00.25.20 W

Project manager: P Armstrong (Humberside County Council Archaeology Unit), 1984

Archival body: Hull and East Riding Museum

Description: medieval burgage tenements. The site lay within a water-filled hollow or channel. Two small north-to-south ditches of indeterminate date were cut probably in an attempt to reclaim and drain the area. Wattle fences and drainage gullies set out on an east-to-west alignment marked a change in land use later in the tenth or eleventh centuries and set the pattern for the first time for the burgage tenement development which was to follow.

Objectives: there was evidence for local settlement on the margins of this wet ground, perhaps in the Anglo-Saxon or early Viking period of Beverley's history. This could correspond to the eighth century AD developments recorded at Lurk Lane south of the Minster, but the possibility remains that it may represent an even earlier period of human occupation, which we do not yet fully understand.

Final comment: D Evans (December 1994), three out of the four radiocarbon dates from this site are entirely consistent with other dating evidence; however, HAR-7069 is anomalous, and appears to be too early. The other two pre-Conquest dates (HAR-7067 and HAR-7068) were invaluable in providing a middle Saxon bracket for a process of gradual land reclamation of a natural pond, which otherwise yielded little dating evidence. The one post-Conquest date (HAR-7070) corroborated the dating suggested by other forms of evidence. Radiocarbon dating will help establish a chronology for the occupation of this site where no other artefactual based chronology is possible.

References: Evans and Tomlinson 1992
Walker *et al* 1990, 187

HAR-7067 1280 ±70 BP

$\delta^{13}C$: -28.9‰

Sample: BE84/752, submitted in November 1985 by P Armstrong

Material: wood (waterlogged; remaining subsample now dried and collapsed, probably all narrow roundwood) (R Gale 1999)

Initial comment: from a scatter of chippings of wood and twigs overlying an apparently natural silt and peat formation and sealed by a further deposit of peat. It represents the earliest horizon in which occupation of the site was identified.

Objectives: to establish a chronology for the occupation of the site where no other artefactual based chronology is possible. A date older than the tenth century AD is anticipated.

Calibrated date: 1 σ : cal AD 660–810
2 σ : cal AD 640–900

Final comment: D Evans (December 1994), this sample was taken from wood and twigs in phase 1 layer 752, overlying peat and silt deposits in the top of the pond. It represents the initial reclamation of a pond, and could be shown to be

earlier than the mid-eighth century on other grounds. The result suggests a middle Saxon date range for activity, which otherwise could not be closely dated; however, this is consistent with what is known of activity in this part of the town at this period.

HAR-7068 1200 ±70 BP

$\delta^{13}C$: -30.5‰

Sample: BE84/751, submitted in November 1985 by P Armstrong

Material: peat

Initial comment: from a deposit of compact peat up to 35cm in thickness, which formed above a thin primary silt within a natural hollow. The peat appears to be a natural formation. This sample was above HAR-7067 and below HAR-7069.

Objectives: as HAR-7067

Calibrated date: 1 σ : cal AD 700–940
2 σ : cal AD 660–990

Final comment: D Evans (December 1994), this sample was taken from a deposit of compact dung (751) overlying 752 (the layer sampled for HAR-7067). It belongs to the earlier part of phase 2, which is dated on other grounds to the period from the mid-eighth to the late eleventh centuries AD. The result is entirely consistent with the other dating evidence from this phase and provides a date for part of a sequence of local reclamation on the site.

HAR-7069 1470 ±70 BP

$\delta^{13}C$: -28.0‰

Sample: BE84/1621, submitted in November 1985 by P Armstrong

Material: wood (waterlogged; remaining subsample now dried and collapsed, probably all narrow roundwood) (R Gale 1999)

Initial comment: from a bundle of wattles lying at the bottom of a ditch cutting through a peaty deposit assumed to be natural, the ditch being for drainage reclamation purposes and therefore representative of the period of early settlement. This sample was above HAR-7068, but below HAR-7070.

Objectives: as HAR-7067

Calibrated date: 1 σ : cal AD 540–650
2 σ : cal AD 420–670

Final comment: D Evans (December 1994), this sample was taken from a bundle of wattles in a phase 2 gully 1599 (context 1621), and is clearly anomalous. It derives from a feature belonging to a phase dated on other grounds to the period from the mid-eighth to the late-eleventh centuries. It should have produced a date later than HAR-7068, which came from the top of a feature, which it cut; however, even at 95% confidence, the result is far too early. There is no clear reason why this should be anomalous.

HAR-7070 1000 ±70 BP

$\delta^{13}C$: -28.4‰

Sample: BE84/4526, submitted in November 1985 by P Armstrong

Material: wood (waterlogged; remaining subsample now dried and collapsed, mostly roundwood) (R Gale 1999)

Initial comment: from a curving hurdlework fence representing the first enclosing feature on the site in which remained a heavily organic soil condition with a high water table.

Objectives: to establish a chronology for the occupation of the site where no other artefactual based chronology is possible. A date in the region of the tenth to eleventh century AD is anticipated.

Calibrated date: 1 σ : cal AD 980–1160
2 σ : cal AD 890–1210

Final comment: D Evans (December 1994), this sample came from a wattle fence lining the side of a phase 3 gully 1526. On other grounds, phase 3 can be clearly shown to date from the late eleventh to the early twelfth centuries. This result is entirely consistent with other dating evidence, including a dendrochronological determination of AD 1100–40 for a plank, which was in contemporary use with this fence.

Beverley: Lurk Lane, Humberside

Location: TA 03793919
Lat. 53.50.18 N; Long. 00.25.21 W

Project manager: P Armstrong (Humberside County Council Archaeology Unit), 1980–2

Archival body: Hull and East Riding Museum

Description: within an area of rough grassland on the south side of Beverley Minster, separated from the church by a thoroughfare known as Minster Yard South. Residential development in 1978 gave rise to the excavation.

Objectives: both during and after excavation, stratified sequences were seen to be flawed by the presence of apparently intrusive material. Radiocarbon dates were submitted in order to help clarify periods of use.

Final comment: D Evans (February 1995), in general, all of these samples were consistent with other dating evidence from the site, with the single exception of HAR-4814. The pre-Conquest dates were invaluable for providing a check against the suggested dating from associated artefacts, and for confirming that the excavated remains fell into the middle Saxon and late Saxon periods. The post-Conquest dates were less useful, as in many cases, more precise dating was supplied by other methods (dendrochronology, archaeomagnetism, and associated coins and pottery); however, they did provide an independent form of corroboration of those dates.

Laboratory comment: (25 July 2007), another result has been reported from Lurk Lane (HAR-4944; 850 \pm 60 BP; calibrated date: 1 sigma: cal AD 1150–1260, 2 sigma: cal AD 1020–1280 (Reimer *et al* 2004)), although no trace of this sample can be found in the site archive, and so this may be a clerical error).

References: Armstrong *et al* 1991
Reimer *et al* 2004

HAR-4811 990 \pm 60 BP

$\delta^{13}\text{C}$: -24.6‰

Sample: LL799, submitted in October 1981 by P Armstrong

Material: wood (waterlogged; remaining sample now dried and collapsed and composed of log slivers): *Quercus* sp., heartwood (8.36g, 100%) (R Gale 1999)

Initial comment: from a post stump in posthole 799 in the northern pentice of the phase 6B aisled hall. J Hillam (Sheffield University) reports that post 799 is from a tree with a growth period of at 150 years when felled. This is based on a count of 119 annual growth rings (average width 1.54mm) and no sapwood.

Objectives: to date phase 6B.

Calibrated date: 1 σ : cal AD 990–1160
2 σ : cal AD 900–1180

Final comment: D Evans (February 1995), independent dating evidence (including dendrochronology) showed the occupation of phase 6B to encompass a date range of *c* AD 1135–1180. The calibrated date range for this sample at 95% confidence would thus include the period of construction of this building (*c* AD 1135).

HAR-4812 1230 \pm 70 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: LL1424, submitted in October 1981 by P Armstrong

Material: wood (waterlogged; remaining sample now dried and collapsed): *Quercus* sp. (4.68g, 100%); unidentified (35.43g) (R Gale 1999)

Initial comment: from wood found in secondary deposits in the phase 2 ditch 1427 (context 1424).

Objectives: to date phase 2 of the occupation.

Calibrated date: 1 σ : cal AD 680–890
2 σ : cal AD 650–980

Final comment: D Evans (February 1995), an Anglian monastery was established on the site in about AD 700. This sample represents secondary silting within one of the monastic ditches. The calibrated date range is in agreement with all of the other evidence from this phase of the site (early eighth century AD).

HAR-4813 1140 \pm 70 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: LL1418, submitted in October 1981 by P Armstrong

Material: wood (waterlogged; remaining sample now dried and collapsed): *Quercus* sp., sapwood (8.46g, 100%); unidentified (14.80g) (R Gale 1999)

Initial comment: this sample was collected from organic material from the clay plug over ditch 1290 (context 1418) in phase 4A.

Objectives: to date phase 4A of the occupation.

Calibrated date: 1 σ : cal AD 770–990
2 σ : cal AD 680–1030

Final comment: D Evans (February 1995), independent dating evidence (including a coin hoard) suggests that this phase ended in the mid-ninth century AD (in or shortly after AD 851). The date range for phase 4A is early-mid-ninth century, and this plug should belong towards the end of the phase. The calibrated date ranges for this sample are in accord with all of the other evidence.

HAR-4814 1540 ±70 BP

$\delta^{13}\text{C}$: -27.9‰

Sample: LL1325B, submitted in October 1981 by P Armstrong

Material: wood (waterlogged; remaining sample comprising one piece, now dried and collapsed): *Quercus* sp., heartwood (41.47g, 100%) (R Gale 1999)

Initial comment: from a line of stakes adjoining the phase 4A ditch 1290 (context 1325B).

Objectives: to date phase 4A of the occupation.

Calibrated date: 1 σ : cal AD 420–610
2 σ : cal AD 380–650

Final comment: D Evans (February 1995), the result is a complete anomaly. The context was early-mid ninth century, and the expected date range of the sample should have been similar to that of HAR-4813. Even at 95% confidence, the calibrated date range does not extend into the expected date of the context. Had this been taken from a large timber, then there might have been the possibility that it represented the heartwood from a large tree; however, as the sample is from small stakes, that explanation is not possible.

HAR-4815 1110 ±90 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: LL1234, submitted in October 1981 by P Armstrong

Material: wood (waterlogged): unidentified

Initial comment: taken from wood found in the secondary fill of phase 4B ditch 1242 (context 1234).

Objectives: to date phase 4B of the occupation.

Calibrated date: 1 σ : cal AD 780–1020
2 σ : cal AD 680–1150

Final comment: D Evans (October 1981), phase 4B on this site has been dated to the later ninth and early tenth centuries AD, on the basis of its associated finds. This particular sample is taken from wood detritus, which appears to represent the collapse of a revetment into the ditch in the second half of the ninth century. The calibrated date range of the sample is thus in accord with the other dating evidence.

HAR-4816 1060 ±70 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: LL1165, submitted in October 1981 by P Armstrong

Material: charcoal (remaining sample now friable and comminuted): unidentified (14.40g); *Quercus* sp., sapwood

(0.78g, 28.5%); *Quercus* sp., heartwood (1.96g, 71.5%) (R Gale 1999)

Initial comment: this sample was taken from the timber edges of phase 5A hearth 1190 (context 1165). This sample can be compared with HAR-4817 and HAR-4818.

Objectives: to date phase 5A of the occupation.

Calibrated date: 1 σ : cal AD 890–1030
2 σ : cal AD 780–1160

Final comment: D Evans (February 1995), the suggested date range from phase 5A is from the tenth to the early eleventh centuries. A weighted mean date range of cal AD 885–985 from this phase (HAR-4816, HAR-4817, and HAR-4818) is thus in agreement with other dating evidence.

HAR-4817 1130 ±80 BP

$\delta^{13}\text{C}$: -26.4‰

Sample: LL1164, submitted in October 1981 by P Armstrong

Material: charcoal (remaining sample identified): unidentified (40.64g); *Quercus* sp., sapwood (1.10g, 2.2%); *Quercus* sp., heartwood (49.91g, 97.8%) (R Gale 1999)

Initial comment: from the silt of a phase 5A ditch, III (context 599). This sample can be compared with HAR-4816 and HAR-4818.

Objectives: to date phase 5A of the occupation.

Calibrated date: 1 σ : cal AD 770–1000
2 σ : cal AD 680–1030

Final comment: see HAR-4816.

HAR-4818 1180 ±90 BP

$\delta^{13}\text{C}$: -26.4‰

Sample: LL599, submitted in October 1981 by P Armstrong

Material: animal bone

Initial comment: from the silt of a phase 5A ditch, III (context 599). This sample can be compared with HAR-4816 and HAR-4817.

Objectives: to date phase 5A of the occupation.

Calibrated date: 1 σ : cal AD 710–980
2 σ : cal AD 650–1030

Final comment: D Evans (February 1995), this phase has been ascribed a date range of the tenth to the early eleventh centuries AD, and ditch III was cut during the course of the phase rather than at its inception; a tenth-century date for this feature would be acceptable and in accordance with the ceramic and numismatic evidence from the phase. Hence the radiocarbon determination, as published, falls within the anticipated date range.

HAR-4935 630 ±80 BP

$\delta^{13}\text{C}$: -28.1‰

Sample: LL86130, submitted in October 1981 by P Armstrong

Material: wood (waterlogged): twig

Initial comment: from fill 86 of a phase 8 garderobe (the same context as HAR-4936).

Objectives: to date phase 8 of the occupation, anticipated to be fifteenth century AD.

Calibrated date: 1 σ : cal AD 1280–1410
2 σ : cal AD 1250–1440

Final comment: D Evans (February 1995), the anticipated fifteenth-century date of this context falls just within the calibrated date range at 68% confidence, but is better covered at 95% confidence. In reality, a far better guide to the dating of this context was offered by the ceramic evidence, rather than the radiocarbon determinations, whilst, of the two samples (HAR-4935 and HAR-4936), HAR-4936 appeared to correspond better with the other dating evidence for this feature.

HAR-4936 460 \pm 80 BP

$\delta^{13}C$: -28.1‰

Sample: LL86130, submitted in March 1982 by P Armstrong

Material: wood (waterlogged): twig

Initial comment: from fill 86 of a phase 8 garderobe.

Objectives: as HAR-4935

Calibrated date: 1 σ : cal AD 1410–1480
2 σ : cal AD 1300–1640

Final comment: D Evans (February 1995), other dating evidence shows that the occupation of phase 8 spanned the period *c* AD 1400–1500, and that this garderobe was clearly in use during this period. The date is consistent with the other dating evidence.

Final comment: A Bayliss (25 July 2007), the two radiocarbon results from the fill 86 of garderobe LL86130 are statistically consistent ($T'=2.3$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

Bidford-on-Avon: Lloyds Bank Site VII, Warwickshire

Location: SP 102521
Lat. 52.10.00 N; Long. 01.51.03 W

Project manager: S M Hirst, 1978

Archival body: Warwickshire Museums

Description: this site is adjacent to and east of the site of a well-known pagan Saxon cemetery (late fifth/sixth century into seventh century AD). Four burials with heads to the west and no grave goods were found.

Objectives: the orientation and absence of finds suggested these burials might be of a later date than the adjacent cemetery. The bone report received after two radiocarbon dates had been run (HAR-3452 and HAR-3456; Jordan *et al* 1994, 21) suggested HB9 included at least two individuals, and another bone from which appeared to have been buried much longer. Two further samples from HB9 were run to distinguish between the two individuals buried, and to account for very wide difference in date of first two samples.

Final comment: S M Hirst (26 February 2003), these two dates help to confirm that the likely date of the four burials was mid to late Saxon as predicted. However, the discrepancy in date between the first HB9 sample HAR-3456 (presumably from the 'older bone' 9A) and HAR-8577 (definitely from 9A) is puzzling. Dr Wilkinson said that HB9 could have comprised up to three individuals. Roman cremations were found on the Alsceam site and Roman inhumations would not be surprising as well on this roadside site (Rychneld Street). The presence of an Iron Age burial as well is more surprising, but there is some Iron Age material in the vicinity.

Laboratory comment: Ancient Monuments Laboratory (1995), two further dates from this site, HAR-3452 and HAR-3456 were published in the first volume of *Radiocarbon Dates* (Jordan *et al* 1994, 21).

References: Jordan *et al* 1994, 21
Walker *et al* 1991a, 101

HAR-8576 1150 \pm 70 BP

$\delta^{13}C$: -19.9‰

Sample: B1DHB9B, submitted in July 1987 by S Hirst

Material: human bone (Dr Wilkinson)

Initial comment: from the same context as HAR-8577 but thought to have been buried longer. HAR-3456 (1960 \pm 70 BP; 160 cal BC–cal AD 220 at 95% confidence; Stuiver and Pearson 1986) was from the same context but it was not clear whether it came from skeleton HB9A or HB9B. HAR-3452 (1210 \pm 80 BP; cal AD 650–1000 at 95% confidence; Stuiver and Pearson 1986) gave a much younger date for bone from a nearby skeleton from the same burial group. The date given by HAR-3452 seems the most likely one, ie a middle-late Saxon burial ground, succeeding the early Anglo-Saxon cemetery to the west.

Objectives: to clarify the two previous dates HAR-3452 and HAR-3456.

Calibrated date: 1 σ : cal AD 770–990
2 σ : cal AD 680–1030

Final comment: S M Hirst (26 February 2003), confirms mid to late Saxon date for four orientated burials.

References: Stuiver and Pearson 1986

HAR-8577 1650 \pm 80 BP

$\delta^{13}C$: -21.3‰

Sample: BIDHB9A, submitted in July 1987 by S Hirst

Material: human bone (Dr Wilkinson)

Initial comment: from the same context as HAR-8576 but thought to be younger. *See* HAR-8576.

Objectives: as HAR-8576

Calibrated date: 1 σ : cal AD 260–540
2 σ : cal AD 220–580

Final comment: S M Hirst (26 February 2003), the discrepancy with HAR-3456 suggested the possibility that the Saxon burial HB9B had disturbed both a Roman and an Iron Age burial.

Binchester cemetery, Durham

Location: NZ 210313
Lat. 54.40.34 N; Long. 01.40.27 W

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

Archival body: Bowes Museum, Barnard Castle

Description: Roman fort of first to fourth/fifth century AD date, with subsequent sub-Roman and Anglo-Saxon activity, and subsequent medieval settlement.

Objectives: this sample series was submitted in order to determine whether these burials, without grave goods, were part of a large Anglo-Saxon cemetery at Binchester.

Final comment: P Marshall (9 November 2009), the four measurements from these burials are statistically consistent $T'=6.1$; $T'(5\%)=7.8$; $v=3$; Ward and Wilson 1978) and could be of the same actual age.

References: Ferris 2010
Ferris and Jones 1980
Ferris and Wilson 2000
Ward and Wilson 1978

HAR-4587 1210 ±80 BP

$\delta^{13}C$: -21.7‰

Sample: V71AT, submitted in 1981 by R F J Jones

Material: human bone

Initial comment: a mature adult ?female from one of a group of skeletons, together with V71HD (HAR-4588) and V71GZ (HAR-4589), which were found about 25m north of 789G1SK2 (HAR-4590).

Objectives: to establish whether the burials represented by HAR-4587, HAR-4588, HAR-4589, and HAR-4590, are contemporary.

Calibrated date: 1 σ : cal AD 680–940
2 σ : cal AD 650–1000

Final comment: I M Ferris (31 January 2007), the date result confirmed that these burials were indeed contemporary.

HAR-4588 1020 ±90 BP

$\delta^{13}C$: -21.7‰

Sample: V71HD, submitted in 1981 by R F J Jones

Material: human bone

Initial comment: from a deposit of human bone containing a minimum of four individuals from one of a group of skeletons which were found about 25m north of 789G1SK2 (HAR-4590).

Objectives: as HAR-4587

Calibrated date: 1 σ : cal AD 900–1160
2 σ : cal AD 780–1220

Final comment: I M Ferris (31 January 2007), see HAR-4587

HAR-4589 1070 ±80 BP

$\delta^{13}C$: -21.0‰

Sample: V71GZ, submitted in 1981 by R F J Jones

Material: human bone

Initial comment: as HAR-4587

Objectives: as HAR-4588

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

Final comment: I M Ferris (31 January 2007), see HAR-4587

HAR-4590 1260 ±70 BP

$\delta^{13}C$: -21.7‰

Sample: 789G1SK2, submitted in 1981 by R F J Jones

Material: human bone

Initial comment: this bone is from one of a number of skeletons discovered in a small trench within the area of the Roman fort in 1978. They lay only about 20cm below the surface and had no dating material related to them. However a skeleton discovered in an isolated position about 15m to the south had grave goods, which have been dated to the mid sixth century AD. This skeleton was 25m south of V71AT (HAR-4587), V71HD (HAR-4588), and V71GZ (HAR-4589).

Objectives: as HAR-4587

Calibrated date: 1 σ : cal AD 660–880
2 σ : cal AD 640–950

Final comment: I M Ferris (31 January 2007), see HAR-4587

Binsted, Hampshire

Location: SU 770412
Lat. 51.09.52 N; Long. 00.53.55 W

Project manager: M A B Lyne, 1981

Description: ESSO pipeline site E.P. 27. When digging the trench two shallow pits filled with charcoal and black earth were discovered. The western feature contained middle Iron Age saucepan pot fragments and the eastern had late Iron Age Atrebatian wares: both features appeared to be primitive pottery firing structures.

Objectives: to see if a radiocarbon date would agree with the date suggested by the pottery found in the pits.

References: Cotton and Poulton 1991
Lyne 1991

HAR-4529 1930 ±60 BP

$\delta^{13}C$: -25.8‰

Sample: EP27(1), submitted on 14 July 1981 by M A B Lyne

Material: charcoal: unidentified, twigs and outer parts of charcoal fragments from large timber selected

Initial comment: charcoal from stoke hole of suspected kiln associated with fragments from several pottery vessels in the St Catherine's Hill-Worthy Down 'saucepan' pot tradition and normally dated c 300–50 BC. Twigs and outer parts of charcoal fragments from large timbers were selected.

Objectives: to see if a radiocarbon date would agree with the date suggested by the pottery found in the pit.

Calibrated date: 1 σ : cal AD 1–130
2 σ : 50 cal BC–cal AD 240

Final comment: M A B Lyne (12 December 2006), the radiocarbon date produced a date of 1930 \pm 60 BP. This date is rather later for the ‘saucepan’ pot and might suggest an overlap with the Roman period.

Borwick: Manor Farm, Lancashire

Location: SD 513725
Lat. 54.08.45 N; Long. 02.44.44 W

Project manager: A C H Olivier (University of Lancaster), 1982

Archival body: Lancaster City Museum

Description: excavation of a large circular dished earthwork revealed a substantial Bronze Age funerary monument. The earliest structure of limestone boulders dated to c 1740–1640 cal BC and was associated with parts of two poorly preserved inhumation burials lying on the previously cleared ground surface.

Objectives: to investigate the form and function of the site and establish a chronological framework by comparative data and radiocarbon dates.

Final comment: A C H Olivier (1987), the radiocarbon dates derived from the surface of the subsoil and the two *in situ* inhumations therefore suggest that the monument was constructed and first used during the early Bronze Age. The probable reuse of the cairn as a cremation cemetery at a later date is perhaps implied by the concentrations of cremated bone and pottery fragments; and the dated scatters of inhumed bone indicate a further reuse for interment during the latter part of the late Bronze Age, and also during the post-Roman Dark Age.

Laboratory comment: Ancient Monuments Laboratory (2003), two samples MF82SFF102 (HAR-5660) and MF82SFCB (HAR-7015) submitted for radiocarbon dating but failed.

References: Olivier 1987

HAR-5626 6360 \pm 170 BP

$\delta^{13}\text{C}$: -29.0‰

Sample: MF82SS49, submitted on 2 June 1983 by A Olivier

Material: charcoal: unidentified

Initial comment: from the surface of truncated sub-soil (Stagno-podzol), below the limestone enclosure.

Objectives: to date the preparation of the site immediately prior to the construction of the enclosure.

Calibrated date: 1 σ : 5490–5200 cal BC
2 σ : 5630–4930 cal BC

Final comment: A C H Olivier (1987), this dates the activity from trace of a secondary accumulation of humic horizon (however slight) together with the observed clean surface of the truncated soil (where undisturbed by the later setting

of the cairn). Also suggests that the cleared area was not exposed for any great length of time before deposition of the cairn.

References: Olivier 1987, 135 and 180

HAR-5658 3270 \pm 80 BP

$\delta^{13}\text{C}$: -25.2‰

Sample: MF82SF55, submitted in June 1983 by A Olivier

Material: human bone

Initial comment: from the central inhumation lying on truncated sub-soil (Stagno-podzol), below the main body of cairn material.

Objectives: to date the central and main inhumation, and to provide a date for the use of the enclosure.

Calibrated date: 1 σ : 1640–1450 cal BC
2 σ : 1750–1400 cal BC

Final comment: A C H Olivier (1987), this date and HAR-5661, were from associated material forming the original configuration of burial I. Together with the possible presence of some intrusive material, this date unfortunately suggests that the relationship between this sample and the metalwork should not be overemphasised.

HAR-5659 2580 \pm 110 BP

$\delta^{13}\text{C}$: -22.4‰

Sample: MF82SF52, submitted in June 1983 by A Olivier

Material: human bone

Initial comment: recovered during the removal of the main body of cairn 002, which overlay the limestone enclosure 008.

Objectives: to date a scatter of inhumed bone within the overlying cairn in order to establish whether this material was derived from a burial contemporary with the enclosure, or represents later post-enclosure activity.

Calibrated date: 1 σ : 830–540 cal BC
2 σ : 980–400 cal BC

Final comment: A Olivier (1988), result indicates possible Iron Age reuse of monument.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 302

HAR-5661 3450 \pm 70 BP

$\delta^{13}\text{C}$: -21.0‰

Sample: MF82SF55/B, submitted in July 1983 by A Olivier

Material: animal bone: *Felis sylvestris*

Initial comment: found amongst the human bone of the central excavation (831222).

Objectives: to date the central and main inhumation. This will also provide a date for the use of the enclosure.

Calibrated date: 1 σ : 1890–1680 cal BC
2 σ : 1950–1600 cal BC

Final comment: see HAR-5658

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 302

HAR-6857 3440 ±70 BP

$\delta^{13}\text{C}$: -22.3‰

Sample: MF82SF73, submitted on 19 February 1985 by A Olivier

Material: human bone

Initial comment: part of an *in situ* primary inhumation, located inside a 'cell' within a limestone boulder enclosure; lying directly on truncated subsoil, underlying the main body of the cairn material.

Objectives: the central inhumation in a primary stratigraphic location MF82SF55 was associated with an early Bronze Age flat axe and dagger. The metalwork specialist does not regard the radiocarbon date derived from this context, HAR-5658, as consistent with the date of the bronzes. Unfortunately the entire surviving portion of this burial was required for processing, and it is not possible therefore to obtain a second date from this context. The second *in situ* inhumation (HAR-6857) was also associated with a flat dagger of similar form to the one recovered from the central inhumation. Although a direct relationship between these two burials cannot definitely be proven, they are both in a primary stratigraphic position and likely to be broadly contemporary. It is hoped that a date derived from HAR-6857 may resolve the problems relating to the date of HAR-5658.

Calibrated date: 1 σ : 1880–1660 cal BC
2 σ : 1940–1530 cal BC

Final comment: A Olivier (1990), central burial included early Bronze Age flat axe and dagger as did second *in situ* burial. Although a direct relationship between these two burials cannot definitely be proven they are both in a primary stratigraphic position and likely to be broadly contemporary.

References: Walker *et al* 1990, 175

HAR-7012 1530 ±90 BP

$\delta^{13}\text{C}$: -21.7‰

Sample: MF82SF44, submitted in April 1986 by A Olivier

Material: human bone

Initial comment: from an inhumation recovered during the removal of the main body of cairn (002), which overlay the limestone enclosure 008.

Objectives: to establish the extent of possible Iron Age reuse (HAR-5659) of the Bronze Age burial monument (HAR-5626, HAR-5658, and HAR-5661). See also HAR-7013 and HAR-7014. The samples could result from later intrusion into the main part of the cairn.

Calibrated date: 1 σ : cal AD 420–630
2 σ : cal AD 330–670

Final comment: A Olivier (1990), dates HAR-7012 to HAR-7014 come from a scatter of human bone recovered during removal of main body of cairn (002), which overlay limestone enclosure (008). Samples were dated to establish extent of possible Iron Age reuse (HAR-5659) of Bronze Age burial monument (HAR-5626, HAR-5658, and HAR-5661: 1680 BC, 1320 BC, and 1430 BC). These samples could result from later intrusion into main part of cairn.

References: Walker *et al* 1990, 175

HAR-7013 1220 ±90 BP

$\delta^{13}\text{C}$: -23.0‰

Sample: MF82SF46, submitted in April 1986 by A Olivier

Material: human bone

Initial comment: as HAR-7012.

Objectives: as HAR-7012

Calibrated date: 1 σ : cal AD 670–940
2 σ : cal AD 640–1020

Final comment: A Olivier (1990), see HAR-7012. The date suggests that this bone scatter is the result of more recent activity and is entirely unrelated to the function of the underlying enclosure.

References: Walker *et al* 1990, 176

HAR-7014 2690 ±100 BP

$\delta^{13}\text{C}$: -23.0‰

Sample: MF82SFBB, submitted in April 1986 by A Olivier

Material: human bone

Initial comment: as HAR-7012

Objectives: as HAR-7012

Calibrated date: 1 σ : 930–790 cal BC
2 σ : 1060–570 cal BC

Final comment: see HAR-7012

References: Walker *et al* 1990, 176

Brandon: Staunch Meadow, Suffolk

Location: TL 778864
Lat. 52.26.46 N; Long. 00.36.59 E

Project manager: A Tester (Suffolk Archaeological Unit), 1981–2, 1984–5

Description: a middle Saxon settlement including buildings, an industrial area, church, and attendant cemeteries all concentrated within a readily defined island. The occupation of the bulk of the site is restricted to the middle Saxon period. The settlement sits beside a 1km wide arm of the Fenland which follows the valley of the Little Ouse river c 6km inland from Hockwold Fen; Brandon was probably the lowest crossing point of the river Ouse until recent times. The site occupies a sand ridge surrounded by peat, and stands as an island in time of flood. The river is some 50m north of the 'island' while the southern margin of the peat

deposits (ie the edge of the floodplain) is c 80m to the south. The island is c 350m east-west by 150m north-south at its widest point with an area of some 4.75ha; of this c 1.5ha at the west end appears to have been unoccupied and a further c 1.25ha at the east end of the island has been scheduled as an Ancient Monument.

Objectives: the samples submitted were from valley sediments, charcoal layers of wooden structures on floodplain adjacent to site. The intention was to date palaeoecological results and to establish dates for the structures.

Final comment: P L Murphy (6 June 2003), HAR-5071, HAR-5072, and HAR-6605 were all related to a thin peat section adjacent to the middle Saxon site. They confirm that palaeoecological data do relate directly to middle Saxon activity.

References: Carr *et al* 1988

Brandon: Staunch Meadow, environmental sequences, Suffolk

Location: TL 778864
Lat. 52.26.46 N; Long. 00.36.59 E, 1

Project manager: R Carr (Suffolk Archaeological Unit), 1981 and 1984

Archival body: Suffolk County Council Archaeological Service

Description: environmental work carried out on the peat surrounding the island.

Objectives: primarily to provide chronology for peat sequence and timber structures.

Final comment: P L Murphy (6 June 2003), the two dates, from the base of the peat sequence at its deepest point, are indistinguishable. The calibrated date ranges are rather wide, but they imply that peat growth post-dated prehistoric ploughing on the floodplain and provide chronology for the palaeoecological results from the peat.

Laboratory comment: Ancient Monuments Laboratory (1995), two further dates from Brandon (HAR-4086 and HAR-4087) were published in Jordan *et al* (1994, 26).

References: Carr *et al* 1988
Jordan *et al* 1994, 26

HAR-5071 1340 ±60 BP

$\delta^{13}C$: -30.4‰

Sample: BRD49-51, submitted in February 1982 by P Murphy

Material: peat

Initial comment: from the base of a peat section adjacent to a middle Saxon site.

Objectives: to bracket the chronology of thin peat sequence adjacent to site.

Calibrated date: 1 σ : cal AD 640–770
2 σ : cal AD 600–780

Final comment: P L Murphy (6 June 2003), the calibrated date AD 600–800 (2 σ) confirms that peat development began during the middle Saxon period and that the palaeoecological data therefore relate directly to site.

HAR-5072 1390 ±50 BP

$\delta^{13}C$: -24.1‰

Sample: BRD25-27, submitted in February 1982 by P Murphy

Material: peat

Initial comment: from the top of a peat section adjacent to a middle Saxon site.

Objectives: to bracket the chronology of thin peat sequence adjacent to site.

Calibrated date: 1 σ : cal AD 610–670
2 σ : cal AD 570–690

Final comment: P Murphy (6 June 2003), the calibrated date AD 560–700 (2 σ) confirms that a thin layer of sand in-wash in peat does relate to middle Saxon activity and provides dating for palaeoecological results

HAR-6474 1920 ±60 BP

$\delta^{13}C$: -30.9‰

Sample: BRD0185B, submitted on 10 August 1984 by P Murphy

Material: peat

Initial comment: from the base of a peat section from which a column of samples for pollen analysis and macrofossil analysis was taken. The section showed 190cm of peats and interdigitating sands. Two samples were submitted, one from a depth of 188-190cm and another from 186-188cm.

Objectives: samples taken by R Scaife and P Murphy will provide detailed information of local vegetational change. middle Saxon pottery is present in the upper part of the peat but the base is undated by artefacts. A radiocarbon date is therefore required.

Calibrated date: 1 σ : cal AD 20–140
2 σ : 50 cal BC–cal AD 240

Final comment: P L Murphy (6 June 2003), the calibrated date range (50 cal BC–cal AD 240) is less precise than had been hoped. However, it suggests that plough works on the sand surface beneath the peat dated are prehistoric and helps to provide a chronology for palaeoecological data from the peat.

References: Walker *et al* 1991a, 91

HAR-6475 1950 ±70 BP

$\delta^{13}C$: -31.0‰

Sample: BRD0185A, submitted on 10 August 1984 by P Murphy

Material: peat

Initial comment: as HAR-6474

Objectives: as HAR-6474

Calibrated date: 1 σ : 40 cal BC–cal AD 130
2 σ : 110 cal BC–cal AD 240

Final comment: P L Murphy (6 June 2003), this date relates to HAR-6474 and is entirely consistent with it.

References: Walker *et al* 1991a, 91

HAR-6605 1330 \pm 80 BP

$\delta^{13}\text{C}$: -26.9‰

Sample: BRD0183, submitted in July 1984 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (14.09g); *Quercus* sp., sapwood (0.08g, 1.5%); *Fraxinus* sp. (0.35g, 6.5%); *Quercus* sp., heartwood (0.52g, 9.7%); *Corylus* sp., roundwood, diameter up to 15mm, some fragments with 5 or 11 growth rings (4.40g, 82.2%) (R Gale 1998)

Initial comment: from column sample 3 at a depth of 25–40cm. The sample was taken from a dense deposit of charcoal.

Objectives: the charcoal deposit appears to relate to a clearance by burning of vegetation on the site. A date would help define the beginnings of the site and is also relevant to the dating of Ipswich ware in general.

Calibrated date: 1 σ : cal AD 640–780
2 σ : cal AD 570–890

Final comment: P L Murphy (6 June 2003), the calibrated date on charred material from a peat sequence confirms that it related to nearby middle Saxon activity.

References: Walker and Otlet 1988, 312

Brandon: Staunch Meadow, wooden structures, Suffolk

Location: TL 778864
Lat. 52.26.46 N; Long. 00.36.59 E

Project manager: R Carr (Suffolk Archaeological Unit), 1982 and 1985

Archival body: Suffolk County Council Archaeological Service

Description: posts comprising components of timber causeway on floodplain of River Little Ouse.

Objectives: to date the causeway.

Final comment: P L Murphy (6 June 2003), establishes Anglo-Saxon date for causeway.

Laboratory comment: Ancient Monuments Laboratory (1995), two further dates from Brandon (HAR-4086 and HAR-4087) were published in Jordan *et al* 1994, 26).

References: Carr *et al* 1988
Carr 1992
Jordan *et al* 1994, 26

HAR-9273 1180 \pm 60 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: B0181216, submitted in December 1987 by P Murphy

Material: wood (waterlogged): *Quercus* sp., 66 heartwood rings, plus 6 sapwood rings (C Groves) (P Murphy 1987)

Initial comment: from a post on the west side of a middle Saxon timber causeway.

Objectives: to date the causeway. Dendrochronology did not provide absolute dates.

Calibrated date: 1 σ : cal AD 770–950
2 σ : cal AD 680–990

Final comment: P L Murphy (6 June 2003), establishes an Anglo-Saxon date for the causeway.

HAR-9274 1110 \pm 70 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: B0181285, submitted in December 1987 by P Murphy

Material: wood (waterlogged): *Quercus* sp., 105 heartwood rings, plus 6 sapwood rings (C Groves) (P Murphy 1987)

Initial comment: from a post on the east side of a middle Saxon timber causeway.

Objectives: as HAR-9273

Calibrated date: 1 σ : cal AD 870–1020
2 σ : cal AD 720–1040

Final comment: see HAR-9273

HAR-9275 1160 \pm 60 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: B0181295, submitted in December 1987 by P Murphy

Material: wood (waterlogged): *Quercus* sp., 83 heartwood rings, plus 8 sapwood rings (C Groves) (P Murphy 1987)

Initial comment: from a post on the east side of a middle Saxon timber causeway.

Objectives: as HAR-9273

Calibrated date: 1 σ : cal AD 770–980
2 σ : cal AD 680–1020

Final comment: see HAR-9273

Brean Down, Somerset

Location: ST 290580
Lat. 51.18.58 N; Long. 03.01.08 W

Project manager: M Bell (Lampeter University), 1985–87

Archival body: Somerset County Museum

Description: excavations, made necessary by coastal erosion, have revealed probably the best preserved Bronze Age settlement sequence in southern Britain. Five metres of deposits contained five prehistoric occupation phases separated by blown sand and eroded soil.

Objectives: Brean's well-stratified sequence of Bronze Age occupation phases characterised by contrasting pottery assemblages seemed an ideal site for an attempt to refine Bronze Age chronology. It was decided, in consultation with the project's archaeological advisers, to try to obtain four radiocarbon dates from each of the main horizons.

Final comment: M Bell (1990), if all the dates are accepted, each of the main occupation units covers a long range and they overlap in time to a considerable extent. Thus the dating programme is of limited value in its original objective of helping to pinpoint more accurately the dating of the pottery and artefact sequence.

Laboratory comment: English Heritage (25 July 2007), a further two samples failed (HAR-8545; BD UBSS5, and HAR-9152; BD3701).

References: Bell 1990
Taylor and Woodward 1985

HAR-7016 3420 ±100 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: BD5801-1, submitted in November 1985 by M Bell

Material: charcoal: unidentified

Initial comment: context 103; from a feature sealed by the compacted clay floor (context 60) of a stone roundhouse of probable middle Bronze Age date.

Objectives: context 103 is cut into the base of the terrace later occupied by the building. It will provide an initial date for activity in this occupation horizon to set beside HAR-7017, which is from the overlying floor. Between them these two dates will provide information on the period of usage of structure 59.

Calibrated date: 1 σ : 1890–1610 cal BC
2 σ : 2020–1490 cal BC

Final comment: M Bell (1990), unit 5b includes results from four samples (HAR-7016, HAR-7017, HAR-7019, and HAR-7018) related to structures 59 and 95. The earliest date stratigraphically and chronologically is HAR-7016 from a pit below structure 59. Ward and Wilson (1978) tests by J Walker show that it is not statistically separable from HAR-7020 in underlying unit 6^a ($T'=0.7$; $T'(5\%)=3.8$; $v=1$). The structures produced a consistent group of dates; HAR-7017 from the floor of structure 59, HAR-7019 from the wall of structure 95, and HAR-7018. The latter was from a particularly good quality sample, a discrete charcoal spread associated with a late phase of the hearth in structure 95. HAR-7017 to HAR-7019 are in agreement with the pottery dating evidence from unit 5b. It should be noted that the dates from unit 5b show considerable overlap with those of 6a.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: AERE Harwell (1990), HAR-7017, HAR-7018, and HAR-7019 form a statistically indistinguishable group. HAR-7016 is considerably earlier and statistically indistinguishable from HAR-7020 from structure 57, unit 6^a. In addition HAR-7017, HAR-7018,

and HAR-7019 form a statistically acceptable group with HAR-7021 and HAR-8992.

References: Otlet *et al* 1983
Walker *et al* 1990, 178
Ward and Wilson 1978

HAR-7017 2730 ±100 BP

$\delta^{13}\text{C}$: -25.5‰

Sample: BD5749-2, submitted in November 1985 by M Bell

Material: charcoal (remaining subsample identified): unidentified (2.64g); *Corylus* sp. (0.08g, 100%) (R Gale 1999)

Initial comment: context 60; from within the hard-packed clay floor of a stone roundhouse of probable middle Bronze Age date. This sample is from exactly the same location as HAR-7021.

Objectives: context 60 is the floor of Bronze Age structure 59. This sample will provide a date for the structure, which can be compared to that from the underlying pit (HAR-7016). Those from the two other Bronze Age structures excavated of which structure 95 appears to be broadly contemporary with 59 and structure 57 is clearly earlier in that it is separated from these two structures by a layer of sand.

Calibrated date: 1 σ : 1000–800 cal BC
2 σ : 1130–760 cal BC

Final comment: see HAR-7016

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 178

HAR-7018 2870 ±100 BP

$\delta^{13}\text{C}$: -25.1‰

Sample: BD5803-3, submitted in November 1985 by M Bell

Material: charcoal (remaining subsample mostly too friable to identify): unidentified (0.56g); *Fraxinus* sp. (0.09g, 100%) (R Gale 1999)

Initial comment: from an area of burning in context 93, associated with a clay hearth in the centre of the floor of a well-preserved Bronze Age roundhouse, structure 95.

Objectives: to provide a date for the final phases of the use of structure 95. This sample can be compared to HAR-7019 from within the wall of the same structure and the samples from the two other Bronze Age structures on the site.

Calibrated date: 1 σ : 1250–910 cal BC
2 σ : 1390–810 cal BC

Final comment: see HAR-7016.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 178–9

HAR-7019 2940 ±100 BP $\delta^{13}\text{C}$: -25.4‰

Sample: BD6013-4, submitted in November 1985 by M Bell

Material: charcoal (remaining subsample comminuted and friable): unidentified (0.94g); *Quercus* sp. (0.12g, 80%); ?*Quercus* sp., possibly (0.03g, 20%) (R Gale 1999)

Initial comment: context 131; from within the stone wall of Bronze Age roundhouse structure 95.

Objectives: to provide a date for the construction of structure 95. This can be compared to HAR-7018, hearth charcoal from the floor of this structure, and the dates from two other Bronze Age structures on the site.

Calibrated date: 1 σ : 1320–1000 cal BC
2 σ : 1430–890 cal BC

Final comment: see HAR-7016

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 179

HAR-7020 3310 ±80 BP $\delta^{13}\text{C}$: -25.0 (assumed) ±3.0‰

Sample: BD6153-5, submitted in November 1985 by M Bell

Material: charcoal (remaining subsample friable and comminuted): unidentified (3.40g); *Rhamnus cathartica* sp. (0.02g, 3.2%); *Taxus* sp. (0.04g, 6.4%); *Fraxinus* sp. (0.05g, 7.9%); Pomoideae (0.06g, 9.5%); *Prunus spinosa* (0.21g, 33.3%); *Quercus* sp., heartwood (0.25g, 39.7%) (R Gale 1999)

Initial comment: context 163, unit 6^a; from within the floor of an oval stone built Bronze Age structure (57). This structure is separated by a layer of blown sand, from the overlying Bronze Age occupation horizon.

Objectives: to date structure 57 and compare it to dates from the two overlying structures and the underlying alluvial deposit.

Calibrated date: 1 σ : 1690–1490 cal BC
2 σ : 1780–1420 cal BC

Final comment: M Bell (1990), because structure 57 was not fully excavated its relationship to unit 6a was never totally resolved. In the field the impression was that structure 57 probably related to a late stage in unit 6a. However, HAR-7020 is earlier than the three dates from unit 6a (HAR-7021, HAR-8991, and HAR-8992), which suggests that the structure may relate to a late phase of unit 6b or an early stage of unit 6a. Unlike the three units 6a dates, HAR-7020 is in line with that suggested for pottery from units 6a and 6^a.

Laboratory comment: AERE Harwell (1990), within units 6a and 6^a two groups appear. HAR-7021 and HAR-8992 are replicate check measurements, which agree closely; the weighted mean of the two results is 2685 ±65 BP (1000–790 cal BC at 95% confidence; Pearson and Stuiver 1986). This is clearly different from HAR-8991. However, HAR-8991 does agree with HAR-7020, the only result from structure 57. Although the relationship of this structure to unit 6a was

not clearly defined, the possibility of a link to one of the 6a phases was considered and this is confirmed by the dating.

Laboratory comment: English Heritage (25 March 2009), this laboratory number was assigned in error to two different samples, this one and HAR-7020 from Reading Crane Wharf.

References: Pearson and Stuiver 1986
Walker *et al* 1990, 179

HAR-7021 2600 ±90 BP $\delta^{13}\text{C}$: -27.1‰

Sample: BD5886-6, submitted in November 1985 by M Bell

Material: charcoal: *Corylus avellana*; Pomoideae (V Straker)

Initial comment: from context 61 with lenses of burnt material representing occupation activity within gleyed colluvium which abuts or pre-dates structure 57 and is separated from structures 59 and 95 by a layer of blown sand.

Objectives: to provide a date for the episode of occupation activity associated with the colluvium and to establish the chronological relationship of this layer to structure 57 and the underlying ungleyed alluvium (HAR-7022).

Calibrated date: 1 σ : 830–670 cal BC
2 σ : 930–410 cal BC

Final comment: M Bell (1990), three dates were obtained from unit 6a, HAR-7021, HAR-8991, and HAR-8992. The single sample, which produced HAR-7021 and HAR-8992, seemed to be archaeologically one of the best quality samples since it was a lens of charcoal between two clay bands. Yet this sample is 400 to 600 years more recent than the dating bracket suggested for the unit 6 pottery.

Laboratory comment: AERE Harwell, see HAR-7020

References: Walker *et al* 1990, 179

HAR-7022 3890 ±130 BP $\delta^{13}\text{C}$: -26.0‰

Sample: BD6062-7, submitted in November 1985 by M Bell

Material: charcoal: unidentified

Initial comment: from context 66; from ungleyed colluvium, which underlies the gleyed colluvium from which HAR-7021 was collected.

Objectives: to date the episode of colluviation, which interrupted sand blown and to establish its chronological relationship to the underlying blown sand with Beaker artefacts and the overlying structural evidence.

Calibrated date: 1 σ : 2570–2140 cal BC
2 σ : 2860–1980 cal BC

Final comment: M Bell (1990), this date has a very large error term increased still more by calibration. It is, however, significantly earlier than the unit 7 date, HAR-9156 and, presumably therefore, than the two latest dates in unit 8a, HAR-8547 and HAR-8993. It is not significantly different from HAR-8990 in unit 8a ($T'=0.3$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978) and probably in view of the micromorphologically confirmed colluvial origin of 6b the charcoal is redeposited from 8a.

Laboratory comment: AERE Harwell (1990), HAR-7022, the only result from unit 6b, cannot be distinguished from HAR-8990 in unit 8a.

References: Walker *et al* 1990, 179

HAR-7023 4720 ±140 BP

$\delta^{13}\text{C}$: -24.6‰

Sample: BD6171-8, submitted in November 1985 by M Bell

Material: charcoal: unidentified; *Ulmus* sp.; *Quercus* sp.; *Prunus* cf *avium*; *Corylus avellana*; Pomoideae; *Fraxinus excelsior* (V Straker)

Initial comment: context 63; from a palaeosol, which represents the basal layer of the post-glacial sequence. In the past this layer has apparently produced Grooved Ware and a Beaker burial. During our excavation it produced a (?earlier Neolithic) leaf-shaped arrowhead.

Objectives: to provide a date for initial activity on the site.

Calibrated date: 1 σ : 3650–3360 cal BC
2 σ : 3790–3090 cal BC

Final comment: M Bell (1990), the radiocarbon dates for unit 8a, HAR-7023, HAR-8547, HAR-8990, and HAR-8993, show that there was activity on this surface for a long period, which extends to more than 2000 years when the dates are calibrated. J Walker's statistical examination of the dates suggests three possibly independent phases of activity as follows: 1) an otherwise unattested earlier Neolithic phase represented by HAR-7023; 2) HAR-8990; 3) HAR-8547 and HAR-8993. Phases 2 and 3 are within the range of determinations elsewhere for contexts with Beakers (Gibson 1982, fig 2), but phase 3 is late in that range and HAR-8547 is particularly noteworthy because it was apparently associated with a maritime Beaker, a type generally thought to be early. There is, however, no reason to reject the date itself, which corresponds very closely to HAR-8993. The latter was from below unit 7 sand and, together with HAR-9156, shows that the unit accumulated in the early second millennium BC. Taylor and Taylor (1949) show that the putative burial with which HAR-8547 was associated occurred after some sand deposition had begun, thus confirming a late date.

Laboratory comment: AERE Harwell (1990), in unit 8a HAR-7023 is clearly considerably earlier than the other three results and must be considered to belong to a different phase of activity. HAR-8547, HAR-8993, and HAR-8990 form a separate group but, although the results overlap at 95% confidence, the Ward and Wilson (1978) test would not accept them as forming a single distribution ($T'=12.8$; $T'(5\%)=6.0$; $v=2$) but would reject HAR-8990. The possibility of three phases being represented within this unit must, therefore, be considered.

References: Gibson 1982
Taylor and Taylor 1949
Walker *et al* 1990, 179
Ward and Wilson 1978

HAR-8546 5620 ±100 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: BDPT385, submitted in April 1987 by M Bell

Material: peat

Initial comment: from outcrops on the foreshore c 500m from the present sea wall at 0.15m OD. This peat overlies 2.5m of blue clay and the sample to be dated is from the base of the peat at its junction with the clay. The pollen identified in the peat is predominantly Graminae, Cheropodiaceae, and Cyperaceae, which suggests that it formed under salt marsh conditions.

Objectives: to establish the date of the peat, which is being examined for pollen, plant macrofossils, and diatoms. This will help to establish a clearer picture of the environmental context of the prehistoric site. It is also relevant to questions of sea level since the peat is at c OD and at present mean spring tides reaches c +5.7m OD.

Calibrated date: 1 σ : 4550–4350 cal BC
2 σ : 4710–4260 cal BC

Final comment: M Bell (1990), this provides one in a series of dates, which is part of a framework against which to compare the other archaeological evidence.

References: Hardiman *et al* 1992, 55

HAR-8547 3460 ±80 BP

$\delta^{13}\text{C}$: -28.3‰

Sample: BDUBSS6, submitted in April 1987 by M Bell

Material: charcoal: Pomoideae; *Prunus spinosa*; *Quercus* sp. (V Straker)

Initial comment: from a pit dug in the surface of unit 8a (Neolithic and Beaker). The pit was examined by H Taylor in 1936 and found to contain two Beaker pots. It was interpreted as a burial. Although the sample was taken in 1936 it was considered to be reliable by A ApSimon who catalogued the material in 1947–9.

Objectives: to establish the date of a feature containing two very fine Beaker pots, which is believed to be a burial. This also helps to establish the date of Beaker activity within the Brean sequence as a whole. It is also related to sea level questions since the discovery was on the foreshore between tides.

Calibrated date: 1 σ : 1890–1680 cal BC
2 σ : 2020–1530 cal BC

Final comment: see HAR-7023

References: Walker *et al* 1991a, 101

HAR-8548 1550 ±80 BP

$\delta^{13}\text{C}$: -20.0‰

Sample: BD6530, submitted in April 1987 by M Bell

Material: human bone (mid-shaft fragments of femur, tibia, humerus, ulna, and radius (one arm) plus fragments of pelvis, skull, and a few ribs) (B Levitan)

Initial comment: this skeleton forms part of a sub-Roman cemetery, which lies within unit 3 of the Brean Down sequence. The graves are cut through the basal part of unit 3 and rest on, or are just cut into, the top of unit 4a. The bones forming this sample (find no. 6530) are from context 213. The skeleton was undisturbed but poorly preserved and has been reported on by Bruce Levitan. Round the head of the grave was a lining of Carboniferous limestone blocks; the

grave was articulated east-west and was without grave goods. All these features are consistent with a sub-Roman (early Christian) attribution, and there are a number of cemeteries of this date in the area.

Objectives: to date this phase of activity within the Brean sequence; to help establish the chronological range of the sub Roman cemetery by comparison with HAR-8549 and a previously obtained date on an old find of 1300 ±80 BP (Birm-246; cal AD 600–900 at 95% confidence; Stuiver and Pearson 1986). This will help to establish the chronological relationship to late Roman activity in the temple on Brean Down itself and to known historical events, such as the Saxon conquest of Somerset.

Calibrated date: 1σ: cal AD 410–610
2σ: cal AD 330–660

Final comment: M Bell (1990), the burials in unit 3c produced three dates, HAR-8548, HAR-8549, and Birm-246. These dates are in line with archaeological expectation and confirm a broadly sub Roman date for the cemetery. Calibration indicates that two of the burials are likely to relate to the period before the Saxon conquest of this area, probably about the second half of the seventh century. The published date Birm-246 could imply that the cemetery continued in use later but, as J Walker notes below, there is some evidence that the true date should be earlier.

Laboratory comment: AERE Harwell (1990), unit 3c is the sub-Roman cemetery and here there are two Harwell dates, HAR-8548 and HAR-8549, plus a determination made by Birmingham, Birm-246 (1300 ±80 BP; cal AD 600–900 at 95% confidence; Stuiver and Pearson 1986) For the latter we have used the result given by Shotton and Williams (1973) in *Radiocarbon*. Rahtz (1977), however, notes that this date needs to be corrected, apparently (see Rahtz 1977, 59, note 4) because of a revised ¹³C/¹²C ratio. Without quoting a specific revised determination he says that this gives a date centring on the sixth (rather than the seventh) century. If no correction was made for the stable isotope ratio ¹³C/¹²C this could indeed make the result up to 100 years older. In the preface to the list Shotton and Williams state that the 1σ error quoted refers only to a statistical analysis of sample, background, and standard count rates; it must, therefore, be an underestimate of the true error term since all other sources are ignored. Even if no correction is made for these factors, however, the three results do form a group.

References: Rahtz 1977, 59
Shotton and Williams 1973, 8
Stuiver and Pearson 1986
Walker *et al* 1991a, 101

HAR-8549 1430 ±30 BP

$\delta^{13}\text{C}$: -22.7‰

Sample: BD6543, submitted in April 1987 by M Bell

Material: human bone (tibiae, fibulae, and femora)
(B Levitan)

Initial comment: together with HAR-8548 this skeleton forms part of a sub-Roman cemetery, which lies within unit 3 of the Brean Down sequence. The graves are cut through the basal part of unit 3 and rest on, or are just cut into, the top of unit 4a. The skeleton forming this sample (find no. 6543)

are from context 212. This skeleton is essentially complete but in poor condition and has been analysed by Bruce Levitan. This grave was of special interest because it was marked by a massive limestone boulder and the grave edge itself was revetted, on the up-slope side only, by substantial limestone slabs. The grave was orientated east-west and was without grave goods.

Objectives: as HAR-8548

Calibrated date: 1σ: cal AD 600–650
2σ: cal AD 570–660

Final comment: see HAR-8548

References: Walker *et al* 1991a, 101

HAR-8990 3810 ±90 BP

$\delta^{13}\text{C}$: -25.3‰

Sample: BD60531, submitted in January 1988 by M Bell

Material: charcoal: *Ulmus* sp. (V Straker)

Initial comment: artefact 60531 from the dry sieving of the basal palaeosol (unit 8a, in grid square 8/12), context 63.

Objectives: to provide an indication of the duration of activity on the basal palaeosol. This produced a Beaker pit containing pots in 1936 (HAR-8547) and a scatter of Beaker pottery and Neolithic artefacts. One radiocarbon date is already available for this unit, HAR-7023 above. We wish to establish whether the charcoal from elsewhere in the palaeosol is of the same date and what its chronological relationship is to the breaker pit (HAR-8547) and HAR-8993.

Calibrated date: 1σ: 2460–2130 cal BC
2σ: 2550–1970 cal BC

Final comment: see HAR-7022 and HAR-7023

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-8991 3120 ±90 BP

$\delta^{13}\text{C}$: -25.0‰

Sample: BD6020, submitted in January 1988 by M Bell

Material: charcoal: *Acer campestre*; *Ulmus* sp.; *Corylus avellana*
(V Straker)

Initial comment: context 61, artefact 6020; an occupation deposit within unit 6a of the Brean Down sequence.

Objectives: unit 6a is one of the main occupation layers in the sequence. The horizon, which produced this sample, is from the outside of a well-preserved oval structure (HAR-7020 above). One other sample has been dated from unit 6a, HAR-7021, but is c 600 years more recent than expected (see HAR-8992 below). The aim of submitting this additional sample is to try to resolve this problem.

Calibrated date: 1σ: 1500–1290 cal BC
2σ: 1610–1120 cal BC

Final comment: see HAR-7021

HAR-8992 2770 ±90 BP $\delta^{13}\text{C}$: -26.2‰*Sample*: BD5886B, submitted in January 1988 by M Bell*Material*: charcoal: *Corylus avellana*; Pomoideae (V Straker)*Initial comment*: artefact 5886 from unit 61, an occupation deposit within unit 6 of the sequence.*Objectives*: the charcoal lenses within unit 61 were regarded as particularly well-stratified discrete episodes of burning. Part of this sample has already been dated, HAR-7021, but is *c* 600 years more recent than expected on the basis of the other radiocarbon dates and the artefact stratigraphy. The remainder of the same sample is being submitted in order to check HAR-7021.*Calibrated date*: 1 σ : 1020–810 cal BC
2 σ : 1200–790 cal BC*Final comment*: see HAR-7021.*Final comment*: A Bayliss (25 July 2007), the two radiocarbon results on bulk charcoal from this deposit (HAR-7021 and HAR-8992 are statistically consistent ($T'=1.8$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).*References*: Ward and Wilson 1978**HAR-8993** 3390 ±90 BP $\delta^{13}\text{C}$: -25.9‰*Sample*: BD60521, submitted in January 1988 by M Bell*Material*: charcoal: Pomoideae; *Ulmus* sp. (V Straker)*Initial comment*: artefact no. 60521 from the dry sieving of the basal palaeosol, context 63, unit 8a, in grid square 12/13.*Objectives*: as HAR-8990*Calibrated date*: 1 σ : 1870–1530 cal BC
2 σ : 1930–1460 cal BC*Final comment*: see HAR-7023**HAR-9151** 2730 ±70 BP $\delta^{13}\text{C}$: -21.8‰*Sample*: BD4716, submitted in November 1987 by M Bell*Material*: animal bone (unidentified)*Initial comment*: bone find no. 4716 from context 16 which is part of unit 4, the latest of the Bronze Age occupation horizons.*Objectives*: three samples, HAR-9151, HAR-9153, and HAR-9155, should establish the date of unit 4, which is associated with two gold bracelets. Unit 4 is the only occupation level, which does not so far have radiocarbon dates.*Calibrated date*: 1 σ : 970–810 cal BC
2 σ : 1050–790 cal BC*Final comment*: M Bell (1990), HAR-9151, HAR-9153, and HAR-9155 came from unit 4. HAR-9153 and HAR-9155 are earlier than the dating suggested by parallels for the gold bracelets, *c* 1000–650 BC, or the suggested pottery dating. HAR-9151 is in good agreement with the cultural evidence. Even more worrying is that the two early dates are

themselves earlier than the apparently consistent group of dates from the underlying unit 5b.

Laboratory comment: AERE Harwell (1990), unit 4 produced a series of results with a wide spread of ages, which cannot be combined. HAR-9151 fits with one group of results from unit 5b and HAR-9155 with HAR-7016 from unit 5b and all fall in the general range from the site.**HAR-9153** 3100 ±100 BP $\delta^{13}\text{C}$: -22.8‰*Sample*: BD1352, submitted in November 1987 by M Bell*Material*: animal bone (unidentified)*Initial comment*: bone find no. 1352 from context 16, unit 4.*Objectives*: as HAR-9151*Calibrated date*: 1 σ : 1500–1260 cal BC
2 σ : 1610–1050 cal BC*Final comment*: see HAR-9151**HAR-9155** 3400 ±90 BP $\delta^{13}\text{C}$: -25.5‰*Sample*: BD2056, submitted in November 1987 by M Bell*Material*: animal bone (unidentified)*Initial comment*: bone find 2056 from context 16, unit 4.*Objectives*: as HAR-9151*Calibrated date*: 1 σ : 1880–1610 cal BC
2 σ : 1940–1490 cal BC*Final comment*: see HAR-9151**HAR-9156** 3560 ±90 BP*Sample*: BD6192, submitted in November 1987 by M Bell*Material*: charcoal: Pomoideae; *Prunus spinosa*; *Euonymus europaeus* (V Straker)*Initial comment*: from context 188, hand-collected from a distinct thin charcoal band in the sand.*Objectives*: as HAR-7023*Calibrated date*: 1 σ : 2030–1760 cal BC
2 σ : 2200–1680 cal BC*Final comment*: M Bell (1990), this date is a little earlier than the two latest dates in unit 8a, but Ward and Wilson (1978) tests by Jill Walker show that there is no significant difference between the three dates ($T'=1.8$; $T'(5\%)=6.0$; $v=2$). There is no likelihood of reworked charcoal in this context (188); it was a discrete thin charcoal band without any colluvial component. See also HAR-7023.*Laboratory comment*: AERE Harwell (1990), unit 7 contains only one result, HAR-9156, which is statistically indistinguishable from HAR-8547 and HAR-8993 in unit 8a.*References*: Ward and Wilson 1978

Brigstock, Northamptonshire

Location: SP 884818
Lat. 52.25.36 N; Long. 00.41.59 W

Project manager: D Jackson, 1979–81

Archival body: Northampton Museum and Art Gallery

Description: an Iron Age circular earthwork.

Objectives: to examine its date and function before being levelled.

References: Jackson 1983

HAR-4928 720 ±70 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: BK/AREA4, submitted in 1983 by D A Jackson

Material: charcoal: *Quercus* sp. (M Taylor)

Initial comment: from the base of a fire, directly above Iron Age levels.

Objectives: to date charcoal-burning activity. Black patches are common on the surface of the fields in the area but their date and function was uncertain.

Calibrated date: 1 σ : cal AD 1250–1380
2 σ : cal AD 1180–1400

Final comment: D Jackson (1995), it was suspected that the large black patches situated close to an Iron Age settlement were caused by charcoal burning in the medieval period. The radiocarbon date confirms this hypothesis.

Brixworth Church, Northamptonshire

Location: SP 747712
Lat. 52.20.00 N; Long. 00.54.13 W, 1

Project manager: M Audouy (Northampton Archaeology), 1981–2

Archival body: Northampton Museum and Art Gallery

Description: an Anglo-Saxon church, which was excavated on the north side of the nave and revealed the buried structure of *porticus* and nave foundations with fragments of flooring, and burials.

Objectives: to record structural evidence of the nave and *porticus* foundations, and superstructure, including building phases and dating evidence.

Laboratory comment: Ancient Monuments Laboratory (1995), three further dates from this site were published in the first volume of *Radiocarbon Dates*, HAR-483, HAR-484, and HAR-485 (Jordan *et al* 1994, 26–7).

References: Jordan *et al* 1994, 26–7
Walker *et al* 1988, 325

HAR-4945 1130 ±70 BP

$\delta^{13}\text{C}$: -27.8‰

Sample: BX81705, submitted in April 1982 by M Audouy

Material: wood: unidentified

Initial comment: from base courses of jamb of nave arcading; third arch from the east.

Objectives: the sample was collected from the lower course between the brick in the fabric, in order to date the masonry.

Calibrated date: 1 σ : cal AD 780–990
2 σ : cal AD 690–1030

Final comment: M Audouy (5 May 1995), this sample has provided a date for the construction or abandonment of the third arch from the east, which is later than the construction date of the church, suggested by HAR-4946. This is in accordance with the general belief that the wide arcade is a secondary feature. The results also accord with another radiocarbon determination carried out by the University of Texas Radiocarbon Laboratory in 1983 (MS-208T; Tx-4221B; 965 ±90 BP; cal AD 880–1260 at 95% confidence; Stuiver and Pearson 1986), on a sample of charred wood from the blocking of a small doorway between the *porticus* and choir.

References: Stuiver and Pearson 1986

HAR-4946 1270 ±80 BP

$\delta^{13}\text{C}$: -24.8‰

Sample: BX81600, submitted in April 1982 by M Audouy

Material: wood (charred): unidentified

Initial comment: from just below a thin layer of mortar, probably a construction layer, and therefore is associated with the building of the church.

Objectives: to date the church. The sample originates from a large lens of charred wood securely stratified in association with the construction level of *porticus* III and the north wall of the nave.

Calibrated date: 1 σ : cal AD 660–880
2 σ : cal AD 630–970

Final comment: M Audouy (5 May 1995), this result provides the most satisfactory result indicator of a date of construction of the church.

Bromfield, Shropshire

Location: SO 485775
Lat. 52.23.34 N; Long. 02.45.25 W

Project manager: S Stanford and G Hughes (University of Birmingham), 1978–9, 1981, and 1991

Archival body: Shropshire County Museum

Description: Neolithic and Beaker occupation, mid-late Bronze Age cemetery.

Objectives: to provide a chronology for the site.

Final comment: S Stanford (19 January 1995), HAR-6544 to HAR-6546 support the sparse ceramic evidence for enclosure E2's Iron Age origins and Roman abandonment. The ranges at 95% confidence are too wide to go further but given that starting point a more detailed phasing is possible based on post-lives and hut details. HAR-6457, HAR-6560, and HAR-6561 support the contemporaneity of pyre,

primary, and satellite burials under barrow B15 and give a useful *terminus ante quem* for Beakers hereabouts. HAR-6566 dates a fresh element in the Bromfield ceramic sequence.

Laboratory comment: Ancient Monuments Laboratory (1995), one further date from this site, HAR-3968 (sample S163), was funded prior to 1981 and was published in the first volume of *Radiocarbon Dates* (Jordan et al 1994, 27).

References: Jordan et al 1994, 27
Stanford 1982
Stanford 1985
Stanford 1995
Walker and Otlet 1988, 309–10

HAR-6544 2400 ±80 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: S168, submitted on 6 September 1984 by S C Stanford

Material: charcoal: unidentified, mature wood (20g)

Initial comment: from post socket F10 of a single-phase four-post structure within a square single-ditched farm enclosure.

Objectives: to establish whether the enclosure (E2) is more likely to be Iron Age (as is the pottery from it) or Roman in date. This is the most completely excavated example of the very numerous (c 200) single-ditched enclosures that remain inadequately dated throughout Shropshire.

Calibrated date: 1 σ : 750–390 cal BC
2 σ : 790–260 cal BC

Final comment: S Stanford (1995), probably a structural timber, this came from a hay-tree post (not a four-poster) thought to be in use when E2 was embanked. It indicates an early-middle Iron Age date for the enclosure and the four-posters within it.

HAR-6545 2130 ±70 BP

$\delta^{13}\text{C}$: -25.3‰

Sample: S175, submitted on 6 September 1984 by S C Stanford

Material: charcoal: unidentified, mature wood

Initial comment: from the upper filling of shallow pit F80, which should probably be contemporary with, or slightly later than, the main occupation of the farm enclosure (E2) including the four-poster from which HAR-6544 was obtained. Neolithic and Saxon activity is also recorded in the vicinity of E2, so this sample should be treated separately.

Objectives: as HAR-6544

Calibrated date: 1 σ : 360–50 cal BC
2 σ : 390 cal BC–cal AD 20

Final comment: S Stanford (1995), this result provides a firm Iron Age date for the small pit component of the farm enclosure E2.

HAR-6546 1800 ±70 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: S182S183, submitted on 6 September 1984 by S C Stanford

Material: charcoal (remaining subsample composed of fragments mostly too small to identify): unidentified (20.64g); *Rhamnus cathartica* sp. (0.03g, 0.7%); Pomoideae (0.05g, 1.2%); *Quercus* sp., sapwood (0.05g, 1.2%); *Alnus* sp. (1.92g, 46.7%); *Quercus* sp., heartwood (2.02g, 49.2%); bark (0.03g, 0.7%); *Acer* sp. (0.01g, 0.2%) (R Gale 1998)

Initial comment: from the upper filling of enclosure ditch in sectors D and E, ie layers F1D layer 3 and F1E layer 2. The sample should relate to extramural activities after the abandonment of the enclosure.

Objectives: as HAR-6544

Calibrated date: 1 σ : cal AD 120–330
2 σ : cal AD 60–410

Final comment: S Stanford (1995), coming from the upper filling of the enclosure ditch of E2, this supports the indication, given by the absence of Roman pottery from the interior, that E2 was not occupied during the Roman period.

HAR-6547 3460 ±90 BP

$\delta^{13}\text{C}$: -24.4‰

Sample: S228S230, submitted on 6 September 1984 by S C Stanford

Material: charcoal (remaining subsample very comminuted and friable): unidentified, superficially similar (88.32g); *Quercus* sp., heartwood (13.10g, 100%) (R Gale 1998)

Initial comment: from a well-preserved pyre base on the old ground surface below a few centimetres of preserved barrow material. The charcoal layer of the pyre was cut by primary grave F266, which yielded HAR-6560.

Objectives: to date barrow B15 within the Bromfield funerary sequence and provide a *terminus ante quem* for the Beaker occupation that preceded the barrow.

Calibrated date: 1 σ : 1900–1670 cal BC
2 σ : 2030–1520 cal BC

Final comment: S Stanford (1995), this combined sample gives a reasonable date for the construction of the overlying barrow B15 to place it in the Bromfield funerary sequence, there being no datable artefacts for this.

HAR-6560 3450 ±70 BP

$\delta^{13}\text{C}$: -24.1‰

Sample: S231, submitted on 6 September 1984 by S C Stanford

Material: charcoal (remaining subsample very comminuted and friable): unidentified (49.14g); herbaceous stem, diameter 2mm, structure very collapsed (0.02g, 0.11%); *Quercus* sp., sapwood (0.81g, 4.45%); *Quercus* sp., heartwood (17.26g, 94.78%); *Corylus* sp. (0.12g, 0.66%) (R Gale 1998)

Initial comment: from the primary cremation grave F266 in the centre of barrow B15, below the barrow turf but cut through the pyre layer. It will presumably be derived from the pyre and be of the same date as HAR-6547.

Objectives: as HAR-6547

Calibrated date: 1 σ : 1890–1680 cal BC
2 σ : 1950–1600 cal BC

Final comment: S Stanford (1995), this result supports the assumption that the primary burial and pyre (HAR-6547) were contemporary and backs the dating for barrow B15.

Final comment: A Bayliss (7 August 2007), the radiocarbon results from the pyre and primary burial are statistically consistent (HAR-6547 and HAR-6560; $T'=0.0$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978

HAR-6561 3540 ±70 BP

$\delta^{13}C$: -26.5‰

Sample: S232, submitted on 6 September 1984 by S C Stanford

Material: charcoal (remaining subsample identified): unidentified (33.11g); *Quercus* sp., sapwood (0.10g, 1.3%); Pomoideae (0.19g, 2.5%); *Quercus* sp., heartwood (4.69g, 61.28%); *Corylus* sp., some roundwood, diameter 15mm (2.68g, 35%) (R Gale 1998)

Initial comment: from satellite cremation grave F267 within area of barrow B15 but probably below the barrow material, its allocation depends on position and not stratigraphy. The charcoal in it should be about the same date as samples HAR-6547 and HAR-6560, whether the satellite cremation was buried at the same time as the primary funeral pyre or was emplaced between the pyre phase and barrow construction.

Objectives: to establish whether the satellite burial F267 is about the same date as the primary burial F266, as this would influence the interpretation of two stone slabs that stood just inside the barrow ditch on the eastern side.

Calibrated date: 1 σ : 1960–1760 cal BC
2 σ : 2120–1690 cal BC

Final comment: S Stanford (1995), the result supports the impression from excavation that the satellite grave was contemporary with the pyre and primary burial under barrow B15.

HAR-6566 3090 ±70 BP

$\delta^{13}C$: -25.2‰

Sample: S233, submitted on 6 September 1984 by S C Stanford

Material: charcoal (remaining comminuted subsample identified): unidentified, (superficially similar) (29.13g); *Quercus* sp., heartwood (3.37g, 100%) (R Gale 1998)

Initial comment: from cremation grave F272 in a small cemetery of which other graves contained sherds of ?late Beaker/early Bronze Age pottery, not represented previously at Bromfield. The grave was not sealed and it held no artefacts.

Objectives: to place the small cemetery within the Bromfield barrow and flat cemetery sequence and suggest a date for the pottery found in other graves of this cemetery. The Bromfield pottery sequence is one of the best illustrated in the Welsh Marches.

Calibrated date: 1 σ : 1440–1260 cal BC
2 σ : 1500–1130 cal BC

Final comment: S Stanford (1995), the result confirms that the small cemetery C3 outside the B15 barrow was secondary to it and offers a date for sherds from C3 that are new to the Bromfield ceramic sequence.

Burghfield: Field Farm, Berkshire

Location: SU 675704
Lat. 51.25.41 N; Long. 01.01.44 W

Project manager: S Lobb (Wessex Archaeology), 1985

Archival body: Reading Museum and Art Gallery

Description: excavated as part of the Kennet Valley Survey funded by HBMC(E) and carried out in response to the impending destruction of a large ring ditch, 417, and the surviving half of a smaller one, 418. Ring ditch 417 was located on a low but prominent gravel bank adjacent to an old river channel.

Objectives: a sequence of radiocarbon dates has been determined for the middle and later Bronze Age settlements at Knights Farm (Bradley *et al* 1980; Jordan *et al* 1994, 28), the site of which lies in the adjacent field to Field Farm. This series of samples will provide a set of dates which will complement the sequence which has already been established, extending the range into the early Bronze Age and later Neolithic periods for which there is very little evidence in the area to date.

References: Bradley *et al* 1980
Butterworth and Lobb 1992
Jordan *et al* 1994, 28
Lobb and Rose 1996

HAR-9139 3650 ±80 BP

$\delta^{13}C$: -27.3‰

Sample: W109J267, submitted in February 1988 by S J Lobb

Material: charcoal: *Quercus* sp.; *Prunus* sp.

Initial comment: from a pit at the centre of large ring ditch 417, containing cremated bone. The pit is the primary feature of the monument.

Objectives: to date the construction of the ring ditch.

Calibrated date: 1 σ : 2140–1910 cal BC
2 σ : 2280–1770 cal BC

Final comment: C Butterworth and S Lobb (1992), this is an acceptable date for the Collared Urn sherds falling towards the beginning of the range suggested by Longworth (1984). This would date the ring ditch as late Neolithic.

References: Longworth 1984

HAR-9140 3690 ±120 BP

$\delta^{13}C$: -28.8‰

Sample: W109R625, submitted in February 1988 by S J Lobb

Material: charcoal: *Prunus* sp.; *Corylus* sp.

Initial comment: from the fill of a cremation urn with a smaller ring ditch, 604, about 75m to the north east of ring ditch 417. The urn was reasonably intact when found although the top had been removed by the scraper.

Objectives: to provide a relative date for the construction of the ring ditch and to date the urn type.

Calibrated date: 1 σ : 2280–1910 cal BC
2 σ : 2470–1740 cal BC

Final comment: C Butterworth and S Lobb (1992), the result provides a relative date of construction of the ring ditch and dates the urn type (Deverel-Rimbury). The early date obtained from the Deverel-Rimbury vessel falls at the beginning of the range of radiocarbon dates quoted by Barrett (1976) and is comparable with the date from Worgret Barrow, Dorset (3690 \pm 90 BP; NPL-199; calibrated date: 1 σ : 2210–1960 cal BC; 2 σ : 2460–1820 cal BC; Pearson and Stuiver 1986).

References: Barrett 1976
Hardiman *et al* 1992, 48
Pearson and Stuiver 1986

HAR-9142 3560 \pm 70 BP

$\delta^{13}\text{C}$: -26.2‰

Sample: W109F34, submitted in February 1988 by S J Lobb

Material: charcoal: *Quercus* sp., mature wood

Initial comment: from the burnt layer in ring ditch 417; from the fill on the west side of the monument only. This activity is unassociated with artefactual material and may represent primary clearance of woodland for agricultural purposes.

Objectives: to date this clearance phase, which may represent the onset of agriculture in this area.

Calibrated date: 1 σ : 2020–1770 cal BC
2 σ : 2140–1690 cal BC

Final comment: C Butterworth and S Lobb (1992), as the charcoal was all of mature oak it is believed to probably represent a further clearance of woodland for agriculture or for settlement purposes.

HAR-9143 2890 \pm 60 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: W106A416, submitted in February 1988 by S J Lobb

Material: charcoal: *Quercus* sp., mature wood

Initial comment: from the fill of a Collared Urn; a secondary burial inside ring ditch 417. The urn contained cremated bone and a smaller Collared Urn with an accompanying cup. The urn was upright and reasonably intact, the rim had been removed, probably by ploughing.

Objectives: to date the Collared Urn. No dates for this type of urn have been determined previously in this area. It will be important to establish the chronological significance of this urn in relation to the other cremation urns on the site.

Calibrated date: 1 σ : 1200–990 cal BC
2 σ : 1270–910 cal BC

Final comment: C Butterworth and S Lobb (1992), a late date for this type of urn, but would indicate that the Collared Urn was used throughout the period of cremation burial at the site.

Bury St Edmunds: Abbey, Suffolk

Location: TL 859642
Lat. 52.14.39 N; Long. 00.43.24 E

Project manager: A J Fleming (English Heritage), 1979–80

Archival body: English Heritage and Bury St Edmunds Abbey

Description: the site is cut by the twelfth-century masonry of Bury St Edmund's Abbey, one of the largest, richest, most powerful, and influential monasteries of medieval England. The occupation features were associated with middle and late Saxon ceramics whose other archaeological and documentary contexts, likely to have stimulated site activity, include: the presence of early Anglo-Saxon cemeteries in the vicinity; an early eighth-century reference to a royal centre named Beodricsworth in the time of King Sigebert of East Anglia; the growth of a pilgrimage and religious centre after the martyrdom of King Edmund in the later ninth century; the refoundation and patronage of that centre by King Canute in the early eleventh century, and a hugely rich endowment by King Edward in the later mid-eleventh century.

Objectives: these excavations are the first to demonstrate the good survival of pre-Conquest archaeological evidence at Bury St Edmunds. Radiocarbon dating is essential for a proper understanding of the individual structures, their sequence and hence the site's history and regional role.

Final comment: A J Fleming (4 March 2007), the purpose of this suite of radiocarbon assays was to establish an independent chronology to assist calibrating the ceramic types and the site occupation. While this has been partly successful it became clear here, as at similar sites such as Brandon and Raunds, that while midden occupation layers enabled the recovery of bone on this gravel terrace, their disturbance by continuing occupation activity, creates the challenges to close dating documented below. However, the application of Bayesian analysis has greatly assisted clarification of the data. Thus, the results are largely consistent with the dates expected on the basis of artefactual evidence, and confirm the occupation of the site throughout the mid-late Saxon period. Although it is generally possible to fit the results to the stratigraphic sequence, they do not necessarily provide reliable dates for individual contexts, as many samples consisted of more than one bone or charcoal fragment, of uncertain taphonomic history. All of this material appears to have been derived from the mid-late Saxon occupation midden, and the radiocarbon results agree with this interpretation.

Laboratory comment: (19 March 2008), three further samples 49/958 (HAR-4504), 319/840 (HAR-4505), and 408/506 (HAR-4741) failed.

References: Bronk Ramsey *et al* 2000, 295

HAR-3365 1050 \pm 70 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: 512435, submitted on 4 May 1979 by A Fleming

Material: charcoal: unidentified (9.54g); *Quercus* sp., sapwood (0.04g, 0.7%); *Quercus* sp., heartwood (0.10g, 1.75%); *Pomoideae* (2.26g, 39.44%); *Ulex* sp. (2.69g, 46.94%); *Acer* sp. (0.20g, 3.49%); *Corylus* sp. (0.44g, 7.68%) (R Gale 1999)

Initial comment: from context 512, phase 1.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 890–1030
2 σ : cal AD 820–1160

Final comment: A J Fleming (4 March 2008), as the charcoal dated appears to have come mainly from relatively short-lived species, the result provides a reasonable *terminus post quem* for the date of this context, consistent with its attribution to the mid-late Saxon period on artefactual grounds.

HAR-3385 1120 \pm 80 BP

$\delta^{13}\text{C}$: -27.4‰

Sample: 512436, submitted on 4 May 1979 by A Fleming

Material: charcoal: unidentified (2.61g); *Quercus* sp. (0.07g, 30.4%); *Prunus spinosa* (0.10g, 43.5%); *Corylus* sp. (0.06g, 26.1%) (R Gale 1999)

Initial comment: from context 512, phase 1.

Objectives: as HAR-3365

Calibrated date: 1 σ : cal AD 780–1020
2 σ : cal AD 680–1040

Final comment: A J Fleming (4 March 2008), *see* HAR-3365

HAR-3421 1250 \pm 60 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: 512434, submitted on 4 May 1979 by A Fleming

Material: charcoal: *Quercus* sp., from mature timbers (C Keepax 1979)

Initial comment: from context 512, phase 1.

Objectives: as HAR-3365

Calibrated date: 1 σ : cal AD 670–880
2 σ : cal AD 650–940

Final comment: A J Fleming (4 March 2008), although the sample may incorporate a significant wood-age offset, the result is not inconsistent with the attribution of this context to the mid-late Saxon period on artefactual grounds.

HAR-4501 1200 \pm 80 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: 270/575, submitted in July 1981 by A J Clark

Material: charcoal: unidentified

Initial comment: from context 270, which seals 271 and was sealed by 101.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 690–950
2 σ : cal AD 650–1020

Final comment: A J Fleming (4 March 2008), although the sample may incorporate a significant wood-age offset, the result is broadly consistent with the dates of bone samples from the same phase (OxA-831, OxA-836).

HAR-4502 1230 \pm 70 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: 270/576, submitted in July 1981 by A J Clark

Material: charcoal: unidentified

Initial comment: from a charcoal spread in phase 3, context 270; sealing 271 and sealed by 101.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 680–890
2 σ : cal AD 650–980

Final comment: A J Fleming (4 March 2008), *see* HAR-4501

HAR-4503 1240 \pm 70 BP

$\delta^{13}\text{C}$: -25.4‰

Sample: 625/973, submitted in July 1981 by A J Clark

Material: charcoal (remaining small subsample identified): unidentified (2.09g); Salicaceae (<0.01g, 3%); *Fraxinus* sp. (0.01g, 3%); *Quercus* sp., sapwood (0.06g, 18.2%); *Quercus* sp., heartwood (0.18g, 54.6%); bark, unidentified (<0.01g, 3%); *Corylus* sp. (0.06g, 18.2%) (R Gale 1999)

Initial comment: from a stake hole in context 625; sealing 606 and sealed by 622.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 670–890
2 σ : cal AD 650–980

Final comment: A J Fleming (4 March 2008), uncertainty about the taphonomy and intrinsic age of the charcoal in this sample means that the relationship between the radiocarbon result and the date of this context is unclear, but a significant time lag is likely.

Laboratory comment: English Heritage (4 March 2008), both this result and HAR-4506 may incorporate a significant wood-age offset, and the fact that the two bulk charcoal sample results from this context are statistically consistent ($T'=2.5$, $T'(5\%)=3.8$, $v=1$; Ward and Wilson 1978) does not mean that residual charcoal was not dated. HAR-4503 is statistically inconsistent with the date of a bone from the same context, which appears to be even older, and which must be reworked (*see* HAR-4717). Given the uncertain taphonomy of this material, and the likelihood of significant wood-age offsets, there is no advantage in reporting the average radiocarbon age of the dated charcoal.

References: Ward and Wilson 1978

HAR-4506 1070 \pm 80 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: 625/970, submitted in July 1981 by A J Clark

Material: charcoal (remaining subsample identified): unidentified (97.37g); Pomoideae (0.38g, 5.28%); *Quercus* sp., heartwood (6.47g, 89.86%); *Corylus* sp. (0.35g, 4.86%) (R Gale 1999)

Initial comment: from a beam slot in context 625, sealing 606 and sealed by 622.

Objectives: to date this mid-late Saxon occupation level.

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

Final comment: A J Fleming, *see* HAR-4503

Laboratory comment: English Heritage (4 March 2008), HAR-4506 may incorporate a significant wood-age offset, and it is also possible that residual charcoal was included in this bulk sample. Nevertheless, as it could be more recent than the other two dates from this context (*see* HAR-4503, HAR-4717), HAR-4506 may be preferred as the *terminus post quem* date for context 625, and the overlying context 622 (*see* HAR-4669).

HAR-4614 1240 \pm 70 BP

$\delta^{13}\text{C}$: -22.6‰

Sample: 932/322, submitted in July 1981 by A J Clark

Material: animal bone (unidentified) (A Locker)

Initial comment: from a beam slot in context 322, sealing 318 and sealed by 316.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 670–890
2 σ : cal AD 650–980

Final comment: A J Fleming (4 March 2008), although the sample taphonomy is unclear, the result is broadly consistent with the expected date of the context on artefactual and stratigraphic grounds.

HAR-4669 1110 \pm 70 BP

$\delta^{13}\text{C}$: -23.2‰

Sample: 1201/622, submitted in September 1981 by A J Clark

Material: animal bone (unidentified) (A Locker)

Initial comment: from a silty soil layer in context 622, sealing 594 and sealed by 49.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 870–1020
2 σ : cal AD 720–1040

Final comment: A J Fleming (4 March 2008), although the sample taphonomy is unclear, the result is broadly consistent with the expected date of the context, based on artefactual and stratigraphic evidence and the radiocarbon dates of samples from stratigraphically earlier (*see* HAR-4506) and later (*see* HAR-4670) contexts.

HAR-4670 1010 \pm 70 BP

$\delta^{13}\text{C}$: -23.1‰

Sample: 459/49, submitted in September 1981 by A J Clark

Material: animal bone (jawbones with teeth) (A Locker)

Initial comment: from a dark, charcoal rich soil in context 49; sealing 606 and sealed by 585.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 980–1150
2 σ : cal AD 880–1180

Final comment: A J Fleming (4 March 2008), although the sample taphonomy is unclear, the result is broadly consistent with the expected date of the context, based on artefactual and stratigraphic evidence and the radiocarbon dates of samples from stratigraphically earlier contexts (*see* HAR-4506, HAR-4669).

HAR-4691 1020 \pm 70 BP

$\delta^{13}\text{C}$: -23.2‰

Sample: 936/334, submitted in September 1981 by A J Clark

Material: animal bone (unidentified) (A Locker)

Initial comment: from context 334, a grey/brownish silty loam with occasional stones and pebbles, and lighter in colour than context 316. Context 334 sealed context 335 and was sealed by 316.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 970–1120
2 σ : cal AD 880–1170

Final comment: A J Fleming (4 March 2008), although the sample taphonomy is unclear, the result is broadly consistent with the expected date of the context, based on artefactual and stratigraphic evidence and the radiocarbon dates of samples from stratigraphically earlier (*see* HAR-4692) and later (*see* HAR-4711) contexts.

HAR-4692 1290 \pm 80 BP

$\delta^{13}\text{C}$: -23.1‰

Sample: 937/335, submitted in September 1981 by A J Clark

Material: animal bone (unidentified) (A Locker)

Initial comment: from context 335, a silty loam with a considerable admixture of gravel and orange sand. Context 335 was sealed by 334.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 650–810
2 σ : cal AD 600–940

Final comment: A J Fleming (4 March 2008), stratigraphically, context 335 is later than contexts 270 (*see* HAR-4501, HAR-4502), 378 (*see* OxA-831, OxA-832), 418 (*see* OxA-836), 425 (*see* OxA-834, OxA-837), and 426 (*see* OxA-838). Given the radiocarbon results from these contexts, all of which should provide *termini post quem* for context 335, it is more than likely that HAR-4692 represents a residual bone, and that the true date of the context is somewhat later. Nevertheless, the result provides further evidence of activity on the site earlier in the mid-late Saxon period.

HAR-4711 1100 \pm 70 BP

$\delta^{13}\text{C}$: -23.4‰

Sample: 934/315, submitted in September 1981 by A J Clark

Material: animal bone (unidentified) (A Locker)

Initial comment: from a gravelly, fairly dark soil in context 315, sealing 316 and sealed by 297.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 880–1020
2 σ : cal AD 770–1040

Final comment: A J Fleming (4 March 2008), although the sample taphonomy is unclear, the result is broadly consistent with the expected date of the context, based on artefactual and stratigraphic evidence and the radiocarbon dates of samples from stratigraphically earlier contexts (see HAR-4691).

HAR-4717 1370 \pm 70 BP

$\delta^{13}\text{C}$: -23.2‰

Sample: 1160/625, submitted in September 1981 by A J Clark

Material: animal bone (unidentified) (A Locker)

Initial comment: from a beam slot in context 625, sealing 606 and sealed by 622.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 610–690
2 σ : cal AD 550–780

Final comment: A J Fleming (4 March 2008), although not useful for dating context 625, this result has helped to date the earliest Saxon-period activity on this site.

Laboratory comment: (4 March 2008), this result is not statistically consistent with the more plausible of the bulk charcoal radiocarbon results from this context (HAR-4506: $T' = 7.9$; $T' (5\%) = 3.8$, $v = 1$; Ward and Wilson 1978), and the dated bone therefore appears to be significantly older than the context in which it was found.

References: Ward and Wilson 1978

HAR-4749 950 \pm 60 BP

$\delta^{13}\text{C}$: -24.1‰

Sample: 938/338, submitted in September 1981 by A J Clark

Material: animal bone (unidentified) (A Locker)

Initial comment: from a beam slot in context 338, which sealed 318 and was sealed by 335.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 1020–1170
2 σ : cal AD 980–1220

Final comment: A J Fleming (4 March 2008), the result is surprisingly late, given the artefactual and stratigraphic evidence. Context 338 is stratigraphically earlier than contexts 335 (see HAR-4692), 334 (see HAR-4691), and 315 (see HAR-4711), yet HAR-4749 appears to be later than the three radiocarbon results from these contexts. Unless all three of these samples are residual, it is likely that HAR-4749 represents an intrusive bone, and that the true date of the context is somewhat earlier.

HAR-4750 1370 \pm 80 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: 1140/606, submitted in September 1981 by A J Clark

Material: animal bone (jawbones with teeth, and horncore) (A Locker)

Initial comment: from a mottled brown soil in context 606, sealing 693 and sealed by 49.

Objectives: to date this mid-late Saxon occupation level.

Calibrated date: 1 σ : cal AD 600–690
2 σ : cal AD 540–810

Final comment: A J Fleming (4 March 2008), the result, although broadly consistent with the expected date of the context, based on artefactual and stratigraphic evidence, appears to be significantly earlier than that from the overlying context, 49 (see HAR-4670). Given the uncertain taphonomy of HAR-4750, this need not suggest a depositional hiatus.

OxA-831 1050 \pm 80 BP

$\delta^{13}\text{C}$: -19.0‰ (assumed)

Sample: 378-1102, submitted in February 1986 by A J Fleming

Material: bone

Initial comment: from a beam slot, context 378, of an early building and early phase.

Objectives: six samples were submitted (OxA-831, OxA-832, OxA-834, OxA-836 to OxA-838) to provide a chronology for the early phase at the abbey.

Calibrated date: 1 σ : cal AD 890–1030
2 σ : cal AD 770–1170

Final comment: A J Fleming (4 March 2008), the result is broadly consistent with the expected date of the context, based on artefactual and stratigraphic evidence.

References: Hedges *et al* 1987, 295

OxA-832 1200 \pm 100 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: 378-1382, submitted in February 1986 by A J Fleming

Material: charcoal: unidentified

Initial comment: from a beam slot in context 378, cut into the gravel of the early phase of the site.

Objectives: as OxA-831

Calibrated date: 1 σ : cal AD 680–970
2 σ : cal AD 640–1030

Final comment: A J Fleming (4 March 2008), see OxA-831

References: Hedges *et al* 1987, 295

OxA-834 1250 \pm 100 BP

$\delta^{13}\text{C}$: -19.0‰ (assumed)

Sample: 425-1262, submitted in February 1986 by A J Fleming

Material: bone

Initial comment: from a beam slot in context 425, from an early phase.

Objectives: as OxA-831

Calibrated date: 1 σ : cal AD 660–900
2 σ : cal AD 600–1000

Final comment: see OxA-831

References: Hedges *et al* 1987, 295

OxA-836 1240 \pm 80 BP

$\delta^{13}\text{C}$: -19.0‰ (assumed)

Sample: 418-1260, submitted in February 1986 by A J Fleming

Material: bone

Initial comment: from a beam slot in context 418, from an early phase.

Objectives: as OxA-831

Calibrated date: 1 σ : cal AD 670–890
2 σ : cal AD 640–990

Final comment: see OxA-831

References: Hedges *et al* 1987, 295

OxA-837 1050 \pm 80 BP

$\delta^{13}\text{C}$: -19.0‰ (assumed)

Sample: 425-1127, submitted in February 1986 by A J Fleming

Material: bone

Initial comment: from a beam slot in context 425, from an early phase.

Objectives: as OxA-831

Calibrated date: 1 σ : cal AD 890–1030
2 σ : cal AD 770–1170

Final comment: see OxA-831

References: Hedges *et al* 1987, 295

OxA-838 1310 \pm 80 BP

$\delta^{13}\text{C}$: -19.0‰ (assumed)

Sample: 426-1128, submitted in February 1986 by A J Fleming

Material: bone

Initial comment: from a beam slot in context 426, of an early phase.

Objectives: as OxA-831

Calibrated date: 1 σ : cal AD 650–780
2 σ : cal AD 590–900

Final comment: see OxA-831

References: Hedges *et al* 1987, 295

Burythorpe: Whitegrounds Barrow, Yorkshire (East Riding)

Location: SE 78286825
Lat. 54.06.14 N; Long. 00.48.10 W

Project manager: T C M Brewster (East Riding Archaeological Research Committee), 1968

Archival body: Malton Museum, MAP Archaeological Consultancy Ltd

Description: a two-phase barrow: Barrow 1: an oval cairn with 'entrance grave' structure containing disarticulated inhumation burials accompanied by Grimston-style pottery and an amber pendant. Barrow 2: a central grave inserted into the earlier mound for a crouched inhumation accompanied by a Seamer-type flint axe and jet slider. An overlying earth mound with a stone kerb 21m in diameter.

Objectives: continuing cultivation was displacing the kerbstones and levelling a mound that had no previous record of investigation.

Final comment: T G Manby (30 September 1996), the samples were submitted to obtain dates for the burials associated with a two-phase Neolithic monument. Samples were submitted in 1982 and 1983 as the first series of samples conflicted with the stratigraphical associations (possibly caused by an accident in storage).

HAR-4931 4250 \pm 80 BP

$\delta^{13}\text{C}$: -23.2‰

Sample: WB1EGSB3, submitted in 1982 by T C M Brewster

Material: human bone

Initial comment: from the 'entrance grave' in cairn, burial 3 of Whitegrounds Barrow 1.

Objectives: to date the context.

Calibrated date: 1 σ : 2920–2760 cal BC
2 σ : 3090–2620 cal BC

Final comment: A Bayliss (1 May 2009), this result is statistically significantly different from HAR-5318 (4590 \pm 90 BP) ($T'=8.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978), a replicate measurement on the same individual. HAR-4931 is a later grave from the overlying barrow (HAR-4932 and HAR-5507), and thus appears to be anomalous.

Final comment: T G Manby (30 September 1996), the determinations for HAR-4931 and HAR-4932 conflicted with the stratigraphic relationships for Barrow 1 and Barrow 2. The excavator submitted replacement samples in 1983, HAR-5318 and HAR-5507.

Laboratory comment: AERE Harwell (16 October 1986), this sample was not ideal because it had been glued, but we cut away the edges in contact with the adhesive and thought that the sample should be datable.

References: Ward and Wilson 1978

HAR-4932 4670 \pm 110 BP

$\delta^{13}\text{C}$: -22.3‰

Sample: WB1RBSB2, submitted in 1982 by T C M Brewster

Material: human bone

Initial comment: from the central grave of a late Neolithic round barrow built on top of the 'entrance grave' cairn.

Objectives: to date the context.

Calibrated date: 1 σ : 3640–3350 cal BC
2 σ : 3660–3090 cal BC

Final comment: T G Manby (30 September 1996), see HAR-4931. HAR-4932 was replaced by HAR-5507.

Laboratory comment: English Heritage (1 May 2009), this result is statistically consistent with a replicate measurement on the same individual (HAR-5507) ($T'=1.8$; $T'=(5\%)=3.8$; $v=1$). The best indication of the date of this burial is therefore provided by the weighted mean of these determinations, 4558 \pm 70 BP, which calibrates to 3520–3020 cal BC (95% confidence; Reimer *et al* 2004).

Laboratory comment: AERE Harwell (16 October 1986), this sample was not ideal because it had been glued, but we cut away the edges in contact with the adhesive and thought that the sample should be datable.

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

HAR-5318 4590 \pm 90 BP

$\delta^{13}C$: -23.1‰

Sample: WB1EGSB3, submitted in 1982 by T C M Brewster

Material: human bone

Initial comment: repeat of HAR-4931.

Objectives: to confirm the date for the burial deposit in the 'entrance grave' structure of barrow 1.

Calibrated date: 1 σ : 3500–3120 cal BC
2 σ : 3640–3020 cal BC

Final comment: see HAR-4931 and HAR-4932

Laboratory comment: English Heritage (1 May 2009), see HAR-4931. This measurement provides the most accurate estimate of the date of this burial.

HAR-5506 5260 \pm 200 BP

$\delta^{13}C$: -21.8‰

Sample: ENTGRAVE, submitted in 1983 by T C M Brewster

Material: human bone

Initial comment: from the 'entrance grave'.

Objectives: to establish a date for the burial deposit in the 'entrance grave' structure of Barrow 1.

Calibrated date: 1 σ : 4340–3800 cal BC
2 σ : 4500–3650 cal BC

Final comment: T G Manby (30 September 1996), this determination is compatible with the Grimston-style pottery accompanying the human bone deposit in the 'entrance grave' within an early fourth millennium BC range. There is a significant overlap in the calibration range with HAR-5580, which supports a date early in the fourth millennium BC for the 'entrance grave' structure and mortuary practices associated with it.

HAR-5507 4480 \pm 90 BP

$\delta^{13}C$: -22.2‰

Sample: CIRGRAVE, submitted in 1983 by T C M Brewster

Material: human bone (right femur)

Initial comment: from a circular grave.

Objectives: to establish a date for the central grave burial 3 of Barrow 2, and its accompanying flint and jet artefacts.

Calibrated date: 1 σ : 3360–3010 cal BC
2 σ : 3500–2900 cal BC

Final comment: T G Manby (30 September 1996), this determination supports the later Neolithic date appropriate to the associated Seamer-type flint axes and the jet slider. It is notably earlier than the conflicting dates for a pair of inhumations in a rectangular enclosure at Abingdon, Oxfordshire, one accompanied by a similar slider was 4120 \pm 60 BP (BM-2707; which calibrates to 2900–2500 cal BC at 95% confidence; Pearson *et al* 1986). The second inhumation in the same shallow grave, associated with a ground flint knife, provided an even later date of 3860 \pm 50 BP (BM-2708, which calibrates to 2470–2140 cal BC at 95% confidence; Bradley (1992, 132, and 138)). A later fourth-millennium BC date for the Whitegrounds burial would not be inconsistent with the jet slider association. Jet sliders have associations with Peterborough Ware at Boltby, Yorkshire, and at Gop's Cave, Flintshire; this ceramic style has an increasing number of radiocarbon determinations in a fourth millennium to early third millennium BC range (Gibson 1995).

Laboratory comment: English Heritage (1 May 2009), see HAR-4932

References: Bradley 1992
Gibson 1995
Pearson *et al* 1986

HAR-5580 5040 \pm 100 BP

$\delta^{13}C$: -22.8‰

Sample: ENTGRAVE, submitted in 1983 by T C M Brewster

Material: human bone (right femur)

Initial comment: from the 'entrance grave' from Burial 2.

Objectives: to obtain a confirmatory date for the burial deposit in the 'entrance grave' structure of Barrow 1.

Calibrated date: 1 σ : 3970–3700 cal BC
2 σ : 4050–3640 cal BC

Final comment: T G Manby (30 September 1996), supports an early fourth-millennium BC date for this burial deposit. See HAR-5506.

Buscot Lock, Oxfordshire

Location: SU 230980
Lat. 51.40.02 N; Long. 01.40.02 W

Project manager: M Robinson (Oxford Archaeological Unit), 1978

Archival body: Oxfordshire Museum

Description: a Neolithic/early Bronze Age riverbed of the Thames, exposed by weir construction.

Objectives: to date a Thames palaeochannel organic deposit with pollen, macroscopic plant, and insect evidence that the floodplain

was largely wooded. Vertebrate remains included both domestic animals and aurochs. A red deer antler was also present.

References: Robinson and Wilson 1987

HAR-4491 4010 ±90 BP

$\delta^{13}C$: -30.7‰

Sample: BC1, submitted on 18 May 1981 by M Robinson

Material: wood (waterlogged): *Alnus* sp. (M Robinson 1981)

Initial comment: a cross-section of a waterlogged log, with about 35 rings, from a peat deposit. The sample had not been penetrated by rootlets and was dried after identification.

Objectives: to date a Thames palaeochannel organic deposit with pollen, macroscopic plant, and insect evidence that the floodplain was largely wooded. Vertebrate remains included both domestic animals and aurochs. A red deer antler was also present.

Calibrated date: 1 σ : 2830–2460 cal BC
2 σ : 2880–2280 cal BC

Final comment: M Robinson (December 2001), the result was very useful in showing that a largely wooded landscape arrived at least in some places on the floodplain of the upper Thames until at least the late Neolithic. Detailed studies of pollen, macroscopic plant remains, and bones were made on the deposit.

Bushmead Priory, Bedfordshire

Location: TL 108108
Lat. 51.47.04 N; Long. 00.23.37 W

Project manager: D Sherlock (English Heritage), 1981

Archival body: English Heritage

Description: a small Augustinian house in north Bedfordshire. Its foundations date of c AD 1195 is known from documentary sources.

Objectives: to confirm the date obtained on stylistic grounds and to provide a felling date for the timber from which the building was constructed.

Final comment: D Sherlock (27 April 1995), the remains of the refectory which survive are dated on stylistic grounds. Radiocarbon dating was requested to see whether the well-preserved timber-framed roof of crown-post and collar-purlin construction could be scientifically dated. The results suggest the roof went with the first major alterations in the walls of c 1310 rather than their initial build.

Laboratory comment: Ancient Monuments Laboratory (2003), one further sample from a section of dormer purlin (AML-813990; HAR-6667) failed, although subsequently this timber has been dated by dendrochronology to AD 1709–1740 (Groves and Locatelli 2004). Combining the relative tree-ring chronology with the radiocarbon measurements, using the methods outlined in Christen and Litton (1995), suggests that timber 16N1 was felled after cal AD 1295–1345 (54% probability) or after cal AD 1370–1415 (41% probability).

References: Christen and Litton 1995
Groves and Locatelli 2004
Hughes *et al* 1981
Sherlock 1985
Walker and Otlet 1988, 313–4

HAR-6628 630 ±40 BP

$\delta^{13}C$: -24.9‰

Sample: 16N1B, submitted in May 1985 by D Haddon-Reece

Material: wood: *Quercus* sp. (D Haddon-Reece)

Initial comment: rings 11–20 of the 30-year sequence from timber 16N1. As there is no sapwood on this timber, the earliest felling date must be considered as at least 30 years (-11, +20) beyond the outer ring (Hughes *et al* 1981).

Objectives: to estimate the felling date of the timber from which the building was constructed.

Calibrated date: 1 σ : cal AD 1290–1400
2 σ : cal AD 1280–1410

Final comment: D Sherlock (27 April 1995), the resulting date range clearly allows the construction of the roof to be assigned to be rebuilding of the priory refectory in c AD 1310 rather than the primary build of c AD 1250, or the next rebuild of c AD 1500, but both date ranges are too wide to be helpful in this case.

Laboratory comment: this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Hughes *et al* 1981

HAR-6629 680 ±40 BP

$\delta^{13}C$: -25.4‰

Sample: 16N1C, submitted in May 1985 by D Haddon-Reece

Material: wood: *Quercus* sp. (D Haddon-Reece)

Initial comment: rings 1–10 from timber 16N1. See HAR-6628.

Objectives: as HAR-6628

Calibrated date: 1 σ : cal AD 1270–1390
2 σ : cal AD 1260–1400

Final comment: see HAR-6628

Laboratory comment: Ancient Monuments Laboratory (1985), this sample was processed using the larger sample, higher precision liquid scintillation system.

Butley: Burrow Hill, Suffolk

Location: TM 389487
Lat. 52.05.04 N; Long. 01.29.14 E

Project manager: V Fenwick (Butley Archaeological Group), 1978–present

Archival body: Butley Archaeological Group

Description: causeway connecting a former island (SAU BU1) with prehistoric and middle Saxon occupation.

Objectives: to date a timber structure contemporary with a marine incursion.

Laboratory comment: Ancient Monuments Laboratory (1995), a further date (HAR-2987) from this site was funded prior to 1981 and was published in the first volume of Radiocarbon Dates (Jordan *et al* 1994, 30).

References: Fenwick 1984
Jordan *et al* 1994, 30
Walker *et al* 1990, 191

HAR-8180 2200 ±80 BP

$\delta^{13}C$: -27.2‰

Sample: BH864526, submitted on 22 September 1986 by D Sherlock

Material: wood (waterlogged): *Alnus* sp., possibly

Initial comment: from an early ?middle Saxon raft or causeway; taken from wooden piles beneath 1m clay and 0.85m of sand and humus. The wooden piles were beneath marsh clay and a raised causeway at -1.95m OD.

Objectives: to date the raft/causeway.

Calibrated date: 1 σ : 390–160 cal BC
2 σ : 410–40 cal BC

Final comment: V Fenwick (28 March 1995), a fifth to third century BC bracket for the timber structure sealed by alluvium and underlying the causeway is consistent with the earlier Iron Age settlement on the summit of the former island.

**Caldecotte: MK-117,
Buckinghamshire**

Location: SP 89213511
Lat. 52.00.25 N; Long. 00.42.01 W

Project manager: M Petchey (Milton Keynes Development Corporation Archaeology Unit), 1982

Archival body: Milton Keynes Council

Description: an oval enclosure at Caldecotte, Bow Brickhill, Buckinghamshire. Three phases have been determined on stratigraphic grounds.

Objectives: the significance of the site is that it seemed to be the first excavated example of a Celtic ritual (religious or funerary) enclosure in Britain; it was therefore of importance to date it accurately.

Final comment: M Petchey (21 February 2007), the dates confirmed the Iron Age date of the feature.

Laboratory comment: Ancient Monuments Laboratory (2 October 2003), one further sample, MK117010 (HAR-5615) was submitted for dating but failed to produce a result.

References: Loveday and Petchey 1982
Zeevat *et al* 1994

HAR-5614 1940 ±110 BP

$\delta^{13}C$: -27.7‰

Sample: MK117040, submitted in June 1983 by M Petchey

Material: wood (waterlogged): unidentified

Initial comment: from the second lowest fill of ditch 4 in section F of blue-grey sticky clay. Each stake was at least 1.5m long lying horizontally on the base of ditch 4.

Objectives: to date it and place it in its proper sequence on the site.

Calibrated date: 1 σ : 50 cal BC–cal AD 220
2 σ : 210 cal BC–cal AD 340

Final comment: M Petchey (21 February 2007), the date confirmed, but did not refine, the dating of the oblong ditched feature as late first century BC/early first century AD.

References: Walker *et al* 1988, 338

HAR-5616 1750 ±100 BP

$\delta^{13}C$: -27.6‰

Sample: MK117/04, submitted in June 1983 by M Petchey

Material: charcoal: *Quercus* sp.

Initial comment: from context 100, the primary silt of ditch 4 in section F, a dark blue/grey black clayey silt with much organic material.

Objectives: as HAR-5615.

Calibrated date: 1 σ : cal AD 130–410
2 σ : cal AD 50–540

Final comment: M Petchey (21 February 2007), the date confirmed, but did not refine, the dating of the oblong ditched feature as late first century BC/early first century AD.

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 169

Cannington, Somerset

Location: ST 252406
Lat. 51.09.33 N; Long. 03.04.11 W

Project manager: S Hirst (University College London), 1962–3

Archival body: Somerset County Council Museum Service

Description: the site is on the northern rim of Cannington Park Quarry, which exploits limestone of Carboniferous age. Cannington is an important period cemetery with a possible Roman or even earlier origin. This is of interest as an exposition of mortuary behaviour in one of the most challenging periods of British history and as providing physical details of the large sample of a population in the area over several centuries.

Objectives: it is hoped that radiocarbon dating can be used to answer general questions concerning chronology and spatial development and to provide a date range for individual graves. It could help define limits before and after which the cemetery was not used; to suggest peaks or troughs of burial intensity and to define a minimum period of use.

Final comment: S Hirst (13 July 1994), dating for the Cannington cemetery, of several hundred graves, is based on radiocarbon, and on a small number of dated objects found in graves; most graves have no finds. The series of radiocarbon determinations are fundamental in providing an overall likely range for burial, from the mid fourth to the late seventh centuries AD; and in providing date ranges for individual graves, which have given a basis for the study of the spatial and temporal development of the cemetery. OxA-3446 (2020 ±75 BP; 210 cal BC–cal AD 130 at 95% confidence; Reimer *et al* 2004) is of animal bones and shows they are much earlier than the cemetery.

References: Rahtz *et al* 2000
Reimer *et al* 2004

HAR-5483 1600 ±100 BP

$\delta^{13}\text{C}$: -23.1‰

Sample: 114, submitted in January 1982 by S Hirst

Material: human bone

Initial comment: from an aberrantly orientated grave.

Objectives: to establish if the orientation implies a great difference in date from nearby groups.

Calibrated date: 1 σ : cal AD 340–570
2 σ : cal AD 230–650

Final comment: S Hirst (13 July 1994), this date is within the general range of the cemetery at 68% confidence, however, at 95% confidence the earlier part of the range is probably outside that of the cemetery. The date showed that the grave was not of a different period (ie prehistoric) to its neighbours, as already suggested by the copper alloy tweezers from the fill.

HAR-5484 1410 ±80 BP

$\delta^{13}\text{C}$: -22.6‰

Sample: 154, submitted in January 1982 by S Hirst

Material: human bone

Initial comment: from grave 154, one of a fairly regular row of graves equidistant between the row with grave 197 and the row represented by grave 122 (HAR-5486).

Objectives: an opportunity to test the development of the cemetery in this area of fairly regular rows of graves and possibly to date the row.

Calibrated date: 1 σ : cal AD 570–670
2 σ : cal AD 430–780

Final comment: S Hirst (13 July 1994), this date is within the general range of the cemetery at 68% confidence, but at 95% confidence the range probably extends too late. The grave was part of a row, and thereby probably dates the row in broad terms; and it was in an area of several rows and thereby useful in showing the broad dating of this 'regular' part of the cemetery.

HAR-5485 1650 ±100 BP

$\delta^{13}\text{C}$: -22.1‰

Sample: 203, submitted in January 1982 by S Hirst

Material: human bone

Initial comment: from grave 203 containing a skeleton with the arms folded to the neck; part of a row of graves.

Objectives: to check the hypothesis that this position could imply adherence to Christianity and therefore a late or post-Roman date. This grave is in the same row as grave 197 and can be used as a check on Birm-194 (*see also* HAR-9136, which is a replicate of Birm-194) and a guide as to whether dating can be extended from one grave to a row of graves.

Calibrated date: 1 σ : cal AD 250–540
2 σ : cal AD 130–610

Final comment: S Hirst (13 July 1994), this skeleton was chosen because of the arm position of the skeleton. The earlier part of the radiocarbon range is probably too early, but the terminal dates of both ranges are useful in assessing the date of such a grave and this part of the cemetery.

HAR-5486 1510 ±90 BP

$\delta^{13}\text{C}$: -22.0‰

Sample: 122, submitted in January 1982 by S Hirst

Material: human bone

Initial comment: from grave 122, one of a central group of graves all orientated to the south of east-west.

Objectives: potentially providing dating for the central group of graves.

Calibrated date: 1 σ : cal AD 420–650
2 σ : cal AD 350–670

Final comment: S Hirst (13 July 1994), this result helps to date the whole central group. The radiocarbon range is virtually that of the cemetery as a whole at 95% confidence.

HAR-5487 1580 ±80 BP

$\delta^{13}\text{C}$: -22.1‰

Sample: 259, submitted in January 1982 by S Hirst

Material: human bone

Initial comment: from grave 259, a crouched burial with only prehistoric material and possibly prehistoric in date. The grave contained a bone pin, as do a number of graves.

Objectives: to date the grave and possibly the provision of bone pins in graves. This grave is on the western edge of the main area of graves and will help establish the chronology of the site.

Calibrated date: 1 σ : cal AD 400–570
2 σ : cal AD 250–650

Final comment: S Hirst (13 July 1994), crouched burials are rare at this date. The result confirms that it is not in fact prehistoric. The burial was on the west edge and helps to define the broad chronology of the cemetery. A bone pin associated with the burial should also be Roman or later.

HAR-5488 1460 ±90 BP

$\delta^{13}\text{C}$: -22.0‰

Sample: 408, submitted in January 1982 by S Hirst

Material: human bone

Initial comment: from grave 408, a knife grave in the south-east part of the cemetery.

Objectives: to serve as a check on the Roman date Birm-193 (1610 ±105 BP; cal AD 210–650 at 95% confidence; Shotton and Williams 1971, 153) on the knife grave G402 (see also HAR-9138, which is a replicate of Birm-193) to the north as compared with the nearby post-Roman grave goods of G405 (HAR-8807) and 407 (HAR-8806).

Calibrated date: 1σ: cal AD 530–660
2σ: cal AD 410–770

Final comment: S Hirst (13 July 1994), from one of a group of burials with knives. The result confirms post-Roman dating of the knife. The grave was on the edge of the cemetery, near the graves with grave goods of late seventh century AD, so the later end of the date range would be more likely.

References: Shotton and Williams 1971, 153

HAR-5489 1370 ±90 BP

$\delta^{13}\text{C}$: -22.0‰

Sample: 503, submitted in January 1982 by S Hirst

Material: human bone

Initial comment: from grave 503, one of a group of graves on the extreme west.

Objectives: to check the date of the group because it was isolated from the rest and could be earlier in date.

Calibrated date: 1σ: cal AD 600–770
2σ: cal AD 530–880

Final comment: S Hirst (13 July 1994), the result confirms that this group of graves is of the same period as the rest. The latest date at 68% confidence is preferred as the later part of the range at 95% confidence is probably too late.

HAR-6255 1740 ±80 BP

$\delta^{13}\text{C}$: -21.1‰

Sample: 384, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (immature)

Initial comment: from grave 384, part of a grave group south of grave 409 and mound with a different orientation.

Objectives: to establish whether grave 384 was secondary to the mound; this grave is potentially one of the latest.

Calibrated date: 1σ: cal AD 210–410
2σ: cal AD 80–530

Final comment: S Hirst (13 July 1994), the grave was near the nuclear grave, and possibly secondary to it. We would expect this grave to be later than most of the radiocarbon range. The terminal dates are potentially of great importance in suggesting a late Roman date for the nuclear grave.

HAR-6256 1520 ±80 BP

$\delta^{13}\text{C}$: -22.6‰

Sample: 200, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (adult)

Initial comment: from grave 200 in the most westerly row of the central mass of graves. The burial was crouched and finds include a prehistoric pot, a bone pin, and a marked fragment of bone.

Objectives: to provide a date for the grave and help establish the chronology for the cemetery.

Calibrated date: 1σ: cal AD 420–630
2σ: cal AD 380–660

Final comment: S Hirst (13 July 1994), crouched burials are usually prehistoric, but the radiocarbon date confirms it is of late Roman or post-Roman date, and therefore (like HAR-5487) unusual at this date. The associated bone pin should be Roman or later.

HAR-6259 1730 ±80 BP

$\delta^{13}\text{C}$: -22.6‰

Sample: 374, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (adult)

Initial comment: from grave 374 on the northern periphery of the main concentration of graves. This grave is later than path FT23 associated with the slab-marked grave mound and is potentially one of the very latest graves.

Objectives: as HAR-6256

Calibrated date: 1σ: cal AD 220–410
2σ: cal AD 80–540

Final comment: S Hirst (13 July 1994), grave 374 is secondary to the nuclear grave. We would discount the earlier parts of the radiocarbon ranges, however the latest part of the range is possible. The grave was expected to be later than cal AD 450.

References: Walker and Otlet 1988, 303

HAR-6269 1540 ±70 BP

$\delta^{13}\text{C}$: -22.0‰

Sample: 140, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (adult)

Initial comment: from grave 140 in the southern part of the cemetery, oriented north-west to south-east. The grave is associated with a Roman pot.

Objectives: as HAR-6256

Calibrated date: 1σ: cal AD 420–610
2σ: cal AD 380–650

Final comment: S Hirst (13 July 1994), the date ranges are within the expected range of the cemetery. This grave was orientated north of west-east, and the radiocarbon date helps to show this is 'normal'.

HAR-6270 1600 ±70 BP

$\delta^{13}\text{C}$: -22.2‰

Sample: 295, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (19 years old)

Initial comment: from grave 295 in a group oriented north-west to south-east. The burial is associated with a prehistoric pot and bone pin.

Objectives: as HAR-6256

Calibrated date: 1 σ : cal AD 390–550
2 σ : cal AD 250–610

Final comment: S Hirst (13 July 1994), one of a group orientated to the north of west-east. We would discount the earlier part of the range at 95% confidence, otherwise the result is nicely within range. Only prehistoric pottery was associated with the burial.

HAR-7097 1830 \pm 100 BP

$\delta^{13}\text{C}$: -21.9‰

Sample: 100, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (adult)

Initial comment: from grave 100, one of a group on the west side of the southern part of the cemetery. The orientation contrasts with grave 140 (HAR-6269).

Objectives: as HAR-6256

Calibrated date: 1 σ : cal AD 70–330
2 σ : 50 cal BC–cal AD 420

Final comment: S Hirst (13 July 1994), an abnormal orientation. The date range provided appears to be too early, only the last part of the range at 95% confidence would be acceptable. Only prehistoric pottery was associated with the burial.

HAR-7098 1130 \pm 70 BP

$\delta^{13}\text{C}$: -23.3‰

Sample: 181, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone

Initial comment: from grave 181, the primary burial of four, in the central mass of graves. An iron ring was found below the pelvis and a possible chain link.

Objectives: to establish a potentially early date.

Calibrated date: 1 σ : cal AD 780–990
2 σ : cal AD 690–1030

Final comment: S Hirst (13 July 1994), the date range given seems too late. This grave is one of two infants with grave goods of the late seventh century AD. Only the very beginning of the range is possible.

HAR-8049 1390 \pm 40 BP

$\delta^{13}\text{C}$: -20.2‰

Sample: 401, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (immature)

Initial comment: from grave 401; part of a well-defined row in a group of graves in the north-east corner of the cemetery. The group comprises 401, 404 (HAR-8051), 419 (HAR-8050), 421 (HAR-8052), 422 (HAR-8053), and neonates 420 and 404a. The group are thought to be broadly contemporary and possibly a family group. All the samples are submitted for high-precision dates. The grave is associated with summit structure FT43.

Objectives: to provide a date for the grave and associated structure, and help establish the chronology for the cemetery.

Calibrated date: 1 σ : cal AD 630–670
2 σ : cal AD 590–680

Final comment: S Hirst (13 July 1994), both date ranges for HAR-8049 and HAR-8051 lie within the seventh century AD. A very useful date for this grave in assessing the chronology of this group, for which this (close) dating is appropriate and welcome. An earlier Roman pot was in the fill.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Walker *et al* 1990, 189

HAR-8050 1460 \pm 40 BP

$\delta^{13}\text{C}$: -20.5‰

Sample: 419, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (adult)

Initial comment: from grave 419, one of a group of samples for high-precision dating (*see* HAR-8049). Roman and prehistoric finds are associated with the burial.

Objectives: as HAR-6256

Calibrated date: 1 σ : cal AD 560–650
2 σ : cal AD 540–660

Final comment: S Hirst (13 July 1994), the result confirms the late dating of this area, though it seems earlier than HAR-8049.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Walker *et al* 1990, 189

HAR-8051 1370 \pm 40 BP

$\delta^{13}\text{C}$: -20.2‰

Sample: 404, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (adult)

Initial comment: from grave 404, one of a group of samples for high-precision dating (*see* HAR-8049). Roman and prehistoric finds are associated with the burial. The bones exhibit interesting pathology possibly indicating leprosy.

Objectives: as HAR-6256

Calibrated date: 1 σ : cal AD 640–670
2 σ : cal AD 600–760

Final comment: S Hirst (13 July 1994), the result confirms the late dating of this area and, as with HAR-8049, both date ranges lie within the seventh century AD. This result is very close in date to HAR-8049 and HAR-8050 and gives increased confidence in dating this part of the cemetery.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Walker *et al* 1990, 189

HAR-8052 1560 ±40 BP

$\delta^{13}\text{C}$: -21.5‰

Sample: 421, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (adult)

Initial comment: from grave 421, one of a group of samples for high-precision dating (*see* HAR-8049).

Objectives: as HAR-6256

Calibrated date: 1 σ : cal AD 420–560
2 σ : cal AD 410–600

Final comment: S Hirst (13 July 1994), this should be the same period as HAR-8049, HAR-8050, HAR-8051, and HAR-8053; so we would only accept the later part of this range on current hypotheses.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Walker *et al* 1990, 189

HAR-8053 1360 ±40 BP

$\delta^{13}\text{C}$: -20.3‰

Sample: 422, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (immature)

Initial comment: from grave 422, one of a group of samples for high-precision dating (*see* HAR-8049).

Objectives: as HAR-6256

Calibrated date: 1 σ : cal AD 640–680
2 σ : cal AD 610–770

Final comment: S Hirst (13 July 1994), this result is consistent with HAR-8049, HAR-8050, and HAR-8051 in assigning a late date to this area and row.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

HAR-8806 720 ±100 BP

$\delta^{13}\text{C}$: -21.8‰

Sample: 407, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (young child)

Initial comment: from grave 407 with late grave goods.

Objectives: to confirm a date between the fifth to eighth century AD; possibly one the latest graves.

Calibrated date: 1 σ : cal AD 1220–1390
2 σ : cal AD 1050–1420

Final comment: P A Rahtz and S M Hirst (2000), from the radiocarbon dates and grave goods it is believed that the cemetery continued into the eighth century AD. It is unlikely however on general grounds that the use of the cemetery continues substantially beyond this date and it would appear therefore that HAR-8806 is erroneous.

Laboratory comment: English Heritage (3 January 2012), handwritten calculations in the file suggest an age of 880 ±90 BP. Also an age of 824.8 ±100 BP recalib to 879 ±90 BP. It is the recalibrated age that is quoted for other dates in this list, but Walker *et al* 1991 publish 720 ±100 BP.

References: Walker *et al* 1991a, 108

HAR-8807 1130 ±100 BP

$\delta^{13}\text{C}$: -19.5‰

Sample: 405, submitted on 2 August 1984 by P Rahtz, S Hirst, and S Wright

Material: human bone (young child)

Initial comment: from grave 405 with late grave goods. The burial is associated with a seventh/eighth-century brooch.

Objectives: as HAR-6256

Calibrated date: 1 σ : cal AD 770–1020
2 σ : cal AD 660–1150

Final comment: S Hirst (13 July 1994), this is one of two infant graves with grave goods (*see* also HAR-7098). Similar to HAR-7098, only the beginning of the radiocarbon range would be acceptable.

References: Walker *et al* 1991a, 109

HAR-9135 1700 ±60 BP

$\delta^{13}\text{C}$: -22.0‰

Sample: GRAVE 424, submitted in March 1988 by S M Hirst

Material: human bone

Initial comment: a replicate sample of Birm-186, which provided two determinations done on different rib bones from the same skeleton from grave 424 (Birm-186a; 1320 ±160 BP; cal AD 410–1030 at 95% confidence; Birm-186b; 1370 ±230 BP; cal AD 170–1160 at 95% confidence (Reimer *et al* 2004), Shotton and Williams 1971, 153).

Objectives: to act as a check on Birm-186 and hopefully improve on the date.

Calibrated date: 1 σ : cal AD 250–420
2 σ : cal AD 210–540

Final comment: A Bayliss (7 August 2007), the three radiocarbon results from this burial are statistically significantly different (Birm-186a, Birm-186b, HAR-9135; $T' = 6.2$; $T'(5\%) = 6.0$; $v = 2$; Ward and Wilson 1978), with the results produced by the Birmingham laboratory in the late 1960s appearing very slightly too young. HAR-9135 probably provides the most reliable indication of the date of this burial.

Final comment: S Hirst (13 July 1994), grave 424 is central to a shrine or mausoleum on the summit of the hill, some distance from the main part of the cemetery. The structure should be primary and Roman. The date range lends support to this hypothesis, providing a *terminus ante quem* of cal AD 450 at 95% confidence (Pearson and Stuiver 1986). A fourth-century pot found within the fill suggests the later end of the range is preferable.

References: Pearson and Stuiver 1986
Reimer *et al* 2004
Shotton and Williams 1971, 153

HAR-9136 1530 ±70 BP

$\delta^{13}C$: -22.5‰

Sample: GRAVE 197, submitted in March 1988 by S Hirst

Material: human bone

Initial comment: a replicate sample of Birm-194, (1685 ±100 BP; cal AD 90–600 at 95% confidence; Reimer *et al* 2004; Shotton and Williams 1971, 153), dating the skeleton from grave 197 originally submitted to date a row of burials on the west edge of the cemetery.

Objectives: to act as a check on Birm-194 and hopefully improve on the date.

Calibrated date: 1 σ : cal AD 420–610
2 σ : cal AD 390–660

Final comment: A Bayliss (7 August 2007), the two radiocarbon results from this burial are statistically consistent (Birm-194 and HAR-9136; $T'=1.6$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978). The best indication of the date of this burial is therefore provided by the weighted mean of these determinations, 1582 ±57 BP, which calibrates to cal AD 340–610 (95% confidence; Reimer *et al* 2004).

Final comment: S Hirst (13 July 1994), the date range is wholly appropriate, especially the range at 95% confidence as a fifth century pot was recovered from the fill.

References: Reimer *et al* 2004
Shotton and Williams 1971, 153
Ward and Wilson 1978

HAR-9137 1730 ±70 BP

$\delta^{13}C$: -23.1‰

Sample: GRAVE 87, submitted in March 1988 by S Hirst

Material: human bone

Initial comment: a replicate sample of BM-469 (1334 ±67 BP; cal AD 590–860 at 95% confidence; Reimer *et al* 2004; Burleigh *et al* 1976, 19) dating the skeleton from grave 87.

Objectives: to act as a check on BM-469 and hopefully improve on the date.

Calibrated date: 1 σ : cal AD 230–410
2 σ : cal AD 120–510

Final comment: A Bayliss (7 August 2007), the two radiocarbon results from this burial are statistically significantly different (BM-469 and HAR-9137; $T'=16.7$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978). BM-469 may be anomalously recent, and HAR-9137 may provide the most reliable indication of the date of this burial.

Final comment: S Hirst (13 July 1994), from grave 87 on the south border of the cemetery. It was chosen by D Brothwell as an initial sample. The latter part of the range is acceptable.

References: Burleigh *et al* 1976, 19
Hardiman *et al* 1992, 58
Reimer *et al* 2004
Ward and Wilson 1978

HAR-9138 1370 ±80 BP

$\delta^{13}C$: -22.3‰

Sample: GRAVE 402, submitted in March 1988 by S Hirst

Material: human bone

Initial comment: a replicate sample of Birm-193, (1610 ±105 BP; cal AD 210–650 at 95% confidence; Reimer *et al* 2004; Shotton and Williams 1971, 153) dating the skeleton from grave 402, an isolated deep grave, separate from others.

Objectives: to act as a check on Birm-193 and hopefully improve on the date.

Calibrated date: 1 σ : cal AD 600–690
2 σ : cal AD 540–810

Final comment: A Bayliss (7 August 2007), the two radiocarbon results from this burial are statistically consistent (Birm-193 and HAR-9138; $T'=3.3$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978). The best indication of the date of this burial is therefore provided by the weighted mean of these determinations, 1461 ±64 BP, which calibrates to cal AD 430–670 (95% confidence; Reimer *et al* 2004).

Final comment: S Hirst (13 July 1994), a buckle of *c* seventh-century date was recovered from the grave and the date range for HAR-9138 at 95% confidence seems wholly appropriate.

References: Reimer *et al* 2004
Shotton and Williams 1971, 153
Ward and Wilson 1978

Canterbury: 69a Stour Street, Kent

Location: TR 148577
Lat. 51.16.38 N; Long. 01.04.48 E

Project manager: T Tatton-Brown (Canterbury Archaeological Trust), 1981

Archival body: Canterbury Archaeological Trust

Description: a late Saxon cellared building cutting the south-western portico of the Roman temple precinct at Canterbury.

Objectives: to date the building more precisely.

Final comment: P Bennett (1996), a convincing date for the building was not obtained from cultural materials as the building had been destroyed by fire. The samples were taken from carbonised timbers recovered *in situ* from postholes. Stylistically the building appears to be of mid-to-late Anglo-Saxon date and this is also indicated by the stratigraphic position. The dates appear to confirm a ninth-century context for the building - one of only three similarly dated buildings known at Canterbury.

References: Bennett *et al* 1980

HAR-5182 1270 ±70 BP $\delta^{13}\text{C}$: -27.8‰

Sample: CBRV203, submitted in September 1982 by P Blockley

Material: wood (waterlogged): *Quercus* sp. (D Haddon-Reece 1982)

Initial comment: a fragment from a preserved and waterlogged timber, part of a vertical post.

Objectives: to date the building.

Calibrated date: 1 σ : cal AD 660–860
2 σ : cal AD 640–940

Final comment: P Bennett (1996), the dates at 95% confidence provide a seventh- to ninth-century context for the building. A ninth-century date is preferred.

HAR-5229 1060 ±70 BP $\delta^{13}\text{C}$: -26.5‰

Sample: CBR V 246A (STOUR02), submitted in 1982 by D Haddon-Reece

Material: charcoal (remaining subsample identified): unidentified (20.35g); *Quercus* sp., sapwood (0.90g, 9.3%); *Quercus* sp., heartwood (8.77g, 90.7%) (R Gale 1999)

Initial comment: from a charred timber recovered *in situ* from a posthole.

Objectives: to date the building.

Calibrated date: 1 σ : cal AD 890–1030
2 σ : cal AD 780–1160

Final comment: P Bennett (1996), the dates at 95% confidence provide a ninth- to twelfth-century context for the building. A ninth-century date is preferred.

References: Walker *et al* 1988, 329

HAR-5230 1170 ±70 BP $\delta^{13}\text{C}$: -27.0‰

Sample: CBR V 246B (STOUR03), submitted in 1982 by D Haddon-Reece

Material: charcoal (remaining subsample identified): unidentified (30.59g); *Quercus* sp., heartwood (21.21g, 100%) (R Gale 1999)

Initial comment: from a charred timber recovered *in situ* from a posthole.

Objectives: to date the building.

Calibrated date: 1 σ : cal AD 770–980
2 σ : cal AD 670–1020

Final comment: P Bennett (1996), the dates at 95% confidence indicate a seventh- to ninth-century context for the building. A ninth-century date is preferred.

References: Walker *et al* 1988, 329

Carlisle: Castle Street, Cumbria

Location: NY 39855604
Lat. 54.53.43 N; Long. 02.56.17 W

Project manager: M McCarthy (Carlisle Archaeological Unit), 1981

Archival body: English Heritage

Description: excavations took place on the site of numbers 32–40 (even numbers), Castle Street, approximately 140m north of the Cathedral. The site produced evidence of occupation from the first century AD up until the present day.

Objectives: the stratigraphic sequence on the Castle Street site extends from late first century AD to post medieval (period 17). The sequence is good and reliable up to period 9 (later Roman) but thereafter the sequence and interpretation are open to doubts. From period 11 onwards the site is divided into northern and southern halves. In the northern half little activity is attested apart from a well and a grave (HAR-8769). It is thought that the well and grave are Anglo-Saxon in date, possibly tenth/eleventh century. If this can be sustained by radiocarbon dating, there will be an argument for postulating a hitherto unknown church. This period is the least understood aspect of Carlisle's archaeology and one of the major research objectives. In the southern half, by contrast, there was much activity including a timber-lined pit dendrochronologically dated to the late eighth century (eg Q-4950). The bone deposit (HAR-8770) including context 176 appears to overlie the pit and may be of late Saxon date.

References: McCarthy 1983
McCarthy 1991
Walker *et al* 1991a, 104–5

HAR-8769 1230 ±90 BP $\delta^{13}\text{C}$: -22.9‰

Sample: CSTB127, submitted on 24 July 1987 by M R McCarthy

Material: human bone (vertebrae)

Initial comment: from grave CSTB127; SK 1, oriented east-west. The grave cuts the backfill of a well attributed to period 13. This sample is attributed to period 14 and is clearly post-Roman and probably earlier than the thirteenth/fourteenth century.

Objectives: to confirm a date between the Roman period and the twelfth century. A result is important for this site with wider potential for understanding the way in which settlement developed in Carlisle in the Anglo-Saxon period.

Calibrated date: 1 σ : cal AD 670–900
2 σ : cal AD 640–1000

Final comment: M R McCarthy (1991), sample is clearly post-Roman; grave cuts back-fill of well thought to be Anglo-Saxon.

References: Walker *et al* 1991a, 104

HAR-8770 1830 ±70 BP $\delta^{13}\text{C}$: -23.4‰

Sample: CSTB176, submitted on 24 July 1987 by M R McCarthy

Material: animal bone (unidentified)

Initial comment: from context 176; part of a massive deposit of animal bone consisting of about 2.5 million fragments of cattle limb bones. It is attributed to period 13 and is thus clearly post-Roman and probably earlier than the thirteenth/fourteenth century.

Objectives: to confirm a date between the eighth and twelfth centuries AD. It has a high priority for the site for which there are no other sources of dating at this point of the sequence.

Calibrated date: 1 σ : cal AD 80–260
2 σ : cal AD 20–390

Final comment: M R McCarthy (1991), Castle Street stratigraphic sequence is well-established, up to Period 9 (later Roman) but thereafter, sequence and interpretation are open to doubts.

References: Walker *et al* 1991a, 105

Carlisle: Cathedral, Cumbria

Location: NY 399559
Lat. 54.53.39 N; Long. 02.56.14 W

Project manager: M McCarthy (Carlisle Archaeological Unit), 1985

Archival body: Tullie House Museum and Art Gallery

Description: Carlisle Cathedral overlies a deep accumulation of Roman and post-Roman deposits. A series of small-scale excavations were undertaken whilst an assessment of the structural condition of the foundations was being carried out in advance of the construction of an underground Treasury.

Objectives: no details of the structural sequence relating to pre-medieval levels are known.

References: Walker *et al* 1990, 183–4

HAR-7046 1200 \pm 70 BP

$\delta^{13}C$: -20.2‰

Sample: CAT F 22, submitted on 18 September 1985 by M R McCarthy

Material: human bone (vertebrae and pelvic bone)

Initial comment: from trench F; the wall foundations were located in trench F, at the west end adjacent to the former north wall of the nave. These are believed to belong to the first phase of the existing church. The foundations cut a series of soily deposits, one of which, context F22, was a grave containing human skeletal remains. This deposit is the first hint that there was a church earlier than the present building on the site. The date of the grave could be anywhere between late Roman and early twelfth century.

Objectives: to confirm a date between the seventh and early twelfth century and thus establish an ecclesiastic presence before the Cathedral, c AD 1123/5; and to provide additional information required in the formulation of detailed research aims for the excavation planned in advance of the Treasury construction programme.

Calibrated date: 1 σ : cal AD 700–940
2 σ : cal AD 660–990

Final comment: M R McCarthy (1990), the date confirms seventh–eleventh centuries for this context and establishes for first time presence of ecclesiastical building below present cathedral.

Cataclews: Barrow 1, Cornwall

Location: SW 86947605
Lat. 50.32.41 N; Long. 05.00.27 W

Project manager: P Rose (Cornwall Archaeology Unit), 1944

Archival body: Royal Cornwall Museum

Description: excavated by C K Croft Andrew. The most westerly of a group of six barrows strung out along the cliff edge between Cataclews Point and Mother Ivey's Bay. A low, double-kerbed mound covered a fire and a stone cist containing cremated bone. Sherds of several Bronze Age pots, which had been scattered over the central cairn, were recovered from the mound.

Objectives: to date the barrow.

References: Christie 1985
Christie 1988
Walker *et al* 1990, 190

HAR-8099 3510 \pm 70 BP

$\delta^{13}C$: -25.9‰

Sample: CATS4, submitted in July 1983 by P Christie

Material: charcoal (remaining subsample identified): unidentified (15.63g); *Ulex/Cytisus* sp. (0.39g, 3%); *Quercus* sp., sapwood (1.31g, 10.1%); *Quercus* sp., heartwood (11.33g, 86.9%) (R Gale 1999)

Initial comment: from a central fire area under a cairn.

Objectives: to provide a primary date for the cairn.

Calibrated date: 1 σ : 1940–1740 cal BC
2 σ : 2030–1660 cal BC

Final comment: F Healy (5 July 2004), the hearth from which the sample came lay on the pre-barrow surface, beneath a cairn of smallish stones and earth. This was in turn overlain by a yellow sandy soil, in which were sherds of four or five incomplete pots. Two vessels were in the Trevisker style, another possibly so, and one, perhaps two, were plain. The hearth itself consisted of an area 1.2m x 2.3m covered with a mass of charcoal with a few fragments of bone, flints, and pebbles, beneath which the rough stony underlying surface was charred to shallow depth. Given the presence of a cist containing a cremation deposit less than a metre away, the 'hearth' might, in retrospect, be seen as pyre debris. Since most of the residue of the sample was oak heartwood, which may have been considerable age when burnt, the date can be taken as a *terminus post quem* for the construction of the barrow and for the pottery incorporated in its capping.

Catterick: Bainesse Farm, North Yorkshire

Location: SE 240972
Lat. 54.22.11 N; Long. 01.37.50 W

Project manager: P Wilson (English Heritage), 1981 and 1983

Archival body: English Heritage

Description: a Roman roadside settlement with associated field systems and burials, and superimposed by early Anglo-Saxon burials.

Objectives: to establish the date range of burial activity on the site; confirm the post-Roman date of late burials without diagnostic grave goods. To provide an objective check on the interpretative framework applied to the burials distributed across the site.

Final comment: P Wilson (20 February 1995), the series includes samples from a Roman-period enclosed cemetery, post-Roman burials associated with other burials, which had sixth century AD artefacts, and a possible early Roman outlying burial from within the field system.

References: Walker *et al* 1988, 336
Wilson 2002

HAR-5272 1640 ±70 BP

$\delta^{13}\text{C}$: -22.5‰

Sample: 46-941, submitted in October 1982 by N Balaam

Material: human bone

Initial comment: from grave 1743, skeleton 941; one of three graves (see also HAR-5273 and HAR-5275) within an enclosed Roman period cemetery located to the south of the Anglian burials.

Objectives: to establish which phase of the Roman settlement the burial belonged to.

Calibrated date: 1 σ : cal AD 330–540
2 σ : cal AD 240–570

Final comment: P Wilson (20 February 1995), the date conforms to the range expected for burials associated with the later phases of the Roman roadside settlement, or with the possible villa that may partially replace it.

HAR-5273 1660 ±70 BP

$\delta^{13}\text{C}$: -23.5‰

Sample: 46-1742, submitted in October 1982 by N Balaam

Material: human bone

Initial comment: from grave 1740, skeleton 1742; one of three graves (see also HAR-5272 and HAR-5275) within an enclosed Roman period cemetery located to the south of the Anglian burials.

Objectives: as HAR-5272

Calibrated date: 1 σ : cal AD 260–510
2 σ : cal AD 230–560

Final comment: see HAR-5272

HAR-5275 1870 ±70 BP

$\delta^{13}\text{C}$: -22.0‰

Sample: 46-1732, submitted in October 1982 by N Balaam

Material: human bone

Initial comment: from grave 1730, skeleton 1732; one of three graves (see also HAR-5272 and HAR-5273) within an enclosed Roman period cemetery located to the south of the Anglian burials.

Objectives: to confirm a Roman date.

Calibrated date: 1 σ : cal AD 60–240
2 σ : 40 cal BC–cal AD 330

Final comment: P Wilson (20 February 1995), the date conforms to the range expected for the main period of occupation.

HAR-5276 1500 ±70 BP

$\delta^{13}\text{C}$: -21.9‰

Sample: 46-709, submitted in October 1982 by N Balaam

Material: human bone

Initial comment: from grave 4112, skeleton 709.

Objectives: to confirm the date of a burial associated with other early Anglo-Saxon burials.

Calibrated date: 1 σ : cal AD 440–640
2 σ : cal AD 410–660

Final comment: P Wilson (20 February 1995), the date conforms to the expected range for a burial contemporary with the other early Anglo-Saxon burials which are associated with artefacts.

HAR-5277 1560 ±70 BP

$\delta^{13}\text{C}$: -22.5‰

Sample: 46-3520, submitted in October 1982 by N Balaam

Material: human bone

Initial comment: from grave 3775, skeleton 3520; the skeleton was poorly preserved, c 1.64m tall, and buried with her head to the west and on the left side, in a loosely crouched position.

Objectives: as HAR-5276

Calibrated date: 1 σ : cal AD 410–580
2 σ : cal AD 340–650

Final comment: see HAR-5276

HAR-5740 1900 ±80 BP

$\delta^{13}\text{C}$: -23.6‰

Sample: 46-1033, submitted in September 1983 by N Balaam

Material: human bone

Initial comment: from a crouched burial in a pit with no artefacts, sealed by early Roman features.

Objectives: to date the burial.

Calibrated date: 1 σ : cal AD 20–230
2 σ : 60 cal BC–cal AD 330

Final comment: P Wilson (20 February 1995), the date conforms to the range expected for a burial pre-dating the development of the field system associated with the Roman roadside settlement.

Charlwood, Surrey

Location: TQ 23254135
Lat. 51.09.27 N; Long. 00.14.14 W

Project manager: R Ellaby (Surrey Archaeological Society), 1979

Description: a Mesolithic occupation site with a series of pits containing calcined bone and struck flints.

Objectives: to assist in the dating of the occupation of the site.

Final comment: A Bayliss (9 August 2007), the three radiocarbon results from this pit are statistically significantly different ($T'=92.3$; $T'(5\%)=6.0$; $v=2$; Ward and Wilson 1978), as are the two from the lower levels ($T'=8.4$; $T'(5\%)=3.8$; $v=1$).

Final comment: R Ellaby (24 January 1995), the dates show decreasing age of the samples from the basal 40.6–45.7cm level (HAR-4533) through the 35.6–40.6cm level (HAR-4532) to the 30.5–35.6cm level (HAR-4531). This sequence suggests increasing contamination of the samples nearer the surface through soil fissures and root and faunal action (it was noted that the soil in the upper part of the pit was of a crumbly nature indicative of work action). If such a suggestion is correct then it may be that the basal sample HAR-4533 is nearest a true date, but HAR-4533 and HAR-4532 do overlap at 95% confidence indicating only slight contamination at the bottom of the pit. Both dates appear to belong to the final phase of the Mesolithic period in south-east England.

References: Ellaby 1983
Ellaby 1987
Hardiman *et al* 1992, 61
Walker *et al* 1991a, 89
Ward and Wilson 1978

HAR-4531 4340 ±100 BP

$\delta^{13}C$: -28.6‰

Sample: PIT 1-1214, submitted in April 1981 by R Ellaby

Material: charcoal: unidentified

Initial comment: all three samples in the series (HAR-4531, HAR-4532, and HAR-4533) were taken from the basal levels of a truncated pit containing calcined bone and over one thousand pieces of struck flint in mint condition. HAR-4531 was taken from the 30.5–35.6cm level.

Objectives: to assist in the dating of the occupation of the site.

Calibrated date: 1 σ : 3100–2880 cal BC
2 σ : 3350–2690 cal BC

Final comment: see series comments

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-4532 5270 ±90 BP

$\delta^{13}C$: -27.3‰

Sample: PIT 1-1416, submitted in April 1981 by R Ellaby

Material: charcoal: unidentified

Initial comment: from the 35.6–40.6cm level, see also HAR-4531.

Objectives: as HAR-4531

Calibrated date: 1 σ : 4240–3970 cal BC
2 σ : 4340–3940 cal BC

Final comment: see series comments

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-4533 5640 ±90 BP

$\delta^{13}C$: -26.3‰

Sample: PIT 1-1618, submitted in April 1981 by R Ellaby

Material: charcoal: unidentified (<0.01g); *Corylus* sp., probably (<0.01g, 100%) (R Gale 1999)

Initial comment: from the 40.6–45.7cm level, see also HAR-4531.

Objectives: as HAR-4531

Calibrated date: 1 σ : 4550–4360 cal BC
2 σ : 4710–4330 cal BC

Final comment: see series comments

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Cherry Willingham, Lincolnshire

Location: TF 033726
Lat. 53.14.24 N; Long. 00.27.07 W

Project manager: N Field (Lindsay Archaeological Services), 1980

Archival body: Lindsey Archaeological Service

Description: excavations in June 1980 were carried out by the North Lincolnshire Archaeology Unit east of the churchyard at Cherry Willingham, in advance of housing development. This area proved to be on the periphery of the Saxon and medieval settlement but evidence for Saxon occupation was obtained, finds dating between the sixth and twelfth centuries. One sunken hut, associated with ninth-century pottery, and a series of drainage gullies and fences were located. The most important feature on the site was the remains of an iron smelting furnace, probably Saxon in date.

Final comment: N Field (20 November 2006), one of the dates in this series is Roman, which suggests a possible mix of material remains from the two different levels. It also suggests Roman presence at the site before the Saxon arrival.

References: Field 1981

HAR-4429 1640 ±80 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: CW80-50, submitted in February 1981 by N Field

Material: charcoal: *Quercus* sp. (C Keepax)

Initial comment: from the possible destruction remains from a *Grubenhaus*.

Objectives: to establish if the features are Saxon in date.

Calibrated date: 1 σ : cal AD 260–540
2 σ : cal AD 230–600

Final comment: N Field (20 November 2006), this result reflects the fact that the site was sitting on top of Roman features and that the Roman and Saxon features had become mixed.

HAR-4430 1460 ±80 BP

$\delta^{13}\text{C}$: -25.5‰

Sample: CW80-14, submitted in February 1981 by N Field

Material: charcoal: *Quercus* sp. (C Keepax)

Initial comment: from the floor of the *Grubenhaus*.

Objectives: as HAR-4429

Calibrated date: 1 σ : cal AD 540–660
2 σ : cal AD 420–690

Final comment: N Field (20 November 2006), this result confirms what the pottery had already told us, namely that this area, at the periphery of the known Saxon and medieval settlement, also proved to be Saxon in date.

HAR-4431 1500 ±70 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: CW80-4, submitted in February 1981 by N Field

Material: charcoal: Pomoideae; Rosaceae; *Quercus* sp. (C Keepax)

Initial comment: from a furnace.

Objectives: as HAR-4429

Calibrated date: 1 σ : cal AD 440–640
2 σ : cal AD 410–660

Final comment: see HAR-4430

HAR-4432 1220 ±70 BP

$\delta^{13}\text{C}$: -25.2‰

Sample: CW80-16, submitted in February 1981 by N Field

Material: charcoal: *Quercus* sp.; *Fraxinus* sp.; *Alnus* sp.; ?*Quercus* sp; *Corylus* sp. (C Keepax)

Initial comment: from a pit.

Objectives: as HAR-4429

Calibrated date: 1 σ : cal AD 680–900
2 σ : cal AD 650–990

Final comment: see HAR-4430

Chester: Hunter School, 1981, Cheshire

Location: SJ 403664
Lat. 53.11.28 N; Long. 02.53.37 W

Project manager: T J Strickland (Chester City Council), 1981

Archival body: Chester Archaeology

Description: an extensive dark brown soil and rubble layer over Roman fortress buildings, containing Roman, late Saxon, and a little medieval pottery.

Objectives: to date this dark brown soil and rubble layer and further understand its relationship to the late Saxon building found on an adjacent site in 1980. Also to date the sunken-featured building found immediately to the south of the present site in 1979, which is essentially undatable but possibly also late Saxon.

Final comment: S Ward (1994), radiocarbon dating was attempted on samples of the bone from the deposit. In general they gave results spanning the Saxon period. However, the first two samples, Sa 21 and Sa 22 (HAR-5006 and HAR-5007) consisted of several fragments of bone, and as some of these are likely to have been residual Roman, the results could represent a mean of a wide date range. HAR-6625 (Sa 69), which consisted of only one bone, demonstrates the likely influence of residuality. Consequently the date of the deposition or formation if the dark earth is likely to have been at a later end of the range indicated by the radiocarbon results.

References: Strickland 1982
Ward and Ward 1994

HAR-5006 890 ±60 BP

$\delta^{13}\text{C}$: -29.1‰

Sample: CHE\HSS81 Sa21, submitted on 30 September 1981 by P Carrington

Material: animal bone (bulked)

Initial comment: from an extensive dark brown soil and rubble layer containing Roman, late Saxon, and a little medieval pottery.

Objectives: to ascertain if the animal bone belonged to one of the ceramically attested periods or to a virtually aceramic one (c fifth and ninth centuries), when Chester is known from literary references to have been occupied, or to several periods, ie sample is an amalgamate?

Calibrated date: 1 σ : cal AD 1030–1220
2 σ : cal AD 1020–1270

Final comment: P Carrington (9 February 1995), despite our requests, the collection was analysed, not single bones, so the result could be an amalgam, see series comment.

Laboratory comment: Ancient Monuments Laboratory (1982), provisional result only.

HAR-5007 1180 ±190 BP

$\delta^{13}\text{C}$: -24.4‰

Sample: CHE\HSS81 Sa22, submitted on 30 September 1981 by P Carrington

Material: animal bone (bulked)

Initial comment: as HAR-5006

Objectives: as HAR-5006

Calibrated date: 1 σ : cal AD 650–1030
2 σ : cal AD 440–1230

Final comment: see series comments

Laboratory comment: Ancient Monuments Laboratory (1982), provisional result only.

HAR-6625 1490 ±70 BP

$\delta^{13}\text{C}$: -21.7‰

Sample: CHE\HSS81 Sa69, submitted on 16 April 1985 by P Carrington

Material: animal bone: *Bos* sp., single fragment of femur

Initial comment: from post-Roman 'dark earth'. Associated with Roman and late Saxon pottery.

Objectives: as HAR-5006

Calibrated date: 1 σ : cal AD 530–650
2 σ : cal AD 410–670

Final comment: see series comments

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 171

Chester: Hunter's Walk, 1980, Cheshire

Location: SJ 404664
Lat. 53.11.28 N; Long. 02.53.32 W

Project manager: S Ward (Chester City Council), 1980

Archival body: Chester Archaeology

Description: a timber building north of the legionary *principia*.

Objectives: this was the first systematic exploration of this key area of the city centre. The Roman military and Saxon occupation could not be predicted, and so radiocarbon dating was required to compensate for the lack of associated artefacts.

Laboratory comment: Ancient Monuments Laboratory (2003), three samples HSS8120 (HAR-5005), HSS8165 (HAR-6624), and V380SA34 (HAR-4625) submitted for dating failed to produce results.

References: Ward 1981

HAR-4624 2000 ±80 BP

$\delta^{13}\text{C}$: -27.5‰

Sample: CHE\HW80 Sa38, submitted on 16 September 1981 by A J Clark

Material: charcoal: unidentified

Initial comment: from a posthole in sub-soil beneath the floors of a building to the north of the Roman *praetorium*.

Objectives: the only datable context is late fourth century, presumably belonging to the end of the life of the building. A radiocarbon date for this sample could give an indication of the beginning of activity on the site.

Calibrated date: 1 σ : 100 cal BC–cal AD 80
2 σ : 210 cal BC–cal AD 210

Final comment: P Carrington (9 February 1995), the purpose of the sample was to compensate for the lack of artefactual dating evidence. The date range of the result is merely consistent with what one would have guessed.

Chineham, Hampshire

Location: SU 6555 exact location unknown
Lat. 51.17.32 N; Long. 02.30.07 W

Project manager: P V Waton (University of Southampton), 1980

Archival body: University of Southampton

Description: two monoliths of peat were taken for analysis from the faces of a contractor's pit. Five samples from each column were analysed for pollen. The material from monolith 2 showed a more complete pollen spectrum, and the radiocarbon samples were therefore taken from the top and bottom of the peat bed in this monolith from the south face of the excavated area.

Objectives: to date the peat and provide a chronological framework for the pollen analysis.

HAR-4646 11250 ±110 BP

$\delta^{13}\text{C}$: -31.0‰

Sample: CH2/1, submitted on 28 August 1981 by P Waton

Material: peat

Initial comment: from the bottom of 0.4m thick buried peat bed (ie 0.41–0.45m).

Objectives: to date the earliest part of the peat bed.

Calibrated date: 1 σ : 11320–11130 cal BC
2 σ : 11400–10920 cal BC

Final comment: K Cullen (4 January 2010), this date places the peat within the Upper Palaeolithic period, substantially earlier than the expected Iron Age or later date.

HAR-4647 8920 ±100 BP

$\delta^{13}\text{C}$: -28.7‰

Sample: CH2/2, submitted on 28 August 1981 by P Waton

Material: peat

Initial comment: from the top of the 0.4m thick buried peat bed (ie 0.04–0.08m).

Objectives: to date the end of the peat sequence.

Calibrated date: 1 σ : 8260–7950 cal BC
2 σ : 8300–7730 cal BC

Final comment: K Cullen (4 January 2010), this date also places the peat sequence within the Mesolithic period, rather than the Iron Age or later periods, although it is of later Mesolithic date, in line with the stratigraphic positions of the samples.

Church Lawton, Cheshire

Location: SJ 808557
Lat. 53.05.52 N; Long. 02.17.12 W

Project manager: R McNeil (Liverpool University Rescue Archaeology Unit), January 1983

Archival body: Cheshire Museum

Description: Bronze Age burial mound.

Objectives: to elucidate the chronology of the burial mound and associated burials.

Laboratory comment: one sample failed to produce a result (HAR-5540; sample 2547 F20).

References: McNeil 1982
Mullin 2001, 533
Walker *et al* 1988, 337–8

HAR-5533 3600 \pm 100 BP

$\delta^{13}C$: -24.9‰

Sample: 3551F12, submitted on 4 May 1983 by R McNeil

Material: charcoal: unidentified

Initial comment: from a mortuary house.

Objectives: to date the burial ground. The sample represents the only evidence that the mound was intended as a burial ground.

Calibrated date: 1 σ : 2130–1780 cal BC
2 σ : 2280–1690 cal BC

Final comment: R McNeil (1988), sample from possible mortuary house, representing only evidence that mound was ever a burial ground.

HAR-5534 4100 \pm 160 BP

$\delta^{13}C$: -26.3‰

Sample: 3551F14, submitted on 4 May 1983 by R McNeil

Material: charcoal: unidentified

Initial comment: from the old ground surface sealed under the barrow. The deposit was associated with the pre-construction and early phases of the barrow. The sand of the barrow sealed the context.

Objectives: to date pre-construction/early phase of the construction of the barrow.

Calibrated date: 1 σ : 2900–2460 cal BC
2 σ : 3090–2200 cal BC

Final comment: R McNeil (1988), deposit associated with previous and early phase of the barrow.

Laboratory comment: AERE Harwell (1984), the small sample accounts for the larger than normal error term.

HAR-5535 3400 \pm 80 BP

$\delta^{13}C$: -27.3‰

Sample: 3547F5, submitted on 4 May 1983 by R McNeil

Material: charcoal (remaining subsample identified): unidentified (24.14g); *Alnus* sp. (11.47g, 100%) (R Gale 1999)

Initial comment: from fire pit F5, used for cremating bones. The sample was sealed by turf and the feature belongs to the phase 2 barrow; *see* also HAR-5536 for a further measurement of the same phase.

Objectives: to date the cremation. The sample is one of a few examples where cremation is seen to occur (fire pit).

Calibrated date: 1 σ : 1870–1610 cal BC
2 σ : 1920–1500 cal BC

Final comment: R McNeil (1988), sample is sealed by turf and belongs to the phase 2 barrow.

HAR-5536 3300 \pm 80 BP

$\delta^{13}C$: -26.9‰

Sample: 3547F11, submitted on 4 May 1983 by R McNeil

Material: charcoal (remaining subsample identified): unidentified (23.51g); *Alnus* sp. (10.56g, 100%) (R Gale 1999)

Initial comment: from fire pit F11, associated with phase 2 of the barrow.

Objectives: to date phase 2 of the barrow; *see* also HAR-5535 from the same phase.

Calibrated date: 1 σ : 1690–1490 cal BC
2 σ : 1760–1410 cal BC

Final comment: R McNeil (1988), sample associated with phase 2 barrow.

HAR-5537 3490 \pm 80 BP

$\delta^{13}C$: -26.3‰

Sample: 3547F12, submitted on 4 May 1983 by R McNeil

Material: charcoal (remaining subsample identified): unidentified (16.62g); *Quercus* sp., sapwood (1.34g, 41.7%); *Quercus* sp., heartwood (1.87g, 58.3%) (R Gale 1999)

Initial comment: from the burnt lid of a ?primary crouched inhumation. No skeleton remained because the soil was very acid. The pit cut the old ground surface and was sealed by the sand of phase 2 of the barrow.

Objectives: to date the primary burial.

Calibrated date: 1 σ : 1920–1690 cal BC
2 σ : 2030–1610 cal BC

Final comment: R McNeil (1988), no skeleton was present because soil was very acid; the pit cuts old ground surface and is sealed by sand of phase I barrow.

HAR-5538 3560 ±80 BP $\delta^{13}\text{C}$: -24.5‰*Sample*: 3547F13, submitted on 4 May 1983 by R McNeil*Material*: charcoal (remaining subsample identified very comminuted and mostly too thin to identify): unidentified (12.70g); *Quercus* sp. (0.88g, 100%) (R Gale 1999)*Initial comment*: from a ditch surrounding the barrow. The sample came from the primary silts and was sealed by slumping from the barrow.*Objectives*: to date the earliest activity on the site. The ditch pre-dates the construction of the barrow and therefore the feature probably represents the earliest activity.*Calibrated date*: 1 σ : 2030–1770 cal BC
2 σ : 2140–1690 cal BC*Final comment*: R McNeil (1988), ditch ante-dates construction of phase I barrow and is sealed by slumping from the barrow.**HAR-5539** 3500 ±100 BP $\delta^{13}\text{C}$: -26.6‰*Sample*: 3547F16, submitted on 4 May 1983 by R McNeil*Material*: charcoal (remaining subsample identified): unidentified (8.79g); *Ilex* sp. (0.11g, 2.4%); *Quercus* sp., heartwood (3.93g, 86.6%); *Corylus* sp. (0.50g, 11%) (R Gale 1999)*Initial comment*: from inside a Food Vessel from a satellite burial in phase I. The feature was sealed by the sand of the mound. No cremation was present.*Objectives*: to date the satellite burial.*Calibrated date*: 1 σ : 1950–1690 cal BC
2 σ : 2140–1530 cal BC*Final comment*: R McNeil (1988), this result is from a satellite burial, phase I, feature sealed by the sand of the mound of the phase I barrow, no cremation was present.**HAR-5541** 3500 ±80 BP $\delta^{13}\text{C}$: -25.6‰*Sample*: 3547F26, submitted on 4 May 1983 by R McNeil*Material*: charcoal (remaining subsample identified): unidentified (35.25g); *Quercus* sp., sapwood (5.71g, 25.7%); *Quercus* sp., heartwood (16.47g, 74.3%) (R Gale 1999)*Initial comment*: from a pit containing a Food Vessel in a satellite burial in phase I. No associated cremation was present.*Objectives*: to establish the relationship between the features and the artefacts found.*Calibrated date*: 1 σ : 1940–1690 cal BC
2 σ : 2040–1620 cal BC*Final comment*: R McNeil (1988), from a satellite burial, phase I. No cremation was present.**Chysauster, Cornwall***Location*: SW 472354
Lat. 50.09.50 N; Long. 05.32.24 W*Project manager*: G Smith (Central Excavation Unit), 1984*Archival body*: English Heritage*Description*: a large area of stone-walled and lynched field system in places physically linked with the late Iron Age and Romano-British settlement of Chysauster. Within the field system were the remains of at least three small circular stone-walled houses suggesting that the system may have originated in the Bronze Age.*Objectives*: the whole sequence of Bronze Age pottery in Cornwall is at present largely hypothetical based on disputed stylistic sequences with little direct dating evidence. As a group, with firm dating evidence, the pottery from Chysauster could provide a turning point in knowledge of Bronze Age pottery in the South West as an established chronological style horizon.*Final comment*: G Smith (July 1986), the context of the urns within the monument and all the typological considerations suggest a period of activity which is more restricted than the wider range of dates given by the radiocarbon dating results. When allowance is made for typological factors, the period c 1800–1500 cal BC may be proposed as a bracket in which the kerbed cairn was at one time built and used. This would accommodate pots P1–P3 as primary deposits in upright slab-marked contexts, with pots P4–P6 evidently serving as secondary deposits in simple pits dug sometime during this period (Smith 1996, 193).*References*: Smith 1996
Walker and Otlet 1988, 310**HAR-6548** 3650 ±80 BP $\delta^{13}\text{C}$: -25.2‰*Sample*: 8410209, submitted in February 1985 by N Balaam*Material*: charcoal: *Quercus* sp.*Initial comment*: from the top of the old land surface sealed beneath cairn 38, context OLS 534. The charcoal occurred over a fairly wide area and was scattered; ie it was not just a result of a small fire but may be the result of clearance of woodland prior to construction of the cairn.*Objectives*: to provide a date for the construction of the kerb enclosure. This may have been a ceremonial enclosure, which pre-dates the insertion of the first burials and the building of the cairn mound.*Calibrated date*: 1 σ : 2140–1910 cal BC
2 σ : 2280–1770 cal BC*Final comment*: G Smith (July 1986), it must be regarded as most unfortunate that three dates from the same site, HAR-6548, HAR-6549, and HAR-6651, two from similar pots, do not agree with those measured at Oxford, OxA-821 and OxA-822. The three Harwell dates are three to four hundred years earlier and unlikely to be correct on comparative stylistic grounds for the pottery.*References*: Smith 1996, 193
Walker *et al* 1988, 310

HAR-6549 3790 ±120 BP $\delta^{13}\text{C}$: -26.1‰*Sample*: 8410212, submitted in February 1985 by N Balaam*Material*: charcoal: *Corylus avellana*; *Quercus* sp.*Initial comment*: from the fill of pot P3 containing a cremation burial. The pot was contained in pit 548 under a small cist outside the kerb of the cairn.*Objectives*: to date the burial and the decorated pot containing it.*Calibrated date*: 1 σ : 2470–2030 cal BC
2 σ : 2580–1890 cal BC*Final comment*: see HAR-6548*References*: Smith 1996, 193
Walker *et al* 1988, 310**HAR-6651** 3680 ±80 BP $\delta^{13}\text{C}$: -25.9‰*Sample*: 8410213, submitted in February 1985 by N Balaam*Material*: charcoal: *Quercus* sp.*Initial comment*: from the fill of pot P4 containing a cremation burial from pit 529, located outside the kerb of the cairn.*Objectives*: to date the burial and the decorated pot containing it.*Calibrated date*: 1 σ : 2200–1940 cal BC
2 σ : 2300–1880 cal BC*Final comment*: see HAR-6548.*Laboratory comment*: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).*References*: Otlet *et al* 1983
Smith 1996, 193
Walker *et al* 1988, 310**HAR-6652** 3740 ±90 BP $\delta^{13}\text{C}$: -25.5‰*Sample*: 8410216, submitted in February 1985 by N Balaam*Material*: charcoal: *Quercus* sp.*Initial comment*: from the fill of pot P2 containing a cremation burial, located in pit 551 below the cairn but near the centre of it.*Objectives*: as HAR-6651*Calibrated date*: 1 σ : 2290–2020 cal BC
2 σ : 2470–1890 cal BC*Final comment*: G H Smith (1988), HAR-6652 and HAR-6654 date both the burials and the decorated pots containing them, and will help sequencing Bronze Age pottery in south-west, which is, at present, hypothetical.*Laboratory comment*: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).*References*: Otlet *et al* 1983
Smith 1996, 193
Walker *et al* 1990, 172**HAR-6654** 3110 ±70 BP $\delta^{13}\text{C}$: -24.5‰*Sample*: 8410210, submitted in February 1985 by N Balaam*Material*: charcoal: *Quercus* sp.*Initial comment*: from the fill of pot P6 containing a cremation burial, located in pit 536 outside the kerb of the cairn.*Objectives*: as HAR-6651*Calibrated date*: 1 σ : 1450–1300 cal BC
2 σ : 1520–1210 cal BC*Final comment*: G Smith (1996), the date for satellite pot P6 appears, perhaps to be a little later than might be expected for a vessel which still displays a faceted tongue lug (Smith 1996, 193); see also HAR-6652.*Laboratory comment*: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).*References*: Otlet *et al* 1983
Smith 1996, 193
Walker *et al* 1990, 172**HAR-6925** 4570 ±120 BP $\delta^{13}\text{C}$: -26.5‰*Sample*: 8410168, submitted in May 1985 by N Balaam*Material*: charcoal: *Corylus avellana*, some; *Quercus* sp., mainly*Initial comment*: from buried soil in a positive lynchet, which is one element of a widespread field system physically continuous with the Romano-British period settlement of Chysauster.*Objectives*: to provide a date for a phase of agricultural activity for which there is abundant physical evidence but no cultural material associated.*Calibrated date*: 1 σ : 3510–3090 cal BC
2 σ : 3640–2910 cal BC*Final comment*: G M Smith (1988), dates phase of agricultural activity for which there is abundant physical evidence but no association material, although field system may well have Bronze Age origins.*Laboratory comment*: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).*References*: Otlet *et al* 1983
Walker *et al* 1990, 172**HAR-6926** 3150 ±90 BP $\delta^{13}\text{C}$: -25.7‰*Sample*: 8410178, submitted in May 1985 by N Balaam*Material*: charcoal: *Quercus* sp.

Initial comment: from the fill of pit 502 containing an unurned cremation. The pit lay outside the kerb of the cairn and was one of six pits with probable cremations found around the cairn, but not containing burial pots.

Objectives: as a sample of the six unaccompanied burials, the date will provide a comparison with those from burials which were accompanied by pots.

Calibrated date: 1 σ : 1510–1310 cal BC
2 σ : 1630–1210 cal BC

Final comment: G H Smith (1988), date acts as sample of six unaccompanied burials and comparison with dates for burials containing pots.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Smith 1996, 193
Walker *et al* 1990, 173

HAR-6927 3280 \pm 120 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: 6927, submitted in May 1985 by N Balaam

Material: charcoal: *Quercus* sp.

Initial comment: from the fill of pit 544 containing a cremation and a rim sherd of decorated pottery (Pot 7). The pit was close to but outside the kerb of the cairn.

Objectives: to date the burial and the associated decorated potsherd.

Calibrated date: 1 σ : 1730–1430 cal BC
2 σ : 1890–1310 cal BC

Final comment: G H Smith (1988), we needed to date this burial and associated potsherd because the whole sequence of Bronze Age pottery in the south-west is, at present, hypothetical.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Smith 1996, 193
Walker *et al* 1990, 173

OxA-821 3330 \pm 80 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: 8410214, submitted on 1 December 1984 by G H Smith

Material: charcoal: *Quercus* sp.

Initial comment: from the fill of pot P5 containing a cremation burial, located in pit 540 outside the kerb of the cairn but sealed beneath a layer of cobbling.

Objectives: to date the burial and the decorated pot containing it.

Calibrated date: 1 σ : 1740–1510 cal BC
2 σ : 1880–1430 cal BC

Final comment: G Smith (July 1986), OxA-821 and OxA-822 fit in well with a general stylistic interpretation of the pottery as post-Collared Urn, middle-to-late Bronze Age. However, there is an absence of stylistically related and dated pottery in Cornwall so these dates at present stand alone and, if verified, will provide a type assemblage for the area and period; *see* also HAR-6548.

References: Gowlett *et al* 1987, 143
Smith 1996, 193

OxA-822 3430 \pm 80 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: 8410215, submitted on 1 December 1984 by G H Smith

Material: charcoal: *Quercus* sp.

Initial comment: from the fill of pot P1 containing a cremation burial, located in pit 549 below the cairn but near the centre of it.

Objectives: to date the burial and the pot containing it.

Calibrated date: 1 σ : 1880–1630 cal BC
2 σ : 1950–1520 cal BC

Final comment:, the variation between the respective dates for pots P1 and P2 (OxA-822 and HAR-6652) is wider than might be hoped for two vessels which are typologically and spatially compatible with a single burial event. This later date for P1 might be favoured as a closer guide to the foundation date of the cairn when due regard is given to the typological characteristics of the pots (Smith 1996, 193); *see* also OxA-821.

References: Gowlett *et al* 1987, 143
Smith 1996, 193

Clacton: Rush Green, Essex

Location: TM 156154
Lat. 51.47.42 N; Long. 01.07.37 E, 1

Project manager: N Brown (Essex County Council), 1983

Archival body: Colchester Museum, Historic Environment Record

Description: ring ditch with cremation.

Objectives: samples were submitted to provide dating evidence for a ring ditch without diagnostic artefacts the suspected date was early and/or middle Bronze Age.

References: Buckley 1983

HAR-5405 3310 \pm 70 BP

Sample: C2 F1 I1 (5), submitted on 24 January 1983 by S G Buckley

Material: charcoal: unidentified

Initial comment: charcoal from burial pit, which contained an unurned cremation, roughly central to the ring ditch.

Objectives: to date the unurned cremation.

Calibrated date: 1 σ : 1690–1500 cal BC
2 σ : 1750–1430 cal BC

Final comment: N Brown, charcoal for this date came from high in the ditch silts and it was anticipated that the date would be later than that from charcoal associated with a central cremation burial (HAR-5406). Since the opposite is true, it may be that the charcoal from the ditch is residual or possibly that the cremation burial was secondary rather than primary.

References: Buckley 1983, 127

HAR-5406 3040 ±80 BP

Sample: C1 F2 (3), submitted on 24 January 1983 by D G Buckley

Material: charcoal: unidentified

Initial comment: charcoal from burial pit, which contained an unurned cremation, roughly central to the ring ditch.

Objectives: to date the unurned cremation.

Calibrated date: 1σ: 1420–1130 cal BC
2σ: 1500–1040 cal BC

Final comment: as HAR-5405.

References: Buckley 1983, 127

Claydon Pike, Gloucestershire

Location: SU 190996
Lat. 51.41.40 N; Long. 01.43.30 W

Project manager: D Miles (Oxford Archaeological Unit), 1979–83

Archival body: Oxford Archaeology, Corinium Museum

Description: two main areas of occupation. To the north at Warrens Field was an un-nucleated middle Iron Age farmstead represented by a series of roundhouse gullies, ditches and pits, spread over three gravel islands. It was probably representative of a shifting settlement. Further to the south at Longdoles Field, was an extensive area of occupation ranging in date from the late Iron Age to the late/sub-Roman period. The dating is based upon pottery and coin evidence.

Objectives: all samples for radiocarbon dating were taken from the middle Iron Age settlement at Warrens Field. The pottery from the three gravel islands ranged from third to first century BC, with the earliest material generally coming from the westernmost island. Also to confirm the general middle Iron Age date of the settlement, and if possible to determine whether or not there was a recognisable shift in occupation across the gravel islands.

Final comment: A Smith (16 January 2003), on the whole, the suite of dates had only limited success in achieving the objectives set out for them. Certain samples did broadly confirm the middle Iron Age date for the settlement, while others were obviously too early or too late.

Laboratory comment: Ancient Monuments Laboratory (2003), one sample FCP6 (HAR-5941) was submitted for dating but failed to produce a result.

References: Miles *et al* 2007
Miles and Palmer 1982
Miles and Palmer 1983
Miles and Palmer 1990

HAR-5407 2380 ±120 BP

Sample: FCP1, submitted on 10 January 1983 by D Miles

Material: animal bone (unidentified)

Initial comment: from the lower levels of an enclosure ditch, which is one of the latest Iron Age features (phase 4) on the evidence of pottery.

Objectives: to confirm a late Iron Age date suggested by the pottery evidence.

Calibrated date: 1σ: 760–370 cal BC
2σ: 810–180 cal BC

Final comment: A Smith (16 January 2003), this sample, from a rectangular enclosure at the far eastern side of the 'island' (1) gave a date, which very broadly confirmed the middle Iron Age date given by the small pottery assemblage. However, it did not serve to refine the pottery dating any further. It is still not certain if this enclosure was contemporary with enclosure 2 and structure 1, 40m to the north-west.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: English Heritage (3 January 2012), this result is published (Walker and Otlet 1988, 301), although a final certificate has not been found.

References: Otlet *et al* 1983
Walker and Otlet 1988, 301

HAR-5408 9590 ±130 BP

δ¹³C: -25.0‰ (assumed)

Sample: FCP2, submitted on 10 January 1983 by D Miles

Material: charcoal: *Crataegus* sp.

Initial comment: from a drainage gully from the lowest level of an Iron Age house. The house belongs to phase 2 of the settlement.

Objectives: to provide a date for phase 2 occupation.

Calibrated date: 1σ: 9240–8750 cal BC
2σ: 9300–8610 cal BC

Final comment: A Smith (16 January 2003), the date of this sample is much earlier than the Iron Age house gully it was recovered from. It has therefore failed to provide a date for what is believed to be the latest middle Iron Age phase of the settlement.

Laboratory comment: AERE Harwell (1983), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5409 1640 ±70 BP

δ¹³C: -20.9‰

Sample: 10/01/1983, submitted on 10 January 1983 by D Miles

Material: bone

Initial comment: from the lower levels of the latest Iron Age enclosure on this 'island' (phase 4). The enclosure was

cut by post-medieval features containing whole animal skeletons. Efforts were made to avoid contamination, but the possibility of later bone fragments penetrating the lower levels must be borne in mind.

Objectives: to date phase 4 of the occupation.

Calibrated date: 1 σ : cal AD 330–540
2 σ : cal AD 240–570

Final comment: A Smith (16 January 2003), the date from this sample is unexpectedly late, as spatially the enclosure is far more likely to be middle Iron Age in date, as the few sherds of pottery suggest. It is suggested that this bone fragment is intrusive.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1991a, 90

HAR-5410 1940 \pm 80 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: FCP4, submitted on 10 January 1983 by D Miles

Material: bone

Initial comment: from the low levels of an Iron Age enclosure ditch, which is in the centre of the site and belongs to the middle phase (phase 2) of occupation.

Objectives: to date phase 2 occupation.

Calibrated date: 1 σ : 40 cal BC–cal AD 140
2 σ : 170 cal BC–cal AD 250

Final comment: A Smith (16 January 2003), the date of this sample is unexpectedly late and does not conform to the large (over 3000g) quantity of middle Iron Age pottery recovered from the same context. It is possible that the earliest range of the second calibrated date (*c* 170 cal BC) is reflective of the date of the feature (ie it corresponds with the large pottery assemblage).

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Hardiman *et al* 1992, 57

HAR-5411 2170 \pm 80 BP

$\delta^{13}\text{C}$: -26.9‰

Sample: FCP5, submitted on 10 January 1983 by D Miles

Material: animal bone (unidentified)

Initial comment: from a deposit dumped onto the peat surface of marsh. The deposit included middle Iron Age pottery and was sealed by a middle Iron Age bank, which in turn was sealed by a Roman bank.

Objectives: to confirm a middle Iron Age date of deposition and also provide a parameter pre-construction date to the subsequent bank.

Calibrated date: 1 σ : 380–100 cal BC
2 σ : 400 cal BC–cal AD 10

Final comment: A Smith (16 January 2003), this date served to confirm the middle Iron Age date of occupation for this 'island', but the range was too broad to refine this date any further than the pottery dates.

Clyst Honiton, Devon

Location: SX 91159438
Lat. 50.44.23 N; Long. 03.25.46 W

Project manager: S Reed (Exeter City Museum), 1987

Archival body: Royal Albert Memorial Museum

Description: the excavation examined parts of three ring ditches of probable Bronze Age date, and two enclosures, one Romano-British, the other post-Roman.

Objectives: excavation was undertaken to evaluate the nature and preservation of an archaeological site known from aerial photographs and threatened by development. Samples were submitted for radiocarbon dating to establish a chronology for the site.

Final comment: S Reed (7 March 1995), the series of dates received from this site (with the exception of HAR-8676 and HAR-8673 which are redeposited charcoal in a post-Roman feature), confirm the chronology of the site which contained Bronze Age ring ditches (HAR-8675), and Roman and post-Roman enclosures (HAR-8672). Mesolithic activity within the site was unexpected but confirmed by the dating of a pit which coincidentally fell within a ring ditch (HAR-8674).

References: Simpson *et al* 1989
Walker *et al* 1991a, 104

HAR-8672 1550 \pm 60 BP

$\delta^{13}\text{C}$: -25.4‰

Sample: HFCH046, submitted on 3 July 1987 by T Pearson

Material: charcoal: unidentified

Initial comment: sample 046 from context 372, section 61, ditch area B; from the ditch fill of a circular enclosure.

Objectives: the ditch contains battered residual Roman material and no medieval finds. A sixth–eighth century AD date is suspected. If confirmed the site will be of considerable importance in the South West. The context and the initial evaluation, from which this sample comes, should be followed up with further extensive excavation of the enclosure.

Calibrated date: 1 σ : cal AD 420–580
2 σ : cal AD 390–640

Final comment: S Reed (7 March 1995), this date agrees with the site chronology placing the feature as an early post-Roman enclosure ditch.

HAR-8673 2330 \pm 90 BP

$\delta^{13}\text{C}$: -26.6‰

Sample: HFCH080, submitted on 3 July 1987 by T Pearson

Material: charcoal: unidentified

Initial comment: sample 080 from context 486, section 84, ditch area A; from the lower ditch fill of the circular enclosure.

Objectives: as HAR-8672

Calibrated date: 1 σ : 490–260 cal BC
2 σ : 760–190 cal BC

Final comment: S Reed (7 March 1995), this date does not agree with the site chronology or stratigraphic relationship for this feature and as such must be interpreted as redeposited charcoal in a later feature.

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-8674 8140 \pm 160 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: HFCH030, submitted on 3 July 1987 by T Pearson

Material: charcoal (remaining subsample identified): unidentified (7.36g); Pomoideae (>0.01g, 0.36%); *Alnus* sp. (>0.01g, 0.36%); *Prunus spinosa* (0.04g, 1.45%); *Quercus* sp., sapwood (0.15g, 5.46%); *Quercus* sp., heartwood (2.35g, 85.46%); *Betula* sp. (0.19g, 6.91%) (R Gale 1999)

Initial comment: sample 030 from context 257, section 12, ditch area C; from the pit fill within or beneath the former mound of the barrow, a possible cremation pit.

Objectives: submitted to supplement the very few radiocarbon dates currently available from barrow/ring ditches in south-west England. A second millennium BC date is expected on morphological grounds, only lithic finds are consonant with this.

Calibrated date: 1 σ : 7360–6840 cal BC
2 σ : 7540–6640 cal BC

Final comment: S Reed (7 March 1995), the date shows that this pit is an earlier feature which coincidentally falls within the bounds of a ring ditch.

References: Hardiman *et al* 1992, 67

HAR-8675 2700 \pm 70 BP

$\delta^{13}\text{C}$: -27.7‰

Sample: HFCH030, submitted on 3 July 1987 by T Pearson

Material: charcoal (remaining subsample identified): unidentified (7.39g); Pomoideae (>0.01g, 0.36%); *Alnus* sp. (>0.01g, 0.36%); *Prunus spinosa* (0.04g, 1.45%); *Quercus* sp., sapwood (0.15g, 5.46%); *Quercus* sp., heartwood (2.35g, 85.46%); *Betula* sp. (0.19g, 6.91%) (R Gale 1999)

Initial comment: sample 007 from context 011, sections 3 and 4, ditch area A; from the ditch fill of a large ring ditch, and from a layer containing carbonised material beneath context 003, above the lower ditch fill, and covering post pit type feature 005.

Objectives: as HAR-8674

Calibrated date: 1 σ : 920–800 cal BC
2 σ : 1010–780 cal BC

Final comment: S Reed (7 March 1995), an acceptable date for a ring ditch interpreted as the ploughed-out remains of a burial mound.

HAR-8676 1910 \pm 100 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: HFCH066, submitted on 3 July 1987 by T Pearson

Material: charcoal: unidentified

Initial comment: sample 066 from context 425, section 71, ditch area B; from the lower ditch fill of a circular enclosure ditch.

Objectives: as HAR-8672

Calibrated date: 1 σ : 20 cal BC–cal AD 240
2 σ : 170 cal BC–cal AD 340

Final comment: S Reed (7 March 1995), this date does not agree with the site chronology for this feature and as such must be interpreted as redeposited charcoal in a later feature.

References: Hardiman *et al* 1992, 67

Colchester: Culver Street, Essex

Location: TL 99052501
Lat. 51.53.15 N; Long. 00.53.34 E

Project manager: P Crummy (Colchester Archaeological Trust), 1981

Archival body: Colchester Castle Museum

Description: a large area within the walled Roman and later town.

Objectives: to provide dates for some apparently late Roman inhumations.

References: Crummy 1992, 114–5

HAR-5984 1860 \pm 80 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: 1.81 E202, submitted in February 1984 by P Crummy

Material: human bone

Initial comment: from EF143; from a grave dug after the Roman period and probably before the Norman Conquest. The grave was dug into the surviving Roman material and revealed after the removal of dark earth by machine. The bones have been washed and handled.

Objectives: to date the inhumation.

Calibrated date: 1 σ : cal AD 60–250
2 σ : 40 cal BC–cal AD 380

Final comment: P Crummy (4 May 1995), this date is consistent with HAR-5985 and together provide very useful evidence that they derive from late Roman (as opposed to post-Roman) inhumations inside the walled Roman town. They are a separate series to those from East Hill House (HAR-5986) and were not decapitated. The bodies appear to have been in shallow graves without coffins and thus presumably of low social order.

References: Crummy 1992, 114

HAR-5985 1630 ±80 BP $\delta^{13}\text{C}$: -21.0‰ (assumed)*Sample*: 1.81E487, submitted in February 1984 by P Crummy*Material*: human bone*Initial comment*: from EF361; *see* also HAR-5984.*Objectives*: as HAR-5984*Calibrated date*: 1 σ : cal AD 330–540
2 σ : cal AD 230–610*Final comment*: *see* HAR-5984*References*: Crummy 1992, 114**Colchester: East Hill House, Essex***Location*: TM 00162516
Lat. 51.53.19 N; Long. 00.54.32 E*Project manager*: P Crummy (Colchester Archaeological Trust), 1983*Archival body*: Colchester Castle Museum*Description*: small excavations in the grounds of a large town house, just inside the east gate of the Roman town, revealed a Roman street and fronting Roman buildings. These remains had been disturbed by medieval pitting. In one trench two uncoffined burials were recovered. These had been decapitated *post mortem* and the heads placed between the legs of the burials.*Objectives*: to determine whether the burials were of Roman or later date.*References*: Crummy 1992, 375–8**HAR-5986** 1700 ±70 BP $\delta^{13}\text{C}$: -21.0‰ (assumed)*Sample*: X244/247, submitted on 29 September 1983 by D Shimmin*Material*: human bone (right femur, left side lower limb, and foot bones)*Initial comment*: recovered from a grave, at a depth of *c* 0.7m below ground level. The grave cut into the Roman levels on the site, and was sealed by a thin mixed dump level and quite a considerable build-up of topsoil. On stratigraphic grounds, therefore, the burial could be late Roman, Saxon, or medieval.*Objectives*: this sample is one of a series of samples derived from human burials from different sites in and around Colchester. They all are of uncertain date, but are most likely of late Roman or Saxon date, and thus of special importance in terms of the history of Colchester.*Calibrated date*: 1 σ : cal AD 240–420
2 σ : cal AD 130–540*Final comment*: P Crummy (4 May 1995), the sample provides a date for the two decapitated burials for which there was practically no other dating evidence apart from a presumed late

Roman attribution based on the fact that they cut into the latest surviving Roman deposits. The burials are of great interest since they occur inside the walled Roman town.

Corston: Wansdyke, Avon*Location*: ST 68816363
Lat. 51.22.13 N; Long. 02.26.53 W*Project manager*: R Iles (Avon County Council), 1983*Description*: the West Wansdyke in Avon is an important linear boundary of late Roman, sub-Roman, or post-Roman date. The best-preserved sections are scheduled. No excavations have been carried out on the Wansdyke and no reliable finds have been recovered in watching other recent cuttings by service trenches.*Objectives*: this material offers the first opportunity to date this very imprecisely dated monument and thereby possibly gain some inference as to who built it.*Laboratory comment*: Ancient Monuments Laboratory (2003), one sample, SW98235A (HAR-5966), submitted for dating failed to produce a result.*References*: Iles 1988**HAR-5967** 280 ±80 BP $\delta^{13}\text{C}$: -27.4‰*Sample*: SW9823SB, submitted on 7 November 1983 by R Iles*Material*: charcoal (remaining subsample identified): unidentified (0.08g); *Ulex/Cytisus* sp. (0.07g, 30.4%); *Prunus* sp., narrow roundwood (0.16g, 69.6%) (R Gale 1999)*Initial comment*: from layer D, which was composed almost entirely of small pieces of charcoal. The layer was at the bottom of the ditch of the Wansdyke and on the side next to the bank (to the south). The section was recorded in a trench for a gas main. The main had in fact been diverted to go around the scheduled section of Wansdyke to the east.*Objectives*: to provide a *terminus ante quem* for the building of Wansdyke.*Calibrated date*: 1 σ : cal AD 1480–1800
2 σ : cal AD 1440–1955**Final comment*: R Iles (30 April 2004), it was thought that the ditch this material came from was the ditch of the Wansdyke. However, these dates now imply very strongly that this ditch is in fact a much later, unrelated feature and not the Wansdyke, despite its position.**Cossington, Leicestershire***Location*: SK 605128
Lat. 52.42.33 N; Long. 01.06.16 W*Project manager*: C O'Brien (University of Newcastle upon Tyne), 1976*Archival body*: Leicestershire County Council

Description: two Bronze Age barrows: aerial surveys revealed a small ring ditch and a larger double ring showing as crop marks on land due to be quarried.

Objectives: to help establish the East Midlands Bronze Age pottery sequence. Cossington has produced Food Vessels, Collared Urns, and Bi-Partite Urns.

Final comment: P Clay (13 June 2003), the dates are consistent with material from the ring ditches and would appear to confirm early Bronze Age construction for the two 'barrows' with possible contemporaneity; (it could be inferred that ring ditch 2 preceded ring ditch 1).

References: O'Brien 1975–6

HAR-4897 3460 ±60 BP

$\delta^{13}C$: -25.9‰

Sample: F1CL, submitted in October 1981 by H Wheeler

Material: charcoal: unidentified

Initial comment: an occupation deposit from barrow 1, from the first phase of the ring ditch and therefore after the erection of the barrow but before its refurbishment as indicated by the phase 2 ring ditch. The sample is associated with flint scrapers.

Objectives: to date the first phase.

Calibrated date: 1 σ : 1890–1690 cal BC
2 σ : 1940–1620 cal BC

Final comment: P Clay (13 June 2003), ring ditch 1 - a date consistent with the interpretation of the ring ditch in representing a ploughed-out early Bronze Age barrow and with the associated flint scrapers.

HAR-4898 3390 ±90 BP

$\delta^{13}C$: -25.7‰

Sample: F14BN, submitted in October 1981 by H Wheeler

Material: charcoal (remaining fragments of subsample mostly too small to identify): Salicaceae (0.02g, 4.1%); *Quercus* sp., sapwood (0.14g, 28.6%); *Quercus* sp., heartwood (0.32g, 65.3%); *Acer* sp., cf very small fragment (>0.01g, 2%) (R Gale 1999)

Initial comment: from a satellite cremation in barrow 2, associated with a Collared Urn of 'primary series' with whipped cord decoration.

Objectives: to date barrow 2.

Calibrated date: 1 σ : 1870–1530 cal BC
2 σ : 1930–1460 cal BC

Final comment: P Clay (13 June 2003), ring ditch 2 - satellite cremation burial associated with a primary series Collared Urn. This date is consistent with interpretation and the associated Collared Urn.

Cot Nab, North Yorkshire

Location: SE 817569
Lat. 54.00.05 N; Long. 00.45.12 W

Project manager: A E Finney (East Riding Archaeological Research Committee), April 1966

Archival body: Hull and East Riding Museum

Description: Cot Nab, also known as Mortimer's Barrow 104, re-excavated in 1966, yielded sherds of Rinyo-Clacton ware on the pre-barrow land surface. It is one of 36 well-preserved Bronze Age barrows on one of the highest zones of the Yorkshire Wolds, overlooking the Vale of York, either on or immediately to the east of Garrowby Hill brow.

Objectives: to establish the stratigraphy of the graves in relation to the mound.

Final comment: A Bayliss (22 December 2009), grave 2 (HAR-8516) is indeed later than grave 1 (HAR-8517) as suggested on stratigraphic grounds. Both are early Bronze Age secondary inhumations associated with the barrow.

References: Brewster 1968

HAR-8516 3530 ±140 BP

$\delta^{13}C$: -27.8‰

Sample: CNRBG2, submitted in 1986 by A E Finney

Material: human bone (left tibia and femur)

Initial comment: bone from grave 2, which cuts and thus post-dates grave 1. No datable artefacts were recovered.

Objectives: the stratigraphic details are insufficient to determine whether both graves post-date the mound. Radiocarbon results would help establish the relationship between the graves and the mound. Graves 1 and 2 could both be Bronze Age secondary burials that post-date the barrow, or grave 1 could be Bronze Age and grave 2 later, possibly Anglian.

Calibrated date: 1 σ : 2040–1680 cal BC
2 σ : 2290–1510 cal BC

Final comment: see series comments

Laboratory comment: AERE Harwell (1990), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1991a, 97

HAR-8517 3950 ±130 BP

$\delta^{13}C$: -22.9‰

Sample: CNRBG1, submitted in 1986 by A E Finney

Material: human bone (left tibia and femur)

Initial comment: bone from grave 1, which is cut by grave 2.

Objectives: as HAR-8516

Calibrated date: 1 σ : 2620–2230 cal BC
2 σ : 2880–2040 cal BC

Final comment: see series comments

Laboratory comment: AERE Harwell (1990), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Dainton, Devon

Location: SX 857668
Lat. 50.29.21 N; Long. 03.36.41 W

Project manager: G Smith (Gwynedd Archaeological Trust), 1986

Archival body: Royal Albert Memorial Museum, Exeter

Description: a once extensive prehistoric field system of c 20ha, gradually destroyed by limestone quarrying. Previous excavations in 1939–46 and 1975, in and near the 1986 study area produced numerous finds of domestic material including pottery, flint-work, wild and domestic animal bones, human bones, beads, spindle whorls, and quern fragments, as well as an important collection of late Bronze Age metal-working debris. Those finds that were datable suggest occupation possibly in two phases within the period c 1100–500 BC if not continuously, although no clear evidence of actual house sites was found. The 1986 excavation was carried out in advance of a new area of quarrying adjacent to the previous late Bronze Age finds and was designed to provide a full record of the archaeological remains. The area included several small, possibly prehistoric, fields within which were a number of cairns including a previously partly excavated crescentic cairn. The excavation showed that the crescentic cairn was the remains of a post-built and stone-walled roundhouse and that a small round cairn had been built over its entrance after the abandonment and perhaps dismantling of the house.

Objectives: the radiocarbon submission was of charcoal from an entrance posthole of the roundhouse and aimed to provide a scientific date for the occupation of the house to accompany the pottery evidence.

References: Hardiman *et al* 1992, 54

HAR-8768 2150 ±80 BP

$\delta^{13}\text{C}$: -25.2‰

Sample: D414127, submitted in September 1987 by N D Balaam

Material: charcoal: Pomoideae; *Prunus cf avium*

Initial comment: from within the fill of a posthole which was sealed by the stone rubble of a small round cairn.

Objectives: to provide a rough *terminus post quem* for the construction of the cairn.

Calibrated date: 1 σ : 360–50 cal BC
2 σ : 400 cal BC–cal AD 20

Final comment: G Smith (20 November 2006), the charcoal selected was of short-lived species and from a well-stratified context. The interior of the house produced a number of domestic artefacts including pottery with a few diagnostic pieces of All Cannings Cross/Meon Hill style of the fifth to third century BC. The radiocarbon date agrees broadly with the date suggested by the pottery but is limited in usefulness because of the wide statistical span resulting from the plateau in the calibration curve for this period.

Laboratory comment: AERE Harwell (1990), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Clarke 1990
Hardiman *et al* 1992, 54
Needham 1980
Otlet *et al* 1983
Silvester 1980
Willis 1951

Dalton Parlours, West Yorkshire

Location: SE 402445
Lat. 53.53.42 N; Long. 01.23.18 W

Project manager: S Wrathmell (West Yorkshire Archaeological Service), 1978

Archival body: West Yorkshire Archaeological Service, Leeds City Museum

Description: a multi-phase Iron Age occupation site of several acres comprising a complex of linked irregular single-ditched enclosures within which were round houses and other typical Iron Age structures. After a break in occupation, a large Roman villa existed c cal AD 200–400. Thereafter, some Anglo-Saxon activity is suspected.

Objectives: no datable artefacts were retrieved from both the Iron Age or Anglo-Saxon periods and therefore the radiocarbon samples are of considerable importance in interpreting the site.

Final comment: S Wrathmell (12 July 1995), these samples were taken as the only means of obtaining dating evidence for the settlement which preceded the Roman villa. They indicate activity during the second half of the first millennium BC. The lack of evidence for activity on this part of the settlement area during the first and second centuries AD accords with the artefactual evidence.

References: Wrathmell and Nicholson 1990

HAR-6714 1780 ±80 BP

$\delta^{13}\text{C}$: -20.7‰

Sample: DP5005, submitted on 25 March 1985 by J D Hedges

Material: human bone

Initial comment: from context 5005, burial SF 798.

Objectives: to establish a chronology for the site.

Calibrated date: 1 σ : cal AD 130–380
2 σ : cal AD 60–430

Final comment: S Wrathmell (12 July 1995), this burial would appear to date to the period of villa occupation, or slightly earlier. There is no other dating or sequential information to compare with this result.

References: Walker and Otlet 1988, 316

HAR-6715 2140 ±70 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: DP602, submitted on 25 March 1985 by J D Hedges

Material: human bone

Initial comment: from context 602, burial SF 285.

Objectives: as HAR-6714

Calibrated date: 1 σ : 360–50 cal BC
2 σ : 390 cal BC–cal AD 10

Final comment: S Wrathmell (12 July 1995), the skeleton occupied a shallow grave in the corner of a pre-Roman settlement enclosure. It may relate to the period of use of the enclosures, a use that is undatable other than by radiocarbon sampling.

References: Walker *et al* 1990, 174

HAR-6716 2090 \pm 80 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: DP764553, submitted on 25 March 1985 by J D Hedges

Material: antler

Initial comment: from context 003/2; from the fill of a ditch on the west side of enclosure 1.

Objectives: as HAR-6714

Calibrated date: 1 σ : 210 cal BC–cal AD 10
2 σ : 380 cal BC–cal AD 80

Final comment: S Wrathmell (12 July 1995), this dating is broadly in line with all but one of the other samples taken to provide a general chronological indication for the pre-Roman settlement.

References: Walker and Otlet 1988, 316

HAR-6725 2320 \pm 90 BP

$\delta^{13}\text{C}$: -23.7‰

Sample: DP764553, submitted on 25 March 1985 by J D Hedges

Material: animal bone

Initial comment: from context 3455/2; from the fill of a gully of roundhouse 6.

Objectives: as HAR-6714

Calibrated date: 1 σ : 420–230 cal BC
2 σ : 760–180 cal BC

Final comment: see HAR-6716

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 174

HAR-6726 2950 \pm 100 BP

$\delta^{13}\text{C}$: -23.3‰

Sample: DP0201, submitted on 25 March 1985 by J D Hedges

Material: animal bone

Initial comment: from context 020/1; from the fill of a ditch on the west side of enclosure II.

Objectives: as HAR-6714

Calibrated date: 1 σ : 1370–1000 cal BC
2 σ : 1430–900 cal BC

Final comment: S Wrathmell (12 July 1995), this date is considerably earlier than that of the other samples taken to provide broad dating for the pre-Roman settlement. As the piece of bone had been incorporated in a ditch fill, it might have been a residual item rather than an indicator of contemporary activity.

References: Walker *et al* 1990, 174

HAR-6727 2320 \pm 120 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: DP0062, submitted on 25 March 1985 by J D Hedges

Material: animal bone

Initial comment: from context 006/2; from the fill of a ditch on the north side of enclosure 1.

Objectives: as HAR-6714

Calibrated date: 1 σ : 520–200 cal BC
2 σ : 790–90 cal BC

Final comment: see HAR-6716

Laboratory comment: AERE Harwell (1990), the larger than normal error term reflects the smaller than optimum size of the sample for liquid scintillation counting.

References: Walker *et al* 1990, 174

Danby Rigg, North Yorkshire

Location: NZ 70460549 to NZ 70780658
Lat. 54.26.23 N; Long. 00.54.49 W, to
54.26.58 N; 00.54.30 W

Project manager: A F Harding (University of Durham),
1986–9

Archival body: Dorman Museum

Description: a stretch of moorland on the south side of the valley of the river Esk. Excavation and survey produced evidence of activity on the site ranging from the early Bronze Age to the Viking period.

Objectives: to date the site. No dates are currently available for the cross-dyke sites of the North York Moors. Danby Rigg is especially appropriate in view of its proximity to a cairnfield.

Final comment: A Harding (21 August 1995), HAR-8908 and HAR-8911 indicate an early medieval date for the Danby Rigg Triple Dykes, where a Bronze Age date had been assumed. There is no associated artefactual evidence. HAR-8909 is significantly earlier than the other three dates, which form an overlapping sequence. No obvious explanation is apparent.

References: Harding and Ostojka-Zagorski 1994
Walker *et al* 1991a, 111

HAR-8908 1140 ±60 BP $\delta^{13}\text{C}$: -30.0‰

Sample: TD/5, submitted on 12 February 1987 by A F Harding

Material: charcoal (remaining subsample consisted of mostly soil with some charcoal in poor condition and composed of narrow stems): unidentified (9.50g); Ericaceae (0.87g, 100%) (R Gale 1999)

Initial comment: from a substantial layer of black material containing charcoal and vertical bands of brown organic material in the east-facing section of the north ditch, context 327. The sample was c 0.30m above the bottom of the ditch.

Objectives: to date the primary infill of the north ditch, together with HAR-8909.

Calibrated date: 1 σ : cal AD 780–990
2 σ : cal AD 710–1020

Final comment: A Harding (21 August 1995), this indicates an early medieval date for the Danby Triple Dykes, previously thought to be Bronze Age. While this date is very similar to HAR-8910 from the adjacent southern ditch, it differs significantly from HAR-8909, from the same context.

HAR-8909 1510 ±80 BP $\delta^{13}\text{C}$: -30.2‰

Sample: TD/6, submitted on 12 February 1987 by A F Harding

Material: charcoal (remaining subsample consisted of mostly soil with some charcoal composed of narrow stems and in poor conditions): unidentified (111.12g); Ericaceae (0.62g, 100%) (R Gale 1999)

Initial comment: as HAR-8908

Objectives: to date the primary infill of the north ditch, together with HAR-8908.

Calibrated date: 1 σ : cal AD 430–640
2 σ : cal AD 390–670

Final comment: A Bayliss (9 August 2007), the two radiocarbon results from this deposit are statistically significantly different ($T'=13.9$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

Final comment: A Harding (21 August 1995), from the same context has HAR-8908 but significantly earlier than it and HAR-8910 and HAR-8911 from the adjacent southern ditch. This presumably supports the early medieval date of the Triple Dykes.

References: Hardiman *et al* 1992, 59
Ward and Wilson 1978

HAR-8910 1120 ±80 BP $\delta^{13}\text{C}$: -29.5‰

Sample: TD/23, submitted on 12 February 1987 by A F Harding

Material: charcoal: unidentified (0.39g); Salicaceae (>0.01g, 12.5%); Ericaceae (0.07g, 87.5%) (R Gale 1999)

Initial comment: from a thin layer c 0.25m above the bottom of the southern outer ditch, context 337. The layer consisted of black earth with charcoal overlying gleyed clays and disturbed natural.

Objectives: to date the primary infill of the south ditch, together with HAR-8911.

Calibrated date: 1 σ : cal AD 780–1020
2 σ : cal AD 680–1040

Final comment: A Harding (21 August 1995), this indicates an early medieval date for the Danby Triple Dykes, previously thought to be Bronze Age. It overlaps with HAR-8911 from the same context.

HAR-8911 990 ±60 BP $\delta^{13}\text{C}$: -28.4‰

Sample: TD/7, submitted on 12 February 1987 by A F Harding

Material: charcoal (remaining subsample consisted of mostly very narrow stems): unidentified (2.91g); herbaceous stem, including monocotyledonous stems and seed capsules (0.18g, 43.9%); Ericaceae (0.23g, 56.1%) (R Gale 1999)

Initial comment: as HAR-8910

Objectives: to date the primary infill of the south ditch, together with HAR-8910.

Calibrated date: 1 σ : cal AD 990–1160
2 σ : cal AD 900–1180

Final comment: see HAR-8910.

Final comment: A Bayliss (9 August 2007), the two radiocarbon results from this deposit are statistically consistent ($T'=3.6$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978

Davidstow Moor, Cornwall

Location: SX 15558455
Lat. 50.37.51 N; Long. 04.36.30 W

Project manager: P Rose (Cornwall Archaeology Unit), 1941–2

Archival body: Royal Cornwall Museum

Description: an area of flat ground at 294m OD immediately north and northeast of Crowdy-Marsh (now Crowdy Reservoir) on the north side of Bodmin Moor.

Objectives: to establish a chronology for the barrows.

Final comment: P Christie (1988), while too much reliance should not be put on single dates, the five radiocarbon determinations from Davidstow are a useful confirmation of the sequence seen in the ceramic evidence: the earliest date associated with a site where Grooved Ware (site XXVI, HAR-6643) was found and the latest, site XXIV(16/23) (HAR-8098), with Trevisker pottery, while the Collared Urn from site V(2) (HAR-6635) lies in between. Sites II and III, while not providing any ceramic material, are structurally similar so should be contemporary, and are earlier than site V. If the Grooved Ware date from site XXVI (HAR-6643) is

excluded as relating to earlier settlement; the barrow group should span some 400–500 years, comparable to the span of a Cornish churchyard. With the earlier date included, some 1000 years of activity on Davidstow Moor can be envisaged. The gap between the dates for sites XXVI and VIII does no more than reflect the lack of data (Christie 1988, 160).

References: Christie 1988

HAR-6634 3520 ±70 BP

$\delta^{13}\text{C}$: -25.2‰

Sample: DM1 4/7, submitted on 5 December 1984 by C Cartwright

Material: charcoal (samples 4 and 7 were combined, total weight 95g): Leguminosae; ?*Carpinus betulus*; *Quercus* sp.; *Calluna* sp.; *Corylus* sp. (C Cartwright)

Initial comment: site I (1) known as Trevassaborough, from fires in Barrow 1.

Objectives: to date the barrows more precisely and establish the relationships between the Davidstow Moor barrows in chronological terms.

Calibrated date: 1 σ : 1950–1740 cal BC
2 σ : 2040–1680 cal BC

Final comment: P M Christie (1988), radiocarbon dating is the sole way of dating barrows more precisely and establishing chronological relationships between them. It is fortunate that charcoal was retained from 1940s excavation. Mid-date of the range gained for the Davidstow Moor sites.

References: Walker and Otlet 1988, 314

HAR-6635 3580 ±70 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: DM2 4, submitted on 5 December 1984 by C Cartwright

Material: charcoal (total 48g): Leguminosae; *Quercus* sp.; *Calluna* sp. (C Cartwright)

Initial comment: site V(2), from a miniature cairn (F2) outside the kerb on the axis of the south-east quadrant of Barrow 2.

Objectives: to precisely date barrow 2 and to establish its chronological relationship with the other barrows in this group (barrows 1, 8, 16, and 22).

Calibrated date: 1 σ : 2030–1830 cal BC
2 σ : 2140–1740 cal BC

Final comment: P M Christie (1988), the result relates satisfactorily to early Collared Urn tradition associated with the barrow. This result provides a date of the range of Davidstow barrow sites.

References: Walker and Otlet 1988, 314

HAR-6640 3740 ±90 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: DM8 2, submitted on 5 December 1984 by C Cartwright

Material: charcoal (total 18g): ?*Quercus* sp.; Leguminosae; *Calluna* sp. (C Cartwright)

Initial comment: site VIII(8), from the centre, on old turf, in barrow 8.

Objectives: to precisely date the old turf layer in barrow 8 and to establish the position of barrow 8 in relationship to barrows 1, 2, 16, and 22.

Calibrated date: 1 σ : 2290–2020 cal BC
2 σ : 2470–1890 cal BC

Final comment: see HAR-6634

References: Walker and Otlet 1988, 314

HAR-6643 4130 ±70 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: DM22 3, submitted on 5 December 1984 by C Cartwright

Material: charcoal (total 23g): Leguminosae; *Quercus* sp.; *Calluna* sp.; *Corylus* sp. (C Cartwright)

Initial comment: site XXVI(22): from a 'ritual pit' (F6) in barrow 22.

Objectives: to precisely date barrow 22 and establish its chronological relationship with barrows 1, 2, 8, and 16.

Calibrated date: 1 σ : 2880–2570 cal BC
2 σ : 2900–2480 cal BC

Final comment: P Christie (1988), this result is unsatisfactory, as the sample is believed to relate to pre-barrow (Grooved Ware) occupation of the site, relating to earlier settlement.

References: Walker and Otlet 1988, 314

HAR-8098 3440 ±100 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: DM16S2, submitted in July 1983 by P Christie

Material: charcoal (remaining subsample identified): unidentified (2.52g); *Quercus* sp., heartwood (0.70g, 47.6%); *Quercus* sp., sapwood (0.77g, 52.4%) (R Gale 1999)

Initial comment: from a central deposit of barrow 16.

Objectives: site XXIV(16): to precisely date barrow 16 and establish its chronological relationship with barrows 1, 2, 8, and 22.

Calibrated date: 1 σ : 1890–1620 cal BC
2 σ : 2030–1500 cal BC

Final comment: P M Christie (1990), primary date for this barrow, the latest site of the group of Davidstow sites.

References: Walker *et al* 1990, 190

Ditchling Beacon, East Sussex

Location: TQ 331130
Lat. 50.54.02 N; Long. 00.06.25 W

Project manager: D Rudling (Institute of Archaeology, London), 1983

Archival body: Institute of Archaeology, University College London

Description: the site is a hillfort-type location, an exposed chalk hill capped with clay-with-flints. It had previously been excavated in 1929 when greater survival was evident (prior to modern ploughing).

Objectives: to establish whether the structure is Neolithic or a 'typical' Iron Age hillfort. To assist limited dating evidence surviving from the recent site ploughing, in particular providing the only datable evidence for excavation trench D, for comparison with excavation data elsewhere on site.

References: Rudling 1985

HAR-5935 2560 ±100 BP

$\delta^{13}\text{C}$: -22.0‰

Sample: DB83/D/10, submitted on 22 November 1983 by C R Cartwright

Material: antler

Initial comment: from the primary silts of the enclosure ditch on the southern perimeter.

Objectives: only source of dating evidence; no other material available from the excavation for closed dating.

Calibrated date: 1 σ : 820–540 cal BC
2 σ : 910–400 cal BC

Final comment: D Rudling (26 November 1996), the date obtained for the antler fragment is compatible with that of the limited pottery finds which Dr Owen Bedwin has dated to the sixth/fifth century BC.

Dorchester Bypass: Flagstones, Dorset

Location: SY 70408995
Lat. 50.25.28 N; Long. 02.25.09 W

Project manager: P Woodward (Wessex Archaeology), 1987

Archival body: Dorset County Museum

Description: site 4 of the survey and excavation along the route of the southern Dorchester Bypass: the western portion of a Neolithic causewayed enclosure with an inner ring ditch and central burial pit.

Objectives: to date the activity of the site.

References: Smith 1997
Woodward 1988
Woodward and Smith 1987

HAR-8578 4030 ±100 BP

$\delta^{13}\text{C}$: -23.6‰

Sample: W183.382.44, submitted in July 1987 by P J Woodward

Material: antler: *Cervus elaphus*

Initial comment: from the base of a ditch segment to the causewayed enclosure. The broken antler was recovered from

the floor of the ditch sealed by the immediate collapse of the adjacent bank.

Objectives: to provide a construction date for the causewayed enclosure. The causeway is a single ring with inner ring ditch and central burial. Close to Mount Pleasant the enclosure is an additional Neolithic monument in the area and a date is crucial for understanding the Neolithic sequence. Other related monuments are Maiden Castle, Dorchester and Maumbury Rings, Mount Pleasant.

Calibrated date: 1 σ : 2840–2460 cal BC
2 σ : 2890–2280 cal BC

Final comment: F Healy (18 July 1991), HAR-8578 is at variance with the sequence formed by HAR-9158, OxA-2322 (4450 ±90 BP; 3490–2890 cal BC at 95% confidence; Reimer *et al* 2004), and OxA-2321 (4210 ±110 BP; 3090–2480 cal BC at 95% confidence; Reimer *et al* 2004), putting the construction of the enclosure in the later Neolithic. There is no suggestion in the excavation records of later recutting or other intervention in segment 13. In the absence of chronologically diagnostic artefacts from primary contexts, the age indicated by the three earlier determinations seems the most likely one.

References: Reimer *et al* 2004
Walker *et al* 1991a, 101–2

HAR-9158 4490 ±70 BP

$\delta^{13}\text{C}$: -23.0‰

Sample: W183.417.31, submitted in November 1987 by P J Woodward

Material: human bone (infant)

Initial comment: the jumbled remains of an infant sealed below a limestone slab at the base of a ditch segment of an interrupted ditch enclosure.

Objectives: to provide a date for the insertion of the burial, and place it in a sequence with the ditch construction (HAR-8578) and the central burial (HAR-9159).

Calibrated date: 1 σ : 3360–3020 cal BC
2 σ : 3490–2920 cal BC

Final comment: F Healy (19 July 1991), HAR-9158, OxA-2322 (4450 ±90 BP; 3490–2890 cal BC at 95% confidence; Reimer *et al* 2004), and OxA-2321 (4210 ±110 BP; 3090–2480 cal BC at 95% confidence; Reimer *et al* 2004), form a sequence consistent with the stratigraphy, suggesting that the enclosure was constructed during the middle Neolithic, with the burial which provided the sample for OxA-2321 cut into the primary fill at a later date.

References: Reimer *et al* 2004

HAR-9159 3560 ±70 BP

$\delta^{13}\text{C}$: -21.7‰

Sample: W183.430.80, submitted in November 1987 by P J Woodward

Material: human bone

Initial comment: from burial 80, pit 430. The skeletal remains sealed below a large sarsen boulder and associated with a single copper alloy rivet. This burial lay at the centre

of a ring ditch and an interrupted ditch enclosure; it was flexed at the base of a large circular pit.

Objectives: this determination would provide a date for this central burial within a sequence of causewayed enclosure construction (HAR-8578) and the enclosure burial (HAR-9158).

Calibrated date: 1σ: 2020–1770 cal BC
2σ: 2140–1690 cal BC

Final comment: F Healy (19 July 1991), HAR-9159 indicates that the central burial and the barrow under which it lay date from the early Bronze Age, as is suggested by the presence of a copper alloy rivet in the grave fill.

HAR-9161 4960 ±80 BP

δ¹³C: -26.0‰

Sample: W183.259.89, submitted in November 1987 by P J Woodward

Material: charcoal: *Quercus* sp.

Initial comment: recovered from a small pit containing burnt environmental and settlement material with early Neolithic Hembury ware. This pit in all probability pre-dates the Flagstones causewayed enclosure.

Objectives: to provide a date for the settlement pre-dating the causewayed enclosure construction and sequence.

Calibrated date: 1σ: 3900–3650 cal BC
2σ: 3960–3630 cal BC

Final comment: F Healy (19 July 1991), HAR-9161 is consistent with determinations for samples associated with Neolithic bowl pottery elsewhere and indicates that two pits containing pottery of this style at Flagstones pre-date the construction of the enclosure.

Dorchester Bypass: Middle Farm, Dorset

Location: SY 67298995
Lat. 50.42.28 N; Long. 02.27.48 W

Project manager: P Woodward (Wessex Archaeology), 1987

Archival body: Dorset County Museum

Description: a sub-divided early to middle Bronze Age enclosure: south-west of Middle Farm the Dorchester Bypass route crosses a north-south shallow coombe and then rises over a spur projecting from one of the east-west ridges north of and parallel to Maiden Castle.

Objectives: to refine the dating of the Bronze Age landscape around Maiden Castle.

References: Hardiman *et al* 1992, 48-9
Smith 1997
Woodward and Smith 1987

HAR-9160 3200 ±90 BP

δ¹³C: -24.8‰

Sample: W186.SF100, submitted in November 1987 by P J Woodward

Material: human bone

Initial comment: from a crouched inhumation cut into the lower silts of a boundary ditch, which in turn cuts and replaces the south-eastern side of an early-middle Bronze Age enclosure.

Objectives: to provide a date for the large boundary ditch (possibly later Bronze Age) and in turn provide a *terminus post quem* for the Bronze Age enclosure. This date will be a valuable addition to a set of radiocarbon dates for the landscape development around Maiden Castle.

Calibrated date: 1σ: 1610–1400 cal BC
2σ: 1690–1260 cal BC

Final comment: F Healy (19 July 1991), this provides a *terminus ante quem* for the cutting of the enclosure ditch and, by implication, the construction of the roundhouse.

Dorchester: Allington Avenue, Dorset

Location: SY 702899
Lat. 50.42.27 N; Long. 02.25.19 W

Project manager: S Davies (Wessex Archaeology), 1984–5

Archival body: Dorset County Museum

Description: plans for a substantial housing development of c 16ha on the south-eastern outskirts of Dorchester, about a kilometre outside the Roman town of *Durnovaria*, offered the opportunity to examine in detail a very large area of rural landscape, which had already produced evidence of use from the Neolithic period onwards. The site lies on a gentle east-west ridge between the town and Mount Pleasant. Excavations in the 1970s defined the latter as an important centre in the late Neolithic and Bronze Age, subsequently farmed in the later prehistoric period (Wainwright 1979).

Objectives: to clarify the chronological sequence of the site.

References: Davies *et al* 1986
Davies *et al* 2002
Wainwright 1979
Walker *et al* 1991a, 102

HAR-8579 4450 ±80 BP

δ¹³C: -23.6‰

Sample: W98/SF272, submitted in July 1987 by S M Davies

Material: animal bone: *Bos longifrons*, maxilla

Initial comment: from primary fill (context 2102, cutting 1790) of the northern ditch (1999) of a possibly Neolithic long barrow. The fragments have been marked with India ink and sealed with ercalene.

Objectives: the paucity of other datable finds (a few waste flakes and flint tools) from the primary fill of this funerary monument makes the need for radiocarbon dating of this skull an obvious priority, particularly when placed within the complex ritual landscape framework in and around Dorchester.

Calibrated date: 1σ: 3340–2920 cal BC
2σ: 3370–2900 cal BC

Final comment: S Davies, P Bellamy, M Heaton, and P Woodward (2002), the date from the cattle skull provides a date for the monument construction. This falls with the latter part of the period of long barrow construction, when enormous diversity of form is apparent. The unusual features of the Allington Avenue long barrow fit with in such a wide range of long barrow types.

References: Davies *et al* 2002

Dorchester: Church Street, Dorset

Location: SY 693907
Lat. 50.42.52 N; Long. 02.26.06 W

Project manager: D Batchelor (English Heritage), 1982

Archival body: Dorset County Museum

Description: the site showed a few traces of Roman occupation, though the majority of Roman surface had been removed by later activity. From below the earliest Roman deposit there were no datable artefacts.

Objectives: using material collected from beneath this earliest Roman phase of the site, an otherwise undated ditch was put forward for radiocarbon dating, to confirm Iron Age evidence for the site. Radiocarbon dating carried out also to confirm that the pre-Roman pit/ditch contained Iron Age material.

References: Batchelor 1983

HAR-5508 4060 ±90 BP

$\delta^{13}C$: -26.5‰

Sample: 45-1129, submitted in March 1983 by N D Balaam

Material: charcoal: *Quercus* sp.

Initial comment: from an undated ditch beneath the earliest Roman phase of the site.

Objectives: to confirm a possible Iron Age date.

Calibrated date: 1 σ : 2860–2470 cal BC
2 σ : 2890–2340 cal BC

Final comment: S Davies and P Woodward (1985), the charcoal date provided one of the few pieces of dating evidence for the site.

References: Davies and Woodward 1995
Woodward *et al* 1993, 25 and 357

Dorchester: Greyhound Yard, Dorset

Location: SY 69349060
Lat. 50.42.49 N; Long. 02.26.04 W

Project manager: P Woodward (Wessex Archaeology), 1984

Archival body: Dorset County Museum

Description: a large Neolithic monument in the south-east corner of the Roman town of Dorchester (*Durnovaria*). The site lies to the south-east of the Old Methodist Chapel excavations of 1982 (Woodward 1982) and east of the excavations on the site of the Old Greyhound Inn, below the

Tudor Arcade (RCHM II 1970, 566). All are located on the Roman *insula*, which lies on a shallow hillslope to the south of the putative *forum* and on the west side of the coombe in which the town baths (Batchelor 1977) were built.

Objectives: to establish the dating of a series of linearly arranged post pits; checking whether the pits were contemporaneous, and confirming the archaeological dating (on form and flint assemblages) which suggest a late Neolithic date.

Final comment: P Woodward (1993), dating for postpits was obtained from radiocarbon determinations for four samples of charcoal and two of antler. The charcoal was recovered from the festoons in the postpipes of postpits 1631 and 1635, and two others from antler bone from the postpipe of pit 4163 and from the chalk above the ramp of postpit 4885. All these form a cohesive group, which give a construction date centred on 2700 BC (when calibrated at 95% confidence).

Final comment: A Bayliss (16 August 2007), the six radiocarbon results from this linear arrangement of postpits are statistically consistent ($T'=1.5$; $T'(5\%)=11.1$; $v=5$; Ward and Wilson 1978).

References: Batchelor 1977
Ward and Wilson 1978
Woodward *et al* 1984
Woodward *et al* 1993
Woodward 1982

HAR-6663 4020 ±80 BP

$\delta^{13}C$: -23.8‰

Sample: W67.4947, submitted in November 1984 by P J Woodward

Material: antler: *Cervus elaphus* L., frontal bone and skull attached to antler from mature stag

Initial comment: from the primary context of a late Neolithic postpit; layer 4947, pit 4885, context set 21/07/02.

Objectives: to establish a construction date of the late Neolithic monument.

Calibrated date: 1 σ : 2830–2460 cal BC
2 σ : 2880–2300 cal BC

Final comment: P Woodward (1988), the two results, HAR-6663 and HAR-6664, are consistent with each other and also with HAR-5508 from Church Street, Dorchester (4060 ±90 BP; 2900–2390 cal BC at 95% confidence (Pearson *et al* 1986; Pearson and Stuiver 1986); $T'=0.2$; $T'(5\%)=6.0$; $v=2$; Ward and Wilson 1978) and provide a date in the late Neolithic slightly earlier than those of two neighbouring sites, shafts at Mammbury Rings (BM-2281; 3650 ±70 BP; 2280–1820 cal BC at 95% confidence; and BM-2282; 3640 ±70 BP; 2270–1780 cal BC at 95% confidence: Bradley and Thomas 1985) and the construction of the palisade at Mount Pleasant (BM-662; 3637 ±63 BP; 2200–1820 cal BC at 95% confidence; and BM-665; 3645 ±43 BP; 2190–1890 cal BC at 95% confidence (Wainwright 1979, 186)).

References: Bradley and Thomas 1985
Pearson *et al* 1986
Pearson and Stuiver 1986
Wainwright 1979
Walker and Otlet 1988, 315
Ward and Wilson 1978

HAR-6664 4070 ±70 BP

$\delta^{13}\text{C}$: -23.6‰

Sample: W67.4166, submitted in November 1984 by P J Woodward

Material: antler: *Cervus elaphus* L., base and shaft, mature and shed

Initial comment: from a primary deposit in postpipe 4165; layer 4166, context set 31/13/01.

Objectives: as HAR-6663

Calibrated date: 1 σ : 2860–2490 cal BC
2 σ : 2880–2460 cal BC

Final comment: see HAR-6663

References: Walker and Otlet 1988, 315

HAR-6686 4020 ±80 BP

$\delta^{13}\text{C}$: -27.0‰

Sample: W67.1648, submitted in August 1984 by P J Woodward

Material: wood (waterlogged): *Quercus* sp., crushed and broken large timbers

Initial comment: from the infill on the outer edge of postpit; layer 1648, pit 1635, postpipe 1647, context set 31/02/01.

Objectives: to establish a date for the postpit, which is otherwise dated by form and flint assemblage only, to the late Neolithic. One of a series of postpits in linear arrangement, structurally similar to postpits at Mount Pleasant and Durrington Walls. It would be valuable to confirm an association with neighbouring late Neolithic monuments.

Calibrated date: 1 σ : 2830–2460 cal BC
2 σ : 2880–2300 cal BC

Final comment: P J Woodward (1990), results establish dates of postpits, which are otherwise dated on form and flint assemblages alone to late Neolithic (Woodward *et al* 1984). This is series of postpits in linear arrangement structurally similar to post pits at Mount Pleasant/Durrington Walls.

References: Walker *et al* 1990, 173
Woodward *et al* 1984

HAR-6687 4090 ±70 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: W67.1649, submitted in August 1984 by P J Woodward

Material: wood (waterlogged): *Quercus* sp., crushed and broken from large timbers

Initial comment: from festoons of charcoal along the edge of the inner postpipe; layer 1649, pit 1635, postpipe 1647, context set 31/02/01.

Objectives: as HAR-6686

Calibrated date: 1 σ : 2870–2490 cal BC
2 σ : 2890–2470 cal BC

Final comment: see HAR-6686

References: Walker *et al* 1990, 173

HAR-6688 4080 ±70 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: W67.1653, submitted in August 1984 by P J Woodward

Material: wood (waterlogged): *Quercus* sp., from large timbers

Initial comment: from festoons of charcoal in the lower postpipe fill; layer 1653, pit 1631, postpipe 1639, context set 31/01/01.

Objectives: as HAR-6686

Calibrated date: 1 σ : 2860–2490 cal BC
2 σ : 2890–2460 cal BC

Final comment: see HAR-6686

References: Walker *et al* 1990, 173

HAR-6689 4140 ±90 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: W67.1642, submitted in August 1984 by P J Woodward

Material: wood (waterlogged): *Quercus* sp., from large timbers

Initial comment: from the fill of a postpipe; layer 1642, pit 1631, postpipe 1639, context set 31/01/01.

Objectives: as HAR-6686

Calibrated date: 1 σ : 2890–2570 cal BC
2 σ : 2920–2470 cal BC

Final comment: see HAR-6686

References: Walker *et al* 1990, 173

**Dorchester-Upon-Thames:
Bypass, Oxfordshire**

Location: SU 58189493
Lat. 51.38.59 N; Long. 01.09.32 W

Project manager: R A Chambers (Oxfordshire
Archaeological Unit), 1981

Archival body: Oxfordshire Museum

Description: graves of a late and sub-Roman cemetery within a rectangular ditched enclosure, discovered along the route of the Dorchester Bypass at Queenford Mill. These burials formed part of the extra-mural cemetery to the north-east of the Roman town.

Objectives: to provide a chronology for the site as there were no stratigraphic relationship between graves.

Final comment: R A Chambers (1987), the radiocarbon dates suggest that this cemetery was in use during the fifth century, and do not preclude burial continuing late into the sixth century. Although pottery from the enclosure ditches was not manufactured any later than the fourth century, the majority of sherds were heavily abraded, suggesting that they were residual within the fill of the enclosure ditch. It is therefore possible that this ditch was not dug until the fifth century.

Laboratory comment: Ancient Monuments Laboratory (2004), two further measurements were obtained from the excavations on this site. These provided dates of HAR-175 (1520 ±110 BP; cal AD 250–690 at 95% confidence; F94) and HAR-176 (1530 ±110 BP; cal AD 250–680 at 95% confidence; F180; Reimer *et al* 2004).

References: Chambers 1987
Reimer *et al* 2004

HAR-5324 1430 ±70 BP

$\delta^{13}\text{C}$: -24.4‰

Sample: DBPIF64, submitted in November 1982 by R A Chambers

Material: human bone

Initial comment: from an east-west grave within the rectangular enclosure, which contained the supine skeleton of an adult female.

Objectives: to provide a chronology for the site as there were no stratigraphic relationships between graves.

Calibrated date: 1 σ : cal AD 560–660
2 σ : cal AD 430–690

Final comment: R A Chambers (1987), this result suggests that burial on the site may have continued into the sixth century AD.

References: Walker *et al* 1988, 337

HAR-5325 1480 ±70 BP

$\delta^{13}\text{C}$: -22.3‰

Sample: DBPIF34, submitted in November 1982 by R A Chambers

Material: human bone

Initial comment: from an east-west grave to the south of the rectangular enclosure, which contained the supine skeleton of a young adult female.

Objectives: as HAR-5324

Calibrated date: 1 σ : cal AD 530–650
2 σ : cal AD 420–670

Final comment: R A Chambers (1987), this result suggests that burial on the site may have continued into the sixth century AD.

HAR-5350 1550 ±70 BP

$\delta^{13}\text{C}$: -21.8‰

Sample: DBPIF48, submitted in November 1982 by R A Chambers

Material: human bone

Initial comment: from an east-west grave to the south of the rectangular enclosure, which contained the supine skeleton of an adult male.

Objectives: as HAR-5324

Calibrated date: 1 σ : cal AD 420–600
2 σ : cal AD 350–650

Final comment: R A Chambers (1987), this result suggests that the burial is of sub-Roman date.

References: Walker *et al* 1988, 337

HAR-5351 1550 ±80 BP

$\delta^{13}\text{C}$: -23.1‰

Sample: DBPIF75, submitted in November 1982 by R A Chambers

Material: human bone

Initial comment: from an east-west grave with the rectangular enclosure, which contained the supine skeleton of an older adult male.

Objectives: as HAR-5324

Calibrated date: 1 σ : cal AD 410–610
2 σ : cal AD 330–660

Final comment: R A Chambers (1987), this burial may be of fifth- or sixth-century date.

References: Walker *et al* 1988, 337

Dovercourt Bay, Essex

Location: TM 24552950
Lat. 51.55.05 N; Long. 01.15.56 E

Project manager: P Murphy (University of East Anglia), 1987

Archival body: Norfolk Museum

Description: a charcoal spread on the palaeosol surface, overlain by estuarine sediments.

Objectives: to establish whether this spread falls within the range of dates obtained from other similar deposits elsewhere in the Essex coast and to provide a *terminus post quem* for estuarine sedimentation.

References: Walker *et al* 1991a, 110
Wilkinson and Murphy 1995, 15

HAR-8876 4020 ±70 BP

$\delta^{13}\text{C}$: -26.1‰

Sample: D2/CON3, submitted in October 1987 by P Murphy

Material: charcoal: *Quercus* sp.

Initial comment: from a spread of charcoal on palaeosol over pale grey silty fine sand, sealed by up to 1.4m of estuarine clays.

Objectives: similar charcoal spreads in comparable stratigraphic situations from the Blackwater Estuary have yielded dates in the range 2740–2040 cal BC (Wilkinson and Murphy 1995) and represent Neolithic woodland clearances. Flintwork and pottery from the Dovercourt site suggests similar activity but a radiocarbon date is required to confirm this.

Calibrated date: 1 σ : 2630–2470 cal BC
2 σ : 2870–2340 cal BC

Final comment: P Murphy (1995), charcoal spreads on the palaeosol sealed by estuarine sediments on the Thames III transgression (from c 2375 cal BC) are common around the Essex coast. Though usually unassociated with artefacts, radiocarbon determinations point to mid-late Neolithic activity, perhaps woodland clearance. The determination from Dovercourt Bay places this site within the same group.

References: Wilkinson and Murphy 1995

Drayton: Cursus, Oxfordshire

Location: SU 490944
Lat. 51.38.45 N; Long. 01.17.30 W

Project manager: G Lambrick and A Barclay (Oxford Archaeological Unit), 1982

Archival body: Oxfordshire Museum

Description: a cursus monument on the Thames floodplain.

Objectives: to date the cursus and associated pottery.

Final comment: A Barclay, A Bayliss, G Lambrick, and M Robinson (1997), four samples from the cursus ditch are from the primary fill, HAR-6477, HAR-6478, OxA-2071 (4810 ±70 BP; 3710–3370 cal BC at 95% confidence; Reimer *et al* 2004), and OxA-2072 (3630 ±80 BP; 2210–1760 cal BC at 95% confidence; Reimer *et al* 2004). However, the four measurements are statistically very significantly different ($T'=169.7$; $T'(5\%)=7.3$; $v=3$; Ward and Wilson 1978), and span at least a thousand calendar years. This suggests that not all the dated material dates to the period in which the primary fill accumulated. The statistical model (Barclay *et al* 2003) provides an estimate for the date of the construction of the cursus of 3600–3530 cal BC or 3500–3420 cal BC (68% probability) or 3620–3390 cal BC (95% probability). Perhaps the most convincing argument for its validity is the consistency of results from the earliest cursus contexts, and the consistency of five of the results with the recorded stratigraphy. The date range would be consistent with the hypothesis that the Drayton long barrow aligns on the northern end of the cursus, given that this monument was itself probably constructed some time in the mid fourth millennium cal BC. The recovery of mostly plain sherds and a decorated neck sherd of Peterborough Ware from the base of the ditch is also consistent with this date range, especially now that a development for this ceramic style within the later fourth millennium cal BC can be demonstrated (Gibson and Kinnes 1997).

References: Ainslie and Wallis 1987
Barclay *et al* 2003
Gibson and Kinnes 1997
Reimer *et al* 2004
Walker and Otlet 1988, 306
Ward and Wilson 1978

HAR-6477 4990 ±100 BP

$\delta^{13}C$: -19.0‰ (assumed)

Sample: ABDC821, submitted in November 1983 by R A Chambers

Material: animal bone: *Sus* sp.; *Cervus* sp., antler; *Equus* sp.; *Bos* sp. (R Wilson)

Initial comment: from the primary silt of the east ditch of the cursus.

Objectives: to date the cursus and associated pottery.

Calibrated date: 1 σ : 3950–3650 cal BC
2 σ : 3990–3540 cal BC

Final comment: A Barclay, A Bayliss, G Lambrick, and M Robinson (1997), HAR-6477 is demonstrably too old. If the statistical model (Barclay *et al* 2003) includes this measurement it has poor overall agreement ($A_{\text{overall}}=34.4\%$; $A_c=60.0\%$; Bronk Ramsey 1995). Indeed the probability that HAR-6477 is actually later than OxA-2073 and OxA-2074, as it should be stratigraphically, is only about 2%. This can be explained by examination of the material dated. HAR-6477 is known to have contained a horse scapula, which is likely to represent residual material. R Wilson, who originally identified it, described it as differing from modern specimens. There are reliable late Neolithic finds of horse, for example from Durrington Walls, but the Drayton scapula, if contemporaneous with the cursus, would perhaps be the earliest Neolithic record from the British Isles (cf Harcourt 1971). However, there is the possibility that the bone was from a late glacial horse and had been reworked from the Pleistocene gravels of the site. For these reasons this date is regarded as unreliable.

Laboratory comment: AERE Harwell (1983), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Barclay *et al* 2003
Bronk Ramsey 1995
Harcourt 1971
Otlet *et al* 1983

HAR-6478 4780 ±100 BP

$\delta^{13}C$: -19.0‰ (assumed)

Sample: ABDC822, submitted in November 1983 by R A Chambers

Material: animal bone: *Sus* sp.; *Cervus* sp., antler; *Equus* sp.; *Bos* sp. (R Wilson)

Initial comment: as HAR-6477

Objectives: as HAR-6477

Calibrated date: 1 σ : 3660–3370 cal BC
2 σ : 3770–3360 cal BC

Final comment: A Barclay, A Bayliss, G Lambrick, and M Robinson (1997), *see* HAR-6477. This sample may provide an accurate date for the cursus. The taphonomy of the material is unknown because it does not seem to have been articulated. It is also not known whether several bones from the base of the ditch were bulked together. However the similarity of this result to that from OxA-2071 perhaps provides circumstantial evidence for the reliability of this date, although *see* problems with HAR-6477.

Laboratory comment: AERE Harwell (1983), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Drayton: Cursus, Tree-throw holes, Oxfordshire

Location: SU 490944
Lat. 51.38.45 N; Long. 01.17.30 W

Project manager: G Lambrick and A Barclay (Oxford Archaeological Unit), 1982

Archival body: Oxfordshire Museum

Description: a cursus monument and other activity on the Thames floodplain.

Objectives: to date charcoal from tree-throw holes containing cultural material thought likely to be associated with clearance; to date a possible sunken-featured building suspected of being Saxon in origin, but devoid of cultural material except a few animal bones; and to provide a chronological framework for the environmental sequence.

Final comment: A Barclay, A Bayliss, G Lambrick, and M Robinson (1997), the radiocarbon dates submitted to date the tree-throw holes suggest at least two possible phases of tree clearance, on and around the area of the cursus. The dates obtained for samples OxA-2073 (4800 ±100 BP; 3790–3360 cal BC; Reimer *et al* 2004), and OxA-2075 (4940 ±80 BP; 3960–3530 cal BC; Reimer *et al* 2004), combined with the stratigraphic relationship of OxA-2073 to the cursus bank, suggest that some tree clearance occurred prior to the construction of the monument.

References: Ainslie and Wallis 1987
Barclay *et al* 2003
Hardiman *et al* 1992, 54
Reimer *et al* 2004

HAR-9163 1340 ±90 BP

$\delta^{13}C$: -21.0‰ (assumed)

Sample: ABDC823, submitted in November 1983 by R A Chambers

Material: animal bone: *Bos* sp. (R Wilson)

Initial comment: from alluvial clay layers within the former river channel south of the Drayton North Cursus. The land surface shows traces of occupation (ie flints) and tree clearance.

Objectives: to date the clearance and first occupation of this site and to provide a date for the flintwork and more importantly, the pottery.

Calibrated date: 1 σ : cal AD 630–780
2 σ : cal AD 540–890

Final comment: A Barclay, A Bayliss, G Lambrick, and M Robinson (1997), the date range indicates that the old river channel had not fully silted up until after the Roman period.

Drigg, Cumbria

Location: SD 065985
Lat. 52.22.24 N; Long. 03.26.27 W

Project manager: J Bennett (Unknown), 1983

Archival body: Carlisle Museum

Description: evidence for prehistoric activity near Drigg was first identified in 1954, when flint nodules and flakes were noted on the sea shore at the foot of the cliff. Subsequent field examination of erosion patches within the dunes recovered microliths and other flint tools, establishing Mesolithic and later activity in the area (Nickson and MacDonald 1955). Further work demonstrated concentrations of worked flint north and south of the Esk Estuary (Cherry 1965; 1969), producing a range of tools dating from the late Mesolithic to at least the early Bronze Age period.

Objectives: to provide a precise date for human activity at the site.

Final comment:, the result has confirmed the Mesolithic age of human activity at Drigg.

References: Cherry 1965
Cherry 1969
Nickson and MacDonald 1955

HAR-5712 5870 ±90 BP

$\delta^{13}C$: -27.7‰

Sample: 356-001, submitted on 22 February 1983 by N Balaam

Material: wood (waterlogged): *Salix* sp.

Initial comment: from peat associated with Mesolithic site.

Objectives: to provide a precise date for the wood and associated human activity at the site.

Calibrated date: 1 σ : 4840–4610 cal BC
2 σ : 4960–4520 cal BC

Final comment: P Marshall (20 November 2006), the radiocarbon result confirms the purported Mesolithic age of the site.

References: Cherry 1982

Droitwich: Old Bowling Green, Worcestershire

Location: SO 89926350
Lat. 52.16.09 N; Long. 02.08.52 W

Project manager: J Sawle (Hereford and Worcester County Museum), 1978 and 1979

Archival body: Worcestershire County Council

Description: in 1978 and 1979 a major excavation, covering about 1000m², took place in the valley of the River Salwarpe in Droitwich. The bulk of the evidence recovered related to salt making in the late Iron Age and the Roman periods. The main problem in interpreting the site was the lack of stratigraphy. The area had been levelled, probably in the early twentieth century, when a sunken bowling green was created. Consequently most of the major features were truncated, and there was little vertical, or horizontal, stratigraphy to enable them to be safely allocated to phases. Furthermore, the quality and quantity of finds was generally low, presumably because the site fell within an industrial sector and not a domestic one. Therefore in many cases there was no firm evidence to indicate whether features were of Iron Age, Roman, medieval, or post-medieval date. An

additional complication was encountered because the site was waterlogged and many of the features were large. This resulted in a great deal of slumping over the tops of features, and consequently it was possible for later intrusive pottery to be found in their top fills.

Objectives: the need for 21 radiocarbon dates was thoroughly evaluated, and it was decided that these samples should be submitted to provide the basic chronological framework within which to interpret the site.

Laboratory comment: Ancient Monuments Laboratory (1995), one further date from this site (HAR-4084), was funded prior to 1981 and was published in the first volume of *Radiocarbon Dates* (Jordan *et al* 1994, 52).

Laboratory comment: Ancient Monuments Laboratory (29 June 1990), The combined radiocarbon age for the two groups of dates belong to distinct phases, 3 and 8, are as follows: phase 3: 2045 ±44 BP (190 cal BC–cal AD 60 at 95% confidence; Stuiver and Pearson 1986) and phase 8: 1877 ±44 BP (cal AD 20–240 at 95% confidence; Stuiver and Pearson 1986).

References: Jordan *et al* 1994, 52
Stuiver and Pearson 1986
Woodiwiss 1992

HAR-5872 2000 ±70 BP

$\delta^{13}C$: -28.5‰

Sample: 600-28E, submitted in November 1983 by J Sawle

Material: wood (waterlogged): *Quercus* sp.

Initial comment: from the fill of a wattle-lined pit (F28), distinguished from the other eight wood-lined pits by its wattle rather than plank lining. Its stratigraphic position is poor but it contained a large quantity of mid/late second-century pottery.

Objectives: a radiocarbon date would enable this feature to be allocated to the correct period on the site, and would assist in judging its relationship with other timber-lined pits in the area. The small wood is from the primary fill of the pit and should therefore date the disuse of the feature.

Calibrated date: 1 σ : 90 cal BC–cal AD 80
2 σ : 200 cal BC–cal AD 140

Final comment: D Hurst (10 April 1995), the resulting date indicated that this feature was of the same broad date range as other features of similar type on the site.

HAR-5873 2130 ±80 BP

$\delta^{13}C$: -27.2‰

Sample: 600-156, submitted in November 1983 by J Sawle

Material: wood (waterlogged): twig, leaves

Initial comment: from the fill of a clay and timber-lined pit (F132), similar to seven others found on the site, four of which are dated by dendrochronology to after cal AD 25. The poor stratification and low level of finds from this pit prevents a firm dating being made.

Objectives: to enable the feature to be allocated to the correct site phase. The sample is from the fill of the pit, therefore dating its disuse rather than its construction.

Calibrated date: 1 σ : 360–40 cal BC
2 σ : 390 cal BC–cal AD 50

Final comment: D Hurst (10 April 1995), this radiocarbon date indicates that when this feature was backfilled, some very residual material was incorporated.

HAR-5874 1930 ±70 BP

$\delta^{13}C$: -27.3‰

Sample: 600-308, submitted in November 1983 by J Sawle

Material: wood (waterlogged): *Quercus* sp.

Initial comment: from a wooden post (F307), which probably represented part of a building. There is no useful internal stratigraphic evidence to enable a date to be put on this building.

Objectives: to enable a date to be applied to an important structural element of the site.

Calibrated date: 1 σ : cal AD 1–140
2 σ : 90 cal BC–cal AD 240

Final comment: D Hurst (10 April 1995), the date confirmed that this structure was likely to be of early to middle Roman date.

HAR-5875 2200 ±80 BP

$\delta^{13}C$: -26.5‰

Sample: 600-476, submitted in November 1983 by J Sawle

Material: wood (waterlogged): *Quercus* sp.

Initial comment: from the fill of a ditch (F468), part of a network of ditches found on the site, which are poorly stratified and contained a poor pottery assemblage.

Objectives: to ascertain the correct period to which the ditch should be allocated.

Calibrated date: 1 σ : 390–160 cal BC
2 σ : 410–40 cal BC

Final comment: D Hurst (10 April 1995), the date indicated that the infilling of this feature incorporated residual material.

HAR-5876 2000 ±70 BP

$\delta^{13}C$: -27.9‰

Sample: 600-494, submitted in November 1983 by J Sawle

Material: wood (waterlogged): *Quercus* sp.

Initial comment: from the fill of a clay and timber-lined pit (F495), similar to seven others found on the site, four of which are dated by dendrochronology to after cal AD 25. This pit was poorly stratified and had few finds and no dendrochronological date was possible from the wood recovered from it.

Objectives: to ascertain whether this pit could be contemporary with its neighbours.

Calibrated date: 1 σ : 90 cal BC–cal AD 80
2 σ : 200 cal BC–cal AD 140

Final comment: D Hurst (10 April 1995), the resulting date indicated that this feature was of the same broad date range as other features of similar date on the site.

HAR-5877 2050 ±90 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: 600-578, submitted in November 1983 by J Swale

Material: charcoal: unidentified

Initial comment: from a square cut ditch (F578) that is poorly stratified and contains a poor pottery assemblage. The sample has been sorted.

Objectives: the feature is an important component, and a radiocarbon date should indicate its true chronological position.

Calibrated date: 1 σ : 190 cal BC–cal AD 60
2 σ : 360 cal BC–cal AD 130

Final comment: D Hurst (10 April 1995), the radiocarbon date indicated that this feature probably incorporated some residual material in its backfill.

HAR-5878 1820 ±70 BP

$\delta^{13}\text{C}$: -26.6‰

Sample: 600-1023, submitted in November 1983 by J Sawle

Material: wood (waterlogged)

Initial comment: from a piece of wood, probably a barrel stave, contained within a layer of possible late Roman date.

Objectives: to enable a comparison to be made with the other barrels from the site, and to identify the phase into which the layer containing this sample should be put.

Calibrated date: 1 σ : cal AD 80–320
2 σ : cal AD 30–390

Final comment: D Hurst (10 April 1995), the result confirmed that this barrel stave was of a similar date range as other barrel finds on the site.

HAR-5879 1940 ±80 BP

$\delta^{13}\text{C}$: -26.4‰

Sample: 600-1152, submitted in November 1983 by J Sawle

Material: wood (waterlogged): *Larix decidua*

Initial comment: from a stave of an intact half of a wooden barrel, set as a trough in the ground, similar to four others from the site. The pottery assemblage indicates a fourth-century depositional date. This barrel lay adjacent to another (F1102) dated to cal AD 70–420 at 95% confidence (HAR-4084; 1770 ±70 BP) (Reimer *et al* 2004).

Objectives: to date its manufacture and to compare the result with the remains of the other barrels found on the site.

Calibrated date: 1 σ : 40 cal BC–cal AD 140
2 σ : 170 cal BC–cal AD 250

Final comment: D Hurst (10 April 1995), the result provided an indication of date of manufacture for the barrel.

References: Reimer *et al* 2004

HAR-5880 1930 ±80 BP

$\delta^{13}\text{C}$: -29.1‰

Sample: 600-1228, submitted in November 1983 by J Sawle

Material: wood (waterlogged): *Quercus* sp.

Initial comment: from the binding hoops found in a pit (F1038), probably the remains of a barrel whose staves had been removed. It should be of a similar date to the others found on the site.

Objectives: to confirm the period of manufacture of the barrel.

Calibrated date: 1 σ : 20 cal BC–cal AD 140
2 σ : 110 cal BC–cal AD 250

Final comment: D Hurst (10 April 1995), the result provided an indication of the date of the manufacture for the barrel.

HAR-5881 1770 ±70 BP

$\delta^{13}\text{C}$: -29.0‰

Sample: 600-1229, submitted in November 1983 by J Sawle

Material: wood (waterlogged): *Quercus* sp.

Initial comment: from the binding hoops found in a pit (F1180) presumed to belong to a barrel whose staves had been removed. Probably of similar date to others found on the site.

Objectives: to confirm the period of manufacture of the barrel.

Calibrated date: 1 σ : cal AD 130–380
2 σ : cal AD 70–420

Final comment: D Hurst (10 April 1995), the result provided an indication of the date of the manufacture for the barrel.

HAR-5882 2020 ±80 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: 600-1685, submitted in November 1983 by J Sawle

Material: wood (waterlogged): *Quercus* sp.

Initial comment: from the wood lining of a pit (F1685), dated by dendrochronology to after cal AD 25. The outer rings of the plank were chosen carefully for this sample.

Objectives: to confirm the results obtained from dendrochronology.

Calibrated date: 1 σ : 160 cal BC–cal AD 70
2 σ : 350 cal BC–cal AD 140

Final comment: D Hurst (10 April 1995), the radiocarbon date confirmed the results from dendrochronology.

HAR-5883 1910 ±90 BP

$\delta^{13}\text{C}$: -27.0‰

Sample: 600-1727, submitted in November 1983 by J Sawle

Material: wood (waterlogged): *Larix decidua*

Initial comment: from the staves of a barrel (F1582) laid as a trough in the ground. It was badly disturbed by later pit digging and was poorly stratified.

Objectives: to estimate the date of manufacture of the barrel.

Calibrated date: 1 σ : cal AD 1–230
2 σ : 110 cal BC–cal AD 330

Final comment: D Hurst (10 April 1995), the radiocarbon date provided an indication of the date of the manufacture of the barrel.

HAR–5884 2180 \pm 80 BP

$\delta^{13}\text{C}$: -26.6‰

Sample: 600-1961, submitted in November 1983 by J Sawle

Material: wood (waterlogged): *Quercus* sp., twigs

Initial comment: from the fill of a large ditch (F1869), which is poorly dated on its own evidence. It was poorly stratified and contained a confusing finds assemblage.

Objectives: to enable this feature to be allocated to the correct phase in the sites history.

Calibrated date: 1 σ : 380–110 cal BC
2 σ : 400 cal BC–cal AD 1

Final comment: D Hurst (10 April 1995), stratigraphic analysis indicated that this radiocarbon date was derived from residual material.

HAR–5885 2790 \pm 90 BP

$\delta^{13}\text{C}$: -28.7‰

Sample: 600-2192, submitted in November 1983 by J Sawle

Material: charcoal: unidentified

Initial comment: from one of the earliest layers on site, which is aceramic and probably pre-Roman.

Objectives: to allocate this layer to the correct period.

Calibrated date: 1 σ : 1050–830 cal BC
2 σ : 1260–790 cal BC

Final comment: D Hurst (10 April 1995), this radiocarbon date provided an indication of later Bronze Age activity on the site.

HAR–5886 2190 \pm 80 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: 600-2465, submitted in November 1983 by J Sawle

Material: wood (waterlogged): *Quercus* sp.

Initial comment: from a post found standing on a padstone, being part of a very substantial building whose position was indicated by two parallel lines of padstones set in pits. There is very poor stratigraphic evidence and very few finds to enable a firm date to be given to this structure. The sample was cut from the outer rings of the post.

Objectives: to confirm whether the structure is Roman (probable) or medieval (possible).

Calibrated date: 1 σ : 390–120 cal BC
2 σ : 410–40 cal BC

Final comment: D Hurst (10 April 1995), the radiocarbon date confirmed that this structure was most likely of Roman date, and provided grounds for the structural timbers having been reused from an earlier construction.

Dubby Sike, Durham

Location: NY 795311
Lat. 54.40.28 N; Long. 02.19.05 W

Project manager: D Coggins (Barnard Castle),
September/October 1984

Archival body: The Bowes Museum

Description: a curvilinear complex of the boulder foundations of circular buildings and irregular small enclosures along the bank of the former Dubby Sike. A boulder cairn and small sub-rectangular building *c* 30m east of the main complex. The site lies just below the high-water mark (488m OD) of the Cow Green reservoir.

Objectives: to examine the key elements of the site during the brief period of its exposure following the lowering of the water level with the hope of recovering dating evidence and palaeobotanical material. The palaeobotany of the Cow Green area has been extensively studied but no direct evidence of anthropogenic change had been hitherto available.

Final comment: D Coggins (10 June 1995), since the necessarily brief excavation produced very few finds, none of which were in any way diagnostic, the radiocarbon determinations provide the only direct dating evidence. It seems likely that the four samples from the different elements of the site relate to a single occupation period in the late Iron Age. The structural evidence is consistent with this. When considered with the palaeobotanical report the dates help to confirm that in the end of the first millennium BC the open moorland characteristic of the area today was already in existence. The presence of heath flowers shows that the site was occupied in the late summer but some of the botanical samples helped to elucidate the function or economy of the site.

References: Clapham 1978
Coggins 1986

HAR–6550 2040 \pm 70 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: DS84 1P, submitted on 24 October 1984 by D Coggins

Material: wood (waterlogged): unidentified, small twigs

Initial comment: from a small rectangular pit dug into natural subsoil of a ring-cairn and covered by flat stones. The cairn forms part of a complex site but its relationship to the other features cannot be determined stratigraphically.

Objectives: the site has produced no artefacts and no alternative dating evidence is available. It is hoped that the radiocarbon determinations will show whether the different features of the cairn and the rest of the site are contemporary.

Calibrated date: 1 σ : 170 cal BC–cal AD 50
2 σ : 350 cal BC–cal AD 120

Final comment: D Coggins (10 June 1995), the material for this sample, mostly heather, was recovered from one of the small pits within the ring cairn (*see* also HAR-6551) at the extreme east of the site. The deposits seem to have had no function but to have been ritual in nature, each perhaps

marking the beginning, or ending of, a seasonal occupation of the high, barren exposed site. The dates obtained from this sample and from HAR-6551 are in very close agreement.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-6551 2110 ±90 BP

$\delta^{13}\text{C}$: -26.2‰

Sample: DS84 2P, submitted on 24 October 1984 by D Coggins

Material: wood (waterlogged): unidentified, small twigs

Initial comment: from a bowl-shaped pit dug into the natural subsoil of a ring-cairn and covered by flat stones; the cairn forms part of a complex site and its relationship to the other features cannot be determined stratigraphically.

Objectives: the relationship of these two deposits (HAR-6550 and HAR-6551) to each other and of the ring-cairn to the rest of the site can only be ascertained by radiocarbon dating.

Calibrated date: 1 σ : 360 cal BC–cal AD 1
2 σ : 390 cal BC–cal AD 80

Final comment: see HAR-6550

References: Walker and Otlet 1988, 311

HAR-6552 2170 ±100 BP

$\delta^{13}\text{C}$: -26.4‰

Sample: DS84 3GH, submitted on 24 October 1984 by D Coggins

Material: wood (waterlogged): unidentified, twigs, few tiny fragments

Initial comment: from beneath the paving just outside the entrance to a large sub-circular building at the southwestern edge of the site.

Objectives: charcoal was very scarce on the western part of the site and this was the only place where an amount sufficient for dating was found.

Calibrated date: 1 σ : 390–50 cal BC
2 σ : 410 cal BC–cal AD 50

Final comment: D Coggins (10 June 1995), the close agreement between the date of the sample from the extreme west of the site and the two samples (HAR-6550 and HAR-6551) from the extreme east, tends to confirm that the occupation of both elements were contemporaneous though they were physically separate. The structure of the building from which this sample was taken was consistent with a date in the late Iron Age.

References: Walker and Otlet 1988, 311

HAR-6557 1830 ±100 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: DS84 4L, submitted on 24 October 1984 by D Coggins

Material: charcoal: unidentified

Initial comment: from between the cobbles of the floor of a boat-shaped building on the eastern half of the site and immediately south of the ring cairn.

Objectives: to establish the relationship between this building, the adjacent cairn and the other part of the site.

Calibrated date: 1 σ : cal AD 70–330
2 σ : 50 cal BC–cal AD 420

Final comment: D Coggins (10 June 1995), this, from the third element of the site, was the smallest and least satisfactory sample and so it is perhaps not surprising that it differs from the rest. The appearance of the building from which it was taken suggested that of an early shieling though structurally it was associated with the ring cairn (see HAR-6500 and HAR-6501). On balance it seems best to assume that the difference in the date is due to the quantity of the sample and that the building formed part of the original site plan.

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Durham: Milburngate, Durham

Location: NZ 27184264
Lat. 54.46.40 N; Long. 01.34.39 W

Project manager: M van der Veen (University of Durham), July 1983

Archival body: Oriental Museum, Durham

Description: a small scale excavation carried out in the car park of the Milburngate shopping centre, Durham City, in advance of further development in the area.

Objectives: to establish when the earliest occupation in the area started, and therefore when exactly this area, which is part of Framwellgate, had become part of Durham City. The results of the excavation have provided a thirteenth-century AD date for the earliest settlement.

References: van der Veen 1985
Walker *et al* 1990, 194–5

HAR-8365 3350 ±70 BP

$\delta^{13}\text{C}$: -29.3‰

Sample: DMG83196, submitted in March 1986 by M van der Veen

Material: wood (desiccated, previously waterlogged, remaining subsample identified, now structurally collapsed): unidentified (0.50g); *Quercus* sp., heartwood (0.45g, 100%) (R Gale 1999)

Initial comment: from the lowest level on the site, lying on top of natural. The deposit is sealed by thirteenth-century AD occupation.

Objectives: it is not clear from the excavation records, whether this deposit should be regarded as having been put down immediately before the thirteenth-century occupation

of the site (ie some sort of clearance phase), or whether to the contrary, we are dealing with a much earlier (say Neolithic) deposit which has been truncated. The macro plant remains in the deposit suggest it represents natural woodland. If the deposit is thirteenth-century, then that has important implications for our understanding of the development of Durham City.

Calibrated date: 1 σ : 1740–1520 cal BC
2 σ : 1880–1460 cal BC

Final comment: M van der Veen (1990), the result indicates a truncated soil profile, unrecognised during excavation. Woodland represented in the sample must be of early prehistoric date (van der Veen 1985) and therefore has no bearing on medieval Durham.

References: van der Veen 1985

East Heselton, North Yorkshire

Location: SE 938753
Lat. 54.09.53 N; Long. 00.33.47 W

Project manager: T G Manby (Donchester Museum and Art Gallery), 1962

Archival body: Hull and East Riding Museum

Description: a former long barrow defined by flanking quarry ditches. A multiphase progression of trench-set timber mortuary structures terminating in a concave-posted facade with flanking return walls, the timbers burnt down into the ground. The eastern portion of the long barrow site was excavated in advance of levelling by continuing cultivation. The western portion of the mound remains as an upstanding earthwork, unexcavated.

Objectives: to provide dating for the timber facade structure of the last phase of the long barrow's development.

References: Kinnes 1992
Manby *et al* 2003
Powlesland 2003a
Powlesland 2003b
Vatcher 1984
Walker *et al* 1990, 180–1

HAR-7029 4920 \pm 90 BP

$\delta^{13}\text{C}$: -24.5‰

Sample: EHLB1, submitted on 9 January 1986 by T G Manby

Material: charcoal: unidentified

Initial comment: four samples, HAR-7029 to HAR-7032, were selected from different posts in the facade bedding trench at the eastern end of the long barrow. HAR-7029 came from post B13.

Objectives: to provide a date for the facade structure. This is the most developed facade structure known from the Yorkshire long barrow group.

Calibrated date: 1 σ : 3790–3640 cal BC
2 σ : 3960–3520 cal BC

Final comment: T G Manby (12 November 1996), within the expected date range for long barrow mortuary structures (*see* HAR-7032 for overall commentary).

HAR-7030 5020 \pm 70 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: EHLB2, submitted on 9 January 1986 by T G Manby

Material: charcoal (remaining very comminuted subsample identified): unidentified (52.54g); *Quercus* sp., heartwood (8.39g, 100%) (R Gale 1999)

Initial comment: from post C13 (*see* HAR-7029).

Objectives: as HAR-7029

Calibrated date: 1 σ : 3950–3700 cal BC
2 σ : 3970–3650 cal BC

Final comment: T G Manby (12 November 1996), within the expected date range (*see* HAR-7032 for overall commentary).

HAR-7031 5020 \pm 110 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: EHLB3, submitted on 9 January 1986 by T G Manby

Material: charcoal: unidentified

Initial comment: from post C12 (*see* HAR-7029).

Objectives: as HAR-7029

Calibrated date: 1 σ : 3960–3660 cal BC
2 σ : 4050–3630 cal BC

Final comment: T G Manby (12 November 1996), within the expected date range (*see* HAR-7032 for overall commentary).

HAR-7032 4640 \pm 70 BP

$\delta^{13}\text{C}$: -25.0‰

Sample: EHLB4, submitted on 9 January 1986 by T G Manby

Material: charcoal: unidentified

Initial comment: from post B12 (*see* HAR-7029).

Objectives: as HAR-7029

Calibrated date: 1 σ : 3520–3350 cal BC
2 σ : 3640–3120 cal BC

Final comment: T G Manby (12 November 1996), this result differs from the three previous dates as it is younger, however it can be reconciled at 95% confidence. These dates, HAR-7029 to HAR-7032, belong to the lower end of the date range of long barrow mortuary structures that are concentrated across the earlier fourth millennium BC (Kinnes 1992, 117–8). They are all derived from massive timbers with a potential growth range of several centuries from heartwood to sapwood present in a mature tree and each sample is the product of the carbonisation process as it effected the individual timbers during their burning. The four samples come from timbers forming a structure

expected to be of a single date. The samples HAR-7029 to HAR-7031 form a close grouping, but the fourth, HAR-7032, provides a marked divergence, but all can be reconciled in the second sigma range in the mid fourth millennium cal BC. A later date during the period of long barrow usage would not be inappropriate to this final development of the successive structural sequence that has been recognised at East Heslerton.

Final comment: A Bayliss (22 October 2007), the four radiocarbon results from the timber facade are not statistically consistent ($T'=17.3$; $T'(5\%)=7.8$; $v=3$; Ward and Wilson 1978). This is not unexpected, since the samples contained tree-rings which were laid down in different years. All the dates provide *termini post quos* for the construction of the timber facade, the latest of them (HAR-7032) may be closest in age to the construction of the facade.

References: Kinnes 1992
Ward and Wilson 1978

Etton Landscape, Maxey, Cambridgeshire

Location: TF 51453075
Lat. 52.51.09 N; Long. 00.14.58 E

Project manager: C French (Fenland Archaeological Unit), 1987

Archival body: The British Museum

Description: a Neolithic/early Bronze Age settlement and ceremonial complex on meandering streams and the fen edge on the River Welland first terrace gravels, on the route of the A15 Bypass near Glinton and Northborough villages.

Objectives: this series of dates was chosen to set a relative chronology for the main phases of activity at the Etton Landscape/A15 bypass site. The site was in fact a series of superimposed landscapes, ranging in date from the Neolithic to the Roman period, all partially buried by river alluvial deposits.

Final comment: C French (19 July 1994), in general, the radiocarbon dates (Q-3093 to Q-3100 and Q-3147 to Q-3150) obtained served to reinforce the dating opinions arrived at on site from artefacts and stratigraphic relationships. It also provided an excellent landscape context for the adjacent ceremonial sites, such as the Etton causewayed enclosure and both Etton Landscape hengiform sites (EL2 and EL4).

Laboratory comment: (24 October 2007), these samples were funded by English Heritage through a grant to the Godwin Laboratory, University of Cambridge, for radiocarbon dating research in support of the Fenland Project (*see below*).

References: French and Pryor 2005, 97
Taylor and French 1985

Q-3093 3860 ±50 BP

Sample: F538, submitted in October 1987 by C French

Material: charcoal: unidentified (19.50g)

Initial comment: from a midden lens in layer 3 associated with Grooved Ware pottery of late Neolithic date, and large quantities of cattle bone.

Objectives: to date a Grooved Ware period dome-midden. The domestic contexts of this period are extremely rare in Britain. A date will give a time context with respect to other Neolithic features at this site and elsewhere in England.

Calibrated date: 1 σ : 2470–2210 cal BC
2 σ : 2480–2140 cal BC

Final comment: C French (19 July 1994), the midden activity is contemporary with the active stream channels some 25m to the south.

Q-3094 4220 ±50 BP

Sample: F408, submitted in October 1987 by C French

Material: charcoal: unidentified (34.40g)

Initial comment: one of five dates (Q-3094 to Q-3096, Q-3099, and Q-3100) obtained for the late Neolithic midden complex situated on the edge of an active relict stream channel. This midden feature contained Mildenhall-style middle Neolithic pottery of *c* 2700–2500 BC date.

Objectives: to assess contemporaneity with Etton causewayed enclosure ceremonial ditch deposits, and provide phasing information. It may resolve conflicts generated by typological dating of Neolithic pottery and where Neolithic people who built the enclosure were living.

Calibrated date: 1 σ : 2900–2710 cal BC
2 σ : 2920–2630 cal BC

Final comment: C French (19 July 1994), the date is perfectly consistent with the lithic and ceramic assemblage found in the same context. F408 (Q-3094) and F489 (Q-3100) are regarded as contemporary and similar middens, and the two dates compare well.

Q-3095 4320 ±70 BP

Sample: F487, submitted in October 1987 by C French

Material: charcoal: unidentified

Initial comment: the context was cut by a Bronze Age ditch and contained later Neolithic flints.

Objectives: if this ditch is indeed Neolithic it will by implication date an extensive field system visible on aerial photography. Also this would be the first and only securely dated prehistoric field system in the Welland Valley. It is important to ascertain in which part of the millennium the field system was dug.

Calibrated date: 1 σ : 3020–2880 cal BC
2 σ : 3270–2770 cal BC

Final comment: C French (19 July 1994), this ditch ran into and beneath the upper edge of the F408 (Q-3094) midden complex. The similar radiocarbon dates suggest that these features are more or less contemporary.

Q-3096 4425 ±80 BP

Sample: F522, submitted in October 1987 by C French

Material: wood (waterlogged): twig, roundwood (63.60g)

Initial comment: from a rubbish pit sealed by the overlying midden deposit F408, containing similar middle Neolithic pottery.

Objectives: to date one of the earliest features on the site, and indeed in this part of the lower Welland valley. The feature also contained excellent environmental evidence, eg pollen and botanical remains in peat. It is important to assess contemporaneity with F408 (Q-3094) and suggest the life of the midden.

Calibrated date: 1 σ : 3330–2910 cal BC
2 σ : 3370–2890 cal BC

Final comment: C French (19 July 1994), pit F522 (like pit F569, Q-3099) was sealed by the F408 midden spread, but also contained similar midden material. As one of five dates from the F408 midden complex, it reinforces the dating of this complex to the later Neolithic.

Q-3098 3395 \pm 40 BP

Sample: F561, submitted in October 1987 by C French

Material: charcoal: unidentified (15.20g)

Initial comment: this pit is cut through the barrow soil, but beneath the Bronze Age barrow mound. Other pits beneath the mound produced later Beaker period pottery.

Objectives: this was the only pre-barrow mound feature containing material suitable for radiocarbon dating. By implication the date of this pit may date the period of pre-barrow mound activity. It is one of ten pits containing crouched inhumations beneath the barrow 1 mound and it is essential to ascertain whether it dates to the earlier or later first half of the second millennium BC.

Calibrated date: 1 σ : 1750–1630 cal BC
2 σ : 1870–1610 cal BC

Final comment: C French (19 July 1994), along with the grave goods accompanying the inhumations, this has established the date of the barrow as firmly in the earlier Bronze Age. This date compares well with Q-3150, a second date from another pit feature sealed by the same barrow.

Q-3099 4375 \pm 65 BP

Sample: F569, submitted in October 1987 by C French

Material: wood: twig

Initial comment: as Q-3096

Objectives: as Q-3096

Calibrated date: 1 σ : 3100–2900 cal BC
2 σ : 3340–2880 cal BC

Final comment: see Q-3096

Final comment: A Bayliss (22 October 2007), the two radiocarbon results from the roundwood fragments from this pit are statistically consistent ($T'=0.2$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978

Q-3100 4180 \pm 75 BP

Sample: F489, submitted in October 1987 by C French

Material: wood: unidentified (59.50g)

Initial comment: as Q-3094

Objectives: as Q-3094

Calibrated date: 1 σ : 2900–2630 cal BC
2 σ : 2920–2500 cal BC

Final comment: see Q-3094

Q-3147 3040 \pm 45 BP

Sample: F210, submitted in October 1987 by C French

Material: wood (waterlogged): unidentified (53g)

Initial comment: from the only waterlogged prehistoric ditch feature on the site with excellent palaeoenvironmental preservation.

Objectives: this sample may be contemporary with the well (F225, Q-3148), but the context contained no artefacts. It is essential to ascertain if it is part of the Bronze Age field system observed further to the north of the site, and generally to date the field system and environmental evidence.

Calibrated date: 1 σ : 1390–1220 cal BC
2 σ : 1420–1130 cal BC

Final comment: C French (19 July 1994), this date served to date a second field system within the former floodplain to the south-east of the Etton causewayed enclosure.

Q-3148 3470 \pm 70 BP

Sample: F225, submitted in October 1987 by C French

Material: wood: unidentified, roundwood twigs (11.80g)

Initial comment: from a well lined with split timber and wattling, within the Bronze Age field system. The well contained excellent environmental evidence; eg pollen, seeds, insects, and also earlier Bronze Age pottery.

Objectives: to date the waterlogged feature; dates for such features with good environmental preservation of this period are absent in the lower Welland valley.

Calibrated date: 1 σ : 1890–1690 cal BC
2 σ : 1960–1610 cal BC

Final comment: C French (19 July 1994), from the wood lining of a well, which was situated within a contemporary field system on the southern side of the active stream channel of the day.

Q-3149 3875 \pm 50 BP

Sample: F596, submitted in October 1987 by C French

Material: wood: unidentified (66.50g)

Initial comment: from the palaeochannel, which overlay the midden complex F408 (Q-3094). This context is the earliest of a series of stream channels, which post-dates the Neolithic features, and pre-dates the alluvial overburden. The wood was not grown *in situ* but incorporated in basal fill.

Objectives: a date could specify the change in drainage pattern and the onset of wetter conditions locally. This stream channel contains colluvium, probably as a result of anthropogenic activity upstream. Dates for the onset of these have implications for land-use upstream. The same colluvial material which infills the stream also infills the lower of the Bronze Age field systems; the deposits overlie the Neolithic midden.

Calibrated date: 1 σ : 2470–2230 cal BC
2 σ : 2480–2200 cal BC

Final comment: C French (19 July 1994), the date accords well with archaeological evidence for the date of this same stream channel at the nearby site of Etton where it clips the edge of a causewayed enclosure.

Q-3150 3340 \pm 100 BP

Sample: F351, submitted in October 1987 by C French

Material: charcoal: unidentified (26.80g)

Initial comment: from a feature sealed by barrow 1 containing late-period pottery.

Objectives: to provide a *terminus ante quem* for the barrow containing ten inhumations. Bronze Age barrows in the Welland valley are rarely well dated, and rarely contain suitable dating material. The relationship between the barrow and the field system needs to be established. The date will also give a *terminus post quem* for the onset of alluvial deposition.

Calibrated date: 1 σ : 1750–1500 cal BC
2 σ : 1890–1410 cal BC

Final comment: C French (19 July 1994), this date compares well with Q-3098, both of which were from features sealed by barrow 1.

Exeter: Albany Road, Devon

Location: SX 915919
Lat. 50.42.58 N; Long. 03.32.13 W

Project manager: V Straker (Bristol University), 1984

Archival body: Royal Albert Museum

Description: floodplain deposits, probably from an abandoned channel of the River Exe.

Objectives: to date the environmental sequence: pollen, plant macrofossils, and diatoms.

HAR-8054 1240 \pm 70 BP

$\delta^{13}C$: -29.8‰

Sample: ALB2, submitted in September 1985 by V Straker

Material: wood (waterlogged): *Corylus avellana*; *Alnus* sp. (V Straker 1985)

Initial comment: the three samples in this series, HAR-8054/5 and HAR-8979, were taken from a silted-up former channel of the River Exe. The channel was 1.6m deep, filled with blue clay (turning brown on exposure), with darker horizontal laminations containing wood, twigs, and leaves. HAR-8054 was taken from a depth of 36–44cm from the top of the channel.

Objectives: there was no other datable material in the channel and there has been very little opportunity to carry out pollen analysis from lowland Devon, or investigate the saline/freshwater conditions of the River Exe. A well-dated sequence is essential.

Calibrated date: 1 σ : cal AD 670–890
2 σ : cal AD 650–980

Final comment: V Straker (3 June 1996), the date has provided evidence that the arable agriculture on the heavier soils upstream of the site took place in the early medieval period, possibly as early as the seventh century AD, but certainly by the tenth century AD. Before this sequence was investigated, this was unknown.

References: Walker *et al* 1990, 189

HAR-8055 970 \pm 80 BP

$\delta^{13}C$: -28.2‰

Sample: ALB3, submitted in September 1985 by V Straker

Material: wood (waterlogged): *Salix/Populus* sp. (V Straker 1985)

Initial comment: as HAR-8054; this sample was taken at a depth of 4–8cm from the top of the channel.

Objectives: as HAR-8054

Calibrated date: 1 σ : cal AD 990–1170
2 σ : cal AD 890–1230

Final comment: V Straker (3 June 1996), this date is the uppermost in the sequence, and the stratigraphy the wood was removed from was overlain by 1m of inorganic silts, which contained twelfth-century pottery. The date (ninth-to-thirteenth century AD) provides continued evidence for agriculture on the floodplain, and overbank flooding from the main channel outside the medieval town.

Laboratory comment: AERE Harwell (1986) this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 189

HAR-8979 3720 \pm 140 BP

$\delta^{13}C$: -30.2‰

Sample: ALB1, submitted in September 1985 by V Straker

Material: wood (waterlogged): *Alnus* sp.; *Corylus/Alnus* sp. (V Straker 1985)

Initial comment: as HAR-8054. This sample was taken from a depth of 110–120cm from the top of the channel.

Objectives: as HAR-8054

Calibrated date: 1 σ : 2340–1930 cal BC
2 σ : 2570–1740 cal BC

Final comment: V Straker (3 June 1996), this date from the base of the sequence was considered unacceptable, possibly contaminated by groundwater, as it is inconsistent with the upper dates, and with the later (twelfth century AD) pottery from the overlying deposit.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: Ancient Monuments Laboratory (1995), this sample replaced HAR-7043, which gave a provisional result only of 610 ±80 BP (cal AD 1260–1450 at 95% confidence; Reimer *et al* 2004). Both HAR-8979 and the provisional result for HAR-7043 are unacceptable in terms of the stratigraphy.

Laboratory comment: English Heritage (3 January 2012), this result is published (Walker *et al* 1991, 112), although a final certificate has not been found.

References: Otlet *et al* 1983
Reimer *et al* 2004
Walker *et al* 1991a, 112

Exning, Suffolk

Location: TL 63036357
Lat. 52.14.45 N; Long. 00.23.18 E

Project manager: E Martin (Suffolk Archaeological Unit), 1979

Archival body: stolen, Suffolk County Council

Description: a large multiple grave which contained seven individuals and a single grave. Found during the construction of a foundation trench.

Objectives: the only artefact associated with the grave was a small pottery sherd believed to be Bronze Age. The dating should confirm this.

References: Martin and Denston 1986
Walker *et al* 1988, 323

HAR-4399 3520 ±80 BP

$\delta^{13}C$: -22.1‰

Sample: EXG027, submitted in February 1981 by E Martin

Material: human bone

Initial comment: from a possibly Bronze Age inhumation.

Objectives: to confirm a Bronze Age date.

Calibrated date: 1 σ : 1950–1740 cal BC
2 σ : 2120–1630 cal BC

Final comment: P Murphy (1988), this confirms a Bronze Age date for the burials.

Fengate: 38 Cat's Water, Cambridgeshire

Location: TL 208989
Lat. 52.34.26 N; Long. 00.13.02 W

Project manager: F Pryor (Department of the Environment), 1978

Archival body: Peterborough City Museum and Art Gallery

Description: a multi-period site which is part of a group of Fen-edge sites which skirt the western Fens.

Objectives: to date the features, supported by the analysis of the animal bone and organic material also submitted for analysis.

Final comment: F Pryor (2001), these samples contribute to the dating of the Bronze Age fields in the Flag Fen basin.

References: Pryor 2001

HAR-3196 2310 ±60 BP

$\delta^{13}C$: -26.8‰

Sample: FNG78-1, submitted on 11 January 1979 by F Pryor

Material: wood (waterlogged): *Quercus* sp.

Initial comment: from sub-site F1551, layer 3, below 0.8m, section 1: from a dovetail-jointed stake, found at the bottom of a well hammered into the ground. A vessel of late Bronze Age/early Iron Age type was found next to it, actually touching the stake.

Objectives: to date the context and the vessel.

Calibrated date: 1 σ : 410–360 cal BC
2 σ : 520–200 cal BC

Final comment: F Pryor (2001), the stake may be split down from a wheel (M Taylor pers comm), and so the sample was probably reused, but not ancient, on deposition.

HAR-3204 3140 ±80 BP

$\delta^{13}C$: -25.0‰

Sample: FNG78-2, submitted on 11 January 1979 by F Pryor

Material: wood: *Quercus* sp., large log

Initial comment: from sub-site F862, layer 4, between sections 9–10, at 1.25m below the surface: from part of a large log found at the bottom of a deep, early Bronze Age, ditch. Bark was intact and the sample is from immediately below it.

Objectives: to establish a date for the ditch.

Calibrated date: 1 σ : 1500–1310 cal BC
2 σ : 1610–1210 cal BC

Final comment: F Pryor (2001), this deposit accumulated shortly after the final recutting of this ditch, which is related to the Bronze Age field system.

Fenland Project, Cambridgeshire, Lincolnshire, Norfolk and Suffolk

Location: See individual sites

Project manager: Martyn Waller and Anne Alderton (University of Cambridge), 1982–9

Description: the Fenland Project aimed to reconstruct changes in human settlement and landscape through time. In this context marine incursions into the Fens were major events whose impact will have greatly affected the pattern of

settlement. A vital and integral part of the project therefore was to obtain a secure chronology for the main marine phases, by radiocarbon dating the organic deposits which separate them.

At the start of the project, the four-fold stratigraphic division for the Fenland outlined by Godwin and Clifford (1938) was influential in driving sample selection. Over much of the southern fen edge a consistent sequence of deposits had been observed: basal, or lower, peat, fen clay of locally diverse lithology indicating marine or brackish conditions, intercalated upper peat, and, patchily, an overlying upper silt. Although Godwin (1940, 246) recognised at a very early stage that the clay-peat interfaces were unlikely to be synchronous horizons over the whole Fenland, much of the complexity of this deposition remained to be revealed. Nonetheless attempts had been made both to date this depositional sequence (Willis 1961; Churchill 1970), and propose a sea-level model for the Fens (Shennan 1986).

Objectives: the aim of the dating programme was, in conjunction with data from stratigraphy and from pollen and diatom counts, to reconstruct environmental conditions in the Fenland basin and plot changes through time in a series of palaeogeographic maps (Waller 1994). The successive incursions of the sea and periods of peat formation form the environmental background to the human occupation of this region (Hall and Coles 1994).

Final comment: M Waller (9 January 2010), the palaeogeographic maps of Waller (1994) have been refined and additional dates from the Flandrian deposits of the Fenland basin (particularly the mid-Flandrian) can now be found in Brew *et al* (2000).

Laboratory comment: English Heritage (2007), the radiocarbon dating for the Fenland Project was funded by English Heritage as a research grant to Dr Roy Switsur of the Godwin Laboratory, University of Cambridge. The work was undertaken between February 1984 and March 1988.

A large number of radiocarbon dates, which were not funded by English Heritage as part of this project, are included in the palaeoenvironmental reconstructions produced by the Fenland Project. These are detailed in Waller (1994, Appendix 1).

Two further samples, from a palaeochannel at Upper Delphs, Haddenham (UDH-1) and from peat at Morton Fen, Barnes Drove (BD-1), were processed as part of this research programme but contained insufficient carbon for dating.

References: Brew *et al* 2000
Churchill 1970
Godwin 1940
Godwin and Clifford 1938
Hall and Coles 1994
Shennan 1986
Waller 1994
Willis 1961

Fenland Project: Bettison's Bridge, Lincolnshire

Location: TF 23405416
Lat. 53.04.12 N; Long. 00.09.35 W

Project manager: I Shennan (University of Durham), 1986

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: this site is situated in the north-western Fens. Detailed survey and sampling was undertaken at Bettison's Bridge at the northernmost end of the 8.8km stretch of the Castle Dyke which was sketched and surveyed. This site is c 7km from Gipsey Bridge, the sampling site at the southern end of the Dyke.

Objectives: this determination will provide information on sea-level and environmental changes in the Wildmore Fen locality.

Final comment: I Shennan (1994), this result is comfortably within the expected range for the onset of marine conditions.

References: Waller 1994, 284–8

Q-2568 3810 ±70 BP

Sample: BB7/1, submitted on 16 December 1986 by I Shennan

Material: peat (humified silty monocotyledonous)
(I Shennan 1986)

Initial comment: from the upper, transgressive contact of the basal peat, at an altitude of -0.22 to -0.26m OD.

Objectives: to date the onset of marine/brackish conditions. The sample is the most landward expression of peat overlain by marine deposits found so far at Wildmore Fen.

Calibrated date: 1σ: 2400–2140 cal BC
2σ: 2480–2030 cal BC

Final comment: I Shennan (1994), unlike many other Fenland samples, the effect of sediment compaction here is likely to be relatively small.

Fenland Project: Bourne North Fen, Lincolnshire

Location: TF 14682110
Lat. 52.46.30 N; Long. 00.17.59 W

Project manager: I Shennan and D Donoghue (University of Durham), 1988

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: the Bourne/Morton canal runs for 4.5km from the modern town of Bourne in a north-easterly direction to join a major roddon in Morton Fen. The extent of the canal sequence was investigated by means of a 3km borehole transect (Waller 1994, fig 13.5), dating being obtained from borehole 21 near the south-western end of the transect.

Objectives: to examine relative sea-level change in the Morton Fen/Bourne Fen area.

Final comment: I Shennan (1994), this result is consistent with those from nearby sites.

References: Waller 1994, 277

Q-2808 2650 ±60 BP

Sample: SYCF-1, submitted on 4 March 1988 by I Shennan and D Donoghue

Material: peat (humified monocot) (I Shennan and D Donoghue 1988)

Initial comment: from the upper, transgressive contact of an intercalated peat bed, at an altitude of -1.03 to -1.13m OD.

Objectives: to date return of marine/brackish conditions at this location.

Calibrated date: 1σ: 840–790 cal BC
2σ: 920–670 cal BC

Final comment: I Shennan and D Donoghue (1994), this date is consistent with the return of marine/brackish conditions in the early first millennium cal BC (*see* Q-2575 from Morton Fen 10/50).

Fenland Project: Coffue Drove, Cambridgeshire

Location: TL 54418468
Lat. 53.20.10 N; Long. 00.19.09 E

Project manager: M Waller (University of Cambridge), 1987

Archival body: Cambridgeshire County Council, University of Cambridge

Description: the marine/brackish clay to the west of Littleport is split into two lobes divided by high ground which extends from Little Downham to Pymore. The sediments in the eastern lobe were sampled by coring (for the western lobe, *see* Pymore). Flandrian deposits from Wood Fen had previously been investigated by Godwin (*et al* 1935).

Objectives: the radiocarbon date subsequently obtained from Godwin's sequence (3090–2470 cal BC; Reimer *et al* 2004; Q-544; 4195 ±110 BP; Godwin and Willis 1961) contrasts with those obtained by the Project nearby at the Pymore which indicated the deposition of marine/brackish clay continued beyond 2830–2200 cal BC (Reimer *et al* 2004; Q-2528; 3955 ±70 BP). It was therefore decided to re-investigate the Wood Fen deposits.

Final comment: M Waller (1994), the taxa indicative of acidic conditions are scarce or absent from the sites examined by the Fenland Project in the south-eastern Fens. This makes the observations of Godwin *et al* (1935) from Wood Fen all the more interesting. Unfortunately it was not possible to re-examine the perimarine deposits during the course of this study, though such an investigation was subsequently undertaken (Wheeler 1989).

References: Godwin *et al* 1935
Godwin and Willis 1961
Reimer *et al* 2004
Waller 1994, 141–3
Wheeler 1989

Q-2580 3800 ±65 BP

Sample: COFF-1, submitted on 14 August 1987 by M Waller

Material: peat (highly humified) (I Shennan 1986)

Initial comment: from the base of the intercalated peat on top of the marine/brackish clay, at an altitude of -1.65 to -1.70m OD.

Objectives: to date the regressive contact in this embayment.

Calibrated date: 1σ: 2340–2140 cal BC
2σ: 2470–2030 cal BC

Final comment: M Waller (1994), this result agrees closely with the dates at Welney, Feltwell, and Redmere for the end of marine/brackish clay deposition in this region (*see* Q-2821, Q-2551, and Q-2595).

Laboratory comment: English Heritage (5 December 2007), the four results from this area relating to the end of the marine/brackish conditions are statistically consistent (T'=0.3; T'(5%)=7.8; v=3; Ward and Wilson 1978).

References: Ward and Wilson 1978

Q-2581 4150 ±80 BP

Sample: COFF-2, submitted on 14 August 1987 by M Waller

Material: peat (humified, with wood and *Phragmites*) (I Shennan 1986)

Initial comment: from the top of the basal peat immediately beneath the marine/brackish clay, at an altitude of -2.06 to -2.13m OD.

Objectives: to date the transgressive contact in this embayment.

Calibrated date: 1σ: 2890–2580 cal BC
2σ: 2910–2480 cal BC

Final comment: M Waller (1994), the onset of marine/brackish conditions is earlier here than at Pymore (*see* Q-2528), where the contact between the basal peat and marine/brackish clay is 0.94m lower than at Coffue Drove. This difference in altitude is probably attributable to differential compaction. The overlying marine/brackish clay is certainly much thicker (1.21m) at Pymore.

Fenland Project: East Meadowgate 2, Norfolk

Location: TL 48020822
Lat. 52.39.04 N; Long. 00.11.18 E

Project manager: A Alderston (University of Cambridge), 1983

Archival body: Cambridgeshire County Council, University of Cambridge

Description: one of seven sites examined along the Wisbech bypass, and one of five closely grouped sites around a major roddon at Elm. This site is located 562m along the east ditch of the Wisbech bypass.

Objectives: to date the sedimentary sequences across a substantial part of central Fenland.

Final comment: A Alderton and M Waller (1994), the transgressive contact here is clearly eroded.

References: Waller 1994, 242–6

Q-2523 2470 ±60 BP

Sample: EM2/1, submitted in December 1994 by A Alderton

Material: peat (alder fen wood) (A Alderton 1983)

Initial comment: from the upper, eroded contact of an intercalated peat at an altitude of +0.58 to +0.55m OD. The sample was taken immediately above Q-2524 (EM2/2).

Objectives: to date the return to marine/brackish conditions.

Calibrated date: 1σ: 770–410 cal BC
2σ: 800–400 cal BC

Final comment: A Alderton and M Waller (1994), very sharp shifts occur in the pollen stratigraphy across the boundary between the peat and overlying marine/brackish clay (Waller 1994, fig 11.13). This suggests either that marine conditions returned very rapidly, or that transitional sediments have been eroded.

References: Waller 1994, fig 11.13

Q-2524 2330 ±70 BP

Sample: EM2/2, submitted in December 1984 by A Alderton

Material: peat (humified fen peat with *Phragmites*) (A Alderton 1983)

Initial comment: from within an intercalated peat just below the upper, eroded contact with marine/brackish clay, at an altitude of +0.55 to +0.53m OD. The sample was taken immediately below Q-2523 (EM2/1).

Objectives: dating this sample will provide a check on the result from EM2/1, thought to provide a date for the return to marine/brackish conditions.

Calibrated date: 1σ: 410–370 cal BC
2σ: 740–200 cal BC

Final comment: see Q-2523

Fenland Project: East Meadowgate A, Norfolk

Location: TL 487085
Lat. 52.39.12 N; Long. 00.11.55 E

Project manager: A Alderton (University of Cambridge), 1983

Archival body: Cambridgeshire County Council, University of Cambridge

Description: additional samples for radiocarbon dating from the vicinity of the Wisbech bypass were collected from East Meadowgate. A cleaned dyke was discovered about 400m east of the bypass route. Site A and B were located 30m apart on either side of a small roddon. The peat was of variable thickness (from c 22cm to c 58cm) and dipped, so that the base of the bed at Site A was at the same height as the top at Site B.

Objectives: to date the transitions from marine/brackish to freshwater environments in this area.

Final comment: A Alderton and M Waller (1994), marine/brackish conditions retreated here at the start of the first millennium cal BC (Q-2521, and see Q-2514), earlier than at some more seaward sites (see for example Q-2510). The peat accumulation rate increased during the latter stage of peat formation, which might account for the sharp, but late (Q-2519) contact with the overlying marine/brackish sediments.

References: Waller 1994, 246

Q-2519 2120 ±60 BP

Sample: EMA-1, submitted on 1 February 1985 by A Alderton

Material: peat (A Alderton 1983)

Initial comment: from the upper, transgressive, contact of an intercalated peat, at an altitude of +0.38 to +0.36m OD.

Objectives: to date the last stages of peat growth prior to the overlying marine inundation.

Calibrated date: 1σ: 350–50 cal BC
2σ: 370 cal BC–cal AD 10

Final comment: A Alderton and M Waller (1994), this sample provides the latest date for peat growth. Since slight erosion of this upper contact is suspected, it cannot be said with certainty that this date provides one for the onset of the overlying marine conditions, but obviously this cannot pre-date this result (see Q-2520).

Q-2520 2170 ±70 BP

Sample: EMA-2, submitted on 1 February 1985 by A Alderton

Material: peat (humified fen peat with *Phragmites*) (A Alderton 1983)

Initial comment: from within an intercalated peat bed, from an altitude of +0.30 to +0.275m OD. Stratigraphically this sample is derived from mid-way between the contacts of the peat layer.

Objectives: this date will enable the calculation of the accumulation rate of this peat layer, and provide a check on the date for the transgressive contact (Q-2519, EMA-1) above.

Calibrated date: 1σ: 370–110 cal BC
2σ: 400–40 cal BC

Final comment: A Alderton and M Waller (1994), the sediment accumulation rate for this peat bed is shown in Waller (1994, fig 11.6).

References: Waller 1994, fig 11.6

Q-2521 2720 ±70 BP

Sample: EMA-3, submitted on 1 February 1985 by A Alderton

Material: peat (humified fen peat) (A Alderton 1983)

Initial comment: from the lower, regressive, contact of an intercalated peat, at an altitude of +0.22 to +0.20m OD.

Objectives: to date the return to freshwater conditions at this site.

Calibrated date: 1σ: 930–800 cal BC
2σ: 1020–790 cal BC

Final comment: A Alderton and M Waller (1994), the transition from the underlying marine/brackish clay to peat was diffuse here and so, although biostratigraphic investigations were not undertaken, this sample probably dates the marine/brackish withdrawal accurately (*see* Q-2520).

Fenland Project: East Meadowgate B, Norfolk

Location: TL 487085
Lat. 52.39.12 N; Long. 00.11.55 E

Project manager: A Alderton (University of Cambridge), 1983

Archival body: Cambridgeshire County Council, University of Cambridge

Description: additional samples for radiocarbon dating from the vicinity of the Wisbech bypass were collected from East Meadowgate. A cleaned dyke was discovered about 400m east of the bypass route. Sites A and B were located 30m apart on either side of a small roddon. The peat was of variable thickness (from *c* 22cm to *c* 58cm) and dipped, so that the base of the bed at site A was at the same height as the top at site B.

Objectives: to check the date of the transgressive contact from East Meadowgate (Site A) (Q-2519), only 30m away, as the sharp boundary of the upper contact at this site suggested that the peat at Site A may have been truncated by erosion.

Final comment: A Alderton and M Waller (1994), this result is significantly earlier than the transgressive contact from Site A (Q-2519). It is unlikely that peat continued to form at site A for several hundreds of years whilst marine conditions prevailed at this site (30m away)! It appears therefore that this contact, despite its diffuse boundary, is eroded.

References: Waller 1994, 246

Q-2522 2350 ±60 BP

Sample: EMB-1, submitted on 1 February 1985 by A Alderton

Material: peat (humified peat with wood and *Phragmites*) (A Alderton 1983)

Initial comment: from the upper, transgressive contact of an intercalated peat, at an altitude of +0.20 to +0.18m OD.

Objectives: to date the onset of marine conditions at this location.

Calibrated date: 1σ: 420–380 cal BC
2σ: 740–230 cal BC

Final comment: *see* series comment

Fenland Project: Farcet Fen, Cambridgeshire

Location: TL 23239212
Lat. 52.30.46 N; Long. 00.11.02 W

Project manager: M Waller (University of Cambridge), 1986

Archival body: Cambridgeshire County Council, University of Cambridge

Description: a tripartite sequence of a basal peat, grey clay (the 'fen clay'), and an upper peat, was discovered in a freshly cleaned dyke section. The sampling location was chosen to be as close as possible to the maximal limit of the marine/brackish clay, and was located where there was a marked slope in the pre-Flandrian surface (Waller 1994, fig 9.2).

Objectives: to date the onset of marine/brackish conditions and the development of the lower, basal peat. No samples were collected from the upper peat as its poor state of preservation made it unsuitable for both pollen analysis and radiocarbon dating.

Final comment: M Waller (1994), the dates obtained from the Farcet monolith suggests that marine conditions reached their maximum extent in this region during the Bronze Age (after Q-2552), at approximately the same time as in the Ouse Valley between Chatteris and Somersham (*see* Q-2585). Although this contradicts the early work of Godwin (Godwin and Clifford 1938; Godwin 1940) it is clear that in his later publications Godwin had begun to question the synchronicity of the marine/brackish clay across the Southern Fens (Godwin and Vishnu-Mittre 1975, 600). This series of dates has provided data for the plotting of both sediment and pollen accumulation rates, enabling the understanding of the lower peat growth at Farcet Fen.

References: Godwin 1940
Godwin and Clifford 1938
Godwin and Vishnu-Mittre 1975
Waller 1994, 186–91

Q-2552 3700 ±60 BP

Sample: FCGF-1, submitted on 10 June 1986 by M Waller

Material: peat (fen peat with abundant *Phragmites* remains) (M Waller 1986)

Initial comment: from the top of the basal peat, at its transgressive contact with overlying marine/brackish clay, at an altitude of -1.03 to -1.05m OD (at the boundary of pollen zones CG-3/CG-4; Waller 1994, fig 9.3).

Objectives: there is no evidence from the lithology or the pollen assemblage at the CG-3/CG-4 boundary to suggest a break in sedimentation at the peat/clay contact. The

radiocarbon date from beneath this horizon should therefore be a reliable indicator of the timing of the onset of marine/brackish conditions at this site.

Calibrated date: 1 σ : 2200–1980 cal BC
2 σ : 2290–1920 cal BC

Final comment: M Waller (1994), the date of this sample suggests that marine/brackish conditions reached their maximum extent in this region during the Bronze Age, sometime after this date (the onset of clay deposition). The date of this sample has provided data for the plotting of both sediment and pollen accumulation rates at Farcet Fen (Waller 1994, figs 9.3–9.5).

References: Waller 1994, figs 9.3–9.5

Q-2553 3720 \pm 60 BP

Sample: FCGF-2, submitted on 10 June 1986 by M Waller

Material: peat (fen peat with abundant *Phragmites* remains) (M Waller 1986)

Initial comment: from within the basal peat, at an altitude of -1.05 to -1.07m OD.

Objectives: to date the environmental evidence from the basal peat, and allow sediment accumulation rates to be derived.

Calibrated date: 1 σ : 2210–2030 cal BC
2 σ : 2300–1940 cal BC

Final comment: M Waller (1994), the date has provided data for the plotting of both sediment and pollen accumulation rates, enabling the understanding of the lower peat growth at Farcet Fen (Waller 1994, figs 9.3–9.5).

References: Waller 1994, figs 9.3–9.5

Q-2554 3780 \pm 60 BP

Sample: FCGF-3, submitted on 10 June 1986 by M Waller

Material: peat (fen peat with abundant *Phragmites* remains) (M Waller 1986)

Initial comment: from within the basal peat at the boundary of pollen zones CG-2 and CG-3 (Waller 1994, fig 9.3), at an altitude of -1.17 to -1.19m OD.

Objectives: as Q-2553

Calibrated date: 1 σ : 2300–2130 cal BC
2 σ : 2460–2030 cal BC

Final comment: M Waller (1994), *see* Q-2553. This sample also dates the transition from fen carr to reedswamp at Farcet Fen.

Q-2555 3960 \pm 70 BP

Sample: FCGF-4, submitted on 10 June 1986 by M Waller

Material: peat (fen peat with abundant *Phragmites* remains) (M Waller 1986)

Initial comment: from the base of basal peat, at an altitude of -1.29 to -1.31m OD.

Objectives: to date the start of the environmental sequence recovered from the basal peat, and to allow the estimation of the accumulation rate of this deposit.

Calibrated date: 1 σ : 2570–2340 cal BC
2 σ : 2840–2210 cal BC

Final comment: M Waller (1994), *see* Q-2553. This sample also dates the onset of fen carr at Farcet Fen.

Fenland Project: Feltwell Common, Norfolk

Location: TL 66839173
Lat. 52.29.51 N; Long. 00.27.28 E

Project manager: M Waller (University of Cambridge), 1986

Archival body: Cambridgeshire County Council, University of Cambridge

Description: the Flandrian deposits of Feltwell Common were investigated, utilising a freshly cleaned dyke. This lies only 6km to the north of Peacock's Farm and Redmere. The sediments at Feltwell are part of distinct north-eastern lobe of marine/brackish clay, however, separated from the Shippea Hill sites by high ground which extends westwards beyond Brandon Bank.

Objectives: to determine the age of marine/brackish conditions close to their eastern limit.

Final comment: M Waller (1994), the basal peat at Feltwell Common was formed over a period of a few hundred years (Waller 1994, fig 7.8). This is in marked contrast to the much longer sequence recorded at the nearby site of Methwold Fen (Godwin *et al* 1934; 1940), which must have accumulated in response to local factors, possibly being associated with one of the ground-ice depressions, which are not uncommon along the eastern fen edge. A complete Flandrian record was obtained from one such feature only a few kilometres away at Oxborough Wood (Bradshaw 1981). Comparable dates for the onset of marine/brackish conditions are available from elsewhere in this embayment (*see* Peacock's Farm, Q-2537), and from elsewhere in southern-eastern fens close to the maximum inland extent of this deposit (*see* Redmere, Q-2596, Pymore, Q-2528, and Coffue Drove, Q-2581).

References: Bradshaw 1981
Godwin *et al* 1934
Godwin 1940
Waller 1994, 133–7

Q-2548 4135 \pm 70 BP

Sample: FWC-1, submitted on 2 April 1986 by M Waller

Material: peat (*Phragmites*) (M Waller 1986)

Initial comment: from the top of the basal peat at its contact with marine/brackish clay, at an altitude of -2.44 to -2.455m OD.

Objectives: to determine the onset of marine/brackish conditions close to their eastern limits.

Calibrated date: 1 σ : 2880–2570 cal BC
2 σ : 2900–2480 cal BC

Final comment: M Waller (1994), this sample provides a date for a transgressive contact. The onset of marine/brackish conditions at this site occurred at a comparable date to similar changes elsewhere in this embayment (*see* Peacock's Farm, Q-2537).

Q-2549 4225 ±75 BP

Sample: FWC-2, submitted on 2 April 1986 by M Waller

Material: peat (*Phragmites*) (M Waller 1986)

Initial comment: from an altitude of -2.51 to -2.525m OD. This sample was from within the basal peat (*see* Q-2548).

Objectives: this sample will allow the accumulation rate of the basal peat to be calculated for this site.

Calibrated date: 1σ: 2910–2700 cal BC
2σ: 3010–2580 cal BC

Final comment:, the accumulation rate of the sediments from this site is shown in Waller 1994 (fig 7.8).

References: Waller 1994, fig 7.8

Q-2550 4490 ±75 BP

Sample: FWC-3, submitted on 2 April 1986 by M Waller

Material: peat (*Phragmites*) (M Waller 1986)

Initial comment: from the base of basal peat, at an altitude of -2.66 to -2.675m OD.

Objectives: to date the onset of peat formation at this site.

Calibrated date: 1σ: 3360–3020 cal BC
2σ: 3500–2910 cal BC

Final comment: M Waller (1994), the accumulation rate of the sediments from this site is shown in Waller 1994 (fig 7.8).

References: Waller 1994, fig 7.8

Q-2551 3815 ±70 BP

Sample: FWC-4, submitted on 2 April 1986 by M Waller

Material: peat (humified *Phragmites* peat) (M Waller 1986)

Initial comment: from the base of an intercalated, upper peat at its contact with marine/brackish clay, at an altitude of -1.495 to -1.515m OD. Contamination from modern vegetation may be a serious problem in this upper peat sample, as there was visible rootlet penetration even though the area sampled was chosen to avoid this as much as possible.

Objectives: to date the termination of the clay deposition, and hence the return of freshwater conditions.

Calibrated date: 1σ: 2440–2140 cal BC
2σ: 2480–2030 cal BC

Final comment: M Waller (1994), this result dates the return of freshwater conditions at Feltwell Common. It is in close agreement with the ideas of Godwin and Vishnu-Mittre (1975) for the South Levels, though this is the first radiocarbon dating evidence from this area.

References: Godwin and Vishnu-Mittre 1975

Fenland Project: Fengate Road, Norfolk

Location: TF 48801040
Lat. 52.40.14 N; Long. 00.12.03 E

Project manager: M Waller (University of Cambridge), 1984

Archival body: Cambridgeshire County Council, University of Cambridge

Description: one of seven sites examined along the Wisbech bypass, recorded from the Fengate Road section which runs for 400m.

Objectives: to obtain information on the age of the peat bed over the north-eastern part of the bypass.

Final comment: A Alderton and M Waller (1994), marine/brackish conditions persisted here until the early Iron Age (Q-2802), later than at some sites further inland (*see* Q-2514 and Q-2521), and returned at the end of the first millennium cal BC (Q-2801).

References: Waller 1994, 246

Q-2801 2090 ±60 BP

Sample: FGR-1, submitted in January 1988 by M Waller

Material: peat (highly humified fen peat with some clay) (M Waller 1984)

Initial comment: from the upper, marine transgressive contact of the single intercalated peat layer at this location, at an altitude of +0.47 to +0.44m OD.

Objectives: to date the onset of marine/brackish conditions.

Calibrated date: 1σ: 200–40 cal BC
2σ: 360 cal BC–cal AD 50

Final comment: A Alderton and M Waller (1994), this contact appeared to be disturbed, but the late date and nearby archaeological evidence dating to the second century AD (Johnson 1986) suggests that there can be little of the sequence missing. This sample therefore probably provides an accurate age for the return to marine/brackish conditions at this location.

References: Johnson 1986

Q-2802 2455 ±70 BP

Sample: FGR-2, submitted in January 1988 by M Waller

Material: peat (M Waller 1984)

Initial comment: from the lower, regressive contact of an intercalated peat bed, at an altitude of +0.40 to +0.38m OD.

Objectives: to date the return to freshwater conditions at this location.

Calibrated date: 1σ: 770–400 cal BC
2σ: 800–390 cal BC

Final comment: A Alderton and M Waller (1994), the sharp contact between the underlying clay and peat at this location might suggest a break in sedimentation here, although this date is comparable with that from New Bridge Road (Q-2510), where pollen evidence suggests that sedimentation was continuous. This sample may therefore provide an accurate date for the retreat of marine conditions at this location.

Fenland Project: Foulmire Fen, Cambridgeshire

Location: TL 41987665
Lat. 52.22.09 N; Long. 00.05.08 E

Project manager: I Hodder and C Evans (University of Cambridge), 1984

Archival body: Cambridgeshire County Council

Description: these two samples were collected from the archaeological excavations at Foulmire Fen, one sample each from cuttings A and B (Evans and Hodder 2006a, Fig 2.9).

Objectives: to date the later Mesolithic and Neolithic occupation of the site.

Final comment: I Hodder and C Evans (1994), these results do not relate critically to the environmental investigations in the fen, in particular to the dating of the marine/brackish episode at this site.

References: Evans and Hodder 2006a, 42
Waller 1994, 170–4

Q-2535 3180 ±60 BP

Sample: FMF84 C-1, submitted in January 1985 by C Evans

Material: wood: unidentified

Initial comment: this sample was a piece of wood collected from the base of the marine/brackish clay in cutting A, recovered from an altitude of approximately -0.20m OD (Evans and Hodder 2006a, Fig 2.13). It overlies a substantial later Mesolithic and Neolithic flint assemblage.

Objectives: the sample will provide a *terminus ante quem* for the flint assemblage and a *terminus post quem* for the deposition of marine/brackish clay at this location.

Calibrated date: 1σ: 1510–1410 cal BC
2σ: 1610–1310 cal BC

Final comment: M Waller (1994), this sample is of little value in estimating the age of the marine/brackish episode, as the tree cannot have been growing *in situ* during what was a distinctly brackish episode.

Final comment: C Evans and I Hodder (1996), this result provides a *terminus ante quem* for the flint assemblage. A further date has been obtained on identified charcoal from a burnt mound which also underlay the marine/brackish clay (3340–2700 cal BC (Beta-180721, 4340 ±90 BP; Reimer *et al* 2004), which also provides a *terminus post quem* for its deposition.

References: Evans and Hodder 2006a, fig 2.13
Reimer *et al* 2004

Q-2536 3430 ±60 BP

Sample: FMF84 C-2, submitted in January 1985 by C Evans

Material: wood: bark

Initial comment: this bark sample was located within the basal peat, from cutting B, at an altitude of approximately -0.30m OD (Evans and Hodder 2006a, Fig 2.14). The bark was spread, possibly by human agency, on the surface of the sand terrace, upon which was extensive later Mesolithic and Neolithic occupation.

Objectives: to date the later Mesolithic and Neolithic occupation in this cutting.

Calibrated date: 1σ: 1880–1660 cal BC
2σ: 1900–1600 cal BC

Final comment: C Evans and I Hodder (2006), the bark is significantly later than the flint assemblage recovered from this cutting.

References: Evans and Hodder 2006a, fig 2.14

Fenland Project: Foulmire Fen A, Cambridgeshire

Location: TL 41987665
Lat. 52.22.09 N; Long. 00.05.08 E

Project manager: A Alderton (University of Cambridge), 1984

Archival body: Cambridgeshire County Council, University of Cambridge

Description: this monolith was obtained from a cleaned ditch section about 100m south of the Haddenham VI long barrow (Evans and Hodder 2006a, fig 2.9). The opposing side of the ditch was excavated as part of a trial archaeological exploration of Foulmire terrace.

Objectives: the objective of these studies was to provide an environmental background for the extensive archaeological investigations being conducted on the adjacent Upper Delphs terrace.

Final comment: M Waller (1994), the primary objective of obtaining radiocarbon dates from the Foulmire sediments was to determine the date of the marine/brackish clay. However, the dates from the transgressive overlap range from cal BC 3350–2870 (Q-2534) to cal BC 2130–1690 (Q-2502) and the three dates from the regressive overlap from cal BC 2880–2290 (Q-2533) to cal BC 1690–1410 (Q-2501) (all at 95% confidence, Reimer *et al* 2004). Over such short distances and with such little change in altitude the range exhibited by these dates is highly surprising. Unfortunately, detailed discussion of the inconsistencies between profiles is not possible as the monoliths no longer exist. Nevertheless, it seems that these dates are not reliable. Those, which indicate peat formation as high as *c* -0.25m OD by *c* 2900 cal BC (*c* 4300 BP), appear anomalous, though they could be a reflection of local drainage difficulties. Despite the rather equivocal radiocarbon evidence from Foulmire Fen, the marine episode responsible for the marine/brackish clay layer may be dated to the early or middle Bronze Age. This agrees closely with the dates obtained from the adjacent south-western Fens, where the ‘fen clay’ episode also aggrades to just below OD.

Laboratory comment: English Heritage (6 November 1997), three further samples were dated from a second monolith from the opposite side of this drainage ditch. CAR-828 (2520 ±70 BP, 820–400 cal BC, at 95% confidence, Reimer *et al* 2004) was from just above the regressive contact of the marine/brackish clay with the overlying peat at -0.165 to -0.175m OD, CAR-829 (3590 ±70 BP, 2140–1740 cal BC, at 95% confidence, Reimer *et al* 2004) was from the basal peat just beneath its transgressive contact with the

marine/brackish clay at -0.295 to -0.305m OD, and CAR-830 (3480 ±70 BP, 2010–1620 cal BC, at 95% confidence: Reimer *et al* 2004) was from -0.345 to -0.355m OD.

References: Evans and Hodder 2006a, 42
Reimer *et al* 2004
Waller 1994, 170–4

Q-2501 3260 ±60 BP

Sample: FMF84 A1, submitted in January 1985 by A Alderton

Material: peat (peaty clay) (A Alderton 1984)

Initial comment: from 0.01m above the regressive contact between a marine/brackish clay and the upper peat, at an altitude of -0.095 to -0.115m OD.

Objectives: to clarify the date of the end of marine/brackish conditions.

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

Final comment: M Waller (1994), this result is about 1000 years younger than expected. It is one of the extreme results of the series of radiocarbon dates from the sediments at Foulmire, which are so surprisingly inconsistent. This result is unlikely to date the end of marine/brackish conditions in this area reliably.

Q-2502 3550 ±70 BP

Sample: FMF84 A2, submitted in January 1985 by A Alderton

Material: peat (peaty clay) (A Alderton 1984)

Initial comment: from the transgressive contact of the basal peat with the overlying marine/brackish clay, at an altitude of -0.505 to -0.545m OD.

Objectives: to date the onset of marine/brackish conditions.

Calibrated date: 1σ: 2010–1770 cal BC
2σ: 2130–1690 cal BC

Final comment: see Q-2501

Fenland Project: Foulmire Fen B, Cambridgeshire

Location: TL 41947665
Lat. 52.22.09 N; Long. 00.05.08 E

Project manager: A Alderton (University of Cambridge), 1984

Archival body: Cambridgeshire County Council, monoliths no longer exist

Description: Foulmire Fen sites A and B were approximately 30m apart and situated about 100m south of the Haddenham VI long barrow (Evans and Hodder 2006a, fig 2.9). A large quantity of worked flint was revealed lying on and within pre-Flandrian sands at this site.

Objectives: to date changing marine/brackish and freshwater conditions at this site, and to provide an idea of the rate of

peat growth in this location to aid environmental reconstruction.

Final comment: A Alderton (1985), Q-2503 to Q-2507 have produced results which are highly surprising, as they are seemingly 1000 years younger than expected. Comparable samples from a second monolith were dated to check these results. These three results (Q-2532 to Q-2534) do not eradicate the anomalies in the dating of this site.

Final comment: M Waller (1994), the primary objective of obtaining radiocarbon dates from the Foulmire sediments was to determine the date of the marine/brackish clay. However, the dates from the transgressive overlap range from 3350–2870 cal BC (Q-2534) to 2130–1690 cal BC (Q-2502) and the three dates from the regressive overlap from 2880–2290 cal BC (Q-2533) to 1690–1410 cal BC (Q-2501) (all at 95% confidence, Reimer *et al* 2004). Over such short distances and with such little change in altitude the range exhibited by these dates is highly surprising. Unfortunately, detailed discussion of the inconsistencies between profiles is not possible as the monoliths no longer exist. Nevertheless, it seems that these dates are not reliable. Those, which indicate peat formation as high as *c* -0.25m OD by *c* 2900 cal BC (*c* 4300 BP), appear anomalous, though they could be a reflection of local drainage difficulties. Despite the rather equivocal radiocarbon evidence from Foulmire Fen, the marine episode responsible for the marine/brackish clay layer may be dated to the early or middle Bronze Age. This agrees closely with the dates obtained from the adjacent south-western Fens, where the ‘fen clay’ episode also aggrades to just below OD.

References: Evans and Hodder 2006a, 42
Reimer *et al* 2004
Waller 1994, 170–4

Q-2503 2480 ±50 BP

Sample: FMF84 B1, submitted in January 1985 by A Alderton

Material: peat (peaty clay) (A Alderton 1984)

Initial comment: from within the upper peat, at an altitude of +0.05 to +0.03m OD.

Objectives: this sample will provide a date within the upper peat layer, and so will provide an idea of the rate of peat growth in this locality and aid environmental reconstruction.

Calibrated date: 1σ: 770–420 cal BC
2σ: 800–400 cal BC

Final comment: A Alderton (1985), as no pollen analysis is available from the upper peat, the original aims of submission are not applicable.

Q-2504 2950 ±60 BP

Sample: FMF84 B2, submitted in January 1985 by A Alderton

Material: peat (humified) (A Alderton 1984)

Initial comment: from within the upper peat, at an altitude of -0.035 to -0.06m OD.

Objectives: as Q-2503

Calibrated date: 1 σ : 1270–1050 cal BC
2 σ : 1390–990 cal BC

Final comment: see Q-2503

Q-2505 3340 \pm 90 BP

Sample: FMF84 B3, submitted in January 1985 by A Alderton

Material: peat (humified) (A Alderton 1984)

Initial comment: from the upper peat at its regressive contact with underlying marine/brackish clay, at an altitude of -0.12 to -0.16m OD.

Objectives: to date return of freshwater conditions at this site.

Calibrated date: 1 σ : 1750–1510 cal BC
2 σ : 1890–1430 cal BC

Final comment: A Alderton (1985), the date is surprisingly young, and so further material from a similar horizon will be submitted for radiocarbon dating to confirm this result (see Q-2533).

Q-2506 3975 \pm 70 BP

Sample: FMF84 B4, submitted in January 1985 by A Alderton

Material: peat (humified sandy peat) (A Alderton 1984)

Initial comment: from the top of the basal peat at its transgressive contact with overlying marine/brackish clay, at an altitude of -0.22 to -0.24m OD.

Objectives: to date the onset of marine/brackish conditions at this site.

Calibrated date: 1 σ : 2580–2460 cal BC
2 σ : 2840–2280 cal BC

Final comment: A Alderton (1985), the date is surprisingly young, and so further material from a similar horizon will be submitted for radiocarbon dating to confirm this result (see Q-2534).

Q-2507 4260 \pm 60 BP

Sample: FMF84 B5, submitted in January 1985 by A Alderton

Material: peat (humified sandy peat) (A Alderton 1984)

Initial comment: from the base of basal peat, at an altitude of -0.26 to -0.275m OD.

Objectives: this sample should date the initiation of peat formation at this site.

Calibrated date: 1 σ : 2920–2870 cal BC
2 σ : 3020–2680 cal BC

Final comment: A Alderton (1985), this date is surprisingly young (see Q-2505 and Q-2506).

Q-2532 2750 \pm 80 BP

Sample: FMF84 B2/1, submitted in August 1985 by A Alderton

Material: peat (*Phragmites* and rootlet peat with some small twigs) (A Alderton 1984)

Initial comment: from within the upper peat at an altitude of +0.01 to -0.01m OD.

Objectives: this sample will provide an idea of the rate of peat growth in this location and aid environmental reconstruction.

Calibrated date: 1 σ : 1000–810 cal BC
2 σ : 1120–790 cal BC

Final comment: see Q-2503

Q-2533 4020 \pm 90 BP

Sample: FMF84 B2/2, submitted in August 1985 by A Alderton

Material: peat (*Phragmites* and rootlet peat with some silty clay) (A Alderton 1984)

Initial comment: from the base of the upper peat at its regressive contact with a marine/brackish clay, at an altitude of -0.18 to -0.20m OD.

Objectives: to date the return of freshwater conditions at this site, and to replicate the late result provided by Q-2505.

Calibrated date: 1 σ : 2840–2460 cal BC
2 σ : 2880–2290 cal BC

Final comment: A Alderton (1985), the sample dates the end of the deposition of 'fen clay', but is seemingly anomalously old in comparison to the other results in this series.

Final comment: M Waller (1994), diatom analysis shows that the marine/brackish clay was deposited in a low-energy environment. It is therefore unlikely that redeposition of peat is responsible for this apparently anomalous old date.

Laboratory comment: English Heritage (22 November 2007), the two results from this contact at Foulmire Fen are statistically inconsistent (Q-2505 and Q-2533; T'=28.5; T'(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

Q-2534 4380 \pm 80 BP

Sample: FMF84 B2/3, submitted in August 1985 by A Alderton

Material: peat (humified *Phragmites* peat with much sand and some silty clay) (A Alderton 1984)

Initial comment: from the top of the basal peat at its transgressive contact with marine/brackish clay, at an altitude of -0.265 to -0.315m OD.

Objectives: to date the onset of marine brackish conditions at this site, and to replicate the surprisingly late result provided by Q-2506.

Calibrated date: 1 σ : 3270–2900 cal BC
2 σ : 3350–2880 cal BC

Final comment: A Alderton (1985), this result is surprisingly different from Q-2506 and Q-2502, showing an unexpected variety of dates for the transgressive overlap at this locality.

Laboratory comment: English Heritage (22 November 2007), the two results from this contact at Foulmire Fen are statistically inconsistent (Q-2506 and Q-2534; T'=14.6; T'(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

Fenland Project: Friskney, Lincolnshire

Location: TF 43625571
Lat. 53.04.44 N; Long. 00.08.39 E

Project manager: M Waller (University of Cambridge),
1988

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: to complement the investigations undertaken in East Fen and to the east at Thorpe Culvert, a series of cleaned dykes were examined in an intermediate area: Small End near Friskney (Waller 1994, fig 15.11).

Objectives: to provide a radiocarbon chronology for the organic sediments of the north-eastern Fens.

Final comment: M Waller (1994), the four dates from this site represent the contacts of each of the two thin intercalated peat beds. Pollen analysis suggests that, despite the sharp changes in the lithology, there are no major discontinuities in this sequence (Waller 1994, fig 15.12). The radiocarbon samples therefore accurately date the alternating environmental conditions at this site. The rate of sediment accumulation is shown in Waller (1994, fig 15.6).

References: Waller 1994, 307–13

Q-2825 2385 ±60 BP

Sample: FRY 1, submitted on 23 March 1988 by M Waller

Material: peat (highly humified fen peat) (M Waller 1988)

Initial comment: from the upper, transgressive contact of the upper intercalated peat at this site, at an altitude of +0.38 to +0.40m OD.

Objectives: to date the return to marine/brackish conditions at this site.

Calibrated date: 1σ: 530–390 cal BC
2σ: 760–370 cal BC

Final comment: M Waller (1994), this sample dates the onset of the third major marine incursion in this area, which does not appear to have penetrated as far inland as East Fen (see Q-2805).

Q-2826 2735 ±60 BP

Sample: FRY 2, submitted on 23 March 1988 by M Waller

Material: peat (highly humified fen peat) (M Waller 1988)

Initial comment: from the lower, regressive contact of the upper intercalated peat bed at this site, at an altitude of +0.25 to +0.27m OD.

Objectives: to date the return to freshwater conditions after the previous marine incursion.

Calibrated date: 1σ: 970–810 cal BC
2σ: 1020–790 cal BC

Final comment: M Waller (1994), the return to freshwater conditions here saw the development of bog vegetation (Waller 1994, fig 15.12).

References: Waller 1994, fig 15.12

Q-2827 3135 ±50 BP

Sample: FRY 3, submitted on 23 March 1988 by M Waller

Material: peat (highly humified fen peat) (M Waller 1988)

Initial comment: from the upper, transgressive contact of the lower intercalated peat bed at this site, at an altitude of +0.03 to +0.01m OD.

Objectives: to date the return of marine/brackish conditions at this location.

Calibrated date: 1σ: 1450–1380 cal BC
2σ: 1510–1300 cal BC

Final comment: M Waller (1994), this is the earliest date for the second major, middle Bronze Age, marine incursion in this area.

Q-2828 3260 ±50 BP

Sample: FRY 4, submitted on 23 March 1988 by M Waller

Material: peat (highly humified fen peat) (M Waller 1988)

Initial comment: from the lower, regressive contact of the lower intercalated peat bed at this site, at an altitude of -0.03 to -0.05m OD.

Objectives: to date the return to freshwater conditions after the preceding marine incursion.

Calibrated date: 1σ: 1610–1460 cal BC
2σ: 1670–1430 cal BC

Final comment: M Waller (1994), the result shows that drier, freshwater conditions, following the retreat of the first major marine incursion into this area, returned in the middle Bronze Age at this location.

Fenland Project: GipseY Bridge, Lincolnshire

Location: TF 27994986
Lat. 53.01.49 N; Long. 00.05.39 W

Project manager: I Shennan (University of Durham), 1986

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: this site is situated in the north-western Fens. Detailed survey and sampling was undertaken at GipseY Bridge at the southern end of the 8.8km stretch of the Castle Dyke, which was sketched and surveyed. This site is c 7km from Bettinson's Bridge, the sampling site at the northernmost point of the Dyke.

Objectives: dating will assist in the understanding of sea level and environmental changes in Wildmore Fen and West Fen.

Final comment: I Shennan (1994), waterlogging in this site commenced during the first half of the third millennium cal BC (Q-2566), with a marine incursion recorded approximately 250 years later (Q-2565 and Q-2567).

References: Waller 1994, 284–8

Q-2565 3825 ±75 BP

Sample: GB 13/1, submitted on 16 December 1986 by I Shennan

Material: peat (humified monocotyledonous peat) (I Shennan 1986)

Initial comment: from the upper, transgressive contact of the basal peat, at an altitude of -0.12 to -0.16m OD.

Objectives: to date the onset of marine/brackish conditions at this site.

Calibrated date: 1σ: 2460–2140 cal BC
2σ: 2480–2030 cal BC

Final comment: see Q-2567

Laboratory comment: English Heritage (21 November 2007), see Q-2567

Q-2566 4070 ±80 BP

Sample: GB 13/2, submitted on 16 December 1986 by I Shennan

Material: peat (humified monocotyledonous peat with some sand) (I Shennan 1986)

Initial comment: from the base of basal peat at an altitude of -0.50 to -0.54m OD.

Objectives: to date the start of peat growth at this site, which was probably related to a rising water table due to sea-level rise.

Calibrated date: 1σ: 2860–2480 cal BC
2σ: 2890–2460 cal BC

Final comment: I Shennan (1994), peat growth began here in the first half of the third millennium cal BC.

Q-2567 3790 ±80 BP

Sample: GB 11/1, submitted on 16 December 1986 by I Shennan

Material: peat (humified monocotyledonous peat with some sand) (I Shennan 1986)

Initial comment: from the upper, transgressive contact of the basal peat at an altitude of -0.48 to -0.52m OD. This sample was from sampling position 11 (TF 2802–4982).

Objectives: to date the onset of marine/brackish conditions at this location.

Calibrated date: 1σ: 2350–2050 cal BC
2σ: 2480–1970 cal BC

Final comment: I Shennan (1994), the transgressive contact of the peat bed here is at a lower altitude (-0.48 to -0.52m OD) than that for Q-2565 (-0.12 to -0.16m OD) as a result of compaction.

Laboratory comment: English Heritage (21 November 2007), the two determinations on the upper contact of the basal peat from Gipsey Bridge are statistically consistent (Q-2565 and Q-2567; $T'=0.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978

Fenland Project: Hobbs Lot Farm, March, Cambridgeshire

Location: TF 40450061
Lat. 52.35.05 N; Long. 00.04.24 E

Project manager: M Waller (University of Cambridge), 1987

Archival body: Cambridgeshire County Council, University of Cambridge

Description: the northern tip of March Island occupies an important position, as it is the upland edge against which the embayments of the southern Fenland divide. This location seemed to offer an opportunity to link sequences examined in the eastern Fens with those found on the south-western side of the Fenland. Borehole 6, where all three organic layers revealed by the borehole transect were present, was selected for pollen investigations and radiocarbon dating.

Objectives: to date episodes of marine influence on sedimentation at this locality and the pollen evidence from this sequence.

Final comment: M Waller (1994), the deepest Flandrian clastic unit at Hobbs Lot appears to have been deposited in the middle/late Neolithic (Q-2574 and Q-2573), when an intercalated peat was forming over much of the west-central Fens. To the east, there are contemporaneous marine/brackish sediments. The second period of marine/brackish sedimentation (Q-2572) is compatible with the 'fen clay' marine phase recognised widely in the west-central Fens, but is coincident with regressive contacts in the south-eastern Fens and along the eastern Fen edge. Therefore the earlier deposit may be expected to be part of a sediment body with an easterly distribution and the later deposit part of a sediment body with a westerly distribution. The dates from the uppermost peat may be problematic (Q-2569–Q-2571).

References: Waller 1994, 209–19

Q-2569 2240 ±65 BP

Sample: MH 1, submitted on 23 March 1987 by M Waller

Material: peat (with *Phragmites*) (M Waller 1986)

Initial comment: from close to the disturbed top of the uppermost intercalated peat (a transgressive contact with the overlying layer), at an altitude of -0.53 to -0.56m OD.

Objectives: to date the onset of marine/brackish conditions.

Calibrated date: 1σ: 400–200 cal BC
2σ: 410–120 cal BC

Final comment: M Waller (1994), this sample is not from the transgressive contact and if uncontaminated would only provide a maximum estimate of the age of the subsequent marine phase.

Q-2570 2280 ±65 BP

Sample: MH 2, submitted on 23 March 1987 by M Waller

Material: peat (with *Phragmites*) (M Waller 1986)

Initial comment: from within the uppermost intercalated peat, at the boundary of pollen zones HLM-6 and HLM-7 (Waller 1994, fig 10.10), at an altitude of -0.63 to -0.65m OD.

Objectives: to date the return to fen carr from sedge fen.

Calibrated date: 1 σ : 400–230 cal BC
2 σ : 480–190 cal BC

Final comment: see Q-2571

References: Waller 1994, fig 10.10

Q-2571 2360 \pm 65 BP

Sample: MH 3, submitted on 23 March 1987 by M Waller

Material: peat (with *Phragmites*) (M Waller 1986)

Initial comment: from the bottom of uppermost intercalated peat at its regressive contact with underlying marine/brackish clay, at an altitude of -0.72 to -0.75m OD.

Objectives: to date the return to freshwater conditions at this site.

Calibrated date: 1 σ : 510–390 cal BC
2 σ : 760–230 cal BC

Final comment: M Waller (1994), this sample provides a date for the lower contact of this intercalated peat, although here this regressive overlap is much younger than at other sites in this region. The sharp contact may indicate discontinuity. Alternatively, the proximity of this peat to the surface suggests that this bed could have been infiltrated by younger carbon. For this reason, the dates from this uppermost intercalated peat may be anomalously young, and the sediment accumulation rate for this deposit has not been calculated. This sample also dates the boundary between pollen zones HLM-5 and HLM-6 (Waller 1994, fig 10.10), which sees the local establishment of reed swamp.

References: Waller 1994, fig 10.10

Q-2572 3855 \pm 80 BP

Sample: MH 4, submitted on 23 March 1987 by M Waller

Material: peat (with abundant *Phragmites*) (M Waller 1986)

Initial comment: from the top of the middle intercalated peat at its transgressive contact with the overlying blue clay, at an altitude of -1.57 to -1.66m OD.

Objectives: as Q-2569

Calibrated date: 1 σ : 2470–2200 cal BC
2 σ : 2570–2040 cal BC

Final comment: M Waller (1994), the date of this marine episode is compatible with the ‘fen clay’ marine phase recognised widely in the west-central Fens, but is coincident with regressive contacts in the south-eastern Fens and along the Eastern Fen edge.

Q-2573 4150 \pm 80 BP

Sample: MH 5, submitted on 23 March 1987 by M Waller

Material: peat (with abundant *Phragmites*) (M Waller 1986)

Initial comment: from the base of the middle intercalated peat at its regressive contact with underlying blue clay, at an altitude of -1.94 to -2.03m OD.

Objectives: to date the return to freshwater conditions at this site.

Calibrated date: 1 σ : 2890–2580 cal BC
2 σ : 2910–2480 cal BC

Final comment: M Waller (1994), this phase of peat growth occurred over much of the west-central Fens, although to the east there are contemporaneous marine/brackish sediments. This sample also dates the boundary between pollen zones HLM-3 and HLM-4 (Waller 1994, fig 10.10), and the transition from brackish conditions to fen carr.

References: Waller 1994, fig 10.10

Q-2574 4450 \pm 100 BP

Sample: MH 6, submitted on 23 March 1987 by M Waller

Material: peat (humified) (M Waller 1986)

Initial comment: from the top of the basal peat at its transgressive contact with overlying blue clay, at an altitude of -2.53 to -2.62m OD.

Objectives: as Q-2569

Calibrated date: 1 σ : 3350–2920 cal BC
2 σ : 3500–2890 cal BC

Final comment: M Waller (1994), see Q-2573. This sample also dates the boundary between pollen zones HLM-2 and HLM-3, which evidence steadily rising water levels.

Fenland Project: Hobhole A, Lincolnshire

Location: TF 38365698
Lat. 53.05.30 N; Long. 00.03.59 E

Project manager: M Waller (University of Cambridge), 1986

Archival body: Cambridgeshire County Council, University of Cambridge

Description: the Hobhole Drain is the main north-south drainage channel bisecting East Fen. Following the cleaning of a 3.4km stretch of the Drain in late 1985 (Waller 1994, fig 15.3), monolith tins were used to collect samples for palaeoenvironmental analysis and radiocarbon dating from three sites: Hobhole A, Hobhole B, and Lade Bank. The thick upper, intercalated peat was dated from this site.

Objectives: to provide a radiocarbon chronology for the organic sediments of East Fens.

Final comment: M Waller (1994), the progressive series from reedswamp, through sedge fen, to fen carr with *Betula*, inferred from the pollen diagram (Waller 1994, fig 15.9) at Hobhole A is indicative of falling water levels. The upper estuarine sediments are absent and peat formation continued here until at least the end of the second millennium cal BC (Q-2560). However, the second major marine incursion in this region may have had an impact later here, when it reached its maximal inland extent (some 200m south of site A).

References: Waller 1994, 307–9

Q-2560 2905 ±60 BP

Sample: HBA-1, submitted on 12 September 1986 by M Waller

Material: peat (highly humified with some *Phragmites*) (M Waller 1986)

Initial comment: from the top of the surviving undisturbed peat at an altitude of -0.36 to -0.38m OD.

Objectives: to allow the sedimentation rate of the peat bed to be calculated.

Calibrated date: 1σ: 1220–1000 cal BC
2σ: 1300–920 cal BC

Final comment: M Waller (1994), a graph of the accumulation rate of this peat bed is shown in Waller (1994, fig 15.6).

References: Waller 1994, fig 15.6

Q-2561 3090 ±60 BP

Sample: HBA-2, submitted on 12 September 1986 by M Waller

Material: peat (highly humified with some *Phragmites*) (M Waller 1986)

Initial comment: from within an intercalated peat bed, at an altitude of -0.40 to -0.42m OD.

Objectives: to provide a check on Q-2560 and to allow the calculation of the sediment accumulation rate for this unit.

Calibrated date: 1σ: 1430–1290 cal BC
2σ: 1500–1210 cal BC

Final comment: see Q-2560

Q-2562 3310 ±65 BP

Sample: HBA-3, submitted on 12 September 1986 by M Waller

Material: peat (highly humified with some *Phragmites*) (M Waller 1986)

Initial comment: from the lower, regressive contact of an intercalated peat bed, at an altitude of -0.44 to -0.46m OD.

Objectives: to date the return of freshwater conditions at this location.

Calibrated date: 1σ: 1690–1500 cal BC
2σ: 1750–1440 cal BC

Final comment: M Waller (1994), despite the sharp lithological contact the pollen assemblages strongly suggest continuous sedimentation across the clay/peat boundary and therefore this result should accurately reflect the arrival of freshwater conditions at this site.

**Fenland Project: Hobhole B,
Lincolnshire**

Location: TF 38225610
Lat. 53.05.02 N; Long. 00.03.50 E

Project manager: M Waller (University of Cambridge), 1986

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: the Hobhole Drain is the main north-south drainage channel bisecting East Fen. Following the cleaning of a 3.4km stretch of the Drain in late 1985 (Waller 1994, fig 15.3), monolith tins were used to collect samples for palaeoenvironmental analysis and radiocarbon dating from three sites: Hobhole A, Hobhole B, and Lade Bank. The contacts of an intercalated peat bed were dated from this site.

Objectives: to provide a radiocarbon chronology for the organic sediments of East Fens.

Final comment: M Waller (1994), the two dates from Hobhole B indicate that freshwater conditions returned during the early Bronze Age, but that a further estuarine phase occurred from the middle Bronze Age. The freshwater phase only lasted for a few hundred years and may have been insufficient for the serial development of fen carr vegetation to have occurred here.

References: Waller 1994, 304–7

Q-2563 3120 ±70 BP

Sample: HBB-1, submitted on 12 September 1986 by M Waller

Material: peat (highly humified silty peat) (M Waller 1986)

Initial comment: from the upper, transgressive contact of an intercalated peat bed, at an altitude of +0.19 to +0.17m OD.

Objectives: to date the return of marine/brackish conditions at this site.

Calibrated date: 1σ: 1460–1310 cal BC
2σ: 1530–1210 cal BC

Final comment: M Waller (1994), this date provides a maximum age for the return of marine sedimentation at this location. The contact is sharp and coincident with abrupt changes in the pollen stratigraphy (Waller 1994, fig 15.7) and, although it is possible that this represents a very rapid return to marine/brackish conditions, there may be a break in sedimentation or the contact may be eroded.

References: Waller 1994, fig 15.7

Q-2564 3390 ±70 BP

Sample: HBB-2, submitted on 12 September 1986 by M Waller

Material: peat (highly humified silty peat) (M Waller 1986)

Initial comment: from the lower, regressive contact of an intercalated peat bed, at an altitude of +0.13 to +0.11m OD.

Objectives: to date the return of freshwater conditions at this site.

Calibrated date: 1σ: 1760–1610 cal BC
2σ: 1890–1510 cal BC

Final comment: M Waller (1994), it appears from the pollen record (Waller 1994, fig 15.7) that this diffuse contact signifies the gradual onset of freshwater conditions, pre-dating the change in lithology. Consequently this sample dates the start of the peat growth here rather than the onset of freshwater conditions.

References: Waller 1994, fig 15.7

Fenland Project: Lade Bank, Lincolnshire

Location: TF 37975480
Lat. 53.04.20 N; Long. 00.03.35 E

Project manager: M Waller (University of Cambridge),
1986

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: the Hobhole Drain is the main north-south drainage channel bisecting East Fen. Following the cleaning of a 3.4km stretch of the Drain in late 1985 (Waller 1994, fig 15.3), monolith tins were used to collect samples for palaeoenvironmental analysis and radiocarbon dating from three sites: Hobhole A, Hobhole B, and Lade Bank. The basal peat was dated from this site.

Objectives: to provide a radiocarbon chronology for the organic sediments of East Fens.

Final comment: M Waller (1994), the pollen diagram from the basal peat at Lade Bank (Waller 1994, fig 15.4) shows that the rising water levels which accompanied the marine incursion promoted the same type of retrogressive vegetational change in this region as has been documented from many other parts of the Fenland basin. It is clear that waterlogging was responsible for the transformation from lime woodland to saltmarsh at this location in *c* 200 years.

References: Waller 1994, 300–4

Q-2543 4250 ±70 BP

Sample: LBA-1, submitted on 10 March 1986 by M Waller

Material: peat (fen peat with abundant *Phragmites* and some wood) (M Waller 1986)

Initial comment: from the upper, transgressive contact of the basal peat at an altitude of -2.19 to -2.21m OD.

Objectives: to date the onset of marine/brackish conditions at this location.

Calibrated date: 1σ: 2920–2770 cal BC
2σ: 3020–2630 cal BC

Final comment: M Waller (1994), the high pollen percentages for saltmarsh taxa immediately prior to the transgressive contact indicate that radiocarbon dates from this transition should accurately date the onset of marine/brackish conditions.

Laboratory comment: English Heritage (21 November 2007), see Q-2544

Q-2544 4230 ±70 BP

Sample: LBA-2, submitted on 10 March 1986 by M Waller

Material: peat (fen peat with some wood and abundant *Phragmites*) (M Waller 1986)

Initial comment: from within the basal peat at an altitude of -2.21 to -2.23m OD.

Objectives: to provide a check on Q-2543 from the transgressive contact, and for peat accumulation rates to be calculated for this site.

Calibrated date: 1σ: 2910–2700 cal BC
2σ: 3010–2620 cal BC

Final comment: M Waller (1994), the accumulation rate of this basal peat is shown in Waller (1994, fig 15.6).

Laboratory comment: English Heritage (21 November 2007), the two results from contiguous peat samples from the top of the basal peat here are statistically consistent (Q-2543 and Q-2544; T'=0.0, T'(5%)=3.8, ν=1; Ward and Wilson 1978).

References: Waller 1994, fig 15.6
Ward and Wilson 1978

Q-2545 4285 ±70 BP

Sample: LBA-3, submitted on 10 March 1986 by M Waller

Material: peat (fen peat with some wood and abundant *Phragmites*) (M Waller 1986)

Initial comment: from with the basal peat at an altitude of -2.23 to -2.25m OD

Objectives: to allow peat accumulation rates to be calculated for this site.

Calibrated date: 1σ: 2930–2870 cal BC
2σ: 3090–2690 cal BC

Final comment: M Waller (1994), the accumulation rate of this basal peat is shown in Waller (1994, fig 15.6).

References: Waller 1994, fig 15.6

Q-2546 4340 ±70 BP

Sample: LBA-4, submitted on 10 March 1986 by M Waller

Material: peat (fen peat with some wood and abundant *Phragmites*) (M Waller 1986)

Initial comment: from within basal peat at an altitude of -2.27 to -2.29m OD. This sample dates the boundary between pollen zones LB-2 and LB-3 (Waller 1994, fig 15.4).

Objectives: to allow peat accumulation rates to be calculated for this site.

Calibrated date: 1σ: 3080–2890 cal BC
2σ: 3320–2870 cal BC

Final comment: M Waller (1994), the accumulation rate of this basal peat is shown in Waller (1994, fig 15.6). Pollen zone LB-3 sees the transition to predominately coastal reedswamp.

References: Waller 1994, figs 15.4 and 15.6

Q-2547 4460 ±90 BP

Sample: LBA-5, submitted on 10 March 1986 by M Waller

Material: peat (fen peat with some wood and abundant *Phragmites*) (M Waller 1986)

Initial comment: from the base of basal peat at an altitude of -2.32 to -2.34m OD.

Objectives: to date the initiation of peat growth at this location.

Calibrated date: 1σ: 3350–2920 cal BC
2σ: 3500–2890 cal BC

Final comment: M Waller (1994), rising water levels initiated peat formation here during the middle/late Neolithic.

Fenland Project: Meadowgate Lane, Norfolk

Location: TF 47800807
Lat. 52.38.59 N; Long. 00.11.06 E

Project manager: A Alderton (University of Cambridge),
1984

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: one of seven sites examined along the Wisbech bypass, and one of five closely grouped sites around a major roddon at Elm. This site lies a few metres to the east of where the peat bed is truncated by the Elm roddon.

Objectives: to date the changes in lithology at this site and the pollen evidence from the intercalated peat bed.

Final comment: A Alderton and M Waller (1994), the lack of any age gradient in the dates from this site is unsatisfactory. The explanation probably lies with the high prevalence of wood throughout the profile, so that essentially the same material has been dated in all four samples. The pollen evidence indicates that the material used to obtain Q-2518 may not have been deposited immediately after marine/brackish sedimentation ceased. However, a very different and apparently transitional pollen assemblage (MGL-3) was obtained from the material used to provide Q-2515. This date should therefore be a reliable guide as to the timing of the return of marine/brackish conditions.

References: Waller 1994, 238–42

Q-2515 2440 ±50 BP

Sample: MGL-1, submitted in August 1985 by A Alderton

Material: peat (highly humified wood peat with silty clay)
(A Alderton 1984)

Initial comment: from the top of an intercalated peat bed at its transgressive contact with overlying dark grey silty clay, at an altitude of +0.68 to +0.66 m OD.

Objectives: to date the onset of marine/brackish conditions.

Calibrated date: 1σ: 750–400 cal BC
2σ: 780–390 cal BC

Final comment: A Alderton (1994), this date should be a reliable guide to the timing of the return to marine/brackish conditions.

Q-2516 2410 ±50 BP

Sample: MGL-2, submitted in August 1985 by A Alderton

Material: peat (humified wood peat with scattered *Phragmites*) (A Alderton 1984)

Initial comment: from within the intercalated, upper peat bed, at an altitude of +0.60 to +0.585 m OD.

Objectives: to date the environmental evidence from the site, and to allow an estimate of the rate of peat growth to be made.

Calibrated date: 1σ: 730–400 cal BC
2σ: 760–390 cal BC

Final comment: A Alderton (1994), this sample is not thought to provide a reliable date for this deposit (*see series comment*).

Q-2517 2380 ±60 BP

Sample: MGL-3, submitted in August 1985 by A Alderton

Material: peat (highly humified fen wood peat) (A Alderton 1984)

Initial comment: from within the intercalated, upper peat bed, at an altitude of +0.53 to +0.51 m OD.

Objectives: as Q-2516

Calibrated date: 1σ: 520–390 cal BC
2σ: 760–370 cal BC

Final comment: *see* Q-2516

Q-2518 2450 ±60 BP

Sample: MGL-4, submitted in August 1985 by A Alderton

Material: peat (highly humified *Phragmites* peat with a little wood and some clay) (A Alderton 1984)

Initial comment: from the base of the intercalated, upper peat at its regressive contact with the underlying grey silty clay, at an altitude of +0.43 to +0.41 m OD.

Objectives: to date the return to freshwater conditions at this site.

Calibrated date: 1σ: 760–400 cal BC
2σ: 790–390 cal BC

Final comment: A Alderton (1994), this result is not thought to provide a reliable date for this deposit. The pollen evidence from this level (Waller 1994, fig 11.11) indicates that the material used to obtain Q-2518 may not have been deposited immediately after marine/brackish sedimentation ceased.

References: Waller 1994, fig 11.11

Fenland Project: Midville, Lincolnshire

Location: TF 359580
Lat. 53.06.07 N; Long. 00.01.42 E

Project manager: A Alderton (University of Cambridge),
1983

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: a dyke section near Midville in East Fen (Waller 1994, fig 15.2). The site lies on the end of a small sand island only recently exposed and lying at about 0m OD, near the limit of the marine clay.

Objectives: to provide the north-eastern Fens with a radiocarbon chronology for the organic sediments of East Fen.

Final comment: A Alderton and M Waller (1994), the major early/middle Bronze Age marine incursion in this region reached its maximum inland extent here. Marine/brackish conditions began later (Q-2527) and persisted later (Q-2526) than elsewhere in this locality.

References: Waller 1994, 299

Q-2525 3825 ±70 BP

Sample: MV-1, submitted in December 1984 by A Alderton

Material: peat (fen wood peat) (A Alderton 1983)

Initial comment: from the upper, transgressive contact of the basal peat, at an altitude of -1.00 to -1.03m OD (TF35915795).

Objectives: to date the onset of marine/brackish conditions at this location.

Calibrated date: 1σ: 2460–2140 cal BC
2σ: 2480–2030 cal BC

Final comment: see Q-2527

Q-2526 3170 ±70 BP

Sample: MV-2, submitted in December 1984 by A Alderton

Material: peat (fen wood peat) (A Alderton 1983)

Initial comment: from close to the contact of an upper peat bed, at an altitude of -0.185 to -0.215m OD (TF35905812).

Objectives: to date the end of the underlying marine phase and the return to freshwater conditions.

Calibrated date: 1σ: 1510–1390 cal BC
2σ: 1620–1290 cal BC

Final comment: M Waller (1994), this is the latest date for the end of the underlying marine incursion in this area, but is in broad agreement with other dates for this regressive overlap in this area.

Q-2527 3780 ±60 BP

Sample: MV-3, submitted in December 1984 by A Alderton

Material: wood (waterlogged): ?*Quercus* sp. (A Alderton 1983)

Initial comment: from an altitude of -1.11 to -1.20m OD (TF35915794). The sample is one of the large blocks of wood lying within and especially at the base of the basal peat, the whole height of the sample represents the whole thickness of the basal peat.

Objectives: the sample may provide a date for the growth of trees on the till, when they were being swamped by peat growth and so will give a date for the initiation of peat growth.

Calibrated date: 1σ: 2300–2130 cal BC
2σ: 2460–2030 cal BC

Final comment: A Alderton and M Waller (1994), this wood sample has provided a date for the initiation of the growth of basal peat here. This is the youngest age for the onset of clastic conditions in this area, and marks the maximum extent inland of the major early/middle Bronze Age marine incursion.

Fenland Project: Morton Fen 10/50, Lincolnshire

Location: TF 146239
Lat. 52.48.00 N; Long. 00.18.00 W

Project manager: I Shennan (University of Durham), 1986

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: among the many subtle surface archaeological and palaeoenvironmental features in Morton Fen, the Bourne-Morton canal is one of the most striking. This 4.5km linear feature runs from the modern town of Bourne in a north-easterly direction to join a major roddon in Morton Fen. Hayes and Lane (1992) discuss the feature, commenting on a possible dual role as both a drainage canal and a causeway across the Fen. The Morton Fen 10/50 was one of the three boreholes put down across the centre of the canal.

Objectives: the sequence of these five dates will provide a stratigraphic chronology for the peat deposition and additional information for the sea level and environmental changes in the Morton Fen locality.

Final comment: I Shennan (1994), the results for this unusually complete stratigraphic sequence are internally consistent without inversions. Broadly speaking, the radiocarbon dates show that waterlogging, leading to peat growth, commenced at the end of the fourth millennium cal BC (Q-2579). Approximately a thousand years later, marine sedimentation is recorded (Q-2578). This clastic sedimentation continued until peat growth resumed at the end of the second millennium cal BC (Q-2577).

References: Hayes and Lane 1992
Waller 1994, 272-7

Q-2575 2630 ±70 BP

Sample: MF-1, submitted in June 1987 by I Shennan

Material: peat (humified *Phragmites* peat) (I Shennan 1986)

Initial comment: from the top, transgressive contact of an intercalated peat bed, at an altitude of -0.51 to -0.63m OD.

Objectives: to date the onset of marine/brackish conditions.

Calibrated date: 1σ: 840–780 cal BC
2σ: 920–560 cal BC

Final comment: I Shennan (1994), the presence of a number of herbaceous types, characteristic of coastal environments in the pollen assemblage at this transition (Waller 1994, fig 13.6), suggests that this contact has not been eroded.

References: Waller 1994, fig 13.6

Q-2576 2850 ±60 BP

Sample: MF-2, submitted in June 1987 by I Shennan

Material: peat (humified *Phragmites* peat) (I Shennan 1986)

Initial comment: from within an intercalated peat bed, at an altitude of -0.67 to -0.75m OD.

Objectives: to date the renewed growth of this intercalated peat layer.

Calibrated date: 1σ: 1120–920 cal BC
2σ: 1260–840 cal BC

Final comment: I Shennan (1994), this result dates the boundary between pollen zones MF-6/MF-7 (Waller 1994, fig 13.6), and marks the resumption of peat growth following a short-lived dry phase.

References: Waller 1994, fig 13.6

Q-2577 2960 ±70 BP

Sample: MF-3, submitted in June 1987 by I Shennan

Material: peat (humified *Phragmites* peat) (I Shennan 1986)

Initial comment: from the lower, regressive contact of an intercalated peat bed, at an altitude of -0.79 to -0.89m OD.

Objectives: to date the return to freshwater conditions at this site.

Calibrated date: 1σ: 1310–1050 cal BC
2σ: 1410–940 cal BC

Final comment: I Shennan (1994), peat growth resumed at this site at the end of the second millennium cal BC (*see also* Q-2599 from this regressive contact at South Drove).

Q-2578 3550 ±70 BP

Sample: MF-4, submitted in June 1987 by I Shennan

Material: peat (humified) (I Shennan 1986)

Initial comment: from the top, transgressive contact of the basal peat, at an altitude of -1.89 to -1.97m OD.

Objectives: to date the onset of marine/brackish conditions.

Calibrated date: 1σ: 2010–1770 cal BC
2σ: 2130–1690 cal BC

Final comment: I Shennan (June 1987), this result agrees with another determination for this transgressive contact, from South Drove (Q-2600), in placing the onset of marine conditions at the start of the second millennium cal BC.

Q-2579 4430 ±100 BP

Sample: MF-5, submitted in June 1987 by I Shennan

Material: peat (humified) (I Shennan 1986)

Initial comment: from the base of basal peat, at an altitude of -3.47 to -3.55m OD.

Objectives: to date the initiation of peat growth at this location.

Calibrated date: 1σ: 3350–2910 cal BC
2σ: 3490–2880 cal BC

Final comment: I Shennan (1994), waterlogging leading to peat growth occurred at this location at the end of the fourth millennium cal BC.

Fenland Project: Morton Fen South Drove, Lincolnshire

Location: TF 14712347
Lat. 52.47.46 N; Long. 00.17.55 W

Project manager: I Shennan and D Donoghue (University of Durham), 1988

Archival body: Cambridgeshire County Council, University of Cambridge

Description: among the many subtle surface archaeological and palaeoenvironmental features in Morton Fen, the Bourne-Morton canal is one of the most striking. This

4.5km linear feature runs from the modern town of Bourne in a north-easterly direction to join a major roddon in Morton Fen. Hayes and Lane (1992) discuss the feature, commenting on a possible dual role as both a drainage canal and a causeway across the Fen. Morton Fen, South Drove was one of the three boreholes put down across the centre of the canal (borehole 2).

Objectives: to date the deep intercalated clastic bed, which represents the first marine/brackish inundation of the area.

Final comment: I Shennan (1994), these two samples have provided dating results consistent with those of nearby sites (*see* Morton Fen, 10/50 and Bourne North Fen).

References: Hayes and Lane 1992
Waller 1994, 277

Q-2599 2910 ±60 BP

Sample: MFSD-1, submitted in June 1988 by I Shennan and D Donoghue

Material: peat (humified monocot peat) (I Shennan and D Donoghue 1988)

Initial comment: from the lower, regressive contact of an intercalated peat bed, at an altitude of -1.93 to -2.02m OD.

Objectives: to date the return of freshwater conditions at this locality.

Calibrated date: 1σ: 1260–1000 cal BC
2σ: 1310–920 cal BC

Final comment: I Shennan (1994), peat growth resumed at this site at the end of the second millennium cal BC (*see also* Q-2577 from this regressive contact at Morton Fen 10/50).

Q-2600 3445 ±70 BP

Sample: MFSD-2, submitted in June 1988 by I Shennan and D Donoghue

Material: peat (humified monocot peat) (I Shennan and D Donoghue 1988)

Initial comment: from the upper, transgressive contact of the basal peat, at an altitude of -2.08 to -2.20m OD.

Objectives: to date the onset of marine conditions at this site.

Calibrated date: 1σ: 1890–1680 cal BC
2σ: 1940–1540 cal BC

Final comment: I Shennan (1994), this result agrees with another determination for this transgressive contact, from Morton Fen 10/50 (Q-2578), in placing the onset of marine conditions at the start of the second millennium cal BC.

Fenland Project: Murrow, Cambridgeshire

Location: TF 3707
Lat. 52.38.36 N; Long. 00.01.24 E

Project manager: M Waller (University of Cambridge), 1987

Archival body: Cambridgeshire County Council,
University of Cambridge

Calibrated date: 1 σ : 490–390 cal BC
2 σ : 750–260 cal BC

Description: the cleaning and straightening of a series of dykes between the villages of Murrow and Parson Drove, provided a convenient opportunity to examine the sediments midway between Thorney and Wisbech. The lower intercalated peat was sampled from by piston corer at TF 37520790, the upper intercalated peat was sample from the dyke section at TF 37290768 (Waller 1994, fig 10.5).

Final comment: see Q-2590

Objectives: to provide a chronology for the environmental evidence from the site.

Q-2592 2650 \pm 60 BP

Sample: MUR-3, submitted on 21 October 1987 by M Waller

Material: peat (humified fen peat with some *Phragmites*) (M Waller 1987)

Initial comment: from the base of the upper intercalated peat at its regressive contact with underlying marine/brackish sediments, at an altitude of -0.50 to -0.52m OD.

Objectives: to date the return to freshwater conditions, and the pollen evidence from this site.

Calibrated date: 1 σ : 840–790 cal BC
2 σ : 920–670 cal BC

Final comment: see Q-2590

Final comment: M Waller (1994), the deeper of the intercalated peats at Murrow appears to be part of a layer which has been widely recognised in this and adjacent regions. The radiocarbon evidence suggests that the peat formation here was short-lived and the pollen diagram indicates that a brackish influence was maintained. Murrow is probably therefore close to the seaward limits of the layer. The upper intercalated peat formed during the Iron Age at the same time as the extensive organic layer exposed along the Wisbech bypass. The major roddon, which overlies and cuts through this layer at Murrow, cannot therefore be part of the 'Upper Barroway Drove Beds', though it was mapped as such by Wyatt (1984).

Q-2803 4065 \pm 70 BP

Sample: MUR-4, submitted on 18 January 1988 by M Waller

Material: peat (humified fen peat with some clay/silt and *Phragmites*) (M Waller 1988)

Initial comment: from the top of the lower intercalated peat at its transgressive contact with overlying blue clay, at an altitude of -3.19 to -3.21m OD.

Objectives: to date the onset of marine conditions provide dating for the pollen sequence.

Calibrated date: 1 σ : 2850–2480 cal BC
2 σ : 2880–2460 cal BC

Final comment: M Waller (1994), the deeper intercalated peat at Murrow appears to be part of a layer which has been widely recognised in this and adjacent regions. The pollen evidence is detailed in Waller 1994 (figs 10.6–7).

References: Waller 1994, figs 10.6–7

References: Waller 1994, 204–9
Wyatt 1984

Q-2590 2130 \pm 50 BP

Sample: MUR-1, submitted on 21 October 1987 by M Waller

Material: peat (humified fen peat with some *Phragmites*) (M Waller 1987)

Initial comment: from the top of the upper intercalated peat, from its transgressive contact with overlying marine/brackish sediments, at an altitude of -0.33 to -0.35m OD.

Objectives: to date the onset of marine/brackish conditions and the pollen sequence.

Calibrated date: 1 σ : 350–60 cal BC
2 σ : 360–40 cal BC

Final comment: M Waller (1994), the upper intercalated peat at Murrow formed during the Iron Age. Sediment accumulation rates and the pollen evidence are shown in Waller 1994 (figs 10.6–8).

Q-2804 4290 \pm 70 BP

Sample: MUR-5, submitted on 18 January 1988 by M Waller

Material: peat (humified fen peat with some *Phragmites*) (M Waller 1988)

Initial comment: from the base of the lower intercalated peat at its regressive contact with underlying clay, at an altitude of -3.23 to -3.27m OD.

Objectives: to date the return to freshwater conditions at this location and the pollen sequence.

Calibrated date: 1 σ : 2930–2880 cal BC
2 σ : 3090–2700 cal BC

Final comment: see Q-2803

References: Waller 1994, figs 10.6–8

Q-2591 2360 \pm 60 BP

Sample: MUR-2, submitted on 21 October 1987 by M Waller

Material: peat (humified fen peat with some *Phragmites*) (M Waller 1987)

Initial comment: from within the upper intercalated peat at the MU-5/MU-6 pollen zone boundary, at an altitude of -0.41 to -0.43m OD.

Objectives: to date the MU-5/MU-6 pollen boundary, where a rise in arboreal pollen and a decline in herbaceous pollen are evident.

Fenland Project: New Bridge Road, Cambridgeshire

Location: TF 45700745
Lat. 52.38.41 N; Long. 00.09.13 E

Project manager: A Alderton (University of Cambridge), 1984

Archival body: Cambridgeshire County Council, University of Cambridge

Description: one of seven sites examined along the Wisbech bypass. The sampling location was chosen where the intercalated peat occurred at a relatively constant altitude.

Objectives: to date the changes in lithology at the site, and provide dating for the pollen diagram and diatom analysis.

Final comment: A Alderton and M Waller (1994), marine/brackish conditions persisted here until the early Iron Age (Q-2510), later than at some more inland sites (see Q-2514 and Q-2521). The date for the return to marine conditions is the youngest acquired from the bypass (Q-2508), and archaeological evidence would appear to discount the extensive erosion of the upper surface of the peat. Johnson (1986) recorded first century AD occupation in the overlying sediment close to this site. A sudden return to marine conditions, possibly linked to the site's proximity to the Elm roddon, is indicated at the very end of the first millennium cal BC.

References: Johnson 1986
Waller 1994, 234–8

Q-2508 2010 ±50 BP

Sample: NBR-1, submitted in March 1985 by A Alderton

Material: peat (peaty clay) (A Alderton 1984)

Initial comment: from the top of an intercalated peat bed at its transgressive contact with overlying grey silty clay, at an altitude of +0.50 to +0.485m OD. It is suspected that it has been slightly reworked by the incoming clays (of the marine influence), and the contact may be slightly erosive.

Objectives: to date the onset of marine conditions.

Calibrated date: 1σ: 60 cal BC–cal AD 60
2σ: 170 cal BC–cal AD 90

Final comment: see series comment

Q-2509 2120 ±50 BP

Sample: NBR-2, submitted in March 1985 by A Alderton

Material: peat (highly humified peat with wood) (A Alderton 1984)

Initial comment: from within an intercalated peat, at an altitude of +0.45 to +0.435m OD.

Objectives: to date the pollen and diatom evidence, and provide a check on the accuracy of the dates from the contacts of this peat.

Calibrated date: 1σ: 210–50 cal BC
2σ: 360 cal BC–cal AD 1

Final comment:, the pollen diagram and diatom evidence for this site are shown in Waller (1994, figs 11.8 and 11.9). This result forms a consistent stratigraphic series with those from the peat contacts (Q-2508 and Q-2510).

References: Waller 1994, figs 11.8 and 11.9

Q-2510 2430 ±60 BP

Sample: NBR-3, submitted in March 1985 by A Alderton

Material: sediment (organic clay) (A Alderton 1984)

Initial comment: from the base of an intercalated, upper peat at its regressive contact with underlying silty clay, at an altitude of +0.395 to +0.38m OD.

Objectives: to date the return to freshwater conditions at this site.

Calibrated date: 1σ: 750–400 cal BC
2σ: 780–390 cal BC

Final comment: A Alderton and M Waller (1994), the sharp contact between the underlying clay and peat might suggest an interruption in sedimentation here, although the occurrence of a transitional brackish/freshwater pollen assemblage argues against such a break, and this sample may provide an accurate date for the end of marine conditions at this location.

Fenland Project: Ouse Haddenham, Cambridgeshire

Location: TL 41837799
Lat. 52.22.52 N; Long. 00.05.02 E

Project manager: M Waller and S Peglar (University of Cambridge), 1984

Archival body: Cambridgeshire County Council

Description: boreholes were sunk across the major Ouse roddon where it occurs approximately 1km to the north of the Foulmire investigations, in order to recover deposits of early and mid Flandrian age which could be related to the Mesolithic and Neolithic archaeology recorded on the terrace. Deposits from borehole 106 were selected for detailed analysis and dating.

Objectives: to date a palaeoenvironmental sequence that could be related to the important Mesolithic and Neolithic archaeology recorded on the Foulmire terrace (Evans and Hodder 2006a).

Final comment: M Waller and S Peglar (1994), as expected the radiocarbon dates for this site represent a long, slow accumulation from the early Devensian to mid Flandrian, with a break in sedimentation between pollen zones OCH-1 and OCH-3 (Waller 1994, fig 8.13). During OCH-3 and probably most of OCH-4, peat formation in this embayment would have largely been confined to the channel. The terraces would have been dry and suitable for clearance and settlement, a process which the pollen and radiocarbon evidence indicates began early in the Neolithic (Q-2814). The pollen diagram strongly suggests that cultivation was occurring at this time. From the late Neolithic, the rising

water table would probably have started to affect the vegetation and settlement on the lower parts of the neighbouring terrace, with the continuation of this process resulting in the abandonment of progressively higher levels.

References: Evans and Hodder 2006a, 26–30
Waller 1994, 174–9, and fig 8.13

Q-2813 3950 ±95 BP

Sample: OUH-1, submitted on 10 March 1988 by M Waller and S Peglar

Material: peat (undifferential peat/detrital mud) (M Waller 1988)

Initial comment: from the top of the basal peat at its transgressive contact with overlying marine/brackish clay, at an altitude of -3.28 to -3.33m OD.

Objectives: a radiocarbon determination on this sample would date the onset of the subsequent marine phase and the transgressive overlap. It should be similar in date to sample SOM-2 from Somersham (ie post-elm decline).

Calibrated date: 1σ: 2580–2290 cal BC
2σ: 2860–2140 cal BC

Final comment: M Waller and S Peglar (1994), this radiocarbon date from sediment directly beneath the marine/brackish clay in the Ouse channel is comparable with other dates obtained from similar deposits elsewhere in this region (see Q-2585). This measurement also dates the boundary of pollen zones OCH5 and OCH6 (Waller 1994, fig 8.13), which show a transition from woodland to brackish conditions.

References: Waller 1994, fig 8.13

Q-2814 5420 ±100 BP

Sample: OUH-2, submitted on 10 March 1988 by M Waller and S Peglar

Material: sediment (detrital mud) (M Waller 1988)

Initial comment: from within the basal peat at an altitude of -4.21 to -4.26m OD .

Objectives: this sample will date a decline in tree pollen.

Calibrated date: 1σ: 4360–4080 cal BC
2σ: 4460–3990 cal BC

Final comment: M Waller and S Peglar (1994), the sample was taken from the boundary of pollen zones OCH-3 and OCH-4 (Waller 1994, fig 8.13), which shows evidence for some forest clearance accompanied by arable farming.

References: Waller 1994, fig 8.13

Q-2815 8250 ±120 BP

Sample: OUH-3, submitted on 10 March 1988 by M Waller and S Peglar

Material: peat (detrital mud/undifferential peat with wood) (M Waller 1988)

Initial comment: within basal peat, from an altitude of -4.84 to -4.90m OD.

Objectives: the radiocarbon determination on this sample will date the rise in *Alnus* and other arboreal pollen types in the pollen sequence.

Calibrated date: 1σ: 7490–7070 cal BC
2σ: 7580–7040 cal BC

Final comment:, the sample was taken from the boundary of pollen zones OCH-2 and OCH-3 (Waller 1994, fig 8.13), which show a series of major changes. These support the contention that there was a break in sedimentation between zones OCH-1 and OCH-3, and that the first two thousand years of the Flandrian are missing from the pollen record here.

References: Waller 1994, fig 8.13

Q-2816 10650 ±180 BP

Sample: OUH-4, submitted on 10 March 1988 by M Waller and S Peglar

Material: peat (peaty channel fill) (M Waller 1988)

Initial comment: from the base of the channel, at an altitude of -4.94 to -5.00m OD.

Objectives: the radiocarbon determination on this sample will provide the first dating for a late glacial pollen assemblage from the Fenland Project.

Calibrated date: 1σ: 10740–10460 cal BC
2σ: 10970–10120 cal BC

Final comment: M Waller and S Peglar (1994), the radiocarbon date confirms that the pollen record is of late Devensian age (Waller 1994, fig 8.13).

References: Waller 1994, fig 8.13

Fenland Project: Peacock's Farm, Cambridgeshire

Location: TL 63108516
Lat. 52.26.22 N; Long. 00.23.53 E

Project manager: M Waller (University of Cambridge), 1986

Archival body: Cambridgeshire County Council, University of Cambridge

Description: this site has been subject to excavations, in 1933–4 and 1962 by Clark and Godwin and their collaborators (Clark and Godwin 1962), and more recently by Whittle (1985). A monolith was collected from a dyke section away from the channel of the Little Ouse.

Objectives: material was collected from the basal peat through to the overlying marine/brackish clay, with the intention of examining the former deposits away from the channel of the Little Ouse, the location of all earlier studies. When dated the six samples from this site will enable sediment accumulation rates to be estimated. These can be used to calculate pollen accumulation rates.

Final comment: M Waller (1994), the sediments examined by Godwin in the channel of the Little Ouse appear to have accumulated over some 4000 radiocarbon years. The new

radiocarbon data suggest that the organic material found away from the channel accumulated over a period of several hundred radiocarbon years only. As might be expected comparison of the radiocarbon data between the new site and the one examined by Clark and Godwin (1962) suggests that deposition of the marine/brackish clay began in the channel before spreading out over a wider area, and that brackish influence was probably already evident locally prior to peat formation at this site.

References: Clark and Godwin 1962
Waller 1994, 118–24
Whittle 1985

Q-2537 4350 ±60 BP

Sample: FPFA-1, submitted in March 1986 by M Waller

Material: peat (well-humified peat with wood, particularly rhizomes of *Phragmites*) (M Waller 1986)

Initial comment: this sample is from the contact between the marine/brackish clay and underlying peat, at an altitude of -3.07 to -3.085m OD.

Objectives: because of the similarity of the pollen spectra on either side of the change in lithology at -3.07m OD, despite the relatively sharp contact, continuous sediment accumulation is suggested. Thus, this sample should accurately date the onset of deposition of the marine/brackish clay at this location.

Calibrated date: 1σ: 3080–2900 cal BC
2σ: 3270–2880 cal BC

Final comment: M Waller (1994), this result may suggest that marine/brackish clay was not deposited this far up the Little Ouse until four hundred radiocarbon years later than Godwin suggested.

Q-2538 4390 ±70 BP

Sample: FPFA-2, submitted in March 1986 by M Waller

Material: peat (well-humified peat with wood, particularly rhizomes of *Phragmites*) (M Waller 1986)

Initial comment: from within the basal peat at an altitude of -3.11 to -3.125m OD.

Objectives: to enable calculation of the sediment accumulation rate at this site.

Calibrated date: 1σ: 3270–2910 cal BC
2σ: 3350–2880 cal BC

Final comment: M Waller (1994), the graph showing the accumulation rate of the sediments at Peacock's farm is shown in Waller (1994, fig 7.8).

References: Waller 1994, fig 7.8

Q-2539 4410 ±60 BP

Sample: FPFA-3, submitted in March 1986 by M Waller

Material: peat (well-humified peat with wood, particularly rhizomes of *Phragmites*) (M Waller 1986)

Initial comment: from within the basal peat at an altitude of -3.2 to -3.215 m OD.

Objectives: as Q-2538. This sample dates the boundary between pollen zones PF-2 and PF-3.

Calibrated date: 1σ: 3270–2920 cal BC
2σ: 3350–2900 cal BC

Final comment: M Waller (1994), see Q-2538. Pollen zone PF-3 marks the local replacement of the fen carr which prevailed earlier with either saltmarsh or coastal reedswamp.

Q-2540 4435 ±50 BP

Sample: FPFA-4, submitted in March 1986 by M Waller

Material: peat (well-humified peat with wood, particularly rhizomes of *Phragmites*) (M Waller 1986)

Initial comment: from within the basal peat at an altitude of -3.28 to -3.295m OD.

Objectives: as Q-2538

Calibrated date: 1σ: 3320–3010 cal BC
2σ: 3350–2910 cal BC

Final comment: see Q-2538

Q-2541 4485 ±70 BP

Sample: FPFA-5, submitted in March 1986 by M Waller

Material: peat (well-humified peat with wood, particularly rhizomes of *Phragmites*) (M Waller 1986)

Initial comment: from within the basal peat at an altitude of -3.36 to -3.375m OD.

Objectives: as Q-2538

Calibrated date: 1σ: 3360–3020 cal BC
2σ: 3490–2910 cal BC

Final comment: see Q-2538

Q-2542 4600 ±60 BP

Sample: FPFA-6, submitted in March 1986 by M Waller

Material: peat (well-humified peat with wood, particularly rhizomes of *Phragmites*) (M Waller 1986)

Initial comment: from the lowest contact of the basal peat at an altitude of -3.44 to -3.455m OD.

Objectives: as Q-2538. Determination of this sample will provide dating for the initiation of peat growth at this site.

Calibrated date: 1σ: 3500–3340 cal BC
2σ: 3620–3100 cal BC

Final comment: see Q-2538

Fenland Project: Pymore, Cambridgeshire

Location: TL 49758515
Lat. 52.26.36 N; Long. 00.12.13 E

Project manager: M Waller (University of Cambridge), 1984

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: marine/brackish clay to the west of Littleport is split into two lobes divided by high ground which extends from Little Downham to Pymore. The sediments in the western lobe were examined when the main drain near Pymore was cleaned (for the eastern lobe, *see* Coffue Drove (Wood Fen)).

Objectives: to provide a dated chronology for the peat formation at this site, and the change to marine/brackish conditions.

Final comment: M Waller (1994), the investigations at Pymore, begun in 1984, were the first to be undertaken in the south-eastern Fens in recent years. The dates obtained were difficult to reconcile with the chronologies previously proposed for the onset of marine/brackish conditions in this area (eg Willis 1961; Shennan 1986). The accuracy of this chronology has been confirmed by subsequent studies at Peacock's Farm, Redmere, Feltwell Common, and Coffue Drove (Wood Fen).

References: Shennan 1986
Willis 1961

Q-2528 3955 ±70 BP

Sample: PMD-1, submitted on 14 November 1985 by M Waller

Material: peat (detrital peat with *Phragmites*) (M Waller 1985)

Initial comment: from the top of the basal peat at its contact with marine/brackish clay, at an altitude of -3.06 to -3.075m OD.

Objectives: to date the onset of marine/brackish conditions, and to allow an accumulation rate for the basal peat to be calculated.

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

Final comment: M Waller (1994), this date is internally consistent with the others of the series with no inversions. Buried underneath the silty clay (possibly not the 'fen clay' *sensu* previous workers), this sample suggests that the transgressive contact occurred after 2560–2200 cal BC.

Q-2529 4140 ±70 BP

Sample: PMD-2, submitted on 14 November 1985 by M Waller

Material: peat (humified detrital peat with wood remains and *Phragmites*) (M Waller 1985)

Initial comment: from within the basal peat at an altitude of -3.18 to -3.195m OD.

Objectives: this sample will enable the calculation of sediment accumulation rates at this site.

Calibrated date: 1σ: 2880–2580 cal BC
2σ: 2900–2490 cal BC

Final comment: M Waller (1994), this result is internally consistent with the others in the series. This consistency argues against the later than expected dating of the series

being due to rhizome penetration of the profile. The sediment accumulation rate is shown in Waller (1994, fig 7.8).

References: Waller 1994, fig 7.8

Q-2530 4190 ±70 BP

Sample: PMD-3, submitted on 14 November 1985 by M Waller

Material: peat (humified detrital peat with wood remains and *Phragmites*) (M Waller 1985)

Initial comment: from within the basal peat at an altitude of -3.34 to -3.355m OD.

Objectives: as Q-2529

Calibrated date: 1σ: 2900–2630 cal BC
2σ: 2920–2570 cal BC

Final comment: *see* Q-2529

Q-2531 4300 ±100 BP

Sample: PMD-4, submitted on 14 November 1985 by M Waller

Material: peat (detrital peat with wood and *Phragmites*) (M Waller 1985)

Initial comment: from the base of basal peat, at an altitude of -3.45 to -3.465m OD.

Objectives: to date the onset of peat formation at this site. Dating will also help provide data from which the peat and pollen accumulation rates can be calculated.

Calibrated date: 1σ: 3030–2870 cal BC
2σ: 3330–2620 cal BC

Final comment: *see* Q-2529

Fenland Project: Railway Crossing, Wisbech, Cambridgeshire

Location: TF 45200744
Lat. 52.38.42 N; Long. 00.08.47 E

Project manager: A Alderton and M Waller (University of Cambridge), 1984

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: one of the seven sites along the Wisbech bypass that were dated. It was also one of the five sites that was closely grouped around a major roddon at Elm. Samples were taken from a site 60m west of the railway where the intercalated peat layer, observed consistently in section, was thickest.

Objectives: to date the sedimentary sequences across a substantial part of central Fenland, and to provide a chronology for the environmental evidence recovered from the peat.

Final comment: M Waller and A Alderton (1994), marine/brackish conditions retreated here at the start of the first millennium cal BC (Q-2514, and *see* Q-2521), earlier than at some more seaward sites (*see* for example Q-2510),

and returned at the end of the millennium (Q-2511). The radiocarbon dates indicate the rate of peat accumulation increased dramatically prior to the return of marine conditions (Waller 1994, figs 11.5 and 11.6).

References: Waller 1994, 230–4

Q-2511 2100 ±50 BP

Sample: RWC-1, submitted in August 1995 by A Alderton

Material: peat (clayey humified woody peat) (A Alderton 1984)

Initial comment: from the top of an intercalated peat at its transgressive contact with overlying grey silty clay, at an altitude of +0.64 to +0.62m OD. The contact is diffused indicating continuous sedimentation.

Objectives: to date the onset of brackish/marine conditions.

Calibrated date: 1σ: 200–40 cal BC
2σ: 360 cal BC–cal AD 10

Final comment: A Alderton and M Waller (1994), the diffuse contact and the transitional pollen assemblage for this sample (Waller 1994, fig 11.4) suggests that this date should provide an accurate indication of the timing of the marine inundation at this site.

References: Waller 1994, fig 11.4

Q-2512 2130 ±50 BP

Sample: RWC-2, submitted in August 1985 by A Alderton

Material: peat (very humified amorphous peat with some wood) (A Alderton 1984)

Initial comment: from within an intercalated peat, at an altitude of +0.59 to +0.575m OD.

Objectives: to enable the estimation of the accumulation rate of the intercalated peat bed.

Calibrated date: 1σ: 350–60 cal BC
2σ: 360–40 cal BC

Final comment: A Alderton (1994), this result allowed the calculation of the accumulation rate of the intercalated peat (Waller 1994, fig 11.6).

References: Waller 1994, fig 11.6

Q-2513 2375 ±60 BP

Sample: RWC-3, submitted in August 1985 by A Alderton

Material: peat (humified with some wood) (A Alderton 1984)

Initial comment: from within the intercalated peat, at an altitude of +0.53 to +0.515m OD.

Objectives: as Q-2512

Calibrated date: 1σ: 520–390 cal BC
2σ: 760–370 cal BC

Final comment: see Q-2512

Q-2514 2710 ±60 BP

Sample: RWC-4, submitted in August 1985 by A Alderton

Material: peat (woody) (A Alderton 1984)

Initial comment: from the base of an intercalated peat at its regressive contact with underlying grey silty clay, at an altitude of +0.48 to +0.46m OD. This contact is diffused indicating continuous sedimentation.

Objectives: to date the return to freshwater conditions.

Calibrated date: 1σ: 920–800 cal BC
2σ: 1010–790 cal BC

Final comment: A Alderton and M Waller (1994), the lower contact of the peat was gradual here and the pollen evidence (Waller 1994, fig 11.4), with transitional communities indicated, suggests that sedimentation was continuous. It seems likely that this date accurately reflects the withdrawal of marine/brackish influence at this site.

References: Waller 1994, fig 11.4

Fenland Project: Redmere, Cambridgeshire

Location: TL 65828522
Lat. 52.26.22 N; Long. 00.26.23 E

Project manager: M Waller (University of Cambridge), 1987

Archival body: Cambridgeshire County Council, University of Cambridge

Description: this is the site of a former mere, which may have been formed by the ponding-back of freshwater behind silt levee banks. The lithostratigraphy from a borehole transect is shown in Waller 1994 (fig 7.10). The site lies towards the landward limit of the deposition of marine/brackish clay, and is now deeply ploughed arable farmland.

Objectives: poor preservation has prevented any investigation of the upper peats in the Shippea Hill vicinity, since the advent of radiocarbon dating. To complete the inquiries undertaken from this area, it was therefore decided to sample the intercalated peat where it remains relatively well-preserved beneath the shell marl of Redmere (Jennings 1950). In addition through such investigations it is hoped that the age of the mere can be determined.

Final comment: M Waller and A Alderton (1994), the dates obtained from the contacts of the marine/brackish clay at Redmere (Q-2595 and Q-2596) are in agreement with those from other sites investigated by the Fenland Project from this region. The date from the regressive contact (Q-2595) finally confirms the 1930s archaeologically-based chronology from Shippea Hill. Redmere appears to have formed in the Roman period, probably in response to the marine transgression which formed the 'upper silt'.

References: Jennings 1950
Waller 1994, 124–33

Q-2593 1850 ±50 BP

Sample: FPRED-1, submitted on 26 November 1987 by M Waller

Material: peat (highly humified peat with marl and modern rootlet contamination) (M Waller 1987)

Initial comment: from borehole 24 at an altitude of -0.23 to -0.28m OD. This sample is the upper contact of the peat layer immediately beneath the marl of Redmere.

Objectives: this sample should accurately date mere formation.

Calibrated date: 1σ: cal AD 80–240
2σ: cal AD 50–320

Final comment: M Waller (1994), this date was obtained from beneath the marl in what appears to be an unbroken sequence, and certainly does not suggest that the mere post-dates the nearby roddon of the Little Ouse by more than a few centuries.

Q-2594 3030 ±50 BP

Sample: FPRED-2, submitted on 26 November 1987 by M Waller

Material: peat (highly humified peat with rhizomes, *Phragmites*, and marl contamination) (M Waller 1987)

Initial comment: from borehole 24 at an altitude of -0.705 to -0.735m OD, at the boundary of pollen zones RM-2 and RM-3 (the transition from willow carr to sedge fen).

Objectives: radiocarbon dating would provide a chronology for intercalated peat formation in this part of the Fenland basin.

Calibrated date: 1σ: 1390–1210 cal BC
2σ: 1420–1120 cal BC

Final comment: M Waller (1994), the dated samples from this series have enabled the examination of the sediment accumulation rate at this site (Waller 1994, fig 7.8).

References: Waller 1994, fig 7.8

Q-2595 3840 ±55 BP

Sample: FPRED-3, submitted on 26 November 1987 by M Waller

Material: peat (fen peat with abundant small rhizomes) (M Waller 1987)

Initial comment: from borehole 24 at an altitude of -1.18 to -1.21m OD.

Objectives: this sample is from the base of the upper, intercalated peat where it meets marine/brackish clay, and so will date a return to drier conditions suitable for the formation of peat.

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

Final comment: M Waller (1994), this date from the regressive contact finally confirms the date for this layer, derived from archaeological evidence from Shippea Hill in the 1930s (where an early Bronze Age layer was found close to the base of the upper peat) (Clark 1933; Clark *et al* 1935).

References: Clark *et al* 1935
Clark 1933

Q-2596 4310 ±60 BP

Sample: FPRED-4, submitted on 26 November 1987 by M Waller

Material: peat (with *Phragmites*) (M Waller 1987)

Initial comment: from borehole 24 at an altitude of -2.52 to -2.55m OD.

Objectives: this sample is from the transgressive contact of the base of the marine/brackish clay with the basal peat.

Calibrated date: 1σ: 3010–2880 cal BC
2σ: 3090–2870 cal BC

Final comment: M Waller (1994), the marine/brackish clay is close to its inland limits at Redmere and as might be expected the date for the transgressive contact is later here than at Peacock's Farm (*see* Q-2537).

Fenland Project: Somersham, Cambridgeshire

Location: TL 38168048
Lat. 52.24.16 N; Long. 00.01.52 E

Project manager: M Waller (University of Cambridge), 1987

Archival body: Cambridgeshire County Council, University of Cambridge

Description: a transect of 27 boreholes was sunk in the region of Old Halves/Chatteris Fen where the Flandrian sediments of the region are constricted between the gravels of Somersham and Chatteris. Borehole 61 was chosen for dating as the overlying marl had afforded some protection to the intercalated, upper peat in this location.

Objectives: after investigations at Foulmire Fen had been completed, the age of the marine/brackish clay layers in this region had still not been satisfactorily resolved, due to the inconsistencies in the radiocarbon dates obtained. The intention was to resolve this situation and to clarify the number of times the south-central Fens come directly under marine influence.

Final comment: M Waller (1994), marine conditions appear to have significantly penetrated the Ouse Valley between Chatteris and Somersham only once during the Flandrian, at the time when a marine/brackish clay was deposited. There can be little doubt that, in this region, 'fen clay' deposition began the later third millennium cal BC, with marine conditions reaching their maximum extent inland (and inundating areas, such as Foulmire Fen) several hundred years later.

References: Waller 1994, 180–2

Q-2584 3630 ±80 BP

Sample: SOM-1, submitted on 26 July 1987 by M Waller

Material: peat (fen peat with *Phragmites* and wood) (M Waller 1987)

Initial comment: from the base of the upper peat at its regressive contact with the underlying marine/brackish clay, at an altitude of -0.56 to -0.60m OD.

Objectives: to date the regressive contact in this embayment, and the return to freshwater conditions.

Calibrated date: 1 σ : 2140–1890 cal BC
2 σ : 2210–1760 cal BC

Final comment: M Waller (1994), the date for this sample is older than might be expected for the regressive overlap at Somersham, both from the depth of marine/brackish sediments (*c* 1.5m) and the dates from Foulmire Fen (*see* Q-2501 and Q-2505).

Q-2585 3855 \pm 80 BP

Sample: SOM-2, submitted on 29 July 1987 by M Waller

Material: peat (highly humified) (M Waller 1987)

Initial comment: from the top of basal peat at its transgressive contact with the overlying marine/brackish clay, at an altitude of -2.15 to -2.18m OD.

Objectives: to date the onset of marine/brackish conditions in this embayment.

Calibrated date: 1 σ : 2470–2200 cal BC
2 σ : 2570–2040 cal BC

Final comment: M Waller (1994), the date for this sample puts the end of marine/brackish conditions at Somersham, in close agreement with the similar transgressive contact of the Ouse channel at Haddenham (*see* Q-2813).

Fenland Project: Swineshead A, Lincolnshire

Location: TF 23703935
Lat. 52.56.13 N; Long. 00.09.33 W

Project manager: M Waller (University of Cambridge), 1984

Archival body: Cambridgeshire County Council, University of Cambridge

Description: the building of the A17 bypass provided an opportunity to obtain stratigraphic information from the Swineshead area. Site A was sampled from a ditch section using a monolith tin.

Objectives: to provide dating for a thin intercalated peat at this site, which marks a retreat from marine sedimentation.

Final comment: M Waller (1994), these two determinations for a thin intercalated peat are, internally consistent and compatible with the site B *c* 30m to the south-east. It is unclear, however, whether the freshwater episode recognised here is highly localised or is recognisable over a wider area.

References: Waller 1994, 288–95

Q-2557 1740 \pm 60 BP

Sample: SHA-2, submitted on 25 July 1986 by M Waller

Material: peat (highly humified with *Phragmites*) (M Waller 1984)

Initial comment: from the lower, regressive contact of an intercalated peat bed, at an altitude of +1.765 to +1.745m OD.

Objectives: to date the onset of freshwater conditions at this site.

Calibrated date: 1 σ : cal AD 230–390
2 σ : cal AD 130–430

Final comment: M Waller (1994), the lower contact is sharp which may indicate a discontinuity (*see* also Q-2559).

Laboratory comment: English Heritage (21 November 2007), *see* Q-2559

Q-2558 1590 \pm 60 BP

Sample: SHA-1, submitted on 25 July 1986 by M Waller

Material: peat (highly humified with *Phragmites*) (M Waller 1984)

Initial comment: from the upper, transgressive contact of an intercalated peat bed, at an altitude of +1.80 to +1.78m OD.

Objectives: to date the return to marine/brackish conditions at this site.

Calibrated date: 1 σ : cal AD 400–550
2 σ : cal AD 330–610

Final comment: M Waller (1994), Hallam (1970) envisaged a major transgression (responsible for the ‘post-Roman silts’) occurring between the fifth and seventh centuries AD, as the most seaward finds include fourth- and even early fifth-century material. This is not incompatible with the new radiocarbon evidence.

Laboratory comment: English Heritage (21 November 2007), *see* Q-2556

References: Hallam 1970

Fenland Project: Swineshead B, Lincolnshire

Location: TF 23173930
Lat. 52.56.11 N; Long. 00.09.33 W

Project manager: M Waller (University of Cambridge), 1984

Archival body: Cambridgeshire County Council, University of Cambridge

Description: the building of the A17 bypass provided an opportunity to obtain stratigraphic information from the Swineshead area. Site B lies *c* 30m to the south-east of Site A.

Objectives: to provide dating for a thin intercalated peat at this site, which marks a retreat from marine sedimentation.

Final comment: M Waller (1994), these two determinations for a thin intercalated peat are internally consistent and compatible with site A *c* 30m to the north-west. It is unclear, however, whether the freshwater episode recognised here is highly localised or recognisable over a wider area.

References: Waller 1994, 288–95

Q-2556 1660 ±60 BP

Sample: SHB-1, submitted on 25 July 1986 by M Waller

Material: peat (largely well-humified fen peat with *Phragmites*) (M Waller 1984)

Initial comment: from the upper, transgressive contact of an intercalated peat bed, at an altitude of +1.78 to +1.76m OD.

Objectives: to date the return to marine/brackish conditions at this site.

Calibrated date: 1σ: cal AD 260–430
2σ: cal AD 240–550

Final comment: M Waller (1994), the upper contact at this site was gradual (and *see* Q-2558).

Laboratory comment: English Heritage (21 November 2007), the two determinations from the transgressive contact at Swineshead are statistically consistent (Q-2556 and Q-2558; $T'=0.7$, $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978

Q-2559 1780 ±60 BP

Sample: SHB-2, submitted on 25 July 1986 by M Waller

Material: peat (well-humified fen peat with *Phragmites*) (M Waller 1984)

Initial comment: from the lower, regressive contact of an intercalated peat bed, at an altitude of +1.74 to +1.72m OD.

Objectives: to date the return to freshwater conditions at this location.

Calibrated date: 1σ: cal AD 130–340
2σ: cal AD 80–410

Final comment: M Waller (1994), this date shows that peat began to form during the Roman occupation of the Fenland. Unfortunately, there is little stratigraphic information from this period for comparison. Previously environmental changes during the Roman period in Lincolnshire have been inferred from settlement evidence. Hallam (1970) demonstrated a seaward shift in settlement during the second and third centuries AD.

Laboratory comment: English Heritage (21 November 2007), the two determinations from the regressive contact at Swineshead are statistically consistent (Q-2557 and Q-2559; $T'=0.2$, $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Hallam 1970
Ward and Wilson 1978

Fenland Project: Thorpe Culvert, Lincolnshire

Location: TF 471604
Lat. 53.07.13 N; Long. 00.11.54 E

Project manager: I Shennan (University of Durham), 1983

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: the eight boreholes sunk at Thorpe Culvert provide a 200m long section. The radiocarbon samples were

taken from the intercalated peat bed in borehole H, which was taken from a field to the north-east of the Three Tuns public house between the river Steeping and the railway.

Objectives: to provide a chronology for the sediment sequence in this area.

Final comment: I Shennan (1994), these samples have produced a coherent series of results without anomalies or inversions.

References: Waller 1994, 317

Q-2805 2460 ±80 BP

Sample: TC-1, submitted on 10 December 1987 by I Shennan

Material: peat (humified monocotyledonous peat) (I Shennan 1983)

Initial comment: from the upper, transgressive contact of an intercalated peat, at an altitude of +0.23 to +0.14m OD.

Objectives: to date the return of marine/brackish conditions at this site.

Calibrated date: 1σ: 780–400 cal BC
2σ: 810–390 cal BC

Final comment: I Shennan (1994), this sample dates the onset of the third major marine incursion in this area, which does not appear to have penetrated as far inland as East Fen (*see* Q-2825).

Q-2806 2800 ±60 BP

Sample: TC-3, submitted on 10 December 1987 by I Shennan

Material: peat (humified monocotyledonous peat) (I Shennan 1983)

Initial comment: from within an intercalated peat, at an altitude of +0.06 to -0.06m OD.

Objectives: to provide a check on the dates from the contacts of this peat bed.

Calibrated date: 1σ: 1020–890 cal BC
2σ: 1130–810 cal BC

Final comment: I Shennan (1994), this result lies between the results from the two contact samples of this series.

Q-2807 3425 ±70 BP

Sample: TC-5, submitted on 10 December 1987 by I Shennan

Material: peat (humified monocotyledonous peat) (I Shennan 1983)

Initial comment: from the lower, regressive contact of the intercalated peat bed, at an altitude of -0.14 to -0.22m OD.

Objectives: to date the end of the underlying marine incursion and the return to freshwater conditions.

Calibrated date: 1σ: 1880–1630 cal BC
2σ: 1920–1530 cal BC

Final comment: I Shennan (1994), this is the earliest date for the end of the underlying marine incursion in this area.

Fenland Project: Wallace's Drove, Cambridgeshire

- Location:* TF 32500562
Lat. 52.37.54 N; Long. 00.02.31 W
- Project manager:* M Waller (University of Cambridge), 1988
- Archival body:* Cambridgeshire County Council, University of Cambridge
- Description:* this site is situated on the edge of Thorney Island to the south of Chestnut Farm.
- Objectives:* the major objective of work in this locality was the lithostratigraphic and chronostratigraphic characterisation of the marine/brackish sediments referred to by Hall (1987) as the 'Upper Barroway Drove Beds'.
- References:* Hall 1987
Waller 1994, 202–4

Q-2809 3820 ±110 BP

- Sample:* WDT-1, submitted on 26 February 1988 by M Waller
- Material:* peat (brown humified peat with clay and some *Phragmites* rhizomes) (M Waller 1988)
- Initial comment:* from the top of the basal peat at its transgressive contact with overlying marine/brackish clay, at an altitude of -1.33 to -1.37m OD.
- Objectives:* to date the onset of marine/brackish conditions at this location.
- Calibrated date:* 1σ: 2470–2060 cal BC
2σ: 2580–1940 cal BC
- Final comment:* M Waller (1994), deposition of the sediments which overlie the basal peat along Wallace's Drove appears to have begun during the early Bronze Age. However without biostratigraphic investigations the possibilities that the peat surface has been erosionally truncated, or that unit 5 has been re-deposited above younger sediment, cannot be discounted.

Fenland Project: Welney Washes, Norfolk

- Location:* TL 53649315
Lat. 52.30.51 N; Long. 00.15.52 E
- Project manager:* M Waller (University of Cambridge), 1988
- Archival body:* Cambridgeshire County Council, University of Cambridge
- Description:* Welney Washes lies 30km from the Wash shore of today. The organic deposits are exceptionally well-preserved and provide a rare opportunity to investigate the later environmental history of the Fens.
- Objectives:* to date the beginning of peat formation and the onset marine conditions within this embayment, and to

provide detailed environmental evidence from the later, intercalated, peat deposits.

Final comment: M Waller (1994), apart from Q-2820 (which dates a high percentage of *Cyperaceae* in the pollen record), all these dates are from sedimentary contacts. The recognition in the Welney diagram of the retrogressive series (from woodland, to fen carr, to sedge fen and reedswamp, to marine/brackish conditions), which characterises the basal peat sequences examined by the Project, is interesting. The assemblages at Welney are considerably older than at the other sites investigated, demonstrating the time transgressive nature of these changes in pollen representation. The first apparently marine clastic unit, and the intercalated peat above it, are probably confined to the main channel in the pre-Flandrian surface and have not been recorded from any other site in this region.

Laboratory comment: English Heritage (5 November 2007), four further radiocarbon dates are available from the site of a Roman settlement about a kilometre north (Q-819, 1970 ±100 BP, 210 cal BC–cal AD 250; Q-820, 1940 ±130 BP, 350 cal BC–cal AD 390; Q-823, 1212 ±154 BP, cal AD 540–1160; and Q-829, 2227 ±90 BP, 420–40 cal BC (at 95% confidence, Reimer *et al* 2004; Churchill 1970; Godwin and Switsur 1966).

- References:* Churchill 1970
Godwin and Switsur 1966
Reimer *et al* 2004
Waller 1994, 143–52

Q-2817 755 ±60 BP

- Sample:* WEW-1, submitted on 26 January 1988 by M Waller
- Material:* peat (highly humified with some rootlet penetration and *Phragmites*) (M Waller 1988)
- Initial comment:* from the top of the uppermost intercalated peat at its contact with overlying freshwater alluvium, from an altitude of +1.00 to +0.96m OD.
- Objectives:* to date the end of peat formation at this site.
- Calibrated date:* 1σ: cal AD 1220–1290
2σ: cal AD 1160–1390

Final comment: M Waller (1994), the pollen assemblages from the fourth peat (Waller 1994, figs 7.25–6) are particularly interesting as they cover a time period which, due to peat wastage, is not widely available for study in the Fens. No comparable diagrams have been produced from this region. It is clear that, at least at Welney, eutrophic conditions prevailed well into historic times. The date from the upper contact suggests peat formation probably ceased here before the construction of the Washes in the seventeenth century.

- References:* Waller 1994, figs 7.25–6

Q-2818 1720 ±110 BP

- Sample:* WEW-2, submitted on 26 January 1988 by M Waller
- Material:* peat (highly humified with *Phragmites*) (M Waller 1988)
- Initial comment:* from the base of the uppermost intercalated peat, marking a return to freshwater conditions at an altitude of +0.55 to +0.51m OD.

Objectives: to date the regressive contact marking the end of deposition of marine/brackish clay (the 'Terrington Beds').

Calibrated date: 1 σ : cal AD 170–430
2 σ : cal AD 60–570

Final comment: M Waller (1994), the re-establishment of freshwater conditions may have occurred after a break in deposition. It is instructive to compare this evidence with the stratigraphy of the nearby Roman site, as reported by Churchill (1970). Here the uppermost peat was absent and settlement occurred directly upon silts. Two phases of occupation were recognised, with second-century pottery separated from third- and fourth-century material by a layer of laminated silt. The latter silts were considered to be reworked and to have been deposited during the third century, though Churchill (1970, 138) was unclear whether by a marine or freshwater flooding episode. The regressive contact dated at the new site could be related to the withdrawal of the marine influence, which allowed the second century occupation. Alternatively a break in sedimentation at the new site may correspond to the first phase of occupation. Peat growth could then have been promoted by the subsequent flooding, if the intervening silt was deposited under freshwater conditions. If this layer was of tidal origin, peat formation could even have commenced with the second withdrawal of the marine influence. Clearly any comparison of the two sites is hindered by the lack of precision in the calibrated radiocarbon date. It is also possible that these sequences (particularly that from the site of the Roman settlement adjacent to a roddon) may be reflecting processes of local importance only.

References: Churchill 1970

Q-2819 2255 \pm 60 BP

Sample: WEW-3, submitted on 26 January 1988 by M Waller

Material: peat (with *Phragmites*) (M Waller 1988)

Initial comment: from the top of an intercalated peat at its contact with overlying silty clay (the 'Terrington Beds'), at an altitude of -0.33 to -0.37m OD.

Objectives: to date the transgressive contact of the silty clay layer (the 'Terrington Beds').

Calibrated date: 1 σ : 400–200 cal BC
2 σ : 410–170 cal BC

Final comment: M Waller (1994), this result agrees well with the previous result from the same horizon (*see above*, Q-829).

Q-2820 3075 \pm 50 BP

Sample: WEW-4, submitted on 26 January 1988 by M Waller

Material: peat (humified with *Phragmites*) (M Waller 1988)

Initial comment: from within an intercalated peat, at an altitude of -0.85 to -0.89m OD. Not from a sedimentary contact as are all the other samples in this series.

Objectives: to date the very high frequency of the *Cyperaceae* in pollen zone WW-11 (Waller 1994, fig 7.25). This zone also sees the first clear evidence of anthropogenic activity on the surrounding uplands.

Calibrated date: 1 σ : 1420–1270 cal BC
2 σ : 1450–1210 cal BC

Final comment: M Waller (1994), this sample dates the replacement of fen carr by sedge fen locally. The virtual disappearance of *Tilia* at this time (and *Ulmus* slightly earlier) may suggest increased forest clearance (Waller 1994, 97).

References: Waller 1994, fig 7.25–6, and 97

Q-2821 3810 \pm 50 BP

Sample: WEW-5, submitted on 26 January 1988 by M Waller

Material: peat (with wood and *Phragmites*) (M Waller 1988)

Initial comment: from the base of an intercalated peat, at its contact with underlying marine/brackish clay, from an altitude of -1.38 to -1.41m OD.

Objectives: to date the regressive contact and the return to freshwater conditions following the end of the deposition of the marine/brackish clay.

Calibrated date: 1 σ : 2340–2140 cal BC
2 σ : 2470–2050 cal BC

Final comment: M Waller (1994), this date is very similar to those for the end of marine/brackish conditions from fen-edge locations in this area (*see* Q-2595, Redmere, Q-2551, Feltwell Common, and Q-2580, Coffue Drove). Freshwater conditions evidently become re-established over a large area rapidly.

Q-2822 5710 \pm 100 BP

Sample: WEW-6, submitted on 26 January 1988 by M Waller

Material: peat (highly humified fen peat with *Phragmites*) (M Waller 1988)

Initial comment: from the top of an intercalated peat at its contact with marine/brackish clay, at an altitude of -6.39 to -6.49m OD.

Objectives: to date the transgressive contact of marine/brackish clay in this sequence. This is particularly important at this site because the clay deposit is unusually thick here (4.02m).

Calibrated date: 1 σ : 4690–4450 cal BC
2 σ : 4790–4340 cal BC

Final comment: M Waller (1994), as would be expected given the altitude of the sample, the date acquired from the transgressive contact is much earlier than comparable assays from sites near the inland limits of deposition in this area (*see* Q-2537, Peacock's Farm, Q-2596, Redmere, Q-2548, Feltwell Common, Q-2528, Pymore, and Q-2581, Coffue Drove).

Q-2823 5850 \pm 90 BP

Sample: WEW-7, submitted on 26 January 1988 by M Waller

Material: peat (highly humified fen peat with *Phragmites*) (M Waller 1988)

Initial comment: from the regressive contact of an intercalated peat and a marine/brackish clay layer, at an altitude of -6.72 to -6.82m OD.

Objectives: to date the return of freshwater conditions following the first marine/brackish episode recorded on the site.

Calibrated date: 1 σ : 4830–4600 cal BC
2 σ : 4950–4490 cal BC

Final comment: M Waller (1994), this result dates the upper limit of the first apparently marine clastic unit at Welney Washes. This, and the intercalated peat above, are probably both confined to the main channel in the pre-Flandrian surface and have not been recorded from any other sites in this region.

Q-2824 6170 \pm 110 BP

Sample: WEW-8, submitted on 26 January 1988 by M Waller

Material: peat (highly humified fen peat with *Phragmites*) (M Waller 1988)

Initial comment: from the transgressive contact of the basal peat at its contact with a marine/brackish clay layer above, at an altitude of -6.72 to -6.82m OD.

Objectives: to date the first onset of marine/brackish conditions at the site.

Calibrated date: 1 σ : 5300–4960 cal BC
2 σ : 5370–4800 cal BC

Final comment: M Waller (1994), this sample dates the lower limit of the first apparently marine clastic unit. This, and the intercalated peat above, are probably confined to the main channel in the pre-Flandrian surface and have not been recorded from any other sites in this region.

Fenland Project: Whittlesey Mere, Cambridgeshire

Location: TL 23318975
Lat. 52.29.29 N; Long. 00.11.01 W

Project manager: M Waller (University of Cambridge), 1988

Archival body: Cambridgeshire County Council, University of Cambridge

Description: previous work at Whittlesey Mere had been undertaken by Godwin and Vishnu-Mittre (1975). Sediments from borehole 24 were selected for analysis, as this was where the upper peat was thickest and close to the inland limits of the underlying marine/brackish clay.

Objectives: the best opportunity of finding well-preserved upper peat deposits in the south-western fens appeared to be from beneath mere sediments. The intention was not only to sample the upper peat contact with the underlying marine/brackish clay, but also to acquire material from the upper peat contact with the overlying marl.

Final comment: M Waller (1994), brackish conditions appear to have both entered the Whittlesey basin later and persisted longer than suggested by Godwin and Vishnu-Mittre (1975), spanning the early Bronze Age. The contacts of the marine/brackish clay here are some two metres lower than at the other dated sites in this region. As there is a considerable

quantity of organic material between the pre-Flandrian surface and the clay, this can be attributed with some confidence to post-depositional compaction. Whittlesey Mere itself probably did not form until the Roman period.

References: Godwin and Vishnu-Mittre 1975

Q-2810 1995 \pm 70 BP

Sample: WHM-1, submitted on 26 February 1988 by M Waller

Material: peat (highly humified fen peat with *Phragmites*) (M Waller 1988)

Initial comment: from the top of the upper peat immediately beneath the marl of Whittlesey Mere, at an altitude of -2.48 to -2.51m OD.

Objectives: to date the formation of Whittlesey Mere.

Calibrated date: 1 σ : 60 cal BC–cal AD 80
2 σ : 180 cal BC–cal AD 140

Final comment: M Waller (1994), this dates the upper peat immediately beneath the marl, and suggests that the mere formed during the Romano-British period.

Q-2811 3250 \pm 70 BP

Sample: WHM-2, submitted on 26 February 1988 by M Waller

Material: peat (highly humified fen peat with abundant *Phragmites*) (M Waller 1988)

Initial comment: from the base of the upper peat at its regressive contact with the brackish/marine clay beneath, at an altitude of -2.93 to -2.96m OD.

Objectives: to date the return to freshwater conditions at this location.

Calibrated date: 1 σ : 1620–1440 cal BC
2 σ : 1690–1400 cal BC

Final comment: see Q-2812

Q-2812 3720 \pm 75 BP

Sample: WHM-3, submitted on 26 February 1988 by M Waller

Material: peat (highly humified fen peat with abundant *Phragmites* and some *Cladium*) (M Waller 1988)

Initial comment: from the top of the basal peat, at its transgressive contact with the marine/brackish clay, at an altitude of -3.13 to -3.16m OD.

Objectives: to date the onset of marine/brackish conditions at this site.

Calibrated date: 1 σ : 2270–2020 cal BC
2 σ : 2350–1910 cal BC

Final comment: M Waller (1994), with Q-2811, this result suggests that the marine/brackish episode lasted *c* 500 years. This seems lengthy given that only 0.17m of clay was recorded. Although the basal peat/clay boundary is sharp, the presence of *Phragmites* suggests that the peat is transitional or has probably not been erosionally truncated.

Fenland Project: Wicken Fen, Cambridgeshire

Location: TL 553705
Lat. 52.18.37 N; Long. 00.16.42 E

Project manager: S Peglar (University of Cambridge), 1981

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: Wicken Fen is one of the last vestiges of semi-natural fen vegetation in the Fenland basin. On three sides it is isolated by clay banks, while to the east occurs a ridge of higher (pre-Flandrian) ground on which the village of Wicken stands. The Fen is maintained by the National Trust through an artificially raised water table.

Objectives: the unique management history of Wicken Fen means that it is one of the few sites in the south-eastern Fens where thick and relatively undisturbed organic deposits can still be found close to the Fen edge. It may therefore be possible here to reconstruct the vegetational history of the Fen through to the present.

Final comment: S Peglar (1994), the first phase of peat development at Wicken appears to coincide with the deposition downstream of marine/brackish clay, although the peat/pre-Flandrian boundary here is over a metre higher than equivalent elsewhere. This suggests caution is required when trying to relate environmental changes in the peri-marine zone to events downstream.

Laboratory comment: English Heritage (2003), this site was previously investigated by Godwin (1940).

References: Godwin 1940
Waller 1994, 114–8

Q-2597 3385 ±75 BP

Sample: WF-2, submitted on 29 September 1987 by S Peglar

Material: peat (highly humified sedge peat) (S Peglar 1988)

Initial comment: from a layer of thick relatively undisturbed organic sedge peat at an altitude of -1.38 to -1.48m OD, at the boundary of pollen zones WF-3/WF-4.

Objectives: to date the boundary between pollen zones WF-3/WF-4 (Waller 1994, fig 7.2).

Calibrated date: 1 σ : 1760–1610 cal BC
2 σ : 1890–1500 cal BC

Final comment: S Peglar (1994), this transition shows evidence for forest clearance, with marked decreases in *Quercus*, *Tilia*, *Ulmus*, *Fraxinus*, and *Corylus*-type percentages, rises in *Plantago lanceolata* and *Pteridium*, and the presence of charcoal.

References: Waller 1994, fig 7.2

Q-2598 4450 ±100 BP

Sample: WF-1, submitted on 29 September 1987 by S Peglar

Material: peat (detrital mud) (S Peglar 1988)

Initial comment: from the base of the basal peat, at an altitude of +0.22 to +0.12m OD.

Objectives: to date the onset of peat growth at Wicken Fen.

Calibrated date: 1 σ : 3350–2920 cal BC
2 σ : 3500–2890 cal BC

Final comment: S Peglar (1994), this date for the onset of peat formation at Wicken Fen is in close agreement with the two results obtained by Godwin and Willis (1961) from nearby Adventurers' Fen (3500–2620 cal BC, Q-129, 4380 ±140 BP; 3640–3010 cal BC, Q-130, 4605 ±110 BP; at 95% confidence, Reimer *et al* 2004). This period may have seen the beginning of extensive peat formation in this basin/channel.

Laboratory comment: English Heritage (1 November 2007), the three measurements from the basal peat in this area (Q-129, Q-130, and Q-2597) are statistically consistent ($T'=1.9$; $T'(5\%)=6.0$; $v=2$; Ward and Wilson 1978).

References: Godwin and Willis 1961
Reimer *et al* 2004
Ward and Wilson 1978

Fenland Project: Wiggenhall St Germans Site A, Norfolk

Location: TF 58201315
Lat. 52.41.35 N; Long. 00.20.28 E

Project manager: M Waller (University of Cambridge), 1987

Archival body: Cambridgeshire County Council,
University of Cambridge

Description: Site A was situated closed to the Wiggenhall St Germans; it was sampled by piston corer to study the consistent intercalated peat.

Objectives: to provide a chronology for the sediment sequence and environmental evidence from this site.

Final comment: M Waller (1994), the lower half of the new pollen diagram from Wiggenhall St Germans is similar to that produced by Godwin and Godwin (1933) from bed E. The dates for the intercalated peat bed here are very similar to those from Saddle Bow (2860–2030 cal BC, Q-489, 3905 ±120 BP; 155 cal BC–cal AD 410, Q-549, 1875 ±110 BP (at 95% confidence, Reimer *et al* 2004); Godwin and Willis 1961) and confirm the lithostratigraphic evidence for the continuity of this deposit.

References: Godwin and Godwin 1933
Godwin and Willis 1961
Reimer *et al* 2004
Waller 1994, 259–63

Q-2587 1820 ±50 BP

Sample: WH-3, submitted on 19 October 1987 by M Waller

Material: peat (highly humified) (M Waller 1987)

Initial comment: from the upper, transgressive contact of an intercalated peat bed, at an altitude of -0.73 to -0.78m OD. The upper contact was very sharp.

Objectives: this sample will date the return to marine/brackish conditions at this site.

Calibrated date: 1σ: cal AD 120–250
2σ: cal AD 70–340

Final comment: M Waller (1994), this result is very similar to that for a similar contact at Saddle Bow (155 cal BC–cal AD 410 at 95% confidence (Reimer *et al* 2004), Q-549, 1875 ±110 BP), suggesting a return to marine conditions during the Roman period.

References: Reimer *et al* 2004

Q-2588 2950 ±50 BP

Sample: WH-4, submitted on 19 October 1987 by M Waller

Material: peat (humified with *Phragmites*) (M Waller 1987)

Initial comment: from within an intercalated peat bed, at an altitude of -0.91 to -0.96m OD. This sample dates the WGA-3/WGA-4 boundary in the pollen diagram from this site (Waller 1994, fig 12.7).

Objectives: this sample will date the transition from fen carr to more acidic conditions and allow the sediment accumulation rate to be calculated.

Calibrated date: 1σ: 1270–1050 cal BC
2σ: 1380–1000 cal BC

Final comment: M Waller (1994), the pollen diagram for this site is shown in Waller (1994, fig 12.7) and the sediment accumulation rate in Waller (1994, fig 12.9).

References: Waller 1994, figs 12.7 and 12.9

Q-2589 3820 ±60 BP

Sample: WH-5, submitted on 19 October 1987 by M Waller

Material: peat (humified with *Phragmites*) (M Waller 1987)

Initial comment: from the lower, regressive contact of an intercalated peat bed with underlying clay, at an altitude of -1.08 to -1.13m OD. This contact is very gradual.

Objectives: to provide a date for the end of the marine incursion and the return of freshwater conditions at this site.

Calibrated date: 1σ: 2400–2140 cal BC
2σ: 2470–2040 cal BC

Final comment: M Waller (1994), this result is very similar to that for a similar contact from Saddle Bow (2860–2030 cal BC at 95% confidence (Reimer *et al* 2004), Q-489, 3905 ±120 BP), suggesting widespread peat growth in the late Neolithic/early Bronze Age.

References: Reimer *et al* 2004

Fenland Project: Wiggshall St Germans Site B, Norfolk

Location: TF 58101298
Lat. 52.41.28 N; Long. 00.20.22 E

Project manager: M Waller (University of Cambridge), 1987

Archival body: Cambridgeshire County Council, University of Cambridge

Description: the rebuilding of the St Peter's Drove bridge provided an opportunity to sample what appeared to be the upper, more inconsistent, peat bed found along the Main Drain.

Objectives: to provide a date for the initiation of the growth of the uppermost intercalated peat bed at this site.

Final comment: M Waller (1994), the result suggests that this peat deposit is derived from the underlying main bed. The pollen WGB-1 assemblage (Waller 1994, fig 12.10) is comparable to the WGA-5 zone, found in the latter deposit immediately preceding the marine transgressive overlap (Waller 1994, fig 12.7). Although possibly a product of building the drain, disturbance could also have occurred when the bridge was originally constructed. The uppermost peat found along the Main Drain may not therefore be secondary at all locations and further investigation is necessary to clarify its age and origin.

References: Waller 1994, 263–4

Q-2586 2120 ±60 BP

Sample: WH-2, submitted on 19 October 1987 by M Waller

Material: peat (highly humified) (M Waller 1987)

Initial comment: from the lower, regressive contact of an intercalated bed, at an altitude of +1.25 to +1.23m OD. Due to possible disturbance, this was the only sample sent for dating from this site. The contact was sharp.

Objectives: to date the return to freshwater conditions at this location.

Calibrated date: 1σ: 350–50 cal BC
2σ: 370 cal BC–cal AD 10

Final comment: see series comment

Fenland Project: Willingham Mere, Cambridgeshire

Location: TL 40257330
Lat. 52.20.22 N; Long. 00.03.32 E

Project manager: M Waller (University of Cambridge), 1987

Archival body: Cambridgeshire County Council, University of Cambridge

Description: a number of small lakes are known to have existed in historic times close to where the Great Ouse enters the Fens. Willingham Mere is situated immediately south of the Old West River and appears to have been the largest. The mere sediments extend to within a few hundred metres of the recently excavated archaeological sites on the Upper Delphs terrace (Evans and Hodder 2006a and b).

Objectives: the investigations at Willingham Mere had two major objectives: the first was to determine the age of the mere and establish whether it existed at the time of the Iron Age occupation of the Upper Delphs. If so then the mere may have had an influence on the Iron Age boundary system and could be expected to be an important source of Fenland resources, which these communities were exploiting (Evans and Serjeantson 1988). The second objective was to establish

whether the mere sediments were suitable for palynological investigations and, if possible, to use this technique to reconstruct both the local environment and the land use of adjacent higher and drier areas. Obviously radiocarbon dates would be of great assistance to both these objectives, establishing an absolute chronology.

Final comment: M Waller (1987), these results, although of great value, unfortunately leave open several interpretations of these deposits, as only the lower contact of each peat layer could be dated. The pre-Flandrian surface, as revealed by the lithostratigraphic survey, suggests that the mere sediments formed over a small northward draining valley. The initial phase of peat formation is therefore likely to have occurred in response to regional water levels. Once under their influence, the position of this valley would make it particularly susceptible to being dammed by alluvial sediments when the Ouse flooded. The lithostratigraphic and pollen evidence suggests two open-water phases separated by a drier period. From the radiocarbon evidence it seems likely that the mere did not exist during the Iron Age occupation of the Upper Delphs terrace, but that Fen conditions were then gradually encroaching upon the flanks of the Ouse valley.

References: Evans and Hodder 2006a
Evans and Hodder 2006b
Evans and Serjeantson 1988
Waller 1994, 158–64

Q-2582 1910 ±60 BP

Sample: WILM-1, submitted on 8 June 1987 by M Waller

Material: peat (peaty marl) (M Waller 1987)

Initial comment: from organic deposits immediately beneath the marl of Willingham Mere, at an altitude of +1.24 to +1.14m OD.

Objectives: to provide a chronology from the pollen diagram which is adjacent to the important sites at Upper Delphs, and which may be contemporary with this occupation (see Waller 1994, fig 8.3).

Calibrated date: 1σ: cal AD 20–140
2σ: 50 cal BC–cal AD 240

Final comment: M Waller (1994), this result provides a date for a drier phase when the open water area of the mere contracted considerably. This can be related to the mid second-century AD, Roman occupation of the Upper Delphs terrace.

References: Waller 1994, fig 8.3

Q-2583 2595 ±50 BP

Sample: WILM-2, submitted on 8 June 1987 by M Waller

Material: peat (highly humified) (M Waller 1987)

Initial comment: from the base of the basal peat, at an altitude of +0.62 to +0.51m OD.

Objectives: to provide a chronology from the pollen diagram which is adjacent to the important sites at Upper Delphs (see Waller 1994, fig 8.3). This sample will also provide a date for the first phase of mere formation at this site.

Calibrated date: 1σ: 810–770 cal BC
2σ: 840–590 cal BC

Final comment: M Waller (1994), this result does not indicate the length of time over which the basal peat formed, but provides a *terminus post quem* for the deposition of the marl layer above it. The areas of open water, which are indicated during deposition of the organic marl, may have formed as a result of the flooding episodes responsible for the abandonment of the nearby Upper Delphs Iron Age sites in the first century BC.

References: Waller 1994, fig 8.3

Ferring, Littlehampton, West Sussex

Location: TQ 089024
Lat. 50.48.37 N; Long. 00.27.15 W

Project manager: P Drewett (Institute of Archaeology, London), 1984

Archival body: Worthing Museum

Description: Ferring Rife runs due south from the foot of Highdown Hill, cutting through an area of brickearth. Two trenches were excavated on either side of the finds spot of a late Bronze Age hoard (Aldsworth 1983), as this appeared to have been buried in alluvial clay.

Objectives: to date the alluviation on the site.

Final comment: P Drewett (1985), these results suggest that the alluvium on the site is best interpreted as gradually accumulating over several hundred years during the first millennium BC.

References: Aldsworth 1983
Drewett 1989
Walker *et al* 1990, 181

HAR-7033 2800 ±70 BP

$\delta^{13}C$: -26.6‰

Sample: FRA16, submitted in 1985 by C Cartwright

Material: charcoal (remaining subsample very small and comminuted): unidentified (1.23g); *Quercus* sp. (0.04g, 100%) (R Gale 1999)

Initial comment: from trench A, context 16; a dark brown clay/silt containing organic material and burnt flint.

Objectives: trenches A and B are located adjacent to a marine inlet, which later became a freshwater stream, Ferring Rife. Apart from the burnt flint and a small assemblage of knapped flint, from which no close dating can be achieved, the bulk of the deposit was organic. A late Bronze Age hoard of metalwork was discovered in 1983 near the site of the 1984 excavated trenches. Radiocarbon dating is the only means of pin-pointing these activity areas chronologically.

Calibrated date: 1σ: 1030–840 cal BC
2σ: 1190–810 cal BC

Final comment: P Drewett (1985), this sample is later than HAR-7034, from a compact alluvial clay containing some burnt flint and charcoal. It suggests that alluvium continued to be deposited in the early first millennium BC.

HAR-7034 3040 ±70 BP $\delta^{13}\text{C}$: -24.8‰*Sample*: FRA43, submitted in 1985 by C Cartwright*Material*: charcoal (remaining subsample identified): unidentified (14.65g); *Quercus* sp., sapwood (0.96g, 24.4%); *Quercus* sp., heartwood (2.98g, 75.6%) (R Gale 1999)*Initial comment*: from trench A, context 43; a layer of charcoal and burnt flint (*see* also HAR-7033).*Objectives*: as HAR-7033*Calibrated date*: 1 σ : 1410–1210 cal BC
2 σ : 1450–1050 cal BC*Final comment*: P Drewett (1985), this sample dates the first main phase of alluvial deposition on the site. It came from a layer of alluvial gravel containing burnt flint and charcoal (alder, hazel, hawthorn, beech, buckthorn, ash, *Prunus* sp., oak, willow/poplar, and elm). It is likely that this layer represents primary or secondary clearance of the area, resulting in the onset of gradual, but continuous erosion.**HAR-7035** 2360 ±70 BP $\delta^{13}\text{C}$: -26.0‰*Sample*: FRB42, submitted in 1985 by C Cartwright*Material*: charcoal (remaining subsample identified): unidentified (12.31g); Pomoideae (0.04g, 1.6%); *Prunus spinosa* (0.98g, 38.4%); *Quercus* sp., narrow roundwood (1.53g, 60%) (R Gale 1999)*Initial comment*: from trench B, context 42; a dark brown humic layer with high organic content, including charcoal (*see* also HAR-7033).*Objectives*: as HAR-7033*Calibrated date*: 1 σ : 520–380 cal BC
2 σ : 760–230 cal BC*Final comment*: P Drewett (1985), this result demonstrates that alluvium continued to be deposited into the pre-Roman Iron Age.**Fiskerton, Lincolnshire***Location*: TF 055716
Lat. 53.13.50 N; Long. 00.25.10 W*Project manager*: N Field (North Lincolnshire Archaeological Unit), 1980–1*Archival body*: Lindsey Archaeological Services*Description*: an Iron Age timber causeway built into the River Witham on its north bank.*Objectives*: samples HAR-4471 and HAR-4472 were submitted by N Field to establish a general date for the causeway. Samples HAR-6728 to HAR-6730 were submitted by J Hillam to aid the absolute dating of the posts by dendrochronology.*Final comment*: J Hillam (1995), the chronology of Fiskerton Iron Age causeway has now been determined by dendrochronology (Hillam 1985).*Final comment*: M Parker Pearson (24 March 2000), these were samples of vertical oak posts 553 (HAR-4471) and 57 (HAR-4472) within an Iron Age timber alignment on the north side of the River Witham. This timber causeway was used for votive deposition of La Tène metalwork and other artefacts and was reused for deposition during the Roman period. The causeway is now dated absolutely by dendrochronology, and was first constructed with timber felled in the winter of 457/456 BC and again on at least nine other occasions before 282 BC.*References*: Field 1986
Field and Parker Pearson 2004
Hillam 1985
Hillam 1992**HAR-4471** 2280 ±70 BP $\delta^{13}\text{C}$: -27.0‰*Sample*: F180A, submitted in February 1981 by N Field*Material*: wood (desiccated waterlogged; part of a section through wide roundwood or pole, remaining subsample identified): *Quercus* sp., heartwood (sapwood not present) (58.15g, 100%) (R Gale 1999)*Initial comment*: from a post forming part of a double row of posts running into the River Witham, possibly the remains of a bridge or jetty. HAR-4472 was taken from a similar post.*Objectives*: there was no positive dating of the site, but Iron Age finds were made nearby. Radiocarbon dates may help to clarify the general date of the structure after which an excavation programme can be devised.*Calibrated date*: 1 σ : 410–210 cal BC
2 σ : 510–170 cal BC*Final comment*: M Parker Pearson (11 June 2000), the post (no.553) dated by this sample is not dendrochronologically dated but most probably was felled between 457/456 BC and 282 BC. This accords with its 2 sigma calibrated date of 480–170 cal BC (Reimer *et al* 2004).*References*: Reimer *et al* 2004**HAR-4472** 2460 ±70 BP $\delta^{13}\text{C}$: -27.4‰*Sample*: F180B, submitted in February 1981 by N Field*Material*: wood (desiccated waterlogged; part of a section through wide roundwood or pole, remaining subsample identified): *Quercus* sp., heartwood with sapwood, very degraded and only partially present (117.23g, 100%) (R Gale 1999)*Initial comment*: as HAR-4471*Objectives*: as HAR-4471*Calibrated date*: 1 σ : 770–400 cal BC
2 σ : 800–390 cal BC*Final comment*: M Parker Pearson (11 June 2000), the post (no.57) dated by this sample is not dendrochronologically dated but most probably was felled between 457/456 BC and 282 BC. This accords with its 2 sigma calibrated date of 800–390 cal BC (just!) (Reimer *et al* 2004).*References*: Reimer *et al* 2004

HAR-6728 2450 ±70 BP

$\delta^{13}\text{C}$: -23.9‰

Sample: FISK116, submitted in November 1984 by J Hillam

Material: wood (waterlogged): *Quercus* sp. (J Hillam 1984)

Initial comment: from the causeway structure. This sample has a 42-year stem covering rings 69–100 of the master sequence. The outer ring represents the year of felling.

Objectives: to aid the absolute dating of the posts dendrochronologically.

Calibrated date: 1 σ : 770–400 cal BC
2 σ : 800–390 cal BC

Final comment: J Hillam (22 June 1995), tree-ring analysis of 170 posts produced a 167-year chronology and a very detailed relative chronology for the construction and repairs to the causeway. HAR-6728 represents years 69–100 of the chronology, now dated by dendrochronology to 505–339 BC.

Final comment: A Bayliss (26 October 2007), the dated rings were formed in 437–406 BC. The calibrated radiocarbon date is in good agreement with this tree-ring date.

References: Walker *et al* 1990, 175

HAR-6729 2630 ±70 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: FISK149, submitted in November 1984 by J Hillam

Material: wood (waterlogged): *Quercus* sp. (J Hillam 1984)

Initial comment: from the causeway structure. This sample has a 29-year stem covering rings 72–100 of the master sequence.

Objectives: as HAR-6728

Calibrated date: 1 σ : 840–780 cal BC
2 σ : 920–560 cal BC

Final comment: J Hillam (1995), HAR-6729 represents years 72–100 from the 167-year master chronology, now dated by dendrochronology to 505–339 BC.

Final comment: A Bayliss (26 October 2007), the dated rings were formed in 434–406 BC. The calibrated radiocarbon date is anomalously early.

References: Walker *et al* 1990, 175

HAR-6730 2480 ±70 BP

$\delta^{13}\text{C}$: -24.9‰

Sample: FISK253, submitted in November 1984 by J Hillam

Material: wood (waterlogged): *Quercus* sp. (J Hillam 1984)

Initial comment: from the causeway structure. This sample has a 46-year stem covering rings 5–50 of the master sequence.

Objectives: as HAR-6728

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

Final comment: J Hillam (195), HAR-6730 represents years 5–50 from the 167-year master chronology, now dated by dendrochronology to 505–339 BC.

Final comment: A Bayliss (26 October 2007), the dated rings were formed in 501–456 BC. The calibrated radiocarbon date is in good agreement with this tree-ring date.

References: Walker *et al* 1990, 175

Folkton Wolds: Sharpe Howes 2, Yorkshire (East Riding)

Location: TA 494780
Lat. 54.10.33 N; Long. 00.17.21 E

Project manager: A E Finney (East Riding Archaeology and Research Centre), 1967 and 1970

Archival body: Hull and East Riding Museum

Description: Sharpe Howe 2 is one of a group of barrows excavated in the 1880s by Canon Greenwell.

Objectives: these dates provide an opportunity to develop a chronological framework for a barrow group which can be integrated with other similar sites situated on the Yorkshire Wolds.

Final comment., the samples taken from Sharpe Howes 2 and 4 round barrows will help in determining if this small group of barrows (four in total) are broadly contemporary.

References: Brewster and Finney 1995
Walker *et al* 1991a, 97-8

HAR-8518 3320 ±70 BP

$\delta^{13}\text{C}$: -24.6‰

Sample: SHB2WQ, by A E Finney

Material: antler: *Cervus elaphus*

Initial comment: from primary silting of east quarry.

Objectives: the 1888 and 1967 excavations did not locate any pottery to date the mound. A radiocarbon date of the antler pick would date the quarry and therefore the construction of the second stage mound.

Calibrated date: 1 σ : 1690–1510 cal BC
2 σ : 1760–1440 cal BC

Final comment: A Finney (2 February 2007), Sharpe Howes 2 was significantly later in date than Sharpe Howes 4 showing that the site for the barrow group had a long period of use.

HAR-8519 3800 ±70 BP

$\delta^{13}\text{C}$: -22.5‰

Sample: SHB4G1, submitted on 13 October 1986 by A E Finney

Material: human bone (right tibia and femur)

Initial comment: from burial found in central grave. There were no associated finds. The grave was badly damaged through ploughing and the grave had been disturbed in antiquity.

Objectives: to date the central barrow.

Calibrated date: 1 σ : 2350–2130 cal BC
2 σ : 2470–2030 cal BC

Final comment: A Finney (2 February 2007), Sharpe Howes 4 was significantly earlier in date than Sharpe Howes 2 showing that the site for the barrow group had a long period of use.

Foxley: Cowage Farm, Wiltshire

Location: ST 906862
Lat. 51.34.27 N; Long. 02.08.08 W

Project manager: J Hinchcliffe (Carlisle Archaeological Service), 1983

Archival body: Wiltshire Heritage Museum

Description: an early medieval settlement. Aerial photography indicated the presence of a number of substantial timber buildings. On excavation these buildings possessed structural characteristics comparable to those found on other excavated high-status sites of the sixth to seventh centuries AD. This site is now designated as a monument of national importance (Wilts 917).

Objectives: to provide a chronology for the site.

References: Hinchcliffe 1986

HAR-6216 1430 ±80 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: 245-208, submitted in March 1984 by N Balaam

Material: charcoal: *Quercus* sp.

Initial comment: from the fill of a wall trench; structure C, context 208.

Objectives: to date the feature.

Calibrated date: 1 σ : cal AD 560-670
2 σ : cal AD 430-770

Final comment: J Hinchcliffe (10 June 2005), the date indicated is reconcilable with the interpretation of the site, primarily on the grounds of structure type and site layout, as a major settlement of the mid-Saxon period.

HAR-6217 2050 ±90 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: 245-127, submitted in March 1984 by N Balaam

Material: charcoal: *Quercus* sp.

Initial comment: from a post pipe of a possible middle Saxon hall.

Objectives: to date the feature.

Calibrated date: 1 σ : 190 cal BC-cal AD 60
2 σ : 360 cal BC-cal AD 130

Final comment: see HAR-6216

HAR-8082 1220 ±70 BP

$\delta^{13}\text{C}$: -25.4‰

Sample: 245-172, submitted in March 1984 by N Balaam

Material: charcoal: *Quercus* sp.

Initial comment: from a posthole thought to be part of a ?middle Saxon hall.

Objectives: to date the feature.

Calibrated date: 1 σ : cal AD 680-900
2 σ : cal AD 650-990

Final comment: see HAR-6216

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 189-90

Glastonbury: Fairfield, Somerset

Location: ST 49803980
Lat. 51.09.17 N; Long. 02.43.04 W

Project manager: C Hollinrake (Glastonbury Antiquarian Society), 1987

Archival body: Somerset County Council

Description: a rescue excavation in advance of development. The site consisted of a number of earthwork features, the most notable being a large curving bank and ditch.

Objectives: to elucidate the function and date of the large curving bank and ditch.

References: Hardiman *et al* 1992, 68
Hollinrake and Hollinrake 1991
Hollinrake and Hollinrake 1992

HAR-9207 1120 ±80 BP

$\delta^{13}\text{C}$: -30.8‰

Sample: GCF87/09, submitted on 10 March 1988 by C and N Hollinrake

Material: wood (waterlogged): unidentified

Initial comment: from sharpened wooden revetment stake 09, one of a series reinforcing clay bank 027 in trench IV.

Objectives: there was a good series of pottery from this ditch, which is probably a canal, and other waterlogged timber structures are in close association with medieval pottery. This sample is closely related to the canal/ditch construction and may give an indication of the length of time the ditch was in use.

Calibrated date: 1 σ : cal AD 780-1020
2 σ : cal AD 680-1040

Final comment: C and N Hollinrake (1992), this suggests a pre-Norman date for at least one element of the canal. Such an interpretation is reinforced by the twelfth- and thirteenth-century pot sherds found in the upper silts of the trench. A possible construction date is in the mid-tenth century during the abbacy of Dunstan.

HAR-9208 1340 ±100 BP

$\delta^{13}\text{C}$: -32.8‰

Sample: GFF87/12, submitted on 10 March 1988 by C and N Hollinrake

Material: wood (waterlogged): unidentified

Initial comment: from sharpened stake 12 from the primary silts in ditch D, trench III. The stake comes from the fourth of four parallel ditches, the first of which revealed a Romano-British pot (trench BA).

Objectives: these four ditches are the first possible Romano-British features to be identified in this parish. The Romano-British pots from trench BA are very small and abraded. However, there were no finds from trench III except this stake. A radiocarbon date would provide firmer dating for the ditch complex as a whole. The sample is also related to two biological samples.

Calibrated date: 1 σ : cal AD 610–780
2 σ : cal AD 540–900

Final comment: C and N Hollinrake (1992), the radiocarbon determinations for ditch D places the likely date of this feature in the early medieval period. Late Roman pottery was found adjacent to ditch D, however these ditches presumably delineate one or more boundaries, or may have been dug for local drainage.

Glastonbury: Magdalene Street, Somerset

Location: ST 49883879
Lat. 51.08.43 N; Long. 02.42.59 W

Project manager: V Straker (University of Bristol), 1985

Archival body: Somerset County Museum

Description: a watching brief during redevelopment of the White's Garage site - now renamed Heritage Court - on Magdalene Street, revealed a massive ditch partly under the eastern extremity of the site and partly under Magdalene Street. The feature has been interpreted as the western side of the monastic enclosure ditch.

Objectives: to date the ditch.

References: Hollinrake and Hollinrake 1991
Hollinrake and Hollinrake 1992
Walker *et al* 1990, 183

HAR-7044 950 ±70 BP

$\delta^{13}\text{C}$: -28.9‰

Sample: GLMS1, submitted on 12 March 1985 by V Straker

Material: wood (probably *Thelycrania sanguinea* (dogwood)) (V Straker 1985)

Initial comment: from a small branch *c* 9cm above the base of a large silt filled ditch. The depth of the ditch was *c* 4m, but the width is not known as the eastern lip lies beneath the present street.

Objectives: to determine whether the ditch may be the western boundary of an early monastic precinct. The ditch may be contemporary with the eastern boundary dated by HAR-2812 (1340 ±70 BP; cal AD 590–860 at 95% confidence); HAR-2813 (1450 ±80 BP; cal AD 420–690 at 95% confidence) and HAR-2814 (1470 ±80 BP; cal AD 410–680 at 95% confidence; Stuiver and Pearson 1986) (Ellis 1981–2).

Calibrated date: 1 σ : cal AD 1010–1170
2 σ : cal AD 970–1230

Final comment: C and N Hollinrake (1991), the two dates, HAR-7044 and HAR-7054, overlap between approximately AD 975 and AD 1035 and, assuming that the wood was deposited later than the cutting of the ditch, a mid-tenth century date for the enclosure ditch seems likely.

References: Ellis 1982
Stuiver and Pearson 1986

HAR-7045 1080 ±80 BP

$\delta^{13}\text{C}$: -28.2‰

Sample: GLMS2, submitted on 12 March 1985 by V Straker

Material: wood (probably *Thelycrania sanguinea* (dogwood)) (V Straker 1985)

Initial comment: as HAR-7044

Objectives: as HAR-7044

Calibrated date: 1 σ : cal AD 880–1030
2 σ : cal AD 770–1160

Final comment: see HAR-7044

Gloucester: St Mary de Lode, Gloucestershire

Location: SO 8294118912
Lat. 51.52.04 N; Long. 02.14.52 W

Project manager: R Bryant (Gloucester City Excavation Unit), 1978

Archival body: Gloucester City Museum and Art Gallery

Description: excavation work was carried out prior to relaying the floor of the nave. The presence of an early second-century Roman building was established, and interpreted as part of a baths building. In the fifth century the building was levelled and a timber mausoleum built, which contained three burials. The mausoleum was destroyed by fire, although the alignment was preserved by a succession of buildings on the site interpreted as a churches, and culminating in the extant St Mary de Lode church.

Objectives: to help provide a chronological framework for the site.

References: Bryant and Heighway 2003

HAR-4895 1050 ±80 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: GL578545, submitted on 5 February 1982 by C Heighway

Material: charcoal: unidentified

Initial comment: sample taken from activity pre-dating the 'saxon' nave (phase 5.3).

Objectives: to date the beam found in the destruction levels of a Period 5 building.

Calibrated date: 1 σ : cal AD 890–1030
2 σ : cal AD 770–1170

Final comment: R Bryant and C Heighway (2003), a fragment of a late ninth-century carved cross was found in the burned layer, and this, together with the radiocarbon date, suggest a late ninth- or early tenth-century date for the destruction of the burned-surface building (Bryant and Heighway 2003, 117).

References: Bryant and Heighway 2003, 117

HAR-4896 1930 \pm 70 BP

$\delta^{13}\text{C}$: -25.1‰

Sample: GL578552, submitted on 5 February 1982 by C Heighway

Material: charcoal: unidentified

Initial comment: sample taken from the final occupation and destruction of the Roman building (phase 2.2/2.4).

Objectives: to help date the Roman levels.

Calibrated date: 1 σ : cal AD 1–140
2 σ : 90 cal BC–cal AD 240

Final comment: (5 January 2010), this radiocarbon date concurs with the artefactual dating evidence suggesting an early to mid second century date for the building's construction, and provides a *terminus post quem* for the destruction.

Gloucester: St Oswald's Priory, Gloucestershire

Location: SO 830190
Lat. 51.52.08 N; Long. 02.14.49 W

Project manager: C M Heighway (Gloucester Excavation Unit), 1978

Archival body: Gloucester City Museum

Description: the minster of St Oswald was, according to William of Malmesbury, founded at Gloucester *c* AD 900 by Æthelred, Ealdorman of Mercia and his wife Æthelflæd. Excavations 1974–9 and 1983 established the plan and sequence of a Saxon-church, some of which survives as a ruin.

Objectives: the radiocarbon dates were expected to provide evidence for the foundation date of the excavated church, which has produced structural evidence but no closely-datable artefacts.

Final comment: C M Heighway (21 April 1995), samples date foundation of church, which is pre-1086 on architectural grounds and which is said by William of Malmesbury to date from the time of Alfred. Burials began when church was built. The two samples HAR-8357 and HAR-8358 appear to confirm the late-ninth century date for church's construction.

Laboratory comment: Ancient Monuments Laboratory (2003), two further samples 4175B348 (HAR-9698) and 4175B525 (HAR-9699) were submitted for dating but failed to produce results.

References: Heighway 1978
Heighway 1980
Heighway and Bryant 1999
Walker *et al* 1990, 194

HAR-8357 1070 \pm 70 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: 4175B507, submitted in April 1986 by C Heighway

Material: human bone

Initial comment: from immediately above B518 in stack of six Saxon burials.

Objectives: to date the foundation of the church.

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

Final comment: C Heighway (21 April 1995), the second earliest sample in sequence of six burials, later than B518 (HAR-8358).

HAR-8358 1100 \pm 70 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: 4175B518, submitted in April 1986 by C Heighway

Material: human bone

Initial comment: lowest of a stack of six Saxon burials.

Objectives: to date the foundation of the church.

Calibrated date: 1 σ : cal AD 880–1020
2 σ : cal AD 770–1040

Final comment: C Heighway (21 April 1995), earliest sample in sequence of six burials, is under B507 (HAR-8357). *See* HAR-8357.

Hacconby Fen, Lincolnshire

Location: TF 140255 (approximate)
Lat. 52.48.52 N; Long. 00.18.31 W, 1

Project manager: P Chowne (South Lincolnshire Archaeological Unit), 1983

Archival body: Lincoln City and County Museum

Description: part of the Fenland Survey Project investigating buried landscapes and the general pattern of settlement in the Fens.

Objectives: these samples are important as two landscapes have been found to be separated by an extinct marsh creek. A major part of the survey is to plot and record the creek distribution.

Laboratory comment: Ancient Monuments Laboratory (3 October 2003), one further sample submitted for dating failed to produce a result (HAR-5656; HAC833).

HAR-5657 3510 ±70 BP

$\delta^{13}\text{C}$: -26.4‰

Sample: HAC839, submitted on 28 February 1983 by P Chowne

Material: wood (desiccated wood, previously waterlogged, remaining subsample identified): *Quercus* sp., heartwood (11.42g, 100%); unidentified (24.27g) (R Gale 1999)

Initial comment: as series comments.

Objectives: as series comments.

Calibrated date: 1 σ : 1940–1740 cal BC
2 σ : 2030–1660 cal BC

Final comment: (5 January 2010), the result was within the expected range and dates the peat that covers the former land surface.

Haddenham: Snow's Farm Barrow, Cambridgeshire

Location: TL 41207360
Lat. 52.20.31 N; Long. 00.04.23 E

Project manager: C Evans (Cambridge Archaeological Unit) and I Hodder (University of Cambridge), 1983

Archival body: Cambridgeshire County Council

Description: Snow's Farm barrow lies some 900m east of the Hermitage farm clusters and seems to be an outlier from the main Ouse-side cemeteries. The original barrow would have been some 20–21m in diameter and have stood at least 1–1.5m higher than it survived.

Objectives: to date the site activity of the barrow.

Final comment: C Evans (20 July 2004), the sequence of the HAD III/Snow's Farm round barrow suggest that of these results HAR-6181 and HAR-6176 relate to pre-barrow later Neolithic occupation activity, whereas HAR-6177 dates the primary use of the barrow itself; HAR-6179 relates to secondary late Bronze Age cremation activity.

Laboratory comment: (21 March 2008), two further samples, 819 (HAR-6178) and 1057 (HAR-6180), failed.

References: Evans and Hodder 2006b

HAR-6176 3950 ±90 BP

$\delta^{13}\text{C}$: -25.0‰

Sample: 1072, submitted on 5 July 1984 by C Evans

Material: charcoal (remaining subsample contained insufficient charcoal to identify): unidentified

Initial comment: from the fill of a minor pit containing charcoal and flint flakes in the primary context of an early Bronze Age barrow.

Objectives: to date the primary construction of the barrow.

Calibrated date: 1 σ : 2580–2300 cal BC
2 σ : 2840–2150 cal BC

Final comment: C Evans (20 July 2004), this date would be consistent with the later Neolithic Grooved Ware assemblage recovered from beneath (ie pre-dating) the HAD III/Snow's Farm barrow.

HAR-6177 3190 ±70 BP

$\delta^{13}\text{C}$: -25.1‰

Sample: 1033, submitted in November 1983 by C Evans

Material: charcoal (remaining subsample identified): unidentified (13.51g); *Quercus* sp., sapwood (0.12g, 1.6%); *Quercus* sp., heartwood (7.42g, 98.4%) (R Gale 1999)

Initial comment: from a cremation pit pyre in the bank of a primary early Bronze Age barrow.

Objectives: to date the primary construction of the barrow.

Calibrated date: 1 σ : 1530–1410 cal BC
2 σ : 1630–1310 cal BC

Final comment: C Evans (20 July 2004), this dates a primary pit-pyre cremation deposit from the HAD III/Snow's Farm round barrow.

HAR-6179 2700 ±90 BP

$\delta^{13}\text{C}$: -27.4‰

Sample: 1060, submitted in November 1983 by C Evans

Material: charcoal: unidentified

Initial comment: from a secondary cremation in an early Bronze Age barrow.

Objectives: to date secondary activity associated with the barrow.

Calibrated date: 1 σ : 930–790 cal BC
2 σ : 1050–670 cal BC

Final comment: C Evans (20 July 2004), this dates a late Bronze Age cremation inserted into the southern side of the HAD III/Snow's Farm round barrow; the assignment is reasonable.

HAR-6181 3810 ±70 BP

$\delta^{13}\text{C}$: -25.2‰

Sample: 1004, submitted in November 1983 by C Evans

Material: wood (waterlogged; charred): unidentified

Initial comment: from a pit exterior to the barrow, sealed by barrow slip, and possibly pre-dating the barrow.

Objectives: to date possible pre-barrow activity.

Calibrated date: 1 σ : 2400–2140 cal BC
2 σ : 2480–2030 cal BC

Final comment: C Evans (20 July 2004), this date would indicate that a small pit (one of a pair) found immediately exterior to the HAD III/Snow's Farm round barrow probably related to pre-barrow later Neolithic activity.

Haddenham: Upper Delphs causewayed enclosure, Cambridgeshire

Location: TL 412737
Lat. 52.20.34 N; Long. 00.04.23 E

Project manager: C Evans (Cambridge Archaeological Unit) and I Hodder (University of Cambridge), 1985

Archival body: Cambridgeshire County Council

Description: from the structural sequence of the Upper Delphs causewayed enclosure.

Objectives: to date the period of construction and use of the causewayed enclosure.

Final comment: C Evans and I Hodder (2004), generally these results are not helpful in clarifying the chronology of the enclosure, and further dates should have been obtained. Based on these results, and those from comparable early Neolithic assemblages in the region, in all likelihood the primary usage of the enclosure occurred between c 3750–3400 cal BC.

References: Evans and Hodder 2006a

HAR-8092 4970 ±90 BP

$\delta^{13}\text{C}$: -27.0‰

Sample: HAD84-I, submitted in January 1985 by C Evans

Material: charcoal: unidentified

Initial comment: from a late recut of Ditch I (F. 120).

Objectives: to date the later use of the causewayed enclosure.

Calibrated date: 1 σ : 3940–3650 cal BC
2 σ : 3970–3540 cal BC

Final comment: C Evans and I Hodder (2004), this result is significantly too early for its context. Although including Peterborough Ware sherds, the fill of this deposit consisted of a burnt charcoal-rich matrix, but there was no evidence of burning *in situ*. Therefore, this early assignation may reflect primary enclosure related midden deposits scraped up and redeposited within this later recut.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1991a, 92

HAR-8093 4560 ±90 BP

$\delta^{13}\text{C}$: -25.5‰

Sample: III/84, submitted in January 1985 by C Evans

Material: charcoal: unidentified

Initial comment: from the primary fill of ditch J (F. 136); from a shell marl platform in the base of the causeway camp ditch segment. The platform was cut by postholes and slots and represents packing of the early Neolithic structures with possible mortuary associations.

Objectives: to date the ditch structure and the primary phase of the causeway camp.

Calibrated date: 1 σ : 3500–3100 cal BC
2 σ : 3630–2940 cal BC

Final comment: C Evans and I Hodder (2004), this result is consistent with that from charcoal from the primary fill in Ditch I (see HAR-8096 below). These dates fit well with the later part of the range of dates for Mildenhall ceramics.

HAR-8094 3620 ±110 BP

$\delta^{13}\text{C}$: -25.0‰

Sample: HAD84-IV, submitted in July 1985 by C Evans

Material: charcoal: unidentified

Initial comment: from a burnt length of the palisade trench in the HAD' 84 area.

Objectives: to date the construction of the palisade associated with the causewayed enclosure ditches.

Calibrated date: 1 σ : 2140–1830 cal BC
2 σ : 2300–1690 cal BC

Final comment: C Evans and I Hodder (2004), this date relates to the primary fill of the palisade and may be acceptable given the suggestion that the palisade segment from which the date derives may have been added later in order to restrict movement into the interior. Alternatively the sample may have been contaminated by later activity in the area and the date may be 1000–1500 years too late for the feature.

References: Hardiman *et al* 1992, 63
Walker *et al* 1991a, 92–3

HAR-8096 4630 ±80 BP

$\delta^{13}\text{C}$: -25.3‰

Sample: HAD84 VI, submitted in January 1985 by C Evans

Material: charcoal: unidentified

Initial comment: from the primary fill of ditch I (F. 138).

Objectives: to date the ditch structure and the primary phase of the causeway camp.

Calibrated date: 1 σ : 3520–3350 cal BC
2 σ : 3640–3100 cal BC

Final comment: C Evans and I Hodder (2004), this result is consistent with that from charcoal from the primary fill in Ditch J (see HAR-8093). These dates fit well with the later part of the range of dates for Mildenhall ceramics.

Hallshill, Northumberland

Location: NY 907887
Lat. 55.11.33 N; Long. 02.08.46 W

Project manager: T Gates (University of Newcastle-upon-Tyne), 1981 and 1986

Archival body: University of Newcastle-upon-Tyne

Description: a single prehistoric timber house on Hallshill Farm. The chief characteristics of this type are roundhouses, which are not enclosed within any defensive or other perimeter and are frequently associated with the remains of fields or stone clearance.

Objectives: Hallshill represents a type of settlement, which has hitherto gone almost unnoticed in the north but can now be shown to exist in numbers, particularly in the upland zone beyond the reach of later interference. Very few excavations have been completed on these sites but the indications are that they are early in date and in all likelihood settlements of this kind will turn out to be amongst the earliest so far identified in this part of the country. Dates in the region of 1000 BC or earlier would not be out of place.

Final comment: T Gates (26 October 1988), the radiocarbon dates indicate a more complicated sequence of activity than could have been deduced from either structural or stratigraphic evidence. Results from two postholes, HAR-8184 and HAR-4800, and pits HAR-8183 and HAR-8185, imply that site witnessed more than one phase of Bronze Age agriculture before construction of the timber building. These accords well with palynology and radiocarbon dating at a nearby site at Steng Moss.

References: Gates 1983

HAR-4788 2520 ±70 BP

$\delta^{13}\text{C}$: -27.7‰

Sample: HAL8-1, submitted on 17 December 1981 by T J W Gates

Material: charcoal (remaining subsample identified): unidentified (35.88g); *Quercus* sp., heartwood (1.25g, 7.7%); *Alnus* sp., fast-grown, from wide roundwood (13.44g, 83%); *Corylus* sp., roundwood, diameter 18mm (1.51g, 9.3%) (R Gale 1999)

Initial comment: from the lowest levels of a mass of burnt material, interpreted as a hearth, occupying a central position in a round timber-built house. This sample was sealed better than HAL8-2 (HAR-4789). There is some degree of heather root penetration.

Objectives: a date anywhere from c 1000–2000 BC is expected. Result hopefully will confirm the suspected Bronze Age date.

Calibrated date: 1 σ : 800–520 cal BC
2 σ : 820–400 cal BC

Final comment: T Gates (26 October 1988), the date obtained on charcoal recovered from the burnt mass established a *terminus ante quem* for the occupation of the building and effectively marks the end of prehistoric activity on this part of the site.

HAR-4789 2560 ±60 BP

$\delta^{13}\text{C}$: -27.6‰

Sample: HAL8-2, submitted on 17 December 1981 by T J W Gates

Material: charcoal (remaining subsample identified): unidentified (51.31g); *Alnus* sp. (1.26g, 13.4%); *Betula* sp. (0.57g, 6.1%); *Corylus* sp. (7.55g, 80.5%) (R Gale 1999)

Initial comment: from a mass of burnt material, interpreted as a hearth, occupying a central position within a round timber-built house. There is some degree of heather root penetration.

Objectives: this result should be same as HAR-4788. This should allow us to obtain a mean date with a smaller standard deviation.

Calibrated date: 1 σ : 810–590 cal BC
2 σ : 830–510 cal BC

Final comment: see HAR-4788

Final comment: A Bayliss (26 October 2007), the two measurements on bulk charcoal samples from this hearth are statistically consistent ($T'=0.2$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). As they are bulk samples, a weighted mean may be taken (2543 ±46 BP), which calibrates to 810–520 cal BC at 95% confidence (Reimer *et al* 2004).

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

HAR-4800 2780 ±80 BP

$\delta^{13}\text{C}$: -27.5‰

Sample: HAL-10, submitted on 17 December 1981 by T J W Gates

Material: charcoal (remaining subsample identified): unidentified (7.77g); *Quercus* sp., sapwood (0.12g, 12%); *Quercus* sp., heartwood (0.86g, 86%); *Corylus* sp. (0.02g, 2%) (R Gale 1999)

Initial comment: from one of the main door postholes of a round timber-built house. There is some degree of heather root penetration.

Objectives: to date the period of occupation.

Calibrated date: 1 σ : 1020–830 cal BC
2 σ : 1190–800 cal BC

Final comment: T Gates (26 October 1988), 14 postholes belonging to the timber-built house were excavated. Wood charcoal was found in all of them and six different tree species were represented. As there was no evidence to show the building had burned down, and as all the postholes contained charcoal from at least two different wood species, it is not proposed that the charcoal derives from the timbers of the building itself. More likely it was lying around in or on the topsoil when the postholes were dug and accidentally became incorporated in the fill. Likewise the possibility that some charcoal got into the postholes at a later stage after the timbers had rotted or were withdrawn cannot be entirely discounted. HAR-4800 and HAR-8184 are sufficiently distinct to raise suspicion that more than one event is being registered, perhaps implying that the site witnessed more than one phase of Bronze Age agriculture before the construction of the timber building.

HAR-8183 2960 ±60 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: HAL-23, submitted in September 1986 by T Gates

Material: charcoal: *Alnus* sp., twigs and larger wood (D Haddon-Reece 1986)

Initial comment: from a small pit (context no. 23) stratigraphically earlier than the excavated building from which HAR-4800 came. Besides wood charcoal the fill of the pit contained carbonised plant material, burnt bone, and burnt stones, in addition to a single undecorated sherd of pottery, the only one recovered from the site.

Objectives: to ascertain whether the pit, which could be either a cremation burial or a rubbish deposit, represents a hitherto undated phase of activity on the site. In the 1981 season a pit or grave was excavated, which is demonstrably earlier than the excavated building but cannot be securely dated.

Calibrated date: 1 σ : 1300–1050 cal BC
2 σ : 1390–1000 cal BC

Final comment: T Gates (26 October 1988), the pit could be either a cremation burial or a rubbish deposit and ante-dates the timber building.

References: Walker *et al* 1990, 192

HAR-8184 3130 \pm 60 BP

$\delta^{13}\text{C}$: -27.0‰

Sample: HAL-21, submitted in September 1986 by T Gates

Material: charcoal: *Corylus avellana* L. (D Haddon-Reece 1986)

Initial comment: from one of the eight postholes constituting an inner ring of roof supports belonging to the excavated roundhouse.

Objectives: to compare the date with HAR-4800, which represented the porch of the house.

Calibrated date: 1 σ : 1460–1320 cal BC
2 σ : 1520–1260 cal BC

Final comment: T Gates (26 October 1988), the previous sample from this building yielded a date of 1190–790 cal BC at 95% confidence (Reimer *et al* 2004; HAR-4800; 2780 \pm 80 BP). Charcoal from this and other postholes ante-dates construction of the building, perhaps by several centuries, and should be associated with one or more episodes of forest clearance and evidence for cereal cultivation, including emmer wheat and six-row barley (Davies and Turner 1979).

References: Davies and Turner 1979
Reimer *et al* 2004
Walker *et al* 1990, 192

HAR-8185 2710 \pm 70 BP

$\delta^{13}\text{C}$: -26.6‰

Sample: HAL-25, submitted in September 1986 by T Gates

Material: charcoal: *Alnus* sp., twigs and larger wood (D Haddon-Reece 1986)

Initial comment: from a small pit (context no. 25) whose stratigraphical relationship to the excavated building is unclear (most probably it is later or broadly contemporary). In addition to wood charcoal the pit contained burnt stones, carbonised plant material (including cereal grains), and a small quantity of burnt bone.

Objectives: to determine whether the pit represents a separate phase of activity from that represented by the

excavated building. No datable artefacts were present in the pit, which could be either a rubbish deposit or a cremation burial. The existence of cereal grains in the same deposit is of particular interest.

Calibrated date: 1 σ : 920–800 cal BC
2 σ : 1020–780 cal BC

Final comment: T Gates (26 October 1988), the radiocarbon date suggests the existence of a distinct episode of cereal cultivation, from that identified by HAR-8183, broadly corresponding with the later two of three Bronze Age clearance phases at Steng Moss.

References: Walker *et al* 1990, 192

Ham Hill, Somerset

Location: ST 480168
Lat. 50.56.39 N; Long. 02.44.04 W

Project manager: G H Smith (Central Excavation Service), 1983

Archival body: Somerset County Museum, Taunton

Description: a large multi-vallate hillfort of c 84ha (210 acres). Partial excavation in the 1920s indicated that occupation was concentrated on one promontory within the fort and that this was an important Iron Age settlement, probably a tribal centre, with rich finds including a variety of pottery, bronze chariot fittings, and iron currency bars. Other chance finds from the hilltop show that it was important in earlier periods with Neolithic stone axes, flint tools, Bronze Age pottery, and bronze palstaves, socketed axes, and spearheads.

Objectives: the excavation was carried out to record an area of the interior of the fort in advance of quarrying, and had potential to understand the wider use of the hilltop beyond the previously excavated area of Iron Age occupation.

Final comment: G Smith (20 November 2006), the samples were from excellent contexts and material but two dates were not in agreement. One was so far from the reasonably estimated date that some error in processing must be assumed.

Laboratory comment: Ancient Monuments Laboratory (2003), one further sample 252-92 (HAR-6221) was submitted for dating but it failed to produce a result.

References: McKinley 1998
Smith 1983
Walker *et al* 1990, 173

HAR-6222 1640 \pm 80 BP

$\delta^{13}\text{C}$: -27.0‰

Sample: 252-94, submitted in April 1985 by N Balaam

Material: charcoal: *Alnus* sp. (N Balaam)

Initial comment: from charcoal-rich layers within Iron Age pit 65.

Objectives: to provide a chronology for the occupation features identified and for the pottery associated with them.

Calibrated date: 1 σ : cal AD 260–540
2 σ : cal AD 230–600

Final comment: G Smith (20 November 2006), this date differs so much from the expected period based on the pottery styles, even though this was a very well-sealed context, that some error must have occurred in processing.

References: Smith 1983, 27–45

HAR-6653 2160 \pm 90 BP

$\delta^{13}\text{C}$: -25.0 (assumed) \pm 3.0‰

Sample: 252-84, submitted in April 1985 by N Balaam

Material: charcoal: *Alnus* sp. (N Balaam)

Initial comment: from a lens of charcoal and carbonised grain within an Iron Age pit.

Objectives: to provide a chronology for the occupation features identified and for the pottery associated with them.

Calibrated date: 1 σ : 380–50 cal BC
2 σ : 400 cal BC–cal AD 30

Final comment: G Smith (20 November 2006), this date provides general support for the estimated date for the pit based on the style of the associated pottery but does not provide any greater precision because of the wide statistical range.

References: Smith 1983, 27–45
Walker *et al* 1990, 173
Walker and Otlet 1988, 314

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 1 ha 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: Bayliss *et al* 2009
Farrar 1951
Healy 2004
Mercer 1980
Mercer 1985
Mercer 1988
Mercer 1999
Mercer and Healy 2008
Oswald *et al* 2001
Palmer 1976a
RCHME 1970

Hambledon Hill: Everley Water Meadow, Dorset

Location: ST 86101151
Lat. 50.54.08 N; Long. 02.11.52 W

Project manager: R J Mercer (University of Edinburgh), 1982–84

Archival body: Dorset County Museum

Description: the identification of a concentration of burnt flint in the Iwerne Valley below Hambledon Hill during fieldwalking by Rog Palmer led to excavations as part of a programme of investigation of sediments in the valleys around Hambledon Hill. Two main areas were excavated. In the south area, the base of a palaeochannel of the Iwerne contained sediments perhaps of late glacial date, overlain by others reworked in the Roman and medieval periods, although they contained some late Bronze Age artefacts. In the north area, a burnt mound lay at the edge of the palaeochannel, partly washed away by the river, and truncated by the earthworks of the water meadow which extended over both areas. The burnt mound contained middle Bronze Age pottery.

Objectives: to date the burnt mound.

References: Walker and Otlet 1988, 308–9

HAR-6529 3160 \pm 70 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: EWM 8361, submitted in January 1985 by R J Mercer

Material: charcoal: unidentified

Initial comment: recovered from the calcined flint mound; trench 2, layer 1A, section 2.

Objectives: to date the burnt mound.

Calibrated date: 1 σ : 1500–1390 cal BC
2 σ : 1610–1260 cal BC

Final comment: A Bayliss (18 November 2007), the two measurements on bulk charcoal samples from this layer are statistically consistent ($T'=0.8$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). As they are bulk samples, a weighted mean may be taken (3115 \pm 49 BP), which calibrates to 1500–1260 cal BC at 95% confidence (Reimer *et al* 2004).

Final comment: F Healy (26 November 2006), all three samples were from a single burnt mound. Since most of the charcoal from the mound was subsequently identified as from short-life species, the sample was probably close in age to its context. This and the other two dates accord with the presence of middle Bronze Age pottery in the mound.

References: Mercer and Healy 2008, 439
Reimer *et al* 2004

HAR-6530 3090 ±80 BP

$\delta^{13}\text{C}$: -25.4‰

Sample: EWM 84292, submitted in January 1985 by R J Mercer

Material: charcoal (remaining subsample subsequently identified): *Prunus* sp. (P Austin)

Initial comment: recovered from the calcined flint mound: from trench 3, layer 4, section 6.

Objectives: to date the burnt mound.

Calibrated date: 1 σ : 1440–1260 cal BC
2 σ : 1520–1120 cal BC

Final comment: see HAR-6529

References: Mercer and Healy 2008, 439

HAR-6531 3070 ±70 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: EWM 84331, submitted in January 1985 by R J Mercer

Material: charcoal (remaining subsample subsequently identified): *Acer campestre*; *Corylus avellana*; *Quercus* sp. (P Austin)

Initial comment: recovered from the calcined flint mound: trench 3, layer 4, section 6.

Objectives: to date the burnt mound.

Calibrated date: 1 σ : 1430–1260 cal BC
2 σ : 1500–1120 cal BC

Final comment: see HAR-6529

Laboratory comment: see HAR-6529

References: Mercer and Healy 2008, 439

Hambledon Hill: Hanford Flint Mines, Dorset

Location: ST 849122
Lat. 50.54.08 N; Long. 02.13.39 W

Project manager: R 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* 1 m 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
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.

References: Mercer 1987

HAR-6037 4270 ±100 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: HN82 C108, submitted on 30 May 1983 by R Mercer

Material: charcoal (remaining subsample subsequently identified): *Corylus avellana* (P Austin)

Initial comment: from the gallery undercut in F606, the flint mine.

Objectives: to date the feature.

Calibrated date: 1 σ : 3010–2760 cal BC
2 σ : 3270–2580 cal BC

Final comment: F Healy (26 November 2006), HN82 F606, layer 3, from break-through running north from ‘flint mine’. Since OxA-7833 (3810 ± 45 BP; 2460–2130 cal BC at 95% confidence; Reimer *et al* 2004), 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 activity.

References: Hardiman *et al* 1992, 53
Reimer *et al* 2004
Walker *et al* 1991a, 88

Hambledon Hill: Hanford Outer Outwork, Dorset

Location: ST 849116
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1982

Archival body: Dorset County Museum

Description: continuous linear outworks link the Hanford and Stepleton spurs of the hill. Parts of three segments of the outer of the two were excavated on the Hanford spur. It was subsequently suggested on the basis of earthwork survey (Palmer and Oswald in Mercer and Healy 2008) that the outworks on the two spurs had been connected after their construction. Fortunately, the excavated segments included components of both proposed elements, segment 2 belonging to the possibly original Hanford spurwork and segment 3 to the possibly later, longer connecting earthwork.

Objectives: the two outworks on the Hanford spur of the hill remain imprecisely dated. It is impossible to tell, for example, to which of the three outworks on the Stepleton spur they relate, although all appear part of a continuous system.

References: Mercer and Healy 2008
Walker *et al* 1990, 167

HAR-6038 4530 ±110 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: HN82 C113, submitted on 30 May 1983 by R Mercer

Material: charcoal: unidentified

Initial comment: ditch 3, unit 6, layer 5c; from the primary fill of the outwork ditch on Hanford Spur.

Objectives: to date the primary fill.

Calibrated date: 1 σ : 3490–3020 cal BC
2 σ : 3630–2900 cal BC

Final comment: F Healy (26 November 2006), from ashy silt on the base of the north-west butt of segment 3, an equivalent context to the samples for UB-4271 (4492 ±27 BP; 3350–3030 cal BC at 95% confidence; Reimer *et al* 2004) and UB-4272 (4476 ±26 BP; 3350–3020 cal BC at 95% confidence; Reimer *et al* 2004). As a bulked sample of unidentified charcoal, it can be viewed only as a *terminus post quem*. It is, however, compatible with these two dates on articulated samples, which suggests that it consisted at least predominantly of short-life material.

References: Reimer *et al* 2004

Hambledon Hill: Main Enclosure 4, Dorset

Location: ST 84921226
Lat. 50.54.31 N; Long. 02.12.53 W

Project manager: R Mercer (University of Edinburgh), 1974–7

Archival body: Dorset County Museum

Description: scattered segments of the main enclosure.

Objectives: to date this part of the enclosure as a step towards establishing the chronology of the whole.

References: Mercer and Healy 2008
Walker *et al* 1991a, 88

HAR-2369 4520 ±80 BP

$\delta^{13}\text{C}$: -22.6‰

Sample: HH76 31, submitted in 1988 by R Mercer

Material: plant macrofossils (burnt nuts, *Corylus* sp.) (C Keepax 1988)

Initial comment: site H, causewayed enclosure ditch, segment 2, layer 3; flints and chalk lumps set in a dark brown loam packed with crushed charcoal fragments and occasional burnt shells. Layer 3 would appear to be the scarp cut of the ditch, possibly recut by layer 5 located as a distinct linear deposit of flint against the east edge of layer 3.

Objectives: to date the context.

Calibrated date: 1 σ : 3370–3090 cal BC
2 σ : 3500–2920 cal BC

Final comment: F Healy (2006), Segment 13, recorded as from layer 3, but placed by measurements in layer 5, the fill of a single phase VI slot cut into the ditch top. This is among the latest dates from the enclosure ditch.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

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 2 m deep and over 3 m 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 (1995), three further dates were funded prior to 1981 and were published in Jordan *et al* 1994, 71 (HAR-3058, HAR-3060, and HAR-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, 71
Mercer 1985
Mercer and Healy 2008
Reimer *et al* 2004

HAR-4433 4840 ±90 BP

$\delta^{13}\text{C}$: -24.5‰

Sample: ST79 66, submitted on 21 January 1981 by R Mercer

Material: charcoal: *Quercus* sp., from mature timbers (C Keepax 1981)

Initial comment: site 2B, ditch 1, layer 5A; from a small timber associated with the apparent collapse of breastwork of the rampart, stratified in the primary fill of the ditch.

Objectives: to date the construction of the rampart. The small timbers reflect a date close to the construction. The expected date is *c* 2700 cal BC.

Calibrated date: 1 σ : 3710–3520 cal BC
2 σ : 3800–3370 cal BC

Final comment: F Healy (2006), Segment 5, cutting 14, layer 5A. The maturity of the sample makes the date a *terminus post quem* for its context.

HAR-4435 4880 ±90 BP

$\delta^{13}\text{C}$: -23.5‰

Sample: ST80 23, submitted on 21 January 1981 by R Mercer

Material: charcoal: *Quercus* sp., from mature timbers (C Keepax 1981)

Initial comment: site 3B, ditch 4, layer 6B; from the primary context at the base of the ditch of the main outwork on Stepleton Spur.

Objectives: to date the main outwork. The expected date is *c* 2700 cal BC.

Calibrated date: 1 σ : 3760–3540 cal BC
2 σ : 3940–3380 cal BC

Final comment: F Healy (2006), Segment 4, unit 4, layer 6. The maturity of the sample makes the date a *terminus post quem* for its context.

References: Mercer and Healy 2008, 243

HAR-4437 5040 ±80 BP

$\delta^{13}\text{C}$: -24.6‰

Sample: ST80 81, submitted on 21 January 1981 by R Mercer

Material: charcoal: *Quercus* sp., from mature timber (730g) (C Keepax 1981)

Initial comment: feature 603, bank 4; from a large timber *in situ* in the gateway. The sample is thought to be taken from the heartwood.

Objectives: to date the construction of the rampart. The expected date is *c* 2700 cal BC.

Calibrated date: 1 σ : 3960–3710 cal BC
2 σ : 3990–3650 cal BC

Final comment: F Healy (2006), the maturity of the sample makes the date a *terminus post quem* for its context.

References: Mercer and Healy 2008, 241, 304

HAR-4438 4770 ±80 BP

$\delta^{13}\text{C}$: -25.3‰

Sample: ST80 80, submitted on 21 January 1981 by R Mercer

Material: charcoal: *Quercus* sp., from mature timber (450g) (C Keepax 1981)

Initial comment: feature 601, bank 4; as HAR-4437.

Objectives: as HAR-4437

Calibrated date: 1 σ : 3650–3380 cal BC
2 σ : 3710–3360 cal BC

Final comment: see HAR-4437

References: Walker *et al* 1990, 167

Hamworthy: Shipwright's Arms, Dorset

Location: SY 9911
Lat. 49.59.55 N; Long. 02.00.50 W

Project manager: I Horsey (Poole Museums Service), 1978

Archival body: Waterfront Museum, Poole

Description: massive oyster middens on the foreshore of the medieval port of Poole and on the Hamworthy peninsula.

Objectives: to date a deposit of harvested oysters, 3.4m thick.

Final comment: K Jarvis (16 May 1995), the calibrated dates suggest the Hamworthy oyster industry was in the period AD 840–1360 at 2 σ or cal AD 950–1250 at 1 σ . For Saxon pottery from Poole see Lynn (1994), and for discussion of the uncalibrated dates, Jarvis and Horsey (1992).

References: Jarvis and Horsey 1992, 60–1
Lyne 1994

HAR-3464 1280 ±80 BP

$\delta^{13}\text{C}$: -0.5‰

Sample: PM32/1D, submitted on 30 May 1979 by I Horsey

Material: shell: *Ostrea* sp.

Initial comment: from the top of the 3.4m oyster midden.

Objectives: to date the end of oyster deposition.

Calibrated date: 1 σ : cal AD 1030–1230
2 σ : cal AD 970–1290

Final comment: K Jarvis (16 May 1995), the date suggests the Hamworthy oyster industry had terminated by AD 1360 at 2 σ .

Laboratory comment: English Heritage (18 November 2007), this measurement has been calibrated using the marine calibration data of Hughen *et al* (2004) and a ΔR value of -5 ± 40 BP for the coastal waters off England (Stuiver and Braziunas 1993).

References: Hughen *et al* 2004
Reimer *et al* 2004
Stuiver and Braziunas 1993

HAR-3465 1420 ±70 BP

$\delta^{13}\text{C}$: -0.5‰

Sample: PM32/11D, submitted on 30 May 1979 by I Horsey

Material: shell: *Ostrea* sp.

Initial comment: from the base of the 3.4m oyster midden.

Objectives: to date the beginning of oyster deposition.

Calibrated date: 1 σ : cal AD 900–1050
2 σ : cal AD 810–1150

Final comment: K Jarvis (16 May 1995), the date suggests the Hamworthy oyster industry did not begin before AD 840 at 2 σ .

Final comment: English Heritage (18 November 2007), this measurement has been calibrated using the marine calibration data of Hughen *et al* (2004) and a ΔR value of -5 ±40 BP for the coastal waters off England (Stuiver and Braziunas 1993).

References: Hughen *et al* 2004
Stuiver and Braziunas 1993

Hartfield: Cansiron Farm, East Sussex

Location: TQ 45653835
Lat. 51.07.31 N; Long. 00.04.54 E

Project manager: D Rudling (Institute of Archaeology, London), 1983

Archival body: Sussex Archaeological Unit

Description: a Roman tiliary site.

Objectives: to establish whether the Roman tiliary and bloomery were contemporary.

Final comment: D Rudling (25 November 1996), the two radiocarbon dates for samples recovered at Hartfield relate to two distinct activity sites, a Roman tiliary and a nearby probable Roman bloomery. The dates obtained are useful in helping to confirm the dating of both the bloomery and the tile kiln. Although it is possible that both sites were in use at the same time, the radiocarbon dates may suggest that this was not so, and that the bloomery preceded the tiliary.

References: Rudling 1986

HAR-6389 1830 ±70 BP

$\delta^{13}\text{C}$: -26.9‰

Sample: 1983.2/1/MF, submitted in September 1984 by C Cartwright

Material: charcoal: *Quercus* sp.; *Corylus* sp.; *Betula* sp.

Initial comment: the charcoal contents, presumably fuel, from the main flue of the stokehole of the tile kiln.

Objectives: to determine more precisely than the blanket term ‘Romano-British’, the period of use and function of the tile kiln by dating the main flue contents.

Calibrated date: 1 σ : cal AD 80–260
2 σ : cal AD 20–390

Final comment: D Rudling (25 November 1996), the radiocarbon date is compatible with the archaeomagnetic dating of AD 100–130 at the 68% confidence level obtained from the structure of the combustion chamber (AML-841226; Site Latitude=51.10 N, Longitude=0.10 E, Number of samples=12, Declination at site=0.9, Inclination at site=63.4, Declination at Meriden=0.7, Inclination at Meriden=64.4, α_{95} =1.6, Fisher index=736.894; Clark *et al* 1988).

References: Clark *et al* 1988

HAR-6390 1930 ±70 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: 1983.2/VI/6, submitted in September 1984 by C Cartwright

Material: charcoal: Rosaceae, sub-family Pomoideae; *Quercus* sp.; *Crataegus* sp.; *Betula* sp.; *Corylus* sp.

Initial comment: possible iron re-smelting hearth adjacent to, but not necessarily contemporary with, the Romano-British tile kiln

Objectives: to establish a precise date for the iron re-smelting hearth to ascertain whether it is contemporary with the Romano-British tile kiln or with later activity, possibly even medieval or post-medieval in date.

Calibrated date: 1 σ : cal AD 1–140
2 σ : 90 cal BC–cal AD 240

Final comment: D Rudling (25 November 1996), the radiocarbon date obtained from charcoal recovered in association with the remains of a bloomery furnace indicates that the furnace is either late Iron Age or early Roman. The other main dating evidence from Trench VI is Roman pottery. It is therefore probable that the bloomery furnace is post-Conquest and dates to the second half of the first century or early second century.

Hartlepool: Church Close, Cleveland

Location: NZ 52853375
Lat. 54.41.45 N; Long. 01.10.48 W

Project manager: R Daniels (Cleveland County Council), 1985

Archival body: Tees Archaeology

Description: part of the Anglo-Saxon monastery of Hartlepool, comprising a complex of timber buildings with associated boundaries. Finds include metalworking moulds and crucibles which have added materially to the knowledge of early Northumbrian art and metalworking.

Objectives: to confirm the provisional interpretation of the site as part of the Anglo-Saxon monastery of the seventh to eighth centuries AD.

Final comment: R Daniels (4 May 1995), this series and the weighted mean provided by David Jordan (1327 ±40 BP; cal AD 640–780 at 95% confidence; Reimer *et al* 2004) was very satisfactory and confirmed a range of other types of evidence (historical, archaeological, art historical, and numismatic) in identifying the site as seventh- to eighth-

century. They particularly tied together a range of features for which there was no stratigraphical linkage and allowed a fuller picture to be drawn of the seventh- and eighth-century occupation than would otherwise have been possible.

References: Cramp and Daniels 1987
Daniels 1988
Daniels 1990
Reimer *et al* 2004
Walker *et al* 1991a, 102–3

HAR-8599 1320 ±80 BP

$\delta^{13}\text{C}$: -23.1‰

Sample: HCCA2100, submitted in July 1987 by R Daniels

Material: bone

Initial comment: from a dark brown sandy soil, which occupies the lowermost fill of a post pit. This is one of three set on a curve and sealed by Anglo-Saxon material.

Objectives: to confirm the chronological relationship of the bone to the Anglo-Saxon deposits or establish if it is of prehistoric date and therefore suggesting a substantial monument from a period only known from stray finds in the area.

Calibrated date: 1 σ : cal AD 640–780
2 σ : cal AD 590–890

Final comment: R Daniels (4 May 1995), the date identified this and two other related substantial post pits as part of the Anglo-Saxon occupation, when it was thought they may be prehistoric. It answered the question satisfactorily and posed an unresolved interpretational problem.

HAR-8600 1270 ±70 BP

$\delta^{13}\text{C}$: -23.5‰

Sample: HCCB0057, submitted in July 1987 by R Daniels

Material: bone

Initial comment: from sandy soil, uppermost fill of timber palisade trench, which comprises part II of the boundary complex. The complex has three components, I, a series of large post pits; II, a continuous timber palisade trench, and III, two large post pits set outside but parallel to I and II.

Objectives: to establish a *terminus ante quem* for part II of the boundary complex; to establish the chronological relationship between parts II and III of the boundary complex; to establish the chronological relationship to the timber buildings on the site; and to confirm whether or not this could be part of the Anglo-Saxon monastic complex.

Calibrated date: 1 σ : cal AD 660–860
2 σ : cal AD 640–940

Final comment: R Daniels (4 May 1995), it identified phase II of the boundary complex as part of the Anglo-Saxon occupation. The deposit was dated to *c* AD 700 on stylistic grounds from the metalworking moulds recovered from the same feature (Daniels 1988).

References: Daniels 1988

HAR-8602 1400 ±80 BP

$\delta^{13}\text{C}$: -22.9‰

Sample: HCCB0093, submitted in July 1987 by R Daniels

Material: bone

Initial comment: from an orange-brown sandy soil, which is the uppermost fill of a post pit, which was robbed and backfilled. This is a component of part I of a boundary complex and is cut by part II.

Objectives: to give a *terminus ante quem* for part I of the boundary and a *terminus post quem* for part II; establish the possibility of contemporaneity of the timber buildings from the site and confirm whether or not this is part of the Anglo-Saxon monastic complex.

Calibrated date: 1 σ : cal AD 590–680
2 σ : cal AD 530–780

Final comment: R Daniels (4 May 1995), it identified phase I of the boundary complex as part of the Anglo-Saxon occupation of the site.

HAR-8603 1590 ±90 BP

$\delta^{13}\text{C}$: -23.5‰

Sample: HCCC0021, submitted in July 1987 by R Daniels

Material: bone

Initial comment: from a brown sandy soil, which is the fill of a gully. The latter is one of two parallel gullies beyond the boundary complex (cf HCCB0057, HCCB0093, and HCCB0158).

Objectives: to provide a *terminus ante quem* for the gully and establish its chronological relationship to the boundary complex and timber buildings.

Calibrated date: 1 σ : cal AD 380–570
2 σ : cal AD 240–650

Final comment: R Daniels (4 May 1995), the date suggested that the feature may have been earlier than the Anglo-Saxon occupations. This posed no interpretation problems and was an acceptable date.

HAR-8604 820 ±80 BP

$\delta^{13}\text{C}$: -23.1‰

Sample: HCCA1920, submitted in July 1987 by R Daniels

Material: bone

Initial comment: from red-brown sand, which is backfill of a posthole of one of the timber buildings.

Objectives: to give a *terminus ante quem* for the timber building and establish its chronological relationship to the boundary complex.

Calibrated date: 1 σ : cal AD 1150–1280
2 σ : cal AD 1020–1300

Final comment: R Daniels (4 May 1995), this date is not acceptable, on archaeological grounds, as a dating for the structure with which it is associated.

Laboratory comment: English Heritage (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-8608 1340 ±90 BP

$\delta^{13}\text{C}$: -21.2‰

Sample: HCCB0158, submitted in July 1987 by R Daniels

Material: bone

Initial comment: from orange-brown sandy soil, which is the uppermost fill of a post pit, which was robbed and backfilled. This is a component of part III of the boundary complex.

Objectives: to give a *terminus ante quem* for part III and establish chronological relationship with parts I and II and the timber buildings.

Calibrated date: 1 σ : cal AD 630–780
2 σ : cal AD 540–890

Final comment: R Daniels (4 May 1995), this date identified the third component of the boundary complex as part of the Anglo-Saxon occupation and was satisfactory.

Haseley Manor, Isle of Wight

Location: SZ 547857
Lat. 50.40.04 N; Long. 01.13.33 W

Project manager: R Young (Haseley Manor (owner)), November 1983

Archival body: Haseley Manor

Description: a grade II listed multi-period building incorporating the core of a fifteenth-century monastic grange belonging to Quarr Abbey. Core samples were taken for dendrochronology in 1984 from the principal rafters and collar of an arch-braced truss in apparently the oldest part of the building. The braces are decorated with a simple hollow chamfer.

Objectives: to date the arch-braced collar truss included in the earliest discernible part of the building. As no other dendrochronology has been undertaken on the Isle of Wight, and with the possibility that the island's highly individual weather patterns might prevent cross-matching with mainland reference material, samples were submitted for radiocarbon dating.

Final comment: R Young (6 July 1996), the overall average of the five samples is AD 1348, but if one omits HAR-6361, which as a date at its latest limit of AD 1630, is not compatible with the written record, then an average of the other five samples is AD 1321, taking the two narrowest age bands. It would seem safe to date the truss as *c* cal AD 1350.

Laboratory comment: Ancient Monuments Laboratory (2003), five further samples submitted HM83F (HAR-6355), HM83B (HAR-6360), HM83D (HAR-6359), HM83G (HAR-6354), and HM83E (HAR-6350) failed to produce results.

Laboratory comment: English Heritage (17 February 2010), the radiocarbon dates agree with the tree-ring dating of the site dendrochronological sequence from this roof which spans AD 1342–1424 (Haddon-Reece *et al* 1990, 47–9).

References: Haddon-Reece *et al* 1990

HAR-6349 730 ±80 BP

$\delta^{13}\text{C}$: -25.2‰

Sample: HM83A, submitted in January 1984 by D Haddon-Reece

Material: wood: *Quercus* sp., heartwood (D Haddon-Reece 1984)

Initial comment: combined sample consisting of core 1 (55 rings) and core 2 (45 rings) taken from a collar beam, boring downwards into the upper face. No dendrochronology measurement was possible.

Objectives: to date the arch-braced collar truss included in the earliest discernible part of the building.

Calibrated date: 1 σ : cal AD 1220–1380
2 σ : cal AD 1160–1410

Final comment: R Young (6 July 1996), like HAR-6801 and HAR-6802, this result confirms the written records of Haseley.

HAR-6353 580 ±100 BP

$\delta^{13}\text{C}$: -24.5‰

Sample: HM83H, submitted in January 1984 by D Haddon-Reece

Material: wood: *Quercus* sp., heartwood (D Haddon-Reece 1984)

Initial comment: section 5/4 from core 5 from the northern arch brace; one end is the outer face of the beam and has smoke blackening. The sample consisted of four rings.

Objectives: to date the arch-braced collar truss included in the earliest discernible part of the building.

Calibrated date: 1 σ : cal AD 1280–1440
2 σ : cal AD 1260–1470

Final comment: R Young (6 July 1996), the result is well within the expected building of this wing, confirming the likely date.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 304

HAR-6361 500 ±90 BP

$\delta^{13}\text{C}$: -26.6‰

Sample: HM83C, submitted in January 1984 by D Haddon-Reece

Material: wood: *Quercus* sp., heartwood (D Haddon-Reece 1984)

Initial comment: combined sample from three cores (4U, 4M, and 4L) taken from the southern rafter. These three cores cross-matched. The samples contained rings which grew over a 40-year period.

Objectives: to date the arch-braced collar truss included in the earliest discernible part of the building.

Calibrated date: 1 σ : cal AD 1320–1460
2 σ : cal AD 1280–1640

Final comment: R Young (6 July 1996), HAR-6361 would seem to be over such a wide range and of a much later date than all of the other samples as to question its viability. Also the later end AD 1630 is nowhere near the organic growth of the manor building as the recorded rebuilding of the medieval grange was undertaken in AD 1538.

HAR-6801 600 \pm 80 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: HASMAN3, submitted in July 1985 by D Haddon-Reece

Material: wood: unidentified

Initial comment: context unknown.

Objectives: to date the arch-braced collar truss included in the earliest discernible part of the building.

Calibrated date: 1 σ : cal AD 1280–1420
2 σ : cal AD 1260–1450

Final comment: R Young (6 July 1996), the results confirm the written record, that this building was built by the monks of Quarr Abbey after AD 1136 and before being modified and extended by John Mills in AD 1538.

HAR-6802 720 \pm 70 BP

$\delta^{13}\text{C}$: -25.3‰

Sample: HASMAN4, submitted in July 1985 by D Haddon-Reece

Material: wood: unidentified

Initial comment: context unknown.

Objectives: to date the arch-braced collar truss included in the earliest discernible part of the building.

Calibrated date: 1 σ : cal AD 1250–1380
2 σ : cal AD 1180–1400

Final comment: R Young (6 July 1996), HAR-6802, together with HAR-6801, compare favourably with the scant written records of Haseley.

Hawsker: Gnipe Howe Round Barrow, North Yorkshire

Location: NZ 934856
Lat. 55.09.21 N; Long. 00.32.02 W

Project manager: A E Finney (East Riding Archaeological Research Committee), 1972

Archival body: Hull and East Riding Museum

Description: excavated early in 1972, in the parish of Hawsker-cum-Stainsacre at 180m OD, the site is in the northern sector of farm buildings belonging to Gnipe Howe farm. Both farm and the barrow are on a sandstone spur of reclaimed moorland less than 400m from the sea. The nearby cliff face had several jet mines, and at least one mining tunnel ran under the farm.

Objectives: to date the phases of construction of the barrow.

References: Brewster and Finney 1995, 1–3

HAR-4933 3240 \pm 80 BP

$\delta^{13}\text{C}$: -27.0‰

Sample: GHCFCCB2, submitted on 12 April 1982 by T C H Brewster

Material: charcoal: *Fagus* sp.; *Quercus* sp.

Initial comment: seated beneath an intact Food Vessel in a partly robbed cist.

Objectives: to date the construction of the cist.

Calibrated date: 1 σ : 1620–1430 cal BC
2 σ : 1740–1320 cal BC

Final comment: T C M Brewster and A E Finney (1995), HAR-4993 and HAR-8787 dated the cist with the latter being nearly compatible with the early Bronze Age Fargo phase of 1800–1650 BC.

HAR-8773 3440 \pm 90 BP

$\delta^{13}\text{C}$: -28.1‰

Sample: GHRBQB2, submitted on 7 August 1985 by A E Finney

Material: charcoal (remaining subsample identified): unidentified (1.97g); *Quercus* sp., sapwood (0.13g, 6.6%); Pomoideae (0.49g, 24.7%); *Quercus* sp., heartwood (1.36g, 68.7%) (R Gale 1999)

Initial comment: associated with Urn III and found in Quad B. The sample was resting on the stones of the cairn and was sealed by the final capping mound.

Objectives: this sample will provide an independent date for the pot and its contents. As the pot was covered by the mound it also provides a date for the final sealing of the mound, and can be compared to the date for HAR-8774, a sample from a similar position.

Calibrated date: 1 σ : 1890–1630 cal BC
2 σ : 2020–1520 cal BC

Final comment: A Finney (1992), the result provides an independent date for the pot and its contents as well as for the final sealing of the mound.

References: Hardiman *et al* 1992, 49
Walker *et al* 1991a, 106

HAR-8774 3910 \pm 150 BP

$\delta^{13}\text{C}$: -28.1‰

Sample: GHRBQB3, submitted on 7 August 1985 by A E Finney

Material: charcoal: unidentified

Initial comment: associated with many fragments of pot Urn II. Flakes of flint showing traces of burning and deposits of charcoal and ash were also found with the pot sherds. Found in undisturbed soil sealed by final capping mound.

Objectives: to provide a date for the final capping of the mound and to compare with the date for sample HAR-8773, which is also from area sealed by final mound.

Calibrated date: 1 σ : 2580–2140 cal BC
2 σ : 2880–1960 cal BC

Final comment: see HAR-8773

References: Walker *et al* 1991a, 106

HAR-8787 3500 \pm 90 BP

$\delta^{13}C$: -27.3‰

Sample: GHRBCC1, submitted on 7 August 1985 by A E Finney

Material: charcoal: unidentified

Initial comment: from a disturbed and robbed cremation cist, which was located in the centre of the mound. The sample comes from the bottom of the cist where the deposits remained *in situ* with an intact Food Vessel.

Objectives: to provide an independent date for the cremation cist, which appears to be earlier than the later burials in the urns and therefore possibly illustrating two phases of use of the round barrow.

Calibrated date: 1 σ : 1950–1690 cal BC
2 σ : 2120–1610 cal BC

Final comment: see HAR-4933

References: Walker *et al* 1991a, 106

Hayling Island: Iron Age and Roman Temple, Hampshire

Location: SU 724031
Lat. 50.49.20 N; Long. 00.58.19 W

Project manager: G Soffe (English Heritage) and A King (University of Winchester), 1976–82

Archival body: English Heritage

Description: the site of Hayling Island was first excavated at the beginning of this century, but at that time the form and nature of non-classical temples was poorly understood and the temple not recognised for what it was. Lewis (1966) in his review of evidence for temples in Roman Britain, recorded the existence of the site as a possible temple, but left the question of its function open due to lack of detailed evidence. Interpretation of the site remained in this uncertain state until 1975/6, when new aerial photographs of high definition and clarity enabled the present authors to suggest tentatively that the form resembled a Romano-Celtic temple, and to mount a campaign of excavations between 1976 and 1982. It was immediately apparent that Iron Age material underlay the Roman phase and structural details of an Iron Age shrine gradually came to light in successive seasons.

Objectives: to uncover the plan of the late Iron Age religious complex, and understand its sequence of development; to record the overlying Roman temple and its development; and to explore the nature of subsequent occupation.

Final comment: A King (11 October 2007), three dates from Iron Age features are sought to help date the initial construction and final use of the Iron Age temple. Three dates from Anglo-Saxon features are also sought to help date this phase of occupation. Subsequent to these dates being obtained, two further radiocarbon determinations were undertaken on material from the 2001 excavation. These produced dates of cal AD 630–880 (Wk-10542; 1312 \pm 60 BP) and cal AD 540–1020 (Wk-10543; 1277 \pm 125 BP) (at 95% confidence; Reimer *et al* 2004), which conformed to the dating for the Anglo-Saxon features from the site.

References: Downey *et al* 1980
King and Soffe 1994
Lewis 1966
Reimer *et al* 2004
Walker *et al* 1991a, 99–100

HAR-8532 1400 \pm 90 BP

$\delta^{13}C$: -25.3‰

Sample: K3, submitted in April 1986 by G Soffe

Material: charcoal (large wood, remaining subsample identified): unidentified (0.44g); *Quercus* sp., heartwood (0.09g, 14.5%); *Quercus* sp., sapwood (0.53g, 85.5%) (R Gale 1999)

Initial comment: from shallow ditch overlying the Roman temple. Mid-Saxon pottery is associated with this feature.

Objectives: to obtain a date for the middle Saxon occupation of the site.

Calibrated date: 1 σ : cal AD 570–680
2 σ : cal AD 430–780

Final comment: A King (11 October 2007), the dating confirms the suggested date of the feature.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-8533 2230 \pm 130 BP

$\delta^{13}C$: -25.7‰

Sample: E98/99, submitted in April 1986 by G Soffe

Material: charcoal: unidentified, large wood

Initial comment: part of a burnt timber of a post forming part of the entrance to the Iron Age temple.

Objectives: to date the construction and use of the Iron Age temple.

Calibrated date: 1 σ : 410–110 cal BC
2 σ : 760 cal BC–cal AD 50

Final comment: A King (11 October 2007), the dating suggests that the initial phase of Iron Age use of the site was earlier than previously thought.

HAR-8534 1910 ±70 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: E39A, submitted in April 1986 by G Soffe

Material: charcoal: unidentified

Initial comment: from a pit in the centre of the temple, probable of ritual use. It is associated with metalwork, unusual forms of pottery and Celtic coins.

Objectives: to provide a date for the construction and use of the Iron Age temple.

Calibrated date: 1 σ : cal AD 20–210
2 σ : 50 cal BC–cal AD 250

Final comment: G Soffe (1991), dates use and final phase of the Iron Age temple.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-8535 1840 ±100 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: E46, submitted in April 1986 by G Soffe

Material: charcoal (remaining subsample identified): unidentified (<0.01g); *Quercus* sp., heartwood (<0.01g, 100%) (R Gale 1999)

Initial comment: from a late Iron Age gully forming part of the circular structure of a temple. It is associated with unusual forms of pottery and Celtic coin.

Objectives: as HAR-8534

Calibrated date: 1 σ : cal AD 60–330
2 σ : 50 cal BC–cal AD 420

Final comment: G Soffe (1991), dates use and final phase of the Iron Age temple.

References: Hardiman *et al* 1992, 59–60

HAR-8536 1440 ±90 BP

$\delta^{13}\text{C}$: -26.4‰

Sample: V57A/1, submitted in April 1986 by G Soffe

Material: charcoal: unidentified, large wood

Initial comment: part of a burnt plank in the bottom of a mid-Saxon pit dug into the courtyard of the Roman Temple. From the same context as HAR-8537.

Objectives: to obtain a date for the middle Saxon occupation of the site.

Calibrated date: 1 σ : cal AD 540–670
2 σ : cal AD 420–770

Final comment: A King (11 October 2007), dates the middle Saxon occupation of the site.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-8537 1720 ±100 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: V57A/2, submitted in April 1986 by G Soffe

Material: charcoal (large wood remaining subsample identified): unidentified (0.21g); *Quercus* sp., heartwood (0.20g, 100%) (R Gale 1999)

Initial comment: from the same context as HAR-8536.

Objectives: to confirm date of HAR-8536.

Calibrated date: 1 σ : cal AD 220–430
2 σ : cal AD 70–550

Final comment: G Soffe (1991), dates the middle Saxon occupation of the site.

Final comment: A Bayliss (22 February 2008), the two radiocarbon results on bulk charcoal samples from this context are not statistically consistent ($T'=4.3$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978). It appears that HAR-8537, at least, contained wood with an age-at-death offset and so is older than the context from which it was recovered.

References: Hardiman *et al* 1992, 60
Ward and Wilson 1978

Hazleton, Gloucestershire

Location: SP 073189
Lat. 51.52.05 N; Long. 01.53.38 W

Project manager: A Saville (Cheltenham Art Gallery and Museum), 1980–2

Archival body: Corinium Museum

Description: an early Neolithic chambered long cairn of the Cotswold-Severn group. This trapezoidal long cairn is an example of the laterally-chambered type of tomb with two very similar L-shaped chambered areas near its centre, entered from opposite sides of the monument.

Objectives: to provide a chronology for the site.

Final comment: A Saville (1990), as well as the three samples HAR-8349 to HAR-8351, a major series of radiocarbon determinations was undertaken by the Radiocarbon Accelerator Unit at Oxford University. Formal lists of the Oxford dates, which were all obtained from small-sized samples using Accelerator Mass Spectrometry, have already appeared (Gillespie *et al* 1985; Gowlett *et al* 1986a, 1986b, and 1987; Hedges *et al* 1988), as have discussions based upon some of the dates (Saville 1986 and 1990, Saville *et al* 1987).

The series as a whole is extremely compact, virtually all the dates overlapping in a very marked way, around a central point at c 4900 BP, (c 3700 cal BC), with only a few eccentric dates at either end of the sequence. The compactness of this series encourages confidence in the validity of the Hazleton dates and is suggestive of a very limited time range for all the activity under consideration. Although it is clear that a sequence of events is involved, the conclusion to be drawn from the dates as a whole is that the timescale of events under investigation is simply too short for a relatively small number of radiocarbon dates, with their associated error terms, to subdivide satisfactorily. This is particularly evident from the fact that the pre-cairn and

monument construction dates are individually indistinguishable from most of the burial dates. A complex multi-optional conversion for the calibration of most dates of the Neolithic period exists depending on where they fall when plotted against the calibration curve (Pearson *et al* 1986; cf Saville *et al* 1987, fig 4). Detailed consideration of the existing Hazleton radiocarbon dates suggested that a 'minimum' range of *c* 3780–3640 cal BC and a 'maximum' range of *c* 3800–3500 cal BC were indicated by the central spread of dates (Saville *et al* 1987, 115). Statistically, however, the radiocarbon dates are not separable and we cannot validly determine 'minimum' and 'maximum' ranges; instead, we can eliminate outliers (OxA-383 and OxA-1177), combine the values for groups of dates, and then the groupings themselves to give an overall value of 4891 ±33 BP, calibrating to 3780–3640 cal BC at 95% confidence (Pearson *et al* 1986). Thus, the calibration only produces a slight broadening of the period of activity at Hazleton.

Laboratory comment: English Heritage (2011), further consideration of the chronology of this monument, including additional radiocarbon dates and formal chronological modelling, is discussed by Meadows *et al* (2007).

References: Gillespie *et al* 1985
Gowlett *et al* 1986a
Gowlett *et al* 1986b
Gowlett *et al* 1987
Hedges *et al* 1988
Meadows *et al* 2007
Pearson *et al* 1986
Saville *et al* 1987
Saville 1986
Saville 1990

HAR-8349 4830 ±60 BP

$\delta^{13}\text{C}$: -23.5‰

Sample: 13926, submitted on 11 August 1986 by A Saville

Material: antler: *Cervus elaphus*

Initial comment: from context 463, from the base of the cairn infill adjacent to the south and north chambers, ie this antler is incorporated within an early phase of the cairn construction. Some pieces of the antler have been glued together with UHU or masking tape.

Objectives: to date the initial construction phase in the axial zone between two chambers, subsequent to the erection of the orthostats.

Calibrated date: 1 σ : 3660–3530 cal BC
2 σ : 3710–3380 cal BC

Final comment: A Saville (1990), antler 3129 (HAR-8350) came from the primary fill of the western cutting through the north quarry, at about 150mm above the quarry floor and must relate to a very early phase of the quarry infill. Circumstantially, the antler is presumed to have been a discarded quarrying tool and therefore directly associated with the constructional process. The other dated antler came from the dump deposit 463, representing the initial construction phase in the axial zone between the two chambers, subsequent to the erection of the orthostats. This antler was therefore directly associated with the cairn construction. There was nothing to indicate any ritual connotation to its occurrence, and it is assumed, as with the previous antler, to have been a

discarded tool. A third antler (8481), from the primary fill of the south quarry, was also submitted to Harwell but in this case no date was obtained from the sample.

References: Saville 1990
Walker *et al* 1990, 194

HAR-8350 4950 ±60 BP

$\delta^{13}\text{C}$: -23.4‰

Sample: 3129, submitted on 11 August 1986 by A Saville

Material: antler: *Cervus elaphus*

Initial comment: from context 85, the primary infill of the northern quarry flanking of the long cairn. The antler is part of a discarded tool used in the quarrying of limestone to be used in the building of the long cairn. The antler was found 160mm above the quarry floor. The antler has been repaired with UHU glue.

Objectives: to provide a date for the quarrying activity in the northern quarry. No other suitable organic material from the primary fill was available for dating. The antler is presumed to have been a discarded tool and therefore directly associated with the quarrying construction process.

Calibrated date: 1 σ : 3790–3650 cal BC
2 σ : 3940–3640 cal BC

Final comment: see HAR-8349

References: Walker *et al* 1990, 194

HAR-8351 5730 ±100 BP

$\delta^{13}\text{C}$: -23.9‰

Sample: 8481, submitted on 11 August 1986 by A Saville

Material: antler: *Cervus elaphus*

Initial comment: from context 214, a lens within the primary infill of the southern quarry flanking the long cairn. The antler has been repaired using UHU glue or masking tape.

Objectives: to provide a date for the quarrying activity in the southern quarry.

Calibrated date: 1 σ : 4710–4450 cal BC
2 σ : 4800–4350 cal BC

Final comment: A Saville (1995), this date is clearly a problem since it is Mesolithic, when it should relate to the cairn construction phase, as do HAR-8349 and HAR-8350.

Laboratory comment: Ancient Monuments Laboratory (1995), this sample was measured on the mini counter system (Otlet *et al* 1983) and the result was not available prior to publication of Saville (1990).

References: Otlet *et al* 1983
Saville 1990

Helman Tor, Cornwall

Location: SX 068607
Lat. 50.24.49 N; Long. 04.43.11 W

Project manager: R Mercer (University of Edinburgh), August 1986

Archival body: Royal Cornwall Museum

Description: middle Neolithic settlement site at Helman Tor, Parish of Lanlivery, Lostwithiel, Cornwall.

Objectives: to assign chronological limits to the second settlement of Carn Brea type and to furnish comparative chronology with the latter site.

Final comment: R Mercer (10 May 1995), this excavation was undertaken to explore the possibility that the hilltop enclosure at Helman Tor was similar in date, type, and function to that at Carn Brea (Mercer 1981). Radiocarbon dating was undertaken to demonstrate the parallel date of the site to that at Carn Brea and also, in so far as was possible, to elucidate the internal chronology of the site.

Laboratory comment: English Heritage (2011), further discussion of the chronology of Helman Tor, including formal chronological modelling, is provided by Whittle *et al* (2011, 497–504).

References:
Mercer 1981
Mercer 1986
Mercer 2001
Walker *et al* 1991a, 109
Whittle *et al* 2011

HAR-8818 4880 ±120 BP

$\delta^{13}\text{C}$: -28.9‰

Sample: HT8659, submitted in June 1987 by R Mercer

Material: charcoal (remaining fragmented subsample identified): unidentified (15.93g); *Quercus* sp., sapwood (0.04g, 1.12%); *Alnus* sp. (0.82g, 22.84%); *Quercus* sp., heartwood (1.77g, 49.3%); *Corylus* sp. (0.96g, 26.74%) (R Gale 1999)

Initial comment: from a charcoal-filled posthole of a Neolithic structure.

Objectives: to assign chronology to the middle Neolithic settlement site and allow comparison with the very similar site dated to 3000–2700 BC at Carn Brea, Illogan, Cornwall.

Calibrated date: 1 σ : 3790–3530 cal BC
2 σ : 3960–3370 cal BC

Final comment: R Mercer (10 May 1995), this date relates to the post hole relating to a multiplicity of structures on the inner platform of the occupation area. It is stratigraphically indistinguishable from HAR-8820 and HAR-8821, which may well demonstrate the long period over which a complex series of archaeologically inseparable structures existed on the site.

HAR-8819 4520 ±60 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: HT86L6, submitted in June 1987 by R Mercer

Material: charcoal (remaining subsample identified): unidentified (9.93g); Pomoideae (0.13g, 0.84%); *Prunus spinosa* (0.34g, 2.19%); *Quercus* sp., sapwood (5.47g, 35.22%); *Quercus* sp., large fragments, fast-grown and probably from wide roundwood, heartwood (9.13g, 58.79%); *Corylus* sp. (0.46g, 2.96%) (R Gale 1999)

Initial comment: from layer 6, a dark black soft-textured matrix rich in Neolithic finds, within midden.

Objectives: to assign chronology to the middle Neolithic settlement site and compare with Carn Brea, Illogan, as well as to allow internal chronological comparison of midden and of structure built over it.

Calibrated date: 1 σ : 3370–3090 cal BC
2 σ : 3500–3020 cal BC

Final comment: R Mercer (10 May 1995), this date is an accumulative sample from the trampled surface of an (archaeologically interpreted) midden deposit set in a hollow on the eastern side of the site. The date is anomalous in terms of the other more securely dated aspects of the site. It may reflect the length of activity on the site.

HAR-8820 4490 ±70 BP

$\delta^{13}\text{C}$: -27.9‰

Sample: HT86660A, submitted in June 1987 by R Mercer

Material: charcoal (remaining subsample identified): unidentified (7.00g); *Alnus* sp. (<0.01g, 0.96%); *Corylus* sp. (1.03g, 99.04%) (R Gale 1999)

Initial comment: from a pit hearth within the occupation surface close to a concentration of post pits. Relates to latest phase of activity on the terrace. This date will provide a *terminus ante quem* for construction of the enclosure wall.

Objectives: to date Neolithic occupation associated with a structure (see HAR-8818). This sample was superimposed on midden material (see HAR-8819).

Calibrated date: 1 σ : 3360–3020 cal BC
2 σ : 3490–2920 cal BC

Final comment: A Bayliss (3 March 2008), the two radiocarbon results on bulk charcoal samples from this context are not statistically consistent ($T'=6.4$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). This may be due to heterogeneity in the sample and/or to the location of the feature on a perhaps long-exposed and long-used surface.

Final comment: R Mercer (10 May 1995), this date relates to an open hearth packed with charcoal set on the platform to the west of the site. Stratigraphically it is contemporary with HAR-8818. Its disparity from the latter date demonstrates the long period over which the site was in use.

References: Ward and Wilson 1978

HAR-8821 4240 ±70 BP

$\delta^{13}\text{C}$: -28.5‰

Sample: HT8660B, submitted in June 1987 by R Mercer

Material: charcoal (remaining subsample identified): unidentified (0.95g); *Alnus* sp. (<0.01g, 9.1%); bark, unidentified (0.03g, 27.3%); *Corylus* sp. (0.07g, 63.6%) (R Gale 1999)

Initial comment: from a pit hearth within the occupation surface close to a concentration of post pits. This sample relates to the latest phase of activity on the terrace and provides a *terminus ante quem* for the construction of the wall.

Objectives: to date the Neolithic occupation associated with a structure (see HAR-8818). This sample was superimposed on midden material (see HAR-8819).

Calibrated date: 1 σ : 2910–2710 cal BC
2 σ : 3020–2620 cal BC

Final comment: see HAR-8820

Final comment: see HAR-8820

HAR-8822 4780 \pm 70 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: HT86103A, submitted in June 1987 by R Mercer

Material: charcoal (remaining subsample identified): unidentified (23.72g); *Prunus spinosa* (0.06g, 0.7%); *Quercus* sp. (2.17g, 25.9%); *Quercus* sp., heartwood (2.71g, 32.4%); *Corylus* sp. (3.43g, 41%) (R Gale 1999)

Initial comment: from a pit hearth cut through layer 6. This sample relates to the latest phase of activity on the terrace, and provides a *terminus ante quem* for construction of the enclosure wall.

Objectives: to establish a *terminus ante quem* for the construction of the Neolithic enclosure wall.

Calibrated date: 1 σ : 3650–3380 cal BC
2 σ : 3700–3370 cal BC

Final comment: A Bayliss (3 March 2008), the two radiocarbon results on bulk charcoal samples from this context are statistically consistent ($T'=0.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978), although they are also significantly earlier than HAR-8819, which is from a stratigraphically earlier context.

Final comment: R Mercer (10 May 1995), this date comes from a hearth quite clearly (archaeologically) later than layer 6 through which it is cut. It is also disparate from the date obtained from the surface to the west. It emphasises the complexity of *internal* chronology on the site as well as confirming its *external* chronology.

References: Ward and Wilson 1978

HAR-8823 4750 \pm 70 BP

$\delta^{13}\text{C}$: -27.9‰

Sample: HT86103B, submitted in June 1987 by R Mercer

Material: charcoal (remaining subsample identified): unidentified (62.00g); *Corylus* sp., fast-grown (17.30g, 100%) (R Gale 1999)

Initial comment: as HAR-8822

Objectives: to confirm HAR-8822.

Calibrated date: 1 σ : 3640–3370 cal BC
2 σ : 3660–3360 cal BC

Final comment: see HAR-8822

Final comment: see HAR-8822

Hemington Fields, Leicestershire

Location: SK 4530
Lat. 52.51.55 N; Long. 01.19.53 W

Project manager: C R Salisbury (Independent), 1985–94

Archival body: Dr C Salisbury, Nottingham

Description: a palaeochannel on the vicinity of the confluence of the rivers Derwent and Trent.

Final comment: C Salisbury (11 January 1998), all these samples come from structures built into the riverbed during the formation of a meander core in the Trent floodplain bounded by a thirteenth- to fourteenth-century AD palaeochannel. It is hoped to establish a sequence of channels, which are associated with and modified by a twelfth-century mill dam, a series of bridges from the eleventh- to thirteenth-century AD, and many fish weirs. Combined with dendrochronological evidence, the dates suggest that the core did not expand regularly but was formed by a shifting pattern of anastomotic channels with the survival of untouched 'parcels' of gravel, one of which incorporates a thirteenth-century BC palaeochannel.

References: Clay 1986
Clay 1992
Clay and Salisbury 1991
Losco-Bradley and Salisbury 1988
Salisbury 1980
Salisbury 1984
Salisbury 1991
Salisbury 1992

HAR-8223 5240 \pm 80 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: PL6BRW86, submitted on 22 April 1986 by C R Salisbury

Material: wood (waterlogged): *Fraxinus* sp., brushwood, c 20 rings (C Salisbury 1986)

Initial comment: from the bed of an ancient course of the Trent, which was abandoned suddenly and rapidly filled with gravel, probably because of a major flood. The sample was in a thin layer of riverbed silt and sealed by clean gravel.

Objectives: to establish whether the channel is Norman or late Bronze Age. The channel is in line with the Norman mill dam and late Bronze Age post alignment (see HAR-8224), but they are not directly linked because the channel has been washed out at its south-west extension.

Calibrated date: 1 σ : 4230–3960 cal BC
2 σ : 4320–3820 cal BC

Final comment: C Salisbury (11 January 1998), it is now clear that this sample was taken from a repositioned organic silt clast derived from an upstream palaeochannel eroded by the river. The site channel was subsequently dated by dendrochronology to the eleventh century AD. Such deposits are quite inappropriate for dating purposes.

References: Walker *et al* 1990, 193

HAR-8224 910 \pm 70 BP

$\delta^{13}\text{C}$: -27.6‰

Sample: PL1WAT85, submitted on 22 April 1986 by C R Salisbury

Material: wood (waterlogged; round-section wattle rods): *Corylus* sp., 11 rings on average (C Salisbury 1986)

Initial comment: from a wattle panel in the floodplain gravel below the water table, and probably part of a fish weir.

Objectives: the main structure is a Norman mill dam made of squared oak posts and timbers. Between the double row of posts is a row of birch posts on exactly the same alignment. A preliminary radiocarbon age from this structure (subsequently withdrawn) suggested a date *c* 800 cal BC. A further radiocarbon date is required to confirm that the wattle panel is associated with the late Bronze Age alignment and not part of the Norman dam. If it is late Bronze Age it may be a uniquely early example of a fish weir in England.

Calibrated date: 1 σ : cal AD 1020–1220
2 σ : cal AD 990–1270

Final comment: C Salisbury (11 January 1998), the date suggests that this fish weir wattling is contemporary with, or a little earlier than the overlying mill dam (with a dendrochronological date of cal AD 1120). The weir had probably created a sand bar on which the mill dam was built. Re-dating of the fish weir post gave a result contemporary with the wattle and not in the Bronze Age!

Final comment: A Bayliss (11 March 2008), the three radiocarbon results from this structure (HAR-8224, HAR-8509, and Q-unknown, 950 \pm 50 BP) are from different timbers, and are not statistically consistent ($T'=7.3$; $T'(5\%)=6.0$; $v=2$; Ward and Wilson 1978). As all the dated wood was short-lived, this may suggest the structure was repaired during its period of use.

References: Walker *et al* 1990, 193

HAR-8507 1280 \pm 70 BP

$\delta^{13}C$: -26.3‰

Sample: PL8FWA86, submitted on 2 April 1987 by C R Salisbury

Material: wood (waterlogged): *Quercus* sp., 17 rings of heartwood, 25 rings of sapwood with bark-edge (C Salisbury 1987)

Initial comment: from a post buried in clean gravel 1–3m below a gravel/overburden silt interface in a gravel pit 5.5m deep in the Trent floodplain. The post was probably part of a fish weir associated with a Norman milling complex.

Objectives: to establish whether this is part of a Norman landscape or contemporary with a late Bronze Age post row 100m away, making this the earliest fish weir in the east Midlands.

Calibrated date: 1 σ : cal AD 660–810
2 σ : cal AD 640–900

Final comment: C Salisbury (11 January 1998), this eighth-century AD fish weir lies between an eleventh century- and a thirteenth-century channel. The date suggests that it must occupy a relict 'parcel' of gravel bypassed by anastomotic channels of the Trent but a repeat estimation would be prudent.

References: Walker *et al* 1991a, 95–6
Ward and Wilson 1978

HAR-8508 4720 \pm 70 BP

$\delta^{13}C$: -25.3‰

Sample: PL7FWB86, submitted on 2 April 1987 by C R Salisbury

Material: wood (waterlogged; *Rhamnus catharticus*) (C Salisbury 1987)

Initial comment: from a post 2.5m below the gravel/silt overburden interface in a floodplain gravel pit 5.5m deep; probably part of a fish weir.

Objectives: as HAR-8507

Calibrated date: 1 σ : 3640–3370 cal BC
2 σ : 3650–3360 cal BC

Final comment: C Salisbury (11 January 1998), a fragment of wattle, two holly posts, one each of willow and elder, and five posts of purging buckthorn (one of which was sampled, HAR-8508) were all sealed under clean sand and gravel in a rapidly filled channel. The excavator's opinion is that this was a primary deposit and, if not a fish weir, can still reliably date the channel as Neolithic. A relict 'parcel' of gravel left behind by river anastomosis.

References: Walker *et al* 1991a, 96

HAR-8509 1150 \pm 70 BP

$\delta^{13}C$: -28.7‰

Sample: PL1PST85, submitted on 2 April 1987 by C R Salisbury

Material: wood (waterlogged): *Corylus* sp., approximately 30 rings (C Salisbury 1987)

Initial comment: from vertical posts buried in a gravel pit under 2m of clean gravel and 1m of silt overburden. The posts had been driven into an old riverbed and rapidly buried because of lateral river meandering. They were well below the water table and in anaerobic conditions and were probably part of a Norman mill dam. The majority of the lignin/cellulose had disappeared by chemical action (non-biological). Only the samples for identification were kept, so wood from five adjacent posts was combined to make up 20g.

Objectives: to establish a date for the posts to compare with other radiocarbon dates of a row of posts with a brushwood wattle panel. A date will also provide information for the east Midlands dendrochronological master curve at the extreme limit and possibly extend it by 50 years.

Calibrated date: 1 σ : cal AD 770–990
2 σ : cal AD 680–1030

Final comment: C Salisbury (11 January 1998), the date supports the suggestion that these five posts were part of a fish weir that had formed a sandbar upon which a twelfth-century mill dam had been built. The fish weir was used for two centuries.

Final comment: see HAR-8224

References: Walker *et al* 1991a, 96

Hengistbury Head, Dorset

- Location:* SZ 175905
Lat. 50.42.48 N; Long. 01.45.08 W
- Project manager:* R I Macphail (Institute of Archaeology, London), September 1983
- Archival body:* Institute of Archaeology, London
- Description:* an Upper Palaeolithic and early Mesolithic site located on Eocene Bracklesham Beds and superficial deposits, with artefacts occurring within the now heath-covered Holocene podzolic soil cover. A prehistoric bank and ditch are also present.
- Objectives:* to date the pollen sequence and the site activity.
- References:* De Coninck 1980
Macphail 1992
Scaife and Macphail 1983

HAR-6185 1700 ±90 BP

$\delta^{13}\text{C}$: -28.8‰

Sample: HENG4BHS, submitted on 23 May 1984 by R I Macphail

Material: soil

Initial comment: acid cemented Bhs horizon.

Objectives: to date illuvial organic matter relating to earliest heath formation; also possibly relating to intensive Mesolithic activity on site. The date will relate to the pollen sequence.

Calibrated date: 1 σ : cal AD 230–430
2 σ : cal AD 120–550

Final comment: R I Macphail (20 June 1995), this is regarded as a MRT (Mean Residence Time) date and has been produced by the dating of carbon from what can be regarded as the 'oldest' monomorphic illuvial organic matter in the humoferric podzol studied. 'Younger' humus would be expected in the overlying 'unaged' polymorphic Bh horizon. The MRT date of 1700 ±90 BP suggests major podzolisation during the late Bronze Age/early Iron Age. This coincides with the soil micromorphological and pollen interpretation from the bank feature (HAR-6186). Many other southern heathland sites have evidence of Mesolithic podzolisation. In comparison full podzolisation appears to be late at Hengistbury Head despite an early Mesolithic presence.

HAR-6186 3350 ±90 BP

$\delta^{13}\text{C}$: -29.2‰

Sample: HENG1BOH, submitted on 23 May 1984 by R I Macphail

Material: soil (remaining subsample consisted of small lumps of soil with filament-like rootlets; no identifiable material present) (R Gale 1999)

Initial comment: acid buried soil beneath bank.

Objectives: to date pollen sequence and provide a *terminus post quem* for bank and its buried soil.

Calibrated date: 1 σ : 1750–1520 cal BC
2 σ : 1890–1430 cal BC

Final comment: R I Macphail (20 June 1995), the late Bronze Age date for the burial beneath the bank is possibly supported by the presence of barrows, whereas Hengistbury Head generally is famous for its prehistoric to Roman archaeology. Pollen and soil micromorphology show that the typical gley-podzol formed under oak woodland and it is suggested that clearance and full-blown podzolisation commenced after the construction of this bank. Late podzolisation under oak woodland was also reported from the Iron Age site of Caesar's Camp, Kent, for example.

Henley Wood, Somerset

- Location:* ST 443652
Lat. 51.22.57 N; Long. 02.48.02 W
- Project manager:* L R J Watts and P F Leach (Western Archaeological Trust), 1962–9

Archival body: North Somerset Museum

Description: a Roman temple of two or possibly three phases, with a late/post-Roman cemetery of fifth–seventh century date, partly overlapping with the latest sub-phases of the temple.

Objectives: to date the cemetery, which has no certain associated finds. This site is of special interest in the study of the post-Roman West of Britain, being close to the hillfort of Cadbury–Congresbury, which was reused in the sixth century AD.

Final comment: P A Rahtz and L R J Watts (9 July 1995), 15 determinations were made from human skeletal material. All were from adults, except HAR-8761, an infant stratified in temple levels earlier than the fourth century AD; the date range of the latter (cal AD 650–1030 at 95% confidence; Reimer *et al* 2004) is thus at least three centuries later than that anticipated from the archaeological evidence, and should thus be discounted. The remaining 14 determinations were from graves inside the south ambulatory of the late Roman temple, and from a cemetery of 60+ individuals lying to the east of the temple, many in the filling of the temple *temenos* ditch.

In general terms, the graves should be of the late fourth century or later, since they are secondary to the main use of the temple in the later fourth century, with very few exceptions. There is a possibility that one or more of the graves in the south ambulatory might be contemporary with some late secondary use of the temple.

Only three determinations begin their 68% confidence range earlier than cal AD 380. The main bunching is from this date onwards to the beginning of the seventh century. One exception was HAR-5583, but this was replicated by HAR-8758, which gave a date range within the 'bunching' referred to above. Another exception is HAR-8761, which appears to be anomalously late.

On the basis of the general run of dates, and on that of coins (which in some cases include the earlier part of the radiocarbon range) we would date the cemetery as fifth to seventh centuries AD, with an especial emphasis on the fifth to sixth centuries. The end of the range at 68% confidence is in no case later than cal AD 670, or cal AD 770 at 95% confidence; but only two graves have a 95% confidence range

ending later than cal AD 660. Within these broad limits, there is no clear evidence that the cemetery developed in a particular direction, or that parts of it were different in date from others. The only exception to this general statement is that the graves in the temple ambulatory may possibly be among the earliest. No date among these, at 68% confidence, is later than cal AD 570 (cal AD 610 at 95% confidence). The three for which high-precision dates were provided (HAR-8758, HAR-8762, and HAR-8759) bunch tightly between cal AD 410 and cal AD 570 at 68% confidence (cal AD 390 and cal AD 610 at 95% confidence). While the fifth-century to (?earlier) seventh-century range is important for the dating of the otherwise undated cemetery succeeding the Roman temples at Henley Wood (ie for the site sequence) it is also useful confirmation that some or all of the graves could be those of the nearby hillfort of Cadbury Congresbury, which excavation has shown was a high-status settlement, centring on the sixth century (Rahtz 1992).

In a wider context, the dating also confirms the Henley Wood cemetery as one of a series of such cemeteries in the south-west of England, of which the type-site is Cannington, near Bridgewater. The much larger cemetery there, of several hundred individuals, also has its origins in the late Roman period, and continues to *c* AD 700. Such cemeteries are at present the best evidence for continuity of indigenous settlement in the area in the fifth to seventh centuries AD, supported by more complex evidence from hillforts and temple sites. While no direct evidence has been found that any or all those cemeteries show evidence of Christianity, there is a possibility that this religion influenced some facets of mortuary ritual. It is currently suggested that such cemeteries are those of dispersed settlements grouped around local high-status sites and their rulers; a society which finally gave way to more organised English establishments of church and cemetery, which led to the abandonment of the earlier cemeteries such as Henley Wood.

We might finally ask whether the 13 effective radiocarbon determinations provided by Harwell (about 18% of the total number of individuals buried) were sufficient to indicate the dating of the cemetery as a whole? Would (say) twice the number have provided us with a closer dating, and a better idea of the variations in the burying population? One might hazard a guess that further dates would not have contributed much to the broad dating of the cemetery, but would provide a higher confidence level (especially high-precision dates) and would very likely help to determine the directions and manner in which the cemetery developed. Was this multi-focal, based on kin or other allegiance nuclei, or was it organised by some other control, which led, for example, to systematic development in rows? Ideally, one would like to have a determination based on each and every burial; and indeed such a programme encompassing several examples of this type of cemetery would then provide hypotheses to be tested elsewhere where the number of radiocarbon determinations was more limited.

References: Rahtz 1977
Rahtz 1992
Reimer *et al* 2004
Walker *et al* 1991a, 105–6
Watts and Leach 1996

HAR-5583 1350 ±70 BP $\delta^{13}\text{C}$: -23.4‰*Sample:* HWHB5B, submitted in May 1983 by P J Leach*Material:* human bone*Initial comment:* one of a pair of skeletons in a double grave in the temple ambulatory cutting fourth-century AD Roman temple remains; orientated north-south, in contrast with west-east of the cemetery proper.*Objectives:* to compare the date with others in the temple area, and the cemetery in general; also to compare with the other skeleton in the double grave (HAR-8762).*Calibrated date:* 1 σ : cal AD 640–770
2 σ : cal AD 570–810*Final comment:* A Bayliss (3 March 2008), the two radiocarbon results this skeleton are not statistically consistent (T' =8.7; $T'(5\%)$ =3.8; ν =1; Ward and Wilson 1978). The replicate measurement (HAR-8758) is, however, statistically consistent with the measurement on the other skeleton in this double grave (HAR-8762; T' =0.0; $T'(5\%)$ =3.8; ν =1) and so HAR-5583 may be anomalously late.*Final comment:* P A Rahtz (9 July 1995), this date was considered too late for its context; its relationship to the temple layers suggested a late fourth- or fifth-century date. It was accordingly re-submitted as HAR-8758 (high precision) below, which did indeed yield a more 'acceptable' date, which barely overlapped HAR-5583; and was moreover very similar to HAR-8762, the other member of this double grave.*References:* Ward and Wilson 1978**HAR-5584** 1530 ±70 BP $\delta^{13}\text{C}$: -22.0‰*Sample:* HWHB13, submitted in May 1983 by P J Leach*Material:* human bone*Initial comment:* from a single grave cut into the Roman temple *temenos* ditch.*Objectives:* to clarify any difference between this southerly zone of the cemetery (which has a slightly different orientation) and the northern zone.*Calibrated date:* 1 σ : cal AD 420–610
2 σ : cal AD 390–660*Final comment:* P A Rahtz (9 July 1995), this result accords well with other chronology, to support the general dating of the cemetery; no difference is seen in this southern zone. The dating range at 95% confidence nicely covers the span proposed for the cemetery.**HAR-5585** 1510 ±70 BP $\delta^{13}\text{C}$: -22.8‰*Sample:* HWHB24, submitted in May 1983 by P J Leach*Material:* human bone*Initial comment:* from a single rock-cut grave cutting the temple forecourt: from the same row as HAR-5589 below.

Objectives: to check whether this grave, at the extreme south end of the cemetery, is later in date.

Calibrated date: 1 σ : cal AD 430–630
2 σ : cal AD 400–660

Final comment: P A Rahtz (9 July 1995), the date range at 95% confidence falls neatly into the general dating of the cemetery, and does not support any difference in this most southern grave.

HAR-5586 1590 \pm 90 BP

$\delta^{13}\text{C}$: -22.8‰

Sample: HWHB25, submitted in May 1983 by P J Leach

Material: human bone

Initial comment: a single grave cutting into the *temenos* ditch in the southern zone.

Objectives: to compare with others in the cemetery area.

Calibrated date: 1 σ : cal AD 380–570
2 σ : cal AD 240–650

Final comment: P A Rahtz (9 July 1995), the wide range for this grave at 95% confidence makes it less useful than the others. While the terminal date of cal AD 650 is possible (if later than the *floruit*) the initial date of cal AD 240 is likely to be 150–200 years too early; at 68% confidence the initial date of cal AD 380 is however appropriate.

HAR-5587 1420 \pm 80 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: HWHB39, submitted in May 1983 by P J Leach

Material: human bone

Initial comment: from a single grave cutting into the Roman temple *temenos* ditch fills.

Objectives: to obtain a date for this grave, being a possible outlier nearer to the temple.

Calibrated date: 1 σ : cal AD 560–670
2 σ : cal AD 430–770

Final comment: P A Rahtz (9 July 1995), the earliest part of the date range is consistent with the proposed dating for the cemetery, but the later part of the range at 95% confidence is probably too late by 100 years or more; the 68% confidence range is however appropriate. The date range does not suggest that this outlier is of a different date.

HAR-5588 1630 \pm 80 BP

$\delta^{13}\text{C}$: -23.3‰

Sample: HW62HB3, submitted in May 1983 by P J Leach

Material: human bone

Initial comment: from a double grave in the temple ambulatory, cutting Roman temple remains.

Objectives: to date the double grave and compare with others in the temple ambulatory and the cemetery proper to the east of the temple.

Calibrated date: 1 σ : cal AD 330–540
2 σ : cal AD 230–610

Final comment: P A Rahtz (9 July 1995), the dating range at 95% confidence is wide, at cal AD 240–610. The initial date at both levels of confidence is probably too early by 100–150 years. In general though the dating shows that this double grave in the temple ambulatory is similar to others there, and also to the cemetery proper. The earlier part of the range (cal AD 230–367) is further shown to be unlikely and probably impossible, since it is stratified above a coin of AD 367–75.

HAR-5589 1430 \pm 80 BP

$\delta^{13}\text{C}$: -20.0‰ (assumed)

Sample: HWHB2, submitted in May 1983 by P J Leach

Material: human bone

Initial comment: from a single rock-cut grave, cutting the Roman temple forecourt south of temple and closest to it; from the same row as HAR-5585 above.

Objectives: to date this outlying grave and compare it to the cemetery as a whole.

Calibrated date: 1 σ : cal AD 560–670
2 σ : cal AD 430–770

Final comment: P A Rahtz (9 July 1995), the date range is useful in showing that this isolated grave is not any different from others in the cemetery. The later part of the range at 95% confidence is probably too late by a century or less; but the 68% confidence terminal of cal AD 670 would be appropriate.

HAR-5590 1550 \pm 70 BP

$\delta^{13}\text{C}$: -23.6‰

Sample: HWHB44, submitted in May 1983 by P J Leach

Material: human bone

Initial comment: from a single grave within the fills at the far northern end of the Roman temple *temenos* ditch.

Objectives: to ascertain whether this most northerly grave is later than the others, or earlier.

Calibrated date: 1 σ : cal AD 420–600
2 σ : cal AD 350–650

Final comment: P A Rahtz (9 July 1995), the dating range shows that there is no obvious difference in date for this most northerly grave. The earlier part of the range at 95% confidence is probably too early by a century; the date is likely to be within the 68% confidence range.

HAR-5662 1550 \pm 70 BP

$\delta^{13}\text{C}$: -21.5‰

Sample: HWHB38B, submitted in May 1983 by P J Leach

Material: human bone

Initial comment: from a double grave also containing HB38A, and cutting into the Roman temple *temenos* ditch fills. This sample is a repeat of HAR-5582, which failed.

Objectives: to date this double grave in the central part of the cemetery.

Calibrated date: 1 σ : cal AD 420–600
2 σ : cal AD 350–650

Final comment: P A Rahtz (9 July 1995), the date range for this member of a double grave is in accord with the general cemetery dating.

HAR-6084 1660 ±90 BP

$\delta^{13}\text{C}$: -23.4‰

Sample: HWHB47, submitted in May 1983 by P J Leach

Material: human bone

Initial comment: from a single grave cut into the forecourt between the Roman temple and the north end of the *temenos*.

Objectives: a date would establish whether this isolated grave is contemporary with the rest of the cemetery.

Calibrated date: 1 σ : cal AD 250–540
2 σ : cal AD 130–600

Final comment: P A Rahtz (9 July 1995), the 95% confidence date range is in accord with the rest of the cemetery in its later part. But its initial date of cal AD 130 is 200+ years too early; even at 68% confidence the starting date of cal AD 250 is 100+ years too early. This conclusion is supported by the evidence of a coin of AD 335–45, stratified below this grave.

HAR-8758 1590 ±40 BP

$\delta^{13}\text{C}$: -21.6‰

Sample: GRA5B, submitted on 21 September 1987 by L Watts

Material: human bone

Initial comment: from a double grave in area temple 3 of the ambulatory; see HAR-8762 for details of the other skeleton.

Objectives: to check whether the earlier determination HAR-5583 was correct as it was the latest of the first set of determinations. See also HAR-5583.

Calibrated date: 1 σ : cal AD 410–540
2 σ : cal AD 390–570

Final comment: A Bayliss (3 March 2008), see HAR-5583

Final comment: P A Rahtz (9 July 1995), this is a second determination on this skeleton, the first being HAR-5583 above. The latter was considered too late, and this second (high precision) range is much more acceptable, and in almost exact accord with HAR-8762 below, which is on the other skeleton in this double grave (identical at 68% confidence). The two dates confirm that this double grave in the temple ambulatory is of similar date to the cemetery proper.

Laboratory comment: AERE Harwell (1989), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Walker *et al* 1991a, 105-6

HAR-8759 1550 ±40 BP

$\delta^{13}\text{C}$: -21.9‰

Sample: GRA6, submitted on 21 September 1987 by L Watts

Material: human bone

Initial comment: from area temple 3 of the ambulatory, but apparently before destruction of at least part of the structure.

Objectives: this is the only grave within the area of the temples that appears to pre-date the destruction of the building. A date will establish how grave 6 compares with other graves both within this area and beyond the temple.

Calibrated date: 1 σ : cal AD 430–570
2 σ : cal AD 410–610

Final comment: P A Rahtz (9 July 1995), the date range is similar to the cemetery range as a whole. This grave appears to pre-date the destruction of the building, so its date range could be used as evidence that the temple was not finally destroyed before cal AD 410 (95% confidence) or cal AD 430 (68% confidence). Again the date range does not suggest that these temple burials are significantly different in date from the cemetery proper.

Laboratory comment: AERE Harwell (1989), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Walker *et al* 1991a, 105

HAR-8760 1650 ±40 BP

$\delta^{13}\text{C}$: -21.1‰

Sample: GRA62/13, submitted on 21 September 1987 by L Watts

Material: human bone

Initial comment: from part of the main cemetery, outside the temple area.

Objectives: to ascertain how this grave, on the south-west extremity of the main group of graves, compares with the others.

Calibrated date: 1 σ : cal AD 350–430
2 σ : cal AD 260–540

Final comment: P A Rahtz (9 July 1995), the date range for this most south-westerly grave is in general rather early; the true date is likely to be in the second half of the range; but there is no hint from this date range that this terminally located grave is different in period, though it may hint at the southern end being at the early stage of the century.

Laboratory comment: AERE Harwell (1989), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Walker *et al* 1991a, 105

HAR-8761 1190 ±90 BP

$\delta^{13}\text{C}$: -20.4‰

Sample: GRA12, submitted on 21 September 1987 by L Watts

Material: human bone

Initial comment: from grave 12, associated with structure 1 or temple 2 (pre-fourth century AD).

Objectives: this grave is not considered to be part of the main cemetery but associated with the early phases of the Roman temple site, for which other dating only comes from the destruction level of the second phase. It is hoped that a date will establish whether the burial is Roman or Iron Age.

Calibrated date: 1 σ : cal AD 690–970
2 σ : cal AD 650–1030

Final comment: P A Rahtz (9 July 1995), this is the only date range in the series, which appears to be impossible, three centuries or more too late. The grave was that of an infant, associated with temple phases earlier than the fourth century. The reason for submitting it was to see if the infant burial (not part of the cemetery) was Roman or possibly Iron Age; a date was expected in the first to third centuries AD, so this determination should perhaps be discounted.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Oilet *et al* 1983).

References: Hardiman *et al* 1992, 58
Oilet *et al* 1983
Walker *et al* 1991a, 105

HAR-8762 1580 \pm 40 BP

$\delta^{13}C$: -22.5‰

Sample: GRA5A, submitted on 21 September 1987 by L Watts

Material: human bone

Initial comment: from a double grave in area temple 3 of the ambulatory; to be compared with HAR-8758.

Objectives: to compare the burials in the area of the temples with those from burials beyond the building. It will also test the association of the two bodies in one grave (HAR-8758 and HAR-8758).

Calibrated date: 1 σ : cal AD 420–550
2 σ : cal AD 390–580

Final comment: A Bayliss (3 March 2008), *see* HAR-5583

Final comment: P A Rahtz (9 July 1995), this is from the westerly member of a double grave in the temple ambulatory; the date range is virtually the same as the other easterly member of this grave (HAR-8758), and together they confirm that these ‘temple’ burials are similar in date to the main cemetery.

Laboratory comment: AERE Harwell (1989), this sample was processed using the larger sample, higher precision liquid scintillation system.

Hereford: King Street, Herefordshire

Location: SO 50853981
Lat. 52.03.15 N; Long. 02.43.01 W

Project manager: R Shoesmith (City of Hereford Archaeology Committee), 1980

Archival body: Hereford and Worcester Museum

Description: a Saxon settlement. A trench, some 2.4m deep, was dug along King Street from a point in Broad Street, on the edge of the cathedral close, to the junction with Bridge Street. Opportunities to observe the excavations were limited by the speed of the operation and consisted solely of the examination of the faces of the trench after shoring had been put in place.

Objectives: to determine whether this was part of the original street plan of Hereford.

References: Shoesmith 1985
Walker *et al* 1988, 322–3

HAR-5066 980 \pm 70 BP

$\delta^{13}C$: -24.9‰

Sample: Sample F, submitted in June 1982 by D Haddon-Reece

Material: wood (waterlogged; outer rings sampled): *Quercus* sp. (D Haddon-Reece 1982)

Initial comment: from a timber corduroy road 2m below the present level in King Street. The sample came from the point where the road crossed a marshy area some 50m wide to the west of the Cathedral.

Objectives: to determine whether this was part of the original street plan of Hereford.

Calibrated date: 1 σ : cal AD 990–1160
2 σ : cal AD 890–1220

Final comment: D Haddon-Reece (1988), King Street appears to be the original east-west road of the Saxon town and may have provided the west limit of the original cathedral nucleus (Shoesmith 1980). The radiocarbon result is of value in considering the origin of the street plan of Hereford.

References: Shoesmith 1980

Heybridge, Essex

Location: TL 85020823
Lat. 51.44.30 N; Long. 00.40.49 E

Project manager: P J Drury (Chelmsford Archaeological Trust), 1972

Archival body: Colchester Museums

Description: an area of c 1600m² was stripped and excavated before development took place.

Objectives: to establish a sequence for the multi-period site.

References: Wickenden 1986

HAR-4843 2100 \pm 80 BP

$\delta^{13}C$: -25.4‰

Sample: F 168?, submitted in January 1982 by N Wickendon

Material: charcoal (remaining subsample identified): unidentified (54.51g); *Quercus* sp., slivers, probably including sapwood and heartwood (9.73g, 100%) (R Gale 1999)

Initial comment: the whole site had a subsoil of gravel and animal disturbance was abundant. This sample was probably burnt *in situ* in the posthole of an Iron Age four-post structure.

Objectives: to date the four-post structure and the possible hearth.

Calibrated date: 1 σ : 350 cal BC–cal AD 1
2 σ : 380 cal BC–cal AD 70

Final comment: N Wickenden (1986), this is broadly indicative of a middle pre-Roman Iron Age date as is the pottery from the posthole, which also produced briquetage.

References: Walker *et al* 1988, 324

HAR-4844 2610 ±110 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: F84?, submitted in March 1982 by A J Clarke

Material: charcoal (remaining subsample contained insufficient material for identification, but *see* HAR-4843.) (R Gale 1999)

Initial comment: as HAR-4843

Objectives: as HAR-4843

Calibrated date: 1 σ : 890–590 cal BC
2 σ : 1010–400 cal BC

Final comment: A J Clarke (1992), this measurement is at variance with HAR-4843 from the same post.

Laboratory comment: AERE Harwell (1990), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Hardiman *et al* 1992, 50
Otlet *et al* 1983

Hob Ditch, Warwickshire

Location: SP 16957036
Lat. 52.19.50 N; Long. 01.45.04 W

Project manager: S Cracknell (Alcester Archaeology), August 1987

Archival body: Alcester Archaeology

Description: a linear earthwork of uncertain date.

Objectives: to establish a date for the earthworks as previous excavations have failed to do so. Apart from the charcoal samples only one undatable pottery sherd was recovered. The debate centres on whether the earthwork is pre- or post-Roman.

Laboratory comment: Ancient Monuments Laboratory (2003), one further sample 3/0/1 (HAR-8873) was submitted for dating but failed to produce a result.

References: Cracknell and Hingley 1995
Hardiman *et al* 1992, 67
Hutty 1975

HAR-8874 2530 ±90 BP

$\delta^{13}\text{C}$: -27.3‰

Sample: 32/8/1, submitted on 16 October 1987 by S Cracknell

Material: soil (with unidentified charcoal fragments)

Initial comment: the excavated area consisted of a bank and two ditches. The sample came from the smaller of the two ditches, from the second lowest fill of a recut. It was one of several layers, which accumulated rapidly after the recutting.

Objectives: the sample was a coherent deposit suggesting deposition over a short time. It should provide a reliable date for the ditch recut.

Calibrated date: 1 σ : 810–510 cal BC
2 σ : 840–400 cal BC

Final comment: S Cracknell (17 May 1995), the radiocarbon date obtained from this secondary feature accords with the pre-Roman date suggested for the ditch earthworks.

Holbeach: Shell Bridge, Lincolnshire

Location: TF 343161
Lat. 52.43.32 N; Long. 00.00.40 W

Project manager: A C Bell (Central Excavation Unit), September 1983

Archival body: Lincoln City and County Museum

Description: a plough damage evaluation of field OS 46, part of the Romano-British fenland drove and enclosure system at Holbeach St Johns.

Objectives: to date the ditch and associated features, samples for pollen analysis also taken from these levels.

HAR-6362 1420 ±80 BP

$\delta^{13}\text{C}$: -29.2‰

Sample: 260-45, submitted in December 1983 by N D Balaam

Material: peat

Initial comment: from fill of ditch, possibly Roman. No dating evidence is available, and the feature may be medieval.

Objectives: to date ditch and associated features, samples for pollen analysis also taken from these levels.

Calibrated date: 1 σ : cal AD 560–670
2 σ : cal AD 430–770

Final comment: A C Bell (1999), no artefacts were recovered from the drove ditches, but this sample from the peaty top fill of ditch 59 provided a *terminus ante quem*.

HAR-6364 1580 ±80 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: 260-84, submitted in December 1983 by N D Balaam

Material: peat

Initial comment: filling of a possibly Romano-British ditch. No dating material was recovered within the peat levels.

Objectives: to establish whether ditches may have been open for sometime after their initial formation.

Calibrated date: 1 σ : cal AD 400–570
2 σ : cal AD 250–650

Final comment: N D Balaam (1999), it is important to note that the peat and its associated pollen may date to a period significantly later than that of the creation of the ditched enclosures. The environment and agricultural regime suggested by the pollen analysis may, therefore, not be linked with any certainty to the setting out and first use of the field systems.

Holme-on-Spalding Moor: Hasholme Farm, Humberside

Location: SE 824326
Lat. 53.46.59 N; Long. 00.45.08 W

Project manager: M Millett (University of Durham), August 1984

Archival body: Hull and East Riding Museum

Description: excavation of a log boat and an investigation of the environmental context in which it was deposited.

Objectives: to recover the log boat and establish its date, its environmental and archaeological context. Through this work, the aim was to reconstruct the contemporary context in this part of east Yorkshire.

Final comment: M Millett (3 July 1995), the dates related to two sets of problems, first the age of the boat, and second the chronology of the environmental sequence. The problems were both solved by the dating programme. The dendrochronological date later provided a more precise date for the log-boat, but the radiocarbon date fits the chronology of the environmental sequence. This sequence provides reliable fixed point in this region.

Laboratory comment: Ancient Monuments Laboratory (2003), one further sample HAS23 (HAR-6396) was submitted for dating but failed to produce a result.

References: McGrail and Millett 1985
McGrail and Millett 1987

HAR-6394 2350 \pm 90 BP

$\delta^{13}\text{C}$: -27.3‰

Sample: HAS-6, submitted in 1985 by M Millett

Material: wood (waterlogged): *Quercus* sp., sapwood

Initial comment: from outer face of hollowed-out log boat, nearest to sapwood.

Objectives: boat otherwise undated, one of a set of three samples to provide a date for the boat.

Calibrated date: 1 σ : 520–370 cal BC
2 σ : 770–200 cal BC

Final comment: M Millett (3 July 1995), this date (and the other two in its set HAR-6395 and HAR-6441) provided a consistent set of results which fulfilled the objective of providing a basic date for the log boat. This date was, however, less precise than that eventually provided by dendrochronology.

Laboratory comment: Ancient Monuments Laboratory (3 March 2008), the three radiocarbon results from the outer sapwood rings of the log boat are statistically consistent (T' =4.6; $T'(5\%)$ =6.0; v =2; Ward and Wilson 1978). The weighted mean of these determinations is 2376 \pm 51 BP, which calibrates to 750–380 cal AD (95% confidence; Reimer *et al* 2004), or 520–390 cal BC (68% confidence). This is slightly earlier than the date for the outermost tree-ring present in the log boat subsequently determined by dendrochronology (323 BC; Hillam 1987), although this difference may be accounted for by the number of tree-ring incorporated in the radiocarbon samples.

References: Hillam 1987
Reimer *et al* 2004
Ward and Wilson 1978

HAR-6395 2550 \pm 100 BP

Sample: HAS22, submitted in 1985 by M Millett

Material: wood (waterlogged): *Quercus* sp., sapwood

Initial comment: as HAR-6394

Objectives: as HAR-6394

Calibrated date: 1 σ : 810–520 cal BC
2 σ : 910–400 cal BC

Final comment: see HAR-6394

Laboratory comment: English Heritage (6 January 2012), this result is published (McGrail and Millett 1987, 78), although a final certificate has not been found.

References: McGrail and Millett 1987, 78

HAR-6441 2280 \pm 80 BP

$\delta^{13}\text{C}$: -26.9‰

Sample: ASA7638, submitted in 1985 by S McGrail

Material: wood (waterlogged): *Quercus* sp., sapwood

Initial comment: as HAR-6394

Objectives: as HAR-6394

Calibrated date: 1 σ : 410–200 cal BC
2 σ : 520–160 cal BC

Final comment: see HAR-6394

HAR-7005 2530 \pm 70 BP

$\delta^{13}\text{C}$: -30.3‰

Sample: HAS174, submitted in April 1986 by M Millett

Material: peat

Initial comment: slice of peat from the top of the sequence, immediately prior to a marine transgression.

Objectives: dating is required to establish the chronology of the pollen record and marine transgression in relation to the log boat.

Calibrated date: 1 σ : 800–540 cal BC
2 σ : 820–400 cal BC

Final comment: M Millett (3 July 1995), this date provided an important reference point for the environmental sequence. It is entirely consistent with the other evidence from the project.

References: Walker *et al* 1990, 177

HAR-7006 2830 \pm 70 BP

$\delta^{13}\text{C}$: -30.8‰

Sample: HAS214, submitted in April 1986 by M Millett

Material: peat

Initial comment: slice of peat from lime decline in middle of sequence.

Objectives: to establish chronology of pollen record.

Calibrated date: 1 σ : 1120–900 cal BC
2 σ : 1260–820 cal BC

Final comment: M Millett (3 July 1995), this date established that the sequence of the pollen from Hasholme was consistent with that from other cores in the region and thus fulfilled the original objective.

References: Walker *et al* 1990, 177

HAR-7007 5710 \pm 100 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: HAS430, submitted in April 1986 by M Millett

Material: peat

Initial comment: slice of peat from base of sequence.

Objectives: to establish chronology of pollen record.

Calibrated date: 1 σ : 4690–4450 cal BC
2 σ : 4790–4340 cal BC

Final comment: M Millett (3 July 1995), this date provides a valuable reference point for the base of the pollen sequence and thus fulfilled the original objective. The date was consistent with other cores in the region.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 177

HAR-7024 3230 \pm 90 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: HAS118, submitted on 12 March 1986 by M Millett

Material: wood (waterlogged): *Quercus* sp.

Initial comment: a piece of bog oak; one of a group found near to the log boat. Sample A has rings 120–140 of a 339+ year-old tree.

Objectives: to find out if bog oaks are broadly contemporary with the log boat and if not, to discover their approximate date so they can be used for other tree-ring work.

Calibrated date: 1 σ : 1620–1410 cal BC
2 σ : 1740–1310 cal BC

Final comment: A Bayliss (3 March 2008), dendrochronology has subsequently shown that this sample consisted of a bi-decade of tree-rings centred on 1535 BC. This result is statistically consistent with the three calibration datapoints available for this calendar date: 3297 \pm 19 BP from a decadal sample centred on 1535 BC (Hd-20135), 3308 \pm 22 BP from a decadal sample centred on 1536 BC (QL-11151), and 3302 \pm 21 BP from a bi-decadal sample centred on 1530 BC (UB-1109; T'=0.8; T'(5%)=7.8; v=3; Ward and Wilson 1978).

Final comment: J Hillam (20 June 1995), the tree had 340 heartwood rings, of which years 120–140 were submitted for radiocarbon dating. A tree-ring date was later obtained for the bog oak; its ring sequence spans the period 1665–1326 BC. The bog oaks are therefore considerably older than the log boat itself.

References: Walker *et al* 1990, 177
Ward and Wilson 1978

Hound Tor, Devon

Location: SX 748788
Lat. 50.35.42 N; Long. 03.46.09 W

Project manager: D Austin (St David's University College), 1984

Archival body: Royal Albert Memorial Museum

Description: a cluster of rectangular structures within an abandoned field system. Situated by a medieval hamlet c 315m below Hound Tor on the east side of Dartmoor.

Objectives: to produce a chronology of medieval landscape changes around the deserted village.

References: Austin *et al* 1980
Austin 1984
Austin and Walker 1985
Beresford 1979

HAR-6296 1.0100 \pm 0.006 fM

$\delta^{13}\text{C}$: -29.6‰

Sample: HT16, submitted on 12 October 1984 by D Austin and M J C Walker

Material: peat

Initial comment: peat sample c 1.5cm in thickness taken 16cm from the top of a 75cm peat profile that has developed in a small valley approximately 100m north-east of the deserted medieval village of Hound Tor. The sample dates the end of a possible medieval agricultural episode around the site as indicated by pollen analysis.

Objectives: chronology of medieval landscape changes around the deserted village.

Calibrated date: 1 σ : cal AD 1900–1955
2 σ : cal AD 1720–1955

Final comment: D Austin (4 September 1985), the 101% modern age determination from the 150mm level implies that the increase in arboreal pollen in the upper reaches of

the diagram is essentially a twentieth-century phenomenon reflecting varying degrees of afforestation around the northern fringes of the moor.

Laboratory comment: AERE Harwell (1985), the result was approximately 100% modern. What this means in actual calendar age is more difficult to say. If we look at the range covered by the 2 sigma error band and examine the Stuiver calibration curve we can obtain some idea of the earliest possible age; one end of the range lies at approximately 100 BP and the curve shows that radiocarbon activity equivalent to this occurred throughout most of the last century. I think, therefore, that all it is safe to conclude is that the sample probably belongs to the nineteenth century, within the range of cal AD 1820 to 1910.

Laboratory comment: English Heritage (26 January 2012), this measurement has been calibrated using the data of Kueppers *et al* (2004), with the constraint that this sample must date to before its collection in AD 1984. This result was originally reported as -80 ± 90 BP.

References: Kueppers *et al* 2004

HAR-6297 390 \pm 80 BP

$\delta^{13}\text{C}$: -29.8‰

Sample: HT45, submitted on 12 October 1984 by D Austin and M J C Walker

Material: peat

Initial comment: peat sample *c* 1.5cm in thickness, as HAR-6296, taken 45cm from the top of the 75cm peat profile. The sample is from the mid-point in the profile between HAR-6296 and HAR-6298 and will aid in the establishment of a chronology of medieval and pre-medieval landscape changes around the site based on pollen analytical evidence.

Objectives: as HAR-6296

Calibrated date: 1 σ : cal AD 1430–1640
2 σ : cal AD 1400–1670

Final comment: D Austin and M J C Walker (1985), this is in broad agreement with the archaeological evidence, which suggests that, although desertion was gradual, the farms had been 'abandoned to the bracken and heather' by the middle of the fourteenth century.

HAR-6298 730 \pm 70 BP

$\delta^{13}\text{C}$: -29.9‰

Sample: HT70, submitted on 12 October 1984 by D Austin and M J C Walker

Material: peat

Initial comment: sample 5cm above the base of the 75cm peat profile. The sample dates the period shortly after the onset of peat accumulation (Iron Age?). Pollen evidence from this level suggests scrubland clearance and an episode of arable farming.

Objectives: as HAR-6296

Calibrated date: 1 σ : cal AD 1220–1300
2 σ : cal AD 1160–1400

Final comment: D Austin and M J C Walker (1985), this dates the cereal phase to the medieval period, and hence links this episode of agricultural activity to the Hound Tor settlement.

Hullbridge Survey, Essex

Location: TQ 8194 centred on
Lat. 51.36.53 N; Long. 00.36.50 E,
centred on

Project manager: T J Wilkinson (Essex County Council),
1982–7

Description: a series of samples were submitted from naturally-forming peats and other biogenic deposits and from archaeological deposits at intertidal sites on the Essex Coast.

Objectives: primarily to establish a chronology for transgressive and regressive overlaps and to relate human activity to this sequence.

References: Wilkinson and Murphy 1995

Hullbridge Survey: Bartonhall Creek, Roach site 2, Essex

Location: TQ 90819110
Lat. 51.35.09 N; Long. 00.45.16 E

Project manager: P Murphy (University of East Anglia),
August 1986

Archival body: Essex County Council

Description: biogenic deposits below present salt-marsh surface intercalated in estuarine clays.

Objectives: the first objective for this dating series is for palaeoecological studies and the dating of the sedimentary sequence. Secondly the dates will allow correlation of this sequence with the Thames and Crouch sequences.

HAR-8645 4560 \pm 100 BP

Sample: R2LPEAT, submitted in September 1986 by P Murphy

Material: sediment (biogenic deposit in estuarine clay)

Initial comment: a thin clayey biogenic deposit (lower peat) at depth of 210–220cm below the present salt-marsh surface.

Objectives: as part of the survey of Essex estuaries it is hoped to establish whether this biogenic deposit is equivalent to the River Crouch upper peat, dated to cal AD 250–900 (HAR-5225; 1610 \pm 70 BP; cal AD 250–610 at 95% confidence, and HAR-6589; 1310 \pm 80 BP; cal AD 590–900 at 95% confidence; Reimer *et al* 2004). This would permit an extension of current palaeogeographic reconstruction into the River Roach.

Calibrated date: 1 σ : 3500–3090 cal BC
2 σ : 3630–2920 cal BC

Final comment: P Murphy (7 February 1995), this estuarine biogenic sediment relates to a transgressive overlap, which extended this far up the Roach Estuary in the Neolithic. Together the two determinations re-emphasise the importance of local topographic effects on coastal sedimentation.

Laboratory comment: English Heritage (6 January 2012), this result has been published (Wilkinson and Murphy 1995, 58), although no laboratory documentation relating to this result appears to survive.

References: Reimer *et al* 2004
Wilkinson and Murphy 1995, 58

HAR-8646 2260 ±80 BP

$\delta^{13}\text{C}$: -30.3‰

Sample: R2UPEAT, submitted in September 1986 by P Murphy

Material: peat

Initial comment: thick clayey biogenic deposit (upper peat) at depth of 90–100cm below present salt-marsh surface.

Objectives: as HAR-8645

Calibrated date: 1 σ : 400–200 cal BC
2 σ : 510–110 cal BC

Final comment: P Murphy (7 February 1995), this upper biogenic sediment must represent another transgressive overlap, but it cannot be directly correlated with the Thames sequence at present.

Hullbridge Survey: Blackwater 17, Goldhanger, Essex

Location: TL 06801440
Lat. 51.49.03 N; Long. 00.27.01 W

Project manager: P Murphy (University of East Anglia), 1985

Archival body: Essex County Council

Description: intertidal flats with lines of stakes on the foreshore.

Objectives: to date these structures.

References: Walker *et al* 1990, 186

HAR-7059 1.0000 ±0.0044 fM

$\delta^{13}\text{C}$: -26.4‰

Sample: B17/69, submitted in October 1985 by P Murphy

Material: wood (previously waterlogged; remaining subsample now dry and structurally collapsed, consists of a large volume but very comminuted): unidentified (9.21g); cf *Ulmus* sp. (2.79g, 100%) (R Gale 2000)

Initial comment: double, sometimes triple, line of stakes extending for some 20m, near the low-water mark and parallel to the coast. Possibly this sample could be part of a medieval fish trap.

Objectives: this structure is not dated by artefacts. Further detailed recording would be justified only if its date can be established.

Calibrated date: 1 σ : cal AD 1730–1955
2 σ : cal AD 1710–1955

Final comment: P Murphy (18 September 1995), as this determination demonstrates, simple structures of this type have been constructed on the foreshore up to recent times. Modern ones are indistinguishable in the field from Bronze Age ones.

Laboratory comment: English Heritage (26 January 2012), this measurement has been calibrated using the data of Kueppers *et al* (2004), with the constraint that this sample must date to before its collection in AD 1985. This result was originally reported as 0 ±70 BP.

References: Kueppers *et al* 2004

Hullbridge Survey: Blackwater 18, Tollesbury, Essex

Location: TL 94180809
Lat. 51.44.14 N; Long. 00.48.45 E

Project manager: P Murphy (University of East Anglia), 1985 and July 1987

Archival body: Essex County Council

Description: as at Site 3, Maylandsea, the sequence consists predominantly of grey estuarine clay with a basal 'clayey peat' or estuarine detritus mud overlying the palaeosol. Neolithic artefacts occurred on the palaeosol and wooden structures were exposed on the upper shore.

Objectives: to examine prehistoric activity on the pre-transgression palaeosol, to characterise and date the overlying sediments, and to record and date later prehistoric wooden structures at the site.

Final comment: P Murphy (18 September 1995), two dates, (HAR-7056 and HAR-7060) related to the pre-transgression palaeosol; one on tree roots in it, one on charcoal on it. Together they demonstrate a transgressive overlap from c 2540 cal BC. The other two dates, HAR-7055 and HAR-8879, indicate construction of wooden structures in the intertidal zone between c 950–1000 cal BC, apparently over a shorter timespan than at Blackwater Site 28.

HAR-7055 2790 ±80 BP

$\delta^{13}\text{C}$: -29.5‰

Sample: B18/86, submitted in October 1985 by P Murphy

Material: wood (waterlogged; roundwood)

Initial comment: brushwood structure exposed on foreshore by marine erosion.

Objectives: the stratigraphic position of this structure suggests a late Bronze Age date, although confirmation by dating is required.

Calibrated date: 1 σ : 1030–830 cal BC
2 σ : 1200–800 cal BC

Final comment: P Murphy (18 September 1995), a later prehistoric date is confirmed.

References: Walker *et al* 1990, 185

HAR-7056 4030 ±80 BP

$\delta^{13}\text{C}$: -28.4‰

Sample: B18/91, submitted in October 1985 by P Murphy

Material: wood (waterlogged; remaining subsample now desiccated and structurally collapsed): unidentified (6.71g); *Quercus* sp., heartwood (2.39g, 100%) (R Gale 2000)

Initial comment: tree roots on the old land surface, associated with Neolithic settlement, and sealed by estuarine sediments.

Objectives: these roots will provide a *terminus post quem* for estuarine sedimentation and hence the date of the local marine transgression.

Calibrated date: 1 σ : 2840–2470 cal BC
2 σ : 2880–2340 cal BC

Final comment: P Murphy (18 September 1995), this date gives a good *terminus post quem* for the transgressive overlap. The determination shows that here, as elsewhere, submergence occurred around *c* 2540 cal BC.

References: Walker *et al* 1990, 185

HAR-7060 4180 ±70 BP

$\delta^{13}\text{C}$: -23.7‰

Sample: B18/90, submitted in October 1985 by P Murphy

Material: charcoal (remaining subsample degraded): unidentified (17.43g); *Quercus* sp., heartwood (8.60g, 100%) (R Gale 2000)

Initial comment: charcoal spread on submerged land surface, associated with Neolithic pottery and flints. This sample was sealed beneath later estuarine sediments.

Objectives: to date the Neolithic settlement.

Calibrated date: 1 σ : 2890–2630 cal BC
2 σ : 2920–2500 cal BC

Final comment: P Murphy (18 September 1995), this charcoal spread relates to late Neolithic activity, probably woodland clearance, and post-dates the Neolithic artefacts.

References: Walker *et al* 1990, 186

HAR-8879 2850 ±70 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: B18/192, submitted in October 1987 by P Murphy

Material: wood (desiccated waterlogged, remaining subsample now structurally collapsed): unidentified (36.67g); *Quercus* sp., roundwood, some quite narrow (49.31g, 100%) (R Gale 1999)

Initial comment: wooden structure on foreshore, within estuarine clays.

Objectives: at this site there is a complex of wooden structures similar to that at Blackwater 28, Goldhanger. One of these (HAR-7055) has been dated to 1200–800 cal BC at 95% confidence (Reimer *et al* 2004). Dating this sample would help to establish if all this complex is late Bronze Age in date, or whether there is multi-period activity at the site.

Calibrated date: 1 σ : 1130–910 cal BC
2 σ : 1260–830 cal BC

Final comment: P Murphy (18 September 1995), a later prehistoric date is confirmed. A relatively short period of activity is represented (cf Blackwater, Site 28).

References: Reimer *et al* 2004
Walker *et al* 1991a, 110

Hullbridge Survey: Blackwater 28, The Stumble, Essex

Location: TL 09140725
Lat. 51.43.52 N; Long. 00.45.13 E

Project manager: P Murphy (University of East Anglia), 1985–8

Archival body: Essex County Council

Description: a multi-period complex comprising both dry and wet-land sites extending over intertidal mudflats between Osea Island and the north bank of the Blackwater. The site consists of a Neolithic dryland habitation site on the old land surface to the east and a complex of Iron Age and later wooden structures preserved in estuarine clays and infilled creeks towards the west.

Objectives: to provide dating of the wooden structures.

Final comment: P Murphy (18 September 1995), dates on wooden structures show that construction extended between *c* 400 cal BC (HAR-8880) and the post-medieval period.

HAR-7057 2360 ±70 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: B28/96, submitted in October 1985 by P Murphy

Material: wood (waterlogged; remaining subsample now desiccated): unidentified (0.93g); *Quercus* sp., roundwood (0.48g, 100%) (R Gale 2000)

Initial comment: from a wooden hurdle structure exposed by marine erosion, 3.5m x 0.8m. It was composed of eight longitudinal poles with well-preserved smaller rods, and was probably part of trackway over mud flats.

Objectives: this impressive structure had no associated datable artefacts but its stratigraphic position suggests a late Bronze Age date. Confirmation is required.

Calibrated date: 1 σ : 520–380 cal BC
2 σ : 760–230 cal BC

Final comment: P Murphy (18 September 1995), an Iron Age date is indicated.

References: Walker *et al* 1990, 185

HAR-7058 1020 ±80 BP

$\delta^{13}\text{C}$: -30.1‰

Sample: B28/98, submitted in October 1985 by P Murphy

Material: wood (waterlogged; remaining subsample now desiccated and very degraded, structurally too collapsed to identify with any certainty): unidentified (4.75g); *Salix/Populus* sp., possibly (1.50g, 100%) (R Gale 2000)

Initial comment: brushwood structure, probably a hurdle, associated with fired clay.

Objectives: to avoid further erosion this structure was only superficially investigated. It was close to HAR-7057 and again on stratigraphic grounds is probably of late Bronze Age date. Confirmation of this dating is required before further investigations are undertaken.

Calibrated date: 1 σ : cal AD 900–1150
2 σ : cal AD 870–1210

Final comment: P Murphy (18 September 1995), this structure was of Anglo-Saxon date.

References: Walker *et al* 1990, 185

HAR-8457 2220 \pm 60 BP

$\delta^{13}\text{C}$: -27.7‰

Sample: B28/121, submitted in September 1986 by P Murphy

Material: wood (waterlogged; remaining subsample now desiccated): *Quercus* sp., roundwood, diameter 35mm, 6 growth rings (69g, 100%) (R Gale 2000)

Initial comment: during the 1985 survey wooden structures were located and recorded at this site. They are exposed over several hundred metres of mud flats where they have been exposed by tidal erosion. Dating these structures is very problematical since they produced no artefacts of any significance, and their sedimentary cover, which might have permitted relative dating on stratigraphic grounds, has been eroded away. From their elevation it was, however, anticipated that by analogy with other radiocarbon dated structures in the area they would prove to be late Bronze Age. However, the dates for HAR-7057 and HAR-7058 indicate that we are dealing with a multi-period site of greater complexity than originally suspected.

Objectives: the only way to gain a chronological framework for this very well-preserved group of wooden structures is to have a series of radiocarbon dates.

Calibrated date: 1 σ : 390–190 cal BC
2 σ : 400–110 cal BC

Final comment: P Murphy (18 September 1995), an Iron Age structure.

References: Walker *et al* 1991a, 94

HAR-8458 2380 \pm 70 BP

$\delta^{13}\text{C}$: -27.7‰

Sample: B28/126, submitted in September 1986 by P Murphy

Material: wood (waterlogged; remaining subsample now desiccated and very degraded): unidentified (4.08g); *Fraxinus* sp. (0.14g, 25.5%); *Salix/Populus* sp., possibly, but too degraded to verify (0.41g, 74.5%) (R Gale 2000)

Initial comment: as HAR-8457.

Objectives: as HAR-8457.

Calibrated date: 1 σ : 710–390 cal BC
2 σ : 770–260 cal BC

Final comment: P Murphy (18 September 1995), an Iron Age structure.

References: Walker *et al* 1991a, 95

HAR-8459 240 \pm 60 BP

$\delta^{13}\text{C}$: -27.6‰

Sample: B28/127, submitted in September 1986 by P Murphy

Material: wood (waterlogged; remaining subsample now desiccated): *Ulex/Cytisus* sp., roundwood/root, diameter 10mm (20.23g, 100%) (R Gale 2000)

Initial comment: as HAR-8457

Objectives: as HAR-8457

Calibrated date: 1 σ : cal AD 1630–1950
2 σ : cal AD 1480–1955*

Final comment: P Murphy (18 September 1995), one of two 'late' dates for wooden structures on the foreshore (see also HAR-8460).

References: Walker *et al* 1991a, 95

HAR-8460 250 \pm 60 BP

$\delta^{13}\text{C}$: -30.0‰

Sample: B28/128, submitted in September 1986 by P Murphy

Material: wood (waterlogged; remaining subsample desiccated but not structurally collapsed): unidentified (6.05g); *Rhamnus catharticus* (3.18g, 33.3%); *Quercus* sp., sapwood (6.37g, 66.7%) (R Gale 1999)

Initial comment: as HAR-8457

Objectives: as HAR-8457

Calibrated date: 1 σ : cal AD 1520–1950
2 σ : cal AD 1470–1955*

Final comment: see HAR-8459

References: Walker *et al* 1991a, 95

HAR-8461 2300 \pm 60 BP

$\delta^{13}\text{C}$: -27.8‰

Sample: B28/129, submitted in September 1986 by P Murphy

Material: wood (waterlogged; remaining subsample now desiccated and structurally collapsed): unidentified (3.75g); *Quercus* sp., sapwood (possibly some heartwood) (3.85g, 53.85%); *Corylus* sp., roundwood (3.30g, 46.15%) (R Gale 1999)

Initial comment: as HAR-8457

Objectives: as HAR-8457

Calibrated date: 1 σ : 410–260 cal BC
2 σ : 510–200 cal BC

Final comment: P Murphy (18 September 1995), an Iron Age structure.

References: Walker *et al* 1991a, 95

HAR-8880 2400 ±60 BP

$\delta^{13}\text{C}$: -29.1‰

Sample: B28/190, submitted in October 1987 by P Murphy

Material: wood (waterlogged; remaining subsample now dessicated and structurally collapsed; ?*Corylus/Alnus* sp., but too degraded to identify positively; 22.69g (100%): unidentified (31.92g) (R Gale 1999)

Initial comment: wooden structure on lower foreshore, within estuarine clays.

Objectives: this is one of a group of wooden structures; samples for radiocarbon dating have been submitted from five already. The complex is clearly multi-period, and its chronology and significance can be established only by radiocarbon dating.

Calibrated date: 1 σ : 730–390 cal BC
2 σ : 770–380 cal BC

Final comment: see HAR-8461

References: Walker *et al* 1991a, 95

HAR-8881 2080 ±70 BP

$\delta^{13}\text{C}$: -30.5‰

Sample: B28/195, submitted in October 1987 by P Murphy

Material: wood (waterlogged; remaining subsample now dessicated and structurally collapsed): unidentified (14.43g); Salicaceae (3.73g, 23.01%); *Quercus* sp., probably roundwood (12.48g, 76.99%) (R Gale 1999)

Initial comment: wooden hurdle on upper foreshore, within estuarine clay.

Objectives: as HAR-8880

Calibrated date: 1 σ : 200 cal BC–cal AD 10
2 σ : 360 cal BC–cal AD 70

Final comment: P Murphy (18 September 1995), an Iron Age structure.

Hullbridge Survey: Blackwater 3, Maylandsea, Essex

Location: TL 91280427
Lat. 51.42.14 N; Long. 00.46.07 E

Project manager: P Murphy (University of East Anglia), 1982 and 1987

Archival body: Essex County Council

Description: exposures are much more extensive than those of the open coast around Jaywick: the upper sediments are widely exposed in vertical sections around the edges of the salt-marshes and the lower part of the sequence outcrops on the foreshore. A palaeosol and overlying sediments are visible.

Objectives: to examine prehistoric activity on the pre-transgression land surface and to date the overlying sedimentary sequence.

Final comment: P Murphy (18 September 1995), the two dates relate to the transgressive overlap, which submerged the Mesolithic site and to a small later prehistoric wooden structure constructed in estuarine conditions.

HAR-6623 4190 ±80 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: MAY341, submitted in July 1984 by P Murphy

Material: wood: *Quercus* sp.

Initial comment: from peat overlying the 'head' surface.

Objectives: to date peat overlying the 'head' surface, which produces Mesolithic flints.

Calibrated date: 1 σ : 2900–2630 cal BC
2 σ : 2930–2500 cal BC

Final comment: P Murphy (18 September 1995), estuarine sedimentation must have begun shortly afterwards (cf HAR-6604 and HAR-6618).

References: Walker and Otlet 1988, 313

HAR-8878 2790 ±70 BP

$\delta^{13}\text{C}$: -27.6‰

Sample: B3/182, submitted in October 1987 by P Murphy

Material: wood (waterlogged; remaining subsample now dessicated and structurally collapsed): unidentified (41.04g); wood fragments, too collapsed to identify (12.18g); *Quercus* sp., sapwood and heartwood (20.66g, 100%) (R Gale 1999)

Initial comment: from small rectilinear wooden structure on lower foreshore within estuarine clays overlying the Mesolithic site.

Objectives: the low elevation of this structure suggests that it is of Bronze Age or earlier date. Further work cannot, however, be justified until it is dated. There are no datable artefacts.

Calibrated date: 1 σ : 1020–840 cal BC
2 σ : 1130–800 cal BC

Final comment: P Murphy (18 September 1995), the structure falls into the category of small later prehistoric wooden structures constructed in an estuarine environment, widespread around the Essex coast.

References: Walker *et al* 1991a, 110

Hullbridge Survey: Blackwater 7, St Lawrence, Essex

Location: TL 97300595 to TL 97650613
Lat. 51.43.01 N; Long. 00.51.23 E, to
Lat. 51.43.07 N; Long. 00.51.42 E

Project manager: P Murphy (University of East Anglia), June 1984

Archival body: Essex County Council

Description: an extensive exposure of a palaeosol showing dense surface spreads of charcoal, with minimal sedimentary cover. Artefacts were rare.

Objectives: to examine the charcoal spreads and assess their significance.

References: Walker and Otlet 1988, 312

HAR-6604 3990 ±70 BP

$\delta^{13}\text{C}$: -24.6‰

Sample: STL7/43, submitted in July 1984 by P Murphy

Material: wood (waterlogged; remaining subsample dessicated and mostly too comminuted and friable to identify): unidentified (25.84g); *Quercus* sp., sapwood and heartwood (0.56g, 100%) (R Gale 1999)

Initial comment: charcoal spread on 'head' surface.

Objectives: this charcoal spread is very extensive but is not associated with settlement. It probably relates to a phase of forest clearance, and a date for this would be useful.

Calibrated date: 1 σ : 2580–2460 cal BC
2 σ : 2840–2290 cal BC

Final comment: P Murphy (18 September 1995), the date places this charcoal spread on the palaeosol surface in the late Neolithic. Similar charcoal spreads are known from other sites on the Essex coast (Wilkinson and Murphy 1995, 86). Most seem to relate to late Neolithic woodland clearance.

References: Wilkinson and Murphy 1995, 86

Hullbridge Survey: Blackwater 8, Bradwell-on-Sea, Essex

Location: TM 00460930
Lat. 51.44.45 N; Long. 00.54.15 E

Project manager: P Murphy (University of East Anglia), 1984, 1985, and 1987

Archival body: Essex County Council

Description: intertidal flats close to the nuclear power station. A palaeosol with surface charcoal spreads, cut features including Neolithic artefacts, and later wooden stakes driven into the palaeosol were visible.

Objectives: to examine Neolithic activity at the site and to date and characterise the later wooden structures.

Final comment: P Murphy (18 September 1995), the dates from the palaeosol at Blackwater Site 8 indicate middle–late Neolithic activity. Earlier activity was associated with settlement evidence, but the later with woodland clearance. A later prehistoric date for stakes driven into the palaeosol was established.

Laboratory comment: Ancient Monuments Laboratory (2003), one sample BRA8/34 (HAR-6585) was submitted for dating but failed to produce a result.

HAR-6617 4690 ±70 BP

$\delta^{13}\text{C}$: -25.2‰

Sample: BRA8/32, submitted in July 1984 by P Murphy

Material: charcoal: *Quercus* sp.

Initial comment: charcoal spread beneath peat on the 'head' surface.

Objectives: to date the middle Neolithic site.

Calibrated date: 1 σ : 3630–3360 cal BC
2 σ : 3640–3340 cal BC

Final comment: P Murphy (18 September 1995), a Neolithic date for the main phase of activity at the site is confirmed.

References: Walker and Otlet 1988, 313

HAR-6618 4000 ±70 BP

$\delta^{13}\text{C}$: -24.5‰

Sample: BRA8/31, submitted in July 1984 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (2.14g); *Quercus* sp., heartwood (0.42g, 100%) (R Gale 1999)

Initial comment: as HAR-6617

Objectives: as HAR-6617

Calibrated date: 1 σ : 2580–2460 cal BC
2 σ : 2860–2300 cal BC

Final comment: P Murphy (18 September 1995), this date as well as HAR-6617 relates to late Neolithic woodland clearance.

References: Walker and Otlet 1988, 313

HAR-7054 2350 ±70 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: BRA/79, submitted in October 1985 by P Murphy

Material: wood (waterlogged): *Quercus* sp.

Initial comment: one of a series of wooden stakes driven into submerged land surface at the site of the middle Neolithic settlement.

Objectives: although associated with a middle Neolithic settlement there are no stratigraphic means of determining whether these stakes are contemporary with it or later. A prehistoric radiocarbon date would justify detailed recording of these stakes.

Calibrated date: 1 σ : 490–380 cal BC
2 σ : 760–210 cal BC

Final comment: P Murphy (18 September 1995), the date confirmed that these wooden stakes were of later prehistoric date.

References: Walker *et al* 1990, 185

Hullbridge Survey: Clacton 1, Jaywick, Essex

Location: TM 156131
Lat. 51.46.29 N; Long. 01.07.35 E

Project manager: P Murphy (University of East Anglia),
June 1984

Archival body: Essex County Council

Description: the site consisted of the grey clay fill of a small pit exposed on the foreshore at Clacton (Jaywick Sands) and cut into the pre-transgression palaeosol. Overlying sedimentary cover was of organic clay with wood.

Objectives: to investigate prehistoric activity on the pre-transgression surface and assess the degree of erosion since these sites were last studied in the 1930s, as well as to establish the chronology for overlying sediments.

Final comment: P Murphy (18 September 1995), the dates for this site relate to pre-transgression prehistoric activity, the earliest phases of marine sedimentation, and post-medieval drainage.

References: Walker *et al* 1990, 191

HAR-8154 3830 ±80 BP

$\delta^{13}\text{C}$: -24.9‰

Sample: JAYSIC5, submitted in July 1984 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (2.87g); *Sorbus* sp. /Pomoideae (0.03g, 2.9%); *Quercus* sp., sapwood (0.03g, 2.9%); *Fraxinus* sp. (0.07g, 6.8%); *Tilia* sp. (0.10g, 9.7%); *Quercus* sp., heartwood (0.80g, 77.7%) (R Gale 2000)

Initial comment: from the pit with Beaker pottery.

Objectives: to date Beaker occupation at the site.

Calibrated date: 1 σ : 2470–2140 cal BC
2 σ : 2550–2030 cal BC

Final comment: P Murphy (18 September 1995), this is the latest date for prehistoric activity on the pre-transgression land surface of the Essex coast.

HAR-8368 1420 ±80 BP

Sample: JAYSIC2, submitted in July 1984 by P Murphy

Material: wood (waterlogged; remaining subsample now dessicated and structurally collapsed): unidentified (16.30g); cf *Prunus spinosa* (11.11g, 51.53%); *Corylus* sp. (10.45g, 48.47%) (R Gale 1999)

Initial comment: wood from estuarine clay overlying the 'head' surface, the so-called Lyonesse surface.

Objectives: to date the submergence of this area.

Calibrated date: 1 σ : cal AD 560–670
2 σ : cal AD 430–770

Final comment: P Murphy (18 September 1995), the date is surprisingly late. Basal sediments on the prehistoric land surface elsewhere are dated to c 2400 cal BC onwards. Taken at face value, this date might suggest isolation from tidal influence for an extended period - conceivably by a coastal barrier.

HAR-8369 380 ±90 BP

$\delta^{13}\text{C}$: -25.4‰

Sample: JAYSIC3, submitted in July 1984 by P Murphy

Material: waterlogged plant macrofossil: *Phragmites*

Initial comment: from the upper fill of a linear feature.

Objectives: to establish whether this feature might be related to Beaker activity at the site.

Calibrated date: 1 σ : cal AD 1430–1650
2 σ : cal AD 1400–1800

Final comment: P Murphy (18 September 1995), this is evidently a post-medieval drainage ditch.

Hullbridge Survey: Colne 1, Alresford, Essex

Location: TM 05821978
Lat. 51.50.17 N; Long. 00.59.17 E

Project manager: P Murphy (University of East Anglia),
July 1987

Archival body: Essex County Council

Description: on the north side of the junction of Alresford Creek with the River Colne, c 300m south-west of the site of a Roman villa, an undated wooden structure was located.

Objectives: to date and record the structure.

References: Walker *et al* 1991a, 110

HAR-8877 760 ±70 BP

$\delta^{13}\text{C}$: -27.8‰

Sample: COL1/7, submitted in October 1987 by P Murphy

Material: wood (desiccated, previously waterlogged, remaining subsample identified): unidentified (25.34g); *Quercus* sp., heartwood (40.40g, 100%) (R Gale 1999)

Initial comment: from a wooden structure on the foreshore within estuarine clays. The structure comprises a trough-shaped piece of wood pegged with circular mortices to uprights and associated with other vertical and horizontal wooden elements.

Objectives: the close proximity of this structure to a villa site suggests that it may be part of a Roman riverbank structure, but no datable artefacts were found. Further work could not be justified without a radiocarbon date.

Calibrated date: 1 σ : cal AD 1210–1290
2 σ : cal AD 1150–1390

Final comment: P Murphy (18 September 1995), the structure was of medieval date, unrelated to the villa. Its function is uncertain.

Laboratory comment: English Heritage (3 January 2012), this result is published (Walker *et al* 1991, 110), although a final certificate has not been found.

References: Walker *et al* 1991a, 110

Hullbridge Survey: Crouch 1, Essex

Location: TQ 79649645
Lat. 51.38.15 N; Long. 00.35.47 E

Project manager: P Murphy (University of East Anglia),
June 1982

Archival body: Essex County Council

Description: the site is unusual among the Bronze and Iron Age sites of the Essex coast as it is associated with occupation debris. A wooden platform, exposed in the bank of Fenn Creek, was recorded. Previously the site had produced human skulls.

Objectives: to date and record the structure and associated deposits.

Final comment: P Murphy (18 September 1995), results from the Crouch estuary fall into four groups: 1) wood and other organic material in lower peat, *c* 2890–1880 cal BC; 2) landing stage structures and salt-working sites associated with middle Clay, *c* 1740–540 cal BC; 3) upper (*Phragmites*) peat *c* cal AD 250–660; 4) deposits and structures associated with reclamation following renewed sedimentation (upper clay) *c* cal AD 1450–1955*.

References: Walker *et al* 1988, 327

HAR-5222 2730 ±60 BP

$\delta^{13}\text{C}$: -28.3‰

Sample: H1WOOD14, submitted in August 1982 by P Murphy

Material: wood (waterlogged): unidentified, roundwood

Initial comment: brushwood from a layer sealed by estuarine clay and exposed by erosion.

Objectives: this sample was associated with a platform structure of probable prehistoric date. The objective was to confirm this date.

Calibrated date: 1 σ : 930–810 cal BC
2 σ : 1020–790 cal BC

Final comment: P Murphy (18 September 1995), the date shows that the structure relates to later prehistoric activity - probably ritual in character.

Hullbridge Survey: Crouch 11, Essex

Location: TQ 79649645
Lat. 51.38.11 N; Long. 00.36.26 E

Project manager: P Murphy (University of East Anglia),
June 1982

Archival body: Essex County Council

Description: the deposits had been exposed in a recently excavated flood basin. Oak and hazel were rooted into estuarine clay. There was some evidence of prehistoric activity.

Objectives: to record and date the deposits.

Final comment: P Murphy (18 September 1995), results from the Crouch estuary fall into four groups: 1) wood and other organic material in lower peat, *c* 2890–1880 cal BC; 2) landing stage structures and salt-working sites associated with middle clay, *c* 1740–540 cal BC; 3) upper (*Phragmites*) peat *c* cal AD 250–660; 4) deposits and structures associated with reclamation following renewed sedimentation (upper clay) *c* cal AD 1450–1955*.

References: Walker *et al* 1988, 327

HAR-5221 2620 ±70 BP

$\delta^{13}\text{C}$: -29.1‰

Sample: H11ROOT, submitted in August 1982 by P Murphy

Material: wood (waterlogged; tree roots)

Initial comment: from the exposed clay surface. This sample was within an area of prehistoric occupation exposed by machining.

Objectives: to date the development of terrestrial woodland conditions.

Calibrated date: 1 σ : 830–770 cal BC
2 σ : 910–540 cal BC

Final comment: P Murphy (18 September 1995), it would seem that following a period of estuarine clay accumulation, the area dried sufficiently for oak and hazel woodland to develop on the valley floor. The radiocarbon date suggests that this drying out phase may have taken place between 910–540 cal BC (Reimer *et al* 2004). The previous estuarine phase would thus have ended before this date. It is possible that the estuarine phase may belong to the Thames III transgression and the subsequent dry phase of the Tilbury IV regression, which was followed around 910–540 cal BC by the Thames IV transgression (Devoy 1979).

References: Devoy 1979
Reimer *et al* 2004

Hullbridge Survey: Crouch 19, Essex

Location: TQ 82299589
Lat. 51.37.54 N; Long. 00.38.03 E

Project manager: P Murphy (University of East Anglia),
December 1982

Archival body: Essex County Council

Description: double alignment of posts and associated brushwood spreads on foreshore.

Objectives: to date and record structure.

Final comment: P Murphy (18 September 1995), results from the Crouch estuary fall into four groups: 1) wood and other organic material in lower peat, *c* 2890–1880 cal BC; 2) landing stage structures and salt-working sites associated with middle clay, *c* 1740–540 cal BC; 3) upper (*Phragmites*) peat *c* cal AD 250–660; 4) deposits and structures associated with reclamation following renewed sedimentation (upper clay) *c* cal AD 1450–1955*.

References: Walker *et al* 1988, 328

HAR-5549 270 ±80 BP

$\delta^{13}\text{C}$: -28.5‰

Sample: H44TWIGS, submitted on 25 April 1983 by P Murphy

Material: wood: unidentified, roundwood

Initial comment: brushwood from a probable prehistoric structure.

Objectives: to date the structure.

Calibrated date: 1 σ : cal AD 1490–1950
2 σ : cal AD 1440–1955*

Final comment: P Murphy (18 September 1995), this sample as well as HAR-5550 yielded similar post-medieval dates. It is evident that the structure was part of the old sea wall or related to it.

HAR-5550 300 ±90 BP

$\delta^{13}\text{C}$: -25.2‰

Sample: H45POST, submitted on 25 April 1983 by P Murphy

Material: wood (waterlogged; remaining subsample now desiccated): *Ulmus* sp., roundwood, diameter 35mm (146.49g, 100%) (R Gale 2000)

Initial comment: as HAR-5549

Objectives: as HAR-5549

Calibrated date: 1 σ : cal AD 1460–1800
2 σ : cal AD 1430–1955*

Final comment: see HAR-5549

Hullbridge Survey: Crouch 2, Essex

Location: TQ 80209646
Lat. 51.38.15 N; Long. 00.36.16 E

Project manager: P Murphy (University of East Anglia), June 1983

Archival body: Essex County Council

Description: a small salt-producing site rediscovered in 1982 from a thin band of fired clay at the interface between the buried land surface and the overlying estuarine clay. Excavation in 1983 demonstrated that the site was constructed on the old land surface. At the time of salt production, the land surface must have been above the tidal limit. To the south-east a thick layer of grey estuarine clay had accumulated above the buried land surface.

Objectives: to record and date evidence for salt production.

Final comment: P Murphy (18 September 1995), results from the Crouch estuary fall into four groups: 1) wood and other organic material in lower peat, c 2890–1880 cal BC; 2) landing stage structures and salt-working sites associated with middle clay, c 1740–540 cal BC; 3) upper (*Phragmites*) peat c cal AD 250–660; 4) deposits and structures associated with reclamation following renewed sedimentation (upper clay) c cal AD 1450–1955*.

References: Walker *et al* 1988, 328

HAR-5733 3020 ±90 BP

$\delta^{13}\text{C}$: -25.3‰

Sample: H2/91, submitted in September 1983 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (5.70g); *Tilia* sp. (0.05g, 2.6%); *Prunus spinosa* (0.07g, 3.6%); *Quercus* sp., heartwood (1.40g, 71.8%); *Corylus* sp. (0.43g, 22%) (R Gale 2000)

Initial comment: charcoal from within a prehistoric salt-working hearth, associated with abundant briquetage and a little flint-gritted pottery. The site was located at the contemporary High Water Mark in Fenn Creek, a tributary of the River Crouch, and sealed by grey estuarine clay deposited by a precursor of Fenn Creek. The charcoal includes oak and hazel/alder with some charred cereals.

Objectives: to date salt production.

Calibrated date: 1 σ : 1410–1120 cal BC
2 σ : 1500–1000 cal BC

Final comment: P Murphy (18 September 1995), this is the earliest direct evidence for salt production on the Essex coast.

Hullbridge Survey: Crouch 22, Essex

Location: TQ 92249660
Lat. 51.38.05 N; Long. 00.46.42 E

Project manager: P Murphy (University of East Anglia), April 1983

Archival body: Essex County Council

Description: the site is located c 300m east-south-east of the east end of Bridgemarsh Island, where two exposures of Lower Peat crop out on the foreshore around mid-tide level. The peat overlies the old land surface developed on head. Immediately to the north-west is a spur of London Clay, now truncated by marine erosion. The wooden structure occurs immediately to the south-east of the Lower Peat exposure in grey estuarine clay. The site appears to have originally been on the edge of a small island or rise in the valley floor.

Objectives: to investigate the relationship of the wooden structure to the sedimentary sequence.

Final comment: P Murphy (18 September 1995), results from the Crouch estuary fall into four groups: 1) wood and other organic material in lower peat, c 2890–1880 cal BC; 2) landing stage structures and salt-working sites associated with middle clay, c 1740–540 cal BC; 3) upper (*Phragmites*) peat c cal AD 250–660; 4) deposits and structures associated with reclamation following renewed sedimentation (upper clay) c cal AD 1450–1955*.

References: Walker *et al* 1988, 329

HAR-5736 2800 ±70 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: H22WOOD, submitted in September 1983 by P Murphy

Material: wood (previously waterlogged, remaining subsample now dry and structurally collapsed): unidentified (17.37g); *Quercus* sp., thin slivers (25.08g, 100%) (R Gale 2000)

Initial comment: from an oak timber set obliquely in estuarine clay above the lower peat of the Hullbridge sequence. This sample was selected from a group of timbers associated with hurdle-work. The upper part of structure was well sealed in estuarine clay.

Objectives: on stratigraphic grounds this is likely to be a prehistoric wooden structure. Dating is required to confirm this.

Calibrated date: 1 σ : 1030–840 cal BC
2 σ : 1190–810 cal BC

Final comment: P Murphy (18 September 1995), a later prehistoric date was confirmed.

Hullbridge Survey: Crouch 23, Essex

Location: TQ 92249660
Lat. 51.38.05 N; Long. 00.46.42 E

Project manager: P Murphy (University of East Anglia), April 1983

Archival body: Essex County Council

Description: the site comprised an exposure of lower peat on the pre-transgression palaeosol at Burnham-on-Crouch. Small posts/stakes were driven into the peat.

Objectives: to establish the date of the wood with a view to further investigation.

Final comment: P Murphy (18 September 1995), results from the Crouch estuary fall into four groups: 1) wood and other organic material in lower peat, *c* 2890–1880 cal BC; 2) landing stage structures and salt-working sites associated with middle clay, *c* 1740–540 cal BC; 3) upper (*Phragmites*) peat *c* cal AD 250–660; 4) deposits and structures associated with reclamation following renewed sedimentation (upper clay) *c* cal AD 1450–1955.

References: Walker *et al* 1988, 329

HAR-5737 3680 \pm 70 BP

$\delta^{13}C$: -28.8‰

Sample: H23WOOD, submitted in September 1983 by P Murphy

Material: wood (waterlogged): *Crataegus* sp.

Initial comment: the sample consists of a post from an area of posts and brushwood contained within, and cutting, the lower peat of the Hullbridge sequence, which at this point is rather humified.

Objectives: to date the wooden post.

Calibrated date: 1 σ : 2200–1950 cal BC
2 σ : 2290–1880 cal BC

Final comment: P Murphy (18 September 1995), this was the earliest date on an artificial wooden structure from the project, but more pressing objectives precluded further work.

Hullbridge Survey: Crouch 29, Essex

Location: TQ 89599717
Lat. 51.38.27 N; Long. 00.44.25 E

Project manager: P Murphy (University of East Anglia), April 1983

Archival body: Essex County Council

Description: the site, on the north bank of the Crouch near Bridgemarsh Island, appears to be situated on the edge of a low rise in the valley floor. Two wooden structures were found on the old land surface and buried beneath *c* 2.5m of estuarine clay. Pre-Bronze Age settlement is represented by a scatter of struck flints and a few fragments of flint-gritted pottery suggestive of both earlier and later Neolithic occupation.

Objectives: to investigate all phases of archaeology in relation to their stratigraphic position.

Final comment: P Murphy (18 September 1995), the two wooden structures to be dated were assumed, from their stratigraphic context, to be of later prehistoric date, which the radiocarbon dates confirmed.

References: Walker *et al* 1988, 328

HAR-5734 2950 \pm 70 BP

$\delta^{13}C$: -25.9‰

Sample: H29/67, submitted in September 1983 by P Murphy

Material: wood: *Quercus* sp., twigs; *Prunus* sp., twigs

Initial comment: from a brushwood platform. Randomly laid brushwood, situated within a depression on a former land surface, developed on the London Clay 'head'. The platform was sealed by estuarine clay.

Objectives: on stratigraphic grounds, and also because flintwork was found unstratified in the vicinity, this is believed to be a prehistoric wooden structure. Dating will hopefully confirm this.

Calibrated date: 1 σ : 1300–1040 cal BC
2 σ : 1400–930 cal BC

Final comment: P Murphy (18 September 1995), this measurement confirms a later prehistoric date.

HAR-5735 3250 \pm 90 BP

$\delta^{13}C$: -25.0 (assumed) \pm 3.0‰

Sample: H29/68, submitted in September 1983 by P Murphy

Material: wood (waterlogged): *Fraxinus* sp.

Initial comment: from a horizontal timber (split segment of *Fraxinus* sp.) forming part of a wooden trackway resting on the old land surface on the London Clay 'head'. This sample was stratigraphically equivalent to HAR-5734, and was covered by estuarine clay.

Objectives: as HAR-5734 and to compare the results.

Calibrated date: 1 σ : 1630–1430 cal BC
2 σ : 1750–1320 cal BC

Final comment: P Murphy (18 September 1995), this date confirms a later prehistoric date. Further work suggested the structure was a platform or landing stage rather than a trackway.

Hullbridge Survey: Crouch 4, Essex

Location: TQ 80269561
Lat. 51.37.48 N; Long. 00.36.17 E

Project manager: P Murphy (University of East Anglia),
June 1982 and June 1984

Archival body: Essex County Council

Description: this site is on the north bank of River Crouch opposite Hullbridge. At this site just to the west of the confluence of Fenn Creek and the River Crouch, there are good sections of the upper clay, upper peat, middle clay, and lower peat.

Objectives: to examine the Mesolithic site on the pre-transgression palaeosol and to undertake palaeoecological studies on overlying sediments and to date them.

Final comment: P Murphy (18 September 1995), the sedimentary sequence comprises a basal lower peat and an intercalated upper peat within estuarine clays. Top and bottom contacts were dated to give a chronological sequence. The results are consistent with the Thames sequence.

HAR-5223 3660 ±70 BP

$\delta^{13}\text{C}$: -28.0‰

Sample: H4LPEATW, submitted in August 1982 by P Murphy

Material: wood (waterlogged; remaining subsample now desiccated): unidentified (55.78g); *Quercus* sp., heartwood (45.73g, 100%) (R Gale 2000)

Initial comment: from top of the Flandrian lower peat.

Objectives: to date the sequence.

Calibrated date: 1 σ : 2140–1940 cal BC
2 σ : 2280–1880 cal BC

Final comment: P Murphy (18 September 1995), the contact between the lower peat and middle clay is very sharp and the presence of wood and peat fragments near the base of the clay shows that there was some erosion of the peat surface. The contact between peat and clay is diachronous: a date of 2880–2480 cal BC at 95% confidence (HAR-5227; Reimer *et al* 2004) was obtained from tree roots on the peat surface at Site 8, but upstream at Site 4 wood from the peat surface gave a date of 2280–1870 cal BC (HAR-5223). Results from the top of the middle clay at sites 4 and 9 indicate a changing depositional environment. This might also agree well with a radiocarbon determination (HAR-5226) from the base of the lower peat at this site.

References: Reimer *et al* 2004
Walker *et al* 1988, 327

HAR-5225 1610 ±70 BP

$\delta^{13}\text{C}$: -30.3‰

Sample: H4UPEATB, submitted in August 1982 by P Murphy

Material: peat

Initial comment: from base of the Flandrian upper peat.

Objectives: to date the sequence.

Calibrated date: 1 σ : cal AD 380–550
2 σ : cal AD 250–610

Final comment: P Murphy (19 September 1995), the beginning of the peat formation was a roughly synchronous event in the upper estuary: at site 4 the peat base is dated to cal AD 250–610 (HAR-5225; Reimer *et al* 2004) and at site 9 a date of cal AD 410–660 at 95% confidence (HAR-5224) was obtained. The top of this peat is dated to cal AD 540–780 at 95% confidence (HAR-6589), and the peat development was thus a comparatively short-lived phase of no more than about 250 years.

References: Reimer *et al* 2004
Walker *et al* 1988, 327

HAR-5226 3760 ±70 BP

$\delta^{13}\text{C}$: -30.0‰

Sample: H4LPEATB, submitted in August 1982 by P Murphy

Material: peat

Initial comment: from base of the Flandrian lower peat.

Objectives: to date the sequence.

Calibrated date: 1 σ : 2290–2040 cal BC
2 σ : 2460–1970 cal BC

Final comment: P Murphy (18 September 1995), this result provides a date bracket, together with HAR-5223, for peat development.

References: Walker *et al* 1988, 327

HAR-6589 1380 ±80 BP

$\delta^{13}\text{C}$: -28.8‰

Sample: H4UPEATT, submitted in July 1984 by P Murphy

Material: peat (*Phragmites* sp.)

Initial comment: from the top 5cm of the peat.

Objectives: to date the top of the upper peat indicating a change from freshwater to estuarine conditions.

Calibrated date: 1 σ : cal AD 600–690
2 σ : cal AD 540–780

Final comment: see HAR-5225

References: Walker and Otlet 1988, 312

Hullbridge Survey: Crouch 52, Essex

Location: TL 802956
Lat. 52.31.41 N; Long. 00.39.24 E

Project manager: P Murphy (University of East Anglia),
June 1984

Archival body: Essex County Council

Description: the site lies on the north bank of the River Crouch, opposite Hullbridge, and comprises a spread of artificially laid brushwood within the upper peat.

Objectives: to record and date the structure and specifically to establish whether it related to late Roman or early Saxon activity.

Final comment: P Murphy (18 September 1995), results from the Crouch estuary fall into four groups: 1) wood and other organic material in lower peat, *c* 2890–1880 cal BC; 2) landing stage structures and salt-working sites associated with middle clay, *c* 1740–540 cal BC; 3) upper (*Phragmites*) peat *c* cal AD 250–660; 4) deposits and structures associated with reclamation following renewed sedimentation (upper clay) *c* cal AD 1450–1955*.

References: Walker and Otlet 1988, 312

HAR-6581 1420 ±70 BP

$\delta^{13}C$: -27.7‰

Sample: H52WOOD, submitted in July 1984 by P Murphy

Material: wood (waterlogged; remaining subsample dessicated and comminuted): unidentified (1.33g); *Quercus* sp. (0.46g, 71.9%); *Betula* sp. (0.18g, 28.1%) (R Gale 2000)

Initial comment: from a brushwood trackway in the upper peat.

Objectives: to establish whether this trackway is of late Roman or early Saxon date.

Calibrated date: 1 σ : cal AD 570–670
2 σ : cal AD 470–770

Final comment: P Murphy (18 September 1995), this was the only wooden structure seen within the upper peat.

Potentially it could have dated anywhere between the 95% confidence ranges of cal AD 250–610 (HAR-5225; 1610 ±70 BP; Reimer *et al* 2004) and cal AD 540–780 (HAR-6589; 1380 ±80 BP) and be Roman or Saxon. Even at the two sigma range this date establishes it is post-Roman.

References: Reimer *et al* 2004

Hullbridge Survey: Crouch 56, Essex

Location: TQ 92449591
Lat. 51.37.43 N; Long. 00.46.51 E

Project manager: P Murphy (University of East Anglia), June 1983

Archival body: Essex County Council

Description: the find was made on the south shore of the River Crouch where exposures of the old land surface are absent. The site comprised a wooden paddle stratified in estuarine clay. Well above it was a thin intercalated peat.

Objectives: to record, retrieve, and date the paddle, and secondly to assist in palaeoecological studies and dating of the sedimentary sequence.

Final comment: P Murphy (18 September 1995), results from the Crouch estuary fall into four groups: 1) wood and other organic material in lower peat, *c* 2890–1880 cal BC; 2) landing stage structures and salt-working sites associated with middle clay, *c* 1740–540 cal BC; 3) upper (*Phragmites*) peat *c* cal AD 250–660; 4) deposits and structures associated with reclamation following renewed sedimentation (upper clay) *c* cal AD 1450–1955*.

References: Walker *et al* 1988, 328

HAR-5732 180 ±80 BP

$\delta^{13}C$: -29.4‰

Sample: H56/97, submitted in September 1983 by P Murphy

Material: plant macrofossils (waterlogged material, remaining sub-sample desiccated and very degraded, no wood was recorded): unidentified (0.43g); unidentified herbaceous stem, (0.15g, 100%) (R Gale 2000)

Initial comment: context 97 was exposed in a riverbank section. It is the presumed stratigraphic equivalent of the upper peat exposed further up the estuary, from which, at 95% confidence, the dates of cal AD 540–780 (HAR-6589; 1380 ±80 BP; Reimer *et al* 2004) and cal AD 250–610 (HAR-5225; 1610 ±70 BP) have been obtained.

Objectives: a date is required to check above correlation and to provide a *terminus ante quem* for a prehistoric wooden paddle stratified in subjacent estuarine clays.

Calibrated date: 1 σ : cal AD 1640–1955*
2 σ : cal AD 1510–1955*

Final comment: P Murphy (18 September 1995), the date shows that the preliminary correlation of this peaty clay with the Upper Peat was wrong. It presumably related to semi-terrestrial conditions developed in the post-medieval period.

References: Reimer *et al* 2004

Hullbridge Survey: Crouch 8, Essex

Location: TQ 83409653
Lat. 51.38.14 N; Long. 00.39.02 E

Project manager: P Murphy (University of East Anglia), June 1982

Archival body: Essex County Council

Description: 40m south of the shore of the River Crouch estuary, an extensive stretch of the lower peat surface is exposed between tides along the north bank of Clementsgreen Creek and the River Crouch. The upper surface of the lower peat dips down to the east, or when developed on the ‘head’, follows the underlying topography.

Objectives: to record and date the sediments including a submerged forest.

Final comment: P Murphy (18 September 1995), results from the Crouch estuary fall into four groups: 1) wood and other organic material in lower peat, *c* 2890–1880 cal BC; 2) landing stage structures and salt-working sites associated with middle clay, *c* 1740–540 cal BC; 3) upper (*Phragmites*) peat *c* cal AD 250–660; 4) deposits and structures associated with reclamation following renewed sedimentation (upper clay) *c* cal AD 1450–1955*.

References: Walker *et al* 1988, 327

HAR-5227 4100 ±70 BP

$\delta^{13}C$: -30.6‰

Sample: H8ROOTS, submitted in August 1982 by P Murphy

Material: wood (waterlogged; remaining subsample now desiccated): unidentified (18.73g); *Alnus* sp., including bark (63.34g, 100%) (R Gale 2000)

Initial comment: this sample was an *in situ* tree root. These roots comprised part of a currently exposed Flandrian submerged forest once sealed by estuarine clays, but the sample measured was sub-aerially exposed.

Objectives: to date the top contact of the lower peat.

Calibrated date: 1 σ : 2870–2500 cal BC
2 σ : 2890–2470 cal BC

Final comment: see HAR-5223

Hullbridge Survey: Crouch 9, Essex

Location: TQ 84019657
Lat. 51.38.14 N; Long. 00.39.34 E

Project manager: P Murphy (University of East Anglia), June 1982

Archival body: Essex County Council

Description: at the confluence of Stow Creek and the River Crouch there is an area of unprotected salt marsh with good sections of the upper clay, upper peat and the top of the middle clay. The lower peat is present, but due to its eastward dip, is generally below low-water mark at this site.

Objectives: to record and date the sediments.

Final comment: P Murphy (18 September 1995), results from the Crouch estuary fall into four groups: 1) wood and other organic material in lower peat, *c* 2890–1880 cal BC; 2) landing stage structures and salt-working sites associated with middle clay, *c* 1740–540 cal BC; 3) upper (*Phragmites*) peat *c* cal AD 250–660; 4) deposits and structures associated with reclamation following renewed sedimentation (upper clay) *c* cal AD 1450–1955^{*}.

References: Walker *et al* 1988, 327

HAR-5224 1500 \pm 70 BP

$\delta^{13}\text{C}$: -29.1‰

Sample: H9UPEAT, submitted in August 1982 by P Murphy

Material: peat

Initial comment: from the Flandrian upper peat.

Objectives: to date the sequence.

Calibrated date: 1 σ : cal AD 440–640
2 σ : cal AD 410–660

Final comment: P Murphy (18 September 1995), *see* comments on Crouch upper peat under HAR-5225.

Hullbridge Survey: Thames Site II, Purfleet, Essex

Location: TQ 54457871
Lat. 51.29.09 N; Long. 00.13.29 E

Project manager: P Murphy (University of East Anglia), August 1986

Archival body: Essex County Council

Description: an outcrop of wood peat on the Thames foreshore, with top (surviving) surface at 0.00m OD; 77cm surviving thickness. The peat overlies a land surface developed on earlier estuarine sediments.

Objectives: to investigate Neolithic activity on the pre-peat surface and to establish the date of the peat initiation.

References: Walker *et al* 1991a, 864–7

HAR-8647 3910 \pm 70 BP

$\delta^{13}\text{C}$: -30.2‰

Sample: T2PEAT, submitted in September 1986 by P Murphy

Material: wood (waterlogged; remaining subsample identified): *Alnus* sp., roundwood, diameter 40mm (64.34g, 100%) (R Gale 2000)

Initial comment: from base of wood peat, 46cm thick, exposed in bank section.

Objectives: the peat overlies the palaeosol with woodland mollusc fauna and Neolithic artefacts including two polished axes. This date will establish the relationship between the peat and the earlier Neolithic activity.

Calibrated date: 1 σ : 2480–2290 cal BC
2 σ : 2580–2150 cal BC

Final comment: P Murphy (7 February 1995), the date for the base of this peat firmly establishes that it was related to the later Neolithic Thames III transgression, dated elsewhere to *c* 2300 cal BC onwards.

Ipswich, Suffolk

Location: TM 165445
Lat. 52.03.22 N; Long. 01.09.29 E

Project manager: K Wade (Suffolk County Council), 1980–1

Archival body: Suffolk County Council

Description: middle Saxon and later town.

Objectives: to confirm the date of the Saxon pit.

Laboratory comment: Ancient Monuments Laboratory (2003), one further sample 1ASAL02 (HAR-4628) was submitted for dating but failed to produce a result.

References: Wade 1988

HAR-4627 1070 \pm 60 BP

$\delta^{13}\text{C}$: -25.5‰

Sample: 34100031, submitted on 12 March 1981 by P Murphy

Material: charcoal: unidentified

Initial comment: from a middle Saxon pit. The sample is associated with a pottery group representing the transition from Ipswich ware to Thetford-type ware, traditionally dated to the mid-ninth century. A halfpenny of Alfred, minted

c AD 890–925, associated, implied the transition might go on until the early tenth century.

Objectives: to confirm a possible early tenth-century date.

Calibrated date: 1 σ : cal AD 890–1030
2 σ : cal AD 820–1120

Final comment: K Wade (24 July 1995), the measurement confirms that Ipswich ware continued in circulation to the end of the ninth century and into the tenth century, overlapping with the production of Thetford-type wares.

Isles of Scilly: St Martin's, Little Bay

Location: SV 924166
Lat. 49.58.09 N; Long. 06.17.26 W

Project manager: D Neal (Department of the Environment), 1980

Archival body: Isles of Scilly Museum

Description: a stone-built round house and walls of other structures in a Bronze Age settlement, exposed by winter storms. The house had a central hearth, replaced five times, and radial partitions, sealed by occupation debris.

Objectives: to establish a Bronze Age or Iron Age date.

Laboratory comment: Ancient Monuments Laboratory (2001), two further dates from this site (HAR-1715 and HAR-1726) were funded prior to 1981 and were published in Jordan *et al* (1994, 154). HAR-4324 has been published in Neal (1983, 52) as 3490 \pm 100 BP, however the certificate states 3480 \pm 100 BP.

References: Jordan *et al* 1994, 154
Neal 1983

HAR-4324 3480 \pm 100 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: 34-060, submitted on 31 March 1981 by N D Balaam

Material: charcoal: *Ulex* sp.

Initial comment: Pit 65, beneath Building 2; from a hearth (layer 60).

Objectives: to establish a Bronze Age or Iron Age date.

Calibrated date: 1 σ : 1940–1680 cal BC
2 σ : 2120–1520 cal BC

Final comment: D Neal (1983), samples from the lower, and high, levels of deposits gave results of HAR-1715 (3190 \pm 110 BP) and HAR-1726 (2780 \pm 80 BP) and respectively at 95% confidence these represent 1740–1210 cal BC and 1190–800 cal BC (Reimer *et al* 2004). This may indicate that, as with Building 1 at Nornour (Butcher 1978, 29–112), the hut's occupation spanned the latter half of the second millennium BC. The further determination, HAR-4324, from a sample subsequently obtained in 1980 from a pit beneath the house, represents similarly a bracket of 2120–1520 cal BC.

References: Butcher 1978
Reimer *et al* 2004

Itchen Valley: M3 Watching Brief, Winnall Moors, Hampshire

Location: SU 48602991
Lat. 51.03.57 N; Long. 01.18.23 W

Project manager: P J Fasham (Wessex Archaeology), 1983–5

Archival body: Hampshire County Council

Description: this site is an area of fen, north of Winchester in the Itchen Valley. It comprises a peat deposit measuring approximately 2km from north to south, and is the width of the floodplain, 300–500m. A core was taken from the southern end of the deposit where predominantly *Phragmites* peat, 4.3m in depth, overlies chalky clay and gravel (SU 486799).

Objectives: this is a rare and important pollen sequence that can be related to the vegetation history of the chalk. At the time of analysis and reporting (1981–5) this was the only polliniferous peat sample recording chalkland vegetational history, except those reported from the Isle of Wight by Scaife (1980). Unlike all other known peats in the chalk outcrop of southern England, this deposit is polliniferous (Waton 1983) and because of its large size, it records vegetational changes on several square kilometres of the surrounding downlands. This is of particular significance in view of the paucity of pollen spectra from the chalk downs (Dimpleby and Evans 1979; Scaife 1980; Allen and Scaife 2007) and the fact that this sequence records the vegetational history from the Boreal period (c 9000–6000 cal BC) to the present makes this a significant record. It shows typical Boreal and Atlantic conditions until a major and permanent clearance at about 2.8m. This is comparable to the *Ulmus* (elm) decline clearance recorded elsewhere in Britain and Europe (Scaife and Jones 1988). Dating was required to provide a chronology for the specific vegetational events, which could then be compared with both dated national vegetational events, and regional archaeological activities.

Final comment: M J Allen (2 May 2007), this is a series of 'new' and 'unpublished' results from the floodplain peat of the River Itchen at Winnall Moors, Winchester, which was cored for pollen by Paul Waton (1983) for his doctoral research. Only one radiocarbon result (submitted in 1981) from his PhD work has been previously been published (HAR-4342; Waton 1982; Waton and Sieveking 1986).

The current series of samples were submitted in 1985 in conjunction with the M3 archaeological work by P J Fasham. Despite the value of the pollen information and the chronology provided by this set of radiocarbon dates to the local landscape, neither were referenced in the archaeological report on the adjacent chalkland of Winnall Down (Fasham 1985), nor used in any detail in the review and retrospective of the archaeological work of the M3 (Fasham and Whinney 1991). The published date was reviewed in relation to the later (1990–3) further archaeological work on the M3 (Allen and Walker 2000), when existence of the series of results presented here was unknown. This series of results provides a chronological sequence of events for a detailed and important pollen sequence (Waton 1982; 1983; Waton and Sieveking 1986; Scaife and Jones 1988), and will enable significant chronological revision of the chalkland vegetation

history presented by Waton (1982; 1983; Waton and Sieveking 1986). The new set of four radiocarbon determinations provides a better chronology of the peat accumulation and vegetation sequence originally postulated by Waton (1982; Waton and Sieveking 1986). In fact the sequences are so important, and these results so different from the assumed dates, that the chronology of the vegetation history can be significantly revised. Although the vegetation sequence remains an important type site in southern England, the reader should be made aware that some caution should be used with the assumed dates based on rates of peat accumulation. Ideally this sequence should be republished with the new chronology and a revised narrative.

References: Allen and Scaife 2007
Allen and Walker 2000
Dimpleby and Evans 1979
Fasham 1985
Fasham and Whinney 1991
Scaife 1980
Scaife and Jones 1988
Waton 1982
Waton 1983
Waton and Sieveking 1986

HAR-6442 7790 ±110 BP

$\delta^{13}C$: -27.0‰

Sample: M3WBWM21, submitted on 5 January 1985 by P J Fasham

Material: peat

Initial comment: unlike all other known peats in the chalk outcrop of southern England, this deposit is polliniferous, and because of its large size, it records vegetational changes on several square kilometres of the surrounding downlands. The pollen diagram records the period from the Boreal period to the present. It shows typically Boreal and Atlantic conditions until a major and permanent clearance at about 2.8m. This is comparable with the *Ulmus* decline clearance recorded elsewhere in Britain and Europe. The sample is from the level of the Boreal-Atlantic Transition and will permit comparison of the date of this event with that occurring on the non-calcareous geologies of southern Britain. This will have implications for climatic change, plant migration rates, and possibly human activity. The sample is directly relevant to work carried out at Winnall Down, at Easton Lane, and on the M3 Watching Brief, and correlates with snail work already done.

Objectives: at present it is the only polliniferous peat sample recording chalkland vegetational history. Further dating is required to make full use of this unique pollen data. The site is also currently under threat from the proposal to construct a link road from the M3 across the moors to Winchester city centre, so it is imperative that samples are assayed for ^{14}C as soon as possible.

Calibrated date: 1 σ : 6700–6480 cal BC
2 σ : 7050–6430 cal BC

Final comment: M J Allen (2 May 2007), the date of the Boreal-Atlantic transition is considered to be about 7000–7500 BP (5900–6400 cal BC) elsewhere (Haskins 1978; Hibbert *et al* 1971; Smith and Pilcher 1973; Waton 1983; Waton and Sieveking 1986; Allen and Green 2000;

Allen and Scaife 2007). The result of 7790 ±110 BP which calibrates to 7040–6430 cal BC falls just earlier than this expected range. It is possible that this might in part be due to hard-water error (Shotton 1972), but it may reflect a southern asynchronicity in the vegetation events as suggested by Scaife (1980). Like the rest of the series, however, the sample was a bulk sample of peat and presumably dated humic acids and not an individual identifiable plant remain.

References: Allen and Green 2000
Allen and Scaife 2007
Haskins 1978
Hibbert *et al* 1971
Scaife 1980
Shotton 1972
Smith and Pitcher 1973
Waton 1983
Waton and Sieveking 1986

HAR-6443 3170 ±80 BP

$\delta^{13}C$: -31.3‰

Sample: M3WBWM22, submitted on 5 January 1985 by P J Fasham

Material: peat

Initial comment: as HAR-6442 for general details. This sample is from the level of the *Ulmus* decline clearance dated in 1981 to 5630 ± 90 BP (HAR-4342; 4690–4330 cal BC at 95% confidence; Reimer *et al* 2004). This second sample is to confirm this exceptionally early and at present earliest determination for this event in Britain.

Objectives: as HAR-6442

Calibrated date: 1 σ : 1520–1390 cal BC
2 σ : 1630–1260 cal BC

Final comment: M J Allen (2 May 2007), the result of 3170 ±80 BP gives a surprisingly late date which is not comparable with the previously recorded age, nor does this result fall comfortably within the chronological sequence. A result of 5120 ±80 BP would calibrate to 4140–3700 cal BC at 95% confidence (Reimer *et al* 2004) and falls exactly within the expected date range for the elm decline in southern England (Scaife 1988; Allen and Green 2000; Allen and Scaife 2007). The two results (HAR-4342 and HAR-6443), however, are statistically inconsistent ($T'=18.0$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978) indicating some inconsistency in the results or measurements.

Laboratory comment: English Heritage (3 October 2011), the certificate clearly states that the result from this sample was 3170 ±80 BP.

References: Allen and Green 2000
Allen and Scaife 2007
Reimer *et al* 2004
Scaife and Jones 1988
Ward and Wilson 1978

HAR-6444 1260 ±70 BP

$\delta^{13}C$: -30.5‰

Sample: M3WBWM23, submitted on 5 January 1985 by P J Fasham

Material: peat

Initial comment: as HAR-6442 for general details. This sample is from 190cm, to date the beginning of the second phase of cereal cultivation. On peat accumulation rates this is expected to be *c* 1400 BC.

Objectives: as HAR-6442

Calibrated date: 1σ: cal AD 660–880
2σ: cal AD 640–950

Final comment: M J Allen (2 May 2007), the result indicates a very early, pre-Norman conquest, medieval date, as well as incorrect ascription of peat growth to this sequence. This means that Waton's ascription of a second phase of cereal cultivation in prehistory is incorrect and this should belong to the Anglo-Saxon period. This is a surprise in view of the extensive evidence of Bronze Age field systems and cultivation, especially on the east side of the Itchen Valley at Twyford Down (Allen and Walker 2000).

References: Allen and Walker 2000

HAR-6445 670 ±70 BP

$\delta^{13}\text{C}$: -29.3‰

Sample: M3WBWM24, submitted on 5 January 1985 by P J Fasham

Material: peat

Initial comment: as HAR-6442 for general details. Sample is from 110cm and is to provide a date for the maximum of oak pollen and thus a date for the beginning of the second major period of woodland clearance discernible in the pollen diagram. From peat accumulation rates this is thought to be medieval in origin, *c* AD 1060.

Objectives: as HAR-6442

Calibrated date: 1σ: cal AD 1270–1400
2σ: cal AD 1220–1420

Final comment: M J Allen (2 May 2007), the result, as with HAR-6444, provides a date later than expected. The result is about two and a half centuries later than expected, falling well within the medieval period.

Kelling Heath, Norfolk

Location: TG 108418
Lat. 52.55.54 N; Long. 01.08.12 E

Project manager: R M Jacobi (British Museum), 1981

Archival body: Norfolk County Council

Description: an excavation of 2m² to collect a sample of Mesolithic debitage for analysis.

Objectives: to provide a date for the pit.

HAR-5103 4960 ±700 BP

$\delta^{13}\text{C}$: -27.3‰

Sample: KELLING, submitted in May 1982 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (3.37g); *Quercus* sp., heartwood (3.65g, 100%) (R Gale 1999)

Initial comment: from a Mesolithic 'cooking pit'.

Objectives: an attempt to date the early Mesolithic use of the locality.

Calibrated date: 1σ: 4530–2900 cal BC
2σ: 5480–2030 cal BC

Final comment: R M Jacobi (3 July 1995), from a soil stain incorporating early Mesolithic artefacts and debitage. The radiocarbon date shows the burning to be much later than the Mesolithic activity, which it was intended to date. The finds from previous excavations in this general area included fragments of polished flint axe and a leaf-arrowhead.

Kelvedon, Essex

Location: TL 864186
Lat. 51.50.04 N; Long. 00.42.20 E

Project manager: M Eddy (Essex County Council), August 1981

Archival body: Essex County Council

Description: a multi-period site with limited early prehistoric occupation followed by intensive late pre-Roman Iron Age occupation. Area excavated was site J.

Objectives: to date the feature and therefore the site area J.

References: Eddy and Turner 1982

HAR-4633 6740 ±90 BP

$\delta^{13}\text{C}$: -25.4‰

Sample: KL81J162, submitted in August 1981 by P Murphy

Material: charcoal (remaining subsample mostly too comminuted to identify): unidentified (37.51g); *Ulex/Cytisus* sp., roundwood, diameter 4mm (>0.01g, 5.3%); *Quercus* sp., heartwood (0.18g, 94.7%) (R Gale 1999)

Initial comment: from the fill of a prehistoric pit, pit 162, consisting of reworked brickearth in context 106. The fill from 162 differed from all the other fills in the feature as it contained a high proportion of charcoal fragments and 'ashy' material giving an overall dark greyish brown colour. Prominent infilled root channels penetrated through 162 into 164.

Objectives: to date the pit fill.

Calibrated date: 1σ: 5730–5560 cal BC
2σ: 5800–5480 cal BC

Final comment: M Eddy (1982), Mesolithic flintwork is frequently encountered within the natural brickearth and residually in later features along the terrace edge. This is the first radiocarbon date for the Essex Mesolithic (see Jacobi 1980, 14) but unfortunately the only find was a single flint flake from the very top of the pit fill. A number of other brickearth-filled pit-like features were excavated in trench J but all were totally sterile and had irregular sides and bases.

References: Jacobi 1980

Kemp Howe, Yorkshire (East Riding)

Location: SE 663962
Lat. 54.21.25 N; Long. 00.58.47 W

Project manager: A Finney (East Riding Archaeology and Research Centre), 1968

Archival body: Hull and East Riding Museum

Description: Kemp Howe is a multi-period site consisting of the remains of a long barrow with associated posthole avenue. A round barrow was constructed over the long barrow facade and this was reused in the Anglian period when a small cemetery was excavated in to the barrow ditch. A feature interpreted as a *Grubenhaus* by the original excavator TCM Brewster was shown by the radiocarbon dating to be of a prehistoric date.

Objectives: to provide independent dating for the construction of the long barrow facade, the round barrow ditch, and to date burials from the Anglian cemetery.

Final comment: A E Finney (1991), these results were most useful in providing independent dating for the site and in an area of the Wolds where such dating was poorly represented.

References: Brewster 1969

HAR-5725 5100 ±120 BP

$\delta^{13}C$: -22.0‰ (assumed)

Sample: KHT81248, submitted on 24 August 1983 by T C M Brewster

Material: antler

Initial comment: located at a depth of 7ft on the bottom of the west ditch, trench 8.

Objectives: to provide a date for the construction of the long barrow ditch.

Calibrated date: 1 σ : 4040–3710 cal BC
2 σ : 4240–3640 cal BC

Final comment: A Finney (2 February 2007), the date of the antler provides a date for the construction of the southern long barrow ditch.

HAR-6205 1380 ±80 BP

$\delta^{13}C$: -22.9‰

Sample: KHG33618, submitted on 8 May 1984 by T C M Brewster

Material: human bone (right tibia and femur (290g))

Initial comment: from a post-pagan Anglian grave cut into a Bronze Age round barrow ditch, one of a series.

Objectives: to enable 12 burials of the same period to be dated and to indicate a date for the sunken-featured building.

Calibrated date: 1 σ : cal AD 600–690
2 σ : cal AD 540–780

Final comment: A Finney (2 February 2007), the result helps to clarify an earlier radiocarbon date from grave 3, burial 3 as this series of burials lack gravegoods.

HAR-8775 1290 ±90 BP

$\delta^{13}C$: -27.0‰

Sample: KHT9G5B5, submitted on 7 August 1985 by A E Finney

Material: human bone (right tibia and femur)

Initial comment: from grave 5, burial 5, in the Anglian cemetery; trench 9, section C4/P4.

Objectives: a previous radiocarbon date for grave 3, burial 3 (HAR-6205) is too early. HAR-8775 and HAR-8776 should confirm or disprove this result. These burials had no grave goods to date them.

Calibrated date: 1 σ : cal AD 650–860
2 σ : cal AD 590–970

Final comment: A E Finney (1991), HAR-8773 and HAR-8776 help clarify previous date for grave 3, burial 3 (HAR-6205), which was originally thought to be too early. There are no grave goods with this series of burials to help dating.

References: Walker *et al* 1991a, 106

HAR-8776 1310 ±100 BP

$\delta^{13}C$: -22.0‰

Sample: KHT6GIBI, submitted on 7 August 1985 by A E Finney

Material: human bone (right tibia and femur)

Initial comment: from grave 1, burial 1, in the Anglian cemetery; trench 6, section K3.

Objectives: as HAR-8775

Calibrated date: 1 σ : cal AD 640–810
2 σ : cal AD 550–970

Final comment: A E Finney (1992), a previous date from grave 3, burial 3, gave an earlier than expected result. This result confirms the earlier dating. There were no associated grave goods.

References: Hardiman *et al* 1992, 49

HAR-8778 4870 ±90 BP

$\delta^{13}C$: -27.1‰

Sample: KHLBFBT3, submitted on 7 August 1985 by A E Finney

Material: charcoal (remaining subsample very friable): unidentified (5.23g); *Quercus* sp., sapwood and heartwood (2.31g, 100%) (R Gale 1999)

Initial comment: from a facade bedding trench associated with occupation debris used as packing for the postholes.

Objectives: to obtain an independent date for the facade. The facade was part of an earlier phase at Kemp Howe, which included a mortuary enclosure; therefore the date would phase this stage in comparison with the long barrow ditches.

Calibrated date: 1 σ : 3720–3530 cal BC
2 σ : 3930–3380 cal BC

Final comment: A E Finney (1992), the facade was part of an earlier phase at Kemp Howe, which included a mortuary enclosure. The date should be compared with that for long barrow ditches.

References: Hardiman *et al* 1992, 49, 107

HAR-8779 4330 ±100 BP

$\delta^{13}\text{C}$: -24.9‰

Sample: KHASGH62, submitted on 7 August 1985 by A E Finney

Material: charcoal: unidentified

Initial comment: from stone-free marl above the hearth in the sunken-featured building; trench 6, section A4/B4.

Objectives: to date the sunken-featured building and establish whether it is contemporary with the Anglian cemetery.

Calibrated date: 1 σ : 3090–2880 cal BC
2 σ : 3350–2670 cal BC

Final comment: A E Finney (1992), excavation of the *Grubenhäuser* provided no finds, which could be used to date the building.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Hardiman *et al* 1992, 49
Otlet *et al* 1983

HAR-8780 3730 ±70 BP

$\delta^{13}\text{C}$: -22.6‰

Sample: KHRBDE31, submitted on 7 August 1985 by A E Finney

Material: antler: *Cervus elaphus*

Initial comment: from the bottom fill of chalk rubble, rainwash, and brown marl in the round barrow ditch; trench 5, section E3.

Objectives: to establish a date for the construction of the round barrow ditch.

Calibrated date: 1 σ : 2280–2030 cal BC
2 σ : 2350–1940 cal BC

Final comment: A Finney (2 February 2007), the result provided a date for the construction of the barrow ditch.

References: Hardiman *et al* 1992, 49

Kimpton: Kalis Corner, Hampshire

Location: SU 288480
Lat. 51.13.48 N; Long. 01.35.15 W

Project manager: M Dacre (Andover Excavation Committee), 1966–9

Archival body: Hampshire County Museum

Description: an extensive urn cemetery associated with a complex flint platform with burials of late Neolithic, early Bronze Age, middle Bronze Age (Deverel Rimbury),

and late Bronze Age date. The cemetery developed organically from a late Neolithic/early Bronze Age focus, which had evolved around one or more large sarsen stones.

Objectives: the charcoal is associated with vessels which can only be dated typologically within the date range 1400–1000 BC; radiocarbon dates may provide a better chronology.

Final comment: A Woodward (7 July 2003), the early dates for phase C deposits (HAR-4316, HAR-4317, and HAR-4320), relative to those of the middle Bronze Age phases D and F (HAR-4572 and HAR-4319) and an unphased middle Bronze Age urn (HAR-4318), confirm the internal chronology of the site established by horizontal and vertical stratification; the priority of the phase C barrel urn is firmly highlighted. The early phase C dates are important and confirm the early dating of this vessel type, suggested previously on typological grounds by Ellison (Woodward). The only other early date is from Arne, Dorset (NPL-199; 3690 ±90 BP; 2350–1830 cal BC at 95% confidence; Reimer *et al* 2004), also for a vessel of potentially early type.

Laboratory comment: Ancient Monuments Laboratory (1995), four further dates (HAR-4316, HAR-4317, HAR-4319, and HAR-4320) from this site were funded prior to 1981 and were published in the Jordan *et al* (1994, 84).

References: Dacre and Ellison 1981, esp 201
Jordan *et al* 1994, 84
Reimer *et al* 2004

HAR-4318 3220 ±90 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: X, submitted in January 1981 by A Ellison

Material: charcoal (remaining sparse and comminuted subsample): unidentified (0.14g); Pomoideae (0.10g, 100%) (R Gale 1998)

Initial comment: associated with a human cremation inside an urn of middle Bronze Age date.

Objectives: to confirm expected date of c 1300–1200 BC.

Calibrated date: 1 σ : 1610–1410 cal BC
2 σ : 1740–1300 cal BC

Final comment: A Woodward (7 July 2003), this determination is slightly earlier than the date range expected but lies within the range of the two dates from middle Bronze Age deposits from this site previously dated; urn F6/7 (HAR-4319; 3200 ±70 BP; 1630–1310 cal BC at 95% confidence) and a cremation from phase D (HAR-4572; 3110 ±90 BP; 1610–1120 cal BC at 95% confidence; Reimer *et al* 2004).

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Reimer *et al* 2004
Walker *et al* 1991a, 89

HAR-4572 3110 ±90 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: XV1, submitted in January 1981 by A Ellison

Material: charcoal (remaining subsample identified): unidentified (1.65g); Pomoideae (0.76g, 100%) (R Gale 1998)

Initial comment: associated with a human cremation inside an urn of middle Bronze Age date, from phase D.

Objectives: to establish a date for phase D.

Calibrated date: 1 σ : 1500–1260 cal BC
2 σ : 1610–1120 cal BC

Final comment: A Ellison (1981), the early dates for HAR-4316 (3560 \pm 180 BP; 2470–1450 cal BC at 95% confidence) and HAR-4320 (3470 \pm 110 BP; 2120–1510 cal BC at 95% confidence), relative to those of the middle Bronze Age phases D and F (HAR-4572 (above) and HAR-4319; 3200 \pm 70 BP; 1620–1310 cal BC at 95% confidence; Reimer *et al* 2004), confirm the internal chronology of the site established by horizontal and vertical stratigraphy and the priority of the phase C barrel urns is further highlighted.

References: Reimer *et al* 2004

Kingsteighton: Berry Meadow, Devon

Location: SX 87178295
Lat. 50.32.41 N; Long. 03.35.33 W

Project manager: P Weddell (Royal Albert Memorial Museum), June 1985

Archival body: Royal Albert Memorial Museum

Description: an Anglo-Saxon enclosure. A settlement whose distinctive circular plan is believed to have been laid out by the beginning of the tenth century. No buildings were found but a sequence of ditches and gullies relating to enclosures and trackways were recorded.

Objectives: to date the ditches and gullies.

References: Walker *et al* 1991a, 103–4
Weddell 1987

HAR-8664 1350 \pm 70 BP

$\delta^{13}\text{C}$: -28.3‰

Sample: KN85168A, submitted on 6 July 1987 by P Weddell

Material: charcoal: unidentified

Initial comment: from primary silting within ditch 46 which forms part of the earliest coherent sequence of activity on the site. The context was a silty consistency sandy gravel with some loam content.

Objectives: to date the earliest phase of a sequence of ditches and gullies of the aceramic period terminating in about the thirteenth century AD.

Calibrated date: 1 σ : cal AD 640–770
2 σ : cal AD 570–810

Final comment: T Pearson (1991), this ditch is from the aceramic period, part of a sequence of ditch digging activity that ended in the thirteenth century AD.

Final comment: A Bayliss (3 March 2008), the two radiocarbon results on bulk charcoal samples from this

context are statistically consistent ($T'=0.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978

HAR-8665 1320 \pm 70 BP

$\delta^{13}\text{C}$: -27.5‰

Sample: KN85168B, submitted on 6 July 1987 by P Weddell

Material: charcoal: unidentified

Initial comment: as HAR-8664

Objectives: as HAR-8664

Calibrated date: 1 σ : cal AD 650–780
2 σ : cal AD 600–890

Final comment: T Pearson (1991), this sample was taken from a ditch of the aceramic period that formed part of early sequence of ditch/gully-digging activity terminating in the thirteenth century AD.

Final comment: A Bayliss (3 March 2008), *see* HAR-8664

HAR-8666 1110 \pm 110 BP

$\delta^{13}\text{C}$: -27.6‰

Sample: KN85046A, submitted on 6 July 1987 by P Weddell

Material: charcoal: unidentified

Initial comment: from the secondary infilling of ditch 46 containing gravel and loam. The ditch forms part of earliest coherent sequence of activity on site.

Objectives: as HAR-8664

Calibrated date: 1 σ : cal AD 770–1030
2 σ : cal AD 660–1160

Final comment: T Pearson (1991), the ditch is part of the earliest phase of ditch/gully-digging activity, terminating in the thirteenth century AD.

Final comment: A Bayliss (3 October 2011), the two radiocarbon results on bulk charcoal from this context are statistically consistent ($T'=1.9$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978

HAR-8667 1300 \pm 80 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: KN85046B, submitted on 6 July 1987 by P Weddell

Material: charcoal: unidentified

Initial comment: as HAR-8666

Objectives: as HAR-8664

Calibrated date: 1 σ : cal AD 650–780
2 σ : cal AD 600–900

Final comment: *see* HAR-8666

Final comment: A Bayliss (3 October 2011), *see* HAR-8666

HAR-8668 1400 ±60 BP $\delta^{13}\text{C}$: -24.6‰*Sample*: KN85141A, submitted on 6 July 1987 by P Weddell*Material*: charcoal (remaining subsample identified): unidentified (2.80g); *Quercus* sp., sapwood (0.03g, 0.54%); *Fraxinus* sp. (0.30g, 5.43%); *Quercus* sp., heartwood (4.12g, 74.5%); *Corylus* sp. (0.37g, 6.69%); *Betula* sp. (0.71g, 12.84%) (R Gale 1999)*Initial comment*: from a large pit, pit 49, that was cut by ditch 46. The ditch was part of the earliest sequence of features identified on the site. This layer was the earliest infill of pit. The context was gravelly loam and contained some burnt pebbles and stones.*Objectives*: to provide a *terminus post quem* for the main period of activity on the site and indicate the date of early occupation. This sample is being submitted in case the other samples from the ditch prove unreliable.*Calibrated date*: 1 σ : cal AD 600–670
2 σ : cal AD 540–770*Final comment*: T Pearson (1991), the sample was dated to provide a *terminus post quem* for the main activity and determine the age of the early occupation.**Kingswood, Dorset***Location*: SZ 00578225
Lat. 50.38.22 N; Long. 01.59.31 W*Project manager*: P Waton (University of Southampton), 1981*Archival body*: University of Southampton*Description*: a valley mire 1km north of the Purbeck chalk ridge, east of Corfe Castle.*Objectives*: to provide a chronology for the pollen diagram and to determine the development and composition of the middle post-glacial primary forest and the nature of its clearance.*Laboratory comment*: Ancient Monuments Laboratory (6 October 2003), one further sample KW1/2B (HAR-4237) submitted for dating failed to produce a result.*References*: Waton 1982
Waton 1983**HAR-4239** 4560 ±60 BP $\delta^{13}\text{C}$: -28.1‰*Sample*: KW1/1, submitted on 28 January 1981 by P Waton*Material*: peat*Initial comment*: from elm decline, at a depth of 183–193cm.*Objectives*: to confirm expected date of *c* 3000 BC.*Calibrated date*: 1 σ : 3370–3120 cal BC
2 σ : 3500–3090 cal BC*Final comment*: P Waton (12 February 1991), sample from 1.75–1.85m, *Ulmus* decline at *c* 1.83m, associated *c* 1.83–1.75m. This result suggests the decline at this site is fairly late.**HAR-4367** 2380 ±80 BP $\delta^{13}\text{C}$: -29.4‰*Sample*: KW1/2B, submitted on 23 April 1981 by P Waton*Material*: peat*Initial comment*: from the level of *Fagus* rise.*Objectives*: to confirm the expected date of *c* AD 1–500.*Calibrated date*: 1 σ : 730–390 cal BC
2 σ : 780–230 cal BC*Final comment*: P Waton (12 February 1991), indicates the start of *Fagus* rise and associated clearance referable to Iron Age activity.*Laboratory comment*: Ancient Monuments Laboratory (26 April 2001), HAR-4367 is a replicate check measurement on HAR-4237 (KW 1/2) which failed. This is a provisional result only.**Kynnersley: Wall Fort, Shropshire***Location*: SJ 682179
Lat. 52.45.30 N; Long. 02.28.27 W*Project manager*: D M Bond (Acton Scott Historic Working Farm), June 1983*Archival body*: Shropshire Museums Service*Description*: the Central Excavation Unit examined a small area in the interior of a low-lying Iron Age enclosure at Wall Farm, 25km east of Shrewsbury in advance of the construction of a slurry pit.*Objectives*: to determine the approximate date range of peat deposits surrounding the site.*Final comment*: G Campbell (7 August 2007), the date on the charcoal (HAR-6392) is consistent with the dating of the round-house based on the study of ceramics. The precise location of the peat column is unknown but sample KYO-4 (HAR-6365) suggests that peat of Mesolithic date is present within the vicinity of the site. The material from the base of this peat column almost certainly contained material of mixed date, that is, derived from earlier geological strata and thus could not be dated successfully.*References*: Bond 1991
Pagett 1965
Pagett 1967**HAR-6365** 8140 ±90 BP $\delta^{13}\text{C}$: -29.0‰*Sample*: KYO-4, submitted on 19 September 1984 by N Balaam*Material*: peat*Initial comment*: from a peat column taken from adjacent to the excavated Iron Age site.*Objectives*: to determine the approximate date range of peat deposits surrounding the site.*Calibrated date*: 1 σ : 7310–7050 cal BC
2 σ : 7460–6820 cal BC

Final comment: G Campbell (7 August 2007), the date shows that some of this peat is likely to have been laid down during the Mesolithic period. However, no descriptions for this nature of this material or the location where the column was taken have been found.

HAR-6366 11190 ±100 BP

$\delta^{13}\text{C}$: -29.9‰

Sample: KY96-100, submitted on 19 September 1984 by N Balaam

Material: peat

Initial comment: from the base of a peat column from adjacent to the Iron Age defended enclosure.

Objectives: as HAR-6365

Calibrated date: 1 σ : 11250–11000 cal BC
2 σ : 11350–10820 cal BC

Final comment: G Campbell (7 August 2008), this suggests that the base of the peat may have been contaminated with material of much earlier date, possibly of Tertiary origin.

HAR-6392 2100 ±90 BP

$\delta^{13}\text{C}$: -25.1‰

Sample: 257-115, submitted on 19 September 1984 by N Balaam

Material: charcoal (*Salix/Populus* sp.): *Quercus* sp. (N Balaam 1984)

Initial comment: from the lower levels of a gully surrounding a round house.

Objectives: to determine the approximate age of the occupation activity.

Calibrated date: 1 σ : 350 cal BC–cal AD 10
2 σ : 390 cal BC–cal AD 80

Final comment: D Bond (1991), the result is consistent with that proposed on ceramic grounds by E Morris.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 171

Lancashire Peat Profiles

Location: SD 650160
Lat. 53.38.21 N; Long. 02.31.46 W

Project manager: B Barnes (University of Lancaster), 1979–81, and 1984

Description: peat taken as part of palynological studies on Rivington and Anglezarke Moors. Human exploitation of the area dates from the Mesolithic and Neolithic through the historic period to the present.

Objectives: radiocarbon dates are required to support stratigraphical and palynological evidence and provide a chronological framework for the record.

References: Bain 1991
Howard-Davis 1996

Lancashire Peat Profiles: Anglezarke Moor, Black Brook

Location: SD 632185
Lat. 53.39.41 N; Long. 02.33.25 W

Project manager: B Barnes (University of Lancaster), 1980

Archival body: Lancaster City Museum

Description: the site is located in a narrow incised gully of one of the headwater streams of Black Brook at the northern end of Anglezarke Moor. Erosion is evident across the small interfluves between the several headwater streams in the locality and a number of these areas have yielded concentrations of flint artefacts.

Objectives: to date the stratigraphic and palynological evidence and provide a chronological framework for the site.

References: Bain 1991

HAR-6207 5660 ±80 BP

$\delta^{13}\text{C}$: -29.6‰

Sample: BB I, submitted in September 1983 by B Barnes

Material: peat (mor humus and mineral clay subsoil)

Initial comment: from a depth of 2.42m to 2.46m below the peat surface.

Objectives: to date the peat initiation and early clearance phase. Estimated to be Mesolithic, *c* 4400 cal BC.

Calibrated date: 1 σ : 4560–4370 cal BC
2 σ : 4710–4340 cal BC

Final comment: B Barnes (1987), date agrees well with initial estimates of age based on palynological and stratigraphical data. The date marks the earliest forest clearance phase yet detected in the area.

References: Walker *et al* 1987, 96

HAR-6210 4740 ±70 BP

$\delta^{13}\text{C}$: -29.1‰

Sample: BB2, submitted in September 1983 by B Barnes

Material: peat (highly humified amorphous)

Initial comment: from 2.2m to 2.24m below the peat surface.

Objectives: to date the early clearance phase with *Ulmus* decline. The sample is possibly related to the *Ulmus* decline of north-west Europe. Estimated to be *c* 3800 cal BC.

Calibrated date: 1 σ : 3640–3370 cal BC
2 σ : 3660–3360 cal BC

Final comment: B Barnes (1987), agrees well with accumulation rate estimates from the Round Loaf site and marks the *Ulmus* decline horizon within the published range for north-west England.

References: Walker *et al* 1987, 96

HAR-6420 1840 ±70 BP

$\delta^{13}\text{C}$: -28.9‰

Sample: BB3, submitted on 1 November 1984 by B Barnes

Material: peat (*Eriophorum* and *Calluna*, well humified)

Initial comment: from 1.05m to 1.10m below the surface.

Objectives: to establish the end of a well-defined clearance phase and the beginning of the suspected change in peat accumulation rates. The estimated age is *c* 450–250 cal BC.

Calibrated date: 1 σ : cal AD 80–250
2 σ : cal AD 20–380

Final comment: M G Bain (1991), this date accords with similar evidence at the Round Loaf and Winter Hill sites. The zone date is characterised by a pronounced increase in herbaceous values, particularly Gramineae, Cyperaceae, *Pteridium*, and *Plantagolanceolata*. As well as *Alnus* pollen dominating the arboreal spectra.

HAR-6421 1110 ±70 BP

$\delta^{13}\text{C}$: -27.5‰

Sample: BB4, submitted on 1 November 1984 by B Barnes

Material: peat (*Eriophorum* and *Calluna*, humified)

Initial comment: from 0.5m to 0.55m below the peat surface.

Objectives: to correlate the Black Brook pollen diagram with the master diagram. A date would provide important information on peat accumulation rates and confirm Romano-British clearance at the site. The estimated age is *c* cal AD 200.

Calibrated date: 1 σ : cal AD 870–1020
2 σ : cal AD 720–1040

Final comment: M G Bain (1991), this dates the upper boundary of the zone, which had limited expansion of herbaceous pollen values with Coryloid pollen being important element throughout this dated zone. *Alnus* and *Quercus* dominate the arboreal pollen spectra.

Lancashire Peat Profiles: Anglezarke Moor, Mineral Horizon

Location: SD 631186
Lat. 53.39.44 N; Long. 02.33.31 W

Project manager: B Barnes (University of Lancaster), 1981

Archival body: Lancaster City Museum

Description: this site is located in a gully 150m north-west of the Black Brook pollen site, where the same tributary stream has cut through peat along the southern margin of a shallow basin. Monolith sampling was undertaken from the base of the deposit to a point just above the mineral band.

Objectives: to date the stratigraphic and palynological evidence and provide a chronological framework for the site.

References: Bain 1991

HAR-6422 260 ±80 BP

$\delta^{13}\text{C}$: -28.3‰

Sample: MH1, submitted on 1 November 1984 by B Barnes

Material: peat (*Sphagnum*, highly humified with traces of monocot material)

Initial comment: from 0.97m to 1.0m below the peat surface.

Objectives: to establish the hiatus in deposition involving an abrupt change to a mineral rich deposit. This sample marks the uppermost record of a clearance and cultivation episode in the pollen diagram thought to be of Iron Age date, *c* 450–250 cal BC. The date is also important for correlation with other diagrams from the area.

Calibrated date: 1 σ : cal AD 1510–1950
2 σ : cal AD 1440–1955*

Final comment: M G Bain (1991), this dated the underlying peat to the end of the seventeenth century, for the latter half of which there is evidence of climatic instability across British Isles, involving extremes of winter temperature and storm severity. This would have been favourable to the destabilisation of the marginal upland peats and perhaps more so in view of the evidence within the zone for inference and grazing pressure.

HAR-6423 710 ±80 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: MH2, submitted on 1 November 1984 by B Barnes

Material: peat (*Sphagnum*, highly humified, with monocot traces)

Initial comment: from 0.64m to 0.67m below the peat surface.

Objectives: to estimate the period elapsing in which minerogenic deposits were formed and assist correlation with the accumulation rate shifts noted in other profiles. The estimated age is *c* 250 BC.

Calibrated date: 1 σ : cal AD 1250–1390
2 σ : cal AD 1160–1410

Final comment: M G Bain (1991), dates the zone which displays a distinct shift in pollen proportions. However, the stratigraphy evidence at these levels for the mass flow of sediment into the site indicates considerable reworking and mobility of pollen.

Lancashire Peat Profiles: Anglezarke Moor, Pikestones, monument

Location: SD 627172
Lat. 53.38.59 N; Long. 02.33.52 W

Project manager: B Barnes (University of Lancaster), 1980

Archival body: Lancaster City Museum

Description: this site is located about 44m south-east of the Pikestones burial chamber on the western flank of the Anglezarke Moor. The peat depth of 0.5m is typical of the locality. A thinning peat cover over gently rising ground

north of the site is lost to exposed mineral soil along the southern flanks of Rushy Brow and across the summit of Hurst Hill.

Objectives: to date the stratigraphic and palynological evidence and provide a chronological framework for the site.

References: Bain 1991

HAR-6209 1710 ±70 BP

$\delta^{13}\text{C}$: -29.4‰

Sample: PK1, submitted in September 1983 by B Barnes

Material: peat (highly humified amorphous)

Initial comment: from 0.4m to 0.45m below the peat surface.

Objectives: to date the peat initiation on the flanks of Anglezarke Moor. The clearance phenomena possibly relates to Norse activity. The estimated age is *c* cal AD 1000.

Calibrated date: 1 σ : cal AD 240–420
2 σ : cal AD 130–540

Final comment: B Barnes (1987), this result dates peat initiation on the flanks of the moor, with clearance phenomena. The Romano-British date is earlier than expected but there are problems in estimating age based on the accumulation rates in profile. The result corresponds with clearances dated from Round Loaf samples: HAR-6211 (1550 ±70 BP; cal AD 350–650 at 95% confidence) and HAR-6212 (1710 ±70 BP; cal AD 130–540 at 95% confidence; Reimer *et al* 2004). Palynological evidence from both sites suggests considerable upland exploitation at this time including both arable and pastoral activity.

References: Reimer *et al* 2004
Walker *et al* 1987, 96

HAR-6424 540 ±70 BP

$\delta^{13}\text{C}$: -28.7‰

Sample: PK2, submitted on 1 November 1984 by B Barnes

Material: peat (*Eriophorum*, moderately humified)

Initial comment: from 0.2m to 0.24m below the surface.

Objectives: to establish discontinuity in the peat profile and to establish the well-defined clearance phase of either the Norse period or the Middle Ages. The estimated date is *c* cal AD 1440.

Calibrated date: 1 σ : cal AD 1310–1440
2 σ : cal AD 1280–1460

Final comment: M G Bain (1991), this date supports the interpretation that agriculture was active along the western flanks of the study area from the early fifteenth century AD.

Lancashire Peat Profiles: Anglezarke Moor, Pikestones, ploughings

Location: SD 629170
Lat. 53.38.53 N; Long. 02.33.41 W

Project manager: B Barnes (University of Lancaster), 1980

Archival body: Lancaster City Museum

Description: this pollen site is situated 250m south-east of the Pikestones site. Approximately 50m west of the site are wall boundaries of fields still under cultivation. Peat depths of 0.5m, typical of the ploughed moorland, displayed a very fresh *Sphagnum* lens in the stratigraphy. Random finds of flint generally associated with the mineral soil had been made from the vicinity of the site following the ploughing activity.

Objectives: to date the stratigraphic and palynological evidence and provide a chronological framework for the site.

References: Bain 1991

HAR-6208 310 ±80 BP

$\delta^{13}\text{C}$: -29.6‰

Sample: PKA1, submitted in September 1983 by B Barnes

Material: peat (*Sphagnum* and monocot)

Initial comment: from 0.35m to 0.37m below the peat surface. There is evidence of upland cultivation.

Objectives: to date the clearance activity relating to either the Norse period or the early Middle Ages. The estimated age is *c* cal AD 1000–1350.

Calibrated date: 1 σ : cal AD 1460–1670
2 σ : cal AD 1430–1955*

Final comment: B Barnes (1987), the date is younger than expected but accords well with documentary evidence for increased agricultural activity in the sixteenth and seventeenth centuries AD on uplands. The date reinforces palynological evidence for a truncated profile.

References: Walker *et al* 1987, 96

Lancashire Peat Profiles: Anglezarke Moor, Round Loaf

Location: SD 634180
Lat. 53.39.25 N; Long. 02.33.14 W

Project manager: B Barnes (University of Lancaster), 1980

Archival body: Lancaster City Museum

Description: this site is located 300m south-west of the Round Loaf tumulus at an altitude of 305m OD where stream-out hagg exposures display peat depths of 2m. The stream channel flowing south from the site maintains this separation of shallower and deeper peats until it joins the upper reaches of Limestone Brook.

Objectives: to date the stratigraphic and palynological evidence and provide a chronological framework for the site.

References: Bain 1991

HAR-6211 1550 ±70 BP

$\delta^{13}\text{C}$: -28.9‰

Sample: RL3, submitted in September 1983 by B Barnes

Material: peat (*Calluna* and *Eriophorum*)

Initial comment: from 0.5m to 0.55m below the peat surface.

Objectives: a date for the horizon would mark the end of a well-defined clearance phase and possibly the end of the Norse activity in the area. However it could relate to earlier clearance activity. The estimated age is *c* cal AD 1100.

Calibrated date: 1 σ : cal AD 420–600
2 σ : cal AD 350–650

Final comment: B Barnes (1987), although earlier than estimated, the date relates to well-marked clearance and an agricultural episode in the Romano-British period and accords well with HAR-6212.

References: Walker *et al* 1987, 96

HAR-6212 1710 \pm 70 BP

$\delta^{13}\text{C}$: -28.2‰

Sample: RL4, submitted in September 1983 by B Barnes

Material: peat (*Calluna* and *Eriophorum*)

Initial comment: from 0.6m to 0.65m below the peat surface.

Objectives: as HAR-6211. The estimated age of the sample is *c* cal AD 950.

Calibrated date: 1 σ : cal AD 240–420
2 σ : cal AD 130–540

Final comment: B Barnes (1987), this date agrees well with HAR-6211 and marks initiation of a well-defined Romano-British upland clearance horizon. This corresponds with clearance evidence of similar date HAR-6209 (1710 \pm 70 BP; cal AD 130–540; Reimer *et al* 2004) from Pikestones pollen site.

References: Reimer *et al* 2004
Walker *et al* 1987, 96

HAR-6416 1270 \pm 70 BP

$\delta^{13}\text{C}$: -28.7‰

Sample: RL5, submitted on 1 November 1984 by B Barnes

Material: peat (*Calluna* and *Eriophorum*, moderately humified)

Initial comment: from 0.3m to 0.35m below the peat surface.

Objectives: the estimated age of the sample is *c* cal AD 950. A result will confirm the date of clearance and cultivation activity reflected in the pollen diagram to the Norse period and mark the cessation of the Dark Ages forest regeneration.

Calibrated date: 1 σ : cal AD 660–860
2 σ : cal AD 640–940

Final comment: M G Bain (1991), this dates a zone of reduction of all herbaceous taxa dominant in zone RL5. This suggests a loss of ruderal, open, and disturbed habitats and reduction of cultural exploitation in the area.

HAR-6417 2570 \pm 110 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: RL6, submitted on 1 November 1984 by B Barnes

Material: peat (*Eriophorum*, highly humified)

Initial comment: from 0.99m to 1.03m below the surface.

Objectives: one of a series of dates from a site, which will serve as a master reference pollen diagram for this area. The date will establish the beginning of a clearance episode and also a point in the profile where accumulation rates start to increase. The estimated age is *c* 450 cal BC.

Calibrated date: 1 σ : 830–540 cal BC
2 σ : 930–400 cal BC

Final comment: M G Bain (1991), this sample dates a zone where *Alnus* remains the predominant arboreal pollen. *Quercus*, a consistently important element, shows a pronounced reduction at the top of the zone.

HAR-6418 650 \pm 80 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: RL7, submitted on 1 November 1984 by B Barnes

Material: peat (highly humified monocot)

Initial comment: from 0.1m to 0.15m below the surface.

Objectives: this sample forms one of a series of samples from the master pollen diagram for the area. The objective is to date the initiation of the clearance phase estimated as commencing *c* cal AD 1450–1800.

Calibrated date: 1 σ : cal AD 1270–1410
2 σ : cal AD 1220–1440

Final comment: M G Bain (1991), this sample dates a zone that is characterised by increased herbaceous representation, particularly in its upper levels. Arboreal pollen reduces through the zone from 34.4% to 8.6% with *Alnus* and *Quercus* the dominant arboreal pollen types.

Lancashire Peat Profiles: Rivington Moor, Winter Hill

Location: SD 657147
Lat. 53.37.39 N; Long. 02.31.07 W

Project manager: B Barnes (University of Lancaster), 1979 and 1984

Archival body: Lancaster City Museum

Description: peat of up to 1m depth displays considerable evidence of erosion and disturbance across Rivington and Smithill Moors and contrasts with the deeper blanket peat on the plateau summit of Winter Hill, much of which is intact.

Objectives: to date the stratigraphic and palynological evidence and provide a chronological framework for the site.

References: Bain 1991

HAR-6206 2940 \pm 70 BP

$\delta^{13}\text{C}$: -29.4‰

Sample: WH2, submitted in September 1983 by B Barnes

Material: peat (amorphous, highly humified)

Initial comment: from 1.17–1.20m below the peat surface.

Objectives: to confirm the date of a well-marked clearance phase with cultivation indicated, and to establish a possible relationship with metal extraction activity. The estimated age is *c* 1500 cal BC.

Calibrated date: 1 σ : 1270–1020 cal BC
2 σ : 1390–930 cal BC

Final comment: B Barnes (1987), the date corresponds well with estimates based on peat accumulation rates in other local profiles, and marks the beginning of sustained clearance activity in the Rivington and Anglezarke uplands.

References: Walker *et al* 1987, 96

HAR-6419 1890 \pm 80 BP

$\delta^{13}\text{C}$: -28.2‰

Sample: WH3, submitted on 1 November 1984 by B Barnes

Material: peat (*Eriophorum* and *Calluna*, well humified)

Initial comment: from 0.7m and 0.75m below the peat surface. The onset of a clearance episode in the pollen record coincides with evidence for metal extraction activity from a heavy metal profile.

Objectives: to compare with HAR-6212 from the Round Loaf site on Anglezarke Moor, and to establish a date for the metal extraction work indicated by a peak in the lead profile. The estimated age is *c* cal AD 250.

Calibrated date: 1 σ : cal AD 20–240
2 σ : 50 cal BC–cal AD 330

Final comment: M G Bain (1991), this sample dates the first records of *Carpinus* pollen but many not imply establishment of this taxon in the area since only single grains are noted. The reduction of arboreal pollen values in the zone may reflect clearance activity related to agrarian expansion.

Lancashire Peat Profiles: Winter Hill, Martha Tree Delf

Location: SD 680144
Lat. 53.37.30 N; Long. 02.29.02 W

Project manager: B Barnes (University of Lancaster), 1984

Archival body: Lancaster City Museum

Description: this site is located on the eastern flank of Winter Hill at an altitude of 328m OD. Grass heath vegetation is intact over considerable areas. Stream erosion has produced hagg exposure at the site in excess of 1.5m depth, with basal deposits carrying abundant *Betula* remains.

Objectives: to date the stratigraphic and palynological evidence and provide a chronological framework for the site.

References: Bain 1991

HAR-6425 5500 \pm 160 BP

$\delta^{13}\text{C}$: -28.4‰

Sample: MTD1, submitted on 1 November 1984 by B Barnes

Material: peat (highly humified fibrous peat with *Betula* wood fragments)

Initial comment: from 1.22m to 1.25m below the surface.

Objectives: to provide information on the spatial extent of mid-to-late Bronze Age clearance on Rivington Upland and to correlate this site with the Winter Hill pollen diagram. The estimated date is *c* 1250 cal BC.

Calibrated date: 1 σ : 4500–4180 cal BC
2 σ : 4710–3970 cal BC

Final comment: M G Bain (1991), this sample dates the upper zone boundary and indicates an earlier date for a pollen assemblage believed to be Flandrian III as comparable with other sites (cf WH1, RL2, and RL3). Re-examination of the monolith has not resolved the issue but the fine argillaceous component in the stratigraphy, which could have been imported by wind-blow from nearby burned areas, may have been influential in ageing the deposit. Consequently, the obtained date has to be viewed with caution.

Lechlade: Rough Ground Farm, Gloucestershire

Location: SP 216009 to SP 221005
Lat. 51.42.21 N; Long. 01.41.15 W, to
Lat. 51.42.08 N; Long. 01.40.49 W

Project manager: T Allen (Oxford Archaeological Unit), 1981–2, and 1990

Archival body: Ashmolean Museum

Description: an area of *c* 8ha on the second gravel terrace just north of Lechlade between the rivers Leach and Thames. The site was investigated by M Jones in advance of gravel extraction between 1957 and 1965. These excavations revealed evidence of occupation from the late Neolithic to the end of the Roman period and represent one of the first landscape studies undertaken in this country. The work was stimulated by the discovery of a Roman villa.

Objectives: excavations of the villa buildings were carried out by T G Allen in 1981–2 and in 1990 prior to a housing development.

References: Allen *et al* 1993
Rowlands 1976

HAR-5498 4100 \pm 100 BP

$\delta^{13}\text{C}$: -23.8‰

Sample: RGF784, submitted in June 1983 by T G Allen

Material: bone

Initial comment: from rubbish pit 784, containing Grooved Ware.

Objectives: to provide a chronology for the Grooved Ware assemblage. Three samples, HAR-5498, HAR-5500, and HAR-5501, came from features containing Grooved ware.

Calibrated date: 1 σ : 2880–2490 cal BC
2 σ : 2910–2410 cal BC

Final comment: T G Allen (1993), the dates for all the features containing Grooved Ware (HAR-5498, HAR-5500, and HAR-5501), overlap at 68% confidence, and probably relate to a single episode of activity. Such a proposition is enhanced by the spatial proximity of the features and the similarities in pottery styles between them. The weighted average for all three dates is 3943 ±51 BP, which calibrates to 2580–2290 cal BC at 95% confidence (Reimer *et al* 2004).

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Reimer *et al* 2004
Walker and Otlet 1988, 301

HAR-5499 3710 ±100 BP

$\delta^{13}C$: -22.6‰

Sample: RGF1260, submitted in June 1983 by T G Allen

Material: bone

Initial comment: from a rubbish pit containing domestic Beaker; context 1260.

Objectives: to date the period of domestic Beaker activity on the site.

Calibrated date: 1 σ : 2280–1950 cal BC
2 σ : 2470–1830 cal BC

Final comment: T G Allen (1993), this date is significantly younger than the dates obtained for the late Neolithic Grooved Ware activity at the site, and suggests that the two episodes of occupation were separated by two centuries or more.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 301

HAR-5500 3940 ±80 BP

$\delta^{13}C$: -23.1‰

Sample: RGF962A, submitted in June 1983 by T G Allen

Material: bone

Initial comment: from pit 962, containing Grooved Ware.

Objectives: as HAR-5498

Calibrated date: 1 σ : 2570–2300 cal BC
2 σ : 2840–2200 cal BC

Final comment: T G Allen (1993), HAR-5500 and HAR-5501 both came from context 962, and have a weighted mean of 3887 ±59 BP which calibrates to 2570–2150 cal BC at 95% confidence (Reimer *et al* 2004). *See also* HAR-5498.

Final comment: A Bayliss (3 October 2011), the two radiocarbon measurements from this context are statistically consistent ($T'=1.0$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

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

HAR-5501 3820 ±90 BP

$\delta^{13}C$: -22.3‰

Sample: RGF962B, submitted in June 1983 by T G Allen

Material: bone

Initial comment: from a pit containing Grooved Ware.

Objectives: as HAR-5498

Calibrated date: 1 σ : 2470–2130 cal BC
2 σ : 2570–1980 cal BC

Final comment: *see* HAR-5498 and HAR-5500

HAR-5502 2130 ±120 BP

$\delta^{13}C$: -23.8‰

Sample: RGF1215, submitted in June 1983 by T G Allen

Material: human bone

Initial comment: from crouched burial 1215 from the bottom of boundary ditch 1141.

Objectives: to date the burial.

Calibrated date: 1 σ : 380 cal BC–cal AD 10
2 σ : 410 cal BC–cal AD 130

Final comment: T G Allen (1993), sherds from the ditch are of early Iron Age date and the burial therefore appears to be a later middle Iron Age insertion.

HAR-5503 2840 ±90 BP

$\delta^{13}C$: -22.6‰

Sample: RGF1157, submitted in June 1983 by T G Allen

Material: human bone

Initial comment: from a crouched burial in a shallow grave pit; context 1157.

Objectives: to date the burial.

Calibrated date: 1 σ : 1130–900 cal BC
2 σ : 1300–810 cal BC

Final comment: T G Allen (1993), burials of this date range are more usually cremations, but there is a growing body of evidence for flat crouched inhumation burials at this period. For instance, a flat grave at Tormarton in Gloucestershire was radiocarbon dated to 1410–890 cal BC at 95% confidence (BM-542; 2927 ±90 BP; Rowlands 1976, 55 and 192 and Barker *et al* 1971, 180). Two unaccompanied flat inhumations at Radley, Barrows Hills, Oxfordshire were radiocarbon dated to 1310–990 cal BC and 1020–810 cal BC at 95% confidence; Reimer *et al* 2004 (BM-2701; 2930 ±50 BP and BM-2702; 2760 ±50 BP, respectively; Barclay and Halpin 1999, 53 and 167). These latter burials were inserted into an infilled pond barrow, and flat inhumations are normally found in association with barrows or other monuments. The discovery of an apparently isolated inhumation of this date is more unusual, but burials in stratigraphic isolation are rarely subjected to radiocarbon dating, and it is likely that many more of a similar date exist amongst those ascribed either to the Beaker period or to the Iron Age.

References: Barclay and Halpin 1999, 53, 167
Barker *et al* 1971, 180
Reimer *et al* 2004
Rowlands 1976

HAR-5504 3040 ±100 BP $\delta^{13}\text{C}$: -22.7‰*Sample:* RGF1001, submitted in June 1983 by T G Allen*Material:* bone*Initial comment:* from a middle Bronze Age occupation pit; context 1001.*Objectives:* to confirm a middle Bronze Age date.*Calibrated date:* 1 σ : 1430–1120 cal BC
2 σ : 1510–1000 cal BC*Final comment:* T G Allen (1993), the date is in keeping with the predicted date.**HAR-5505** 1760 ±100 BP $\delta^{13}\text{C}$: -23.9‰*Sample:* RGF1280, submitted in June 1983 by T G Allen*Material:* bone*Initial comment:* from early Iron Age pit 1280.*Objectives:* to confirm an early Iron Age date.*Calibrated date:* 1 σ : cal AD 130–410
2 σ : cal AD 30–540*Final comment:* T G Allen (1993), this pit contained a large assemblage of early Iron Age pottery, which is unlikely to be residual, and the date must therefore be regarded with suspicion. The records suggest that possibly there was a later feature cutting into the early Iron Age pit, from which the dated bone may have come.*Laboratory comment:* AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).*References:* Otlet *et al* 1983
Walker and Otlet 1988, 301**Leintwardine, Hereford and Worcester***Location:* SO 40387390
Lat. 52.21.34 N; Long. 02.52.32 W, 1*Project manager:* J Wills (Hereford and Worcester County Council), June 1985*Archival body:* Hereford Museum*Description:* Leintwardine is situated at the confluence of the rivers Teme and Clun. The history of the village goes back to Roman times when it was *Bravonium*, a military fortification. The embankments of the ramparts are still visible in places.*Objectives:* to date the site activity.*References:* Walker *et al* 1991a, 105**HAR-8677** 1910 ±70 BP $\delta^{13}\text{C}$: -26.8‰*Sample:* 1021-1, submitted on 13 August 1985 by J Wills*Material:* charcoal: *Fraxinus* sp. (D Haddon-Reece 1985)*Initial comment:* from a charcoal layer sealed beneath the clay and timber rampart. The rampart enclosed a small annexe to the Roman settlement; this contained a bath house.*Objectives:* previous excavations at Leintwardine and nearby forts have defined a sequence of Roman military activity in north-west Herefordshire. This is as yet very poorly dated (there is little ceramic or other material) and the status and character of the settlement at Leintwardine are disputed.*Calibrated date:* 1 σ : cal AD 20–210
2 σ : 50 cal BC–cal AD 250*Final comment:* J Wills (1991), previous excavations have defined the sequence of Roman military activity in north-west Herefordshire but, as yet, it is poorly dated and the status and character of the settlement at Leintwardine are disputed.*Final comment:* A Bayliss (3 October 2011), the two results on bulk ash charcoal from this context are statistically consistent ($T'=1.2$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). As they were on bulk samples, although from a potentially long-lived species, a weighted mean may be taken (1966 ±49 BP) to provide a *terminus post quem* for the rampart of 90 cal BC–cal AD 130 (95% confidence) or 40 cal BC–cal AD 80 (68% confidence; Reimer *et al* 2004).*References:* Reimer *et al* 2004
Ward and Wilson 1978**HAR-8678** 2020 ±70 BP $\delta^{13}\text{C}$: -27.9‰*Sample:* 1021-2, submitted on 13 August 1985 by J Wills*Material:* charcoal: *Fraxinus* sp. (D Haddon-Reece 1985)*Initial comment:* as HAR-8677*Objectives:* as HAR-8677*Calibrated date:* 1 σ : 110 cal BC–cal AD 60
2 σ : 210 cal BC–cal AD 130*Final comment:* see HAR-8677**Lincoln: Brayford Wharf East, Lincolnshire***Location:* SK 973710
Lat. 53.13.37 N; Long. 00.32.32 W*Project manager:* B Gilmour (Lincoln Archaeological Trust), 1982*Archival body:* City of Lincoln Archaeology Unit*Description:* a waterfront site, which yielded a continuous sequence of occupation and waterfront development from the early Roman period until the late medieval period.*Objectives:* to establish a date for the wooden structures.

Final comment: K Steane (2001), radiocarbon dating stakes and possible fishweirs cg 31 and cg 35 indicate that they were late Saxon in origin, rather than Roman, as originally presumed.

References: Steane *et al* 2001

HAR-5134 1100 ±70 BP

$\delta^{13}\text{C}$: -30.7‰

Sample: BWE13, submitted on 26 July 1982 by T J Wilkinson

Material: wood (waterlogged; remaining subsample now dessicated and structurally collapsed) (R Gale 1999)

Initial comment: upright of hurdle structure.

Objectives: to date the structure (LUB 9).

Calibrated date: 1 σ : cal AD 880–1020
2 σ : cal AD 770–1040

Final comment: K Steane (1991), these dates are of course to be used with caution and can only be accepted with confidence by allowing for the standard deviations. Stratigraphically cg 31 (LUB 8) is later than cg 25 (LUB 7) but it has an earlier radiocarbon date. Wattles cg 31 and cg 35 (both LUB 8) have been interpreted as being contemporary (as they can be from the stratigraphy) and can be seen as part of the same structure. These possibly suggest the reuse of wood and even the repair of long-standing structures. The pottery from loosely associated contexts was dated between the late-tenth and late-eleventh centuries AD.

HAR-5135 1870 ±70 BP

$\delta^{13}\text{C}$: -28.7‰

Sample: BWE65, submitted on 26 July 1982 by T J Wilkinson

Material: wood (waterlogged; remaining subsample now dessicated and structurally collapsed) (R Gale 1999)

Initial comment: upright of hurdle structure.

Objectives: to date the structure.

Calibrated date: 1 σ : cal AD 60–240
2 σ : 40 cal BC–cal AD 330

Final comment: see HAR-5134

HAR-5136 1170 ±80 BP

$\delta^{13}\text{C}$: -28.0‰

Sample: BWE90, submitted on 26 July 1982 by T J Wilkinson

Material: wood (waterlogged)

Initial comment: wattle of hurdle structure (cg 31).

Objectives: to date the structure (LUB8).

Calibrated date: 1 σ : cal AD 720–980
2 σ : cal AD 660–1030

Final comment: see HAR-5134

HAR-5137 950 ±70 BP

$\delta^{13}\text{C}$: -28.8‰

Sample: BWE93, submitted on 26 July 1982 by T J Wilkinson

Material: wood (waterlogged; remaining subsample now dessicated and structurally collapsed) (R Gale 1999)

Initial comment: wattle of hurdle structure (cg 31).

Objectives: to date the structure (LUB8).

Calibrated date: 1 σ : cal AD 1010–1170
2 σ : cal AD 970–1230

Final comment: see HAR-5134

HAR-5138 950 ±70 BP

$\delta^{13}\text{C}$: -31.7‰

Sample: BWE94, submitted on 26 July 1982 by T J Wilkinson

Material: wood (waterlogged; remaining subsample now dessicated and structurally collapsed and too degraded to identify positively) (R Gale 1999)

Initial comment: upright of hurdle structure.

Objectives: to date the structure (LUB10).

Calibrated date: 1 σ : cal AD 1010–1170
2 σ : cal AD 970–1230

Final comment: see HAR-5134

HAR-5139 1690 ±80 BP

$\delta^{13}\text{C}$: -28.4‰

Sample: BWE102, submitted on 26 July 1982 by T J Wilkinson

Material: wood (waterlogged; remaining subsample now dessicated and structurally collapsed) (R Gale 1999)

Initial comment: upright of hurdle structure (cg 15).

Objectives: to date the structure (LUB4).

Calibrated date: 1 σ : cal AD 240–430
2 σ : cal AD 130–550

Final comment: see HAR-5134

HAR-5140 1080 ±70 BP

$\delta^{13}\text{C}$: -28.4‰

Sample: BWE103, submitted on 26 July 1982 by T J Wilkinson

Material: wood (waterlogged; remaining subsample now dessicated and structurally collapsed) (R Gale 1999)

Initial comment: upright of hurdle structure (cg 25).

Objectives: to date the structure (LUB7).

Calibrated date: 1 σ : cal AD 890–1030
2 σ : cal AD 770–1150

Final comment: see HAR-5134

HAR-5141 1720 ±70 BP

$\delta^{13}\text{C}$: -32.2‰

Sample: BWE114, submitted on 26 July 1982 by T J Wilkinson

Material: wood (waterlogged; remaining subsample now desiccated and structurally collapsed) (R Gale 1999)

Initial comment: from a wooden pier.

Objectives: to date the structure.

Calibrated date: 1 σ : cal AD 230–410
2 σ : cal AD 130–530

Final comment: see HAR-5134

**Lincoln: St Paul-in-the-Bail,
Lincolnshire**

Location: SK 796719
Lat. 53.14.06 N; Long. 00.32.15 W

Project manager: M Jones (City of Lincoln Council), 1978

Archival body: City of Lincoln Archaeological Unit

Description: a series of medieval churches, the earliest which might have been a memorial chapel, overlying a sequence of two timber churches build on the courtyard of the Roman forum.

Objectives: the results of the first samples (HAR-4116, HAR-4120/1, HAR-4131, HAR-4143, HAR-4177, and HAR-4281) spanned the fourth–seventh centuries, which was both unexpected and rewarding. There is a possibility that the early church is late Roman in date and the early graveyard fifth–seventh century, or that the earliest churches include that mentioned by Bede as having been built by Paulinus in AD 627–9. This covers the period when little or nothing is known of the fate of Roman towns or their inhabitants. Analysis of the remaining samples may help to solve the problem of how the single-celled building, the hanging-bowl feature, and apparently associated graves are to be linked with the earlier churches.

Final comment: M J Jones (August 2003), the dates in this second series from the site are consistent with those in the first series. Both suggest that the two early timber churches could be as early as late Roman in date, although church buildings were not common before the late fourth century. Alternatively, they might date to the fifth–sixth centuries, perhaps representing a surviving Christian community from the Roman City, or be associated with Fyrannus who proclaimed his descent from the Roman Empire for political reasons (part of the Roman identity involved being Christian). It is still also just possible that the earliest church represents that mentioned by Bede as having been built in AD 627–9. More precise dating might resolve this important problem.

Laboratory comment: Ancient Monuments Laboratory (2003), seven other samples were dated in 1980 (Jordan *et al* 1994, 90–1); two further samples, 15BHC446 and 31BOK523 (HAR-5091 and HAR-4280 respectively), were submitted but failed to produce results.

References: Hunter and Foley 1987
Jones *et al* 2003
Jones 1994
Jordan *et al* 1994, 90–1
Steane 2003

HAR-5087 1030 ±70 BP

$\delta^{13}\text{C}$: -22.4‰

Sample: 7BAU349, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a plain burial outside the south-east corner of the chancel, the first addition to the single-celled church.

Objectives: to test the dating of the church, when the cemetery began, and how it spread.

Calibrated date: 1 σ : cal AD 900–1040
2 σ : cal AD 880–1170

Final comment: M J Jones (August 2003), this burial probably formed part of the parish church cemetery in the town in the eleventh century. It cut through an earlier grave (HAR-4143).

HAR-5088 1040 ±70 BP

$\delta^{13}\text{C}$: -22.1‰

Sample: 5AZF364, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a burial with a possible wooden coffin immediately south of the south wall, to the south of the single-celled church, presumably after it became the parish church.

Objectives: as HAR-5087

Calibrated date: 1 σ : cal AD 900–1040
2 σ : cal AD 870–1160

Final comment: M J Jones (August 2003), this burial was immediately south of the line of the south wall of the single-celled building. It may form part of the early parish cemetery of the tenth century.

HAR-5089 1110 ±70 BP

$\delta^{13}\text{C}$: -24.4‰

Sample: 24BLV497, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a ?simple cist burial ?inside the single-celled church against a wall. Some large limestone slabs were present along the edges of the cut; the skeleton was in a poor state, ?presence of wood.

Objectives: as HAR-5087

Calibrated date: 1 σ : cal AD 870–1020
2 σ : cal AD 720–1040

Final comment: M J Jones (August 2003), it is difficult to know if this was a burial within the single-celled building while it was a chapel or a mausoleum (if ninth-century), or when it became a parish church (if tenth-century).

HAR-5090 990 ±70 BP

$\delta^{13}C$: -22.3‰

Sample: 14BGU442, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a plain burial outside the north-west corner of the single-celled church.

Objectives: as HAR-5087

Calibrated date: 1 σ : cal AD 980–1160
2 σ : cal AD 890–1220

Final comment: M J Jones (August 2003), probable tenth–eleventh century grave in the cemetery of the parish church.

HAR-5092 1490 ±90 BP

$\delta^{13}C$: -23.6‰

Sample: 26BMQ507, submitted in July 2003 by B Gilmour

Material: human bone

Initial comment: from a ?plain burial cut by the north wall of the single-celled church.

Objectives: as HAR-5087

Calibrated date: 1 σ : cal AD 430–650
2 σ : cal AD 390–680

Final comment: M J Jones (August 2003), from an early burial, possibly as early as fifth century or as late as seventh century, pre-dating the single-celled building (chapel), but of uncertain relationship to the underlying apsidal building. This date provides a *terminus post quem* for the single-celled building.

HAR-5093 1240 ±70 BP

$\delta^{13}C$: -22.1‰

Sample: 23BMG502, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a ?plain burial (trunk and pelvis missing - ?rotted in coffin) outside the north-west corner of the site of the single-celled church.

Objectives: as HAR-5087

Calibrated date: 1 σ : cal AD 670–890
2 σ : cal AD 650–980

Final comment: M J Jones (August 2003), this grave cut into the line of the north wall of the apsidal church, which presumably must no longer have been standing by this date. But a date in the late seventh–ninth century would still allow the apsidal building to be that erected by Paulinus in AD 627–9.

HAR-5094 1360 ±80 BP

$\delta^{13}C$: -21.9‰

Sample: 17BKH482, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a ?plain burial to the south of the site of the single-celled church; a primary burial.

Objectives: as HAR-5087

Calibrated date: 1 σ : cal AD 610–770
2 σ : cal AD 540–860

Final comment: M J Jones (August 2003), from an early grave, probably of seventh–eighth century date, indicating use of the site as a burial ground at this time but not helping to resolve the dating of the structures.

HAR-5095 1040 ±70 BP

$\delta^{13}C$: -21.7‰

Sample: 4AZB359, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a burial with a wooden coffin to the west of the site of the single-celled church.

Objectives: as HAR-5087

Calibrated date: 1 σ : cal AD 900–1040
2 σ : cal AD 870–1160

Final comment: M J Jones (August 2003), this grave, to the west of the single-celled building, probably dates to the late tenth–eleventh centuries, by which time it had become a parish church. This date contributes little to problems of the earlier phases of the site but suggests that the date ranges obtained are accurate.

HAR-5096 1820 ±70 BP

$\delta^{13}C$: -21.8‰

Sample: 25BMM505, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a ?plain burial inside the confines of the single-celled church (in the south-west corner) and on the same alignment.

Objectives: as HAR-5087

Calibrated date: 1 σ : cal AD 80–320
2 σ : cal AD 30–390

Final comment: M J Jones (August 2003), this is either an aberrant date, or the bone analysed was re-buried as a relic from a cemetery of Roman date. It is difficult to know, but the first suggestion seems more likely (but cf HAR-4120; 2030 ±110 BP; 380 cal BC–cal AD 230; Reimer *et al* 2004). The other two graves in similar locations within the single-celled building appear to be of ninth–tenth century date. Was this one associated with the earlier structures?

References: Reimer *et al* 2004

HAR-5097 1040 ±90 BP

$\delta^{13}C$: -23.5‰

Sample: 27BNF511, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a ?plain burial ?inside the south-east corner of the single-celled church.

Objectives: as HAR-5087

Calibrated date: 1 σ : cal AD 890–1040
2 σ : cal AD 770–1210

Final comment: M J Jones (August 2003), this grave was probably placed near the internal south-east corner of the single-celled building (cf also HAR-5096 and HAR-5089), either when it was a memorial chapel or soon after it became a parish church.

HAR-5098 1730 ±110 BP

Sample: 33BQH533, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a ?plain burial close to the chancel screen and within or succeeding the apsidal church.

Objectives: as HAR-5087

Calibrated date: 1σ: cal AD 130–430
2σ: cal AD 50–560

Final comment: M J Jones (August 2003), a very early grave immediately west of the chancel screen of the apsidal church and within the area of the later single-celled building. If it succeeded the apsidal church, or was even contemporary with its use, it would suggest that this church could not be as late as that built by Paulinus in AD 627–9, and must therefore be of late Roman or sub-Roman date. Other graves with similarly early dates would support this interpretation (eg HAR-4177, HAR-4116, HAR-4131, and HAR-4143; Jordan *et al* 1994, 90–1).

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: English Heritage (3 January 2012), this result is published (Walker and Otlet 1988, 300), although a final certificate has not been found.

References: Jordan *et al* 1994, 90–1
Walker and Otlet 1988, 300

HAR-5099 870 ±90 BP

$\delta^{13}C$: -22.3‰

Sample: 37DCM733, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a cist burial cut into the backfill of a ?tenth-century sunken building and, in turn, sealed by cobbling (?c AD 1300). An associated pot has a preliminary date of the eleventh century AD, and so this burial probably provides a fairly good control sample.

Objectives: as HAR-5087

Calibrated date: 1σ: cal AD 1030–1270
2σ: cal AD 990–1290

Final comment: M J Jones (August 2003), this sample was submitted as a control sample since its stratigraphical position indicated a date in the eleventh century, which was (approximately) borne out by the radiocarbon analysis. The accuracy of the date reinforces confidence in the rest of the radiocarbon dating (with one or two possible exceptions).

HAR-5100 1340 ±100 BP

$\delta^{13}C$: -23.7‰

Sample: 19BKW487, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a ?simple cist burial (stones round edges of grave cut) to the north-west of the site of the single-celled church, cut through the line of the north wall of the apsidal church.

Objectives: as HAR-5087

Calibrated date: 1σ: cal AD 610–780
2σ: cal AD 540–900

Final comment: M J Jones (August 2003), another grave post-dating the apsidal church, through whose north wall line it was cut, suggesting that the church had gone out of use by the eighth–ninth centuries - but this still allows for that church to be of Roman, sub-Roman, or Anglo-Saxon date.

HAR-5101 1240 ±70 BP

$\delta^{13}C$: -21.8‰

Sample: 28BNQ516, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a ?plain burial to the south of the single-celled church and cut through the line of the south wall of the apsidal church.

Objectives: as HAR-5087

Calibrated date: 1σ: cal AD 670–890
2σ: cal AD 650–980

Final comment: M J Jones (August 2003), as HAR-5100 above, a grave post-dating the apsidal church and placed close to the wall of the single-celled building when this was a memorial chapel in the ?seventh–ninth centuries. This result does not throw a great deal of light on the earliest phases.

HAR-5219 1020 ±70 BP

$\delta^{13}C$: -22.1‰

Sample: 3AYT361, submitted in July 1982 by B Gilmour

Material: human bone

Initial comment: from a plain burial in the east part of the graveyard, the top half having been cut away by the east wall of the chancel added to the single-celled church.

Objectives: as HAR-5087

Calibrated date: 1σ: cal AD 970–1120
2σ: cal AD 880–1170

Final comment: M J Jones (August 2003), from a grave to the east of the churches cut by the building of the Norman chancel. This result does not throw light on the issue of dating the earliest churches, but the date is consistent (tenth–eleventh century AD) with what might be expected from the stratigraphic context.

Lindow Moss, Cheshire

Location: SJ 820805
Lat. 53.19.15 N; Long. 02.16.13 W

Project manager: R Scaife (University of Southampton),
August 1987

Archival body: Cheltenham College

Description: the discovery of the first part of another well-preserved human body at Lindow Moss in February 1987, led to another chapter in the story of archaeological work on this site.

Objectives: to determine the significance of soil erosion in relation to Lindow Man, whether erosion occurred approximately during the time when the body was deposited.

References: Walker *et al* 1991a, 110

HAR-8875 4980 ±70 BP

$\delta^{13}\text{C}$: -27.8‰

Sample: LINDPODZ, submitted in October 1987 by M Canti

Material: charcoal (remaining subsample identified): unidentified (4.36g); *Quercus* sp., heartwood, extremely slow-grown (5.09g, 100%) (R Gale 2000)

Initial comment: associated with erosional horizons on a ?truncated podzol.

Objectives: to determine the significance of soil erosion in relation to Lindow Man, whether erosion occurred approximately when the bog body was deposited.

Calibrated date: 1 σ : 3920–3660 cal BC
2 σ : 3960–3640 cal BC

Final comment: M Canti (8 September 1995), clearly the soil erosion event occurred much earlier than deposition of the Lindow body.

Lismore Fields, Buxton, Derbyshire

Location: SK 050731
Lat. 53.15.17 N; Long. 01.55.30 W

Project manager: D Garton (Trent and Peak Archaeological Trust), 1984–6

Archival body: Trent and Peak Archaeological Trust

Description: in 1984 work prompted by a housing development and funded by Derbyshire County Council, English Heritage, and the Trustees of the Chatsworth Settlement sought to investigate the supposed line of a Roman road at Lismore Fields in Buxton. What emerged, in place of the resoundingly absent Roman road, after some three seasons of excavation, was an earlier Neolithic settlement consisting of a lithic and pottery assemblage associated with a group of features including sub-rectangular buildings with preserved floors, postholes, and pits (Garton 1991, 19). Analysis of the ground plans has suggested that three similar structures are present. Charred plant remains from the buildings included emmer grains and chaff, flax

seeds, hazelnuts, and crab apple fruits and seeds. Taken together with a series of five dates from buildings, ranging between 3950–3340 cal BC (OxA-2434–8) at 95% confidence (Reimer *et al* 2004; Garton 1991, 19) this site arguably challenges previous views of the earlier Neolithic in the Peak and asks us to test our ideas on how settlement of varying levels of permanency or seasonality might be expected to appear.

The location of the site, within an upland basin formed by the Wye Valley at 300m OD and surrounded on all sides by hills, challenges the models with which so much has already been achieved. Quite incidentally, the spatially coincident but quite distinct later Mesolithic assemblage and possible features at Lismore Fields also reinforce the emergent picture gained from the surface collection surveys. The dated charcoal from a posthole associated with a ring-slot feature perhaps places the assemblage around the late fifth or early fourth millennium (calibrated) BC. The character of the later Mesolithic to earlier Neolithic transition is perhaps a subject worthy of further research in its own right.

Objectives: diagnostic artefacts of only later Mesolithic and Neolithic date have been recovered from some 3800m² of excavations. The features are widely spread and intercutting sequences of features are rare; only two periods of feature digging need be represented. This contrasts with the evidence from the pollen analysis, which shows clearance and disturbance of the vegetation throughout the sampled profiles, so it might just be the lack of artefacts that gives this minimal impression of the periods of occupation.

References: Garton 1987
Garton 1991
Reimer *et al* 2004

HAR-6500 7170 ±80 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: BLFA014, submitted on 5 December 1984 by G C Gilbert

Material: charcoal (remaining subsample identified): *Salix/Populus* sp. (0.02g, 2.1%); unidentified (2.11g); *Sorbus* sp. (0.61g, 63.5%); *Betula* sp. (0.33g, 34.4%) (R Gale 1999)

Initial comment: from a soft dark brown soil lying on the base of a bowl-shaped pit, but probably not burnt *in situ*. The upper part of the pit was filled with brown clay and stone, which effectively protected the charcoal deposit from intrusive material. The sample was found 0.5–0.6m below the modern turf.

Objectives: to give chronological definition to the broad late Mesolithic/Neolithic date indicated by the flintwork

Calibrated date: 1 σ : 6080–5980 cal BC
2 σ : 6230–5890 cal BC

Final comment: G C Gilbert (1988), this sample gives chronological definition to a broad late Mesolithic/Neolithic date indicated by the flintwork from the 1984 trial excavation. Excavations in 1985 have shown discrete areas of Mesolithic and Neolithic occupation and structures.

References: Walker and Otlet 1988, 307

Lofts Farm, Essex

Location: TL 86900936
Lat. 51.45.04 N; Long. 00.42.29 E

Project manager: N Brown (Essex County Council), 1985

Archival body: Colchester Museums

Description: a late Bronze Age settlement with a double-ditched sub-rectangular enclosure, on low-lying gravels bordering the Blackwater estuary.

Objectives: to confirm the dating suggested on typological and stratigraphic grounds.

Final comment: N Brown (1994), it was hoped that the radiocarbon dates would confirm the dating suggested on typological and stratigraphic grounds. With the possible exception of HAR-8514, the dates appear compatible.

References: Brown 1988
Walker *et al* 1991a, 97

HAR-8514 2680 ±70 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: LFP1002, submitted in April 1987 by P Murphy

Material: charcoal (remaining subsample identified; *Salix/Populus* sp. (0.01g, 2.5%): unidentified (2.43g); *Prunus spinosa* (0.09g, 22.5%); *Quercus* sp., heartwood (0.28g, 70%); *Corylus* sp. (0.02g, 5%) (R Gale 1999)

Initial comment: from the upper fill of a 2m-deep well situated outside of the enclosure to the south. This fill of dark silt loam was full of domestic debris, and apparently represents a deliberate backfilling of the well. The upper fill presents a marked contrast with the largely artefact-free organic silt-clay waterlogged lower fill.

Objectives: the context produced a large assemblage of Darmsden-Linton style pottery. This ceramic style is known from a number of sites in East Anglia and is dated on typological grounds to the early Iron Age. So far there are no associated radiocarbon dates to confirm this dating. HAR-8514, together with HAR-8515 from the upper ditch silts of the enclosure, and HAR-8521 from a waterlogged wooden stake from the lower fill of the well, should provide a chronological framework for the interpretation of the site. Moreover they will serve to tie it in to the extensive series of late Bronze Age/early Iron Age radiocarbon dates obtained from submerged sites along the Essex coast including the Blackwater estuary (*see* Hullbridge Survey).

Calibrated date: 1 σ : 910–790 cal BC
2 σ : 1000–770 cal BC

Final comment: N Brown (1994), the calibrated date range appears rather early. It seems likely that the charcoal derives from old wood, or is perhaps residual. Compare with Rook Hall Farm (HAR-6398; 2550 ±70 BP; 830–420 cal BC at 95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004

HAR-8515 2460 ±70 BP

$\delta^{13}\text{C}$: -30.6‰

Sample: LF840192, submitted in April 1987 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (0.02g); *Prunus* spp. (>0.01g, 20%); *Quercus* sp. (0.02g, 40%); *Corylus* sp. (>0.01g, 20%); *Acer* sp. (>0.01g, 20%) (R Gale 1999)

Initial comment: from the upper fill of the enclosure ditch, a deposit of domestic refuse with carbonised grain, pottery, and an amber bead.

Objectives: to provide a date for the associated late Bronze Age pottery and also the last use of the enclosure. *See* also HAR-8514.

Calibrated date: 1 σ : 770–400 cal BC
2 σ : 800–390 cal BC

Final comment: N Brown (1994), the calibrated date range is compatible with the expected date. Typological dating of the pottery would suggest a date in the early part of the range at 68% confidence.

HAR-8521 2800 ±110 BP

$\delta^{13}\text{C}$: -27.8‰

Sample: LFP8402, submitted in June 1986 by P Murphy

Material: wood (waterlogged): *Quercus* sp. (P Murphy 1986)

Initial comment: from the outer rings of stake 2 from the lower fill of late Bronze Age well 840, to the south of the enclosure. Unfortunately this timber could not be dated by dendrochronology.

Objectives: to date the feature and associated pottery; to give a chronological framework for tree-ring analysis of the stakes; and to establish a local ring sequence using this wood and also late Bronze Age wood from intertidal structures (*see* Hullbridge Survey).

Calibrated date: 1 σ : 1120–820 cal BC
2 σ : 1300–790 cal BC

Final comment: N Brown (1994), the calibrated date range is compatible with the anticipated late Bronze Age date for the well.

London: Covent Garden, Jubilee Hall, Greater London

Location: TQ 30408085
Lat. 51.30.40 N; Long. 00.07.14 W

Project manager: R Whytehead (Museum of London), May 1985

Archival body: Museum of London

Description: observation in 1985 recorded evidence of middle Saxon occupation and industrial activity on the Strand foreshore of the Thames in the form of buildings, fireplaces, hearths, and at least one well.

Objectives: due to the limited time scale as this was an emergency excavation, all the information gathered is important to establish dating for the features.

References: Chitty 1986
Cowie *et al* 1988
Cowie 1987
Layard Whytehead *et al* 1989
Whytehead 1985

HAR-8936 1370 ±60 BP

$\delta^{13}\text{C}$: -22.5‰

Sample: LBLL85, submitted in November 1987 by L Blackmore

Material: human bone

Initial comment: a shallow west-to-east grave, cut through the brickearth to a depth of c 16.38m OD. The skeleton is believed to be a adult male, who had been laid prone in the grave, with the head at the west end. The grave was filled with light grey-brown clay containing a patch of greenish silty clay along the north side.

Objectives: to establish a date for the burial.

Calibrated date: 1 σ : cal AD 630–680
2 σ : cal AD 570–780

Final comment: R Layard Whytehead (1988), it could not be established whether this burial pre-dated or was contemporary with the earlier structure. Prone burial in the Romano-British and Anglo-Saxon periods has been interpreted elsewhere as indicative of a criminal or outcast (Harman *et al* 1981), which could explain his isolation.

References: Harman *et al* 1981

HAR-9134 950 ±60 BP

$\delta^{13}\text{C}$: -23.3‰

Sample: 003/107, submitted in October 1987 by L Blackmore and R Whytehead

Material: animal bone

Initial comment: from fill of pit which cuts through sequence of layers which in turn seal grave, and is therefore the stratigraphically latest feature.

Objectives: to establish date of back-filling of feature; to provide date bracket in which the layers of urban deposit accumulated above the grave; as a guide to dating the phasing of the site; and to complement pottery dating evidence for mid-Saxon period.

Calibrated date: 1 σ : cal AD 1020–1170
2 σ : cal AD 980–1220

Final comment: L Blackmore (1992), dates the back-filling of the feature and provides a date range for the accumulation of urban deposit above the grave. The result provides a guide to dating the phasing of the site and complements pottery-dating for the mid-Saxon period.

References: Hardiman *et al* 1992, 68

London: Fulham Palace moated site, Greater London

Location: TQ 24327624
Lat. 51.28.15 N; Long. 00.12.36 W

Project manager: K R Whitehouse (Fulham and Hammersmith Historical Society), February 1984

Archival body: Fulham and Hammersmith Historical Society

Description: a section of Fulham Palace moat was exposed during building work at the rear of the Kings Head Pub, 4 Fulham High Street, SW6. No datable artefactual material was found. However the section showed the base of the moat and successive layers of plant material truncated and overlain by a band of clay. It is suggested that this represents the cleaning out and relining of the moat as referred to in documentary sources.

Objectives: to date the construction of the moat.

HAR-6182 1380 ±80 BP

$\delta^{13}\text{C}$: -29.3‰

Sample: FPMS9, submitted on 1 March 1984 by K Whitehouse

Material: waterlogged plant macrofossil

Initial comment: these appear to be plant remains growing in the bottom of the ditch prior to a major relining. They were trapped between the silt deposits and clay lining.

Objectives: this sample was between silt deposits in the base of the ditch and the first major relining and therefore may suggest the earliest date for the first relining.

Calibrated date: 1 σ : cal AD 600–690
2 σ : cal AD 540–780

Final comment: K Whitehouse (1985), we have what appears to be relining. During the Dark Ages a relining took place of an existing silted up ditch.

HAR-6183 3520 ±80 BP

$\delta^{13}\text{C}$: -28.9‰

Sample: FPMS20, submitted on 1 March 1984 by K Whitehouse

Material: waterlogged plant macrofossil (roots)

Initial comment: as HAR-6182

Objectives: these roots were vertical in apparently natural sand and had been cut when the ditch was dug. The top of one root was at a right angle and trapped between the natural sand and clay lining, when the clay was puddled. It should give a date for when the ditch was dug.

Calibrated date: 1 σ : 1950–1740 cal BC
2 σ : 2120–1630 cal BC

Final comment: K Whitehouse (1985), the date is considered to be incorrect. It may be because the roots were pre-existing.

HAR-6807 1450 ±70 BP

$\delta^{13}\text{C}$: -26.1‰

Sample: FPMS10, submitted on 11 March 1985 by K Whitehouse

Material: sediment (silt with organic content)

Initial comment: silt deposit from moat prior to relining.

Objectives: to date relining.

Calibrated date: 1 σ : cal AD 540–660
2 σ : cal AD 430–680

Final comment: K Whitehouse (1986), dates the organic silt deposit.

References: Walker *et al* 1990, 175

HAR-6841 1710 ±110 BP

$\delta^{13}\text{C}$: -27.7‰

Sample: FPMS17, submitted on 27 February 1985 by K Whitehouse

Material: wood (waterlogged): unidentified

Initial comment: wood fragment from what appears to be moat lining.

Objectives: to date the construction of the moat.

Calibrated date: 1 σ : cal AD 220–430
2 σ : cal AD 60–580

Final comment: K Whitehouse (1990), this sample was taken to date the moat's construction.

References: Walker *et al* 1990, 175

**London: New Fresh Wharf,
City of London**

Location: TQ 32958066
Lat. 51.30.31 N; Long. 00.05.02 W

Project manager: J Schofield (Museum of London), 1974–8

Archival body: Museum of London

Description: a Roman waterfront.

Objectives: to date the revetment with this as the only datable material available due to the presence on the site of vandals/treasure hunters.

Laboratory comment: Ancient Monuments Laboratory (2003), nine samples were included in the first volume of the *Radiocarbon Dates* (Jordan *et al* 1994). Two further samples NFW1 (HAR-1918) and NFW3 (HAR-1965) were submitted for dating but failed to produce results.

References: Hillam and Morgan 1986
Jordan *et al* 1994
Morgan and Schofield 1978

HAR-5481 1760 ±70 BP

$\delta^{13}\text{C}$: -24.1‰

Sample: FRE78 138, submitted on 2 December 1982 by M Rhodes

Material: wood (waterlogged): unidentified

Initial comment: from a Roman riverside revetment revealed by vandals/treasure hunters and therefore not dated by other means. The sample was collected specifically for radiocarbon dating so has been carefully handled.

Objectives: to date the revetment.

Calibrated date: 1 σ : cal AD 170–390
2 σ : cal AD 80–430

Final comment: M Rhodes, the expected Roman date was obtained.

**London: Peninsular House,
City of London**

Location: TQ 328807
Lat. 53.13.37 N; Long. 00.32.32 W

Project manager: V Straker (Museum of London), 1983

Archival body: Museum of London Archaeology Service

Description: Peninsular House was a Roman waterfront excavation carried out by the (then) Department of Urban Archaeology, Museum of London.

Objectives: to obtain dates to accompany a pollen analysis on a peat bed found below the earliest Roman (first century AD) waterfront structures excavated at Peninsular House in the City of London. The peat bed was the first to be discovered within the historic City and offered the opportunity to provide information on the pre-Roman environment of this part of the Thames.

References: Sidell *et al* 2000

HAR-5646 9290 ±100 BP

$\delta^{13}\text{C}$: -29.1‰

Sample: PEN-4BASE, submitted on 21 June 1983 by V Straker

Material: peat

Initial comment: from a peat deposit under ?late first century Roman layers on this waterfront site. This is the lowest sample in the block of peat.

Objectives: pre-Roman deposits are virtually absent from the City of London so any details of pre-Roman environment are very important from dated deposits.

Calibrated date: 1 σ : 8700–8340 cal BC
2 σ : 8790–8280 cal BC

Final comment: J Sidell (28 November 2006), the sample dated to the early Holocene and thus proved to be an exceptionally rare survival of early Holocene organic sediment in the City of London.

HAR-5647 9510 ±120 BP

$\delta^{13}\text{C}$: -27.7‰

Sample: PEN-3, submitted on 21 June 1983 by V Straker

Material: wood (waterlogged; within peat column): unidentified

Initial comment: wood within peat column.

Objectives: as HAR-5646

Calibrated date: 1 σ : 9150–8630 cal BC
2 σ : 9260–8490 cal BC

Final comment: J Sidell (28 November 2006), the sample dated to the early Holocene and thus proved to be an exceptionally rare survival of early Holocene organic sediment in the City of London.

HAR-5648 8950 \pm 110 BP

$\delta^{13}\text{C}$: -28.9‰

Sample: PEN-2, submitted on 21 June 1983 by V Straker

Material: peat

Initial comment: replicate for HAR-5649 and to be held back and not to be used unless its measurement is inadequate.

Objectives: as HAR-5646

Calibrated date: 1 σ : 8290–7950 cal BC
2 σ : 8330–7740 cal BC

Final comment: A Bayliss (3 March 2008), the two radiocarbon results from the top of this peat layer are statistically consistent ($T'=1.8$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). The weighted mean (9057 \pm 78 BP) calibrates to 8450–8000 cal BC (Reimer *et al* 2004).

Final comment: J Sidell (28 November 2006), the sample dated to the early Holocene and thus proved to be an exceptionally rare survival of early Holocene organic sediment in the City of London.

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

HAR-5649 9160 \pm 110 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: PEN1TOP, submitted on 21 June 1983 by V Straker

Material: soil

Initial comment: from the top of the peat layer.

Objectives: as HAR-5646

Calibrated date: 1 σ : 8550–8270 cal BC
2 σ : 8640–8220 cal BC

Final comment: A Bayliss, *see* HAR-5648

Final comment: J Sidell (28 November 2006), the sample dated to the early Holocene and thus proved to be an exceptionally rare survival of early Holocene organic sediment in the City of London.

HAR-5958 2040 \pm 80 BP

$\delta^{13}\text{C}$: -16.1‰

Sample: FISH BONE, submitted on 23 January 1984 by A Jones

Material: animal bone (fish bones)

Initial comment: fish bones chosen to compare with those found at St Mary Bishophill Junior, York (*see* p323).

Objectives: to compare the dates from the two sites to see if there were any problems with the carbon content of the York bones as a result of their marine origin.

Calibrated date: 1 σ : cal AD 240–440
2 σ : cal AD 130–550

Final comment: A Bayliss (3 October 2011), this measurement has been calibrated using the marine calibration data of Hughen *et al* (2004) and a ΔR value of -5 ± 40 BP for the coastal waters off England (Stuiver and Braziunas 1993).

Final comment: R A Hall (11 December 1996), the London fish has not clarified the picture any further since the result obtained there was *c* 90 cal BC which with the addition of the 400 years for the apparent age of the sea, mentioned above, comes out as 1640 BP, *c* 310 cal AD, which is close to the archaeologically expected age of early to mid third century.

References: Hughen *et al* 2004
Stuiver and Braziunas 1993

London: Southwark, 207 Borough High Street, Greater London

Location: TQ 32517983
Lat. 51.30.03 N; Long. 00.05.28 W

Project manager: E Ferretti and A Graham (Southwark Archaeological Excavation Committee), 1972

Archival body: Museum of London

Description: excavation revealed a section of Roman road laid on a timber corduroy and positioned partly across a silted-up channel. Early Roman drainage ditches and buildings were also uncovered, in addition to a fourth-century well, sealed by dark earth.

Objectives: to date the soil sample.

References: Ferretti and Graham 1978
Thompson *et al* 1998

HAR-1730 3190 \pm 100 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: T172SAEC, submitted in February 1976 by H Keeley

Material: soil

Initial comment: a soil sample from trench 1.

Objectives: to date the deposit.

Calibrated date: 1 σ : 1610–1390 cal BC
2 σ : 1690–1220 cal BC

Final comment: H Sheldon (26 September 1977), the date was expected to fall within the Roman period, therefore there may have been some contamination or administrative error.

London: Southwark, St Thomas Street, Greater London

Location: TQ 32748019
Lat. 51.30.15 N; Long. 00.05.16 W

Project manager: G Dennis and L Schaaf (Southwark Archaeological Excavation Committee), 1974

Archival body: Museum of London

Description: excavation at 1–7 St Thomas Street was carried out in advance of office redevelopment. In the Roman period the site lay close to the main approach road for a bridge into London, and several Roman features and deposits were uncovered during the course of the excavations, including building remains and well-preserved timber-lined pits containing organic material.

Objectives: to provide further dating evidence in addition to the artefactual remains.

References: Cowan *et al* 2009
Dennis 1978
Dennis and Schaaf 1975

HAR-1731 1760 ±70 BP

$\delta^{13}C$: -25.8‰

Sample: CONCSAEC, submitted in February 1976 by H Keeley

Material: organic matter (concretion sample)

Initial comment: the sample was taken from a fill of a late second century pit (F28; B III-2a) associated with a wide range of occupation material, much of it organic in origin. Analysis suggested the material was probably derived from fish (Wild in Dennis 1978, 405–7).

Objectives: to provide additional dating evidence for the pit.

Calibrated date: 1 σ : cal AD 170–390
2 σ : cal AD 80–430

Final comment: A Bayliss (3 October 2011), the compatibility of the archaeological dating of this feature with the radiocarbon date when calculated using fully terrestrial calibration data (Reimer *et al* 2004), suggest that the dated material was of terrestrial origin.

Final comment: (23 December 2009), the result confirms a late second century date for the pit.

References: Dennis 1978

London: Swan Lane, City of London

Location: TQ 327806
Lat. 51.30.30 N; Long. 00.05.10 W

Project manager: G Egan (Museum of London Archaeology Service), 1981

Archival body: Museum of London

Description: a Thameside industrial site with a number of hearths having fullers earth in association. Presumably as a result of fulling or dyeing of textiles, this appears to be a surprisingly intensive industrial activity for the period.

Objectives: to confirm or refute the ceramic dating and archaeomagnetic results.

References: Egan 1991

HAR-4528 860 ±70 BP

$\delta^{13}C$: -25.0‰

Sample: SWA81329, submitted on 15 July 1981 by A J Clark

Material: wood (previously waterlogged; remaining subsample now dry and structurally collapsed): *Quercus* sp., heartwood plank (470g, 100%) (R Gale 2000)

Initial comment: part of the supporting framework for an industrial hearth.

Objectives: to confirm or refute the ceramic dating and archaeomagnetic results (although there may have been slumping of deposits) for the early phase of the industry (lowest hearth).

Calibrated date: 1 σ : cal AD 1040–1260
2 σ : cal AD 1020–1280

Final comment: G Egan (October 1995), the date clarifies the earliest part of the important textile processing industrial sequence in a largely aceramic horizon. The meagre ceramic date range corresponds with the central span of the radiocarbon result, late twelfth to early thirteenth century AD. It puts into perspective the archaeomagnetic dating sequence, from immediately overlying deposits, which proved unreliable because of ground slumping.

London: Whitehall, Richmond Terrace, City of London

Location: TQ 300798
Lat. 51.30.06 N; Long. 00.07.37 W

Project manager: D Andrews (Central Excavation Unit), August 1983

Archival body: Museum of London

Description: a watching brief carried out on a development site with deep basements behind a retained Regency facade.

Objectives: two previous investigations of the site had proved largely negative. The watching brief was to check for anything that might turn up, particularly in relation to the origins and early settlement of Westminster. In the event, the operation highlighted the potential for the survival of prehistoric structures beneath deep silts.

Final comment: D Andrews (25 October 1996), this was a very hurried watching brief on a previously investigated site, and the discovery of a timber structure at a depth of over 1m below OD came as a surprise. Were it not for the radiocarbon date (HAR-6393), a date in the Roman or historical periods would have seemed most likely for the structure. The apparent late Bronze Age/early Iron Age date invites comparison with Flag Fen. The function of the

structure is uncertain, but possibly it was a revetment at the side of a channel. The much older peats have yet to have an environmental context provided for them, possibly they will prove valuable in future research and investigations.

References: Andrews and Merriman 1986

HAR-5741 8580 ±110 BP

$\delta^{13}\text{C}$: -29.1‰

Sample: 898, submitted on 19 September 1983 by N Balaam

Material: peat

Initial comment: from a band of peat underlying silts dated archaeomagnetically.

Objectives: to establish the period of silt deposition, as the magnetic date is ambiguous.

Calibrated date: 1 σ : 7680–7530 cal BC
2 σ : 7940–7470 cal BC

Final comment: D Andrews (25 October 1996), the circumstances of the watching brief provided no data to indicate the possible date of this peat. The radiocarbon date was therefore crucial to the investigation.

HAR-5742 4110 ±80 BP

$\delta^{13}\text{C}$: -29.7‰

Sample: 900, submitted on 19 September 1983 by N Balaam

Material: peat

Initial comment: as HAR-5741

Objectives: as HAR-5741

Calibrated date: 1 σ : 2880–2500 cal BC
2 σ : 2900–2470 cal BC

Final comment: see HAR-5741

HAR-6393 2540 ±70 BP

$\delta^{13}\text{C}$: -28.2‰

Sample: BP1, submitted on 19 September 1984 by N Balaam

Material: wood (waterlogged): *Alnus glutinosa* (N Balaam 1984)

Initial comment: from part of the base plate of a wooden structure sealed within layers of grey silts and clays.

Objectives: the material may represent a very early phase of occupation in the Whitehall area. There are no datable artefacts.

Calibrated date: 1 σ : 800–540 cal BC
2 σ : 830–410 cal BC

Final comment: D Andrews (25 October 1996), the radiocarbon date showed this timber structure to be much older than one would otherwise have guessed, and thus gives a tantalising glimpse into the early development of this part of the river side at Westminster.

Longham, Norfolk

Location: TF 93131713
Lat. 52.43.01 N; Long. 00.51.35 E

Project manager: J Wymer (Norfolk Archaeological Unit), 1985

Archival body: Norfolk County Council

Description: Longham Mound and adjacent settlement site, (SMR ref. 7239).

Objectives: rescue excavation of an apparently artificial earthen mound resembling a prehistoric burial mound, threatened with destruction by gravel extraction. The aim was to identify the age and purpose of the mound before its disappearance. Topsoil clearance by a commercial aggregate company adjacent to the mound produced evidence of prehistoric settlement and the project was enlarged to discover its nature.

References: Walker *et al* 1991a, 98
Wymer and Healy 1996

HAR-8520 3870 ±70 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: 72391137, submitted in April 1987 by J Wymer

Material: charcoal (remaining subsample identified): unidentified (1.75g); *Quercus* sp., sapwood (0.11g, 35.5%); *Quercus* sp., heartwood (0.20g, 64.5%) (R Gale 2000)

Initial comment: lower filling of pit truncated by mechanical stripping of topsoil and subsoil. Charcoal from pit 1136 cut into pit 1137, which contained Beaker sherds and flints. Charcoal from both pits has been combined in the sample to increase its size.

Objectives: to date the domestic Beaker material in a pit adjacent to excavated mound with inverted Beakers.

Calibrated date: 1 σ : 2470–2200 cal BC
2 σ : 2570–2130 cal BC

Final comment: J Wymer and F Healy (13 November 1995), this provides a *terminus post quem* for the middle style Beaker sherds in pit 1137. They could be broadly contemporary with/or pre-date the deposition of Step 5 Beakers in the mound.

Longmoor, Hampshire

Location: SU 787268
Lat. 51.03.42 N; Long. 00.52.37 W

Project manager: R M Jacobi (University of Lancaster), 1979

Archival body: Hampshire County Council

Description: a Mesolithic site on the Folkestone Beds division of the Lower Greensand. The site yields a Mesolithic Horsham-type assemblage (*sensu stricto*).

Objectives: to obtain radiocarbon dates relevant to the archaeological occupation, and to construct a working model of the archaeological succession for the Mesolithic in south-east England where there are no radiocarbon dates for an assemblage of this type anywhere in the area of its occurrence.

Final comment: R Jacobi (9 December 1995), there are two results from the Oxford Radiocarbon Accelerator Unit on single fragments of charred hazel nutshell from this site, OxA-376 (8930 ±100 BP; 8300–7730 cal BC at 95% confidence) and OxA-377 (8760 ±110 BP; 8250–7580 cal BC at 95% confidence; Reimer *et al* 2004) (Gillespie *et al* 1985). These accord far better with expectations of age for the flint artefacts from Longmoor (based on comparisons with the continental literature) than either HAR-4475 or HAR-5356. The scattered charcoal fragments used for these two Harwell dates are best interpreted as produced during later natural conflagrations, despite stratigraphic overlap with the worked flints. HAR-5355 is from a charcoal stain at the base of the flint scatter. It is unassociated with reddening or constructional features, which would help identify the sample as from a hearth spot.

Laboratory comment: Ancient Monuments Laboratory (2003), sample HI GR 3 (HAR-5035) was withdrawn.

References: Gillespie *et al* 1985, 238
Reimer *et al* 2004

HAR-4475 6040 ±110 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: LFM B D4, submitted on 15 April 1981 by R M Jacobi

Material: charcoal: *Quercus* sp.; *Betula* sp. (J Sheldon)

Initial comment: from the lower part of a horizon of gley podsol. The horizon also contained Mesolithic-type flint artefacts. Some contamination may be possible as the profile smelled of petrol.

Objectives: to date the artefacts.

Calibrated date: 1 σ : 5200–4790 cal BC
2 σ : 5290–4700 cal BC

Final comment: R M Jacobi (1991), this confirms a Mesolithic date.

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Hardiman *et al* 1992, 61
Otlet *et al* 1983
Walker *et al* 1991a, 89

HAR-5355 9300 ±210 BP

$\delta^{13}\text{C}$: -26.2‰

Sample: H4 GR 89, submitted in August 1980 by R M Jacobi

Material: charcoal: *Pinus* sp. (J Sheldon)

Initial comment: from a constellation of burnt wood fragments associated with a roughly circular soil stain c 30cm in diameter at the base of the A2 horizon of humus-iron podsol. The

sample was at a depth 0.4–0.45m below the base of recent humus. The constellation has been interpreted as a prehistoric firespot. Fuel contamination from army vehicles is a possibility.

Objectives: the sample is believed to be associated with a flint industry of an age greater than 8000 BP.

Calibrated date: 1 σ : 8800–8280 cal BC
2 σ : 9250–7990 cal BC

Final comment: R Jacobi (9 June 1983), this result appears identical to ages obtained from mainland flint technologies closely comparable to that which have been excavating at Longmoor.

Laboratory comment: AERE Harwell (1983), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: AERE Harwell (25 May 1983), this is a preliminary result calculated before the final calibration of the small sample miniature gas counters. A final age has not been calculated and there is no certificate for this result.

References: Otlet *et al* 1983

HAR-5356 5830 ±80 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: H10 GR13, submitted in August 1980 by R H Jacobi

Material: charcoal: *Quercus* sp.; *Betula* sp.; *Corylus* sp. (J Sheldon)

Initial comment: from a localised concentration of charcoal fragments at the summit of the A2 horizon of a humus iron podsol, and only 0.15m below the base of recent humus. The sample post-dates (or appears to post-date) the Mesolithic flint assemblage and comes below a break in the pollen diagram prepared by Professor G W Dimpleby. The sample is directly relevant to dating this break. Fuel contamination from army vehicles is a possibility.

Objectives: to date a break in the pollen diagram.

Calibrated date: 1 σ : 4790–4580 cal BC
2 σ : 4900–4490 cal BC

Final comment: R M Jacobi (1983), it was expected to date a subsequent event.

Laboratory comment: AERE Harwell (1983), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: AERE Harwell (25 May 1983), this is a preliminary result calculated before the final calibration of the small sample miniature gas counters. A final age has not been calculated and there is no certificate for this result.

References: Otlet *et al* 1983

Low Toynton, Lincolnshire

Location: TF 275713
Lat. 53.13.23 N; Long. 00.05.24 W

Project manager: P Chowne (Trust for Lincolnshire Archaeology), May 1986

Archival body: Lincoln City Museum

Description: an isolated feature discovered during topsoil stripping for gravel extraction. Part of the site may have been destroyed. There were flint scatters in the adjacent area.

Objectives: to date the flint scatter.

References: Chowne 1994
Hardiman *et al* 1992, 55
Walker *et al* 1991a, 99

HAR-8531 1530 ±70 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: LT07861, submitted on 27 March 1987 by P Chowne

Material: charcoal (remaining subsample identified): unidentified (67.70g); Pomoideae (0.56g, 3%); *Sambucus* sp. (0.14g, 1%); *Quercus* sp., sapwood (10.90g, 56%); *Quercus* sp., heartwood (1.30g, 7%); knot wood, unidentifiable (2.30g, 12%); *Prunus* sp. (2.70g, 14%); *Corylus* sp. (1.49g, 8%) (R Gale 1997)

Initial comment: filling of Neolithic hearth, associated with pottery and animal bone.

Objectives: to provide a date for Neolithic activity in the middle Bain Valley and for comparison with the Tattershall Thorpe Neolithic dates.

Calibrated date: 1 σ : cal AD 420–610
2 σ : cal AD 390–660

Final comment: P Chowne (10 October 1995), pottery identified as Neolithic requires further consideration in view of this date.

MARC 3, Hampshire

Location: see individual sites

Project manager: (M3 Archaeological Rescue Committee), 1974, 1976, 1977, 1982, and 1983

Description: excavations carried out by the M3 Archaeological Rescue Committee. The sites were located at Easton Lane, Micheldever Wood, Winnall Down, Bridget's Farm, Burntwood Farm, Stratton Park, and Easton Down.

Objectives: to date the features with no diagnostic artefactual evidence, and to establish a dating sequence for the pottery assemblages encountered on some sites.

References: Fasham 1975
Fasham 1976a
Fasham 1976b
Fasham 1977
Fasham 1978a
Fasham 1978b
Fasham 1979
Fasham 1982
Fasham 1983
Fasham 1985
Fasham 1987
Fasham and Ross 1978
Fasham and Whinney 1991
Monk and Fasham 1980

Marc 3: Easton Lane Interchange, Winchester, Hampshire

Location: SU 497305
Lat. 51.04.16 N; Long. 01.17.26 W

Project manager: P J Fasham (Wessex Archaeology), August 1982 to April 1983

Archival body: Wessex Archaeology

Description: a multi-period site, part of the Marc 3 project. There was a large-scale excavation at Easton Lane, near Winchester, the site proposed for Junction 9 of the M3 motorway. The whole site, some 10 hectares in area, was examined either by excavation or watching brief in the period between August 1982 and April 1983. Features dating from the Late Neolithic through to Late Saxon and early medieval period were recorded.

Objectives: the main purpose was to provide a secure date for a small group of pits containing no artefacts diagnostic of date and which could not be reasonably associated with any nearby settlement.

Final comment: P J Fasham (1991), most of the Easton Lane dates reveal the dilemma created by the use of radiocarbon dating as a means of spot dating specific archaeological contexts, especially from a site with shallow or non-existent stratigraphy which may have a lengthy history. Circular structure, 3918, a hut with a sunken floor, contained within its infill Neolithic, Bronze Age, and medieval material. Despite careful excavation the true date of the feature could not be determined.

Laboratory comment: Ancient Monuments Laboratory (2003), two further samples, ELI/218 (HAR-6119) and ELI/1705 (HAR-9162) were submitted but failed to produce results.

References: Fasham and Whinney 1991, 143–7

HAR-6115 3350 ±100 BP

$\delta^{13}\text{C}$: -20.4‰

Sample: ELI/217, submitted in September 1983 by P J Fasham

Material: antler

Initial comment: site area B. From upper fill of a late Neolithic conical pit.

Objectives: to confirm the general contemporaneity of apparently related features of the late Neolithic complex and to assist in dating of the ceramic sequence.

Calibrated date: 1 σ : 1750–1510 cal BC
2 σ : 1900–1420 cal BC

Final comment: see series comments

References: Walker *et al* 1990, 170

HAR-6116 3240 ±120 BP

$\delta^{13}\text{C}$: -22.0‰

Sample: ELI/549, submitted in September 1983 by P J Fasham

Material: antler

Initial comment: site area D. From a posthole in an area immediately south-west of unusual mixed Bronze Age cemetery. Substantial fences, a rectangular house, and two circular huts are components of this complex, which dates to the Bronze Age.

Objectives: to confirm the general date range of the timber structures.

Calibrated date: 1 σ : 1670–1410 cal BC
2 σ : 1870–1260 cal BC

Final comment: see series comments

HAR-6118 2260 \pm 100 BP

$\delta^{13}\text{C}$: -22.3‰

Sample: ELI/222, submitted in September 1983 by P J Fasham

Material: animal bone

Initial comment: site area W. From posthole of small oval post-built structure with large densely spaced postholes. This unusual feature is isolated at the junction of two of the Bronze Age linear ditches. Posthole about 40cm deep.

Objectives: to place the oval structure into its chronological position within the site; the feature is reminiscent of late Neolithic/early Bronze Age structures.

Calibrated date: 1 σ : 410–190 cal BC
2 σ : 730–50 cal BC

Final comment: P J Fasham (1991), this middle Iron Age date does not accord with our predictions for the archaeological interpretation of circular feature 2159, which seems better placed in a Bronze Age rather than a middle Iron Age landscape.

References: Walker *et al* 1990, 170

HAR-6120 2530 \pm 100 BP

$\delta^{13}\text{C}$: -22.4‰

Sample: ELI/1193, submitted in September 1983 by P J Fasham

Material: animal bone

Initial comment: site area G. From bottom layer, 687, of the infilling of a Bronze Age house terraced into a north facing slope. The house and associated pits form a discrete part of the prehistoric landscape being 275m away from the nearest Bronze Age structure but with a potentially contemporary cemetery only 75m north. Related to HAR-6121.

Objectives: to provide a date for associated cultural material from within the fill of the house and for the general site sequence of ceramics. Also to establish contemporaneity with nearby burial ground (HAR-6123).

Calibrated date: 1 σ : 810–510 cal BC
2 σ : 900–390 cal BC

Final comment: P J Fasham (1991), the sample did not assist in resolving the chronological dilemma.

References: Walker *et al* 1990, 170

HAR-6121 3090 \pm 90 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: ELI/1194, submitted in September 1983 by P J Fasham

Material: human bone

Initial comment: from bottom layer, 3381. See HAR-6120.

Objectives: to provide a date, cross referenced with HAR-6120, for cultural material from the fill of the house and for the general site sequence of ceramics. Also to establish contemporaneity with nearby burial ground HAR-6123.

Calibrated date: 1 σ : 1450–1260 cal BC
2 σ : 1530–1110 cal BC

Final comment: see HAR-6120

HAR-6122 2740 \pm 70 BP

$\delta^{13}\text{C}$: -22.1‰

Sample: ELI/459, submitted in September 1983 by P J Fasham

Material: human bone (limb bone)

Initial comment: site area D. Limb bone from inhumation associated with shale and amber beads.

Objectives: to help establish the date of the unusual mixed, cremation and inhumation, open cemetery.

Calibrated date: 1 σ : 980–810 cal BC
2 σ : 1050–790 cal BC

Final comment: P J Fasham (1991), this date would disagree profoundly with dates reached by other means. The amber bead associated with the inhumation was not produced until some 300 years later.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 170

HAR-6123 2960 \pm 80 BP

$\delta^{13}\text{C}$: -22.4‰

Sample: ELI/477, submitted in September 1983 by P J Fasham

Material: human bone (limb bone)

Initial comment: site area F. Limb bone from flexed inhumation in small burial ground, which includes a loose cremation and one urned cremation in an early Bronze Age vessel with a bronze awl.

Objectives: to establish the date for the burial group and to determine contemporaneity or otherwise with the house some 75m to the west to which HAR-6120 and HAR-6121 refer.

Calibrated date: 1 σ : 1320–1040 cal BC
2 σ : 1420–930 cal BC

Final comment: P J Fasham (1991), the date is two or three centuries later than the likely date of the Collared Urn.

HAR-8882 3800 ±70 BP

$\delta^{13}\text{C}$: -24.4‰

Sample: ELI/83F, submitted in September 1983 by P J Fasham

Material: antler

Initial comment: between site areas F and G. From fill of probable late Neolithic pit some 0.75m deep containing several antlers, pottery, and waste flakes.

Objectives: to provide a date for associated cultural material and for the general site ceramic sequence.

Calibrated date: 1 σ : 2350–2130 cal BC
2 σ : 2470–2030 cal BC

Final comment: see series comments

References: Walker *et al* 1991a, 110–1

Marc 3: Winnall Down, R17, Hampshire

Location: SU 49853035
Lat. 51.04.11 N; Long. 01.17.18 W

Project manager: P J Fasham (M3 Archaeological Rescue Committee), May 1977

Archival body: Hampshire County Museum Service

Description: a multi-period, but predominantly Iron Age site.

Objectives: to establish a dating sequence for the pottery.

Laboratory comment: Ancient Monuments Laboratory (1995), fourteen further dates from this site were published in the first volume of Jordan *et al* (1994, 107–9).

References: Fasham 1982
Fasham 1985
Fasham and Whinney 1991
Jordan *et al* 1994

HAR-2650 2530 ±70 BP

$\delta^{13}\text{C}$: -23.0‰

Sample: R17-1483, submitted on 16 November 1977 by P J Fasham

Material: animal bone

Initial comment: from circular storage pit, associated with probably early saucepan pottery.

Objectives: to establish a dating sequence for the pottery.

Calibrated date: 1 σ : 800–540 cal BC
2 σ : 820–400 cal BC

Final comment: P J Fasham (1991), none of the dates at Winnall Down present any problems.

References: Hardiman *et al* 1992, 47

HAR-2651 2440 ±100 BP

$\delta^{13}\text{C}$: -23.0‰

Sample: R17-1476, submitted on 4 November 1977 by P Fasham

Material: animal bone

Initial comment: from F5JJ, layer 7063, the primary silt in an early Iron Age enclosure ditch, associated with haematite-coated pottery.

Objectives: to establish a dating sequence for the pottery.

Calibrated date: 1 σ : 780–390 cal BC
2 σ : 810–260 cal BC

Final comment: see HAR-2650

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 298–9

Margate: East Northdown, Kent

Location: TR 38507045
Lat. 51.22.56 N; Long. 01.25.41 E

Project manager: G Smith (Central Excavation Unit), 1984

Archival body: Kent County Museum Services

Description: a Beaker (?) burial monument and a late Bronze Age assemblage. Aerial photography has revealed a number of archaeological features in the Northdown area including a group of ring ditches. Excavation revealed a single continuous ring ditch of a possible disc barrow. No clearly primary deposit was found, but pottery in secondary positions suggests an early Beaker origin.

Objectives: to provide dating for the barrow activity.

References: Smith 1987a
Walker *et al* 1990, 178

HAR-7010 3020 ±80 BP

$\delta^{13}\text{C}$: -25.4‰

Sample: 274-1327, submitted in December 1985 by N Balaam

Material: charcoal: *Prunus* cf *spinosa*, some; Pomoideae, mostly (N Balaam)

Initial comment: from layer 1337 which was immediately beneath a layer of late Bronze Age rubbish in the ring ditch of a 'saucer' barrow.

Objectives: to provide a *terminus post quem* for the deposition of the late Bronze Age rubbish layer.

Calibrated date: 1 σ : 1400–1120 cal BC
2 σ : 1450–1010 cal BC

Final comment: G H Smith (1987), the absence of a primary burial or of other features which can be definitely related to the construction of the ring ditch at Northdown is problematic. This date from the top layer of the primary chalk silts in the ring ditch provides only a guide but seems rather late at this level, if the monument is Beaker in origin. The radiocarbon date from pit 698 (HAR-7011) is, therefore, important. It shows that pits 698, 700, and 802 were part of the sepulchral/ceremonial use of the monument and that the monument was still in use at this late date.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-7011 2910 ±70 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: 274-1298, submitted in December 1985 by N Balaam

Material: charcoal: *Quercus* sp.; Pomoideae, mostly; *Corylus* sp. (N Balaam)

Initial comment: from pit 698, a small cremation pit within a 'saucer' barrow.

Objectives: to establish a date for the primary use of the barrow.

Calibrated date: 1 σ : 1260–1000 cal BC
2 σ : 1380–910 cal BC

Final comment: see HAR-7010

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Maryport: Ewanrigg, Bronze Age Cremation Cemetery, Cumbria

Location: NY 03423508
Lat. 54.42.05 N; Long. 03.29.56 W

Project manager: R Bewley (Royal Commission on Historic Monuments for England), October 1983, August 1985, and 1986

Archival body: Carlisle Museum

Description: a Bronze Age cremation cemetery was discovered whilst field walking. During the excavations 28 burials were discovered, 26 cremations and two inhumations; the inhumations (one a Beaker burial, the other a central cist) had been disturbed. The cremations contained mainly Collared Urns with a date range of circa 2460–1520 cal BC.

Objectives: to assess the plough damage to the site (as fragments of Food Vessel had been found in the plough soil) and to obtain a sequence of radiocarbon dates for Collared Urns under excavation conditions.

Final comment: R Bewley (27 December 1995), these dates from samples HAR-5959–61, HAR-7071, HAR-7072, and HAR-7077 have helped to date the Collared Urn tradition in Britain; prior to the sequence provided at Ewanrigg (six dates) there were only 25 other radiocarbon dates for Collared Urns in Britain. The dates suggest that this tradition lasted *c* 940 year (calibrated) from 2460 to 1520 BC. Samples HAR-7073 to HAR-7076 dated a late intrusive feature that of a late first millennium AD corn drying kiln.

References: Bewley *et al* 1992
Bewley 1986
Bewley 1987

HAR-5959 3640 ±90 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: EWR83105, submitted in January 1984 by R Bewley

Material: charcoal: unidentified

Initial comment: from context number 5, cremation pit, cut into natural subsoil. Undisturbed cremation containing a complete Collared Urn of 'northern' type.

Objectives: no radiocarbon dates exist for Collared Urns in their original context in Cumbria. This sample will therefore date the deposition of the urn, and the cremation.

Calibrated date: 1 σ : 2140–1890 cal BC
2 σ : 2290–1750 cal BC

Final comment: R H Bewley (27 December 1995), the cremation which the date provided contained a small decorated secondary series Collared Urn, an accessory cup (which appears to be unique in Britain), a tuyère perhaps for metalworking, the bone placed within the urn from an adult male, and a piece of burnt flint. This sample provides a reasonable date for this assemblage, the first to be radiocarbon dated in Cumbria.

HAR-5960 3470 ±70 BP

$\delta^{13}\text{C}$: -26.2‰

Sample: EWR83222, submitted in January 1984 by R Bewley

Material: charcoal (remaining subsample identified): unidentified (9.18g); *Quercus* sp., probably all heartwood (3.13g, 100%) (R Gale 1999)

Initial comment: from a cremation pit containing a Collared Urn (undecorated).

Objectives: to date the Collared Urn.

Calibrated date: 1 σ : 1890–1690 cal BC
2 σ : 1960–1610 cal BC

Final comment: R Bewley (27 December 1995), this sample provides a reasonable date for an undecorated second series, Form 1A Collared Urn. The urn contained cremated bone of an adult, presumably male. The urn was placed in the pit in an upright position. The date helps to form one of the series dates for Collared Urns at Ewanrigg.

HAR-5961 3700 ±90 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: EWR83218, submitted in January 1984 by R Bewley

Material: charcoal: unidentified

Initial comment: from cremation pit containing large urn. Although the urn had been hit by the plough, the pit is a sealed context. The charcoal comes from the pit, outside the urn.

Objectives: the urn is of a different type to those in contexts 5 and 22 (HAR-5959 and HAR-5960); it is also different to the one in 14 (HAR-5962). Thus a date for each type of urn is desirable.

Calibrated date: 1 σ : 2210–1950 cal BC
2 σ : 2410–1880 cal BC

Final comment: R H Bewley (27 December 1995), this sample provides a date for a large north-western style 1C Collared Urn, perhaps the largest on the site. It is also possible that the urn contained the remains of more than one individual; possibly an adult male and female. Its proximity and even connection with context 20, in which the cremated bone of an immature individual were discovered, is suggestive.

HAR-5962 1620 \pm 150 BP

$\delta^{13}C$: -25.9‰

Sample: EWR83114, submitted in January 1984 by R Bewley

Material: bone (calcined)

Initial comment: from context number 14. Stone-lined cist containing a smashed Collared Urn. The site consisted of nine cremations and this one cist. Thus, although it contained no charcoal a date for the cist is important in relation to the other urns. Its location, on the top of the natural mound, may mean it is the primary burial with the cremations being secondary (chronologically this is). The cist, however, seems to have been subject to some disturbance as the urn was smashed, yet still inside the cist. The capping stone was still on the top of the cist. There can be little doubt that the bone is associated with the cist and the urn.

Objectives: to date the cist burial on the cemetery, to see if it differs from the dates for the cremations. The urn in the cist is also of a different type to the ones in the cremations.

Calibrated date: 1 σ : cal AD 240–600
2 σ : cal AD 70–670

Final comment: R H Bewley (27 December 1995), this sample did not provide a reliable date and it was from a disturbed context. The artefacts in the cist suggest a Bronze Age date but the first millennium AD date is more likely to date the disturbance than the original deposition.

References: Hardiman *et al* 1992, 63

HAR-7071 3400 \pm 70 BP

$\delta^{13}C$: -27.7‰

Sample: EWR85052, submitted on 7 October 1985 by R Bewley

Material: charcoal (remaining subsample identified; *Salix/Populus* sp. (1.90g, 15.3%)); unidentified (8.36g); *Quercus* sp., sapwood (0.44g, 3.5%); *Quercus* sp., heartwood (9.95g, 80%); *Corylus* sp. (0.14g, 1.1%) (R Gale 1999)

Initial comment: from a cremation pit cut into the subsoil.

Objectives: of the 29 cremation pits on the site only a few yielded good charcoal samples. Only three of the 29 so far dated.

Calibrated date: 1 σ : 1770–1610 cal BC
2 σ : 1890–1520 cal BC

Final comment: R H Bewley (27 December 1995), one of the few cremations, which contained no urn but it did have a stone platform, as if to receive an urn. Trying to find any sequence of burials within the cemetery was a reason for taking samples from a variety of cremations.

References: Walker *et al* 1990, 188

HAR-7072 3570 \pm 80 BP

$\delta^{13}C$: -26.2‰

Sample: EWR85037, submitted on 7 October 1985 by R Bewley

Material: charcoal (remaining subsample identified): unidentified (0.45g); *Quercus* sp., probably all heartwood (0.13g, 92.9%); *Corylus* sp. (>0.01g, 7.1%) (R Gale 1999)

Initial comment: from cremation pit containing fragments of coarse pottery.

Objectives: few of the cremation pits have good charcoal and even fewer have pottery. This pit has both and is therefore very important for dating the site.

Calibrated date: 1 σ : 2030–1770 cal BC
2 σ : 2140–1690 cal BC

Final comment: R H Bewley (27 December 1995), although there was no urn in this cremation the good quality charcoal samples helped provide the reliable sequence of dates for Ewanrigg. This one sits firmly in the centre of the range.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 188

HAR-7073 1260 \pm 100 BP

$\delta^{13}C$: -26.5‰

Sample: EWR85072, submitted on 7 October 1985 by R Bewley

Material: charcoal: unidentified

Initial comment: from context number 72, which is the tunnel-like ‘entrance’ to a dry stone-walled circular pit. It is assumed that this ‘entrance’ is contemporary with the pit.

Objectives: this feature, along with the stone chamber, are unique in Cumbrian prehistory. This measurement is essential to establish the contemporaneity of both the tunnel and chamber.

Calibrated date: 1 σ : cal AD 650–890
2 σ : cal AD 600–990

Final comment: R H Bewley (27 December 1995), this sample proved that this feature was not part of the cremation cemetery but a late first millennium AD corn drying kiln.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Hardiman *et al* 1992, 63
Otlet *et al* 1983
Walker *et al* 1990, 188

HAR-7074 1040 \pm 80 BP

$\delta^{13}C$: -27.9‰

Sample: EWR85074, submitted on 7 October 1985 by R Bewley

Material: charcoal: unidentified

Initial comment: from context number 74, within a stone-lined circular pit, with a tunnel like entrance way. As an archaeological feature it is unique in Cumbria and therefore is of unknown date and as yet unknown function. Context number 74 is the primary silting layer of this chamber-like feature.

Objectives: a unique feature on Bronze Age sites. A date is crucial to establish its age.

Calibrated date: 1 σ : cal AD 890–1040
2 σ : cal AD 780–1170

Final comment: see HAR-7073

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 188

HAR-7075 1250 \pm 100 BP

$\delta^{13}\text{C}$: -25.4‰

Sample: EWR85059, submitted on 7 October 1985 by R Bewley

Material: charcoal: unidentified

Initial comment: from the primary silt/fill of the chamber feature.

Objectives: to date the final abandonment of the chamber or its last use. It is not known what period (prehistoric–medieval) the feature is.

Calibrated date: 1 σ : cal AD 660–900
2 σ : cal AD 600–1000

Final comment: R H Bewley (27 December 1995), this sample proved that the circular stone-tired chamber was a late first millennium AD corn drying kiln.

References: Walker *et al* 1990, 188

HAR-7076 810 \pm 80 BP

$\delta^{13}\text{C}$: -24.6‰

Sample: EWR85068, submitted on 7 October 1985 by R Bewley

Material: charcoal (remaining subsample identified): unidentified (0.07g); *Sambucus* sp., roundwood (0.51g, 100%) (R Gale 1999)

Initial comment: dark stains, probably stake holes; part of super-structure or use of chamber.

Objectives: to date the final use of the stone chamber.

Calibrated date: 1 σ : cal AD 1160–1280
2 σ : cal AD 1020–1380

Final comment: A Bayliss (10 April 2008), the four radiocarbon results from this structure (HAR-7073–6) are not statistically consistent (T' =17.3; T' (5%)=7.8; ν =3; Ward and Wilson 1978). This result probably provides the best indication of the date of the feature, as the small amount of charcoal that remained from the sample after dating was of a short-life species and this date is the latest from the group.

Final comment: R H Bewley (27 December 1995), this sample proved that the final use of the first millennium AD corn-drying kiln was stretching into AD 1100–1200.

References: Hardiman *et al* 1992, 63
Walker *et al* 1990, 188
Ward and Wilson 1978

HAR-7077 3700 \pm 120 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: EWR85055, submitted on 7 October 1985 by R Bewley

Material: charcoal (remaining subsample identified): unidentified (54.67g); *Quercus* sp., heartwood (22.79g, 98.6%); *Corylus* sp. (0.33g, 1.4%) (R Gale 1999)

Initial comment: from cremation pit with an enlarged Food Vessel.

Objectives: to date the enlarged Food Vessel. Only 24 radiocarbon dates for Collared Urns and Food Vessels in England exist, out of many thousands of examples.

Calibrated date: 1 σ : 2290–1920 cal BC
2 σ : 2470–1750 cal BC

Final comment: R Bewley (27 December 1995), this sample provided the earliest date for a Collared Urn at Ewanrigg, which is a secondary series form 1A decorated urn.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 188

HAR-8788 4440 \pm 70 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: EWR86084, submitted on 10 October 1986 by R H Bewley

Material: charcoal (remaining subsample identified): unidentified (18.04g); *Quercus* sp., sapwood (0.15g, 4.6%); *Quercus* sp., heartwood (3.09g, 95.4%) (R Gale 1999)

Initial comment: from an oval pit with a high concentration of stones; and a Beaker. This pit had a stone-lined bottom - a layer of quartz pebbles. On the cemetery site we have had 30 cremation pits, six of which have been dated to the Bronze Age. The discovery of this 'Beaker pit' is unexpected and of importance in terms of the relationship between the Bronze Age and the Beaker period and the length of use of this site as a cemetery.

Objectives: to date the Beaker pit; a unique feature amongst 30 Bronze Age cremations.

Calibrated date: 1 σ : 3340–2920 cal BC
2 σ : 3370–2900 cal BC

Final comment: R H Bewley (27 December 1995), this date has to be treated with caution as it was from a disturbed context within the Beaker burial. The early date is archaeologically unacceptable.

References: Hardiman *et al* 1992, 64

Maryport: Ewanrigg, Romano-British settlement, Cumbria

Location: NY 035350
Lat. 54.42.02 N; Long. 03.29.51 W

Project manager: R Bewley (Historic Buildings and Monuments Commission), August 1986 and August 1987

Archival body: Carlisle Museum

Description: a Romano-British curvilinear enclosure at Ewanrigg. Excavation in the 1950s and again the 1980s confirmed its fourth century AD date but also a Bronze Age cremation cemetery in an adjacent field.

Objectives: the aim of the excavation in 1986 and 1987 was to confirm the date of the site, assess the state of its preservation, and to see if there was any prehistoric settlement activity on the site.

Final comment: R H Bewley (28 December 1995), the samples were taken to date the earlier features on the Romano-British settlement site at Ewanrigg. The pottery from the site confirmed a fourth century AD date but there was possibly an earlier feature (contexts 346 and 349) predating the Romano-British settlement and perhaps being contemporary with the associated Bronze Age cremation cemetery.

Laboratory comment: English Heritage (28 November 2011), a second sample was of geological age, producing a result of the order of 30,000 BP (HAR-8790; EWR86310), although a conventional radiocarbon age does not seem to have been calculated.

References: Bewley *et al* 1992
Bewley 1960
Blake 1960

HAR-8789 31850 ±1630 BP

$\delta^{13}\text{C}$: -25.1‰

Sample: EWR86306, submitted on 13 October 1986 by R H Bewley

Material: charcoal (remaining subsample sparse and too degraded to identify (0.01g). The bulk of the sample consists of carbonised lumps of bubbly substance, which probably includes small fragments of plant materials (3.67g)) (R Gale 1999)

Initial comment: from the primary filling of the inner ditch of the settlement adjacent to the Bronze Age cremation cemetery. The double-ditched enclosure is undated except from a few sherds of Romano-British pottery from the upper levels. This ditch fill context was very black and could possibly represent a destruction phase of the site.

Objectives: to date this very rare type of site (double-ditched oval enclosure) to test its contemporaneity with the Bronze Age cremation cemetery, which is 50m south.

Calibrated date: 1 σ : 36720–31600 cal BC
2 σ : 39300–31600 cal BC

Final comment: R H Bewley (28 December 1995), the sample was probably contaminated hence the very early date; there was considerable amounts of coal in the deposits

and this may be the reason for such an early date. It is therefore an unreasonable date.

HAR-8790 c 30000 BP

Sample: EWR86310, submitted on 13 October 1986 by R Bewley

Material: charcoal: unidentified

Initial comment: from a linear feature cut into the subsoil but underlying the Romano-British occupation layer on the site. This is probably the earliest datable feature on the site.

Objectives: to date the settlement site which is 50m north of the Bronze Age cremation cemetery.

Final comment: R H Bewley (28 December 1995), this result is of unexpectedly geological rather than archaeological age, at approximately 30,000 years old. This may be due to the very soily nature of the sample.

Melton Foreshore, Humberside

Location: SE 975247
Lat. 53.42.34 N; Long. 00.31.22 W

Project manager: A Foxon (Hull City and East Riding Museum), October 1984

Archival body: Hull and East Riding Museum

Description: intertidal zone on the north bank of the Humber.

Objectives: to define, date, and characterise at least one structure from the foreshore in its physical and environmental context.

References: Crowther and Didsbury 1988

HAR-6367 2910 ±90 BP

$\delta^{13}\text{C}$: -24.6‰

Sample: 3-842033, submitted on 1 November 1984 by D Crowther

Material: wood (waterlogged; roundwood)

Initial comment: from two parallel rails of debarked round timber, with hurdle material above. There is likely to have been an unknown level of chemical contamination due to a nearby effluent pipe from a smelting works, plus the water of the Humber at this point is not considered to be particularly clean.

Objectives: HAR-6367 and HAR-6368 are the only dating evidence for the eroding structure, which is from a similar context to the Bronze Age Ferriby boats.

Calibrated date: 1 σ : 1270–940 cal BC
2 σ : 1400–840 cal BC

Final comment: M Foreman (24 January 2002), the possible survival of trackway features in this area was recognised by the late E V Wright in the 1970s, leading to the recovery of samples in 1984 by Hull Museum and East Riding Archaeological Society members. Subsequent survey of the area by the Humber Wetlands Project identified wooden trackway features in this immediate area. These are likely to be related to the dated feature.

HAR-6368 2990 ±70 BP $\delta^{13}\text{C}$: -26.1‰*Sample*: 2-842032, submitted on 1 November 1984 by D Crowther*Material*: wood (waterlogged; roundwood)*Initial comment*: as HAR-6387*Objectives*: as HAR-6387*Calibrated date*: 1 σ : 1380–1120 cal BC
2 σ : 1420–1000 cal BC*Final comment*: see HAR-6387*Final comment*: A Bayliss (10 April 2008), the two radiocarbon results from roundwood from this structure are statistically consistent ($T'=0.5$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978), and suggest that it was constructed in the last quarter of the second millennium cal BC.*References*: Ward and Wilson 1978**Middleborough, Essex***Location*: TL 99332554
Lat. 51.53.32 N; Long. 00.53.50 E*Project manager*: P Crummy (Colchester Excavation Committee), 1978*Archival body*: Colchester Archaeological Trust*Description*: extramural houses of second and third century date featuring a road leading from the north gate, demolished *c* AD 300 to leave the site clear. Medieval houses and kilns follow. Three inhumations were found, thought in the published report to be post-Roman.*Objectives*: to establish whether the inhumations were late Roman or post-Roman.*Final comment*: P Crummy (24 October 1998), unless HAR-5981 is aberrant the three results together suggest a date for the burials in the late-fourth to early-fifth century AD. This is consistent with the stratigraphic and dating evidence from the site (such as it is). The radiocarbon dates have provided an invaluable contribution to the dating and interpretation of the site.*References*: Crummy 1984
Crummy 1992**HAR-5981** 1520 ±70 BP $\delta^{13}\text{C}$: -21.0‰ (assumed)*Sample*: F214, submitted in 1984 by P Crummy*Material*: human bone*Initial comment*: part of an inhumation of uncertain date.*Objectives*: to confirm the date of these, probably late Anglo-Saxon or early medieval, burials.*Calibrated date*: 1 σ : cal AD 430–620
2 σ : cal AD 390–660*Final comment*: see series comments**HAR-5982** 1820 ±80 BP $\delta^{13}\text{C}$: -23.0‰*Sample*: F308, submitted in 1984 by P Crummy*Material*: human bone*Initial comment*: as HAR-5981*Objectives*: as HAR-5981*Calibrated date*: 1 σ : cal AD 80–330
2 σ : cal AD 20–410*Final comment*: see series comments**HAR-5983** 1800 ±90 BP $\delta^{13}\text{C}$: -22.0‰*Sample*: F770, submitted in 1984 by P Crummy*Material*: human bone*Initial comment*: as HAR-5981*Objectives*: as HAR-5981*Calibrated date*: 1 σ : cal AD 80–340
2 σ : cal AD 20–430*Final comment*: see series comments**Mildenhall: West Row Fen,
MNL-165, Suffolk***Location*: TL 854769
Lat. 52.21.30 N; Long. 00.43.22 E*Project manager*: E A Martin (Suffolk County Council), 1981–2, and 1985*Archival body*: Suffolk County Council*Description*: a Bronze Age settlement on the south-eastern edge of the Fenland region, an area of peat fen, part of Mildenhall Common Fen (drained following a Parliamentary Act of AD 1759). The area consists of 'hummock and hollow micro-relief'.*Objectives*: to provide a suite of dates for the settlement and to check for any chronological variations that could be linked with the spatial development of this open site.*Final comment*: E Martin (9 November 1995), overall, the dates have confirmed the expected Bronze Age date for the settlement. The attempt to date the Neolithic phase of occupation was less successful, with one date coming out too late and the other too early. An episode of woodland clearance appears to have taken place around 2200–1890 BC, followed by activity in the southern part of the site between 2020 and 1740 BC and between 1880 and 1410 BC in the northern part.*Laboratory comment*: Ancient Monuments Laboratory (2003), one further sample, HAR-5633 (1659274) was submitted but failed.*References*: Martin and Murphy 1988

HAR-4629 3190 ±70 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: MNL165, submitted in March 1981 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (12.53g); *Fraxinus* sp. (0.03g, 0.8%); *Quercus* sp., heartwood (0.05g, 1.4%); Pomoideae (0.09g, 2.4%); *Prunus spinosa* (0.42g, 11.4%); *Alnus* sp. (3.10g, 84%) (R Gale 1998)

Initial comment: from an occupation layer encountered in a trial trench. The sample was extracted by sieving.

Objectives: to confirm the date of the occupation layer.

Calibrated date: 1 σ : 1530–1410 cal BC
2 σ : 1630–1310 cal BC

Final comment: E Martin (9 November 1995), the date confirmed the Bronze Age date of the occupation layer and strongly suggested that further excavation work would be informative.

HAR-5634 3280 ±70 BP

$\delta^{13}\text{C}$: -28.7‰

Sample: 165 9115, submitted on 14 June 1983 by P Murphy

Material: soil (organic pit fill)

Initial comment: from pit 0901, layer 0911 (5); a waterlogged pit fill from a possible cattle water-hole.

Objectives: to date the feature.

Calibrated date: 1 σ : 1640–1460 cal BC
2 σ : 1740–1410 cal BC

Final comment: E Martin (9 November 1995), the Bronze Age date was confirmed. The feature was one of three water pits or shallow wells in the excavated area. Environmental studies confirmed that they had contained open fresh water, probably from human use, as diatom analysis showed no signs of contamination by cattle dung.

HAR-5635 3390 ±90 BP

$\delta^{13}\text{C}$: -28.7‰

Sample: 165 915, submitted on 14 June 1983 by P Murphy

Material: soil (organic pit fill)

Initial comment: from a similar feature to HAR-5634 above.

Objectives: to date the feature.

Calibrated date: 1 σ : 1870–1530 cal BC
2 σ : 1930–1460 cal BC

Final comment: E Martin (9 November 1995), a similar feature to that dated by HAR-5634, with apparently an identical function. The two pits are close together, but the dates suggest that although both date from the Bronze Age, one may be slightly younger than the other, perhaps implying sequential rather than contemporary use for the pits.

HAR-5636 4020 ±120 BP

$\delta^{13}\text{C}$: -26.1‰

Sample: 165 967, submitted on 14 June 1983 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (39.50g); *Quercus* sp., probably all heartwood (2.05g, 100%) (R Gale 1998)

Initial comment: from feature 0934, layer 0967; a long, shallow pit containing a high concentration of oak charcoal, possibly a charcoal clamp.

Objectives: to date the feature.

Calibrated date: 1 σ : 2860–2410 cal BC
2 σ : 2900–2200 cal BC

Final comment: E Martin (9 November 1995), this feature contained a mass of oak charcoal, apparently resulting from slow combustion. It was therefore thought possibly to be a clamp for the production of charcoal for metalworking. The date has come out earlier than expected, though this may be the result of the burning of an old piece of timber. As it stands, the date is significantly earlier than most of the Bronze Age occupation on the site and is on the limit of what might be expected for metalworking. Though this date is also earlier than HAR-5637, it is possible that they both relate to a period of woodland clearance, but perhaps HAR-5636 relates to a timber that was already old when it was burnt.

HAR-5637 3650 ±100 BP

$\delta^{13}\text{C}$: -27.9‰

Sample: 165 942, submitted on 14 June 1983 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (20.28g); *Quercus* sp., heartwood (0.85g, 14.9%); *Fraxinus* sp. (2.27g, 39.7%); *Alnus* sp. (2.54g, 44.5%); *Prunus* sp. (0.05g, 0.9%) (R Gale 1998)

Initial comment: from part of felled oak tree, burnt *in situ*, probably relating to a clearance episode.

Objectives: to date the clearance of trees on the site.

Calibrated date: 1 σ : 2200–1890 cal BC
2 σ : 2300–1740 cal BC

Final comment: E Martin (9 November 1995), the date does seem to fall at the beginning of the Bronze Age occupation of the site and may indeed indicate an initial phase of woodland clearance.

Laboratory comment: English Heritage (25 March 2008), the mixed wood species contained within the excess material from this dating sample suggests that the charcoal did not all derive from the felled oak tree.

HAR-5638 3420 ±80 BP

$\delta^{13}\text{C}$: -27.8‰

Sample: 165 946, submitted on 14 June 1983 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (0.70g); *Fraxinus* sp. (0.01g, 2%); *Quercus* sp. (0.01g, 2%); Salicaceae (0.05g, 10%); *Alnus* sp. (0.24g, 48%); *Betula* sp. (0.19g, 38%) (R Gale 1999)

Initial comment: from occupation spread 0956, an extensive spread of ash and charcoal.

Objectives: to date the occupation layer.

Calibrated date: 1 σ : 1880–1620 cal BC
2 σ : 1940–1520 cal BC

Final comment: E Martin (9 November 1995), this confirms the Bronze Age date of the occupation. An identical date (HAR-5639) was obtained for a pit nearby and overlapping dates were obtained for two water pits in the same area (HAR-5634 and HAR-5635).

HAR-5639 3420 ±80 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: 165 4034, submitted on 14 June 1983 by P Murphy

Material: charcoal (remaining subsample identified): Cereal indet, 1 grain (>0.01g, 14.3%); unidentified (0.87g); *Alnus* sp. (0.02g, 28.6%); *Quercus* sp. (0.04g, 57.1%) (R Gale 1999)

Initial comment: from a pit with abundant charcoal and hazelnut shells.

Objectives: to date the feature, which lay close to one of the houses.

Calibrated date: 1 σ : 1880–1620 cal BC
2 σ : 1940–1520 cal BC

Final comment: E Martin (9 November 1995), this is an identical date to HAR-5638 (from an occupation spread nearby), which suggests that this is probably an accurate date for this area of the Bronze Age settlement.

Milton Lilbourne: Barrows 1–5, Wiltshire

Location: SU 191604
Lat. 51.20.34 N; Long. 01.43.36 W

Project manager: P Ashbee (Unknown), September 1958

Description: five barrows on the chalk high plain bordering the south side of the Vale of Pewsey. A discrete linear group comprised an oval double disc barrow and two bell barrows, conjoined by a small bowl barrow: and there was also a detached bowl barrow.

Objectives: to provide a chronology for the barrows.

Final comment: P Ashbee (1986), these dates, calibrated and amalgamated, are fundamental for the Wessex Culture, to which bell and disc barrows are integral (Piggott 1938, 90; 1973a, 355). Up to the present most radiocarbon dates have been from outside the geographical focus and thus, because of extrapolation, not fully satisfactory. Nonetheless, they have been, in some measure, supportive of ApSimon's (1954) division.

More than a decade ago, dates from charcoal close to a Camerton-Snowhill dagger at Earl's Barton, Northamptonshire, were, when calibrated, expected to indicate the end of the Wessex episode (McKerrell 1972, 296). There was, however, hesitancy regarding the radiocarbon separation of the phases, styled Bush barrow and Aldourne-Edmondsham (formally Camerton-Snowhill), although a longer chronology was envisaged (Burgess 1974, 188–9). When four dates applicable to Wessex II became available, the difficulties regarding Wessex I persisted (Megaw and Simpson 1979, 227–9). However, in the light of the single dates from Amesbury Barrow 39

(Ashbee 1979–80, 32) the suggested dates that have emerged for the initial early and the shortlisted Bush Barrow phases are *c* 1700–1450 bc and for the Aldourne-Edmondsham sequence, *c* 2000–1500 bc, which when calibrated became *c* 2000–1500 BC for the Wessex phenomenon as an entity (Burgess 1980, 98–111).

Laboratory comment: Ancient Monuments Laboratory (1986), ten radiocarbon determinations of charcoal fragments from four of the barrows were made. Nine of the samples were just sufficient in weight for the large sample counter, but their relative smallness gave rise to greater than usual counting errors. One sample, HAR-6921, was measured on the mini counter system (Otlet *et al* 1983). These dates permit both the comprehensive assessments of the four Milton Lilbourne barrows in statistical terms and their comparison with the dates from Amesbury (Ashbee 1979–80; Haddon-Reece 1986, 83).

References: ApSimon 1954
Ashbee 1979–80
Ashbee 1984
Burgess 1974
Burgess 1980
Haddon-Reece 1986
McKerrell 1972
Megaw and Simpson 1979
Piggott 1938
Piggott 1973a

Milton Lilbourne: Barrow 1, Wiltshire

Location: SU 19935790
Lat. 51.19.10 N; Long. 01.42.50 W

Project manager: P Ashbee (Unknown), September 1958

Archival body: Wiltshire Archaeological and Natural History Museum

Description: a disc barrow containing one intact grave with an awl-furnished cremation. Although the barrow was plough reduced, its ditch and bank were visible, and its oval shape clear. A slight flattening of outline on the east side was visible, where the outer bank had almost touched that of barrow 2.

Objectives: to date a disc barrow, one of a small isolated group of barrows presumably related.

Final comment: P Ashbee (1986), when these barrows were excavated they were cross dated with European material and on this basis were dated to around 1500 BC. For the most part the radiocarbon dates accord well with the estimates made in the 1950s.

References: Ashbee 1979–80
Ashbee 1986
Coles and Harding 1979
Ó'Riordáin 1937
Piggott 1971

HAR-6471 3400 ±110 BP

$\delta^{13}\text{C}$: -24.8‰

Sample: SECGMLB1, submitted on 24 October 1984 by P Ashbee

Material: charcoal: *Quercus* sp. (D Haddon-Reece 1984)

Initial comment: charcoal fragments from the charcoal laden soil infill of a grave examined and carefully refilled, by John Thurnam *c* AD 1865. The grave was formerly below the low south-eastern mound of a disc barrow. In 1958 the interior mounds had been razed and the grave, plough-truncated, was immediately below the plough soil.

Objectives: to date a disc barrow, one of a small isolated group of barrows presumably related. It is appreciated that this charcoal sample does not correspond exactly with the event to be dated, namely the disc barrow. It was, nonetheless, the only suitable sample that presented itself.

Calibrated date: 1 σ : 1880–1530 cal BC
2 σ : 2020–1440 cal BC

Final comment: P Ashbee (1986), although extended argument cannot be based upon the single determinations from barrows 1 and 5 (HAR-6471 and HAR-6470), the dates for the group are, nonetheless collectively consequent as an indication of the antiquity of Wessex disc and bell barrows, as well as attendant bowl barrows. Disc and bell-barrows have for long been thought of as integral to the Wessex phenomenon (Piggott 1938, 90; 1973a, 355), although their position relate to division of Wessex into two phases is unclear (ApSimon 1954). The radiocarbon dates available for Wessex material are distanced from the geographical focus, and the contexts for some of the samples are not fully satisfactory. Even the date from the main centre Amesbury barrow 39 (HAR-1237) of 3620 \pm 90 BP (1 σ : 2140–1880 cal BC, 2 σ : 2280–1740 cal BC; Reimer *et al* 2004) is not entirely to be depended on. Incorporated occupation material and timber, especially if heartwood, could be of a significantly greater age than the monument itself (Giot 1971, 214).

References: ApSimon 1954
Giot 1971
Piggott 1938
Piggott 1973a
Reimer *et al* 2004

Milton Lilbourne: Barrow 2, Wiltshire

Location: SU 19995789
Lat. 51.19.05 N; Long. 01.42.47 W

Project manager: P Ashbee (Unknown), September 1958

Archival body: Wiltshire Archaeological and Natural History Museum

Description: a bell barrow which no grave was found beneath. The barrow had outer banks, which conjoined with barrow 3.

Objectives: to date the chronology of the barrows.

Final comment: P Ashbee (1986), when these barrows were excavated they were cross dated with European material and on this basis were dated to around 1500 BC. For the most part the radiocarbon dates accord well with the estimates made in the 1950s.

References: Ashbee 1986
Giot 1971
Piggott 1938

HAR-6456 3420 \pm 80 BP

$\delta^{13}\text{C}$: -25.4‰

Sample: C102MLB2, submitted on 24 October 1984 by P Ashbee

Material: charcoal: *Populus* sp. (D Haddon-Reece 1984)

Initial comment: charcoal from occupation earth added to the loam core of this high bell barrow. Sample from base of mound.

Objectives: to date the charcoal element of the occupation earth additive, indeed it could be significantly older than the barrow, however, a useful *terminus post quem* should emerge. The pottery content of the occupation earth points to contemporaneity with the barrow.

Calibrated date: 1 σ : 1880–1620 cal BC
2 σ : 1940–1520 cal BC

Final comment: P Ashbee (1986), like the Amesbury barrow 39 date (HAR-1237), the Milton Lilbourne dates are broadly concurrent with the Stonehenge and Durrington Walls dates (Ashbee 1979–80, 32) and not inconsistent with the extrapolated date (*c* 1650 BC) for Wessex graves with halberd pendants (Piggott 1971, 54; 1973a, 374–5). These attractive trinkets may depict the bound square-sectioned shafts of such weapons in our own western world (Ó'Riordáin 1937) rather than the metal-shafted style of middle Germany. Whatever their inspiration, this date is not necessarily affected for they reflect, like the daggers (ApSimon 1954, 42), local and regional demands and styles. These Milton Lilbourne standard sample determinations provide a pattern of dates, which extend into the earlier stage of the Wessex phenomenon, thus reinforcing earlier observed trends (Piggott 1973a, 374–5; Coles and Harding 1979, 267–8; Ashbee 1979–80, 32). A series of direct radiocarbon dates for the cardinal concentration of distinctive, well-furnished Wessex graves is now, however an imperative.

References: Ó'Riordáin 1937
ApSimon 1954
Ashbee 1979–80
Coles and Harding 1979
Piggott 1971
Piggott 1973a

Milton Lilbourne: Barrow 4, Wiltshire

Location: SU 19995784
Lat. 51.19.08 N; Long. 01.42.47 W

Project manager: P Ashbee (Unknown), September 1958

Archival body: Wiltshire Archaeological and Natural History Museum

Description: an S bell barrow containing a cremation furnished with a miniature vessel and housed in a monoxylous timber coffin, which lay, flanked by a substantial carbonised timber, in an area of burnt soil and spread charcoal.

Objectives: to date the chronology of the barrows.

Final comment: P Ashbee (1986), when these barrows were excavated they were cross dated with European material and

on this basis were dated to around 1500 BC. For the most part the radiocarbon dates accord well with the estimates made in the 1950s.

Laboratory comment: English Heritage (21 March 2003), one further sample, D117MLB4 (HAR-6473), failed.

References: Ashbee 1986
Coles and Harding 1979
Giot 1971
Piggott 1938

HAR-6453 3580 ±80 BP

$\delta^{13}\text{C}$: -23.9‰

Sample: B119MLB4, submitted on 25 October 1984 by P Ashbee

Material: charcoal: *Quercus* sp. (D Haddon-Reece 1984)

Initial comment: from a dense charcoal spread around a timber coffin on the ancient soil surface beneath the barrow.

Objectives: to date the charcoal spread and therefore the possible remains of a pyre beneath the bell-barrow. The sample is from beneath an upstanding barrow and should provide an estimated *terminus post quem* of 1350–1500 BC.

Calibrated date: 1 σ : 2040–1780 cal BC
2 σ : 2200–1690 cal BC

Final comment: P Ashbee (1986), like the Amesbury barrow 39 date (HAR-1237), the Milton Lilbourne dates are broadly concurrent with the Stonehenge and Durrington Walls dates (Ashbee 1979–80, 32) and not inconsistent with the extrapolated date (*c.* 1650 BC) for Wessex graves with halberd pendants (Piggott 1971, 54; 1973a, 374–5). These attractive trinkets may depict the bound square sectioned shafts of such weapons in our own western world (Ó'Riordáin 1937) rather than the metal-shafted style of middle Germany. Whatever their inspiration, this date is not necessarily affected for they reflect, like the daggers (ApSimon 1954, 42), local and regional demands and styles. These Milton Lilbourne standard sample determinations provide a pattern of dates, which extend into the earlier stage of the Wessex phenomenon, thus reinforcing earlier observed trends (Piggott 1973a, 374–5; Coles and Harding 1979, 267–8; Ashbee 1979–80, 32). A series of direct radiocarbon dates for the cardinal concentration of distinctive, well-furnished Wessex graves is now, however, an imperative.

References: Ó'Riordáin 1937
ApSimon 1954
Ashbee 1979–80
Coles and Harding 1979
Piggott 1971
Piggott 1973a

HAR-6454 3780 ±80 BP

$\delta^{13}\text{C}$: -25.1‰

Sample: B126ML4B, submitted on 26 October 1984 by P Ashbee

Material: wood (carbonised): *Quercus* sp. (D Haddon-Reece 1984)

Initial comment: from a horizontal timber flanking the timber coffin and its surrounding burned area on the ancient soil surface beneath the barrow.

Objectives: to date the timber, which was an element of a complicated burial deposit beneath the bell barrow.

Calibrated date: 1 σ : 2340–2040 cal BC
2 σ : 2470–1970 cal BC

Final comment: P Ashbee (1986), this is somewhat later than radiocarbon dates obtained for other Wessex Culture material. Possible explanations are that the site is rather remote from the cultural focus, or that the few earlier measurements were made with insufficient awareness of the possibility that the samples could have been residual.

Laboratory comment: Ancient Monuments Laboratory (1986), using the Ward and Wilson (1978) test for contemporaneity, HAR-6454 was isolated as probably anomalous, especially as there were two directly comparable samples from the same baulk of timber (HAR-6457 and HAR-6458). The remaining samples produced a convincingly tight mean date of 3470 ±30 BP, which calibrates to 1890–1690 cal BC at 95% confidence (Reimer *et al* 2004).

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

HAR-6455 3380 ±80 BP

$\delta^{13}\text{C}$: -24.9‰

Sample: C058MLB4, submitted on 24 October 1984 by P Ashbee

Material: charcoal: *Acer campestre*; *Acer* sp.; *Prunus* sp. (D Haddon-Reece 1984)

Initial comment: from the occupation earth added to the loam core of this high bell barrow.

Objectives: to date the charcoal content of the added occupation earth and provide a *terminus post quem*. The pottery content of the occupation earth should be contemporary with bell barrows.

Calibrated date: 1 σ : 1760–1530 cal BC
2 σ : 1890–1490 cal BC

Final comment: see HAR-6453

HAR-6457 3590 ±90 BP

$\delta^{13}\text{C}$: -24.9‰

Sample: B125ML4A, submitted on 26 October 1984 by P Ashbee

Material: wood (carbonised): *Quercus* sp. (D Haddon-Reece 1984)

Initial comment: as HAR-6454

Objectives: as HAR-6454

Calibrated date: 1 σ : 2120–1780 cal BC
2 σ : 2200–1690 cal BC

Final comment: see HAR-6453

Laboratory comment: Ancient Monuments Laboratory, see HAR-6454

HAR-6458 3460 ±80 BP $\delta^{13}\text{C}$: -25.1‰*Sample*: B125ML4B, submitted on 26 October 1984 by P Ashbee*Material*: wood (carbonised): *Quercus* sp. (D Haddon-Reece 1984)*Initial comment*: as HAR-6454*Objectives*: as HAR-6454*Calibrated date*: 1 σ : 1890–1680 cal BC
2 σ : 2020–1530 cal BC*Final comment*: see HAR-6454*Laboratory comment*: Ancient Monuments Laboratory, see HAR-6454**HAR-6472** 3590 ±190 BP $\delta^{13}\text{C}$: -25.5‰*Sample*: C072MLB2, submitted on 24 October 1984 by P Ashbee*Material*: charcoal: *Populus* sp. (D Haddon-Reece 1984)*Initial comment*: from a charcoal laden occupation earth added to the loam core of an upstanding bell barrow. The sample is from the base of the core at the centre of the mound.*Objectives*: to date the charcoal content of the added occupation earth and to provide a *terminus post quem* for the barrow. The pottery content of the occupation earth points to contemporaneity with bell barrows, which are a small precisely constructed series *c* 1350–1500 cal BC.*Calibrated date*: 1 σ : 2210–1690 cal BC
2 σ : 2480–1490 cal BC*Final comment*: see HAR-6453.**HAR-6921** 3530 ±110 BP $\delta^{13}\text{C}$: -25.2‰*Sample*: C069MLB4, submitted on 24 October 1984 by P Ashbee*Material*: charcoal: *Prunus* sp. (D Haddon-Reece 1984)*Initial comment*: from occupation earth added to a loam core of this high bell barrow. The sample was from the base of the mound.*Objectives*: to date the charcoal element of the occupation earth additive, which could be older than the barrow. A useful *terminus post quem* should emerge. The pottery content of the occupation earth points to contemporaneity with bell barrows (1350–1500 BC).*Calibrated date*: 1 σ : 2030–1690 cal BC
2 σ : 2200–1610 cal BC*Final comment*: see HAR-6453*Laboratory comment*: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).*References*: Otlet *et al* 1983
Walker *et al* 1990, 176**Milton Lilbourne: Barrow 5, Wiltshire***Location*: SU 20075789
Lat. 51.19.09 N; Long. 01.42.43 W*Project manager*: P Ashbee (Unknown), September 1958*Archival body*: Wiltshire Archaeological and Natural History Museum*Description*: a bowl barrow containing a cremation under an inverted Collared Urn in a circular grave.*Objectives*: to date the chronology of the barrows.*References*: Ashbee 1986**HAR-6470** 3410 ±80 BP $\delta^{13}\text{C}$: -26.3‰*Sample*: DFCTMLB5, submitted on 26 October 1984 by P Ashbee*Material*: charcoal: Pomoideae (D Haddon-Reece 1984)*Initial comment*: from a ?branch deposited after the ditch was dug and the barrow raised.*Objectives*: to provide a *terminus ante quem* for the raising of this bowl barrow.*Calibrated date*: 1 σ : 1880–1610 cal BC
2 σ : 1930–1510 cal BC*Final comment*: P Ashbee (1986), although extended argument cannot be based upon the single determinations from barrows 1 and 5 (HAR-6471 and HAR-6470), the dates for the group are, nonetheless collectively consequent as an indication of the antiquity of Wessex disc and bell barrows, as well as attendant bowl-barrows. Disc and bell barrows have for long been thought of as integral to the Wessex phenomenon (Piggott 1938, 90; 1973a, 355), although their position relate to division of Wessex into two phases is unclear (ApSimon 1954). The radiocarbon dates available for Wessex material are distanced from the geographical focus, and the contexts for some of the samples are not fully satisfactory. Even the date from the main centre Amesbury barrow 39 (HAR-1237) of 3620 ± 90 BP (2 σ : 2280–1740 cal BC; Reimer *et al* 2004) is not entirely to be depended on. Incorporated occupation material and timber, especially if heartwood, could be of a significantly greater age than the monument itself (Giot 1971, 214).*References*: ApSimon 1954
Giot 1971
Piggott 1938
Piggott 1973a
Reimer *et al* 2004**Mingie's Ditch, Oxfordshire***Location*: SP 391059
Lat. 51.45.00 N; Long. 01.26.01 W*Project manager*: M Robinson (Oxford Archaeological Unit), 1977–8, and 1980*Archival body*: Ashmolean Museum

Description: a double ditched Iron Age settlement enclosure on the bank of the River Windrush.

Objectives: a well preserved area therefore most suitable for environmental archaeology.

Laboratory comment: Ancient Monuments Laboratory (2003), one further sample, HAR-4486 (HYMD118), was submitted but failed. The final comments were made on uncalibrated dates.

References: Allen 1993

HAR-4485 2170 ±90 BP

$\delta^{13}C$: -27.6‰

Sample: HYMD10, submitted on 18 May 1981 by M Robinson

Material: wood (previously waterlogged, but remaining subsample now dry and structurally collapsed): *Quercus* sp., larger pieces (1.26g, 65.6%); *Prunus spinosa*, or *Crataegus* sp. twigs and roundwood (0.66g, 34.4%); unidentified (3.33g) (R Gale 1999)

Initial comment: waterlogged wood and twigs from the bottom of the Iron Age enclosure ditch. The sample was sorted to remove rootlets. The wood was identified (as hedgerow species) and then dried.

Objectives: to confirm a likely date range of 600–100 BC.

Calibrated date: 1 σ : 380–60 cal BC
2 σ : 410 cal BC–cal AD 20

Final comment: M A Robinson (1993), the date is consistent with the artefactual evidence for the middle Iron Age.

HAR-4487 2840 ±140 BP

$\delta^{13}C$: -26.1‰

Sample: HYMD121, submitted on 18 May 1981 by M Robinson

Material: charcoal (hedgerow species)

Initial comment: from the bottom of an Iron Age gully sump.

Objectives: to confirm a likely date range of 600–100 BC.

Calibrated date: 1 σ : 1260–830 cal BC
2 σ : 1420–780 cal BC

Final comment: M A Robinson (1993), this sample gave a late Bronze Age date, however Iron Age pottery was also recovered from the gully and stratigraphically there is no reason to doubt the Iron Age date. It is possible that the charcoal came from an involution, cut by the gully, containing charcoal relating to the tree clearance.

HAR-4488 1900 ±80 BP

$\delta^{13}C$: -27.2‰

Sample: HYMD136, submitted on 18 May 1981 by M Robinson

Material: charcoal (remaining subsample identified): unidentified (0.58g); *Prunus* spp. (>0.01g, 4.35%); *Quercus* sp. (0.22g, 95.65%) (R Gale 1999)

Initial comment: from the bottom of an Iron Age gully.

Objectives: as HAR-4487

Calibrated date: 1 σ : cal AD 20–230
2 σ : 60 cal BC–cal AD 330

Final comment: M Robinson (2002), this sample should never have been dated. Concerned was raised about the stratigraphic integrity on the context and a request was made to Dr Haddon-Reece not to proceed. It was held back when the other samples in the first set were dated but some years later it was dated, seemingly by accident. It serves to show no more than that there was late Iron Age or Roman activity on the site, which was already well-established.

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Hardiman *et al* 1992, 50
Otlet *et al* 1983
Walker *et al* 1991a, 89

HAR-4489 2800 ±90 BP

$\delta^{13}C$: -28.3‰

Sample: HYMD427, submitted on 18 May 1981 by M Robinson

Material: charcoal: *Alnus* sp., roots

Initial comment: from the bottom of a Neolithic/Bronze Age tree pit pre-dating the Iron Age enclosure.

Objectives: to confirm a likely date range of 3000–2000 BC.

Calibrated date: 1 σ : 1060–830 cal BC
2 σ : 1260–800 cal BC

Final comment: M A Robinson (1993), the charcoal in the pit is interpreted as resulting from a clearance episode of the floodplain woodland.

HAR-4490 2820 ±80 BP

$\delta^{13}C$: -25.7‰

Sample: HYMD781, submitted on 18 May 1981 by M A Robinson

Material: charcoal: *Quercus* sp.

Initial comment: from beneath the bank around the Iron Age enclosure.

Objectives: to confirm a likely date range of 3000–200 BC.

Calibrated date: 1 σ : 1120–890 cal BC
2 σ : 1260–810 cal BC

Final comment: M A Robinson (1993), this sample appears to have derived from a charcoal spread belonging to the same phase as the clearance pits (HAR-4489).

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 299

HAR-5942 2150 ±80 BP $\delta^{13}\text{C}$: -24.9‰*Sample*: HYMD699, submitted on 19 January 1984 by T G Allen*Material*: wood: *Quercus* sp.*Initial comment*: the sample derived from the bottom 0.3m of a door post from an Iron Age roundhouse.*Objectives*: to confirm the Iron Age date and correlate it with the environmental evidence.*Calibrated date*: 1 σ : 360–50 cal BC
2 σ : 400 cal BC–cal AD 20*Final comment*: M A Robinson (1993), as with HAR-4485 a middle Iron Age date is consistent with the artefactual evidence from the settlement.**HAR-8354** 7590 ±80 BP $\delta^{13}\text{C}$: -26.2‰*Sample*: HYMDW, submitted on 27 June 1986 by M Robinson*Material*: wood (waterlogged): *Salix/Populus* sp., twigs and young branchwood; *Corylus* sp., twigs and young branchwood*Initial comment*: from organic river sediments above the Pleistocene gravels and sealed by river gravel. These organic river sediments produced a faunal and floral assemblage of later Flandrian Zone I character. The gravel covering this sample was cut by HYMDO (HAR-8355).*Objectives*: HAR-8354, HAR-8355, HAR-8356, and HAR-8366 have been subjected to full-scale investigations for plant and invertebrate remains. They gave a sequence from late Devensian to Flandrian Zone II. As well as providing the first dated pre-Neolithic palaeoecological sequence for the Upper Thames Valley, the dates are important so that latest palaeolithic flints from the site can be related to the vegetational sequence. HAR-8354 had evidence for early Mesolithic activity.*Calibrated date*: 1 σ : 6480–6400 cal BC
2 σ : 6600–6250 cal BC*Final comment*: M A Robinson (1993), this sample, HAR-8355, HAR-8356, and HAR-8366 are consistent with their known stratigraphy. They fall within the chronological zone suggested by the faunal and floral assemblages. This sample falls at the end of the period suggested by the botanical evidence.*References*: Walker *et al* 1990, 167–8**HAR-8355** 6540 ±80 BP $\delta^{13}\text{C}$: -27.6‰*Sample*: HYMDO, submitted on 27 June 1986 by M Robinson*Material*: wood (waterlogged; young branchwood broken up then dried): *Alnus* sp.; *Quercus* sp.; *Fraxinus* sp.*Initial comment*: from a hollow filled with organic river sediments on the former bed of the Windrush produced a

faunal and floral assemblage of Flandrian Zone II character. The gravel covering HAR-8354 was cut by this sample.

Objectives: as HAR-8354*Calibrated date*: 1 σ : 5610–5470 cal BC
2 σ : 5630–5350 cal BC*Final comment*: M A Robinson (1993), this sample, HAR-8354, HAR-8356, and HAR-8366 are consistent with their known stratigraphy. They fall within the chronological zone suggested by the faunal and floral assemblages. This sample falls in the middle of the Pollen Zone VIIa.*References*: Walker *et al* 1990, 167**HAR-8356** 10860 ±130 BP $\delta^{13}\text{C}$: -30.3‰*Sample*: HYMDG, submitted on 27 June 1986 by M Robinson*Material*: wood (waterlogged): *Salix/Populus* sp., twigs; *Betula* sp., twigs*Initial comment*: from an organic deposit in the bottom of a small channel sealed beneath the uppermost Pleistocene gravels. The deposits produced a faunal and floral assemblage of late Devensian character. This sample is stratigraphically earlier than HAR-8366.*Objectives*: as HAR-8354*Calibrated date*: 1 σ : 10940–10660 cal BC
2 σ : 11150–10610 cal BC*Final comment*: M A Robinson (1993), this sample, HAR-8354, HAR-8355 and HAR-8366 are consistent with their known stratigraphy. They fall within the chronological zone suggested by the faunal and floral assemblages. This sample would be consistent with the start of the late Devensian Zone III.*References*: Walker *et al* 1990, 167–8**HAR-8366** 9380 ±110 BP $\delta^{13}\text{C}$: -31.0‰*Sample*: HYMD/TS2, submitted on 27 June 1986 by M Robinson*Material*: sediment (highly organic silt)*Initial comment*: from highly organic silt in the bottom of a channel which cut the Pleistocene gravels, and was sealed beneath alluvial clays. The silt produced a faunal and floral assemblage of early Flandrian Zone I character. This sample is stratigraphically later than HAR-8356.*Objectives*: as HAR-8354*Calibrated date*: 1 σ : 8790–8490 cal BC
2 σ : 9130–8310 cal BC*Final comment*: M A Robinson (1993), the botanical evidence suggested that the stream fill dated from Godwin's Pollen Zone IV, when the woodland was just becoming established after the late Glacial. The radiocarbon date confirms this.*References*: Walker *et al* 1990, 167–8

Moor Monkton, North Yorkshire

Location: SE 506569
Lat. 54.00.20 N; Long. 01.13.40 W

Project manager: P Newman (University of York/local history group), 1981

Archival body: University of York

Description: a small moated manor house, from which a large collection of metapodials were recovered by a local history group searching for an old rectory.

Objectives: to contribute to statistical analyses used to display the changes of bone dimensions through time.

References: Tyldesley 1982

HAR-4300 360 ±110 BP

$\delta^{13}\text{C}$: -24.7‰

Sample: MM001, submitted on 19 February 1981 by A Turner

Material: animal bone: *Bos taurus*, 2 metacarpals (A Turner 1981)

Initial comment: part of a large sample taken from a pit. The sample is believed to be post-sixteenth century in date.

Objectives: to confirm whether the age is post-sixteenth century or more modern in order to use the sample as comparative material in a study of Anglo-Scandinavian to medieval cattle changes.

Calibrated date: 1 σ : cal AD 1430–1650
2 σ : cal AD 1320–1955*

Final comment: T O’Conner (2001), the date confirms the expected age.

Murton High Crag, Northumberland

Location: NT 965496
Lat. 55.44.23 N; Long. 02.03.21 W

Project manager: I Jobey (University of Newcastle upon Tyne), August 1983

Archival body: Society of Antiquaries, Newcastle upon Tyne

Description: a defended hilltop enclosure within a lowland landscape.

Objectives: to help provide a chronology for the site as radiocarbon dates for Northern palisaded sites are few in number and the length of currency uncertain.

References: Jobey and Jobey 1987

HAR-6200 2060 ±100 BP

$\delta^{13}\text{C}$: -25.0 (assumed) ±3.0‰

Sample: MHC633, submitted on 16 January 1984 by I Jobey

Material: charcoal (remaining subsample identified): unidentified (4.95g); *Quercus* sp., sapwood (3.29g, 97.05%); *Betula* sp. (0.10g, 2.95%) (R Gale 1999)

Initial comment: from the timber of house T10, which had been burnt *in situ* and was sealed beneath the paved floor of the later stone built house S7.

Objectives: the sequences of timber built houses lying within the enclosed perimeters (HAR-6200 and HAR-6202) depends upon ‘horizontal’ stratigraphy where this exists, there being little vertical stratigraphy except as between timber built and overlying stone-built round houses. There are no very secure charcoal samples of sufficient weight from the interior of the site, in timber built phases, except this one.

Calibrated date: 1 σ : 200 cal BC–cal AD 60
2 σ : 380 cal BC–cal AD 140

Final comment: I Jobey and G Jobey (1987), at least in a structural sense, a general *terminus ante quem* for most if not all of the timber built houses was provided by the overlying stone built settlement represented by HAR-6200.

HAR-6201 2960 ±80 BP

$\delta^{13}\text{C}$: -23.9‰

Sample: MHC611, submitted on 16 January 1984 by I Jobey

Material: charcoal (remaining subsample identified): unidentified (9.85g); *Prunus* spp. (0.05g, 0.66%); *Alnus* sp. (7.48g, 98.68%); *Betula* sp. (0.05g, 0.66%) (R Gale 1999)

Initial comment: from a charcoal impregnated burnt patch, which had been cut by the inner palisade trench P1, and was sealed beneath a thin layer of what was taken to be the infrequent remnants of upcast from the palisade trench or the inner ditch.

Objectives: the assays of HAR-6201 and HAR-6202 would provide some indication, including *terminus ante quem* for later stockades.

Calibrated date: 1 σ : 1320–1040 cal BC
2 σ : 1420–930 cal BC

Final comment: I Jobey and G Jobey (1987), the true nature of the activity responsible for the burnt deposit dated by HAR-6201, which is earlier than the erection of the first enclosed settlement remains uncertain. However the date provides a *terminus anti quem* for the latter.

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-6202 2130 ±80 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: MHC619, submitted on 16 January 1984 by I Jobey

Material: charcoal: *Quercus* sp.

Initial comment: from the post-pipe of a burnt post, well sealed, in the innermost construction trench, which stratigraphically most probably represents the earliest of the timber-built enclosures. See also HAR-6200.

Objectives: as HAR-6201

Calibrated date: 1 σ : 360–40 cal BC
2 σ : 390 cal BC–cal AD 50

Final comment: I Jobey and G Jobey (1987), this date from the earliest of the timber built perimeters is generally later than those from a number of similar palisaded or stockaded settlements in the uplands of Tyne-Forth, but certainly no later than dates, which exist or have been inferred for some similar timber built settlements in north Tynedale.

Nadbury Camp, Warwickshire

Location: SP 390482
Lat. 52.07.49 N; Long. 01.25.49 W

Project manager: C McArthur (Birmingham University Field Archaeology Unit), April 1983

Archival body: Warwickshire County Museum

Description: excavation of section through threatened rampart of an Iron Age hillfort.

Objectives: to establish the nature and condition of the defences in the area.

References: McArthur 1987

HAR-5887 2410 ±90 BP

$\delta^{13}\text{C}$: -26.1‰

Sample: NAD83/1, submitted on 1 August 1983 by C McArthur

Material: charcoal: unidentified

Initial comment: from a large pit, which was sealed by the stone platform.

Objectives: to obtain a *terminus ante quem* for the rampart.

Calibrated date: 1 σ : 760–390 cal BC
2 σ : 800–230 cal BC

Final comment: C McArthur (1987), upon the basis of a single date it is difficult to estimate closely a construction date for the rampart. There is also the unhelpful flatness of the radiocarbon curve. Given these qualifications the rampart construction can most probably assigned to the central two centuries of the first millennium BC.

Nancekuke: Penhale Barrow, Cornwall

Location: SW 67654627
Lat. 50.16.12 N; Long. 05.15.39 W

Project manager: C K Croft Andrew (Independent), 1940

Description: a barrow situated on Nancekuke common excavated by C K Croft Andrew prior to the construction of an airfield.

Objectives: to date the barrow, one of nine barrows on the north Cornish coast between Portreath and Crackington Haven.

References: Christie 1988
Walker *et al* 1990, 190

HAR-8097 3550 ±80 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: NKS 2, submitted in July 1983 by P Christie

Material: charcoal: unidentified

Initial comment: from a fire on the old land surface of the barrow.

Objectives: to date the barrow.

Calibrated date: 1 σ : 2020–1760 cal BC
2 σ : 2140–1680 cal BC

Final comment: P Christie (1985), the sample gives a primary date for the barrow.

Newton Cliffs, Lincolnshire

Location: SK 825727
Lat. 53.14.41 N; Long. 00.45.49 W

Project manager: D Garton (Trent and Peak Archaeological Trust), August 1980

Description: the collection of 50,000 artefacts by R Minnitt from three adjoining fields in the parishes of Newton Clifton, Nottinghamshire, and Newton-on-Trent, Lincolnshire indicated severe plough damage to a site of late Mesolithic to late Neolithic/early Bronze Age date. During the 1980 excavation a posthole structure and activity areas were recovered. The finds analysis has shown that the artefacts date to two periods, late Mesolithic and Beaker. One sample was submitted for radiocarbon dating.

Objectives: to recover structural evidence, and define activity areas.

Final comment: see HAR-6505

References: Garton 1983
Walker and Otlet 1988, 307–8

HAR-6505 4130 ±120 BP

$\delta^{13}\text{C}$: -25.3‰

Sample: N80/15, submitted in August 1983 by D Garton

Material: wood (charred, and hazelnuts)

Initial comment: from the middle layer in the fill of small feature 15, and probably one of a group of nine postholes forming a roughly trapezoidal setting or structure.

Objectives: to date the structure and distinguish between the possibilities of its two main artefactual associations, Mesolithic-flint knapping and Beaker pottery.

Calibrated date: 1 σ : 2890–2490 cal BC
2 σ : 3010–2350 cal BC

Final comment: (14 January 1988), after pre-treatment the sample was found to be at the lower size limit for the standard counter, which accounts for the large error term of the eventual result. In the absence of a secure series of samples to establish a precise chronology, post-excavation processing had also identified an earlier Neolithic stage of occupation, it was decided not to submit the sample to the more precise small counter.

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

North Elmham: Spong Hill, Norfolk

Location: TF 983195
Lat. 52.44.11 N; Long. 00.56.15 E

Project manager: A Rogerson (Norfolk Archaeological Unit), 1984

Archival body: Norfolk County Council

Description: the site has been previously excavated in the mid nineteenth century and then in 1956, 1968, and from 1972–1981. The site consists of three barrows and ring ditches within the Wensum Basin, spanning from the early Neolithic to the Romano-British period.

Objectives: to help establish the chronology of the site.

Laboratory comment: Ancient Monuments Laboratory (2003), HAR-2398, HAR-2901, and HAR-2903 were published in the previous volume of Radiocarbon dates (Jordan *et al* 1994, 119–20).

References: Healy 1984
Healy 1988
Jordan *et al* 1994, 119–20
Walker *et al* 1990, 180

HAR-7025 8250 ±90 BP

$\delta^{13}\text{C}$: -26.2‰

Sample: 10123645, submitted in March 1986 by P Murphy

Material: charcoal: unidentified

Initial comment: from Neolithic pit 3644 with Mildenhall ware and struck flint.

Objectives: it is unclear how far the early/middle Neolithic occupation of the site was single-period and how far it consisted of successive episodes. In particular, the determinations already made do not show whether occupation continued through the later third millennium BC, although stylistic features of some of the Neolithic pottery suggest that it may have.

Calibrated date: 1 σ : 7460–7080 cal BC
2 σ : 7530–7050 cal BC

Final comment: F Healy (1988), it is impossible to tell whether the Mesolithic material represents more than one episode.

HAR-7063 8280 ±80 BP

$\delta^{13}\text{C}$: -24.6‰

Sample: SPON3408, submitted in October 1985 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (6.23g); *Pinus* sp. (4.58g, 100%) (R Gale 1999)

Initial comment: from a layer (context 3408=3594) of burnt sand and gravel in a feature (context 3367), which contained struck flint of later Mesolithic character, some of it also burnt, throughout its fills.

Objectives: to date the deposit and the presumably Mesolithic activity from which it resulted.

Calibrated date: 1 σ : 7480–7180 cal BC
2 σ : 7530–7070 cal BC

Final comment: F Healy (1988), the three radiocarbon determinations relating to the period are indistinguishable, with a weighted mean of 8235 ±60 BP (HAR-2903 (8150 ±100 BP), HAR-7025, and HAR-7063) and were made on features on the extreme east and west of the site. The dispersal of three indistinguishable determinations over the excavated area would be compatible with the generation of samples on which they were made during a single woodland fire.

North Marden, Sussex

Location: SU 801156
Lat. 50.56.01 N; Long. 00.51.36 W

Project manager: P Drewett (Institute of Archaeology, London), 1982

Archival body: Institute of Archaeology, London

Description: an extensively plough damaged Neolithic oval barrow. No burials were found under the mound but disarticulated human skeletal material was found in the ditches. There was evidence for Beaker and Romano-British activity in the upper ditch fills and there was a Saxon sunken hut in the corner barrow.

Objectives: to evaluate the site chronology.

References: Drewett 1986a
Drewett 1986b

HAR-5542 3550 ±80 BP

$\delta^{13}\text{C}$: -25.3‰

Sample: NM8225, submitted on 29 April 1983 by C Cartwright

Material: charcoal (remaining subsample identified): unidentified (7.98g); *Sorbus* sp., (Pomoideae) (0.18g, 5.6%); *Prunus* spp. (0.50g, 15.6%); *Fraxinus* sp., some heartwood (2.18g, 68.1%); *Acer* sp. (0.04g, 1.3%); *Corylus* sp. (0.30g, 9.4%) (R Gale 1999)

Initial comment: the site's apparent main feature is a ploughed out Neolithic mound, but artefacts were recovered of Neolithic, Beaker, Roman, and Saxon periods.

Objectives: to elucidate the site chronology.

Calibrated date: 1 σ : 2020–1760 cal BC
2 σ : 2140–1680 cal BC

Final comment: P Drewett (29 April 1996), HAR-5542 and HAR-5543 date the Beaker activity in the upper ditch fill.

HAR-5543 3590 ±80 BP

$\delta^{13}\text{C}$: -27.6‰

Sample: NM8255, submitted on 29 April 1983 by C Cartwright

Material: charcoal: unidentified

Initial comment: as HAR-5542

Objectives: as HAR-5542

Calibrated date: 1 σ : 2040–1830 cal BC
2 σ : 2200–1740 cal BC

Final comment: see HAR-5542

HAR-5544 4710 ±110 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: NM8265, submitted on 29 April 1983 by C Cartwright

Material: charcoal: unidentified

Initial comment: as HAR-5542

Objectives: as HAR-5542

Calibrated date: 1 σ : 3640–3360 cal BC
2 σ : 3710–3110 cal BC

Final comment: P Drewett (29 April 1996), HAR-5544 is from the base of the oval barrow ditch (context 65) and is consistent with the ceramic dating of the barrow to the Neolithic

North Shoebury, Essex

Location: TQ 931860
Lat. 51.32.21 N; Long. 00.47.03 E

Project manager: N Brown (Essex County Council), 1981

Archival body: Central Museum, Southend on Sea

Description: excavations were carried out in advance of urban development. The site lay on a brickearth covered gravel terrace. The excavations were adjacent to an extensive area of rescue recording undertaken during brickearth extraction in the early 1970s. There was evidence for continuous land use from at least the middle Bronze Age. The area examined is referred to as Site 13850-56 in the Essex Sites and Monuments Record.

Objectives: to clarify the date of two particular deposits within a very large multi-period settlement complex.

References: Wymer and Brown 1995

HAR-4634 3280 ±70 BP

$\delta^{13}\text{C}$: -25.1‰

Sample: NS0600C, submitted in August 1981 by P Murphy

Material: charcoal (remaining subsample identified): *Quercus* sp., heartwood (0.16g, 100%) (R Gale 1999)

Initial comment: from an unurned cremation burial excavated close to two cropmark ring ditches some distance from a middle Bronze Age settlement.

Objectives: to confirm a Bronze Age date.

Calibrated date: 1 σ : 1640–1460 cal BC
2 σ : 1740–1410 cal BC

Final comment: N Brown (30 November 1995), this date indicates that the burial is contemporary with, or slightly earlier than, the nearby middle Bronze Age settlement, which was associated with Deverel-Rimbury pottery.

Laboratory comment: English Heritage (26 March 2008), this sample may have had a significant age-at-death offset.

References: Walker *et al* 1988, 324

HAR-5104 2130 ±80 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: NS1412A, submitted in May 1982 by P Murphy

Material: carbonised plant macrofossil (charred peas, some cereals, charcoal; remaining subsample contained charred cereal grains; 0.64g (100%), no charcoal present) (R Gale 1999)

Initial comment: from a small pit at the edge of an unenclosed late Bronze Age/early Iron Age settlement. The pit contained a large quantity of carbonised peas and sherds thought likely to be of early Iron Age date.

Objectives: to confirm an Iron Age date.

Calibrated date: 1 σ : 360–40 cal BC
2 σ : 390 cal BC–cal AD 50

Final comment: N Brown (30 November 1995), pottery from this pit might suggest a date in the first half of the calibrated date range, on typological grounds. The pit would thus date towards the end of the life of the early Iron Age settlement, prior to a major shift in location in the middle Iron Age.

Northampton: Black Lion Hill, Northamptonshire

Location: SP 747604
Lat. 52.14.11 N; Long. 00.54.22 W

Project manager: M Shaw (Northampton County Council), August 1982

Archival body: Northampton Museum and Art Gallery

Description: Black Lion Hill is one of a number of areas investigated that were situated midway between Marefair and St Peter's Street and comprised the yards and garden areas of medieval and later properties fronting on to the two streets.

Objectives: to date the site activity.

Final comment: J Williams (1985), two samples were measured but no groupings were suggested.

References: Walker *et al* 1991b, 82
Williams *et al* 1985, 64–6

HAR-5560 1340 ±80 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: B110/167, submitted on 27 April 1983 by M Shaw

Material: animal bone

Initial comment: from the construction trench of an early/middle Saxon building.

Objectives: to date the site activity.

Calibrated date: 1 σ : cal AD 640–770
2 σ : cal AD 560–890

Final comment: see series comments

HAR-5561 1180 ±70 BP

$\delta^{13}\text{C}$: -22.7‰

Sample: C15, submitted on 27 April 1983 by M Shaw

Material: animal bone

Initial comment: from a ditch running parallel with and alongside Marefair, the main east-west axis of the town. The date of the ditch stratigraphically is somewhere in the period Roman–middle Saxon but there are no artefacts in the ditch.

Objectives: to confirm a probable Roman date. The ditch is the correct shape and size for a Roman roadside ditch.

Calibrated date: 1 σ : cal AD 720–970
2 σ : cal AD 670–1020

Final comment: see series comments

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Northampton: Briar Hill, Northamptonshire

Location: SP 73625923
Lat. 52.13.33 N; Long. 00.55.19 W

Project manager: H Bamford (Northampton Development Corporation), 1974–8

Archival body: Northampton Museum

Description: the first Neolithic causewayed enclosure in the Midlands to be examined extensively. The enclosure lies at a height of 75–85m AOD on the north-facing slope of Briar Hill. It covers c 3ha and has two main ditch circuits dug in concentric arcs.

Objectives: to establish the longevity of the site for which all other means are too imprecise, and to compare the dates with those from enclosures in the Thames Valley and southwestern groups.

Laboratory comment: Ancient Monuments Laboratory, 18 samples were published in Jordan *et al* (1994, 120–2); HAR-2282, HAR-2283, HAR-2389, HAR-2607, HAR-2625, HAR-3208, HAR-4057, HAR-4058, HAR-4065, HAR-4066, HAR-4067, HAR-4071, HAR-4072, HAR-4073, HAR-4074, HAR-4075, HAR-4089, and HAR-4092.

Laboratory comment: English Heritage (28 March 2008), a reanalysis of these results is provided by Meadows (2003).

References: Bamford 1985
Jordan *et al* 1994, 120–2
Meadows 2003
Walker *et al* 1991b, 82–4

HAR-2284 3460 ±120 BP

$\delta^{13}\text{C}$: -25.2‰

Sample: P76E7-41, submitted on 1 July 1977 by J H Williams

Material: charcoal (subsample 73 (c 25% identified) *Quercus* sp., Pomoideae, *Corylus/Alnus* sp., all from fairly large timbers; subsample 77 (c 25% identified) *Corylus* sp., *Prunus* sp., and *Quercus* sp., all from fairly large timbers; subsample 80 (c 25% identified) *Corylus/Alnus* sp. and *Quercus* sp., all from fairly large timbers) (J Williams 1978)

Initial comment: sample 4 from inner causewayed ditch segment, feature 41, layers 41, 42 (68). A combined sample of 73, 77, and 80. Fill of pit or third recut, post dates sample 3.

Objectives: to determine whether late Neolithic or early Bronze Age.

Calibrated date: 1 σ : 1940–1620 cal BC
2 σ : 2140–1490 cal BC

Final comment: J Williams (1991), the date is consistent with the pottery evidence.

Laboratory comment: Ancient Monuments Laboratory (2001), this sample produced a very small yield (1.5g of benzene) and was repeated as HAR-2389 (3540 ±90 BP) (Jordan *et al* 1994, 120–1). The two results are statistically consistent (T' =0.3; $T'(5\%)$ =3.8; $v=1$) (Ward and Wilson 1978). The weighted mean of the two measurements is 3511 ±72 BP, which calibrates to 2030–1640 cal BC at 95% confidence (Reimer *et al* 2004).

References: Jordan *et al* 1994, 120–1
Reimer *et al* 2004
Ward and Wilson 1978

HAR-4110 3410 ±100 BP

$\delta^{13}\text{C}$: -27.3‰

Sample: P76C3275, submitted on 29 September 1980 by J H Williams

Material: charcoal: *Quercus* sp., from mature timbers (C A Keepax 1980)

Initial comment: a combined sample of 288 and 289, from F192B, from the secondary infill of the second cut in a sequence of five in a segment of the main inner ditch. The sample is from a well defined layer of discoloured 'ashy' sand.

Objectives: to confirm if it is Neolithic in date.

Calibrated date: 1 σ : 1880–1610 cal BC
2 σ : 1960–1460 cal BC

Final comment: J Williams (1991), HAR-4110, HAR-5125, and HAR-5271 provide intermediate dates for the site. Of the three samples, only HAR-5271 fits with archaeological

expectation. At most, a time span of *c* 500 years, during which the site was maintained, can be postulated, which would allow an interval of 220 years between major recutting phases.

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5125 3900 ±90 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: P76D6095, submitted in 1981 by J H Williams

Material: charcoal (remaining subsample very comminuted): unidentified (3.87g); *Pomoideae* (0.16g, 100%) (R Gale 1999)

Initial comment: sample 175, F165, from the bottom of the second cut of at least four in a segment of the spiral ditch on the north side of the inner enclosure. The sample is from a patch of burnt material (possibly a hearth) on the very bottom of the cut. There were traces of burning *in situ*.

Objectives: as HAR-4110

Calibrated date: 1 σ : 2490–2210 cal BC
2 σ : 2620–2130 cal BC

Final comment: see HAR-4110

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5216 4365 ±85 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: P76C2541, submitted in 1981 by J H Williams

Material: charcoal (remaining subsample sparse and very comminuted, fragments mostly too small to identify): unidentified (1.58g); *Quercus* sp. (0.03g, 100%) (R Gale 1999)

Initial comment: sample 213, from F176, from the lower infill of the primary cut in a sequence of at least three in a segment of the spiral ditch round the inner enclosure. The sample was from a well defined layer of discoloured ‘ashy’ sand.

Objectives: to establish a date.

Calibrated date: 1 σ : 3100–2890 cal BC
2 σ : 3350–2870 cal BC

Final comment: J Williams (1991), HAR-5216 does not belong to the same distribution as three other dates in the group, HAR-2282, HAR-4072, and HAR-4092, but there is no reason from the laboratory’s side to reject the date. In fact, the result is the mean of two replicate measurements on the same sample (4130 ±150 BP and 4365 ±85 BP).

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5217 4420 ±90 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: P76A3021, submitted in 1981 by J H Williams

Material: charcoal: unidentified

Initial comment: sample 323, in F248, from a very well defined layer of blackened sand and heavily burnt ironstone. The sample came from above the primary infill of third phase cut (of four) in a segment of the inner ditch.

Objectives: to provide a date.

Calibrated date: 1 σ : 3340–2910 cal BC
2 σ : 3370–2880 cal BC

Final comment: J Williams (1991), HAR-5217 agrees with HAR-4071 (4610 ±90 BP) and HAR-4075 (4660 ±70 BP) and together they provide approximate dates for the final recutting of the ditch system.

HAR-5271 4780 ±120 BP

Sample: P76C8330, submitted in July 1981 by J H Williams

Material: charcoal (remaining subsample very comminuted): unidentified (0.90g); *Alnus* sp. (0.01g, 5.5%); *Corylus* sp. (0.01g, 6.6%); ?*Quercus* sp (0.08g, 87.9%) (R Gale 1999)

Initial comment: a combined sample of 64 and 69, from F28, from the primary infill of the second cut in a sequence of at least four in a segment of the main inner ditch on the east side of the inner enclosure. The sample is combined from well defined lens of discoloured ‘ashy’ sand on the bottom of the feature and from the layer immediately above this. The layers in question lay against the end of the recut where it truncates the infill of the primary cut. It is possible that they had weathered out of a deposit of discoloured sand and charcoal in the secondary infill of the primary cut, exposed in this edge.

Objectives: to give a *terminus post quem* or a *terminus ante quem* for the recut within fairly close limits.

Calibrated date: 1 σ : 3660–3370 cal BC
2 σ : 3800–3340 cal BC

Final comment: see HAR-4110

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

**Northampton: Gregory Street,
Northamptonshire**

Location: SO 751603
Lat. 52.14.07 N; Long. 00.54.01 W

Project manager: M Shaw (Northampton Development Corporation), 1979

Archival body: Northampton Museum and Art Gallery

Description: middle Saxon graves immediately south of St Gregory’s Church site. Four orientated inhumations appeared to lie underneath metallurgy associated with late Saxon timber buildings.

Objectives: the church is first recorded in the twelfth century but it is impossible to determine whether a church or a chapel was contemporary with the middle Saxon cemetery or the relationship of the cemetery to the palace complex.

References: Walker *et al* 1991b, 82
Williams *et al* 1985

HAR-4390 1360 ±100 BP

$\delta^{13}\text{C}$: -22.0‰

Sample: M282C315, submitted on 8 April 1981 by J Williams

Material: human bone

Initial comment: from a burial overlain by a late Saxon layer. The burial is almost certainly associated with St Gregory's Church. The earliest known reference to the church is twelfth century.

Objectives: to establish a date for the burial.

Calibrated date: 1 σ : cal AD 600–770
2 σ : cal AD 470–890

Final comment: J Williams (1985), although these graves need not be contemporary, the results combine satisfactorily and the weighted mean is 1230 ±60 BP which calibrates to cal AD 660–970 at 95% confidence (Reimer *et al* 2004).

References: Reimer *et al* 2004

HAR-4809 1140 ±70 BP

$\delta^{13}\text{C}$: -21.7‰

Sample: M282C408, submitted on 20 January 1982 by J Williams

Material: human bone (includes right foot, right femur, right tibia, left little toe, left femur and patella, left tibia and fibula)

Initial comment: from a burial, probably predating the late Saxon surface. The burial is almost certainly associated with St Gregory's Church.

Objectives: as HAR-4390

Calibrated date: 1 σ : cal AD 770–990
2 σ : cal AD 680–1030

Final comment: see HAR-4390

HAR-4810 1260 ±70 BP

$\delta^{13}\text{C}$: -21.1‰

Sample: M282C410, submitted on 20 January 1982 by J Williams

Material: human bone (include right femur, right fibula, right foot and toes, right tibia, left radius, left femur, left femur and fibula, left foot and toes)

Initial comment: from a middle Saxon grave. This sample is stratigraphically later than HAR-4809.

Objectives: as HAR-4390

Calibrated date: 1 σ : cal AD 660–880
2 σ : cal AD 640–950

Final comment: see HAR-4390

Northampton: St Peter's Gardens, Northamptonshire

Location: SP 7560
Lat. 52.13.58 N; Long. 00.54.06 W

Project manager: M Shaw (Northampton Development Corporation), 1981–2

Archival body: Northampton Museum and Art Gallery

Description: the areas investigated comprised yards and garden areas of medieval and later properties in Marefair and St Peter's Street around St Peter's Church. The deposits on the site were divided into a) deposits antedating stone buildings of Phase II (including large middle Saxon timber hall or palace), b) middle Saxon stone building, c) late Saxon, d) medieval and post-medieval. Radiocarbon dates came from Phases I and II, early and middle Saxon deposits.

Objectives: to elucidate the chronology of the site.

Final comment: J Williams (1995), samples relate to a timber hall, one of the buildings included in Phase I classification (early/middle Saxon sunken-featured buildings). HAR-5557 antedates this feature but fits with archaeological expectations. The remaining seven dates originate from postholes associated with the hall and are thought to have accumulated in these locations shortly after the destruction of the timber building. The group of bone samples, HAR-5551 to HAR-5555 and HAR-5558 might be expected to form the tightest grouping (bearing in mind the time span over which bone assimilates carbon). Although no specific reason could be found, HAR-5554 appears as an outlier of the group and was subsequently rejected in examination (Williams *et al* 1985, 64–6). The remaining five bone dates form a better group but this only becomes acceptable statistically, using the test of Ward and Wilson (1978) if HAR-5558 is removed, giving a mean result for the group of 1100 ±45 BP, which calibrates to cal AD 780–1030 at 95% confidence (Reimer *et al* 2004). The charcoal date HAR-5556 is earlier than this but is less reliable in terms of its intrinsic age prior to association with its context. The archaeologically expected time span of building was *c* 50–100 years so that although results fit the expectation of construction and use prior to Danish occupation, which commenced *c* AD 875, they do not have the resolution necessary to pinpoint precisely construction and abandonment time.

Laboratory comment: English Heritage (2010), one further sample, Z60 (HAR-5559), failed.

References: Reimer *et al* 2004
Walker *et al* 1991b, 80
Ward and Wilson 1978
Williams *et al* 1985

HAR-5551 1100 ±80 BP

$\delta^{13}\text{C}$: -22.7‰

Sample: AA926/479, submitted on 27 April 1983 by J Williams

Material: animal bone (bulk)

Initial comment: from a construction trench, SFB 2331, 2338, 2378.

Objectives: to confirm a possible seventh-century date.

Calibrated date: 1 σ : cal AD 870–1020
2 σ : cal AD 710–1150

Final comment: J Williams, M Shaw, and V Denham (1985), the combining of samples in order to provide one unit suitable for dating may have contributed to the difficulty in identifying the separate phases from the measurements.

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5552 1070 \pm 80 BP

$\delta^{13}\text{C}$: -22.3‰

Sample: AA926.11, submitted on 27 April 1983 by J Williams

Material: animal bone (bulk)

Initial comment: from a posthole in a construction trench, SFB 2335.

Objectives: to confirm a late seventh- or early eighth-century date.

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

Final comment: J Williams, M Shaw, and V Denham (1985), this sample and HAR-5553, HAR-5554, and HAR-5558 came from postholes thought to relate to the end of the life of the building.

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5553 1220 \pm 70 BP

$\delta^{13}\text{C}$: -22.5‰

Sample: AA479.11, submitted on 27 April 1983 by J Williams

Material: animal bone (bulk)

Initial comment: from a posthole in a construction trench, SFB 2278-2300.

Objectives: to confirm a late seventh- or early eighth-century date.

Calibrated date: 1 σ : cal AD 680–900
2 σ : cal AD 650–990

Final comment: see HAR-5552

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5554 1680 \pm 120 BP

$\delta^{13}\text{C}$: -22.7‰

Sample: AA479.8, submitted on 27 April 1983 by J Williams

Material: animal bone (bulk)

Initial comment: as HAR-5553

Objectives: as HAR-5553

Calibrated date: 1 σ : cal AD 230–540
2 σ : cal AD 70–620

Final comment: see HAR-5552

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5555 1010 \pm 70 BP

$\delta^{13}\text{C}$: -21.4‰

Sample: AA465, submitted on 27 April 1983 by J Williams

Material: animal bone (bulk)

Initial comment: from a construction trench, SFB 2271-3.

Objectives: to confirm a possible seventh century date.

Calibrated date: 1 σ : cal AD 980–1150
2 σ : cal AD 880–1180

Final comment: see HAR-5551

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5556 1300 \pm 80 BP

$\delta^{13}\text{C}$: -27.5‰

Sample: AA766.1, submitted on 27 April 1983 by J Williams

Material: charcoal (remaining subsample identified): unidentified (1.35g); *Quercus* sp., sapwood (0.08g, 7.77%); *Quercus* sp., heartwood (0.95g, 92.23%) (R Gale 1999)

Initial comment: the sample consisted of burnt soil and charcoal from the floor of a large timber hall, and possibly represents the destruction of the building.

Objectives: to establish the date of destruction.

Calibrated date: 1 σ : cal AD 650–780
2 σ : cal AD 600–900

Final comment: J Williams, M Shaw, and V Denham (1985), the validity of rejecting HAR-5556 and HAR-5558 is to be considered. Although the removal of HAR-5556 might be justified on the grounds that it was charcoal already having an intrinsic age likely to be older than the bones. HAR-5558 was not expected, archaeologically, to be different from the other bone samples. Leaving both these samples in the group gives an age spread of 300 years on the individual results obtained. This is not inconceivable for a set of results measured to precisions of \pm 70 to \pm 80 years, but should not be interpreted as meaning that the actual time-span is of this magnitude.

HAR-5557 1590 ±60 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: AA441, submitted on 27 April 1983 by J Williams

Material: charcoal: unidentified

Initial comment: SF SS 22-4; from the fill of a probable sunken-featured building predating the large timber hall. Small rootlets are present.

Objectives: to provide a *terminus ante quem* for the large timber hall.

Calibrated date: 1 σ : cal AD 400–550
2 σ : cal AD 330–610

Final comment: J Williams, M Shaw, and V Denham (1985), HAR-5557 ante dates this feature but fits with archaeological expectations.

HAR-5558 1310 ±70 BP

$\delta^{13}\text{C}$: -22.0‰

Sample: AA479.17, submitted on 27 April 1983 by J Williams

Material: animal bone (bulk)

Initial comment: from a posthole in a construction trench of the Saxon timber hall.

Objectives: to confirm a late seventh- or early eighth-century date.

Calibrated date: 1 σ : cal AD 650–780
2 σ : cal AD 600–890

Final comment: see HAR-5552 and HAR-5556.

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Northmoor: Watkins Farm, Oxfordshire

Location: SP 425036
Lat. 51.43.45 N; Long. 01.23.04 W

Project manager: T G Allen (Oxford Archaeological Unit), 1983–4

Archival body: Oxfordshire Museum Service

Description: middle Iron Age enclosed settlement and Romano-British enclosures. The site lay on low-lying first gravel terrace east of the River Windrush and the occupied areas lay upon a slightly higher gravel island than the surrounding land. Because of the high watertable waterlogged remains were preserved in the deepest features.

Objectives: to recover a plan of the site, enough pottery to date the occupation, and a spectrum of environmental samples.

Final comment: T G Allen (14 December 1995), with the exception of HAR-8253, this series of dates agrees with the ceramic evidence for the middle Iron Age occupation

of the site. However, the date range in every case is so wide that it offers no additional help, except in the case of HAR-7053 from which the pottery was absent. Greater precision in dating resulting in a smaller standard deviation would be necessary to justify undertaking a similar dating program for this type of site in the future.

References: Allen 1990

HAR-7047 2210 ±90 BP

$\delta^{13}\text{C}$: -23.6‰

Sample: NMWF487, submitted in November 1985 by T G Allen

Material: animal bone

Initial comment: large pit cut by the ditches surrounding the central roundhouse in this Iron Age enclosure. This is one of the earliest features on the site and stands at the beginning of the longest stratigraphic sequence for the Iron Age occupation.

Objectives: to establish the date of the earliest occupation.

Calibrated date: 1 σ : 400–160 cal BC
2 σ : 410–40 cal BC

Final comment: T G Allen (14 December 1995), the calibrated date range agrees with the pottery, which indicated that occupation began in the middle Iron Age. The span of the range, however, especially at 95% confidence level, is so wide that it provides no help in refining the dating suggested by the pottery.

HAR-7051 2340 ±90 BP

$\delta^{13}\text{C}$: -23.2‰

Sample: NMWFMED1, submitted in November 1985 by T G Allen

Material: animal bone

Initial comment: from main enclosure ditch surrounding Iron Age settlement, primary peat fill

Objectives: to provide a date for the construction of the main enclosure, this appears to have been dug when the site was first occupied. This will also provide a check on the central roundhouse sequence as well.

Calibrated date: 1 σ : 520–360 cal BC
2 σ : 770–200 cal BC

Final comment: T G Allen (14 December 1995), the calibrated date range at the 95% confidence level includes the earlier part of the middle Iron Age, which agrees with the suggested pottery dating. The radiocarbon date has been helpful in refining the pottery sequence by indicating a *terminus ante quem* for the start of the Iron Age occupation.

References: Walker *et al* 1990, 184

HAR-7053 2160 ±70 BP

$\delta^{13}\text{C}$: -28.4‰

Sample: NMWF60, submitted in November 1985 by T G Allen

Material: wood (remaining subsample previously waterlogged, now dry and structurally collapsed): *Fraxinus* sp. (8.53g, 100%); unidentified (36.06g) (R Gale 1999)

Initial comment: from large triangular waterlogged feature situated directly outside the entrance to the central roundhouse. This feature produced the only assemblage of fishbones from the site. It is thought that this was the well serving the Iron Age inhabitants - there was no water source close by, and no other wells of Iron Age date, but 60 did not itself produce any pottery. It also represents the only sizeable waterlogged deposit from inside the enclosure that is probably Iron Age, and so is very important for the environment in that period. Overlying Romano-British occupation in this area makes it vital to date this feature. 0.5m of peat were sealed by clay silt and clay and gravel backfill.

Objectives: to date the likely water-source of the settlement, and with it available environmental deposit and group of fish bones. Understanding of the layout and organisation of the Iron Age settlement will be much advanced if this feature can be dated.

Calibrated date: 1 σ : 360–100 cal BC
2 σ : 400 cal BC–cal AD 1

Final comment: T G Allen (14 December 1995), the calibrated date range, though wide falls almost entirely within the middle Iron Age, and the well can thus be ascribed to the middle Iron Age occupation. This is one of the very few wells or waterholes of this date identified in the Upper Thames region.

References: Walker *et al* 1990, 184

HAR-8253 3060 \pm 60 BP

$\delta^{13}C$: -28.9‰

Sample: NMWF598, submitted in October 1986 by T G Allen

Material: wood (and charcoal; the remaining subsample of wood was previously waterlogged but is now dry and structurally collapsed): *Quercus* sp., wood (5.14g, 99.4%); *Sambucus* sp., charcoal, including twig, diameter 1mm (0.02g, 0.4%); unidentified (3.12g) (R Gale 1999)

Initial comment: from a burial in a waterlogged pit. The burial extended around the side of the large, deep pit or well, associated with layers of burned limestones and several wooden and leather objects. This feature laid within a penannular Iron Age gully, but produced very little pottery. The burial appears to be very unusual.

Objectives: to confirm an Iron Age date.

Calibrated date: 1 σ : 1420–1260 cal BC
2 σ : 1450–1120 cal BC

Final comment: T G Allen (14 December 1995), the middle Bronze Age date was unexpected and considerably earlier than anything else on the site. The little associated pottery could have been of Bronze Age date, but the level of the watertable, which was the same as that in the Iron Age enclosure ditch, suggested a later date, since evidence from other sites suggests that the watertable was lower before the late Bronze Age. Sporadic clearance in the Bronze Age has been noted at the first terrace and the floodplain of the river Windrush (Allen 1993), the validity of this date remains in doubt.

References: Allen 1993
Walker *et al* 1990, 184

HAR-8254 2190 \pm 70 BP

$\delta^{13}C$: -25.2‰

Sample: NMWF151, submitted in October 1986 by T G Allen

Material: charcoal (remaining subsample identified): unidentified (1.51g); *Prunus* spp. (0.33g, 30.6%); *Rhamnus cathartica* sp. (0.75g, 69.4%) (R Gale 1999)

Initial comment: from a ditch immediately outside the central roundhouse.

Objectives: to date the latest stages of occupation.

Calibrated date: 1 σ : 380–160 cal BC
2 σ : 400–40 cal BC

Final comment: T G Allen (1 February 1996), the calibrated date range spans the middle Iron Age, and this is therefore in broad agreement with the ceramic evidence. The span of the date range however, especially at 95% confidence level, is so wide that it adds nothing to the pottery dating.

References: Walker *et al* 1990, 184

HAR-8255 2060 \pm 80 BP

$\delta^{13}C$: -27.7‰

Sample: NMWF5531, submitted in October 1986 by T G Allen

Material: charcoal (no charcoal exists in the remaining subsample, it does possibly contain plant fragments): unidentified (0.04g) (R Gale 1999)

Initial comment: from a hearth in an enclosure attached to the main settlement.

Objectives: to confirm an expected middle Iron Age or early Roman date.

Calibrated date: 1 σ : 190 cal BC–cal AD 30
2 σ : 360 cal BC–cal AD 120

Final comment: T G Allen (1 February 1996), the sample was submitted in the hope of establishing whether this group of enclosures belonged to the middle Iron Age or with the early Roman occupation. The date range at 1 σ would appear to indicate a middle Iron Age occupation but the 2 σ range is so wide that it includes both, and has therefore not resolved the question. The revised calibration, extended since the publication of the report, has cast doubt upon the published phasing of the external enclosures, north of the main enclosures.

References: Walker *et al* 1990, 184

Norwich: Fishergate, Norfolk

Location: TG 23270907
Lat. 52.37.59 N; Long. 01.17.59 E

Project manager: B Ayers (Norfolk Archaeological Unit), 1985

Archival body: Norfolk County Council

Description: waterfront excavation, which revealed early–mid Flandrian peats, middle Saxon ditches, and late Saxon to post medieval land claim deposits.

Objectives: to make a record of the archaeological sequence prior to re-development of the site.

References: Ayers 1994, 34–5

HAR-7061 1150 ±80 BP

$\delta^{13}\text{C}$: -28.0‰

Sample: 732/113, submitted in October 1985 by P Murphy

Material: peat

Initial comment: a deposit of *Phragmites* peat just over 80cm thick underlying late Saxon occupation deposits. From the top surface at 113cm.

Objectives: samples from this peat will be examined for pollen, plant microfossils, and insects to investigate pre-urban land use and vegetation. Middle Saxon pottery came from the top of the peat (*in situ*, or pressed in) but its base is completely undated.

Calibrated date: 1 σ : cal AD 770–990
2 σ : cal AD 670–1030

Final comment: P Murphy (18 January 2002), this date provides a *terminus post quem* for the beginnings of land-claim on the Wensum floodplain at this point.

References: Walker *et al* 1990, 186

HAR-7062 9410 ±110 BP

$\delta^{13}\text{C}$: -31.4‰

Sample: 732/195, submitted in October 1985 by P Murphy

Material: peat

Initial comment: deposit of *Phragmites* peat just over 80cm thick underlying late Saxon occupation deposits. From the base at 190–5cm.

Objectives: as HAR-7061

Calibrated date: 1 σ : 8810–8560 cal BC
2 σ : 9160–8340 cal BC

Final comment: P Murphy (18 January 2002), this provides a date for the base of the sediment sequence and the pollen analysis of the peats. Early Flandrian peat development of the floodplain, with local *Betula* and *Pinus* woodland is indicated.

References: Walker *et al* 1990, 186

Orsett: Rectory Road, Essex

Location: TQ 647811
Lat. 51.30.15 N; Long. 00.22.24 E

Project manager: T Wilkinson (Essex County Council), 1979–80

Archival body: Essex County Council

Description: a small Iron Age settlement on a high point of the Boyn Hill Terrace, approx 600m west of the Orsett ‘Cock’ enclosure (Toller 1980, 35–42) and 620m north-west of Orsett causewayed enclosure (Hedges and Buckley 1978). Excavation took place in advance of the Grays Bypass. Several sites were excavated, Orsett: Rectory Road is Site 1.

Objectives: to date the deposit.

Final comment: T Wilkinson (12 January 1995), these two dates are from the same large grain deposit on the base of an early Iron Age storage pit. They are inconsistent but the earlier sample date agrees well with the large pottery assemblage.

References: Hedges and Buckley 1978
Toller 1980
Walker *et al* 1988, 324
Wilkinson 1988

HAR-4527 2110 ±80 BP

$\delta^{13}\text{C}$: -24.2‰

Sample: RR278, submitted in June 1981 by T J Wilkinson

Material: grain (charred, unidentified)

Initial comment: from pit 277, fill 278. A 4cm thick deposit of carbonised grain, covered the pit floor. The grain consisted mainly of spelt and six-row hulled barley. The grain was either burned within the pit, or accumulated very rapidly as a dry, cohesive deposit after it had remained on the ground surface for a minimum amount of time. This sample came from the base of the deposit. *See* HAR-4635 for a further measurement.

Objectives: to date the deposit.

Calibrated date: 1 σ : 350–40 cal BC
2 σ : 390 cal BC–cal AD 60

Final comment: T J Wilkinson (12 January 1995), this date is rather late for the ceramic assessment (by Sue Hamilton in Wilkinson 1988), which places the pit deposit in the range fourth–fifth centuries BC.

References: Wilkinson 1988

HAR-4635 2350 ±70 BP

$\delta^{13}\text{C}$: -24.0‰

Sample: RR278, submitted in November 1980 by P Murphy

Material: grain (charred cereals, unidentified)

Initial comment: from the same deposit as HAR-4527.

Objectives: as HAR-4527

Calibrated date: 1 σ : 490–380 cal BC
2 σ : 760–210 cal BC

Final comment: A Bayliss (12 January 1995), the two radiocarbon results from this deposit are not statistically consistent ($T'=5.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

Final comment: T Wilkinson (12 January 1995), the assessment of the date of the early Iron Age pottery from this group (fourth–fifth century BC) falls within the calibrated date range at 95% confidence.

References: Ward and Wilson 1978

Oundle, Northamptonshire

Location: TL 033880
Lat. 52.28.47 N; Long. 00.28.44 W

Project manager: D A Jackson (Independent), 1979

Archival body: Northampton Museum

Description: an Anglo-Saxon site excavated prior to development.

Objectives: to date the site.

References: Brown 1980
Johnston 1993

HAR-4929 1610 ±70 BP

$\delta^{13}C$: -25.7‰

Sample: OUNDLE.F3, submitted in December 1979 by D A Jackson

Material: charcoal (remaining subsample identified): unidentified (6.23g); *Sambucus* sp. (0.04g, 3.7%); *Sorbus* sp. (0.32g, 29.6%); *Fraxinus* sp. (0.65g, 60.2%); *Acer* sp. (0.07g, 6.5%) (R Gale 1999)

Initial comment: a sunken floored feature was found which may date to the fifth century AD.

Objectives: this sample is to provide confirmation of that date.

Calibrated date: 1 σ : cal AD 380–550
2 σ : cal AD 250–610

Final comment: P Jackson (22 February 1994), the charcoal used for the sample came from the filling of an Anglo-Saxon sunken featured structure; located on a building site. A quantity of Anglo-Saxon and Roman pottery was recovered from the feature and a fifth century date was postulated for the Saxon pottery, the radiocarbon date supported this.

Oxford: 65 St Aldate's, Oxfordshire

Location: SP 514058
Lat. 51.44.46 N; Long. 01.15.20 W

Project manager: B G Durham (Oxford Archaeological Unit), 1981–2

Archival body: Oxfordshire Museums Service

Description: exploratory trenches, preparing the way for a major investigation of the Morris Garages forecourt.

Objectives: to get a convincing answer to the question of whether there was an embanked Thames Crossing in the late eighth century.

References: Walker *et al* 1988, 319–20

HAR-5339 830 ±70 BP

$\delta^{13}C$: -28.5‰

Sample: OX65A313, submitted in December 1982 by B G Durham

Material: wood (remaining subsample previously waterlogged, now dry and structurally collapsed): *Fraxinus*

sp. (1.82g, 82.35%); *Fraxinus* sp., probably (0.39g, 17.65%); unidentified (1.60g) (R Gale 1999)

Initial comment: from earliest silting after abandonment of Oxen Ford, from the first 0.3m silting.

Objectives: to provide a date for the silts of the underlying channel.

Calibrated date: 1 σ : cal AD 1150–1270
2 σ : cal AD 1020–1290

Final comment: B G Durham (1988), the result of AD 1100 was expected for this material.

HAR-5340 1020 ±70 BP

$\delta^{13}C$: -28.7‰

Sample: OX65A317, submitted in December 1982 by B G Durham

Material: wood (waterlogged): unidentified

Initial comment: from core of stone ford.

Objectives: to obtain a date for the construction of the stone ford.

Calibrated date: 1 σ : cal AD 970–1120
2 σ : cal AD 880–1170

Final comment: B G Durham (1988), 'Oxen Ford' is thought to have existed from *c* AD 800; this result presumably relates to repair or general widening of the upstream edge.

HAR-5341 1080 ±70 BP

$\delta^{13}C$: -29.3‰

Sample: OX65A402, submitted in December 1982 by B G Durham

Material: wood (remaining subsample previously waterlogged, now dry and structurally collapsed): *Fraxinus* sp. (4.68g, 98.9%); *Salix/Populus* sp. (0.05g, 1.1%); unidentified (0.60g) (R Gale 1999)

Initial comment: from waterfront at rear end of a tenement fronting St Aldate's.

Objectives: to date the tenement.

Calibrated date: 1 σ : cal AD 890–1030
2 σ : cal AD 770–1150

Final comment: B G Durham (1988), topographically this feature was assumed to be thirteenth century AD; however, the result is one of the earliest dates in Oxford, at which time the area was assumed to be the broad, forded river channel. The sample came from a salvage operation so no other evidence is available.

Oxford: 89-91 St Aldate's, Oxfordshire

Location: SP 513058
Lat. 51.44.53 N; Long. 01.15.25 W

Project manager: B G Durham (Oxford Archaeological Unit), 1982 and 1985

Archival body: Oxford Archaeology

Description: the excavation was undertaken in response to a proposal by Christ Church to create a new quadrangle on the site of Nos 89-91 St Aldate's. A total of seven trenches were excavated between 1982 and 1985. Trenches I and II preceded the first phase of the development, which included the west range of the new quad, and this was followed by a watching brief on the conversion of No. 90 St Aldate's (Trench III) and on sewerage works (Trenches IV and V). Trenches VI and VII were excavated prior to the second phase of construction, which replaced No. 89 St Aldate's with a building which wrapped round behind the preserved frontage of No. 90. The building at 89 St Aldate's dates from the seventeenth century, and was recorded prior to demolition.

Objectives: the excavations were designed to investigate the origins and any former alignments of the Trill Mill stream, which is now culverted below, and on the line of, Rose Place, an east-west street south of the site. They were also intended to examine the development of occupation and buildings relative to the stream in this area, which lies at the foot of the second gravel terrace and just outside the south gate of the medieval town.

Laboratory comment: Ancient Monuments Laboratory (2003), one further sample, OXTMS33 (HAR-5345), was submitted for dating and failed to produce a result.

References: Dodd 2003

HAR-5342 2410 ±80 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: OXTMS29, submitted in October 1982 by B G Durham

Material: wood (remaining subsample previously waterlogged, now dry and structurally collapsed): unidentified (0.37g); *Corylus* sp. (0.80g, 100%) (R Gale 1999)

Initial comment: from the earliest silting of the primary channel.

Objectives: to investigate the origins and any former alignments of the Trill Mill stream.

Calibrated date: 1 σ : 750–390 cal BC
2 σ : 790–360 cal BC

Final comment: D Wilkinson (2003), this sample dated a layer, which, from environmental evidence, indicates well-oxygenated flowing water. The quality of organic preservation suggests that the area was not permanently under water and did not dry out.

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1991a, 90

HAR-5343 1080 ±80 BP

$\delta^{13}\text{C}$: -27.4‰

Sample: OXTMS31, submitted in October 1982 by B G Durham

Material: wood (waterlogged): unidentified

Initial comment: a stake from the base of a gully in the southern trench.

Objectives: to investigate the origins and any former alignments of the Trill Mill stream.

Calibrated date: 1 σ : cal AD 880–1030
2 σ : cal AD 770–1160

Final comment: D Wilkinson (2003), this result dated the flattened remains of a wattle fence (34), which lay within a gully.

References: Walker *et al* 1988, 320

HAR-5344 920 ±100 BP

$\delta^{13}\text{C}$: -29.8‰

Sample: OXTMS32, by B G Durham

Material: wood (remaining subsample previously waterlogged, now dry and structurally collapsed): ?*Quercus* sp., but too degraded to verify (0.66g, 65.3%); cf *Alnus/Corylus* sp., but too degraded to verify (0.35g, 34.7%); unidentified (0.66g) (R Gale 1999)

Initial comment: from a mid-late Saxon gully.

Objectives: to investigate the origins and any former alignments of the Trill Mill stream.

Calibrated date: 1 σ : cal AD 1010–1220
2 σ : cal AD 890–1280

Final comment: D Wilkinson (2003), this date was taken in conjunction with other dates, this shows that phase 2 on this site almost certainly spanned the periods before and after AD 900.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 169

HAR-5346 980 ±70 BP

$\delta^{13}\text{C}$: -27.9‰

Sample: OXTMS35, submitted in October 1982 by B G Durham

Material: wood (waterlogged; remaining subsample identified): *Corylus* sp., probably, but too degraded to verify; roundwood, diameter 45mm, approximately 17 growth rings (150.58g, 100%) (R Gale 1999)

Initial comment: from a wooden fender in front of the gravel waterfront.

Objectives: to investigate the origins and any former alignments of the Trill Mill stream.

Calibrated date: 1 σ : cal AD 990–1160
2 σ : cal AD 890–1220

Final comment: D Wilkinson (2003), this sample dated a low wattle fence and from environmental evidence appears to have been a waterside area of damp, disturbed ground. This could have resulted from habitation in the immediate area, or from dumping of organic refuse.

References: Walker *et al* 1988, 320

HAR-8360 1020 ±70 BP

$\delta^{13}\text{C}$: -27.4‰

Sample: OXTSM713, submitted in December 1985 by B G Durham

Material: leather (offcuts, apparently new leather rather than scrap)

Initial comment: from trench VII; from sandy silts L815 beneath a thick layer of dumped material beside the modern frontage, at a level of 54.8m OD. It appears to be a deliberate infilling of the mill stream, in a location where it could be a causeway or ford.

Objectives: the sample of leather worker's waste could give a good indication of the date of infilling of the primary mill stream channel and therefore provide confirmation of the date when flooding of the mill stream demanded a causeway to carry the road across it.

Calibrated date: 1 σ : cal AD 970–1120
2 σ : cal AD 880–1170

Final comment: B G Durham (1990), this result confirms the date of causeway construction due to flooding.

References: Walker *et al* 1990, 169

HAR-8361 2280 ±100 BP

$\delta^{13}\text{C}$: -31.6‰

Sample: OXTMS626, submitted in December 1985 by B G Durham

Material: soil (marsh deposit with *Phragmites* rhizomes)

Initial comment: from Trench VI, a marsh deposit L657 sealed by the blue clay layer L654. It was an extensive deposit of fine clay into which the mill stream had been cut, and from which the causeway was apparently constructed.

Objectives: to provide an approximate start date for the deposition of the fine clay.

Calibrated date: 1 σ : 410–200 cal BC
2 σ : 750–90 cal BC

Final comment: D Wilkinson (2003), this sample provides a date for layer 657, when peat had formed in reed-swamp conditions, on a channel bed or in marginal marsh.

References: Walker *et al* 1990, 169

HAR-8362 1080 ±80 BP

$\delta^{13}\text{C}$: -25.0 (assumed) ±3.0‰

Sample: OXTMS615, submitted in December 1985 by B G Durham

Material: wood (waterlogged): *Corylus/Alnus* sp., twigs

Initial comment: from the earliest and successively later silting of the channel. See HAR-8363 and HAR-8364 for further measurements.

Objectives: to confirm or refute the dating of a mid or late Saxon date for the Thames causeway, assumed to be constructed from the upcast of this mill stream.

Calibrated date: 1 σ : cal AD 880–1030
2 σ : cal AD 770–1160

Final comment: B G Durham (1990), the results for samples HAR-8362 to HAR-8364 confirm a mid or late Saxon date for the Thames causeway, assumed to be constructed from upcast of the mill stream.

References: Walker *et al* 1990, 169

HAR-8363 1180 ±70 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: OXTMS623, submitted in December 1985 by B G Durham

Material: wood (waterlogged): *Corylus* sp.

Initial comment: as HAR-8362

Objectives: as HAR-8362

Calibrated date: 1 σ : cal AD 720–970
2 σ : cal AD 670–1020

Final comment: see HAR-8362

References: Walker *et al* 1990, 169–70

HAR-8364 1210 ±70 BP

$\delta^{13}\text{C}$: -26.2‰

Sample: OXTMS625, submitted in December 1985 by B G Durham

Material: wood (waterlogged): *Corylus/Alnus* sp., twigs

Initial comment: as HAR-8362

Objectives: as HAR-8362

Calibrated date: 1 σ : cal AD 690–900
2 σ : cal AD 660–990

Final comment: see HAR-8362

Final comment: A Bayliss (10 April 2008), the three radiocarbon results from this channel (HAR-8362–4) are statistically consistent (T'=1.6; T'(5%)=6.0; v=2; Ward and Wilson 1978), and are compatible with a date in the ninth or tenth century cal AD for the deposition of these sediments in the channel.

References: Walker *et al* 1990, 169–70
Ward and Wilson 1978

Pakenham, Suffolk

Location: TL 935697
Lat. 52.17.27 N; Long. 00.50.15 E

Project manager: P Murphy (Centre of East Anglian Studies, University of East Anglia), October 1983

Archival body: Suffolk County Council Archaeology Service

Description: excavation of a Roman fort and civil settlement. The sample was taken to date a sequence of lake sediments from the edge of Micklenor adjacent to the site.

Objectives: to date the palaeoecological sequence.

References: Murphy 1994

HAR-5936 1290 ±100 BP

$\delta^{13}\text{C}$: -29.5‰

Sample: PKM027P, submitted on 23 October 1983 by P Murphy

Material: peat

Initial comment: air-dried before submission. From c 1.64m depth.

Objectives: the shelly lake marl above 1.64m indicates much wetter conditions in the late- or post-Roman period. This is overlain by unsorted colluvial deposits. Both of these layers are thought to be related to changes in the land use within the catchment of the mere, probably deforestation and tillage. The sample submitted will provide a date for the onset of these changes.

Calibrated date: 1 σ : cal AD 650–880
2 σ : cal AD 570–980

Final comment: P Murphy (18 December 1995), the sample establishes that a shift towards deposition of calcareous lake mud occurred in the Saxon period. This is thought to have been related to increased cultivation and soil erosion on chalky till soils in the catchment.

Penhale: Holywell Bay, Cornwall

Location: SW 756592
Lat. 50.23.21 N; Long. 05.09.26 W

Project manager: G Smith (Central Excavation Unit), July 1983

Archival body: Royal Cornwall Museum

Description: a hillfort: approximately 700 m² of the interior of the fort was excavated revealing one round house associated with pottery of south-western, La Tène, decorated ‘Glastonbury’ style. One trench through the bivallate defences showed that the fort probably had offset entrances with a trackway between the inner and outer ramparts. A quantity of flintwork was also found, with two centres of concentration, one probably late Mesolithic associated with narrow blade microliths, the other probably Neolithic in date.

Objectives: of at least thirty coastal promontory forts in Cornwall, only three have so far been investigated by excavation and the results published. None of these have had the benefit of radiocarbon dating and chronology has had to depend on pottery styles which have themselves no fixed chronology. The small amount of pottery found at Penhale was of one easily recognisable type.

Final comment: G Smith (7 July 1986), the pit and postholes that these samples came from lay within a stone-walled circular house within a bivallate cliff promontory fort. Both pit and postholes were well-sealed by rubble and there was no indication of disturbance within their fills. The house was associated with pottery of south-western decorated style (‘Glastonbury ware’) generally reckoned to fall within the third to first century BC time span. The Penhale pottery should stylistically fall late within this sequence. The radiocarbon dates therefore agree with the dating suggested by the pottery and are useful considering the absence of absolute dates from other Cornish promontory forts and the paucity of dates associated with south-western decorated style pottery.

References: Gowlett *et al* 1987, 143
Smith 1988a

OxA-823 1990 ±80 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: 255-183, submitted in December 1983 by N D Balaam

Material: charcoal: *Quercus* sp. (N Balaam)

Initial comment: from the fill of pit 170.

Objectives: to date the last use of the house pit.

Calibrated date: 1 σ : 90 cal BC–cal AD 90
2 σ : 200 cal BC–cal AD 220

Final comment: G Smith (1988), there are two problems with the interpretation of the dates, first that the wood species of the charcoal in the pit and in the post holes are different, second the absence of charcoal of any kind in pit 177, interpreted as a hearth (the absence of charcoal in probable hearth pits has also been noted at Trethurgy and other Cornish Iron Age sites, H Quinnell, pers comm). The agreement between the determinations provides some assurance that they belong to a single episode or at least are from a fairly limited period. They also provide a useful contribution towards a chronology for the La Tène decorated south-western pottery. The pottery fragments at Penhale were found scattered in and outside the entrance of the house and were very well preserved, ie not subsequently abraded by further occupation trampling and so were probably deposited during the final use of the house. A single piece, almost certainly from the same pot, was found in the top of pit 170, apparently altered by secondary burning. The dates fit in well with the currently suggested stylistic chronology and are valuable in defining a late use, presumably prior to the appearance of the Cordoned ware style.

OxA-824 1980 ±80 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: 255-171, submitted in December 1983 by N Balaam

Material: charcoal: *Ulex* sp. (N Balaam)

Initial comment: a combined sample from the postholes of the round house; less reliably stratified than OxA-823.

Objectives: as OxA-823

Calibrated date: 1 σ : 60 cal BC–cal AD 120
2 σ : 200 cal BC–cal AD 230

Final comment: see OxA-823

Pennylands, Buckinghamshire

Location: SP 862411
Lat. 52.03.40 N; Long. 00.44.33 W

Project manager: R J Williams (Bradwell Abbey Field Centre), 1979

Archival body: Buckinghamshire County Museum

Description: an unknown middle Iron Age and early Saxon settlement (Site code MK250). Aerial reconnaissance and previous fieldwalking had not indicated the presence of any archaeological remains in the area. The site, lying on a slight gravel spur at 80m ALS overlooking the Ouzel valley, between the villages of Great Linford and Willen, was clearly chosen for its light free-draining soils in preference to the surrounding boulder and Oxford clays.

Objectives: it is hoped that the dates will provide a *terminus post quem* for the excavation and use of the Iron Age enclosure.

Final comment: R J Williams (1993), the four samples came from the lower carbonised layer 662 of the Iron age pit 790.

References: Williams 1993

HAR-4852 2370 ±80 BP

$\delta^{13}C$: -26.2‰

Sample: MK250 143, submitted on 27 November 1980 by R J Williams

Material: charcoal: *Quercus* sp. (C A Keepax)

Initial comment: composite sample of small fragments and larger pieces from context 662 of pit 790. The sample came from a carbonised layer near the base of the pit. The pit was cut by enclosure ditch 555.

Objectives: the date of the pit will serve as a *terminus post quem* for the enclosure.

Calibrated date: 1 σ : 710–380 cal BC
2 σ : 770–210 cal BC

Final comment: R J Williams (1993), the sample provides a reliable *terminus post quem* for the use of the Iron Age enclosure.

HAR-4853 2270 ±90 BP

$\delta^{13}C$: -27.0‰

Sample: MK250 144, submitted on 27 November 1980 by R J Williams

Material: charcoal: *Quercus* sp., from mature timber (C A Keepax)

Initial comment: context 662 of pit 790; from what was thought to have been a carbonised piece of wood, removed in fragmentary condition.

Objectives: as HAR-4852

Calibrated date: 1 σ : 410–200 cal BC
2 σ : 710–100 cal BC

Final comment: see HAR-4852

Final comment: A Bayliss (11 September 2008), the two radiocarbon results from this deposit are statistically consistent ($T'=0.7$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978); as the samples consisted of bulk oak charcoal, the weighted mean of these measurements (2326 ±60BP) provides a *terminus post quem* of 700–200 cal BC (95% confidence; Reimer *et al* 2004) for this deposit.

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

HAR-5151 1480 ±80 BP

$\delta^{13}C$: -22.9‰

Sample: MK250 649, submitted in May 1982 by R J Williams

Material: bone (8 large bones including scapula, vertebrae, pelvis, and long bones (1kg))

Initial comment: from context 649 of pit 790. The pit is stratigraphically above 662 but statistically inseparable.

Objectives: the date of the pit will serve as a *terminus post quem* for the enclosure.

Calibrated date: 1 σ : cal AD 530–650
2 σ : cal AD 410–680

Final comment: R J Williams (1993), the date of the bone is stratigraphically impossible owing to the sealed nature of the context.

HAR-5352 1841 ±80 BP

$\delta^{13}C$: -23.7‰

Sample: MK250 662, submitted in May 1982 by R J Williams

Material: bone (and teeth; very fragmented (600g))

Initial comment: the total bone content of context 662 of pit 790 from which charcoal samples HAR-4852 and HAR-4853 were taken.

Objectives: as HAR-5151

Calibrated date: 1 σ : cal AD 70–260
2 σ : cal AD 1–390

Final comment: see HAR-5151

Poldowrian, Cornwall

Location: SW 74851690
Lat. 50.00.34 N; Long. 05.08.28 W

Project manager: G Smith (Central Excavation Unit), 1980

Archival body: Royal Cornwall Museum

Description: area of later Mesolithic, early Neolithic, and early Bronze Age settlement.

Objectives: to date the different phases of occupation.

Laboratory comment: Ancient Monuments Laboratory (1995), two further dates from this site, HAR-4033 and HAR-4052, were funded prior to 1981 and were published in Jordan *et al* (1994, 136). Sample HAR-4567 (33-369A) was combined with HAR-4568 to provide sufficient material for dating.

References: Jordan *et al* 1994, 136
Smith 1987b
Smith and Harris 1982

HAR-4323 5180 ±100 BP

$\delta^{13}C$: -25.1‰

Sample: 33-110, submitted on 31 March 1981 by N D Balaam

Material: charcoal: *Quercus* sp., with some Pomoideae

Initial comment: a bulk sample from all the charcoal in pit 106 which contained pot no. 83 and leaf-shaped point no. 86.

Objectives: to confirm a possible Neolithic date.

Calibrated date: 1 σ : 4060–3820 cal BC
2 σ : 4260–3760 cal BC

Final comment: G Smith (1982), this sample is likely to have been contaminated by the inclusion of some derived Mesolithic charcoal.

HAR-4568 6450 \pm 110 BP

Sample: 33-369-B, submitted on 13 July 1981 by G Smith

Material: carbonised plant macrofossil (*Corylus avellana*, nutshell)

Initial comment: a combined sample of HAR-4567 and HAR-4568 (33-369-A and 33-369-B); from level 2, the buried horizon.

Objectives: to confirm a Mesolithic or Neolithic date.

Calibrated date: 1 σ : 5510–5310 cal BC
2 σ : 5620–5210 cal BC

Final comment: G Smith (1982), due to HAR-4568 being a bulked sample of all the hazelnut shell fragments from level 2, the sample contained some Neolithic as well as Mesolithic hazelnut shell.

Potterne, Wiltshire

Location: ST 996591
Lat. 51.19.50 N; Long. 02.00.21 W, 1

Project manager: A J Lawson and C Gingell (Wessex Archaeology), 1984

Archival body: Wessex Archaeology, Wiltshire Heritage Museum, Devizes

Description: a 200m² late Bronze Age midden and underlying occupation site.

Objectives: to date the sequence of midden and underlying occupation deposits.

Final comment: A J Lawson (1994), the majority of the dates form a satisfactory and consistent series, which reflect the anticipated values based on the associated artefactual assemblage. One date (HAR-6983) is older than expected but the sample is presumed to incorporate residual bulked charcoals. The dates imply that the thick midden deposit accumulated rapidly on top of an area, which had previously been the site of post-built structures and considerable activity. There remains a question as to whether there was a hiatus in site activity between the early occupation of the area (represented by HAR-8938 and possibly HAR-6982) and the initiation of the midden deposit over it.

Laboratory comment: Ancient Monuments Laboratory (1994), the data available from these six determinations is inadequate to resolve sophisticated questions of site chronology.

References: Lawson 2000

HAR-6978 2590 \pm 80 BP

$\delta^{13}\text{C}$: -26.6‰

Sample: POTT 1, submitted on 6 December 1985 by C Gingell and A J Lawson

Material: charcoal: *Prunus* cf *spinosa*; *Ulmus* sp.; *Corylus avellana*; Pomoideae, (hawthorn type); *Quercus* sp.; *Prunus* sp. (V Straker)

Initial comment: the midden was excavated in spits and using a grid of metre squares. Charcoal from two adjacent squares was extracted for dating from levels 4, 7, and 11 as shown below.

Objectives: to date the sequence of midden and underlying occupation deposits.

Calibrated date: 1 σ : 820–670 cal BC
2 σ : 910–510 cal BC

Final comment: A J Lawson (1994), the date conforms well with that anticipated from the associated pottery and metalwork assemblages.

References: Gingell and Lawson 1984
Gingell and Lawson 1985
Walker *et al* 1990, 176

HAR-6979 2490 \pm 70 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: POTT 2, submitted on 6 December 1985 by C Gingell and A J Lawson

Material: charcoal: *Fraxinus excelsior*; *Ulmus* sp.; *Corylus avellana*; Pomoideae, (hawthorn type); *Quercus* sp.; *Prunus* sp. (V Straker)

Initial comment: as HAR-6978

Objectives: as HAR-6978

Calibrated date: 1 σ : 790–410 cal BC
2 σ : 810–400 cal BC

Final comment: see HAR-6978

References: Walker *et al* 1990, 176

HAR-6980 2650 \pm 80 BP

$\delta^{13}\text{C}$: -24.0‰

Sample: POTT 3, submitted on 6 December 1985 by C Gingell and A J Lawson

Material: charcoal: cf *Tilia* sp.; *Fraxinus excelsior*; *Ulmus* sp.; Pomoideae, (hawthorn type); *Quercus* sp.; *Prunus* sp. (V Straker)

Initial comment: as HAR-6978

Objectives: as HAR-6978

Calibrated date: 1 σ : 900–780 cal BC
2 σ : 980–560 cal BC

Final comment: see HAR-6978

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 176

HAR-6981 2630 ±70 BP $\delta^{13}\text{C}$: -26.6‰

Sample: POTT 4, submitted on 6 December 1985 by C Gingell and A J Lawson

Material: charcoal: *Acer campestre*; *Prunus* cf *spinosa*; *Ulmus* sp.; cf *Tilia* sp.; Pomoideae, (hawthorn type); *Quercus* sp.; *Prunus* sp. (V Straker)

Initial comment: as HAR-6978

Objectives: as HAR-6978

Calibrated date: 1 σ : 840–780 cal BC
2 σ : 920–560 cal BC

Final comment: see HAR-6978

References: Walker *et al* 1990, 177

HAR-6982 3130 ±100 BP $\delta^{13}\text{C}$: -25.5‰

Sample: POTT 5, submitted on 6 December 1985 by C Gingell and A J Lawson

Material: charcoal: *Prunus* cf *spinosa*; *Corylus avellana*; Pomoideae, (hawthorn type); *Quercus* sp.; *Prunus* sp. (V Straker)

Initial comment: as HAR-6978

Objectives: as HAR-6978

Calibrated date: 1 σ : 1500–1290 cal BC
2 σ : 1630–1120 cal BC

Final comment: A J Lawson (1994), this date confirms that anticipated for the late Bronze Age pottery in the earliest contexts on the site.

References: Walker *et al* 1990, 177

HAR-6983 3430 ±100 BP $\delta^{13}\text{C}$: -26.8‰

Sample: POTT 16, submitted on 6 December 1985 by C Gingell and A J Lawson

Material: charcoal: cf *Tilia* sp.; *Prunus* cf *spinosa*; *Corylus avellana*; Pomoideae, (hawthorn type); *Quercus* sp.; *Prunus* sp. (V Straker)

Initial comment: as HAR-6978

Objectives: as HAR-6978

Calibrated date: 1 σ : 1890–1610 cal BC
2 σ : 2020–1490 cal BC

Final comment: A J Lawson (1994), the date is considerably earlier than any other from the site. Although the sample may well date some human activity, the sample is probably residual in its context in common with some other scant finds from the assemblage and pre-dates the structural activity and the midden development.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 177

HAR-8938 3000 ±90 BP $\delta^{13}\text{C}$: -25.6‰

Sample: POTT 16, submitted on 11 May 1987 by C Gingell

Material: charcoal: *Ulmus* sp.; Pomoideae, (hawthorn type); *Quercus* sp. (V Straker)

Initial comment: from fill 3716 of post pit 3605. This sample contained site sample numbers 2251, 2269, and 2275.

Objectives: as HAR-6978.

Calibrated date: 1 σ : 1400–1110 cal BC
2 σ : 1450–970 cal BC

Final comment: A J Lawson (1994), the date accords well with the other date (HAR-6982) from the base of the overlying deposit. A later Bronze Age date was anticipated from the pottery found in the stratigraphically earlier contexts.

References: Hardiman *et al* 1992, 48

Prudhoe Castle, Northumberland

Location: NZ 091634
Lat. 54.57.54 N; Long. 01.51.28 W

Project manager: L Keen (Unknown), 1974–85

Archival body: English Heritage

Description: excavations were carried out within the inner ward of the medieval castle.

Objectives: to establish the individual dating of contexts and the archaeological sequence with regard to the architectural sequence and the known historical documentation for the castle.

Laboratory comment: Ancient Monuments Laboratory (1995), three further dates, HAR-3937, HAR-3938, and HAR-3939 were funded prior to 1981 and were published in the first volume of *Radiocarbon Dates* (Jordan *et al* 1994, 140–1).

References: Jordan *et al* 1994, 140–1
Keen 1982

HAR-4640 850 ±70 BP $\delta^{13}\text{C}$: -27.5‰

Sample: PC1744, submitted in September 1981 by A J Clark

Material: charcoal (remaining subsample identified): unidentified (19.02g); *Fraxinus* sp. (0.04g, 0.44%); *Prunus spinosa* (0.15g, 1.64%); *Ilex* sp. (0.97g, 10.58%); *Quercus* sp., heartwood (1.45g, 15.81%); *Betula* sp. (0.48g, 5.23%); *Corylus* sp., roundwood (6.08g, 66.3%) (R Gale 1999)

Initial comment: from context 1744. The context was well sealed under the mixed clay of context 1742.

Calibrated date: 1 σ : cal AD 1050–1270
2 σ : cal AD 1020–1290

Final comment: L Keen (1992), radiocarbon samples from this site give a range from the ninth to twelfth-century AD and archaeomagnetic samples give a date range from the eleventh to thirteenth-century. The thirteenth-century date is too late and the ninth-century too early. However, a central date of the mid-eleventh century may be suggested with some confidence.

HAR-4641 1280 ±70 BP $\delta^{13}\text{C}$: -27.2‰

Sample: 10431240, submitted in September 1981 by A J Clark

Material: charcoal (remaining friable subsample identified): unidentified (31.52g); *Frangula alnus* (0.01g, 0.2%); *Alnus* sp. (0.10g, 2.7%); *Quercus* sp., sapwood (0.34g, 9.2%); *Quercus* sp., heartwood (0.42g, 11.4%); *Betula* sp. (1.02g, 27.6%); *Corylus* sp. (1.80g, 48.8%) (R Gale 1999)

Initial comment: quite solid dry timber fragments and twigs from mainly the northern part of the southern area of context 1043. The sample was combined with twigs from context 1240, on the same level but situated to the south-west. The deposits immediately seal the natural clay of context 1027.

Objectives: to confirm a probable eleventh-century date. The sample was taken from what is thought to be primary occupation levels on the hilltop.

Calibrated date: 1 σ : cal AD 660–810
2 σ : cal AD 640–900

Final comment: see HAR-4640

HAR-4642 990 ±70 BP $\delta^{13}\text{C}$: -23.4‰

Sample: PC1023, submitted in September 1981 by A J Clark

Material: animal bone

Initial comment: context 1023 consisted of a very extensive deposit sealed by the midden 411 and sealing the top-most mortar floor 1104. It was a black/brown, clay/silt with a large amount of crushed and solid charcoal. The context was 5–10cm in depth and produced a large amount of domestic refuse eg fish, fowl, and animal bones. The sample was taken from the east half of the southern area from a newly exposed area. This may have been occupation debris above floor 1104. HAR-3937 (720 ±70 BP) and HAR-3939 (670 ±70 BP) also came from context 1023.

Objectives: to produce a *terminus post quem* for the midden and to compare with HAR-3937 and HAR-3939.

Calibrated date: 1 σ : cal AD 980–1160
2 σ : cal AD 890–1220

Final comment: see HAR-4640

Final comment: A Bayliss (10 April 2008), the three radiocarbon results context 1023 (HAR-3937, HAR-3939, and HAR-4642) are not statistically consistent ($T'=12.2$; $T'(5\%)=6.0$; $v=2$; Ward and Wilson 1978). This result is significantly earlier than the other two dates. The most plausible explanation for this is that this sample included residual bone.

References: Ward and Wilson 1978

HAR-4643 1110 ±80 BP $\delta^{13}\text{C}$: -26.8‰

Sample: PC1305A, submitted in September 1981 by A J Clark

Material: charcoal (remaining friable and comminuted subsample mostly too fragmented to identify): unidentified (18.28g); Salicaceae (0.01g, 0.2%); *Quercus* sp., sapwood (0.36g, 6.3%); *Quercus* sp., heartwood (5.30g, 93.5%) (R Gale 1999)

Initial comment: two samples (HAR-4643 and HAR-4644) were taken from an extensive burnt black and red clay/silt layer sealed by the clay rampart 1118. The context contained a large amount of crushed and solid charcoal including some possible thin burnt planks. This was the same context from which HAR-3938 (840 ±70 BP) was taken. The context was above the first occupation on the site and was sealed by the clay rampart which in turn was cut into by the gatehouse and curtain wall. This suggests that the context is probably late eleventh century or more probably early twelfth century.

Objectives: to provide a *terminus ante quem* for the clay rampart.

Calibrated date: 1 σ : cal AD 830–1020
2 σ : cal AD 690–1040

Final comment: see HAR-4640

Final comment: A Bayliss (11 September 2008), the two radiocarbon results from this deposit are statistically consistent ($T'=3.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978); as the samples consisted of bulk charcoal, the weighted mean of these measurements (1012 ±57 BP) provides a *terminus post quem* of cal AD 890–1160 (95% confidence; Reimer *et al* 2004) for this deposit.

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

HAR-4644 910 ±80 BP $\delta^{13}\text{C}$: -26.9‰

Sample: PC1305B, submitted in September 1981 by A J Clark

Material: charcoal (remaining subsample mostly too fragmented to identify): unidentified (45.81g); *Quercus* sp., heartwood (7.55g, 99.2%); *Corylus* sp. (0.06g, 0.8%) (R Gale 1999)

Initial comment: as HAR-4643

Objectives: as HAR-4643

Calibrated date: 1 σ : cal AD 1020–1220
2 σ : cal AD 980–1280

Final comment: see HAR-4640

Laboratory comment: (28 March 2008), see Har-4643

HAR-4645 1000 ±60 BP $\delta^{13}\text{C}$: -27.1‰

Sample: PC1485, submitted in September 1981 by A J Clark

Material: charcoal (remaining subsample identified): unidentified (32.36g); *Fraxinus* sp. (0.28g, 2.6%); *Quercus* sp., heartwood (10.15g, 95.3%); *Corylus* sp. (0.22g, 2.1%) (R Gale 1999)

Initial comment: from a post or postpipe in post pit 1481. Post pit 1481 is one of a series of pits, which form part of a structure sealed by the clay rampart.

Objectives: this structure is earlier than the clay rampart, which is probably early twelfth century in date and is therefore the earliest occupation on site. A radiocarbon date is important, as there is no pottery or other datable material from contexts associated with the structure.

Calibrated date: 1 σ : cal AD 980–1150
2 σ : cal AD 890–1170

Final comment: see HAR-4640

HAR-4837 1020 \pm 70 BP

$\delta^{13}\text{C}$: -27.3‰

Sample: PC1485B, submitted in September 1981 by A J Clark

Material: charcoal (remaining subsample identified): unidentified (22.49g); *Ulmus* sp. (0.17g, 1.8%); *Quercus* sp., heartwood (9.06g, 95.7%); *Corylus* sp. (0.24g, 2.5%) (R Gale 1999)

Initial comment: as HAR-4845

Objectives: as HAR-4845

Calibrated date: 1 σ : cal AD 970–1120
2 σ : cal AD 880–1170

Final comment: see HAR-4640

Laboratory comment: Ancient Monuments Laboratory (1994), HAR-4837 is a replicate of HAR-4645 on the same material. This is one of the rare cases when it is statistically valid to combine radiocarbon determinations before calibration (Ward and Wilson 1978). The weighted mean of the combined date is 1008 \pm 46 BP, which calibrates to cal AD 900–1160 at 95% confidence (Reimer *et al* 2004).

References: Reimer *et al* 2004

OxA-1055 310 \pm 100 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: DHRC1, submitted in August 1986 by D Haddon-Reece

Material: wood: *Quercus* sp.

Initial comment: core from Bressumer in room 3, wall 1B, context 5.

Objectives: to date the Bressumer. Samples OxA-1055 and OxA-1056 were measured in an attempt to assist the dating of a floating tree-ring sequence.

Calibrated date: 1 σ : cal AD 1450–1800
2 σ : cal AD 1420–1955*

Final comment: L Keen (1992), OxA-1055 and OxA-1056 phase three within the Prudhoe Castle but these dates are clearly too late. The gatehouse may be dated on architectural grounds to the early twelfth century, a date supported by historical evidence. And with some confidence, a date in the second quarter of the twelfth century is suggested for this phase.

References: Hedges *et al* 1991b, 290

OxA-1056 510 \pm 80 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: DHRC10, submitted in August 1986 by D Haddon-Reece

Material: wood: *Quercus* sp.

Initial comment: core from lintel C, behind lintel B, in room 12.

Objectives: to date lintel C. See also OxA-1055.

Calibrated date: 1 σ : cal AD 1320–1450
2 σ : cal AD 1290–1620

Final comment: see OxA-1055

References: Hedges *et al* 1991b, 290

Puncknowle, Dorset

Location: SY 533879
Lat. 50.41.18 N; Long. 02.39.40 W

Project manager: J Chaplin (Dorset Natural History and Archaeological Society), 1959

Archival body: Dorset County Council

Description: the samples in this series are from two bowl barrows excavated in 1959 by E Greenfield. The excavation was undertaken in response to plough threat. Barrow G1 is immediately to the west of the Knoll, SY 53318783. Barrow G6 is the second most westerly of five otherwise unexcavated barrows arranged along the ridge of Limekin Hill, SY 54168710.

Objectives: to establish dates for the barrows.

References: Greenfield 1984
Hedges *et al* 1987, 294

OxA-839 4390 \pm 80 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: PKC174G6, submitted on 26 November 1985 by D Haddon-Reece

Material: charcoal: *Quercus robur* (G C Morgan)

Initial comment: charcoal sample 1, bag number 74, barrow G6. From the south quadrant of the barrow near a capstone sealing the primary burial. The sample was sealed by the barrow cairn.

Objectives: to date the primary burial immediately prior to the barrow construction.

Calibrated date: 1 σ : 3270–2900 cal BC
2 σ : 3360–2880 cal BC

Final comment: J Chaplin (1987), the date for the barrow G6 is worrying for it is clearly too early. Given the secure relationship between the primary burial and the barrow construction, the likely explanation is that the date represents intrusive charcoal from an ancient land surface.

OxA-840 3270 ±80 BP $\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: PKC234G1, submitted on 26 November 1985 by D Haddon-Reece

Material: charcoal: *Quercus robur* (G C Morgan)

Initial comment: charcoal sample 2, bag number 34A, barrow G1. From pyre silt beneath the barrow mound.

Objectives: to date the funeral pyre, which is contemporary with the burial and immediately prior to the construction of the barrow.

Calibrated date: 1 σ : 1640–1450 cal BC
2 σ : 1750–1400 cal BC

Final comment: J Chaplin (1987), this date is in close accord with the pottery chronology (Tomalin 1984), which suggests that the two bowl barrows were constructed and used in the period c 1540–1610 cal BC (3350–3250 BP).

References: Tomalin 1984

Raisthorpe Manor, North Yorkshire

Location: SE 852624
Lat. 54.03.01 N; Long. 00.41.55 W

Project manager: A E Finney (East Riding Archaeological Research Committee), 1965

Archival body: Hull and East Riding Museum

Description: this site was excavated by Mortimer in 1863 and classed as a round barrow (his Towthorpe Group 3). Re-excavation in 1965 disclosed a long barrow 80ft long and 50ft wide, with ditches 4ft deep on the north and south sides containing ox bones, flint artefacts, charcoal, and Neolithic pottery sherds. At the eastern end was an outcurved facade bedding trench and a 5ft deep cremation pit. The pit was located in the centre, and contained vertical blocks of charcoal, bone ash, red ash, sherds, and fused flint. Traces of the fused flint and bone cremation deposit reported in 1863 were found in situ to the west of this pit. There were indications of a wall to the south. Within the mound was a 4ft deep pit, a hearth, scattered burnt and unburnt bone, and pockets of charcoal. Part of the cremation area was paved, and near the western end were the remains of a shallow ditch across the mound, and a deep grave containing an inhumation with an amber bead. The barrow mound was constructed of chalk and marl thrown up from the ditches (Brewster 1965).

Objectives: to date the construction and different elements of the long barrow.

Laboratory comment: English Heritage (2 October 2003), a further sample RMLBT44 (HAR-8784) submitted for dating failed to produce a result.

References: Brewster 1965, 8
Butcher and Garwood 1994

HAR-8781 4940 ±80 BP $\delta^{13}\text{C}$: -26.6‰

Sample: RMLBT32, submitted on 7 August 1985 by A E Finney

Material: charcoal (remaining subsample identified): unidentified (0.03g); *Quercus* sp. (>0.01g, 50%); *Fraxinus* sp. (>0.01g, 50%) (R Gale 1999)

Initial comment: from yellow marly loam from centre of mound body, *in situ* from trench 3, section T(4).

Objectives: to date erection of long barrow mound.

Calibrated date: 1 σ : 3800–3640 cal BC
2 σ : 3960–3530 cal BC

Final comment: (14 April 2009), this result dates the construction of the long barrow mound.

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-8782 4850 ±100 BP $\delta^{13}\text{C}$: -26.9‰

Sample: RMLBFT1, submitted on 7 August 1985 by A E Finney

Material: charcoal: unidentified

Initial comment: from lower fill of facade bedding trench, section E.

Objectives: to date the construction of the facade bedding trench and therefore also the mortuary enclosure and related features.

Calibrated date: 1 σ : 3710–3520 cal BC
2 σ : 3930–3370 cal BC

Final comment: A E Finney, dates period of use of bedding trench and related features of the mortuary enclosure, pavement, etc.

HAR-8783 5070 ±60 BP $\delta^{13}\text{C}$: -26.0‰

Sample: RMLBFBT3, submitted on 7 August 1985 by A E Finney

Material: charcoal (remaining subsample identified): unidentified (0.03g); *Quercus* sp., heartwood (>0.01g, 100%) (R Gale 1999)

Initial comment: from upper fill of facade bedding trench, trench 3, section E.

Objectives: to establish the period of use for the facade bedding trench, and therefore also dating the related features of the mortuary enclosure and pavement.

Calibrated date: 1 σ : 3960–3780 cal BC
2 σ : 3990–3700 cal BC

Final comment: A E Finney (1991), *see* HAR-8782

References: Hardiman *et al* 1992, 50
Walker *et al* 1991a, 107

Rand Church, Lincolnshire

Location: TF 107791
Lat. 53.17.49 N; Long. 00.20.21 W

Project manager: N Field (Lincolnshire Archaeological Unit), 1982

Archival body: City and County Museum Lincoln

Description: excavations at Rand church in advance of re-flooring in the nave revealed earlier phases of the church. Two burials were found which pre-dated the sandstone foundations and hint at the possibility of an even earlier church of which no trace was found. A large domestic oven at the east end of the nave was evidence of pre-church activity. Samples for radiocarbon and magnetic dating were taken.

Objectives: in the debris were fragments of a limestone vessel, similar to certain Saxon lamps. The radiocarbon date will help to confirm the period of activity represented by the oven.

Laboratory comment: English Heritage (22 December 2009), an archaeomagnetic sample was also taken from the furnace (the magnetic vector information was: Dec=14.0, Inc=60.8, Number of samples=17, k=73.105, alpha-95=4.2; Site Latitude=53.3, Longitude=0.3; Mean direction at Meridian: Dec=13.3, Inc=59.8). Using the Clark *et al* (1988) calibration curve this would calibrate to AD 1180–1265 at 63% confidence, and AD 1140–1290 at 95% confidence.

References: Clark *et al* 1988
Field 1983a
Field 1983b

HAR-5228 750 ±60 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: RAND01, submitted on 8 October 1982 by N Field

Material: charcoal (remaining subsample identified): unidentified (5.98g); *Alnus* sp., roundwood (0.05g, 2.8%); *Quercus* sp., sapwood (0.59g, 32.6%); *Quercus* sp., heartwood (1.17g, 64.6%) (R Gale 1999)

Initial comment: the sample was taken from inside a furnace thought to be possibly Roman or medieval.

Objectives: the radiocarbon result will provide a comparison for the archaeomagnetic date from the furnace.

Calibrated date: 1 σ : cal AD 1220–1290
2 σ : cal AD 1160–1390

Final comment: K Cullen (23 December 2009), this confirms the archaeomagnetic date and indicates the oven to be of medieval date.

Raunds: Furnells Manor, Northamptonshire

Location: SP 999733
Lat. 52.20.54 N; Long. 00.32.00 W

Project manager: M Audouy (Northampton County Council), 1979, 1980, and 1982

Archival body: Northamptonshire Heritage

Description: excavations at this site include a Saxon settlement, a late Saxon church and cemetery, and a medieval manor house. Work on this began in 1977 and was completed in 1982 although excavation of surround sites continues to investigate the nature and evolution of the Saxon and medieval landscape complex.

Objectives: there is uncertainty with regard to both the foundation of the church, due to the undeveloped state of pottery studies of the period, and with regard to the demolition of the churches, due to the lack of dating evidence from the succeeding phase. The precise dating of the church or churches is essential for the accurate phasing of the site and to link the structures to the documentary evidence, and in particular to establish if there is contemporaneity between the church and the newly discovered manorial complex. To this end it is proposed to link the detailed study of the pottery with a series of carefully selected radiocarbon dates from the pre-church and church sequence.

Final comment: M Audouy and A Chapman (2009), the value of the radiocarbon results from north Raunds is limited in that none is representative of a context which formed part of a good relative sequence (Audouy and Chapman 2009, 59).

References: Audouy and Chapman 2009
Boddington 1987
Boddington 1996

HAR-4903 1480 ±90 BP

$\delta^{13}\text{C}$: -25.4‰

Sample: 223, submitted on 4 September 1981 by G Cadman

Material: charcoal (remaining subsample identified): unidentified (0.89g); *Quercus* sp., probably all heartwood (0.39g, 100%) (R Gale 1999)

Initial comment: from an oven pit SP76, unit number 4337. It is the only sample from an early feature, which appears to date the feature rather than its backfill.

Objectives: to provide a date for a unique series of associated features with similar fills found to exist in isolation at the extreme southern edge of the site. The age expected is medieval.

Calibrated date: 1 σ : cal AD 440–660
2 σ : cal AD 390–690

Final comment: M Audouy and A Chapman (2009), this result, along with HAR-5492 and HAR-5493, confirms the presence of early Saxon settlement at Furnells, with a possible abandonment, or at least a decline, in the mid-seventh century (Audouy and Chapman 2009, 60).

References: Walker *et al* 1988, 325–6

HAR-5010 970 ±70 BP

$\delta^{13}\text{C}$: -21.6‰

Sample: 5222-111, submitted on 15 April 1982 by A Boddington

Material: human bone

Initial comment: from an Anglo Saxon cemetery. The sample is contemporary with period II C of the church. For further measurements from period II C see HAR-5016 (5254-119)

and HAR-5019 (5178-113). These three samples should be later than HAR-5015 (546-71), which pre-dates the period.

Calibrated date: 1 σ : cal AD 1010–1160
2 σ : cal AD 900–1220

Final comment: A Boddington (1996), all the dates were from the graveyard with the exception of HAR-5015, which is from the fourth layer in sequence within the first church chancel (SP4). Samples were primarily selected to date the church. It is unlikely that internal phasing within the graveyard could have been determined from these dates on account of the short life of the graveyard, about two centuries compared to the large standard deviation associated with the dates. With the exception of HAR-5013, which is unacceptably early on archaeological grounds, the dates indicate a period of use in the tenth and eleventh centuries for the church and graveyard. The most probable 2 σ range for an average of the cemetery dates (excluding the chancel sample and HAR-5013) is cal AD 978–1040.

References: Walker *et al* 1988, 325–6

HAR-5011 960 \pm 60 BP

$\delta^{13}\text{C}$: -22.1‰

Sample: 5299-136, submitted on 15 April 1982 by A Boddington

Material: human bone

Initial comment: from a late Anglo Saxon Christian cemetery. The sample is contemporary with period II A/B of the church. For further measurements from period II A/B see HAR-5013 (5266-122), HAR-5014 (5223-112), and HAR-5020 (5298-134).

Calibrated date: 1 σ : cal AD 1010–1160
2 σ : cal AD 980–1220

Final comment: see HAR-5010

References: Walker *et al* 1988, 325–6

HAR-5012 1000 \pm 70 BP

$\delta^{13}\text{C}$: -22.1‰

Sample: 5286-135, submitted on 15 April 1982 by A Boddington

Material: human bone

Initial comment: from a late Anglo Saxon Christian cemetery. The sample is contemporary with period II A/B of the church. For further measurements from period II A/B see HAR-5013 (5266-122), HAR-5014 (5223-112), and HAR-5020 (5298-134).

Calibrated date: 1 σ : cal AD 980–1160
2 σ : cal AD 890–1210

Final comment: see HAR-5010

References: Walker *et al* 1988, 326–6

HAR-5013 1320 \pm 70 BP

$\delta^{13}\text{C}$: -21.0‰

Sample: 5266-122, submitted on 15 April 1982 by A Boddington

Material: human bone

Initial comment: from a late Anglo Saxon Christian cemetery. The sample is contemporary with period II A/B of the church. For further measurements from period II A/B see HAR-5011 (5299-136), HAR-5014 (5223-112), and HAR-5020 (5298-134).

Calibrated date: 1 σ : cal AD 650–780
2 σ : cal AD 600–890

Final comment: see HAR-5010

References: Walker *et al* 1988, 325–6

HAR-5014 1110 \pm 90 BP

$\delta^{13}\text{C}$: -22.4‰

Sample: 5223-112, submitted on 15 April 1982 by A Boddington

Material: human bone

Initial comment: from a late Anglo Saxon cemetery. The sample is possibly contemporary with Period II A/B of the church. For further measurements from period II A/B see HAR-5011 (5299-136), HAR-5013 (5266-122), and HAR-5020 (5298-134).

Calibrated date: 1 σ : cal AD 780–1020
2 σ : cal AD 680–1150

Final comment: see HAR-5010

References: Walker *et al* 1988, 325–6

HAR-5015 1040 \pm 70 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: 546-71, submitted on 15 April 1982 by A Boddington

Material: charcoal: unidentified

Initial comment: from the chancel of a church. The sample pre-dates the period II C rebuilding of the church and therefore the result should be earlier than the results for HAR-5010 (5222-111), HAR-5016 (5254-119), and HAR-5019 (5178-113).

Calibrated date: 1 σ : cal AD 900–1040
2 σ : cal AD 870–1160

Final comment: see HAR-5010

References: Walker *et al* 1988, 325–6

HAR-5016 1080 \pm 70 BP

$\delta^{13}\text{C}$: -22.6‰

Sample: 5254-119, submitted on 15 April 1982 by A Boddington

Material: human bone

Initial comment: from a late Anglo Saxon cemetery. The sample is contemporary with period II C of the church. For further measurements from period II C see HAR-5010 (5222-111) and HAR-5019 (5178-113). These three samples should be later than HAR-5015 (546-71), which pre-dates the period.

Calibrated date: 1 σ : cal AD 890–1030
2 σ : cal AD 770–1150

Final comment: see HAR-5010

References: Walker *et al* 1988, 325–6

HAR-5019 930 ±70 BP

$\delta^{13}\text{C}$: -22.0‰

Sample: 9178-113, submitted on 15 April 1982 by A Boddington

Material: human bone

Initial comment: from late Anglo Saxon Christian cemetery. The sample is contemporary with period II C of the church. For further measurements from period II C, see HAR-5010 (5222-111) and HAR-5016 (5254-119). These three samples should be later than HAR-5015 (546-71), which pre-dates the period.

Calibrated date: 1 σ : cal AD 1020–1210
2 σ : cal AD 980–1260

Final comment: see HAR-5010

References: Walker *et al* 1988, 325–6

HAR-5020 1100 ±80 BP

$\delta^{13}\text{C}$: -22.8‰

Sample: 5298-134, submitted on 15 April 1982 by A Boddington

Material: human bone

Initial comment: from late Anglo Saxon Christian cemetery. The sample is contemporary with period II A/B of the church. For further measurements from period II A/B see HAR-5011 (5299-136), HAR-5013 (5266-122), and HAR-5014 (5223-112).

Calibrated date: 1 σ : cal AD 870–1020
2 σ : cal AD 710–1150

Final comment: see HAR-5010

References: Walker *et al* 1988, 325–6

HAR-5492 2000 ±120 BP

$\delta^{13}\text{C}$: -27.5‰

Sample: 2416-131, submitted on 9 March 1983 by G Cadman

Material: charcoal: unidentified

Initial comment: from the fill of a possible hearth, SP1. The sample is from unit 2226 within cut 2250.

Objectives: the sample is believed to pre-date the use of the late Saxon cemetery. The sample is provisionally dated as *c* seventh century. A radiocarbon date is important in dating the early settlement at the east end of the site and for comparison with provisional pottery typology.

Calibrated date: 1 σ : 170 cal BC–cal AD 130
2 σ : 370 cal BC–cal AD 260

Final comment: M Audouy and A Chapman, see HAR-4903

HAR-5493 1420 ±90 BP

$\delta^{13}\text{C}$: -26.6‰

Sample: 2912-155, submitted on 9 March 1983 by G Cadman

Material: charcoal: unidentified

Initial comment: from the fill of a hollow, SP18. Charcoal flecks and small charcoal fragments in a clay matrix occurred throughout the full extent of the infill, unit 2912. The feature may form part of a sunken-featured structure.

Objectives: believed to pre-date the use of the late Saxon cemetery. As HAR-5492, provisionally dated as *c* seventh century but it may represent activity of a phase different to that of HAR-5492.

Calibrated date: 1 σ : cal AD 560–670
2 σ : cal AD 420–780

Final comment: M Audouy and A Chapman, see HAR-4903

HAR-5494 940 ±90 BP

$\delta^{13}\text{C}$: -26.4‰

Sample: 6635-246, submitted on 9 March 1983 by G Cadman

Material: charcoal: unidentified

Initial comment: from the fill of a posthole. The sample is believed to be contemporary with the use of the posthole. The posthole forms part of a structure of *c* eighth century date and is the only sample available for this phase of the site's occupation.

Objectives: to date the timber building of which the posthole forms a part.

Calibrated date: 1 σ : cal AD 1010–1220
2 σ : cal AD 890–1270

Laboratory comment: English Heritage (8 April 2009), this result is not reported by Boddington (1987) because it was a poor quality sample that required the miniature gas counter (Otlet *et al* 1983) and so a result was not reported until 1989.

References: Otlet *et al* 1983
Walker *et al* 1991a, 90

HAR-5495 1230 ±70 BP

$\delta^{13}\text{C}$: -24.2‰

Sample: 7874-290, submitted on 9 March 1983 by G Cadman

Material: animal bone

Initial comment: the bone was part of fill 7874 from pit SP122. Only a few small pieces of bone were present and they may relate to the pottery vessel buried under fill 7874.

Objectives: the bone is probably seventh century in date. The sample will provide a date for the pot burial.

Calibrated date: 1 σ : cal AD 680–890
2 σ : cal AD 650–980

Final comment: M Audouy and A Chapman (2009), this result suggests that despite the absence of imported middle Saxon pottery there was still some activity on the site in the middle of the Saxon period (Audouy and Chapman 2009, 60).

Raunds: Stanwick, Northamptonshire

Location: SP 97077175
Lat. 52.20.05 N; Long. 00.34.31 W

Project manager: R Perrin (Central Excavation Unit), 1985

Description: the Roman villa at Stanwick is situated on the west side of Stanwick village and the newly constructed A405 bypass. It occupies a gravel terrace on the east bank of the River Nene close to a point where the river swings west to join a secondary canalised channel on the west side of the floodplain.

Objectives: to date the sequence of deposits.

References: Neal 1989
Parry 2006

HAR-8526 1220 ±70 BP

$\delta^{13}\text{C}$: -31.8‰

Sample: 10743, submitted on 6 April 1987 by N D Balaam

Material: wood (waterlogged): *Crataegus* sp.

Initial comment: from level of peat and brushwood immediately underlying the road surface.

Objectives: the road has been assumed to be Romano-British. However some of the finds may be substantially later. Dating of the organic material immediately beneath the road might confirm a post-Roman date for the road construction.

Calibrated date: 1 σ : cal AD 680–900
2 σ : cal AD 650–990

Final comment: A G Brown (2006), the date indicates that this channel of the Nene, adjacent to West Cotton, was active in the Saxon period (Brown in Parry 2006, 36); and that the metalled trackway that sealed this channel was in fact of medieval, not Romano-British, date.

References: Parry 2006, 36

Reading: Crane Wharf, Berkshire

Location: SU 71897335
Lat. 51.27.15 N; Long. 00.57.55 W

Project manager: P J Fasham (Wessex Archaeology), November 1985

Archival body: Wessex Archaeology

Description: the excavation at Crane Wharf forms part of the Trust for Wessex Archaeology's long term project to investigate the management and development of the inland waterfronts of Reading. With only 7% of the below ground history of Reading surviving this project provided a rare opportunity to gather archaeological evidence for the commercial development of the medieval town.

Objectives: the work at Crane Wharf should be seen as a logical continuation of the excavations carried out in 1981 and 1983/4 at the Abbey Wharf and Stable sites to the north of King's Road. Both of these previous sites lay within the Abbey precinct and revealed evidence of large scale management of the River Kennet and the mill stream from the twelfth century to the seventeenth century in the form of a sequence of continually replaced revetted timber waterfronts. Crane Wharf is just outside the Abbey precinct at the presumed junction of the Abbey and town wharves. It was hoped that the excavations would demonstrate the existence or otherwise of town wharves and associated activities upstream from the monastic area.

Laboratory comment: English Heritage (21 March 2008), another sample, W112/22 (HAR-9212), failed.

References: Hawkes and Fasham 1997

HAR-7020 4740 ±70 BP

$\delta^{13}\text{C}$: -32.4‰

Sample: W112188, submitted in April 1985 by J Terry

Material: wood (waterlogged; mixture of species): unidentified

Initial comment: from layer of gravel and sand beneath brown organic rich silt at W112.

Objectives: to ascertain possible prehistoric date of associated deposits.

Calibrated date: 1 σ : 3640–3370 cal BC
2 σ : 3660–3360 cal BC

Final comment: JW Hawkes and P J Fasham (1997), these radiocarbon dates place the deposits within phase 1a on the Crane Wharf site.

Laboratory comment: English Heritage (25 March 2009), this laboratory number was assigned in error to two different samples, this one and HAR-7020 from Brean Down.

HAR-7026 1970 ±70 BP

$\delta^{13}\text{C}$: -30.1‰

Sample: W112187, submitted in April 1986 by J Terry

Material: wood (waterlogged; remaining subsample of wood chips identified): Salicaceae (131.20g, 87.18%); Salicaceae, mixture of *Alnus* sp., *Corylus* sp., and ?*Ulmus* sp. (17.80g, 11.83%); *Alnus* sp. (0.96g, 0.64%); ?*Ulmus* sp. (0.19g, 0.13%); *Salix* sp. (0.12g, 0.08%); unidentified (49.50g); *Corylus* sp. (0.22g, 0.15%) (R Gale 1997)

Initial comment: from layer 187 consisting of brown organic rich silt, similar to peat.

Objectives: as HAR-7020

Calibrated date: 1 σ : 50 cal BC–cal AD 120
2 σ : 170 cal BC–cal AD 220

Final comment: see HAR-7020

References: Walker *et al* 1990, 180

HAR-7027 4990 ±60 BP

$\delta^{13}\text{C}$: -32.4‰

Sample: W112188, submitted in April 1986 by J Terry

Material: wood (waterlogged; remaining subsample of wood chips identified): *Alnus* sp. (23.70g, 100%); unidentified (76.40g) (R Gale 1997)

Initial comment: from layer 188 consisting of gravel and sand. This layer was beneath layer 187 from which HAR-7026 was taken.

Objectives: as HAR-7020

Calibrated date: 1 σ : 3920–3700 cal BC
2 σ : 3960–3650 cal BC

Final comment: see HAR-7020

References: Walker *et al* 1990, 180

HAR-7028 4950 ±80 BP

$\delta^{13}\text{C}$: -27.5‰

Sample: W112195, submitted in April 1986 by J Terry

Material: wood (waterlogged): *Alnus glutinosa*

Initial comment: the sample came from a large waterlogged timber from layer 188, overlying laminated sands and gravels.

Objectives: as HAR-7020

Calibrated date: 1 σ : 3900–3650 cal BC
2 σ : 3960–3540 cal BC

Final comment: see HAR-7020

References: Walker *et al* 1990, 180

Ribchester, Lancashire

Location: SD 468351
Lat. 53.48.39 N; Long. 02.32.05 W

Project manager: A C H Olivier (Lancaster University Archaeology Unit), 1980

Archival body: Lancaster City Museum

Description: an area of 230 square metres was excavated in the field adjacent to Parsonage Avenue, Ribchester.

Objectives: to explore Roman deposits revealed by trial trenching and examine the edge of presumed *vicus* occupation in this part of Ribchester.

Final comment: A Olivier (6 February 2006), an arc of five Bronze Age cremation burials (contained within Collared Urns) associated with a possible ring ditch was revealed below the floor level of a rectangular Roman timber building. Presumably representing a small flat cremation cemetery, although possibly the remains of a barrow flattened by later Roman activity.

References: Olivier and Clack 1982
Olivier and Turner 1987

HAR-4443 3250 ±80 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: RB80 067, submitted in February 1981 by A C H Olivier

Material: charcoal: *Quercus* sp., from mature timbers; ?*Quercus* sp, from mature timbers (C A Keepax)

Initial comment: from cremation burial.

Objectives: to establish the date of the burial.

Calibrated date: 1 σ : 1620–1430 cal BC
2 σ : 1740–1390 cal BC

Final comment: A Olivier (15 November 2006), the identifiable urns belong to Longworth's Secondary Series of North Western Style of Collared Urn (Longworth 1984): the most frequently recorded style of early Bronze Age pottery within the region, characterised by relatively deep collars and pronounced lower collar lips. The five cremation burials also have an apparently direct spatial relationship and are therefore assumed to be broadly contemporary. Nevertheless the calibrated radiocarbon dates cover a very wide range (from possibly as early as the late Neolithic to the beginnings of the first millennium BC) - reflected in the dates of the two samples from a primary urn (HAR-4444) and the inserted vessel (HAR-4446). Each burial is also stratigraphically isolated, so there is no direct physical relationship between the burials. Throughout the North West, there is considerably variation in the complexity and longevity of funerary tradition during the later Neolithic and early Bronze Age, and it is clear that individual sites may have been used and reused for a considerable period of time, and there is no reason why the small, presumably flat, Bronze Age cemetery at Ribchester should be any different.

References: Hodgson and Brennand 2006
Hodgson and Brennand 2007
Longworth 1984

HAR-4444 2800 ±100 BP

$\delta^{13}\text{C}$: -25.5‰

Sample: RB80 068, submitted in February 1981 by A C H Olivier

Material: charcoal: *Quercus* sp., from mature timbers (C A Keepax)

Initial comment: from primary Collared Urn.

Objectives: to establish the date of the burial.

Calibrated date: 1 σ : 1120–830 cal BC
2 σ : 1270–790 cal BC

Final comment: see HAR-4443

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1991a, 89

HAR-4445 2860 ±90 BP $\delta^{13}\text{C}$: -27.5‰*Sample*: RB80 057, submitted in February 1981 by A C H Olivier*Material*: charcoal: ?*Quercus* sp., from mature timbers (C A Keepax)*Initial comment*: from cremation burial.*Objectives*: to establish the date of the burial.*Calibrated date*: 1 σ : 1200–910 cal BC
2 σ : 1320–820 cal BC*Final comment*: see HAR-4443*Laboratory comment*: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).*Laboratory comment*: English Heritage (3 January 2012), this result is published (Walker *et al* 1990, 167), although a final certificate has not been found.*References*: Otlet *et al* 1983
Walker *et al* 1990, 167**HAR-4446** 3820 ±120 BP $\delta^{13}\text{C}$: -26.9‰*Sample*: RB80 068b, submitted in February 1981 by A C H Olivier*Material*: charcoal: *Quercus* sp., from mature timbers (C A Keepax)*Initial comment*: from the fill inside internal vessel.*Objectives*: to establish the date of the burial.*Calibrated date*: 1 σ : 2470–2040 cal BC
2 σ : 2580–1930 cal BC*Final comment*: see HAR-4443*References*: Walker *et al* 1990, 167**Rowden, Dorset***Location*: SY 617893
Lat. 50.42.05 N; Long. 02.32.33 W*Project manager*: P J Woodward (Dorset County Museum), 1981*Archival body*: Wessex Archaeology*Description*: a middle Bronze Age settlement surviving as an earthwork. There are hut platforms within small field enclosures dented by a double lynchet way, and there is an associated enclosure and barrows to the south.*Objectives*: to establish chronological and environmental sequences within an extensive prehistoric settlement study for an area, which contains one of the densest concentrations of Neolithic and Bronze Age barrows in southern England.*Laboratory comment*: Ancient Monuments Laboratory (1991), another sample HAR-5250 was submitted for dating but no result was obtained.*References*: Woodward 1991**HAR-5245** 4690 ±70 BP $\delta^{13}\text{C}$: -26.5‰*Sample*: RD82287, submitted on 13 October 1982 by P J Woodward*Material*: charcoal: unidentified*Initial comment*: from layer 287 in post pit 282.*Objectives*: to establish the date of the pit with early Neolithic sherds.*Calibrated date*: 1 σ : 3630–3360 cal BC
2 σ : 3640–3340 cal BC*Final comment*: P J Woodward (1991), it provides a date as suggested in the phase sequence, a structural setting in the early Neolithic, and a date for quartz gritted wares with bead rims and cord impressions.*References*: Walker *et al* 1988, 330**HAR-5246** 5250 ±140 BP $\delta^{13}\text{C}$: -26.3‰*Sample*: RD82523, submitted on 13 October 1982 by P J Woodward*Material*: charcoal: unidentified*Initial comment*: from layer 523 in pit 327.*Objectives*: to establish a date for the deliberate compaction and infilling of the early Neolithic pit.*Calibrated date*: 1 σ : 4310–3950 cal BC
2 σ : 4360–3710 cal BC*Final comment*: P J Woodward (1991), the date closely conforms to HAR-5248 and HAR-5247 from the base of the same pit. Plain early Neolithic Hembury type carinated wares were recovered from the pit infill.*Laboratory comment*: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).*References*: Otlet *et al* 1983
Walker *et al* 1990, 168**HAR-5247** 4940 ±70 BP $\delta^{13}\text{C}$: -26.7‰*Sample*: RD82571, submitted on 12 October 1982 by P J Woodward*Material*: charcoal (remaining subsample identified): unidentified (20.56g); *Fraxinus* sp. (0.72g, 22%); Pomoideae (0.97g, 29%); *Quercus* sp., sapwood and heartwood (1.01g, 30%); *Corylus* sp. (0.64g, 19%) (R Gale 1997)*Initial comment*: from layer 571 in pit 327.*Objectives*: to establish a date for the primary infilling of this early Neolithic pit.

Calibrated date: 1 σ : 3790–3650 cal BC
2 σ : 3950–3630 cal BC

Final comment: see HAR-5246

References: Walker *et al* 1988, 330

HAR-5248 4860 \pm 70 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: RD82634, submitted on 13 October 1982 by P J Woodward

Material: charcoal (remaining subsample identified): unidentified (8.20g); *Fraxinus* sp. (0.30g, 9%); *Quercus* sp., mostly heartwood (2.70g, 77%); *Corylus* sp. (0.50g, 14%) (R Gale 1997)

Initial comment: from layer 634 in pit 327.

Objectives: to establish a date for the base layer of this early Neolithic pit.

Calibrated date: 1 σ : 3710–3540 cal BC
2 σ : 3790–3520 cal BC

Final comment: see HAR-5246

References: Walker *et al* 1988, 330

HAR-5249 2920 \pm 80 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: RD8237, submitted on 13 October 1982 by P J Woodward

Material: charcoal (remaining subsample identified): unidentified (1.10g); *Alnus* sp. (1.60g, 100%) (R Gale 1997)

Initial comment: from layer 837 from the entrance posthole 841 of the middle Bronze Age hut.

Objectives: to date the construction of the hut.

Calibrated date: 1 σ : 1270–1000 cal BC
2 σ : 1390–900 cal BC

Final comment: P J Woodward (1991), the date is compatible with those of carbonised grain in the storage pit (see HAR-5698), and provides a date for a small globular urn found in another structural posthole (720) of the same building.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 168

HAR-5548 2940 \pm 70 BP

$\delta^{13}\text{C}$: -23.6‰

Sample: RD815773, submitted on 25 April 1983 by P J Woodward

Material: grain (carbonised)

Initial comment: from layer 577 from storage pit 722 within middle Bronze Age hut.

Objectives: to provide a more reliable date for the hut's usage than that provided by the charcoal samples HAR-5249 and HAR-5250.

Calibrated date: 1 σ : 1270–1020 cal BC
2 σ : 1390–930 cal BC

Final comment: P J Woodward (1991), this is a contemporaneous date with that of the hut construction, HAR-5249.

References: Walker *et al* 1988, 330

HAR-5698 2920 \pm 80 BP

$\delta^{13}\text{C}$: -23.2‰

Sample: RD815773, submitted on 25 April 1983 by P J Woodward

Material: grain (carbonised)

Initial comment: a repeat of HAR-5548.

Objectives: as HAR-5548

Calibrated date: 1 σ : 1270–1000 cal BC
2 σ : 1390–900 cal BC

Final comment: P J Woodward (1991), this is contemporaneous with the hut construction, HAR-5249.

Final comment: A Bayliss (11 September 2008), the two radiocarbon results from this deposit are statistically consistent ($T'=0.0$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978); the weighted mean of these measurements (2931 \pm 53 BP) provides a date of 1310–970 cal BC (95% confidence; Reimer *et al* 2004) for this pit.

References: Reimer *et al* 2004
Walker *et al* 1988, 330
Ward and Wilson 1978

Roxton: ring ditch (C), Bedfordshire

Location: TL 158535
Lat. 52.10.02 N; Long. 00.18.24 W

Project manager: P J Woodward and A F Taylor (Unknown), 1974

Archival body: Bedford Museum

Description: ring ditch (C) in a group of five; the primary burial in a Collared Urn was disturbed by the digging of two pits for the second burial; a third burial was inserted into the ditch silt, while a hearth, possibly Roman was found in the upper fill of the ditch.

Objectives: the samples were taken:

1. to date the construction of the monument and the primary burial, and to give a date for the final phase of pit construction: this should be later than HAR-999 and HAR-1000 (perhaps *c* 150 years or more), but within the Bronze Age, although a later date is possible;
2. to compare HAR-1004 with results of magnetic dating carried out on the hearth and the date from HAR-711; the date is expected to be Roman or Saxon;
3. to date the silt which occurs in all five ring ditches; the urn is probably middle Bronze Age in date; the result should be slightly later than HAR-999;
4. to establish the association of the cremated bone.

Laboratory comment: Ancient Monuments Laboratory (1995), nine further dates from this site were funded prior to 1981 and were published in the first volume of *Radiocarbon Dates* (Jordan *et al* 1991, 145–7). HAR-1005 was reported as abandoned erroneously by Jordan *et al* (1994, 146). Rather it was delayed in the queue for the small sample counter, in which it was eventually dated.

References: ApSimon 1985
Jordan *et al* 1994, 145–7
Taylor and Woodward 1985
Walker *et al* 1991a, 87

HAR-1005 2690 ±110 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: ROX74CQ3X1, submitted in January 1975 by P Woodward

Material: charcoal: unidentified

Initial comment: from the point of a stake which was pushed into a ledge into which the fireplace (HAR-1002; 3620 ±80 BP; cal 2210–1750 at 95% confidence; Reimer *et al* 2004) was cut.

Objectives: to confirm whether the stake is representative of the final phase of the pit construction or of a much later date.

Calibrated date: 1 σ : 970–790 cal BC
2 σ : 1130–540 cal BC

Final comment: P Woodward (24 February 1996), this determination provides a more precise date for the deposition of the central secondary cremation burial, since it is derived from a positive constructional element of this event. The charcoal from the central cremation may have been contaminated with earlier material (HAR-1001, 3130 ±60 BP, 1520–1260 cal BC at 95% confidence; Reimer *et al* 2004), hence this younger date for the central secondary bagged cremation with bone toggles. Bone toggles are however normally to be associated with the early Bronze Age and redeposition of toggles from the earlier primary may perhaps be the case.

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: English Heritage (3 January 2012), this result is published (Walker *et al* 1991, 87), although a final certificate has not been found.

References: Reimer *et al* 2004
Walker *et al* 1991a, 87

Runnymede Bridge, Surrey

Location: TQ 019718
Lat. 51.26.08 N; Long. 00.32.02 W

Project manager: S Needham (British Museum), 1978

Archival body: British Museum and Surrey County Council

Description: a late Bronze Age settlement on the south bank of the Thames.

Objectives: to date different stages of the deep river's edge and adjacent bank sequence, containing *in situ* structures, dense occupation refuse and rich environmental data.

Laboratory comment: Ancient Monuments Laboratory (1995), 32 results are published in the first volume of *Radiocarbon Dates*: two determinations from the 1975–6 excavations, and 30 from the 1978 excavations (Jordan *et al* 1994, 148–51). Twelve further samples were submitted in 1983, and seven results were obtained which are published below, the remaining five failed to produce results (HAR-6129, HAR-6134, HAR-6137, HAR-6854, and HAR-6855).

References: Needham 1991

HAR-6128 4920 ±80 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: A4S4B, submitted in September 1983 by S Needham

Material: wood (waterlogged): *Quercus* sp. (R Gale 1999)

Initial comment: from a pile penetrating a Neolithic brush platform and bearing stone axe cut marks. The sample came from Area 4, context A4 S4(b).

Objectives: in the hope of comparative dating with HAR-6132.

Calibrated date: 1 σ : 3790–3640 cal BC
2 σ : 3950–3530 cal BC

Final comment: S Needham (23 October 1990), HAR-6128 and HAR-6132 date two piles (S4 and S1) penetrating the brush consolidation platform in Area 4 (L120 and L121). They do not have to be of one phase, but this structure was not expected to have been long-lived. The difference between the two measurements (at 290 radiocarbon years, significantly greater than expected on the basis of their errors) is therefore a little surprising. Samples of a branch from the platform itself were submitted in the hope of comparative dating, but no results have been possible. The calibrated ranges suggest that S4 dates from the early half of the fourth millennium cal BC, and S1 from the mid-to-late fourth millennium cal BC. The calibrated ranges at 95% confidence only overlap between 3630–3520 cal BC. A subsequent date on associated brushwood is 4760 ±50 BP (BM-2773; 3650–3370 cal BC at 95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004

HAR-6130 4830 ±70 BP

$\delta^{13}\text{C}$: -29.2‰

Sample: A6F202A, submitted in September 1983 by S Needham

Material: wood (waterlogged): *Alnus glutinosa* (R Gale 1999)

Initial comment: from Neolithic worked timber from Area 6, context A6 F202(a).

Objectives: to provide a *terminus post quem* for the deposit.

Calibrated date: 1 σ : 3660–3530 cal BC
2 σ : 3760–3380 cal BC

Final comment: S Needham (23 October 1990), the two dated timbers from area 6 (HAR-6130 and HAR-6131) were both prostrate in secondary contexts within the sediments of L41, but the radiocarbon measurements are in reasonable agreement with one another at 68% confidence and provide *termini post quem* for the deposits. The overlap in the ranges at 95% confidence is 3780–3520 cal BC. Assuming that these timbers entered the channel deposits as rubbish along with the associated pottery, flint, and bone, then they give a date for the middle Neolithic assemblage. It is thought likely that deposition of this assemblage was more or less contemporary with occupation (Needham 1991, chapter 2).

References: Needham 1991

HAR-6131 4930 ±90 BP

$\delta^{13}\text{C}$: -25.0‰

Sample: A6F168A, submitted in September 1983 by S Needham

Material: wood (waterlogged): Salicaceae (R Gale 1999)

Initial comment: from Neolithic worked timber from area 6, context A6 168(a).

Objectives: as HAR-6130

Calibrated date: 1 σ : 3800–3640 cal BC
2 σ : 3960–3520 cal BC

Final comment: see HAR-6130

HAR-6132 4630 ±70 BP

$\delta^{13}\text{C}$: -27.5‰

Sample: A4SIB, submitted in September 1983 by S Needham

Material: wood (waterlogged): *Quercus* sp. (R Gale 1999)

Initial comment: from the tip of a pile penetrating a Neolithic brush platform in area 4, context A4 S1(b).

Objectives: as HAR-6128

Calibrated date: 1 σ : 3520–3350 cal BC
2 σ : 3640–3110 cal BC

Final comment: see HAR-6128

HAR-6133 4690 ±110 BP

$\delta^{13}\text{C}$: -26.9‰

Sample: A83BA, submitted in September 1983 by S Needham

Material: wood (waterlogged; remaining subsample identified): *Quercus* sp., heartwood (R Gale 1999)

Initial comment: from area 8, context A8 3B(a); the sample came from the tip of a pile penetrating pre-Neolithic layers; the pile is either Neolithic or late Bronze Age.

Objectives: to date the pile to either Neolithic or late Bronze Age.

Calibrated date: 1 σ : 3640–3360 cal BC
2 σ : 3700–3100 cal BC

Final comment: S Needham (23 October 1990), HAR-6133 was one of several timber piles recovered from the base of a section almost 2m below the late Bronze Age horizon and also below a pre-late Bronze Age thick bed of gravel (L84). It was felt rather unlikely that the piles had been driven through this gravel, and on this basis they would be somewhat earlier than late Bronze Age. The measurement of HAR-6133 is in fact well within the range of dates associated with middle Neolithic activity in areas 4 and 6 and therefore suggests a wider geographical spread of that activity.

HAR-6136 4270 ±110 BP

$\delta^{13}\text{C}$: -21.0‰

Sample: A6F125A, submitted in September 1983 by S Needham

Material: bone

Initial comment: from area 6, context A6 F125(a); the sample was a butchery deposit stratified late in the Neolithic sequence. This sample is from the same area as HAR-6130 and HAR-6131.

Objectives: to provide an indication of the chronology of the silts between the two main cultural horizons.

Calibrated date: 1 σ : 3020–2700 cal BC
2 σ : 3330–2570 cal BC

Final comment: S Needham (23 October 1990), this sample provides a useful indication of the chronology of the silts between the two main cultural horizons. The group of butchered bones which was sampled was unquestionably *in situ*, and provides a date for the level, fairly high in L40. This result, in conjunction with HAR-6130 and HAR-6131, suggests that there was a substantial passage of time, perhaps several hundred years, between the respective episodes of human activity. During this interval part of layer 41 and much of layer 40 accumulated.

References: Walker and Otlet 1988, 303

HAR-6138 2830 ±110 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: A6L10B, submitted in September 1983 by S Needham

Material: animal bone: *Equus* sp., horse vertebra, articulated parts (S Needham 1983)

Initial comment: stratified late in the late Bronze Age river channel. From site ref. A6 L10b.

Objectives: to date the river channel.

Calibrated date: 1 σ : 1190–840 cal BC
2 σ : 1380–790 cal BC

Final comment: S Needham (23 October 1990), the sample has a poor standard deviation. Its calibrated distribution curve is widely spread and only the tail end corresponds properly to the hardstanding range which it should equate with or slightly post-date.

Rye Bay: steering oar, East Sussex

Location: TQ 940150
Lat. 50.54.07 N; Long. 00.45.28 W

Project manager: P Marsden (Shipwreck Heritage Centre, Hastings), 1987

Archival body: Shipwreck Heritage Centre, Hastings

Description: an enormous wooden steering oar of medieval type was trawled up by a fisherman on 23 November 1983, whilst trawling several miles. The position in which it was found was roughly three miles south-east of Rye Harbour. When found the oar was covered in mud, which together with the apparent absence of marine wood borers, indicates that up until the time of discovery, it had been buried in the sea bed. As the oar was scooped up so easily it must have been lying end-on to the run of the fishing net.

Objectives: steering oars attached to the quarters of ships were in general use until the thirteenth and fourteenth centuries, judging from illustrations on manuscripts and seals of towns. Of particular importance are the seals of the Cinque Ports of southern England for the steering oar was found off the medieval ports of Winchelsea and Rye. The seals of Winchelsea, Hythe, Pevensey, and Dover all show steering oars of the same type as was found in Rye Bay, and of course with them are shown the types of ship that used them. On the evidence of medieval illustrations, it is unlikely that the Rye Bay steering oar dates any later than the fourteenth century. In view of this it was considered necessary to date the oar in order to confirm whether or not it is of medieval date, and on the outcome of this to consider the need to examine the seabed in case the steering oar derived from a wrecked medieval merchant ship.

HAR-8940 920 ±40 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: STEEROAR, submitted on 7 December 1987 by P Marsden

Material: wood (waterlogged): *Quercus* sp.

Initial comment: the samples comes from a side rudder trawled up from the seabed.

Objectives: to confirm possible medieval date. The samples comes from a medieval type of ship's rudder, and might indicate a wreck site of a medieval merchant ship. The rudder is 22ft long and weights 1.5tons and is unlikely to have moved far from its loss site.

Calibrated date: 1 σ : cal AD 1030–1170
2 σ : cal AD 1020–1220

Final comment: P Marsden (5 February 1996), the calibrated dates of samples HAR-8940 and HAR-8981 from the pith of the tree from which this side rudder was fashioned, indicate an eleventh to twelfth century date, though a tree-ring count shows that the tree was cut a century later. A twelfth and thirteenth century date for the site rudder fits very well with what is known about the dating, on historical grounds, of the latest use of side rudders. This and another found at Bergen, Norway, are the largest medieval side rudders known and post important questions about what their parent ships were like.

Final comment: A Bayliss (11 September 2008), see HAR-8981

Laboratory comment: AERE Harwell (1988), this sample was processed using the larger sample, higher precision liquid scintillation system.

HAR-8981 900 ±40 BP

$\delta^{13}\text{C}$: -27.6‰

Sample: STEEROAR2, submitted on 7 December 1987 by P Marsden

Material: wood (waterlogged): *Quercus* sp.

Initial comment: as HAR-8940

Objectives: as HAR-8940

Calibrated date: 1 σ : cal AD 1040–1210
2 σ : cal AD 1020–1230

Final comment: see HAR-8940

Final comment: A Bayliss (11 September 2008), the two radiocarbon results from this rudder are statistically consistent ($T'=0.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978); and so a weighted mean may be taken before calibration (910 ±28 BP) which provides a date of cal AD 1030–1220 (95% confidence; Reimer *et al* 2004). Because the samples were take from the pith of a tree that was around 100 years old when felled, the rudder can be dated securely to the twelfth or thirteenth centuries cal AD.

Laboratory comment: AERE Harwell (1988), this sample was processed using the larger sample, higher precision liquid scintillation system.

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

Rye Bay: sternpost rudder, East Sussex

Location: TQ 940150
Lat. 50.54.07 N; Long. 00.45.28 W

Project manager: P Marsden (Shipwreck Heritage Centre, Hastings), 1987

Archival body: Shipwreck Heritage Centre, Hastings

Description: an almost complete sternpost rudder, with traces of wrought iron pintles and their fastenings, was trawled up by a fisherman close to the shore between Camber and Dungeness.

Objectives: sternpost rudders begin to be used from the thirteenth century onwards in northern Europe and represent a major advance in the steering of ships. The shape and condition of this rudder suggested that it came from a small medieval merchant ship, most likely a type called a 'cog'. However, as no medieval sternpost rudders had been found in Britain it was important that the rudder should be dated. Moreover, as the iron pintles, that originally attached it to the sternpost, had remained it is possible that the rudder indicated the wreck site. If medieval in date it was important to be alerted to the possibility that the wreck site might be found and plundered for its antiquities, hence the request for a radiocarbon date.

HAR-8939 560 ±40 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: SIDE RUDDER, submitted on 7 December 1987 by P Marsden

Material: wood (waterlogged): *Quercus* sp.

Initial comment: from a section of a side rudder trawled up from the seabed. The samples were taken from the heart of the tree which was probably *c* 150 years old when felled.

Objectives: to confirm a possible medieval date and perhaps indicate a shipwreck site.

Calibrated date: 1 σ : cal AD 1320–1420
2 σ : cal AD 1300–1440

Final comment: P Marsden (5 February 1996), the calibrated dates of the two samples (HAR-8939 and HAR-8980) taken from the same rudder fit what was thought to be the date of the rudder, and strengthens the view that the parent ship was most likely a 'cog'. This is the only medieval sternpost rudder yet found in Britain, and so is a clue to how merchant ships were then steered.

Final comment: A Bayliss (11 September 2008), *see* HAR-8980

Laboratory comment: AERE Harwell (1988), this sample was processed using the larger sample, higher precision liquid scintillation system.

HAR-8980 580 ±50 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: SIDE RUDDER2, submitted on 7 December 1987 by P Marsden

Material: wood (waterlogged): *Quercus* sp.

Initial comment: as HAR-8939

Objectives: as HAR-8939

Calibrated date: 1 σ : cal AD 1300–1420
2 σ : cal AD 1280–1440

Final comment: *see* HAR-8939

Final comment: A Bayliss (11 September 2008), the two radiocarbon results from this rudder are statistically consistent ($T'=0.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978); and so a weighted mean may be taken before calibration (568 ±31 BP) which provides a date of cal AD 1300–1430 (95% confidence; Reimer *et al* 2004) for this ship. Because it is not known how far the dated rings of this wood were from the bark of the tree which provided the timber for this rudder, this date is strictly only a *terminus post quem* for this ship, although it is unlikely to be more than 150 years too old.

Laboratory comment: AERE Harwell (1988), this sample was processed using the larger sample, higher precision liquid scintillation system.

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

Scilly Isles: Nornour, Cornwall

Location: SV 944148
Lat. 49.57.15 N; Long. 06.15.40 W

Project manager: S Butcher (Department of the Environment), 1969–73

Archival body: English Heritage

Description: Bronze Age to Early Iron Age settlement, with some Roman occupation.

Objectives: to date the material rescued from a sea-damaged site.

Laboratory comment: Ancient Monuments Laboratory (20 April 2001), three further dates from this site (HAR-457, HAR-459, and HAR-460) were published in Jordan *et al* (1994,154) and one further sample (HAR-458; Sample 2) was in the small counter queue and later abandoned.

References: Butcher 1978, 33, 46, 49, 66

HAR-239-(S) 3260 ±280 BP

$\delta^{13}\text{C}$: -25.0‰

Sample: NN69 Charcoal 3, submitted in 1973 by S Butcher

Material: charcoal (50% identified): *Ulmus* sp.; *Quercus* sp.; *Crataegus* sp. (C Keepax and G Morgan)

Initial comment: from NN 69, collected from the top of the lower midden in the passage between Houses I and II. Oak and larch were identified in the sample from which Char 3 was extracted, and as larch was a later introduction into the British Isles, it was presumably driftwood. Pottery associated with this sample was sent to Oxford for thermoluminescence dating and gave a result somewhere between 250 and 700 cal BC, which even at the lower end of the range is much earlier than the date suggested on archaeological grounds - first century BC or later.

Objectives: to establish the age range of the site and its position in the Iron Age and Romano British sequence. The sample comes from a critical position for the dating of Houses I, II and III.

Calibrated date: 1 σ : 1890–1210 cal BC
2 σ : 2300–840 cal BC

Final comment: K Cullen (12 January 2010), the radiocarbon determination corroborates the thermoluminescence dating of a much earlier than expected Bronze Age or early Iron Age date.

Laboratory comment: AERE Harwell (1973), the small sample weights account for the apparently large error terms.

HAR-240-(S) 2690 ±90 BP

$\delta^{13}\text{C}$: -27.0‰

Sample: NN71 S17, submitted in 1973 by S Butcher

Material: charcoal (charcoal, very finely divided charcoal, ie. residue of fine ash, in very humic soil, 500g, of which about 10% is charcoal plus humus): unidentified

Initial comment: from the filling of hearth 2 in house 5. The sample is associated with imported Iron Age pottery which could not be earlier than *c* 500 cal BC. The sample remained wet for about 7 months before submission, so there is some possibility of fungal growth which could make the sample seem too young.

Objectives: to establish the age range of the site and its position in the Iron Age and Romano-British sequence.

Calibrated date: 1 σ : 920–790 cal BC
2 σ : 1050–670 cal BC

Final comment: S Butcher (1978), this sample is associated with sherds of the Type 8 carinated bowl No 12, and others of this type came from immediately over the ram, which was apparently the only floor. There appeared to be no difference between the deposits on the floor and the general filling of Building 5, as if it had been kept clean until a late stage and then filled with rubbish and debris from the walls. The Type 8 bowls have no parallels sufficiently close for dating; they are related in a general way to numerous variations of a shape derived from late Hallstatt vessels which occur throughout the British Iron Age. If this radiocarbon date is valid it appears that the charcoal must have remained from an early phase of Building 5. This is possible, as the hearths were set over an ash-filled hollow in the ram.

Seamer Carr, North Yorkshire

Location: TA 033820
Lat. 51.13.23 N; Long. 00.24.55 W

Project manager: R T Schadla-Hall (Town Docks Museum, Hull), 1981-3

Archival body: McDonald Institute, University of Cambridge

Description: in 1976 an area of about 40ha was designed a waste disposal area at Seamer Carr by North Yorkshire County Council. An area of approximately 1000m² of detritus muds were excavated (site C) at East Island to expose the early Mesolithic landscape. The whole length of the Mesolithic shoreline within the waste disposal site boundary was investigated. This sampling programme produced evidence of an extensive site (site K) in West Embayment. The vegetational history of Seamer Carr, the infilling of the glacial Lake Pickering and in particular the local environment around the excavated sites has been reconstructed using stratigraphical and pollen analytical data supported by radiocarbon dating.

Objectives: the general aim of this project was to reconstruct the environment of the Mesolithic period from a study of the deposits contained in part of the basin formerly occupied by the glacial Lake Pickering.

Laboratory comment: Ancient Monuments Laboratory (1995), one further date, HAR-2823, was funded prior to 1981 and was published in the first volume of Radiocarbon Dates (Jordan *et al* 1994, 156). Three further samples, 50122808 (HAR-5547), SCK15751 (HAR-5788), and SCK13617 (HAR-5795) were submitted for dating but failed to produce results.

References: Cloutman 1988a
Cloutman 1988b
Jordan *et al* 1994, 156
Schadla-Hall and Cloutman 1985
Schadla-Hall and Cloutman 1987

HAR-5236 9470 \pm 100 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: SC826511, submitted on 13 October 1982 by R T Schadla-Hall

Material: wood (waterlogged; semi-charred, remaining subsample very poorly preserved and too collapsed to identify): unidentified (1.30g) (R Gale 1998)

Initial comment: from context 5012, CXIII. The peat contained struck flint, and worked wood and bone was found in the adjacent area.

Objectives: to date this peat horizon.

Calibrated date: 1 σ : 9120–8630 cal BC
2 σ : 9220–8490 cal BC

Final comment: R Housley (1998), this date comes from horizon 5012, which contained over 2000 pieces of struck flint and animal bone, and can be regarded as an interface horizon between the lower beach sand and the initial peat deposit. Although it is likely that the sample came from immediately adjacent to the cultural material, a direct causal relationship to the associated archaeology cannot be demonstrated. The age difference between this determination and HAR-5547 (8910 \pm 200 BP) from an equivalent horizon in trench C XI is potentially informative. Given that this sample maybe of mixed material of potentially differing age, it is probably safer to treat HAR-5547 as the better, if less precise, estimate for the age of context 5012.

HAR-5237 9800 \pm 80 BP

$\delta^{13}\text{C}$: -29.3‰

Sample: SC826945, submitted on 13 October 1982 by R T Schadla-Hall

Material: antler

Initial comment: from context 2506, CXIII. The peat contained struck flint in the adjacent area.

Objectives: to date the peat.

Calibrated date: 1 σ : 9310–9230 cal BC
2 σ : 9410–9150 cal BC

Final comment: R Housley (1998), this sample came from a deposit, which represents a coarse woody detritus mud formed during early Zone IV. It is not possible to demonstrate an unambiguous connection between the archaeological event that produced the struck flints and the cessation of carbon exchange in the sample. Furthermore, potential peat wastage/decay and mixing by soil organisms makes use of this determination hazardous.

HAR-5238 9300 ±110 BP $\delta^{13}\text{C}$: -28.2‰

Sample: SC826279, submitted on 13 October 1982 by RT Schadla-Hall

Material: charcoal (remaining poorly preserved and friable subsample identified; *Salix/Populus* sp. (1.54g, 100%)): unidentified (4.18g) (R Gale 1998)

Initial comment: the sample came from context 2018, CXVIII, and was a rare find of wood associated with flint in the sand. Most of the flint from the site comes from the sand, below the peat.

Objectives: to confirm the date of the flint and allow us to make a series of deductions about the formation of the sand. The nature of this sand is not perfectly understood but the estimated date is *c* 9500–7500 cal BC.

Calibrated date: 1 σ : 8710–8340 cal BC
2 σ : 8820–8280 cal BC

Final comment: R Housley (1998), this dated sample is probably not a single entity. Time-width is probable but, given the error term, is unlikely to be significant. It is doubtful if a causal relationship with the flint can be shown. However, provided the charcoal is not a mixed assemblage of differing age, HAR-5238 may well be providing a reasonable *terminus post quem* for the associated flint.

HAR-5239 8730 ±90 BP $\delta^{13}\text{C}$: -30.1‰

Sample: SC828508, submitted on 13 October 1982 by RT Schadla-Hall

Material: peat

Initial comment: from context 5005, below the mineral level and possibly signifying a zone V lake deposit.

Objectives: to elucidate the nature of the later peat deposits and indicate the date of the peat.

Calibrated date: 1 σ : 7960–7600 cal BC
2 σ : 8210–7580 cal BC

Final comment: R Housley (1998), this dated sample could have been affected by peat wastage and mixing by soil organisms, considerable care is advisable in using this measurement. To what extent it can be linked with an archaeological event is also unclear.

HAR-5240 9100 ±90 BP $\delta^{13}\text{C}$: -25.9‰

Sample: SC82841, submitted on 13 October 1982 by RT Schadla-Hall

Material: wood (and peat; waterlogged)

Initial comment: associated with bone from zone V-VI deposit associated with early Neolithic flint from site F.

Objectives: to date this zone V-VI deposit.

Calibrated date: 1 σ : 8350–8250 cal BC
2 σ : 8560–8200 cal BC

Final comment: R Housley (1998), HAR-5240 appears to be a sample of mixed composition and thus the validity of the age will depend on how coincident the ages were for the peat and the wood. The timber may have a time-width to it and the precise relationship between the cessation of carbon exchange with the atmosphere of the sample and the archaeological event(s) recorded by the bone and flint scatter is hard to define. For these reasons HAR-5240 has only limited archaeological value.

HAR-5241 9560 ±120 BP $\delta^{13}\text{C}$: -30.3‰

Sample: SC828520, submitted on 13 October 1982 by RT Schadla-Hall

Material: peat (and ?sand)

Initial comment: from context 5067, Z306A. This sample is linked directly with HAR-5242 and comes from above a mineral layer *c* 20cm thick, containing bone and flint.

Objectives: to provide a date for the mineral layer and to establish the period of its development.

Calibrated date: 1 σ : 9220–8740 cal BC
2 σ : 9280–8570 cal BC

Final comment: R Housley (1998), by its position HAR-5241 post-dates the hillwash/solifluction event and an early Holocene age would be acceptable. Although a slightly older age might have been expected, comparison with Day's (1993, 1996) work shows that some lake margins in the Vale did not experience the onset of organic sedimentation until several hundred years after the end of the late glacial, and so the age obtained is acceptable.

References: Day 1993
Day 1996

HAR-5242 11000 ±130 BP $\delta^{13}\text{C}$: -28.0‰

Sample: SC828521, submitted on 13 October 1982 by RT Schadla-Hall

Material: peat (and sand)

Initial comment: from context 5069, Z306A. This sample comes from below the mineral level described in HAR-5241.

Objectives: as HAR-5241.

Calibrated date: 1 σ : 11150–10730 cal BC
2 σ : 11230–10660 cal BC

Final comment: R Housley (1998), as it is, an age of *c* 11,000 BP would not be out of place for the start of the Loch Lomond Stadial.

HAR-5243 10220 ±120 BP $\delta^{13}\text{C}$: -28.3‰

Sample: SC828522, submitted on 13 October 1982 by RT Schadla-Hall

Material: peat (and mineral deposits)

Initial comment: from context 5012, Z313A; from immediately above the mineral levels. This sample is taken from an area where flint of early Mesolithic type was recovered.

Objectives: to assess the date and nature of these deposits.

Calibrated date: 1 σ : 10180–9760 cal BC
2 σ : 10470–9410 cal BC

Final comment: R Housley (1998), in terms of its supposed context and association HAR-5243 would appear to be too young, however, in the absence of further details it is not clear whether the measurement is the problem or whether the inferred age is at fault.

HAR-5244 6910 \pm 120 BP

$\delta^{13}\text{C}$: -28.1‰

Sample: SC828596, submitted on 13 October 1982 by RT Schadla-Hall

Material: peat (and mineral deposits)

Initial comment: the sample was taken from flint 8589 in context 5004, Z101A.

Objectives: to produce a date for a layer, which was rich in flint and lies alongside a late Mesolithic site.

Calibrated date: 1 σ : 5980–5670 cal BC
2 σ : 6020–5620 cal BC

HAR-5547 8910 \pm 200 BP

Sample: 50122808, submitted on 25th April 1983 by T Schadla-Hall

Material: charcoal: unidentified

Initial comment: from context 5012, trench CXI. The sample was taken directly from the base of an extensive flint distribution.

Objectives: this sample represents a potential date for the activity of early Mesolithic date on the edge of the reed swamp. The expected date is *c* 8000–8500 cal BC.

Calibrated date: 1 σ : 8300–7720 cal BC
2 σ : 8610–7570 cal BC

Final comment: R Housley (1998), unfortunately this date has an unknown time-width, and may derive from fragments of differing aged wood as it is doubtful a single entity was dated, although given the large error on the determination such concerns may not be of significance. Although a direct causal association with the immediately overlying archaeology cannot be demonstrated, there is a good likelihood that HAR-5547 is providing a tolerably good if imprecise, *terminus post quem* for the overlying lithic concentration.

HAR-5579 990 \pm 90 BP

$\delta^{13}\text{C}$: -25.0 (assumed) \pm 3.0‰

Sample: GSPRING3, submitted in April 1983 by RT Schadla-Hall

Material: water (ground)

Initial comment: spring water from adjacent to the excavation at Seamer Carr.

Objectives: to determine whether there could be the potential for hard water error at this site.

Calibrated date: 1 σ : cal AD 980–1160
2 σ : cal AD 880–1230

Final comment: A Bayliss (8 April 2009), this finite age suggests that the ground water locally contains an appreciable quantity of geological age carbon.

HAR-5787 10040 \pm 130 BP

$\delta^{13}\text{C}$: -29.7‰

Sample: SCK15752, submitted on 2 September 1983 by RT Schadla-Hall

Material: peat (and mud)

Initial comment: the layer contains early Mesolithic flint and bone and is sealed beneath a layer consisting largely of sand (5084), but above the basal gravels.

Objectives: to date the later occupation on site K.

Calibrated date: 1 σ : 10010–9310 cal BC
2 σ : 10140–9260 cal BC

Final comment: R Housley (1998), the date is assumed to be on 'peat' in an organically enriched sand. The sample's position beneath context 5084, a medium coarse carbonate-rich white sand, suggests that it is providing a *terminus post quem* for this deposit. This leaves two unresolved issues. Firstly, what is the source of the carbon in the sand? An answer to this may well help in gauging the quality of the determination. Secondly, there is Cloutman's assertion that the sand unit (5084) dates to the Loch Lomond Stadial. In practice, context 5084 simply has to post-date CAR-841 and HAR-5242, and pre-date HAR-5241, which is what HAR-5787 indicated. The implication is that HAR-5787 maybe providing an approximate age estimate that yields an acceptable *terminus post quem* for context 5084, however further investigation of the provenance of the dated carbon would be helpful.

HAR-5789 8020 \pm 90 BP

$\delta^{13}\text{C}$: -28.9‰

Sample: SCK13826, submitted on 2 September 1983 by RT Schadla-Hall

Material: peat

Initial comment: from the upper peat immediately adjacent to a group of late Mesolithic flint artefacts which seem to represent a composite tool. The recovery of later Mesolithic flint is a considerable rarity.

Objectives: this is the first group of artefacts to be recovered from the late Mesolithic peat formation. A radiocarbon date would date the artefact itself, an accompanying pollen sample, and also provide a date for the later Mesolithic peats.

Calibrated date: 1 σ : 7080–6770 cal BC
2 σ : 7190–6650 cal BC

Final comment: R Housley (1998), this sample is an age determination by association as it was made on an upper wood peat sample that was removed, in the laboratory, from adjacent to and at the same level as, a group of hafted microliths in context 5005. Since a direct causal or functional relationship cannot be demonstrated between the microliths and the dated carbon in the peat, the elapsed time interval between lithic placement and peat growth will depend on the peat accumulation rate. Provided the rate of growth was not excessively slow, then there would be reasonable case for arguing that the age of the sample coincides relatively well with the time of lithic placement. In which case HAR-5789 maybe viewed as a good unbiased age estimate. However, should rootlets from later plant growth have penetrated down to the level of the microliths then this conclusion would be wrong and HAR-5789 would need to be rejected.

HAR-5790 9520 ±90 BP

$\delta^{13}\text{C}$: -29.3‰

Sample: SCC11147, submitted on 2 September 1983 by RT Schadla-Hall

Material: peat

Initial comment: the sample was taken from alongside and below a bone and was found in deep peat of zone IV/V, together with a pollen sample.

Objectives: there are no radiocarbon dates for the deep peats on site C. A date for this sample would provide a date for both the bone deposits and the pollen column.

Calibrated date: 1 σ : 9140–8720 cal BC
2 σ : 9230–8610 cal BC

Final comment: R Housley (1998), the sample dated by HAR-5790 is unlikely to be affected by a hardwater error and so the chances of it being a valid age-estimate is high. However, given a causal or functional relationship to the associated archaeology cannot be demonstrated (ie the bone butchered), the archaeological value of this determination depends on the elapsed time between cessation of carbon exchange on death and peat formation around bone. If this period of time is judged short than this determination maybe a good age approximation. However, if this cannot be demonstrated it may be safer to view this measurement as of limited archaeological value.

HAR-5791 9340 ±160 BP

$\delta^{13}\text{C}$: -27.8‰

Sample: SCC10128, submitted on 2 September 1983 by RT Schadla-Hall

Material: charcoal (remaining subsample identified; *Salix/Populus* sp. (0.22g, 100%)): unidentified (3.60g) (R Gale 1998)

Initial comment: from a charcoal lens in the sand (2018) containing flint.

Objectives: the flint appears to be of early Mesolithic date from its position and appearance. The same sand deposit has produced flints of earlier date such as late upper Palaeolithic.

Calibrated date: 1 σ : 8800–8330 cal BC
2 σ : 9200–8260 cal BC

Final comment: R Housley (1998), see HAR-5238, except by coming from a discrete charcoal lens the general level of confidence in the measurement may be higher. The good agreement between the two determinations argues for minimal mixing of significantly different aged *Salix/Populus* sp. charcoal suggesting both are good *terminus post quem* for the archaeological material in context 2018.

Laboratory comment: English Heritage (25 September 2008), the two radiocarbon results from this deposit are statistically consistent ($T'=0.0$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978

HAR-5792 9900 ±140 BP

$\delta^{13}\text{C}$: -29.2‰

Sample: SCC11241, submitted on 2 September 1983 by RT Schadla-Hall

Material: charcoal (and soil): unidentified

Initial comment: from a large pit, presumed to be early Mesolithic.

Objectives: the pit seems to be associated with a structure, but artefactual remains are almost non-existent.

Calibrated date: 1 σ : 9660–9250 cal BC
2 σ : 10020–8940 cal BC

Final comment: R Housley (1998), HAR-5792 and HAR-5793 are from the same large pit feature and should, therefore, be interrelated. However, the significant difference in their ages and the fact that the measurement from the stratigraphically deeper, and presumably earlier, sample (HAR-5793) is later than the one from the higher sample suggests that there are problems with one, or both, of these measurements.

Laboratory comment: English Heritage (25 September 2008), the two radiocarbon results from the pit are not statistically consistent ($T'=7.9$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978

HAR-5793 9320 ±150 BP

$\delta^{13}\text{C}$: -28.2‰

Sample: SCC11156, submitted on 2 September 1983 by RT Schadla-Hall

Material: charcoal (remaining subsample identified; *Salix/Populus* sp. (0.15g, 100%)): unidentified (0.25g) (R Gale 1998)

Initial comment: from the same pit as HAR-5792, but taken from a greater depth.

Objectives: it is unclear whether this sample is from an earlier pit than HAR-5792, but dating should resolve this.

Calibrated date: 1 σ : 8770–8320 cal BC
2 σ : 9150–8260 cal BC

Final comment: see HAR-5792

Laboratory comment: see HAR-5792

HAR-5794 9590 ±120 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: SCK14454, submitted on 2 September 1983 by RT Schadla-Hall

Material: charcoal (remaining friable subsample identified; *Salix/Populus* sp. (0.13g, 100%)): unidentified (1.67g) (R Gale 1998)

Initial comment: associated with main occupation level, 15012.

Objectives: would provide a date for the first time for the occupation area.

Calibrated date: 1 σ : 9230–8760 cal BC
2 σ : 9290–8620 cal BC

Final comment: R Housley (1998), the time-width of this sample is unknown but unlikely to be significant. Doubts must remain whether charcoal fragments from successive visits have been amalgamated given we cannot rule out that the exposed surface of 5012 may have been the focus of repeated early Mesolithic human activity. If this has not happened, and the charcoal all derives from a single human activity, then HAR-5794 may provide a reasonable *terminus post quem* for an occupation event.

HAR-6498 8210 ±150 BP

$\delta^{13}\text{C}$: -30.8‰

Sample: SCK, submitted on 2 November 1984 by A David

Material: wood (waterlogged): *Salix/Populus* sp. (J Watson 1984)

Initial comment: found embedded in peat. See HAR-5789.

Objectives: the wood is presumed to be the only surviving remnant of a late Mesolithic arrow shaft.

Calibrated date: 1 σ : 7480–7050 cal BC
2 σ : 7580–6700 cal BC

Final comment: A David (1988), sample was one of series of dates from Seamer Carr project; peat in which wood was embedded was previously dated to 8020 ±90 BP (HAR-5789).

Final comment: R Housley (1998), this sample relates to a single entity, a presumed wooden arrow shaft, exposed in 1983 in one trench sections at the northwest end of site K. As a direct single entity measurement on the identified relatively short-lived sample, HAR-6498 is almost certainly a good age-estimate for the particular dated item.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 307

Seamer Moor, North Yorkshire

Location: TA 01968617
Lat. 54.15.39 N; Long. 00.26.04 W

Project manager: A E Finney and F J de M Vatcher (East Riding Archaeological Research Committee), 1934, 1960, and 1966

Archival body: Hull and East Riding Museum

Description: the barrow was first scheduled as an ancient monument in 1932, partially excavated in 1934, and re-excavated in August and September 1966 due to continual plough damage. The 1966 excavation indicated that Seamer Moor was a two-stage mound constructed primarily of a stone cairn capped by soil scrape. The cairn was composed of burnt and unburnt sandstone varying in size and primarily deposited on the old land surface.

Objectives: to date the barrow mound.

References: Brewster and Finney 1995
Hardiman *et al* 1992, 50
Walker *et al* 1991a, 107

HAR-8785 5260 ±100 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: SMT3SN2, submitted on 7 August 1985 by A E Finney

Material: charcoal (remaining subsample identified): unidentified (17.52g); *Quercus* sp., sapwood (3.40g, 8.6%); *Quercus* sp., heartwood (36.33g, 91.4%) (R Gale 2000)

Initial comment: from trench 3, section N, in the vicinity of the hearth. The sample was found *in situ* amongst red stones.

Objectives: the hearth is sealed by the mound body and so a date from this sample would provide the date for the final deposition of the barrow mound.

Calibrated date: 1 σ : 4240–3960 cal BC
2 σ : 4340–3800 cal BC

Final comment: A E Finney (1992), the date is appropriate for the final deposition of the burial mound.

HAR-8786 4990 ±90 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: SMT3SO1, submitted on 7 August 1985 by A E Finney

Material: charcoal: unidentified

Initial comment: sample from shallow pit in trench 3, section O.

Objectives: this grave pit was excavated in 1934, and as all the 1934 excavated material was lost in the war-time bombing of Hull in 1942, a date for this sample would hopefully give a date for the grave pit and also for the other three pits, which were not found in the 1966 excavation.

Calibrated date: 1 σ : 3950–3650 cal BC
2 σ : 3980–3630 cal BC

Final comment: A E Finney (1992), this pit dates the grave pit and also for the other three pits, which were not found in the 1966 excavation.

Seasalter, Kent

Location: TR 090662
Lat. 51.21.21 N; Long. 01.00.07 E

Project manager: T E Porter (Unknown), 22/04/1970

Archival body: National Maritime Museum

Description: Seasalter mudflats at extreme low-water springs.

Objectives: to date the logboat.

References: McGrail 1978

OxA-1054 1740 ±80 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: Seasalter, oak wood, submitted in August 1986 by B Porter

Material: wood (waterlogged): *Quercus* sp.

Initial comment: small through-section from bottom of Seasalter Logboat. On London clay of tidal mudflats and partly covered by mussel beds.

Objectives: 1) to establish when this type of primitive craft was in use in the waters of the Thames Estuary. 2) if pre-medieval it might be evidence of where the shore lay at the time (ie about half a mile north of present shore). 3) if medieval or post-medieval, this late date would be of interest in the field of maritime history.

Calibrated date: 1 σ : cal AD 210–410
2 σ : cal AD 80–530

Final comment: B Porter (10 February 1990), the age limits approximately coincide with the beginning and the end of the Roman occupation of Britain, with the likelihood that it was a third- or fourth-century AD craft. The boat was found on the mudflats slightly over the half a mile north of the Seasalter Battery (TR 088663) near the outer limit of an average tide. On discovery in 1970 it was thought to be *in situ*. The sides of the boat were missing, presumably eroded away, such that only vestiges remained. It would be reasonable to suppose that when the log boat became unusable it was laid up, possibly in a creeklet, somewhere near the then shore. In the course of time it would have been silted over. As the shore deepened, and the sea cut into the saltings (there was still a fringe of saltings - called 'the lilybanks' - off this shore a hundred years ago), it would gradually have worn away the sides of the log boat. As for its use, this was presumably for fishing.

References: Hedges *et al* 1990, 223

Shifnal: Castle Farm, Shropshire

Location: SJ 72440951
Lat. 52.40.56 N; Long. 02.24.28 W

Project manager: A Roe (University of Birmingham), 1980

Archival body: Shrewsbury Museum

Description: the valley under examination lies six miles due east of the Wrekin in east Shropshire. The surface geology is predominantly boulder clay, capped by eroded glacial sands

and gravels. Evidence for prehistoric settlement was not previously attested in the immediate area. The Roman road from Wroxeter, with a fort at Red Hill runs to the north. Medieval moated sites are known at Manor Park and Stafford Park in Shifnal.

Objectives: to determine the date when the ditch was cut.

Laboratory comment: Ancient Monuments Laboratory (2003), four further samples CF808008 (HAR-5119), CF802155 (HAR-5121), CF802154 (HAR-512), and CF802235 (HAR-5120) submitted for dating but failed to produce a result.

HAR-5116 3810 ±110 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: CF802238, submitted on 12 October 1981 by A Roe

Material: charcoal: unidentified

Initial comment: from clay layer in site C, which possibly indicates the first phase of disuse of the late Iron Age or Roman inner ditch (F100).

Objectives: to date the period of disuse.

Calibrated date: 1 σ : 2470–2040 cal BC
2 σ : 2580–1940 cal BC

Final comment: A Roe (2 February 2007), rather too early considering the type of feature. We would need an array of dates before accepting this.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 300

HAR-5117 28970 ±530 BP

$\delta^{13}\text{C}$: -24.9‰

Sample: CF802080, submitted on 12 October 1981 by A Roe

Material: wood (waterlogged; remaining subsample now dry and structurally collapsed): cf *Quercus* sp., in thin slivers (0.01g, 100%); unidentified (0.09g) (R Gale 2000)

Initial comment: from primary silt of outer ditch (F112) of enclosure. Possibly late Iron Age or Roman.

Objectives: to determine the date of the ditch.

Calibrated date: 1 σ : 32580–30940 cal BC
2 σ : 32800–29990 cal BC

Final comment: A Roe (2 February 2007), the fill is very similar to natural. This was clearly natural with naturally occurring charcoal, rather than the primary fill of the ditch.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5118 2290 ±100 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: CF808007, submitted on 12 October 1981 by A Roe

Material: charcoal: unidentified

Initial comment: from grey sandy layer producing VCP pottery within feature (F800), which is probably a working hollow or hearth on site L, on the eastern side of the enclosure. This sample was combined with HAR-5119 (CF808008) from an orange sandy deposit underneath HAR-5118.

Objectives: to date the ditch.

Calibrated date: 1 σ : 410–200 cal BC
2 σ : 760–100 cal BC

Final comment: A Roe (2 February 2007), this date result is slightly earlier than expected from the pottery report.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 300

**Shoreham: Thundersbarrow Hill,
West Sussex**

Location: TQ 229085
Lat. 50.51.45 N; Long. 00.15.12 W

Project manager: D R Rudling (Field Archaeology Unit, Institute of Archaeology), 1985

Archival body: Brighton Museum

Description: this multi-period site consists of a ?Bronze Age roundbarrow; two prehistoric enclosures; a Romano-British 'village' and an adjacent prehistoric/Romano-British field system.

Objectives: the fieldwork (excavation and survey) in 1985 was designed to assess the effects of plough damage to the site; and to obtain environmental and dating evidence for the two prehistoric enclosures and the field system.

Laboratory comment: Ancient Monuments Laboratory (2003), one further sample, TBD8BAT (HAR-8181) submitted for dating but failed to produce a result.

References: Curwen 1933
Walker *et al* 1991a, 93

HAR-8182 3220 ±70 BP

$\delta^{13}\text{C}$: -21.5‰

Sample: TBD8antl, submitted on 15 September 1986 by C R Cartwright

Material: antler

Initial comment: from the primary silts of the inner enclosure ditch; trench D, context 8. The antler was recovered from the actual floor of the ditch and was sealed by the primary fills of context 8.

Objectives: the date of the ditch of the inner enclosure is thought to be late Bronze Age on the basis of the pottery from its upper layers (contexts 2 and 4). The antler provides the only dating source for the construction and primary use of the ditch and its primary fills.

Calibrated date: 1 σ : 1610–1420 cal BC
2 σ : 1670–1320 cal BC

Final comment: D Rudling (25 November 1996), the date obtained for the antler fragment found on the floor of the inner enclosure ditch indicates that the origins of this enclosure may lie in the middle Bronze Age. If so it may belong to the small group of higher rank Deverel-Rimbury hilltop enclosures, such as Rams Hill, Berkshire. The date obtained for the antler also provides a *terminus post quem* for the late Bronze Age pottery assemblage recovered from the upper layers of the ditch. A date centring on c tenth–ninth century BC is suggested by Dr Sue Hamilton for this pottery assemblage. The assemblage probably dates the main period of use of the smaller enclosure.

**Shrewsbury: Holy Cross, Queen Anne
House, Shropshire**

Location: SJ 498124
Lat. 52.42.24 N; Long. 02.44.35 W

Project manager: J Darlington (Shrewsbury Heritage Project), September 1987

Archival body: Shrewsbury Museum

Description: excavation began on the south side of Abbey Foregate, in the back garden of the Queen Anne House. Historical maps show that this area was once the south-west corner of the former Abbey precincts, and a trial excavation earlier in the year had revealed sandstone walls of monastic origin.

Objectives: to date two important medieval sandstone structures for which there are few good datable contexts; and to establish a chronology for the pottery assemblage both pre- and post-dating the structures. Three samples were taken from a sequence of piles under the structure to the south-east of the building, and three from under the north wall of the building itself. The samples were selected subjectively from those under the walls on the grounds of outwardly good preservation.

Laboratory comment: English Heritage (4 October 2011), all six radiocarbon results from the piles beneath this building are statistically consistent ($T'=7.2$; $T'(5\%)=11.1$; $v=5$; Ward and Wilson 1978). If the timbers were felled for use in the construction of the building, then the weighted mean of these measurements (525 ±25 BP) may suggest that it was constructed in cal AD 1320–1440 (95% confidence) or cal AD 1400–1430 (68% confidence) (Reimer *et al* 2004).

References: Hannaford 2002
Reimer *et al* 2004
Walker *et al* 1991a, 108
Ward and Wilson 1978

HAR-8791 580 ±60 BP $\delta^{13}\text{C}$: -29.5‰

Sample: AS85F346, submitted on 10 September 1987 by J Darlington

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

Initial comment: the sample was taken from a pile of timber underlying the mortar construction in context 1403 of structure 7 (F161). The pile was driven into the clay flood deposit of context 1423.

Objectives: to date two important medieval sandstone structures for which there are few good datable contexts and to establish a chronology for the pottery assemblage both pre- and post-dating the structures.

Calibrated date: 1 σ : cal AD 1300–1420
2 σ : cal AD 1280–1440

Final comment: H Hannaford (2002), these six samples date the piles from beneath the south wall water-channel floor and dated to AD 1370–1550 ±60 years.

References: Hannaford 2002

HAR-8792 540 ±60 BP $\delta^{13}\text{C}$: -29.2‰

Sample: AS85F273, submitted on 10 September 1987 by J Darlington

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

Initial comment: from wood pile beneath the southern edge of Fioz wall, part of structure 3; it was underlying silty clay (context 1685) and driven into context 1435.

Objectives: as HAR-8791

Calibrated date: 1 σ : cal AD 1320–1440
2 σ : cal AD 1290–1450

Final comment: see HAR-8791

HAR-8793 530 ±60 BP $\delta^{13}\text{C}$: -29.6‰

Sample: AS85F347, submitted on 10 September 1987 by J Darlington

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

Initial comment: from pile driven into clay flood deposit (context 1423) beneath mortar construction (context 1403) of structure 7 (F161).

Objectives: as HAR-8791

Calibrated date: 1 σ : cal AD 1320–1440
2 σ : cal AD 1290–1460

Final comment: see HAR-8791

HAR-8794 500 ±60 BP $\delta^{13}\text{C}$: -28.3‰

Sample: AS85F271, submitted on 10 September 1987 by J Darlington

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

Initial comment: from pile underlying silt clay (context 1685) and driven into context 1435 underlying south edge of wall of structure 3 (F102).

Objectives: as HAR-8791

Calibrated date: 1 σ : cal AD 1400–1450
2 σ : cal AD 1300–1480

Final comment: see HAR-8791

HAR-8795 400 ±60 BP $\delta^{13}\text{C}$: -28.6‰

Sample: AS85F348, submitted on 10 September 1987 by J Darlington

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

Initial comment: from pile underlying mortar construction in context 1403 of structure 7 (F161) and driven into the clay food deposit of context 1423.

Objectives: as HAR-8791

Calibrated date: 1 σ : cal AD 1440–1620
2 σ : cal AD 1410–1650

Final comment: see HAR-8791

HAR-8796 620 ±70 BP $\delta^{13}\text{C}$: -28.3‰

Sample: AS85F275, submitted on 10 September 1987 by J Darlington

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

Initial comment: from pile underlying the southern edge of wall F102 that was part of structure 3. The pile was stratigraphically underneath the silty clay of context 1685 and had been driven into the clay of context 1435.

Objectives: as HAR-8791

Calibrated date: 1 σ : cal AD 1280–1410
2 σ : cal AD 1260–1440

Final comment: see HAR-8791

Shrewton, Wiltshire

Location: SU 08854480
Lat. 51.12.07 N; Long. 01.52.24 W

Project manager: A Woodward (Freelance) and M Allen (Wessex Archaeology), 1958–60

Archival body: Salisbury and South Wiltshire Museum

Description: a total of eighteen round barrows from two cemeteries excavated by the late Charles Green. A series of six results are recorded from the two barrow cemeteries (Net Down and Rollerstone Field) and an isolated barrow (Winterbourne Stoke G44). Five of the results are associated directly or indirectly with artefacts of Beaker, early Bronze Age or middle Bronze Age type from both primary burials (inhumation and cremation) and from secondary cremations inserted into the ditch (barrow 5a, Net Down). The sixth is associated with the primary burial in key early Bronze Age monument type (bell barrow).

Objectives: no written objectives were written at the time. However, it is assumed that these were, to date the specific associated artefacts and type of context, and to contribute to an assessment of the date of origin and developmental sequences of two barrow cemeteries (Net Down and Rollerstone Field), and the single bell barrow, Winterbourne Stoke G44.

Final comment: M Allen and A Woodward (1996), none of the determinations were made on inhumations. All these dates except HAR-4830 accord with the dates for similar artefacts elsewhere, and they provide an important contribution to the corpus of dates for these artefact types. With so few determinations it is not possible to establish the sequential development of the cemeteries. However, the dated burials can be related chronologically and do reinforce the dating evidence from the artefacts in indicating the priority of Beaker founding barrows (eg 5K), the progress to early Bronze Age burial forms and continued usage, in apart, into the early to middle Bronze Age. For the detailed analysis of the Net Down cemetery see Mizoguchi (1993).

With exception of the earlier barrow (Winterbourne Stoke G44), which may be late Neolithic in form (cf Kinnes 1979), the primary burials in the Bronze Age barrows fall in the last quarter of the third millennium and the first quarter of the second millennium BC.

The only exception being barrow 5K with a Beaker, for which the result seems slightly early, possibly attributable to measurement on the small counter. The secondary cremations inserted into the barrow 5a are not significantly different at the 95% confidence level Ward and Wilson (1978) and are *c* 500 radiocarbon years later.

Laboratory comment: Ancient Monuments Laboratory (2003), one further sample, SNDRFRC7 (HAR-4833), was submitted for dating but failed to produce a result.

References: Green and Rollo-Smith 1984
Kinnes 1979
Mizoguchi 1993
Ward and Wilson 1978

HAR-4827 3120 ±100 BP

Sample: SNDRFRC1, submitted on 11 December 1981 by S Rollo-Smith

Material: charcoal: unidentified

Initial comment: the samples derives from a cremation pyre and was deposited with a cremation in a secondary context in barrow 5a, Net Down.

Objectives: to date a burial in a second middle Bronze Age Deverel-Rimbury cremation cemetery located in the south-east sector of the barrow ditch. Middle Bronze Age vessels were found with adjacent cremations. Barrow 5a, with primary Beaker burial was the most westerly barrow in the multiple linear group on Net Down.

Calibrated date: 1 σ : 1500–1270 cal BC
2 σ : 1620–1120 cal BC

Final comment: M Allen and A Woodward (1996), these dates (HAR-4827 and HAR-4828) confirm the estimated date for the development of the cremation cemetery and insertion of secondary burials, which was anticipated from the middle Bronze Age pottery used in the cemetery. This cremation

cemetery is associated with Globular urns and Bucket urns typical of the Deverel-Rimbury grouping, and the date falls within the expected range for this ceramic style. These dates cannot, however, be used to refine the chronologies of the ceramic styles (Green and Rollo-Smith 1984).

Laboratory comment: the two radiocarbon results from the cremation pyre are statistically consistent (T'=0.1; T'(5%)=3.8; v=1; Ward and Wilson 1978).

References: Green and Rollo-Smith 1984
Ward and Wilson 1978

HAR-4828 3170 ±90 BP

$\delta^{13}C$: -26.2‰

Sample: SNDRFRC2, submitted on 11 December 1981 by S Rollo-Smith

Material: charcoal: unidentified

Initial comment: the samples derives from a cremation pyre and was deposited with a cremation in a secondary context in barrow 5a, Net Down.

Objectives: as HAR-4827

Calibrated date: 1 σ : 1530–1320 cal BC
2 σ : 1640–1220 cal BC

Final comment: M Allen and A Woodward (1996), see HAR-4827

Laboratory comment: English Heritage (25 September 2008), see HAR-4827

HAR-4829 3340 ±70 BP

$\delta^{13}C$: -24.8‰

Sample: SNDRFRC3, submitted on 11 December 1981 by S Rollo-Smith

Material: charcoal (remaining subsample identified (a large quantity of small fragments of charcoal, many too small to identify)): unidentified (20.90g); Pomoideae (9g, 68.7%); *Prunus* sp., probably *Prunus spinosa* (4.10g, 31.3%) (R Gale 1997)

Initial comment: from a cremation pyre at Net Down, and deposited with a cremation.

Objectives: although the information on the provenance was imprecise (Green and Rollo-Smith 1984, 316), it was probably associated with Collared Urn P12. This disc barrow was centrally placed within the multiple linear Net Down.

Calibrated date: 1 σ : 1740–1520 cal BC
2 σ : 1870–1450 cal BC

Final comment: M Allen and A Woodward (1996), Green and Rollo-Smith (1984, 316), subsequent to submission, admit that the sample is unprovenanced and hence of little specific value. Although we cannot be confident to which of the cremation pits the sample belong, the date 1880–1460 cal BC certainly falls within the expected early Bronze Age pottery (eg Collared Urn, pit 2, P12), which was associated with these burials. The error on this determination however, produces a calibrated range of over 400 years at 2 σ , making this date contemporary, in general terms, with most of the earlier Bronze Age.

References: Green and Rollo-Smith 1984

HAR-4830 4100 ±100 BP $\delta^{13}\text{C}$: -20.5‰

Sample: SNDRFRC4, submitted on 11 December 1981 by S Rollo-Smith

Material: antler: *Cervus elaphus*

Initial comment: fragments of antler picks used in construction of the primary grave and deposited in the backfill at Net Down. The burial is associated with a middle to late Beaker.

Objectives: to date the primary interment in bowl barrow Shrewton 5K. This was associated with a Middle Style (Case 1977; 1995) Beaker; (Clarke 1970, style N2).

Calibrated date: 1 σ : 2880–2490 cal BC
2 σ : 2910–2410 cal BC

Final comment: M Allen and A Woodward (1996), submission by Rollo-Smith seems to have been excellent in that antler pick marks are recorded in the feature (pit 1), and antler fragments discarded in the backfill are likely to have a functional relationship, ie be the tools used in its excavation. Although this is one of the few dated samples from a primary grave of either the Net Down or the Rollerstone Field cemeteries, it is considerably earlier than all the other dates in the series. The date is several hundred years too early for the middle Beaker ceramics and copper dagger with which it is associated. Kinnes *et al* (1991) ascribe Beaker ceramics to 2600–1800 cal BC, and the forms here are expected to be later (ie *c* 2200–1900 cal BC). At the time of publication Green and Rollo-Smith (1984, 316) stated that although submitted to Harwell the sample was too small for analysis, however it remained in the Harwell small counter queue for a long time and the result was not issued until 1989 (Hill pers comm, Harwell archive). With lack of laboratory comments one has to question whether this sample was really too small and has produced an erroneous determination, or whether the antler fragment was either residual or even as part of a curated antler fragment placed in the burial (*see* for instance Stonehenge Y-Hole 30; Allen and Bayliss 1995). Note: This date was never published in the report as it was thought too small for analysis.

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Allen and Bayliss 1995
Case 1977
Case 1995
Clarke 1970
Green and Rollo-Smith 1984
Hardiman *et al* 1992, 48
Kinnes *et al* 1991
Otlet *et al* 1983

HAR-4831 3640 ±80 BP $\delta^{13}\text{C}$: -26.1‰

Sample: SNDRFRC5, submitted on 11 December 1981 by S Rollo-Smith

Material: charcoal: unidentified

Initial comment: from a cremation pyre at Rolleston Field and deposited with a cremation in the pit. The sample is associated with a Collared Urn or an amber button.

Objectives: to date the burial contained within pit 1 or pit 2 (record confused) near the centre of barrow Shrewton 25. Pits 1 to 3 were probably contemporary with pit 1 containing a primary Series Collared Urn and pit 2 a V-bored amber button. Both items would date to the late part of the 'Wessex' early Bronze Age. Barrow 25 is second from the east end of the liner Rollerstone Field barrows group.

Calibrated date: 1 σ : 2140–1890 cal BC
2 σ : 2280–1770 cal BC

Final comment: M Allen and A Woodward (1996), although taken from one of the pits beneath the barrow, Green and Rollo-Smith (1984, 316) admit that its true association with either the Collared Urn or the amber button is unrecorded. Nevertheless, this date is acceptable for both the occurrence of Collared Urns (Longworth 1984) and amber beads (Beck and Shennan 1991), and is earlier than the dated secondary cremation burials (HAR-4827 and HAR-4828).

References: Beck and Shennan 1991
Green and Rollo-Smith 1984
Longworth 1984

HAR-4832 3760 ±70 BP $\delta^{13}\text{C}$: -24.1‰

Sample: SNDRFRC6, submitted on 11 December 1981 by S Rollo-Smith

Material: antler: *Cervus elaphus*

Initial comment: from a butchered animal, partially worked, and deposited as grave furniture with a cremation in the primary grave from Winterbourne Stoke.

Objectives: to date the primary, unaccompanied, cremation found at the centre of isolated bell barrow Winterbourne Stoke 44. Although Grooved Ware was recovered from the mound material, it is likely that the burial was early Bronze Age.

Calibrated date: 1 σ : 2290–2040 cal BC
2 σ : 2460–1970 cal BC

Final comment: M Allen and A Woodward (1996), the barrow had a penannular ditch and the earthen mound (different in character to all the Bronze Age barrows reported), which was derived from the old land surface contained sherds of Grooved Ware. Green and Rollo-Smith (1984, 317) considered this barrow to be an example of late Neolithic monuments reviewed by Kinnes (1979, stage F). The dispersed cremation in pit 1, from which the sample came, was sealed with a cairn of flints a 'layer of turfy loam' (1984, 291), and was considered by Green and Rollo-Smith to be typical of the late Neolithic-early Bronze Age. Other similar examples are recorded at Dorchester-on-Thames, Oxfordshire (Atkinson *et al* 1951) and Bucksin II, Hants (feature 3 Allen *et al* 1995). The date confirms the ascription of this burial to the late Neolithic-early Bronze Age period rather than the earlier Bronze Age, however, as Green and Rollo-Smith (1984, 317) suggest this date cannot be used in the general assessment of the origin and development of the barrow groups (Net Down and Rollerstone) due to the geographic isolation of this barrow.

References: Allen *et al* 1995
Atkinson *et al* 1951
Green and Rollo-Smith 1984
Kinnes 1979

Snail Down, Wiltshire

Location: see individual sites

Project manager: N Thomas (Devezes Museum for the Ministry of Works), 1953–7

Description: Snail Down is an early Bronze Age barrow cemetery on Salisbury Plain, located 8 miles north-east of Stonehenge. Thirty-three mounds include examples of almost every type of Wessex barrow, several of which were fully excavated between 1953 and 1957 (Thomas 2005, xiii). In total eleven radiocarbon dates were obtained from charcoal fragments and human bones from seven of the barrows (Ashbee in Thomas 2005, 253).

Objectives: to provide a chronological framework for the barrow cemetery.

Final comment: N Thomas (2005), radiocarbon determinations from charcoal and bone associated with some of the burials suggest that the early Bronze Age cemetery could have begun between 2140 and 1810 cal BC, and ended between 1750 and 1440 cal BC, the use spanning between 150 and 600 years (Thomas 2005, xiii).

References: Thomas 2005

Snail Down: Site III, Wiltshire

Location: SU 21685205
Lat. 51.15.58 N; Long. 01.41.21 W

Project manager: N Thomas (Devezes Museum), 1955

Archival body: Wiltshire Heritage Museum

Description: a bell barrow with a funeral pyre beneath containing two secondary cremations in urns.

Objectives: to date and provide phasing for the bell barrow.

References: Thomas 2005

HAR-61-(S) 3540 ±140 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: A-III, submitted in 1971 by L Biek

Material: charcoal: *Quercus* sp.

Initial comment: from a funeral pyre beneath a bell barrow. The sample is associated with an urn removed in 1805, now lost.

Objectives: to help phase this major barrow alignment.

Calibrated date: 1 σ : 2120–1690 cal BC
2 σ : 2290–1520 cal BC

Final comment: N Thomas (8 September 1993), the results for HAR-61(S) and HAR-130(S) appear to coincide satisfactorily.

Laboratory comment: English Heritage (4 October 2011), the two measurements on this sample are statistically consistent ($T'=0.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). The weighted mean (3515 ±87 BP) provides a *terminus post quem* for the pyre of 2130–1620 cal BC (95% confidence), or 1940–1740 cal BC (68% confidence) (Reimer *et al* 2004).

HAR-130-(S) 3500 ±110 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: A-III, submitted in 1971 by L Biek

Material: charcoal: *Quercus* sp.

Initial comment: as HAR-61(S)

Objectives: as HAR-61(S)

Calibrated date: 1 σ : 1960–1680 cal BC
2 σ : 2140–1530 cal BC

Final comment: see HAR-61(S)

Laboratory comment: English Heritage, see HAR-61-(S)

Laboratory comment: AERE Harwell (1972), this measurement was an independent check on the same batch of sample material as HAR-61(S).

Snelsmore Common, Berkshire

Location: SU 46317045
Lat. 51.25.50 N; Long. 01.20.02 W

Project manager: P V Waton (University of Southampton), 1980

Archival body: University of Southampton

Description: a valley mire 12 x 50m in size. Located within the chalk outcrop, but in an area of the Berkshire Downs where the chalk is overlain by outliers of tertiary deposits, clay-with-flints and plateau gravels. The bog is located in the south of one such outlier which is 1km east west and 5km north-south.

Objectives: to determine the development and composition of the middle post-glacial primary forest and the nature of its clearance.

References: Waton 1982
Waton 1983

HAR-4236 1290 ±80 BP

$\delta^{13}\text{C}$: -28.3‰

Sample: SM 1/2, submitted on 28 January 1981 by P Waton

Material: peat

Initial comment: from basal layer of clayey peat, from 1.35m to 1.45m depth; from a period of local birch and alder carr development.

Objectives: to confirm an expected date of c 500 AD.

Calibrated date: 1 σ : cal AD 650–810
2 σ : cal AD 600–940

Final comment: P Waton (2001), the elevated tree and shrub levels from the dated horizon may relate to local colonisation of the valley itself whilst there was a more general intensification of land use. The radiocarbon result and place name evidence suggests the latter may be associated with Saxon clearances.

HAR-4241 2570 ±90 BP $\delta^{13}\text{C}$: -28.7‰*Sample*: SM 1/1, submitted on 28 January 1981 by P Waton*Material*: peat (with some sand and gravel)*Initial comment*: from the base of the mire, at a depth of 2.06m to 2.16m; from a level of clearance activity suggesting this may have initiated peat formation.*Objectives*: to confirm an expected date of 300–100 BC, possibly earlier.*Calibrated date*: 1 σ : 820–550 cal BC
2 σ : 910–400 cal BC*Final comment*: P Waton (2001), the pollen evidence suggests that clearance was of moderate extent, although it may have been more widespread but failed to greatly affect the pollen source area. Human activity during this period is attested by an Iron Age hillfort 2km to the north east.**HAR-4310 5390 ±200 BP** $\delta^{13}\text{C}$: -29.2‰*Sample*: SM 2/1, submitted on 28 January 1981 by P Waton*Material*: peat (clayey)*Initial comment*: from the base of the second mire, 0.85–0.95m depth perched on the terrace above the main valley mire. Possible serious contamination by rootlet penetration.*Objectives*: to confirm the expected date of *c* 2500 BC.*Calibrated date*: 1 σ : 4450–3980 cal BC
2 σ : 4690–3780 cal BC*Final comment*: P Waton (2001), the dated horizon is thought to represent immediate post-elm decline regeneration in the pollen record. The anomalous old date is thought to be the result of severe rootlet contamination.**Somerset Levels, Somerset***Location*: ST 3542 to ST 4539 approx
Lat. 51.10.23 N; Long. 02.55.48 W, to
51.08.51 N; 02.47.11W*Project manager*: J Coles (Department of the Environment)*Description*: a series of prehistoric wooden trackways crossing the wetlands in the area of Glastonbury. They were gradually engulfed, and thereby preserved, through the build up of peat in the Levels.*References*: Coles and Dobson 1989
Coles and Orme 1976
Coles and Orme 1979
Coles and Orme 1981
Coles and Orme 1984
Orme 1982**Somerset Levels: Claylands, Huntspill Moor, Somerset***Location*: ST 361444
Lat. 51.11.41 N; Long. 02.54.52 W*Project manager*: R McDonnell (Unknown), 1986*Archival body*: Somerset County Museum*Description*: shallow, linear depression located from aerial photographic evidence; possibly a canal (McDonnell 1985).*Objectives*: to assess the palaeoenvironmental potential of any waterlogged deposits and to determine the purpose and age of the feature and associated landscape earthworks. A sondage was also dug and peat located. A sample from the top of the peat was submitted to establish a date for the cessation of peat formation and the onset of marine conditions.*References*: McDonnell 1985
McDonnell 1986**HAR-9187 3370 ±60 BP** $\delta^{13}\text{C}$: -27.3‰*Sample*: HMO-1, submitted in September 1987 by R McDonnell*Material*: peat*Initial comment*: from the top of a peat deposit beneath clay, which was cut by a shallow ditch.*Objectives*: to provide a date at which peat formation ceased and marine flooding occurred in this part of the Somerset Levels.*Calibrated date*: 1 σ : 1750–1610 cal BC
2 σ : 1880–1510 cal BC*Final comment*: R McDonnell (15 March 2007), the date obtained is one of the first from under the alluvium on the levels and partly to be used as a building block to create a chronology. In that light the result met expectations.**Somerset Levels: Meare Heath, Somerset***Location*: ST 443403
Lat. 51.09.31 N; Long. 02.47.48 W*Project manager*: J Coles (Department of the Environment), 1985*Archival body*: Somerset County Museum*Description*: Meare Heath lies between the 'island' of Meare and the Polden Hills. Much of the heath has been quarried for peat and the remains of a heavy plank-built roadway have been noted since the 1930s. Excavations have taken place intermittently as peat-cutting allows.*Objectives*: to provide indication of foundation dating of this massive structure.*Final comment*., this sequence provided a stratigraphical sequence at the site and the structure.*References*: Coles *et al* 1988c
Walker and Otlet 1988, 304

HAR-6606 3220 ±80 BP $\delta^{13}\text{C}$: -29.0‰*Sample*: SLP8501, submitted in April 1985 by J M Coles*Material*: wood (waterlogged): *Alnus* sp., young roundwood;
Corylus sp., young roundwood*Initial comment*: associated directly with a foundation deposit from the Bronze Age trackway, found in peats closely linked to the flooding horizon.*Objectives*: the radiocarbon dating of the Meare Heath track is unclear at present due to a wide spread of results of earlier samples. Current tree-ring chronology, flooding horizons, and well-sealed deposits should ensure that the two samples now submitted will settle the time range and allow tree-ring work to develop into an absolute chronology.*Calibrated date*: 1 σ : 1610–1410 cal BC
2 σ : 1690–1310 cal BC*Final comment*: J Coles (4 August 1996), compares well with the oak plank HAR-683 (3290 ±70 BP; 1750–1420 cal BC at 95% confidence; Pearson and Stuiver 1986), but is at slight variance with HAR-943 (2980 ±70 BP; 1420–1000 cal BC at 95% confidence; Pearson and Stuiver 1986), which was also brushwood beneath planking. The track was probably constructed in the fifteen to thirteenth centuries BC at a time of activity elsewhere in the Brue Valley.*References*: Pearson and Stuiver 1986**HAR-6607** 3120 ±80 BP $\delta^{13}\text{C}$: -29.0‰*Sample*: SLP8502, submitted in April 1985 by J M Coles*Material*: wood (waterlogged): *Alnus* sp., young roundwood;
Corylus sp., young roundwood*Initial comment*: as HAR-6606*Objectives*: as HAR-6606*Calibrated date*: 1 σ : 1500–1300 cal BC
2 σ : 1530–1130 cal BC*Final comment*: see HAR-6606**Somerset Levels: Meare Heath,
Eclipse Track, Somerset***Location*: ST 442390
Lat. 51.09.41 N; Long. 02.47.17 W*Project manager*: J Coles (Somerset Levels Project,
University of Cambridge), 1980*Archival body*: Somerset County Museum*Description*: Eclipse Track 1980*Objectives*: Eclipse Track was made of a number of panels woven of hazel rods and sails, each panel rammed into its neighbours to provide an overlap of about 20cm. The pollen work at this site has enabled the construction of the trackway to be placed in context in terms of the pollen record, hence in terms of prehistoric man's influence on the vegetation of the region.*Final comment*., this sequence provided a stratigraphical sequence at the site and the structure.*References*: Coles *et al* 1982
Morgan 1989**HAR-4865** 5440 ±70 BP $\delta^{13}\text{C}$: -27.4‰*Sample*: SLP8109, submitted in February 1982 by J M Coles*Material*: peat*Initial comment*: from the base of the peat monolith.*Objectives*: to date the interface of the peat and clay.*Calibrated date*: 1 σ : 4350–4240 cal BC
2 σ : 4450–4050 cal BC*Final comment*: J Coles (3 January 2007), confirms expectations.*References*: Walker *et al* 1987, 91**HAR-4866** 4780 ±70 BP $\delta^{13}\text{C}$: -29.0‰*Sample*: SLP8110, submitted in February 1982 by J M Coles*Material*: peat*Initial comment*: from the lower division of the peat monolith.*Objectives*: to date the E1/E2 boundary and therefore the regional A/B boundary.*Calibrated date*: 1 σ : 3650–3380 cal BC
2 σ : 3700–3370 cal BC*Final comment*: J Coles (3 January 2007), the result fits well with the Sweet Track date for A/B boundary (HAR-5296; 4790 ±80 BP; 3710–3360 cal BC at 95% confidence, or 3650–3380 cal BC at 68% confidence; Reimer *et al* 2004).*References*: Reimer *et al* 2004
Walker *et al* 1988, 334**HAR-4867** 3860 ±60 BP $\delta^{13}\text{C}$: -29.3‰*Sample*: SLP8111, submitted in February 1982 by J M Coles*Material*: peat*Initial comment*: from within zone E4, of local sequence and therefore probably near or at the regional zone D/E boundary.*Objectives*: to date zone E4 and therefore regional zone D/E boundary.*Calibrated date*: 1 σ : 2470–2200 cal BC
2 σ : 2480–2140 cal BC*Final comment*: J Coles (3 January 2007), as expected.*References*: Walker *et al* 1988, 334

HAR-4868 3240 ±70 BP $\delta^{13}\text{C}$: -28.6‰

Sample: SLP8112, submitted in February 1982 by J M Coles

Material: peat

Initial comment: from immediately below the hurdle track and from the top of the monolith.

Objectives: to date the top of the monolith.

Calibrated date: 1 σ : 1610–1430 cal BC
2 σ : 1690–1390 cal BC

Final comment: J M Coles (1988), the date is younger/more recent than expected which could be caused by a possible rootlet contamination.

References: Walker *et al* 1988, 335

Somerset Levels: Meare Heath, Frank's Hurdle Track, Somerset

Location: ST 443409
Lat. 51.09.51 N; Long. 02.47.48 W

Project manager: J Coles (Department of the Environment), 1984

Archival body: Somerset County Museum, Somerset County Council Records Office, Taunton

Description: a peat field being heavily worked by extraction trenches. Frank's field lies near the 'island' of Meare and many wooden trackways linked this to the Polden Hills. The hurdle track lay low in the peat sequence, and was truncated by a peat-cutting.

Objectives: to provide a chronological relationship with environmental succession, and to relate this hurdle to others on adjacent heaths.

References: Coles *et al* 1988b
Walker *et al* 1987, 89

HAR-6265 4790 ±80 BP $\delta^{13}\text{C}$: -29.4‰

Sample: SLP8403, submitted in September 1984 by J M Coles

Material: wood (waterlogged): *Corylus* sp.

Initial comment: rods from a Neolithic hurdle found in isolation in deep peats.

Objectives: possibly the oldest hurdle yet known in Britain and likely to be early/mid third millennium BC. The Neolithic woodland management demonstrated by the even young rods and sails of the hurdle is to be confirmed by tree-ring analysis. The peat is also to be analysed for the environmental setting.

Calibrated date: 1 σ : 3650–3380 cal BC
2 σ : 3710–3370 cal BC

Final comment: J Coles (4 August 1996), confirms this hurdle as the earliest known from the Somerset Levels, and possibly from Britain. The full extent of the hurdle trackway is unknown; parts may lie buried to the north, towards the 'island' of Meare.

Somerset Levels: Meare Heath, Ten Acres, Somerset

Location: ST 44813969
Lat. 51.09.12 N; Long. 02.42.21 W

Project manager: J Coles (Department of the Environment), 1982

Archival body: Somerset County Museum, Somerset County Council Record Office, Taunton

Description: Meare Heath is a large area of peat heavily quarried; many stray finds have been made, mostly by machine drivers. The site of this find is near the Bronze Age Meare Heath Track, hence the careful observation of the driver Ray Sweet.

Objectives: to date a large flint core.

References: Walker *et al* 1987, 86

HAR-5054 3810 ±70 BP $\delta^{13}\text{C}$: -28.6‰

Sample: SLP8210, submitted in June 1982 by J M Coles

Material: peat (wet)

Initial comment: from a flint core recovered by Roy Sweet from *in situ* in peat head near line of Meare Heath track.

Objectives: to date the flint core.

Calibrated date: 1 σ : 2400–2140 cal BC
2 σ : 2480–2030 cal BC

Final comment: J Coles (4 August 1996), the date suggests a presence within the Brue Valley at a time when wooden structures were rarely constructed, a reflection of a period when travel and transport were more easily made on and over the natural vegetation. There must remain a possibility that the core sank into the soft peats and is therefore of later date, thus perhaps more close in time to the nearby Meare Heath Track (HAR-6606; 3220 ±80 BP, 1690–1310 cal BC and HAR-6607; 3120 ± 80 BP, 1530–1130 cal BC at 95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004

Somerset Levels: Meare Village East, Somerset

Location: ST 44664214
Lat. 51.10.31 N; Long. 02.47.30 W

Project manager: J Coles (Department of the Environment), 1982

Archival body: Somerset County Museum, Somerset County Council Records Office

Description: the basic stratigraphic sequence at this Iron Age site is of detritus peats and muds, overlain by alluvine clay. The mound clay of the village occurs on top of the peat and under the alluvial clay.

Objectives: a pollen diagram was prepared from a monolith taken through the organic deposits. Three radiocarbon dates (HAR-7064, HAR-7065, and HAR-7066) were required to enable the local pollen assemblage zones delimited at Meare East to be correlated with the regional pollen zonation already established for the Levels (Beckett and Hibbert 1979).

References: Beckett 1979
Beckett and Hibbert 1979
Coles 1987
Walker *et al* 1990, 186–7

HAR-7064 5270 ±70 BP

$\delta^{13}\text{C}$: -30.0‰

Sample: SLP8505, submitted in November 1985 by A E Caseldine

Material: peat (woody)

Initial comment: from the end of the local pollen assemblage zone MVE.1, ie the MVE.1/MVE.2 zone boundary. The depth of the sample below the top of the monolith was 1.88–1.89m.

Objectives: because of an abundance of local pollen, largely alder, it is difficult to relate this zone, MVE.1, to the regional zonation. MVE.1 does correlate with MVW.1 identified in a diagram from Meare West (Beckett 1979) and a date of 5210 ±80 BP (HAR-2616; 4240–3810 cal BC at 95% confidence; Pearson *et al* 1986) was obtained from the base of the peat at Meare West. The end of MVE.1 may correspond to the end of regional pollen zone C or may be earlier.

Calibrated date: 1 σ : 4240–3980 cal BC
2 σ : 4330–3950 cal BC

Final comment: A E Caseldine (1988), this sample dates MVE.1/MVE.2 pollen zone boundary, indicating that the whole of MVE.1 and therefore MVW.1 as well because of the similarity of the MVE and MVW diagrams is, in fact, pre-elm decline. If this is the case, then the clearance indicator herbs in MVW.1 do not represent low levels of clearance activity during the main Neolithic clearance episode (regional pollen zones) but much more significantly possibly pre-elm decline on Meare Island.

References: Beckett 1979
Caseldine 1988
Pearson *et al* 1986

HAR-7065 4160 ±70 BP

$\delta^{13}\text{C}$: -29.1‰

Sample: SLP8506, submitted in November 1985 by A E Caseldine

Material: peat (woody detritus)

Initial comment: from the boundary of local pollen assemblage zones MVE.3/MVE.4 at a depth of 1.14–1.15m below the top of the monolith.

Objectives: dating the MVE.3/MVE.4 boundary should confirm whether or not this boundary corresponds to the E/F regional pollen assemblage zone boundary. It should also provide a date for the beginning of the increased clearance activity in the Meare area.

Calibrated date: 1 σ : 2890–2620 cal BC
2 σ : 2910–2490 cal BC

Final comment: A E Caseldine (1988), this sample dates the MVE.3/MVE.4 boundary. This is in close agreement with other radiocarbon dates from the C/D regional zone boundary, particularly that from Sweet TW, which is 4180 ±70 BP (HAR-5294; 4180 ±70 BP, 2920–2500 cal BC at 95% confidence; Reimer *et al* 2004).

References: Caseldine 1988, 55
Reimer *et al* 2004

HAR-7066 2660 ±70 BP

$\delta^{13}\text{C}$: -31.8‰

Sample: SLP8507, submitted in November 1985 by A E Caseldine

Material: sediment (detritus mud)

Initial comment: from a depth of 0.54–0.55m below the top of the monolith. The sample is from 20cm below the top of the organic deposits at Meare East and from approximately the middle of the local pollen assemblage zone MVE.6. High *Pediastrum* values in the pollen record and the presence of seeds of submerged aquatic plants suggest a high watertable at this time. MVE.6 correlates with MVW.6 at Meare West (Beckett 1979) and the zone below, MVE.5, correlates with MVW.5. Beckett suggested MVW.5 corresponded to MH.5 at Meare Heath and the latter has been dated as lasting from 2252 ±45 BP (SRR-913; 400–190 cal BC at 95% confidence; Stuiver and Pearson 1986) to 2062 ±45 BP (SRR-912; 200 cal BC–cal AD 30 at 95% confidence; Stuiver and Pearson 1986). However, dates from Mound 19 at Meare East which is on top of the peat, are 1740 ±60 BP (HAR-5001), 2090 ±70 BP (HAR-5002), and 2080 ±60 BP (HAR-5000) (*see* Meare Village East).

Objectives: to see if local zone MVE.6 corresponds to regional zone G and zone F. The evidence for a high water table at Meare may correlate with the first flooding horizon recorded in the peats to the south of Meare Island.

Calibrated date: 1 σ : 900–790 cal BC
2 σ : 980–670 cal BC

Final comment: A E Caseldine (1988), this sample dates the approximate mid-zone of the regional zone F, a zone dominated by *Alnus* and *Quercus* tree pollen. Around mid-zone an increase in water levels is indicated by a peak in *Pediastrum* and it is this level that has been dated to 2660 ±70 BP (970–670 cal BC at 95% confidence; Reimer *et al* 2004) confirming the earlier date of the previous zone and the close correspondence of environmental changes in the Meare Pool area (Caseldine 1986) and Glastonbury area (Housley 1986).

References: Beckett 1979
Caseldine 1986
Caseldine 1988
Housley 1986
Reimer *et al* 2004
Stuiver and Pearson 1986

Somerset Levels: Meare Village East, Mound 19, Somerset

Location: ST 447422
Lat. 51.10.33 N; Long. 02.47.28 W

Project manager: J Coles (Department of the Environment), 1982

Archival body: Somerset County Museum, Somerset County Council Records Office

Description: mounded fields north of the island of Meare Westhay, the remains of a 'lake village' by tradition but now known to have been an occupation on the edge of a raised bog. Mound 19 formed a discrete unit totally separate from the other clay deposits within the excavated area.

Objectives: to provide precision to the typological dating of the site.

Final comment: B J Orme, J M Coles, and R J Silverster (1983), although we cannot date the occupation at MVE82 with precision. The project's excavation have indicated that all of the two groups of mounds were not in simultaneous occupation and perhaps it will emerge that there was a slow shift of focus or of foci across and around the settled area.

References: Coles 1987
Orme *et al* 1983

HAR-5000 2080 ±60 BP

$\delta^{13}\text{C}$: -26.9‰

Sample: SLP8203, submitted in April 1982 by J M Coles

Material: peat

Initial comment: from upper mound 19, from a charred layer below the lower hearth.

Objectives: to provide a chronology of a mound excavated stratigraphically.

Calibrated date: 1 σ : 190 cal BC–cal AD 1
2 σ : 360 cal BC–cal AD 60

Final comment: J Coles (4 August 1996), these three dates, HAR-5000 to HAR-5002, are not internally consistent; HAR-5001 is likely to be too young by several centuries. The problems of internal mound structural material and the identifiable fissuring of most of the mound may be too great for reliability in sampling even with the greatest care in collection. The other two dates are in accordance with expectations and the artefacts and suggest a broad contemporaneity with the occupation at the adjacent Meare Village West. Activity on both sites may be in part consecutive, the West site being initially earlier, but considerable overlap in time is expected and supported by these dates.

HAR-5001 1740 ±60 BP

$\delta^{13}\text{C}$: -27.4‰

Sample: SLP8201, submitted in April 1982 by J M Coles

Material: peat

Initial comment: from mound 19, inner surface.

Objectives: as HAR-5000

Calibrated date: 1 σ : cal AD 230–390
2 σ : cal AD 130–430

Final comment: see HAR-5000

HAR-5002 2090 ±70 BP

$\delta^{13}\text{C}$: -27.0‰

Sample: SLP8202, submitted in April 1982 by J M Coles

Material: peat

Initial comment: from upper mound 19, from a charred layer below the lower hearth.

Objectives: as HAR-5000

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

Final comment: see HAR-5000

Somerset Levels: Meare, Stileway, Somerset

Location: ST 546408
Lat. 51.09.51 N; Long. 02.38.58 W

Project manager: J Coles (Department of the Environment), 1983

Archival body: Somerset County Museum, Somerset County Council Records Office

Description: remnants of wooden trackways and platforms on the extreme eastern end of the Meare 'island', revealed by sporadic peat cutting over a decade.

Objectives: to assess the chronological position of a series of structures.

References: Orme *et al* 1985
Walker *et al* 1987, 89

HAR-5710 3210 ±80 BP

$\delta^{13}\text{C}$: -27.8‰

Sample: SLP8301, submitted on 22 July 1983 by J M Coles

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

Initial comment: from a wooden structure running towards Glastonbury.

Objectives: to provide a chronological relationship of the structure to other known finds in the immediate area.

Calibrated date: 1 σ : 1610–1410 cal BC
2 σ : 1690–1310 cal BC

Final comment: J Coles (4 August 1996), the fragments of structural wood came from a woven hurdle and the sample was of young roundwood immediately beneath the hurdle. Nearby were other patches of brushwood of younger age (HAR-1221; 3050 ±70 BP; 1510–1090 cal BC at 95% confidence and HAR-4477; 2810 ±90 BP; 1270–800 cal BC at 95% confidence; Pearson and Stuiver 1986). The complex suggests a period of activity of several centuries with access to the wetland provided by sporadic dumps and placed materials.

References: Pearson and Stuiver 1986

Somerset Levels: Sedgemoor, Fordgate, Somerset

Location: ST 31673187
Lat. 51.04.54 N; Long. 02.58.32 W

Project manager: J Coles (Somerset Levels Project, University of Cambridge), 1983

Archival body: Somerset County Museum

Description: the bog oak was ploughed up in an area undergoing drainage and cultivation, which has yielded various prehistoric surface finds in the general vicinity.

Objectives: various tree-ring sequences have been developed in the Brue Valley which are now being tested against German and Irish sequences. The bog oak sample, with sapwood, will help to develop the programme and could provide the necessary link, both with the external series, and with the Brue Valley series.

Final comment:, radiocarbon dating of tree-ring sequence aided the development of an absolute chronology for the levels.

References: Morgan 1988
Morgan 1989
Walker and Otlet 1988, 304

HAR-6263 3470 ±90 BP

$\delta^{13}C$: -27.0‰

Sample: SLP8402, submitted on 31 August 1984 by J M Coles

Material: wood (waterlogged): *Quercus* sp., bog oak

Initial comment: tree-ring analysis of selected samples will help provide precision to archaeological fieldwork in the region. The sample came from the outermost 50 sapwood rings of a tree *c* 160 years old.

Objectives: various tree-ring sequences have been developed in the Brue Valley, which are now being tested against German and Irish sequences. The bog oak sample, with sapwood, will help to develop the programme and could provide the necessary link, both with the external series, and with the Brue Valley series.

Calibrated date: 1 σ : 1910–1680 cal BC
2 σ : 2030–1530 cal BC

Final comment: J Coles (3 January 2007), aids development of local tree-ring chronology.

Somerset Levels: Sedgemoor, Henley Bridge, Somerset

Location: ST 438325
Lat. 51.05.19 N; Long. 02.48.09 W

Project manager: J Coles (Department of the Environment), 1982

Archival body: Somerset County Museum, Somerset County Council Records Office

Description: traces of a wooden structure were found in the bank of the River Cary, near Henley Bridge.

Objectives: to assess the chronological position of this structure.

References: Coles and Orme 1983
Walker *et al* 1987, 88

HAR-4998 3020 ±60 BP

$\delta^{13}C$: -29.8‰

Sample: SLP8204, submitted in April 1982 by J M Coles

Material: wood (waterlogged; remaining subsample now dry and degraded): *Alnus* sp., roundwood (R Gale 1999)

Initial comment: from presumed ancient wood structure found in the bank of the River Cary.

Objectives: to date the structure.

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

Final comment: J M Coles (1987), date appears to confirm presumed prehistoric date.

Somerset Levels: Sharpham, Godwin's Tracks, Somerset

Location: ST 466384
Lat. 51.08.31 N; Long. 02.45.48 W

Project manager: J Coles (Department of the Environment), 1982

Archival body: Somerset County Council, Somerset County Council Records Office

Description: a peat field near Sharpham in the eastern end of the Brue Valley, adjacent to Tinney's Ground where many hundreds of Bronze Age brushwood structural remains are known.

Objectives: to allow comparison with the Tinney's Ground complex.

References: Coles *et al* 1985b
Walker *et al* 1987, 88

HAR-5086 3060 ±70 BP

$\delta^{13}C$: -29.7‰

Sample: SLP8206, submitted in July 1982 by J M Coles

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

Initial comment: from a trackway newly discovered in the 1982 excavation.

Objectives: to date the trackway.

Calibrated date: 1 σ : 1420–1210 cal BC
2 σ : 1500–1120 cal BC

Final comment: J Coles (4 August 1996), the brushwood track was structurally comparable to those at Tinney's Ground, and the date suggests that it is broadly contemporary with the multiple series of tracks and small platforms at Tinney's Ground. The whole complex indicates an active and continuing occupation on the Sharpham peninsula.

Somerset Levels: Sutton Hams, Somerset

Location: ST 355371
Lat. 51.07.48 N; Long. 02.55.21 W

Project manager: J Coles (Somerset Levels Project,
University of Cambridge), 1981

Archival body: Somerset County Museum

Description: peatland

Objectives: to date interface of marine clay and freshwater peat.

Final comment:, the marine regression on Sedgemoor was probably later than that in Brue Valley.

HAR-5354 5020 ±80 BP

$\delta^{13}C$: -29.4‰

Sample: SLP8212, submitted in December 1982 by
J M Coles

Material: peat

Initial comment: taken from 289–295.5cm depth from the surface.

Objectives: to date marine regression from west Sedgemoor.

Calibrated date: 1 σ : 3960–3700 cal BC
2 σ : 3980–3640 cal BC

Final comment: J Coles (3 January 2007), slightly later than expected.

Somerset Levels: Sweet Track, Somerset

Location: ST 446423
Lat. 51.10.40 N; Long. 02.47.35 W

Project manager: J Coles (Department of the
Environment), 1980

Archival body: Somerset County Museum, Somerset
County Council Records Office

Description: the Sweet Track is the oldest known prehistoric monument in the levels, perhaps the earliest wooden trackway in western Europe, and it has yielded a wide range of information about fourth millennium BC woodland and woodworking activities. In 1980 an extensive programme was undertaken to ascertain the precise position of the structure beneath the peat along the entire projected 1800m, and to record the condition of the track and its likely future. The peat monolith was taken from Sweet TW, which is at the northern end of the Sweet Track. The monolith was sampled for pollen analysis between 0.50m and 1.72m

Objectives: to date the pollen diagram from Sweet TW.

References: Coles 1989
Coles and Coles 1986
Coles and Orme 1981
Coles and Orme 1984

HAR-5293 3660 ±80 BP

$\delta^{13}C$: -28.5‰

Sample: SLP8211, submitted in November 1982 by
J M Coles

Material: peat

Initial comment: from the top of the peat monolith.

Objectives: to date the top of the pollen diagram.

Calibrated date: 1 σ : 2190–1920 cal BC
2 σ : 2290–1780 cal BC

Final comment: A E Caseldine (1984), this sample dates the final pollen zone at Sweet TW, which suggests some further clearance activity in the region although the evidence is slight.

References: Caseldine 1984, 78

HAR-5294 4180 ±70 BP

$\delta^{13}C$: -29.1‰

Sample: SLP8209, submitted in November 1982 by
J M Coles

Material: peat

Initial comment: from regional pollen assemblage zone boundary C/D.

Objectives: to date zone boundary C/D.

Calibrated date: 1 σ : 2890–2630 cal BC
2 σ : 2920–2500 cal BC

Final comment: A E Caseldine (1984), this sample dates the end of zone C at Sweet TW. Although earlier than the dates from Abbot's Way, Sweet Factory and Meare Heath sites, this date is similar to that obtained for the same boundary at the Eclipse site. According to the radiocarbon evidence from all four sites this regeneration phase does seem to have lasted in the order of 200 to 400 years.

References: Caseldine 1984, 78
Walker *et al* 1988, 335

HAR-5295 4510 ±70 BP

$\delta^{13}C$: -28.1‰

Sample: SLP8208, submitted in November 1982 by
J M Coles

Material: peat

Initial comment: from regional pollen assemblage zone boundary B/C.

Objectives: to date zone boundary B/C.

Calibrated date: 1 σ : 3370–3090 cal BC
2 σ : 3500–2920 cal BC

Final comment: A E Caseldine (1984), this sample dates the end of pollen zone B at Sweet TW, rather earlier than at the Abbot's Way and Sweet Factory sites but later than at the Eclipse site.

References: Caseldine 1984, 78
Walker *et al* 1988, 335

HAR-5296 4790 ±80 BP $\delta^{13}\text{C}$: -29.1‰

Sample: SLP8207, submitted in November 1982 by J M Coles

Material: peat

Initial comment: from regional pollen assemblage zone boundary A/B.

Objectives: to date zone boundary A/B.

Calibrated date: 1 σ : 3650–3380 cal BC
2 σ : 3710–3370 cal BC

Final comment: A E Caseldine (1984), this sample dates the beginning of the clearance phase reflected in the pollen assemblage B at Sweet TW, and this date is in close agreement with those from the same pollen zone boundary at the Abbot's Way (4774 ±50 BP, SRR-542) and Eclipse (4780 ±70 BP, HAR-4866) sites.

References: Caseldine 1984, 78
Walker *et al* 1988, 335

Somerset Levels: Walton Heath, Somerset

Location: ST 455394
Lat. 51.09.03 N; Long. 02.46.45 W

Project manager: J Coles (Department of the Environment), 1983

Archival body: Somerset County Museum, Somerset County Council Records Office

Description: Walton 1983 was an isolated dismantled hurdle truncated by peat cutting.

Objectives: to date the structure and establish its chronology within the Levels.

References: Coles *et al* 1988a
Walker *et al* 1987, 89

HAR-5726 4680 ±70 BP $\delta^{13}\text{C}$: -30.4‰

Sample: SLP8307, submitted in September 1983 by J M Coles

Material: wood (waterlogged): *Corylus* sp.

Initial comment: from part of a newly discovered structure in an area intense with Neolithic activity.

Objectives: to provide a chronological place for an isolated structure showing woodland coppicing in the Neolithic period.

Calibrated date: 1 σ : 3630–3360 cal BC
2 σ : 3640–3340 cal BC

Final comment: J M Coles (4 August 1996), this dismantled hurdle is somewhat older than the Walton Heath (HAR-5726) and Rowland's track hurdles, and younger than Frank's hurdle (HAR-6265). All show the existence of a well-managed coppice system in the Neolithic.

Somerset Levels: Walton Heath, Foster's Walton, Somerset

Location: ST 455392
Lat. 51.08.56 N; Long. 02.46.45 W

Project manager: J Coles (Department of the Environment), 1984

Archival body: Somerset County Museum, Somerset County Council Record Taunton

Description: Foster's Walton 1984 is one of an increasingly large series of structures and finds in the immediate area of Walton Heath, from which many late Neolithic finds have been made in the past. Foster's Walton 1984 may form part of a traditional passageway across the moors. Two separate patches of brushwood were excavated; the intervening space had already been deeply trenched by machine.

Objectives: to date the structures and establish their chronology within the Levels.

References: Coles *et al* 1988a
Walker *et al* 1987, 89

HAR-6264 4660 ±80 BP $\delta^{13}\text{C}$: -29.7‰

Sample: SLP8401, submitted in August 1984 by J M Coles

Material: wood (waterlogged): *Betula* sp.

Initial comment: from part of a wood structure in low peats. The structure extended over two peat heads and must have been at least 20m long; part of it has been destroyed by peat cutting.

Objectives: the sample is of relatively young wood and so should provide an accurate measurement of the wooden structure.

Calibrated date: 1 σ : 3630–3360 cal BC
2 σ : 3640–3120 cal BC

Final comment: J Coles (4 August 1996), the brushwood structure may have consisted of a short-term laying down of material to cross a boggy area of the wetland. It forms part of the long-lived activity in this part of the Brue Valley.

Somerset Levels: West Edington, Somerset

Location: ST 389425
Lat. 51.10.41 N; Long. 02.52.27 W

Project manager: J Coles (Somerset Levels Project, University of Cambridge), 1982

Archival body: Somerset County Museum

Description: local exposure of clay-peat interface.

Objectives: to date interface of marine clay and onset of freshwater peat.

Final comment: clay-peat interface makes marine repression in later fifth millennium BC with some local variation.

References: Walker *et al* 1988, 332

HAR-4999 5420 ±70 BP $\delta^{13}\text{C}$: -28.0‰*Sample*: SLP8205, submitted in April 1982 by J M Coles*Material*: peat*Initial comment*: interface between lower marine clay and freshwater peat.*Objectives*: to date the clay/peat interface in western Brue Valley.*Calibrated date*: 1 σ : 4350–4230 cal BC
2 σ : 4370–4050 cal BC*Final comment*: J Coles (3 January 2007), agrees with local environmental sequence.*Initial comment*: from the Honeybee track, hurdle A, site B 1983.*Objectives*: to provide a date and the relationship with other structures in the Honeygore complex.*Calibrated date*: 1 σ : 3520–3130 cal BC
2 σ : 3640–3020 cal BC*Final comment*: J M Coles (4 August 1996), this hurdle trackway is unique within the Honeygore complex, as all other structures are birch brushwood. Hurdles are better known from Walton Heath, most of them younger than this structure.*References*: Walker *et al* 1987, 92**Somerset Levels: Westhay Level, Honeygore Complex, Somerset***Location*: ST 415409
Lat. 51.09.50 N; Long. 02.50.12 W*Project manager*: J Coles (Department of the Environment), 1983 and 1985*Archival body*: Somerset County Museum, Somerset County Council Records Office*Description*: the Westhay Level was the first area to be explored archaeologically and has yielded a wide variety of structures over the past 100 years. The Honeygore complex was exposed over a series of adjoining fields in an area heavily cut and renovated for peat extraction.*Objectives*: to attempt to assign a chronological position for each of a series of brushwood structures separated both horizontally and vertically.*References*: Coles *et al* 1985a**HAR-5721** 4610 ±90 BP $\delta^{13}\text{C}$: -28.2‰*Sample*: SLP8302, submitted in August 1983 by J M Coles*Material*: wood (waterlogged): *Betula* sp.*Initial comment*: part of a complex of tracks excavated in Neolithic peat. From site A 1983.*Objectives*: to confirm estimated date of *c* 2800 cal BC.*Calibrated date*: 1 σ : 3520–3130 cal BC
2 σ : 3640–3030 cal BC*Final comment*: J M Coles (4 August 1996), the brushwood track is now seen to relate to previous exposures (1940–1960) and Somerset Level Project work (1973–1985), as one of the major trackways in the complex (Honeygore).*References*: Walker *et al* 1987, 92**HAR-5722** 4610 ±100 BP $\delta^{13}\text{C}$: -30.2‰*Sample*: SLP8303, submitted in August 1983 by J M Coles*Material*: wood (waterlogged): *Corylus* sp.**HAR-5723** 4500 ±70 BP $\delta^{13}\text{C}$: -28.3‰*Sample*: SLP8304, submitted in August 1983 by J M Coles*Material*: wood (waterlogged; remaining subsample now dry, collapsed and degraded): cf *Corylus* sp. (R Gale 1999)*Initial comment*: from Honeybee track, hurdle B, site B 1983.*Objectives*: as HAR-5722*Calibrated date*: 1 σ : 3360–3030 cal BC
2 σ : 3500–2920 cal BC*Final comment*: see HAR-5722*References*: Walker *et al* 1987, 92**HAR-5724** 4560 ±80 BP $\delta^{13}\text{C}$: -28.6‰*Sample*: SLP8305, submitted in August 1983 by J M Coles*Material*: wood (waterlogged): *Betula* sp.*Initial comment*: from the Honeycat track, site C 1983.*Objectives*: to assign a chronological position for the brushwood track in an area dense with wooden structures.*Calibrated date*: 1 σ : 3490–3100 cal BC
2 σ : 3620–3020 cal BC*Final comment*: J M Coles (4 August 1996), this brushwood trackway, identified in only a few cuttings, is broadly contemporary with the Honeygore track some 15–20m away; the two converge to the east and disappear into uncut fields.*References*: Walker *et al* 1987, 92**HAR-5727** 4300 ±70 BP $\delta^{13}\text{C}$: -27.5‰*Sample*: SLP8306, submitted on 1 September 1983 by J M Coles*Material*: peat*Initial comment*: from a thin peat surface immediately beneath hurdle B of the Honeybee track, site B 1983.*Objectives*: to provide needed evidence for wood/peat radiocarbon divergences.*Calibrated date*: 1 σ : 3010–2880 cal BC
2 σ : 3100–2700 cal BC

Final comment: J M Coles (4 August 1996), there is a marginal difference between the wooden structure (HAR-5722 and HAR-5723) and its peaty underlying surface.

Final comment: A Bayliss (6 October 2011), this peat is slightly later than might be expected in relation to the hurdle above it (HAR-5722), suggesting that this may have sunk slightly into the mire.

References: Walker *et al* 1987, 92

HAR-6698 4720 ±70 BP

$\delta^{13}C$: -29.6‰

Sample: SLP8503, submitted on 19 June 1985 by J M Coles

Material: wood (waterlogged): *Betula* sp.; *Corylus* sp.

Initial comment: from previously unknown Neolithic track in complex of at least five such tracks. The structure is named Honeypot track.

Objectives: a series of tracks in close proximity suggests Neolithic interest in the immediate area. A date is needed to establish where this track fits into the chronology of the complex.

Calibrated date: 1 σ : 3640–3370 cal BC
2 σ : 3650–3360 cal BC

Final comment: J Coles (4 August 1996), this brushwood structure, previously unidentified, probably relates to one of the earlier trackways seen in the 1960s and subsequently lost to view. It forms part of the Honeygore complex, tightly concentrated in this area and seemingly converging upon a field to the east as yet unexplored.

HAR-6699 4640 ±70 BP

$\delta^{13}C$: -27.8‰

Sample: SLP8504, submitted on 19 June 1985 by J M Coles

Material: wood (waterlogged): *Betula* sp.

Initial comment: from one of at least five Neolithic structures in the Honeygore complex.

Objectives: to relate the track to other adjacent tracks.

Calibrated date: 1 σ : 3520–3350 cal BC
2 σ : 3640–3120 cal BC

Final comment: J Coles (4 August 1996), brushwood trackways in this area of the Honeygore complex form a tightly packed converging group, but this particular structure is aligned away from the putative junction, heading due east rather than south-east. It is contemporary with the series.

References: Walker *et al* 1990, 174

Southampton: Hamwic, Six Dials (SOU 30), Hampshire

Location: SU 42511229
Lat. 50.54.29 N; Long. 01.23.43 W

Project manager: P Andrews (Southampton City Museums), 1981

Archival body: Southampton City Museums

Description: Six Dials, within the middle Saxon town.

Objectives: to investigate part of a large site within the middle Saxon town.

Final comment: P Andrews (28 August 1996), sample HAR-5105 closely agrees with other dating evidence, but sample HAR-5106 appears to be too early. This might indicate the reuse of a possible wooden barrel as the lining of a well.

References: Andrews 1997

HAR-5105 1300 ±70 BP

$\delta^{13}C$: -26.8‰

Sample: C4518, submitted in June 1982 by A Pitt

Material: wood (waterlogged): *Quercus* sp. (D Haddon-Reece 1982)

Initial comment: from well 3299 (C4518).

Objectives: to establish the date of timbers from the original build of the well.

Calibrated date: 1 σ : cal AD 650–780
2 σ : cal AD 610–890

Final comment: P Andrews (28 August 1996), the dendro-chronological felling date range at 95% confidence is cal AD 695–733 (Hillam in Andrews 1997, 194). The post use infilling is dated to the eighth century on artefactual evidence.

HAR-5106 1430 ±60 BP

$\delta^{13}C$: -27.8‰

Sample: WELL2, submitted in June 1982 by A Pitt

Material: wood (waterlogged): *Quercus* sp.; *Fraxinus* sp. (D Haddon-Reece 1982)

Initial comment: from well 3295, (F2015/15).

Objectives: to establish the date of the wood from the original build of the well.

Calibrated date: 1 σ : cal AD 570–660
2 σ : cal AD 530–680

Final comment: P Andrews (28 August 1996), stratigraphically the well from which this sample was taken is later than the well from which sample HAR-5105 was taken. The post-use infilling is dated to the ninth century on artefactual evidence (including a coin).

Southampton: Maddison Street, Hampshire

Location: SU 41871149
Lat. 50.54.03 N; Long. 01.24.16 W

Project manager: P Holdsworth, R Thomson, and S Smith (Southampton City Council Archaeology Section), 1981

Archival body: Southampton City Museums

Description: excavation within the bailey of Southampton Castle revealed Iron Age, Saxon, medieval, and post-medieval features. The medieval and later features, which were connected within the growth and decay of the castle, included an irregular graveyard utilising a lime kiln.

Objectives: to investigate the development of Southampton Castle.

References: Oxley 1986
Oxley 1988
S R Smith 1984

HAR-4648 1480 ±70 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: MAD889, submitted in September 1981 by A J Clark

Material: charcoal (remaining subsample identified): unidentified (10.46g); *Quercus* sp., sapwood (0.05g, 2.1%); *Quercus* sp., heartwood (2.31g, 97.9%) (R Gale 2000)

Initial comment: from context 889 (phase IC), a charcoaly soil sealed by the remnants of the medieval rampart, and containing a tuyère fragment.

Objectives: an approximate result will be sufficient, as the date is required to determine whether this phase is Iron Age or Saxon.

Calibrated date: 1 σ : cal AD 530–650
2 σ : cal AD 420–670

Final comment: J Oxley (1988), the dating evidence for phase IC is tenuous, and too much reliance should not be placed on a single radiocarbon date. However, the possibility exists that the phase IC sequence represents an early Saxon, or perhaps middle Saxon smithy. If one allows this possibility then the site becomes one of a very few excavated and published sites of this type and date.

Southchurch Hall, Essex

Location: TQ 894855
Lat. 51.32.10 N; Long. 00.43.52 E

Project manager: J Jackson (Centre of East Anglian Studies, University of East Anglia), 1977–84

Archival body: Central Museum, Southend-on-Sea, National Maritime Museum, and Southchurch Hall

Description: a timber-framed house tree-ring dated to AD 1321–63, which is enclosed by a moat. The Hall is situated about three-quarters of a mile to the east of Southend town centre and lies on the 10m south facing terrace of the Thames estuary.

Objectives: to investigate the origins and development of the moated site and to locate and reconstruct the numerous manorial buildings known from an inventory of 1391 to have existed around the Hall.

Final comment: D Andrews (25 March 1996), subsequent attempts to tree-ring date this material have failed, although a date has been obtained for the timber-framed manor house. It was hoped that dating of these timbers would provide an absolute chronology for the important stratified sequence discovered in the excavations in the moat. The radiocarbon dates are not really precise enough to be very helpful.

References: Jackson 1987
Tyers 1995

HAR-9276 670 ±60 BP

$\delta^{13}\text{C}$: -28.4‰

Sample: S292X11, submitted in December 1987 by P Murphy

Material: wood: *Quercus* sp. (P Murphy 1987)

Initial comment: from a revetment upright associated with phase I of a medieval bridge.

Objectives: to provide a chronological framework for the moat stratigraphy. Dendrochronology has not given absolute dates.

Calibrated date: 1 σ : cal AD 1270–1390
2 σ : cal AD 1250–1410

Final comment: D Andrews (25 March 1996), within the expected date range.

HAR-9277 720 ±70 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: S292X111, submitted in December 1987 by P Murphy

Material: wood: *Quercus* sp. (P Murphy 1987)

Initial comment: from a revetment upright associated with phase I of a medieval bridge.

Objectives: as HAR-9276

Calibrated date: 1 σ : cal AD 1250–1380
2 σ : cal AD 1180–1400

Final comment: see HAR-9276

HAR-9278 510 ±60 BP

$\delta^{13}\text{C}$: -28.1‰

Sample: S40/5, submitted in December 1987 by P Murphy

Material: wood: *Quercus* sp. (P Murphy 1987)

Initial comment: from a sole plate from phase II of a medieval bridge.

Objectives: as HAR-9276

Calibrated date: 1 σ : cal AD 1400–1450
2 σ : cal AD 1300–1470

Final comment: D Andrews (25 March 1996), an interesting result, in as much as this timber from the second phase of the bridge has produced a slightly later date.

Springfield Lyons, Essex

Location: TL 735083
Lat. 51.44.46 N; Long. 00.30.49 E

Project manager: P Murphy (Essex County Council), 1983

Archival body: Essex County Council

Description: adjacent to Chelmer valley.

Objectives: to date the features.

References: Walker and Otlet 1988, 313

HAR-6621 3760 ±70 BP $\delta^{13}\text{C}$: -24.9‰*Sample:* SB3558, submitted in November 1984 by P Murphy*Material:* charcoal: *Quercus* sp.*Initial comment:* from the late Bronze Age pit.*Objectives:* the feature is believed to pre-date the late Bronze Age enclosure. A date would provide a *terminus post quem* for the enclosure. There may be slight root contamination.*Calibrated date:* 1 σ : 2290–2040 cal BC
2 σ : 2460–1970 cal BC*Final comment:* N Brown (15 July 1994), this date is from the fill of a pit, which would have been beneath the postulated bank of the late Bronze Age enclosure. The feature is one of a number of early and late Neolithic pits, related to a causewayed enclosure, which lay east of the late Bronze Age site.**HAR-6622** 2830 ±70 BP $\delta^{13}\text{C}$: -24.1‰*Sample:* SB3666, submitted in November 1984 by P Murphy*Material:* charcoal: *Fraxinus* sp.; *Quercus* sp.; ?*Quercus* sp.*Initial comment:* from a posthole of the late Bronze Age roundhouse.*Objectives:* to date the structure.*Calibrated date:* 1 σ : 1120–900 cal BC
2 σ : 1260–820 cal BC*Final comment:* N Brown (15 July 1994), this was presumed to be an early feature of the site, the calibrated date range accords well with this.**Springfield Lyons: Chelmer Bridge, Essex**

Location: TL 74390655
Lat. 51.43.48 N; Long. 00.31.32 E

Project manager: P Murphy (Essex County Council), 1985

Archival body: Essex County Council

Description: the valley floor of the river Chelmer, adjacent to cropmark sites at Springfield.

Objectives: to aid in dating of the environmental background of the site.*References:* Walker and Otlet 1988, 315**HAR-6682** 3710 ±80 BP $\delta^{13}\text{C}$: -29.2‰*Sample:* CBBASE, submitted in May 1985 by P Murphy*Material:* wood (waterlogged): *Quercus* sp.*Initial comment:* from the base of detrius mud exposed in contractors excavation.*Objectives:* the section is directly adjacent to Neolithic–late Saxon sites currently under excavation. Changes in the valley sedimentation can be related to the land use in nearby areas, and, this section, if dated, will therefore amplify the environmental background of these sites. The samples came from a sealed context about 180cm of alluvium.*Calibrated date:* 1 σ : 2210–1970 cal BC
2 σ : 2350–1890 cal BC*Final comment:* P Murphy (7 February 1995), the two dates (CBBASE and CBTOP) are from woody detrius mud in a palaeochannel. Within this sediment a marked transition from a wooded to open environment is indicated by macrofossils, followed by clastic alluviation. This gives a helpful chronology for Bronze Age impacts on local vegetation and soil.**HAR-6683** 3200 ±70 BP $\delta^{13}\text{C}$: -28.4‰*Sample:* CBTOP, submitted in May 1985 by P Murphy*Material:* wood (waterlogged): unidentified*Initial comment:* from the top of detrius mud exposed in contractors excavation.*Objectives:* as HAR-6682*Calibrated date:* 1 σ : 1530–1410 cal BC
2 σ : 1630–1310 cal BC*Final comment:* see HAR-6682**Springfield: Cursus, Essex**

Location: TL 732068
Lat. 51.43.57 N; Long. 00.30.30 E

Project manager: P Murphy (Essex County Council Field Archaeology Unit), 1984

Archival body: Essex County Council

Description: excavations on sectors of the 700m cursus failed to find any entrances, though the east end contained a ?circular posthole feature with Mortlake pottery.

Objectives: elsewhere the cursus ditch has contained too little charcoal for dating, and these samples therefore provide the only opportunity to date the cursus, one of a category of rather uncommon field monuments. There is some fibrous root contamination probable, but the charcoal fragments are large.

References: Buckley *et al* 2001

HAR-6266 3990 ±80 BP

$\delta^{13}\text{C}$: -24.7‰

Sample: SB84703A, submitted in November 1984 by P Murphy

Material: charcoal: *Quercus* sp.

Initial comment: from rich charcoal deposits in the enclosing ditch close to the east terminal of the Neolithic cursus.

Objectives: primarily to obtain a date for the ditch in-filling.

Calibrated date: 1 σ : 2580–2460 cal BC
2 σ : 2860–2280 cal BC

Final comment: N Brown (15 July 1994), these calibrated dates (HAR-6266, HAR-6268, and HAR-6271) from a layer in the upper fill of the cursus ditch containing grooved ware are comparable with other dates associated with Grooved Ware in eastern England (Bradley *et al* 1992, 71). The dates relate to the upper fill of the north cursus ditch 40m from the eastern terminal. Therefore the date of the monuments construction, and the deposition of a Mortlake style Peterborough bowl in the lower ditch fill of the eastern terminal is presumably rather earlier.

References: Bradley *et al* 1992

HAR-6268 3960 ±80 BP

$\delta^{13}\text{C}$: -26.1‰

Sample: SB84703B, submitted in November 1984 by P Murphy

Material: charcoal: *Quercus* sp.

Initial comment: from rich charcoal deposits in the enclosing ditch close to the east terminal of the Neolithic cursus.

Objectives: as HAR-6266

Calibrated date: 1 σ : 2580–2340 cal BC
2 σ : 2840–2200 cal BC

Final comment: see HAR-6266

HAR-6271 4120 ±80 BP

$\delta^{13}\text{C}$: -24.9‰

Sample: SB84703B, submitted in November 1984 by P Murphy

Material: charcoal: *Quercus* sp.

Initial comment: from rich charcoal deposits in the enclosing ditch close to the east terminal of the Neolithic cursus.

Objectives: as HAR-6266

Calibrated date: 1 σ : 2880–2500 cal BC
2 σ : 2900–2470 cal BC

Final comment: see HAR-6266

Springfield: Sandon Culvert, Essex

Location: TL 747045
Lat. 51.42.41 N; Long. 00.31.44 E

Project manager: P Murphy (Essex County Council), 1984

Archival body: Essex County Council

Description: palaeochannel of the Sandon Brook, near Chelmsford.

Objectives: to establish the date range of channel sediments.

Final comment: P Murphy (19 April 1996), the two determinations have provided useful dating information on channel sediments spanning a critical time period in this area from Roman to Saxon.

References: Murphy 1994
Walker and Otlet 1988, 311

HAR-6570 860 ±70 BP

$\delta^{13}\text{C}$: -26.6‰

Sample: SANDTOP, submitted in November 1984 by P Murphy

Material: wood (waterlogged; remaining subsample identified, now dry and structurally collapsed; ring-porous wood (ie not *Quercus* sp.) but too degraded to identify, 2.20g (100%)); unidentified (7.60g)

Initial comment: from valley sediments.

Objectives: environmental data from the Neolithic, Bronze Age, and Anglo-Saxon site itself are sparse. However pollen and macrofossil samples have been obtained from this section close to the site and will remedy this deficiency. The change in valley sedimentation from organic muds to mineral alluvium is related to the beginnings of large scale clearance and agriculture. Dates are required to determine when this occurred, within this catchment.

Calibrated date: 1 σ : cal AD 1040–1260
2 σ : cal AD 1020–1280

Final comment: P Murphy (19 April 1996), the date establishes a terminal date for biogenic sedimentation in the channel, which was the intention when submitting the sample.

HAR-6580 1770 ±70 BP

$\delta^{13}\text{C}$: -28.3‰

Sample: SANDBASE, submitted in November 1984 by P Murphy

Material: wood (waterlogged; remaining subsample identified, now dry and structurally collapsed; ring-porous wood (ie not *Quercus* sp.) but too degraded to identify, 2.93g (100%)); unidentified (11.22g)

Initial comment: from valley sediments.

Objectives: as HAR-6570. In addition this sample will date the base of the pollen and macro column samples from the section.

Calibrated date: 1 σ : cal AD 130–380
2 σ : cal AD 70–420

Final comment: P Murphy (19 April 1996), the date establishes the initiation of biogenic sediment deposition.

Sproatley, Humberside

Location: TA 204346
Lat. 53.47.37 N; Long. 00.10.19 W

Project manager: D Crowther (Hull and East Riding Museum), 1985

Archival body: Hull and East Riding Museum

Description: one of a series of 'bog oaks' excavated in 1984 during drainage works in carr land at Sproatley, Humberside (TA 205347). Found in peat, from an estimated depth of 5m with one tree showed signs of having been chopped apart approximately 2m from the root bole.

Objectives: dating sought to establish whether cut marks arose from Neolithic clearance or felling of timber in a rising bog. Specialist examination of the cut marks ascribed them to use a large copper alloy or small iron axe with a curved blade, and hence to activity in the middle Bronze Age or later.

References: Flenev 1987
Walker and Otlet 1988, 313

HAR-6626 6310 ±80 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: 1A, submitted on 18 March 1985 by D Crowther

Material: wood (previously waterlogged; remaining subsample of small slivers now dried out): *Quercus* sp., heartwood (9.12g, 100%); unidentified (13.19g) (R Gale 2000)

Initial comment: removed from a deep peat deposit and left exposed to air for some months before burial beneath peaty soil heap.

Objectives: the sample probably came from worked bog oak. A date is essential to the study of toolmarks.

Calibrated date: 1 σ : 5370–5210 cal BC
2 σ : 5480–5050 cal BC

Final comment: M Foreman (24 January 2002), the radiocarbon dates offer the intriguing possibility of a Neolithic felling. From the toolmark studies showed similar axe cut oak log ends of roughly middle Bronze Age date in the South-East. Although these Sproatley axe bucked log end is likely to be of Bronze Age date at the earliest and could be as late as Iron Age. This would suggest that the radiocarbon dates were unreliable.

HAR-6627 6300 ±80 BP

$\delta^{13}\text{C}$: -26.1‰

Sample: 1B, submitted on 18 March 1985 by D Crowther

Material: wood (previously waterlogged; remaining subsample of small slivers now dried out): *Quercus* sp., heartwood (9.78g, 100%); unidentified (27.62g) (R Gale 2000)

Initial comment: as HAR-6626

Objectives: as HAR-6626

Calibrated date: 1 σ : 5370–5210 cal BC
2 σ : 5480–5050 cal BC

Final comment: see HAR-6626

St Neot: Colliford, Colliford Mill, Cornwall

Location: SX 177713
Lat. 50.30.45 N; Long. 04.34.17 W

Project manager: D Austin (St David's University College) T Greeves (Unknown), April 1983

Archival body: Royal Cornwall Museum

Description: a large early tin Mill complex.

Objectives: to excavate and record the site before its destruction due to the construction of a dam. Placing it in its tin working and landscape context.

References: Austin *et al* 1989

HAR-5608 1540 ±80 BP

$\delta^{13}\text{C}$: -28.5‰

Sample: COLL-5, submitted in May 1983 by D Austin

Material: soil ((buried) and turf)

Initial comment: taken from 5cm below the top of a soil profile/turf layer buried beneath upcast from a leat in the medieval tin mill at Colliford.

Objectives: a pollen diagram has been prepared from the soil profile. The date will give a *terminus post quem* for the construction of the mill leat and also provide an age for late medieval environmental changes around the site.

Calibrated date: 1 σ : cal AD 420–610
2 σ : cal AD 340–660

Final comment: D Austin, GA M Gerrard, and T A P Greeves (1989), this date appears to be up to 1000 years too old. Soils are particularly difficult material to date by the radiocarbon method partly because of the constant recycling that takes place within soil profiles. Consequently, a Romano-British rather than a medieval age for the buried soils is not altogether surprising. Clearly, however this dates is of little value in the establishment of a chronology of medieval land use changes in the upper St Neot valley area.

St Neot: Colliford, Stuffle Farm, Cornwall

Location: SX 183179
Lat. 50.01.58 N; Long. 04.32.15 W

Project manager: D Austin (St David's University College), 1980

Archival body: Royal Cornwall Museum

Description: peat monolith taken from a valley bottom site 200m west of medieval farm and field complex.

Objectives: to provide dating evidence for environmental background.

Laboratory comment: Ancient Monuments Laboratory (2003), two further samples were submitted for dating, STU52 (HAR-5606) and STU-6 (HAR-5607), but both failed to produce a result.

References: Austin *et al* 1989

HAR-4458 870 ±60 BP

$\delta^{13}\text{C}$: -28.8‰

Sample: STU97, submitted on 28 April 1981 by D Austin

Material: peat (amorphous (442g, wet))

Initial comment: from 97cm below surface of bog.

Objectives: to date this phase.

Calibrated date: 1 σ : cal AD 1040–1230
2 σ : cal AD 1020–1280

Final comment: D Austin, G Gerrard, and T Greeves (1989), although difficulties can sometimes arise in radiocarbon dating of loosely-compacted peats, there are no reasons to suspect that the dates obtained from the Stuffle peat profile are markedly aberrant.

HAR-4459 440 ±70 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: STU37, submitted on 28 April 1981 by D Austin

Material: peat (sedge (480g, wet))

Initial comment: taken from 37cm below surface of bog.

Objectives: to date the end of the cereal cultivation phase.

Calibrated date: 1 σ : cal AD 1420–1490
2 σ : cal AD 1320–1640

Final comment: see HAR-4458

Stafford: Bath Street, Staffordshire

Location: SJ 92112420
Lat. 52.48.54 N; Long. 02.07.01 W

Project manager: M Carver (Birmingham University Field Archaeology Unit), 1982

Archival body: Stoke on Trent Museum

Description: ST 34, an area excavation in the town centre.

Objectives: to date the earliest activity in the central area.

Final comment: M Carver (11 December 2006), the series produced convincing dating evidence that the burh built at Stafford began as a middle Saxon centre. As anticipated the potteries belonged to the burh and began work in the late ninth or (more probably) the early tenth century.

References: Carver 2010

HAR-5291 1320 ±70 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: 34108201, submitted on 15 October 1982 by J H Cane

Material: charcoal (remaining subsample consisted of a large volume of charcoal but most fragments were too small to identify): unidentified (19.15g); *Quercus* sp., heartwood (1.69g, 85.4%); *Corylus* sp. (0.29g, 14.6%) (R Gale 2000)

Initial comment: from a context with a spread of friable flecks of clean charcoal, and a few loose crumbs of sand silt soil. The context was identified as a possible hearth or charcoal

spread and was found in an irregular sided sub-circular shallow scoop with an indentation in its base. The upper surface was uneven with irregular edges. The deposit overlay natural sand and gravel.

Objectives: to compare the date with datable pottery and small finds from the earliest phase of the site and to help clarify any stratigraphic problems caused by difficulty in feature deposition above the natural sand and gravel.

Calibrated date: 1 σ : cal AD 650–780
2 σ : cal AD 600–890

Final comment: M Carver (11 December 2006), this corroborates the idea that the earliest settlement in the centre of Stafford was middle Saxon in date.

Stafford: Eastgate Street, Staffordshire

Location: SJ 92452320
Lat. 52.48.21 N; Long. 02.06.43 W

Project manager: M Carver (Birmingham University Field Archaeology Unit), 1982

Archival body: Stoke on Trent Museum

Description: ST 32. An area excavation on the east side of the historic precinct of Anglo-Saxon Stafford. The area produced evidence for kilns making Stafford Ware (late Saxon) and wells and pits which were probably a continuation of industrial activity into the thirteenth century or thereabouts.

Objectives: to explore an industrial area on the east side of the burh built by Æthelflæda Lady of the Mercians in the early tenth century, and its termination.

Final comment: M Carver (11 December 2006), the series produced convincing dating evidence that the burh built at Stafford began as a middle Saxon centre. As anticipated the potteries belonged to the burh and began work in the late 9th or (more probably) the early tenth century. Industrial activity diminished in or after the thirteenth century.

HAR-5292 690 ±70 BP

$\delta^{13}\text{C}$: -30.5‰

Sample: 32123501, submitted on 15 October 1982 by J H Cane

Material: wood (waterlogged): unidentified

Initial comment: from the timber lining of a square cut pit lined with horizontal planks and reinforced with vertical posts at the corners.

Objectives: there are doubts as to the date of this feature because the construction is apparently common late Saxon (paralleled by the well at North Elmham) and timber-lined wells are rarer in the medieval period. The pottery from the earliest fills appears to be medieval and it is also cut by an eighteenth-century pit.

Calibrated date: 1 σ : cal AD 1260–1390
2 σ : cal AD 1210–1410

Final comment: M Carver (11 December 2006), useful confirmation of a later medieval date.

Stafford: St Mary's Grove, Staffordshire

Location: SJ 921232
Lat. 52.48.24 N; Long. 02.07.06 W

Project manager: M Carver (Birmingham University Field Archaeology Unit), 1983

Archival body: Stoke on Trent Museum

Description: this site was situated next to St Mary's church. On present evidence it would seem likely that this area near St Mary's may have been the nucleus of the late Saxon settlement. St Mary's Grove site produced evidence to indicate some specialisation in activities apparently connected with cereals.

Objectives: to explore a site in the centre of the likely precinct of the Anglo-Saxon burh founded by Æthelflæda, Lady of the Mercians in c AD 913. And thus to throw light on the origin of this and other late Saxon burhs in the West Midlands

Final comment: M Carver (11 December 2006), the series produced convincing dating evidence that the burh built at Stafford began as a middle Saxon centre. As anticipated the potteries belonged to the burh and began work in the late ninth or (more probably) the early tenth century.

References: Carver 2010
Walker *et al* 1990, 182

HAR-7039 1270 ±70 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: 29224701, submitted on 9 October 1985 by J Cane

Material: wood (charred): unidentified, plus burnt grain and plant remains

Initial comment: from a chamber of a grain-drying kiln, this was well defined. The sample probably represents the last firing of this feature.

Objectives: the sample was the best and most reliable from a series of four similar, and probably contemporary, structures. They represent the major late Saxon activity on this site but their position within the 150 years of pre-Conquest Stafford is unknown. A radiocarbon date would also further the study of grain and crop processing in this period.

Calibrated date: 1 σ : cal AD 660–860
2 σ : cal AD 640–940

Final comment: L Moffett (1994), the dates for these samples indicate that at least one of the ovens was in use well before the fortification of the burh at Stafford and probably the other too.

Laboratory comment: English Heritage (11 October 2011), the three results (HAR-7039-41) from this bulk sample are statistically consistent ($T'=3.5$; $T'(5\%)=6.0$; $v=2$; Ward and Wilson 1978), and so a weighted mean may be taken (1223 ±44 BP) which calibrates to cal AD 670–940 (95% confidence; Reimer *et al* 2004), or cal AD 710–890 (at 68% confidence).

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

HAR-7040 1120 ±70 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: 29224702, submitted on 9 October 1985 by J Cane

Material: wood (charred, plus unidentifiable grain and plant remains): unidentified

Initial comment: as HAR-7039

Objectives: as HAR-7039

Calibrated date: 1 σ : cal AD 820–1000
2 σ : cal AD 710–1030

Final comment: see HAR-7039

Laboratory comment: (4 October 2011), see HAR-7039

HAR-7041 1310 ±90 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: 29224703, submitted on 9 October 1985 by J Cane

Material: wood (plus unidentifiable grain and plant remains): unidentified

Initial comment: as HAR-7039

Objectives: as HAR-7039

Calibrated date: 1 σ : cal AD 640–780
2 σ : cal AD 570–940

Final comment: see HAR-7039

Laboratory comment: English Heritage (4 October 2011), see HAR-7039

HAR-7042 2290 ±70 BP

$\delta^{13}\text{C}$: -24.2‰

Sample: 29225301, submitted on 9 October 1985 by J Cane

Material: wood (plus unidentifiable grain and other organic remains): unidentified

Initial comment: recovered from the fill of a posthole forming part of a four post structure, which is sealed by a layer containing Romano-British pottery. However, this layer is cultivation derived and may be post-Roman. It belongs to one of two such structures, which pre-dated the main period of activity in the tenth century.

Objectives: these features are the only identified pre-conquest structures known in Stafford. They contained no artefacts and are sealed by cultivation layers. Dating is vital to ascertain whether these features represent pre-burh Saxon activity or earlier Roman/prehistoric settlement.

Calibrated date: 1 σ : 410–230 cal BC
2 σ : 520–190 cal BC

Final comment: L Moffett (1994), this date along with the presence of charred cereals within the postholes, reinforces the interpretation of this structure being used as a granary, which apparently were destroyed by fire, although the destruction layers were later truncated, probably by cultivation.

Stafford: Tipping Street, Staffordshire

Location: SJ 924501
Lat. 53.02.52 N; Long. 02.06.48 W

Project manager: M Carver (Birmingham University Field Archaeology Unit), 1983

Archival body: Stoke on Trent Museum

Description: ST32. An area excavation on the north side of Tipping Street. The shallow stratigraphy produced a palimpsest of pits and postholes with two pottery kilns. The number of wasters present left no doubt that this was a potters' workshop.

Objectives: to explore an industrial area in the Anglo-Saxon burgh.

Final comment: M Carver (2010), the radiocarbon dates allow the initial development of the site to have taken place in the tenth century, consistent with the Æthelflædan foundation.

References: Carver 2010
Walker *et al* 1990, 183

HAR-8237 1150 ±40 BP

$\delta^{13}\text{C}$: -25.5‰

Sample: 32151601, submitted on 9 October 1985 by J Cane

Material: charcoal (remaining subsample of thin slivers identified): unidentified (5.78g); *Quercus* sp., heartwood (0.10g, 7.04%); *Quercus* sp., sapwood (1.32g, 92.96%) (R Gale 2000)

Initial comment: probably the remains of the last firing of a kiln producing Stafford Ware pottery. The kiln is fairly intact and well defined, although its stratigraphic position is uncertain. It was visible in a horizon, which has been tentatively dated to the late twelfth century, though not in use at this time. It was recovered from just inside the stoke hole of the kiln, sealed by fragments of clay superstructure. HAR-8238 was taken from the same context.

Objectives: Stafford Ware was widely distributed around the West Midlands area. Archaeomagnetic sampling gave an unsatisfactory range of cal AD 900–1100. Obviously a tighter date is needed to fix the chronology of this important industry.

Calibrated date: 1 σ : cal AD 820–970
2 σ : cal AD 770–990

Final comment: M Carver (11 December 2006), confirmation of Stafford Ware production beginning in the ninth–tenth century.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

Laboratory comment: English Heritage (6 October 2011), see HAR-8238

HAR-8238 1140 ±40 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: 32151602, submitted on 9 October 1985 by J Cane

Material: wood (burnt): unidentified

Initial comment: as HAR-8237

Objectives: as HAR-8237

Calibrated date: 1 σ : cal AD 870–980
2 σ : cal AD 770–1000

Final comment: M Carver (11 December 2006), confirmation of Stafford Ware production beginning in the ninth–tenth century.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

Laboratory comment: English Heritage (7 October 2011), the two results from this bulk sample are statistically consistent ($T'=0.0$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978), providing a weighted mean (1145 ±29 BP) which calibrates to cal AD 770–980 (95% confidence) or cal AD 880–970 (68% confidence) (Reimer *et al* 2004).

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

HAR-8239 1140 ±40 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: 32175301, submitted on 9 October 1985 by J Cane

Material: charcoal: unidentified (1.68g); *Ilex* sp. (0.03g, 7.3%); *Quercus* sp., sapwood (0.38g, 92.7%) (R Gale 2000)

Initial comment: from a deposit of burnt material and ash just inside the stoke hole of a Stafford Ware producing kiln (F.238). Its status is similar to the kiln, which produced HAR-8237 and HAR-8238. The kiln is directly associated with a number of pits containing very large amounts of Stafford Ware.

Objectives: to provide a backup date for Stafford Ware generally, but primarily to determine whether possible stylistic difference between material associated with the two kilns is chronological or otherwise. This requires sensitivity possibly provided by two samples from the same context. The successful dating of Stafford Ware would provide a fixed point for other sequences in Stafford.

Calibrated date: 1 σ : cal AD 870–980
2 σ : cal AD 770–1000

Final comment: M Carver (11 December 2006), confirmation of Stafford Ware production beginning in the ninth–tenth century.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

Laboratory comment: English Heritage (6 October 2011), see HAR-8240

HAR-8240 1120 ±40 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: 32175302, submitted on 9 October 1985 by J Cane

Material: charcoal (remaining subsample identified): unidentified (1.94g); *Quercus* sp., sapwood (0.09g, 11.8%); *Quercus* sp., heartwood (0.67g, 88.2%) (R Gale 2000)

Initial comment: as HAR-8239

Objectives: as HAR-8239

Calibrated date: 1 σ : cal AD 880–990
2 σ : cal AD 780–1020

Final comment: M Carver (11 December 2006), confirmation of Stafford Ware production beginning in the ninth–tenth century.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

Laboratory comment: English Heritage (6 October 2011), the two results from this bulk sample are statistically consistent ($T'=0.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978), providing a weighted mean (1130 \pm 29 BP) which calibrates to cal AD 780–990 (95% confidence) or cal AD 880–970 (68% confidence) (Reimer *et al* 2004).

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

Stannon, Cornwall

Location: SX 13448102
Lat. 50.35.54 N; Long. 04.38.11 W

Project manager: D Harris (Cornwall Archaeological Society), 1976–77

Archival body: Royal Cornwall Museum

Description: a group of three cairns on the western edge of Bodmin Moor, about to be buried under china clay waste, and already damaged.

Objectives: to establish the nature of the three cairns and their date. Although there are many such mounds on Bodmin Moor, few have been excavated and dated.

References: Harris *et al* 1984
Mercer 1970

HAR-5130 3440 \pm 70 BP

$\delta^{13}C$: -25.8‰

Sample: STA2, submitted in August 1982 by N Balaam

Material: charcoal: *Corylus avellana*; *Quercus* sp. (N Balaam 1982)

Initial comment: from a presumed Bronze Age cremation pit.

Objectives: to determine whether these cairns were of Bronze Age date, and so to link them with known Bronze Age features in the area.

Calibrated date: 1 σ : 1880–1660 cal BC
2 σ : 1940–1530 cal BC

Final comment: D Harris (28 April 1996), the radiocarbon date confirmed that the three Stannon cairns were Bronze Age barrows. Although the importance of a single date should not be exaggerated, this one fits well with the third cairn which produced a cord-impressed biconical urn containing cremations. It could also link the cairns to the Bronze Age hut circle settlement also on Stannon Down, excavated in 1968.

Stanwell: Heathrow Airport, Surrey

Location: TQ 053745 centred on
Lat. 51.27.33 N; Long. 00.29.03 W

Project manager: M O'Connell (Surrey County Council), 1981

Archival body: Surrey County Council Conservation and Archaeology Section

Description: excavation of crop-mark features visible on aerial photographs of the site indicated multi-period occupation. The earliest and most significant of these features were two parallel ditches marking the line of a Neolithic cursus. No evidence of further activity occurred until the late Bronze Age which was to witness the most complex and dense spread of settlement, notably a field system with a network of ditches and trackways, succeeded by scattered habitation in the form of structures and pits. No Iron Age material was discovered and only a relatively small amount of Romano-British. The Anglo-Saxon features formed a rather nebulous picture of small scale, scattered settlement. There was nothing to suggest that the area was other than arable land during the medieval period, while the greatest change that took place in the post-medieval period was the landscaping of the western half of the site to form part of the park attached to Stanwell Place. The post-medieval trackway bordered by two parallel ditches which was found in the northern part of the site may have been medieval in origin. Changes in field boundaries, indicated from documentary evidence, were confirmed by the archaeological record.

Objectives: to provide a date for the late Bronze Age occupation.

Laboratory comment: English Heritage, two further samples were submitted for dating but failed to produce results (HAR-4824 and HAR-4825).

References: O'Connell 1990

HAR-4823 2440 \pm 70 BP

$\delta^{13}C$: -29.1‰

Sample: SHA81 636, submitted on 14 August 1981 by M O'Connell

Material: wood (previously waterlogged, remaining subsample now dried out and structurally collapsed; probably from roundwood of various diameters): unidentified (6.26g); bark (0.32g, 8.9%); *Prunus* spp., and/or *Pomoideae* (3.27g, 91.1%) (R Gale 2000)

Initial comment: from the lower fill of a large late Bronze Age pit. The purpose of the pit is uncertain.

Objectives: part of a series intended to date the late Bronze Age occupation. The other samples were lost (O'Connell 1990, 5).

Calibrated date: 1 σ : 760–400 cal BC
2 σ : 800–390 cal BC

Final comment: R Poulton (1996), the feature was probably a water hole (well) (O'Connell 1990, 41). The loss of the other samples makes this lone date of uncertain significance, but it is broadly comparable with those obtained (reliably) for Petters Sports Field (Needham 1990), and may be regarded as confirming the similarities noted between the late Bronze Age pottery assemblages at these two sites, even though the Petters Sports Field dates may be a little earlier.

References: Needham 1990
O'Connell 1990, 41

Stifford: Ardale School, Essex

Location: TQ 580800
Lat. 51.29.47 N; Long. 00.16.35 W

Project manager: T J Wilkinson (Essex County Council),
1981

Archival body: Thurrock Museum

Description: sample site from the Bridge Pier foundations in the valley of Mar Dyke.

Objectives: to date the estuarine alluvial sequence.

Final comment: T J Wilkinson (10 December 1994), the dates were crucial in dating this estuarine alluvial sequence, without them the sequence would have to be dated by reference on one or two artefacts and by the pollen curves. The earlier dates (HAR-4522, HAR-4523, and HAR-4524) form a consistent time sequence, corresponding well to other independent evidence. The later two dates (HAR-4525 and HAR-4526) may be inconsistent but equally their presence within a dynamic sedimentary environment may explain the apparent rapid change in sedimentation rate.

References: Walker *et al* 1988, 323–4

HAR-4522 5740 ±80 BP

$\delta^{13}\text{C}$: -27.6‰

Sample: 575CI, submitted in June 1981 by T J Wilkinson

Material: wood (previously waterlogged, remaining subsample now dry and structurally collapsed): unidentified (3.98g); *Corylus/Alnus* sp. (3.11g, 100%) (R Gale 2000)

Initial comment: the sample came from a deep section through a Flandrian transgression sequence of peats plus some humic muds. Fine silt and silty clay near the base -4.60m OD

Objectives: to date the estuarine alluvial sequence.

Calibrated date: 1 σ : 4710–4490 cal BC
2 σ : 4790–4370 cal BC

Final comment: T J Wilkinson (10 December 1994), this date the lowest in the sequence seems consistent with both stratigraphy and the pollen analysis, it falls within the Thames II transgression.

HAR-4523 4650 ±90 BP

$\delta^{13}\text{C}$: -27.9‰

Sample: 575CII, submitted in June 1981 by T J Wilkinson

Material: wood (previously waterlogged, remaining subsample now dry and degraded): bark, unidentified (47.34g, 100%); unidentified (5.22g) (R Gale 2000)

Initial comment: the sample came from a deep section through a Flandrian transgression sequence of peats plus some humic muds. The peat contained abundant wood fragments, from the base of the same deposit as 575cII -3.60 OD

Objectives: as HAR-4522

Calibrated date: 1 σ : 3630–3350 cal BC
2 σ : 3640–3100 cal BC

Final comment: T J Wilkinson (10 December 1994), this date is consistent with the presence of the elm decline recognised immediately below (Scaife in Wilkinson 1988, 112–3). It is also approximately consistent with the date from the equivalent horizon at Stone Marsh (3990–3380 cal BC (95% confidence; Pearson *et al* 1986); Q-1336; 4930 ±110 BP; Devoy 1979).

References: Devoy 1979
Pearson *et al* 1986
Wilkinson 1988

HAR-4524 3580 ±70 BP

$\delta^{13}\text{C}$: -28.6‰

Sample: 575CIII, submitted in June 1981 by T J Wilkinson

Material: wood (previously waterlogged, remaining subsample now dry and structurally collapsed): *Alnus* sp., narrow roundwood (3.11g, 24.45%); bark, unidentified, probably from narrow roundwood (9.61g, 71.55%); unidentified (6.24g) (R Gale 2000)

Initial comment: as HAR-4523, but at -2.65 OD.

Objectives: as HAR-4522

Calibrated date: 1 σ : 2030–1830 cal BC
2 σ : 2140–1740 cal BC

Final comment: T J Wilkinson (10 December 1994), again this date is consistent with the stratigraphy and also agrees with the presence of the late Neolithic–early Bronze Age flint knife in the section near the sampled point. The sample falls within the upper part of the Tilbury III regression. This is consistent with the dates from similar peats from elsewhere around the Essex coast (Wilkinson and Murphy 1995).

References: Wilkinson and Murphy 1986
Wilkinson and Murphy 1995

HAR-4525 1540 ±80 BP

$\delta^{13}\text{C}$: -28.4‰

Sample: 575CIV, submitted in June 1981 by T J Wilkinson

Material: peat (with occasional wood fragments)

Initial comment: humified peat, very humic silt mud with occasional wood fragments. Same level as scatter of charcoal fragments in the peats -1.20m OD. It could be a possible clearance level or human interference.

Objectives: as HAR-4522

Calibrated date: 1 σ : cal AD 420–610
2 σ : cal AD 340–660

Final comment: T J Wilkinson (10 December 1994), although possibly conflicting with the presence of an Iron Age sherd in the section nearby the latter might be washed in and out of the context. In terms of steady rates of estuarine sedimentation, this date is roughly consistent with dates earlier in the sequence.

HAR-4526 1470 ±80 BP

$\delta^{13}\text{C}$: -28.5‰

Sample: 575CV, submitted in June 1981 by T J Wilkinson

Material: peat

Initial comment: very humic silt. The humified peat was a well preserved sub-angular blocky structure. The plant remains are only present towards where the sample was taken. This is the uppermost sample from the series *c* -0.70m OD.

Objectives: as HAR-4522

Calibrated date: 1 σ : cal AD 530–660
2 σ : cal AD 410–680

Final comment: T J Wilkinson (10 December 1994), this date is only slightly later than HAR-4525 some 93cm below. Although this date may be slightly too late it may be consistent because at this point there is a change from low energy estuarine sedimentation to a high energy floodplain or estuarine channel environment. The date has therefore been accepted on face value.

Stoke Bishop: Druids Hill, Avon

Location: ST 560762
Lat. 51.28.57 N; Long. 02.38.01 W

Project manager: G Smith (Central Excavation Unit),
January 1983

Archival body: Bristol City Museum and Art Gallery

Description: a Neolithic long barrow (CAS site code 241). An isolated group of massive stones interpreted as the collapsed chamber and possible entrance portal or additional chamber of a tomb of Cotswold-Severn type (Grinsell 1979).

Objectives: to record the area prior to construction work.

References: Grinsell 1979
Smith 1989
Walker *et al* 1990, 190
Walker *et al* 1991a, 90

HAR-5509 1000 ±80 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: 241-008, submitted in February 1983 by N Balaam

Material: charcoal (four fragments): unidentified, two fragments, probably root and possibly *Quercus* sp.; *Quercus* sp., two fragments (N D Balaam 1983)

Initial comment: collected from a buried soil beneath what appeared to be the remains of a mound of limestone rubble, possibly the eroded remains of an original Neolithic cairn over the chamber. The sample came from the soil where it merged with the mound tumble, south of, and therefore not sealed by, the remains of the *in situ* mound rubble, so not necessarily pre-dating the mound.

Objectives: to provide a check on the suggested early Neolithic date for the buried soil and of the mound overlying it.

Calibrated date: 1 σ : cal AD 980–1160
2 σ : cal AD 880–1220

Final comment: G Smith (20 November 2006), the date indicates that the charcoal probably derives from medieval agricultural activity in the vicinity of the tomb rather than from pre-tomb activity.

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Smith 1989
Walker *et al* 1991a, 90

HAR-8083 4070 ±80 BP

$\delta^{13}\text{C}$: -21.4‰

Sample: 241-24, submitted in December 1983 by N Balaam

Material: human bone (adult, fifth metatarsal) (J Bayley 1983)

Initial comment: the bone was found on the surface of the buried soil sealed by the mound rubble and associated with a small potsherd, in Trench 3.

Objectives: to help confirm the expected Neolithic date of the monument and of the funerary activity which the human bone should represent.

Calibrated date: 1 σ : 2860–2480 cal BC
2 σ : 2890–2460 cal BC

Final comment: G Smith (1989), the bone was found in an apparently primary context on top of the old land surface. However, even if the context proved to be secondary, the radiocarbon date of the bone is problematical, even at the extreme of its calibrated range, since there is no evidence from elsewhere of sepulchral reuse of Cotswold-Severn tombs at this 'late' date (A Saville pers comm). If the bone does belong to early Neolithic activity then the date is in error by about a millennium. However, later reuse of Neolithic chambered tombs has been found to be not uncommon in other areas of Britain and so the date may be acceptable.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Smith 1989
Walker *et al* 1990, 190

Stow Church, Lincolnshire

Location: SK 881819
Lat. 53.19.39 N; Long. 00.40.39 W

Project manager: N Field (North Lincolnshire
Archaeological Unit), September 1983

Archival body: Lincoln City and County Museum

Description: excavations took place in advance of building work, which were to extend the Victorian vestry. The area under investigation lay immediately west of a Saxon doorway in the north transept, which has been interpreted in the past as leading, at one time, to a *porticus*.

Objectives: it was hoped that more of the Saxon fabric of the church might be revealed to clarify if the doorway in the north transept lead to a *porticus*. It was also the objective to find the earliest burial date as well as the range of dates for the burials in the churchyard.

Final comment: N Field (20 November 2006), the earliest and latest dates of the series fit with the excavators expectations. However, the rest of the dates are less helpful as the graves were stratified but the dating sequence was not.

Laboratory comment: Ancient Monuments Laboratory (2003), two further samples, ST83/59 (HAR-8811) and ST83/58 (HAR-8814) were submitted for dating but failed to produce a result.

References: Field 1984

HAR-6748 1110 ±40 BP

$\delta^{13}\text{C}$: -28.9‰

Sample: ST83270B, submitted in November 1984 by N Field

Material: charcoal: unidentified

Initial comment: from the floor of the Saxon aisle. The sample was taken from a destruction layer of building antedating the *porticus*. The *porticus* itself both antedates burials (eg B51) and post-dates them (eg B78).

Objectives: to date this phase in the development of the site. The sample may represent an earlier part of the church.

Calibrated date: 1 σ : cal AD 890–990
2 σ : cal AD 780–1020

Final comment: A Bayliss (1 May 2009), this date suggests that the *porticus* was constructed in the tenth century AD or later.

Final comment: see series comments

References: Walker *et al* 1991a, 91

HAR-6749 1410 ±80 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: ST83/270A, submitted in November 1984 by N Field

Material: charcoal (remaining very comminuted subsample identified): unidentified (7.80g); *Quercus* sp., heartwood (4.41g, 100%) (R Gale 1999)

Initial comment: as HAR-6748

Objectives: as HAR-6748

Calibrated date: 1 σ : cal AD 570–670
2 σ : cal AD 430–780

Final comment: see series comments

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: English Heritage (1 May 2009), this result is statistically significantly earlier than HAR-6748, a duplicate measurement on the same bulk charcoal sample ($T'=11.5$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). Both samples provide *termini post quem* for the overlying *porticus*, but this appears to have contained a higher proportion of old wood.

References: Otlet *et al* 1983
Walker *et al* 1991a, 91
Ward and Wilson 1978

HAR-8332 1270 ±40 BP

$\delta^{13}\text{C}$: -21.7‰

Sample: ST83/B51A, submitted in November 1984 by N Field

Material: human bone

Initial comment: from the latest burial (B51) in a sequence to be cut by the *porticus* wall.

Objectives: to establish the time span of use for the churchyard prior to the construction of the *porticus*. This sample will provide a date before which the *porticus* cannot have been built.

Calibrated date: 1 σ : cal AD 670–780
2 σ : cal AD 660–880

Final comment: A Bayliss (1 May 2009), the stratigraphic relationship of this sample to the *porticus* is unclear, although if this result is constrained to be later than HAR-6748–9 which provide *termini post quem* for the *porticus* it has poor agreement.

Final comment: see series comments

References: Walker *et al* 1991a, 91

HAR-8333 1190 ±30 BP

$\delta^{13}\text{C}$: -20.8‰

Sample: ST83B78, submitted in November 1984 by N Field

Material: human bone

Initial comment: from the earliest burial (B78) in the sequence.

Objectives: to establish the first use of the churchyard.

Calibrated date: 1 σ : cal AD 770–890
2 σ : cal AD 720–950

Final comment: see series comments

References: Walker *et al* 1991a, 91

HAR-8809 960 ±80 BP

$\delta^{13}\text{C}$: -22.0‰

Sample: ST83/62, submitted on 7 November 1984 by N Field

Material: human bone (long bone)

Initial comment: from the earliest burial (B62) in the sequence.

Objectives: to establish the first use of the churchyard.

Calibrated date: 1 σ : cal AD 1010–1170
2 σ : cal AD 890–1260

Final comment: see series comments

References: Walker *et al* 1991a, 91

HAR-8810 960 ±70 BP

$\delta^{13}\text{C}$: -21.8‰

Sample: ST83/31, submitted on 7 November 1984 by N Field

Material: human bone (right leg)

Initial comment: from burial 31.

Objectives: to establish the first use of the churchyard.

Calibrated date: 1 σ : cal AD 1010–1170
2 σ : cal AD 900–1220

Final comment: see series comments

Laboratory comment: English Heritage (2010) from the earliest burial in the sequence.

References: Walker *et al* 1991a, 92

HAR-8812 930 ±60 BP

$\delta^{13}\text{C}$: -21.4‰

Sample: ST83/61, submitted on 7 November 1984 by N Field

Material: human bone (left leg)

Initial comment: from burial 61.

Objectives: to date the burial.

Calibrated date: 1 σ : cal AD 1020–1180
2 σ : cal AD 990–1230

Final comment: see series comments

References: Walker *et al* 1991a, 92

HAR-8813 930 ±60 BP

$\delta^{13}\text{C}$: -21.7‰

Sample: ST83/58, submitted in November 1984 by N Field

Material: human bone (long bones)

Initial comment: from burial 58.

Objectives: to date the burial.

Calibrated date: 1 σ : cal AD 1020–1180
2 σ : cal AD 990–1230

Final comment: see series comments

References: Walker *et al* 1991a, 92

HAR-8815 1200 ±60 BP

$\delta^{13}\text{C}$: -21.5‰

Sample: ST83/70, submitted on 7 November 1984 by N Field

Material: human bone (right leg)

Initial comment: from burial 70.

Objectives: to date the burial.

Calibrated date: 1 σ : cal AD 710–900
2 σ : cal AD 670–990

Final comment: see series comments

Laboratory comment: English Heritage (3 January 2012), this result is published (Walker *et al* 1991, 92), although a final certificate has not been found.

References: Walker *et al* 1991a, 92

HAR-9693 1640 ±70 BP

$\delta^{13}\text{C}$: -23.6‰

Sample: ST83/322, submitted on 7 November 1984 by N Field

Material: animal bone: *Bos* sp.

Initial comment: from the earliest level of activity on the site.

Objectives: to establish a date for the first domestic use of the site.

Calibrated date: 1 σ : cal AD 330–540
2 σ : cal AD 240–570

Final comment: see series comments

References: Hardiman *et al* 1992, 59

Stowmarket, Suffolk

Location: TM 060576
Lat. 52.10.40 N; Long. 01.00.48 E

Project manager: K Wade (Suffolk County Council), 1980

Archival body: Suffolk County Council

Description: medieval moated site with a number of prehistoric features sealed under the medieval layers on the moated platform. County Sites and Monuments Record number SKT011.

Objectives: to excavate and record the moated site.

Laboratory comment: Ancient Monuments Laboratory (2003), one further sample SKT01111 (HAR-4626) was submitted for dating but failed to produce a result.

References: Martin *et al* 1981
Walker *et al* 1988, 323

HAR-4473 2470 ±70 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: SKT1155, submitted in February 1981 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (0.53g); *Quercus* sp., of unknown maturity (0.04g, 7.3%); *Ilex* sp. (0.08g, 14.5%); *Quercus* sp., sapwood (0.43g, 78.2%) (R Gale 2000)

Initial comment: contents from a pot of possibly Neolithic date.

Objectives: to date the substantial remains of a poorly-fired pottery vessel found in a small pit. The vessel has an expanded rim, a vertically-pierced lug handle and two horizontal rows of fingertip impressions on the shoulder. Inclusions of burnt flint.

Calibrated date: 1 σ : 780–410 cal BC
2 σ : 800–390 cal BC

Final comment: E Martin (16 May 1996), the date indicates a late Bronze or early Iron Age origin for the vessel. Stylistic parallels for horizontal rows of fingertip impressions on the shoulder are known from similarly dated assemblages of pottery from Darmsden and Barham in Suffolk and from North Shoebury in Essex (the latter site also had a vessel with a vertically pierced lug). Analysis of the fill of the vessel revealed no bone fragments.

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.

References: Parker Pearson and Sydes 1997
Walker *et al* 1991a, 111

HAR-8914 2320 ±70 BP

$\delta^{13}C$: -32.1‰

Sample: SC10803, submitted on 9 December 1987 by B Sydes

Material: wood (waterlogged; remaining subsample previously waterlogged collapsed): *Quercus* sp., possibly, but too collapsed to verify (16.43g, 100%) (R Gale 1999)

Initial comment: the sample forms part of a timber framework or raft, which includes reused structural timbers. It maybe associated with stakes in the ditch. The structure is stratigraphically later than the bank and ditch cut. Context 108 was organic mud, and because it was not fully excavated it is not known whether it was primary fill. The sample submitted was roundwood and was probably not reused, but may have been.

Objectives: as this sample comes from a different part of the enclosure to SC059C01 (HAR-8915), it is hoped that the two dates will give a chronological interrelation for two otherwise separate parts of the site.

Calibrated date: 1 σ : 410–360 cal BC
2 σ : 730–200 cal BC

Final comment: M Parker Pearson (3 April 1995), the four determinations HAR-8914 to HAR-8917 indicate that the enclosures date to the first millennium BC, between 800 and 100 BC, most probably around the middle of that millennium. Although the contexts sampled include the beginning and end of enclosure occupation, it is not possible to discern between them chronologically.

References: Walker *et al* 1991a, 111

HAR-8915 2260 ±70 BP

$\delta^{13}C$: -29.5‰

Sample: SC059C01, submitted on 9 December 1987 by B Sydes

Material: wood (remaining subsample previously waterlogged, now dry and structurally collapsed): *Alnus* sp. (14.67g, 100%) (R Gale 1999)

Initial comment: the sample is a piece of roundwood directly related to a ‘framework’ of poles and logs, most of which seem to be cut from coppice stools. The ‘framework’ lay directly on top of natural clay at the bottom of the ditch. The matrix 059, within which the wood was found is an organic mud and formed the first organic accumulation in the ditch. The ‘framework’ represents a use of the ditch, not necessarily the first use.

Objectives: this sample was taken in order that a *terminus ante quem* can be established for the ditch and bank.

Calibrated date: 1 σ : 400–200 cal BC
2 σ : 420–160 cal BC

Final comment: see HAR-8914

References: Walker *et al* 1991a, 111

HAR-8916 2240 ±90 BP

$\delta^{13}C$: -30.7‰

Sample: SC022C02, submitted on 9 December 1987 by B Sydes

Material: peat

Initial comment: 022 is the upper peat layer directly beneath the bank material. The sample was taken from the very top of the layer beneath the tail of the bank (the opposite side to the ditch).

Objectives: to give a *terminus ante quem* for the construction of the bank, the earliest context that can be related to the enclosure – the buried peat horizon, old land surface.

Calibrated date: 1 σ : 400–190 cal BC
2 σ : 510–50 cal BC

Final comment: see HAR-8914

References: Hardiman *et al* 1992, 67

HAR-8917 2340 ±70 BP

$\delta^{13}C$: -23.2‰

Sample: SC057C04, submitted on 9 December 1987 by B Sydes

Material: grain (partially carbonised): *Triticum spelta* L.; *Triticum dicoccum*

Initial comment: the seeds came from a substantial dump within the ditch fill 057, and appear to have been tipped from the west side of the ditch. The results of an environmental sample from 057 indicate aquatic and waterside plants plus one dung beetle. The context is stratigraphically much later than 059, which contains the wooden ‘framework’.

Objectives: to give a *terminus ante quem* for the burial of the wooden 'framework' (SC059C01) and a date for a later use of the enclosure.

Calibrated date: 1 σ : 420–380 cal BC
2 σ : 750–200 cal BC

Final comment: see HAR-8914

References: Walker *et al* 1991a, 112

Sutton: Packhorse Bridge, Bedfordshire

Location: TL 221474
Lat. 52.06.40 N; Long. 00.13.00 W

Project manager: P McKeague (Bedfordshire County Council), June 1986

Archival body: Bedfordshire Heritage Group

Description: a late medieval bridge forming a two-arched structure.

Objectives: the foundation raft of the bridge was uncovered during construction work on the bridge. The samples were submitted to establish a *terminus post quem* for the laying of the raft and the construction of the bridge.

References: McKeague 1988

HAR-8803 790 \pm 40 BP

$\delta^{13}\text{C}$: -23.2‰

Sample: W1, submitted on 6 November 1986 by P McKeague

Material: wood (waterlogged): *Ulmus* sp. (D Haddon-Reece 1986)

Initial comment: from a timber beam sealed beneath the pier and abutment of bridge. The sample came from the stream bed and was part of the bridge foundation.

Objectives: to provide a date for the foundation raft and construction of the bridge.

Calibrated date: 1 σ : cal AD 1210–1280
2 σ : cal AD 1160–1290

Final comment: P McKeague (1988), the results support a thirteenth century date for felling of the timber and its subsequent use in the construction of the bridge soon afterwards.

HAR-8804 750 \pm 50 BP

$\delta^{13}\text{C}$: -23.6‰

Sample: W3, submitted on 6 November 1986 by P McKeague

Material: wood (waterlogged): *Ulmus* sp. (D Haddon-Reece 1986)

Initial comment: as HAR-8803

Objectives: as HAR-8803

Calibrated date: 1 σ : cal AD 1220–1290
2 σ : cal AD 1210–1380

Final comment: see HAR-8803

Swarkestone Lowes, Derbyshire

Location: SK 367295
Lat. 52.51.41 N; Long. 01.27.17 W

Project manager: S Losco-Bradley (Trent Valley Archaeological Research Committee), 1983

Archival body: Derbyshire County Council Sites and Monuments Record, City Museum of Derby

Description: a linear ditch which appeared to have defined the north east sides of a barrow cemetery.

Objectives: to research the prehistory of the mid Trent Valley and excavate the site before destruction by the Derby southern bypass.

References: Losco-Bradley 1983
Walker and Otlet 1988, 307

HAR-6497 2280 \pm 80 BP

$\delta^{13}\text{C}$: -28.5‰

Sample: SL835AJ, submitted in December 1983 by S Losco-Bradley

Material: wood (waterlogged): *Populus* sp. (D Haddon-Reece)

Initial comment: the wood was found in waterlogged conditions on the bottom of a ditch partly enclosing a barrow cemetery. One of the barrows overlay Beaker occupation levels. The ditch was dug to an average depth of 1.8m into gravel with clay and silt filled periglacial features. For most of its excavated length (14m) the ditch was dry except where it had cut into a clay filled periglacial feature which retained water. The bottom fillings of the ditch were clays and silts overlain by sands and gravels. Ploughing had destroyed the top 0.30m.

Objectives: the ditch from which the sample came partly encloses a barrow cemetery and Beaker occupation. It is necessary to know if the ditch was contemporary with the barrows or Beaker occupation or if it was earlier or later than both.

Calibrated date: 1 σ : 410–200 cal BC
2 σ : 520–160 cal BC

Final comment: G Guilbert (1987), the ditch is more recent than the cemetery dating to the second half of the first millennium BC.

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Swinhope: Ash Hill Long Barrow, Lincolnshire

Location: TF 209962
Lat. 53.26.54 N; Long. 00.10.46 W

Project manager: P Phillips (University of Sheffield), 1983

Archival body: Lincoln City and County Museum

Description: a series of long barrow ditches.

Objectives: to date the construction of the mound.

Final comment: P Phillips (1989), the three prehistoric dates (HAR-9449, HAR-9450, and HAR-6400) fit well with the expectations derived from study of the stratigraphy of the Ash Hill and Hoe Hill long barrow ditches. The close similarity of the dates from the basal silts of Ash Hill and Hoe Hill is impressive, even though it does permit the possibility of up to 300 years discrepancy in mound construction even at the 68% probability level. The difference between these dates and that from the secondary silts at Ash Hill fits the stratigraphic interpretation well, and indicates that activity on or near the mound in this later phase included butchery or meat consumption. The ninth century AD date for the skeletons was less expected, since there were no clues found in 1983 to indicate when they might have been incorporated in the mound structure, and no cultural items were located during the 1986 excavations.

References: Phillips 1989

HAR-6399 1090 ±70 BP

$\delta^{13}C$: -22.7‰

Sample: AH1-3, submitted on 29 October 1984 by P Phillips

Material: human bone (femur)

Initial comment: a nearly complete and a very fragmentary body was discovered when a World War II air raid shelter was removed from the apparently truncated end of Ash Hill long barrow in the summer of 1983. It is presumed that these were primary burials in the mound.

Objectives: if the assumption that these were primary burials is correct, then by dating them it will be possible to date the construction of the mound. Since more than one date is always preferable, the planned excavation of the ditch should provide complementary dating material.

Calibrated date: 1 σ : cal AD 880–1020
2 σ : cal AD 770–1120

Final comment: P Phillips (1989), this date, received in 1985, suggested that interments of Viking age had been inserted into the long barrow mound. As indicated in Phillips (1989), the excavation in 1986 proved that these interments had been placed in the north-west corner of the mound terminal.

References: Phillips 1989

HAR-9449 4660 ±100 BP

$\delta^{13}C$: -23.2‰

Sample: AH239, submitted on 5 November 1987 by P Phillips

Material: animal bone (J Cartledge)

Initial comment: both HAR-9449 and HAR-9450 were located in the lower (not basal) silts of the recut long barrow ditch sectioned across 3m of its width. HAR-9449 was the lowest bone sample when the final 50cm balk was removed.

Objectives: to date the construction of the mound via fallen-back components of the mound. Although not in the basal

silts, the bone may still be of early Neolithic date, indicating the collapse of the mound into the ditch. If not, it may date late Neolithic reuse of the monument.

Calibrated date: 1 σ : 3630–3350 cal BC
2 σ : 3650–3090 cal BC

Final comment: P Phillips (1989), this date suggests mid or late Neolithic activity at the barrow.

HAR-9450 4970 ±100 BP

$\delta^{13}C$: -22.1‰

Sample: AH239, submitted on 5 November 1987 by P Phillips

Material: animal bone (J Cartledge)

Initial comment: as HAR-9449. HAR-9450 was found during the sieving of the lower deposits at the opposite end of the trench, again in the fill of re-cuts. A Grooved ware rim was found in one re-cut, 50cm higher up.

Objectives: as HAR-9449

Calibrated date: 1 σ : 3940–3650 cal BC
2 σ : 3980–3530 cal BC

Final comment: P Phillips (1989), this date is compatible with the expected early Neolithic construction or immediately post-construction date of the long barrow.

Swinhope: Hoe Hill Long Barrow, Lincolnshire

Location: TF 215963
Lat. 53.26.57 N; Long. 00.10.13 W

Project manager: P Phillips (University of Sheffield), 1984

Archival body: Lincoln City and County Museum

Description: as Swinhope: Ash Hill Long Barrow.

Objectives: to date the long barrow.

Final comment: see Swinhope: Ash hill Long Barrow

References: Phillips 1989
Walker *et al* 1991a, 90–1

HAR-6400 4930 ±100 BP

$\delta^{13}C$: -21.4‰

Sample: UU280, submitted on 29 October 1984 by P Phillips

Material: animal bone: *Bos* sp., cattle vertebra

Initial comment: found in the bottom of the long barrow ditch silts.

Objectives: to date the earliest silts of the flanking ditch of the long barrow in order to establish a construction, or immediately post-construction, date.

Calibrated date: 1 σ : 3900–3640 cal BC
2 σ : 3970–3520 cal BC

Final comment: P Phillips (13 April 1989), this date is compatible with the expected early Neolithic construction or immediately post-construction date of the long barrow.

Laboratory comment: AERE Harwell (1988), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Tattershall Thorpe, Lincolnshire

Location: TF 223598
Lat. 53.07.16 N; Long. 00.10.20 W

Project manager: P Chowne (North Lincolnshire Archaeological Unit), 1979, 1980, and 1986

Archival body: Lincoln City and County Museum

Description: an Iron Age enclosure situated at a height of 9.2m OD in an area of acidic sands and gravels overlooking the Bain and Witham river valleys. Modern landuse largely consists of poor quality arable farmland and pasture, with mineral extraction presenting the major threat to the environment.

Objectives: to excavate and record the site before its destruction. The most important aspect of these limited excavations was the recovery of substantial quantities of organic material from the lower ditch fillings, thus enabling an environmental history of the site and surrounding countryside to be reconstructed.

References: Chowne *et al* 1986
Clay 1924
Harding 1974
Seager Smith 1998

HAR-4313 5200 ±110 BP

$\delta^{13}C$: -25.4‰

Sample: TT791-19, submitted in February 1981 by P Chowne

Material: charcoal: unidentified

Initial comment: from the recut in section 8 of the inner ditch. The sample is associated with pottery, fired clay, and animal bone.

Objectives: to date this period of activity.

Calibrated date: 1 σ : 4230–3940 cal BC
2 σ : 4330–3760 cal BC

Final comment: P Chowne (1986), this date is at variance with that of the pottery, which belongs to the early part of the first century AD. The most likely explanation for this apparent anomaly is that charcoal from an early clearance phase was incorporated in the ditch filling during re-cutting.

References: Chowne *et al* 1986
Chowne *et al* 1993

HAR-4315 2350 ±90 BP

$\delta^{13}C$: -25.7‰

Sample: TT791-24, submitted in February 1981 by P Chowne

Material: wood (remaining subsample identified): unidentified (123.40g); *Quercus* sp. (2.50g, 0.9%); *Quercus* sp., heartwood (4.80g, 1.9%); *Quercus* sp., concretion of compressed, charred wood (257.60g, 97.2%) (R Gale 1997)

Initial comment: from the outer ditch, on top of organic lower ditch filling, from a time when the enclosure was going out of use or its role had changed and the ditches were not being maintained. The sample is associated with a sherd of pottery (P26).

Objectives: to date this period of activity.

Calibrated date: 1 σ : 520–370 cal BC
2 σ : 770–200 cal BC

Final comment: P Chowne (1986), this sample was found in the same context as the only sherd, P26, considered to be contemporary with the construction and early use of the enclosure. The sherd forms the greater part of the base from a handmade pedestal jar with a cordon at the junction between the base and wall. Handmade pedestal jars of this type were in use from the fifth to third centuries BC, as at Swallowcliffe Down, Wiltshire (Clay 1924; Harding 1974, pl. 21).

References: Chowne *et al* 1986
Clay 1924
Harding 1974

HAR-5107 1480 ±100 BP

$\delta^{13}C$: -28.0‰

Sample: TT79123B, submitted in July 1982 by A Girling

Material: wood: unidentified

Initial comment: a further wood sample from the Iron Age ring ditch previously dated by HAR-4313 and HAR-4315.

Objectives: to help clarify the sequence.

Calibrated date: 1 σ : cal AD 430–660
2 σ : cal AD 380–770

Final comment: A Fitzpatrick (1993), a sample from the base of the ditch organic sequence from the 1979–80 excavations, which was regarded as being unsuitable for radiocarbon dating, did eventually yield a date.

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Hardiman *et al* 1992, 54
Otlet *et al* 1983

HAR-8527 2210 ±70 BP

$\delta^{13}C$: -28.9‰

Sample: TT86204, submitted on 23 March 1987 by P Chowne

Material: wood (remaining subsample identified): *Quercus* sp., heartwood (1g, 100%) (R Gale 1997)

Initial comment: from the lower levels of the enclosure ditch, between 502 and 503; context 5, and associated with small find 204.

Objectives: to establish a date for the construction and use of the enclosure ditch.

Calibrated date: 1 σ : 390–170 cal BC
2 σ : 410–50 cal BC

Final comment: A Fitzpatrick (1997), this result is not inconsistent with HAR-4315 above, and thought to be contemporary with the construction and early use of the enclosure (Chowne *et al* 1986, 162).

References: Chowne *et al* 1986
Hardiman *et al* 1992, 54
Walker *et al* 1991a, 99

HAR-8528 990 \pm 70 BP

$\delta^{13}\text{C}$: -27.4‰

Sample: TT86151, submitted on 23 March 1987 by P Chowne

Material: charcoal (remaining subsample identified): unidentified (101.40g); *Quercus* sp., uncarbonised and partially carbonised charcoal (7.50g, 63%); *Quercus* sp. (4.40g, 37%) (R Gale 1997)

Initial comment: from the lower levels of the enclosure ditch, context 5, associated with small find 151.

Objectives: to date the use of the enclosure.

Calibrated date: 1 σ : cal AD 980–1160
2 σ : cal AD 890–1220

Final comment: A Fitzpatrick (1997), there are difficulties with HAR-8528 and HAR-8529. The certificates and their initial publication in Walker *et al* (1991a, 99) (HAR-8528; 990 \pm 70 BP and HAR-8529; 410 \pm 70 BP) are appreciably younger than those given in the subsequent volume of Hardiman *et al* (1992, 55) (HAR-8528; 1990 \pm 160 BP and HAR-8529; 6410 \pm 70 BP). At 68% confidence the certificate dates might just be thought compatible with the small quantities of thirteenth–fifteenth century medieval pottery from the tertiary fill of the outer ditch. But the dates given subsequently in Hardiman *et al* (1992) are difficult to reconcile.

Laboratory comment: English Heritage (28 November 2011), the radiocarbon age for this sample published by Hardiman *et al* (1992, 55) appears to be a typographical error and should not be cited. The primary laboratory documentation clearly states the radiocarbon age of this sample was 990 \pm 70 BP, agreeing with Walker *et al* (1991a, 99).

References: Hardiman *et al* 1992, 55
Walker *et al* 1991a, 99

HAR-8529 410 \pm 70 BP

$\delta^{13}\text{C}$: -27.7‰

Sample: TT86226, submitted on 23 March 1987 by P Chowne

Material: wood (remaining subsample identified): unidentified (47.30g); *Quercus* sp., uncarbonised wood (1.80g, 40%); *Quercus* sp., sapwood (2.70g, 60%) (R Gale 1997)

Initial comment: from the lower levels of the enclosure ditch, context 5, and associated with small find 226.

Objectives: as HAR-8527

Calibrated date: 1 σ : cal AD 1430–1620
2 σ : cal AD 1400–1650

Final comment: see HAR-8528

Laboratory comment: English Heritage (28 November 2011), the radiocarbon age for this sample published by Hardiman *et al* (1992) appears to be a typographical error and should not be cited. The primary laboratory documentation clearly states the radiocarbon age of this sample was 410 \pm 70 BP.

References: Hardiman *et al* 1992, 55
Walker *et al* 1991a, 99

HAR-8530 1940 \pm 80 BP

$\delta^{13}\text{C}$: -28.0‰

Sample: TT8615, submitted on 23 March 1987 by P Chowne

Material: charcoal: unidentified

Initial comment: from a hearth in context 515, found at a depth of approximately 2m.

Objectives: to establish a date for the secondary use of the site and to enhance the Tattershall Thorpe sequence.

Calibrated date: 1 σ : 40 cal BC–cal AD 140
2 σ : 170 cal BC–cal AD 250

Final comment: A Fitzpatrick (1997), this later Iron Age/Romano-British date is not inconsistent with the stratigraphic position of feature 20, the base of a posthole cut into the ditch filling or rubbish thrown into the ditch after its abandonment (Chowne *et al* 1986, 162, fig 2).

References: Chowne *et al* 1986, 162
Hardiman *et al* 1992, 55
Walker *et al* 1991a, 99

Tattershall Thorpe: Jeffs Farm, Lincolnshire

Location: TF 237608
Lat. 53.07.47 N; Long. 00.09.03 W

Project manager: P Chowne (North Lincolnshire Archaeological Unit), 1981

Archival body: Lincoln City and County Museum

Description: a Neolithic site, discovered as a result of fieldwalking in the areas of the lower Bain valley, which were threatened by sand and gravel quarrying. Approximately 1000 pieces of worked flint were found on the field surface.

Objectives: as planning permission had been granted for mineral extraction a study of the 549 intact flints was undertaken in an attempt to determine whether there was more than one industry present and to establish possible date ranges. The purpose of this excavation was to see if any Neolithic features had survived years of arable farming.

References: Chowne *et al* 1986
Chowne *et al* 1993

HAR-4638 4800 ±70 BP

$\delta^{13}\text{C}$: -25.5‰

Sample: TT815, submitted on 15 June 1981 by P Chowne

Material: charcoal (remaining subsample identified): unidentified (4.70g); *Quercus* sp. (0.03g, 7%); *Fraxinus* sp. (0.13g, 32%); *Corylus* sp. (0.25g, 61%) (R Gale 1997)

Initial comment: from pit 5, which contained Neolithic bowl pottery, flints, charcoal, and burnt hazelnut shells.

Objectives: to date the pit and its contents.

Calibrated date: 1 σ : 3650–3520 cal BC
2 σ : 3710–3370 cal BC

Final comment: P Chowne (1993), HAR-4638 suggests an early clearance phase in the early fifth millennium BC. This compares well with the date HAR-4313 (5200 ±110 BP; 4340–3780 cal BC at 95% confidence; Pearson *et al* 1986) from the upper levels of an Iron Age ditch 1km to the south-west of the site (Chowne *et al* 1986).

References: Chowne *et al* 1986
Hardiman *et al* 1992, 54
Pearson *et al* 1986

HAR-4639 5820 ±60 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: TT8118, submitted on 15 June 1981 by P Chowne

Material: charcoal: unidentified

Initial comment: from a post burnt *in situ* of a possible Neolithic building in trench 18.

Objectives: to establish a date for the building.

Calibrated date: 1 σ : 4770–4600 cal BC
2 σ : 4830–4530 cal BC

Final comment: P Chowne (1993), HAR-4639 represents early Neolithic activity.

HAR-5220 4450 ±80 BP

$\delta^{13}\text{C}$: -29.6‰

Sample: TT81B10, submitted in October 1982 by P Chowne

Material: wood (waterlogged): *Ulmus* sp. (D Haddon-Reece 1982)

Initial comment: from an environmental trench adjacent to the river; from peat layer 10B, below the current water table. Sherds of Neolithic and Bronze Age pottery and flints were found in a buried soil above this layer.

Objectives: to help provide a chronology for the site and support environmental analysis.

Calibrated date: 1 σ : 3340–2920 cal BC
2 σ : 3370–2900 cal BC

Final comment: P Chowne (1993), HAR-5220 represents later Neolithic/early Bronze Age activity at the site.

Thetford: Fison Way, Norfolk

Location: TL 865845
Lat. 52.25.34 N; Long. 00.44.36 E

Project manager: T Gregory (Norfolk Archaeological Unit), 1981–2

Archival body: Norfolk Museum

Description: a multi-period site. The present town of Thetford lies at the confluence of the Rivers Thet and Little Ouse, which run through a gap in the chalk ridge, from south to north up the west part of Norfolk and Suffolk. The confluence isolates three marked eminences, Snare Hill, Barrow Hill, and Gallows Hill. The flat top of Gallows Hill is about 35m higher than the site of the town, with a relatively steep slope between them.

Objectives: the combination of late Roman finds and striking crop marks on aerial reconnaissance attracted considerable interest in the site. The area had been designated by Breckland District Council for the expansion of the Fison Way Industrial Estate from the south, and a rescue project was therefore launched.

References: Gregory 1991

HAR-5073 1510 ±50 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: 58533304, submitted in February 1982 by P Murphy

Material: charcoal (remaining subsample very comminuted and most fragments too small to identify): unidentified (11.28g); *Erica* sp./*Calluna* sp. (0.19g, 100%) (R Gale 2000)

Initial comment: from context 3304, enclosure 1b, from a pit dug into the middle fill of the inner ditch during Phase IV or later.

Objectives: to establish a chronological sequence for the site. Dating is critical for this context therefore two sub-samples have also been submitted, HAR-5074 and HAR-5075.

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

Final comment: T Gregory (1991), these dates fall into the same order as that expected from the archaeological sequence. The only area of conflict is over the date of the end of Phase III, in the full Roman period or later, from the radiocarbon determinations (HAR-5459), and in the third quarter of the first century AD on archaeological and historical grounds. The deposit and a similar one in 6326 in an analogous position consists entirely of heather, and large heather deposits on the site otherwise belong to Phase IV (Pit 1307, Pit 3329, and the Gallows Hill turf stack) (Lawson and Le Hegarat 1986, 67) and this may indicate that this part of the ditch remained open for some time after the end of Phase III.

Laboratory comment: English Heritage (29 September 2008), the three radiocarbon results from the pit (HAR-5073–5) are statistically consistent ($T'=1.1$; $T'(5\%)=6.0$; $v=2$; Ward and Wilson 1978).

References: Lawson and Le Hegarat 1986
Ward and Wilson 1978

HAR-5074 1470 ±60 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: 58533304, submitted in February 1982 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (1.88g); *Erica* sp./*Calluna* sp., thin stems up to 5mm in diameter (0.36g, 100%) (R Gale 2000)

Initial comment: a sub-sample of HAR-5073.

Objectives: as HAR-5073

Calibrated date: 1 σ : cal AD 540–650
2 σ : cal AD 430–670

Final comment: see HAR-5073

Laboratory comment: see HAR-5073

HAR-5075 1430 ±60 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: 58533304, submitted in February 1982 by P Murphy

Material: charcoal (remaining subsample identified): unidentified (0.88g); cf *Prunus* sp., and/or Pomoideae, narrow roundwood (0.18g, 100%) (R Gale 2000)

Initial comment: a sub-sample of HAR-5073.

Objectives: as HAR-5073

Calibrated date: 1 σ : cal AD 570–660
2 σ : cal AD 530–680

Final comment: see HAR-5073

Laboratory comment: see HAR-5073

HAR-5102 2000 ±70 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: 58533781, submitted in May 1982 by P Murphy

Material: charcoal (remaining subsample sparse and very comminuted): unidentified (0.04g); cf *Quercus* sp. (>0.01g, 33.3%); *Fraxinus* sp. (>0.01g, 33.3%) (R Gale 2000)

Initial comment: from context 3781, enclosure 1a, inner ditch. The sample was taken from a layer of charcoal immediately above the primary fill.

Objectives: to provide a chronological sequence for the site.

Calibrated date: 1 σ : 90 cal BC–cal AD 80
2 σ : 200 cal BC–cal AD 140

Final comment: T Gregory (1991), the sample belonged to Phase II, and indicates the end of the phase. HAR-5460 also dates Phase II.

HAR-5459 1650 ±80 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: 58536852, submitted in January 1983 by P Murphy

Material: charcoal (remaining subsample comminuted, most fragments too small to identify): unidentified (12.08g); *Erica* sp./*Calluna* sp. (3.62g, 100%) (R Gale 2000)

Initial comment: from context 6852, enclosure 1b; from the lowest fill of inner ditch 220.

Objectives: to provide a chronological sequence for the site.

Calibrated date: 1 σ : cal AD 260–540
2 σ : cal AD 220–580

Final comment: T Gregory (1991), the finds from inner ditch 220 were almost entirely of early Roman date, with some Iron Age pottery, presumably residual. However, a group of radiocarbon determinations from the filling suggest a later date. This layer should belong to the end of Phase III.

HAR-5460 1875 ±70 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: 58535871, submitted in January 1983 by P Murphy

Material: charcoal (remaining subsample identified; *Salix/Populus* sp. (0.31g, 23.5%)); unidentified (8.81g); cf *Corylus* sp. (0.11g, 8.3%); *Fraxinus* sp. (0.90g, 69.2%) (R Gale 2000)

Initial comment: from context 5871, enclosure 1a; high in the fill of the outer ditch.

Objectives: to provide a chronological sequence for the site.

Calibrated date: 1 σ : cal AD 60–240
2 σ : 40 cal BC–cal AD 330

Final comment: T Gregory (1991), archaeologically this should belong to the end of Phase II.

Thirlings, Wooler, Northumberland

Location: NT 956324
Lat. 55.35.07 N; Long. 02.04.11 W

Project manager: C O'Brien and R Miket (University of Newcastle upon Tyne), 1971–81

Archival body: Museum Antiquities, University of Newcastle

Description: Thirlings is on the sand and gravel terrace surface of the Milfield Basin in the north of Northumberland in England, 15km from the Anglo-Scottish border and 5km from the small market town of Wooler. The land is currently under arable cultivation and no archaeological features are visible on the ground surface. The site was discovered through cropmarks, photographed by Dr J K St Joseph of Cambridge University and Professor N. McCord of Newcastle University. The 1981 excavation took in the land north east of the field boundary, building L and building C. The site of Thirlings includes Thirlings and Ewart, the latter where the samples relating to the buildings were obtained.

Objectives: to refine the dating of the early and later Neolithic material and provide dates for the Anglo-Saxon structures. At the time of the excavation (1970s) radiocarbon dating in the region was uncommon with only a handful of Neolithic and Anglo-Saxon settlements known.

Final comment: R Miket (22 January 2006), the dates from this site, though in accordance with practice at the time, few in number, nevertheless represented the first Neolithic

and Anglo-Saxon radiocarbon dates from Northumberland, upon which subsequent discoveries in the region have since enlarged.

Laboratory comment: Ancient Monuments Laboratory (1995), five further dates from this site were funded prior to 1981 and were published in the first volume of *Radiocarbon Dates* (Jordan *et al* 1994, 196–7).

References: Gates and O'Brien 1988
Jordan *et al* 1994, 196–7
O'Brien 2000

HAR-1450 4270 ±100 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: F467, submitted on 7 November 1975 by R Miket

Material: charcoal (with earth, c 20% identified): *Corylus avellana* L.; *Crataegus/Pynas/Sorbus/Malus* sp.; *Prunus* sp. (C Keepax)

Initial comment: from a late Neolithic pit (10) containing pottery, organic material, and saddle quern.

Objectives: to provide a date for the feature and contents (pottery and saddle-quern).

Calibrated date: 1 σ : 3010–2760 cal BC
2 σ : 3270–2580 cal BC

Final comment: R Miket (22 January 2006), the date result falls within the established chronology, and provides the earliest date for a saddle-quern in north-eastern England.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-6236 1560 ±70 BP

$\delta^{13}\text{C}$: -26.9‰

Sample: L1687, submitted on 30 January 1984 by C F O'Brien

Material: charcoal (remaining very friable subsample identified): unidentified (8.70g); *Quercus* sp., heartwood (2.40g, 100%) (R Gale 1999)

Initial comment: this sample was taken from foundation trenches of different buildings. The foundation trenches are cut into gravel subsoil and survive immediately below plough soil. Floor levels of the buildings have been removed. HAR-6236 was taken from building L.

Objectives: this sample is submitted to refine the dating for the settlement as a whole. This is considered necessary in the light of structural comparisons to be made with buildings from the nearby site of Yeaverling, which is dated, not on archaeological, but historical arguments.

Calibrated date: 1 σ : cal AD 410–580
2 σ : cal AD 340–650

Final comment: C O'Brien and R Miket (1991), seven radiocarbon dates (HAR- 845, HAR-1119, HAR-6236–40) from the charcoal of timbers in the building foundation trenches confirm the evidence of the structural types represented for a settlement of the early medieval period.

Six of the seven dates are closely grouped, but the dating of building I is earlier than expected. This may be explained due to the use of heartwood from an old tree rather than the date of its incorporation into the structure.

HAR-6237 1570 ±70 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: C1634, submitted on 30 January 1984 by C F O'Brien

Material: charcoal (remaining comminuted subsample identified): unidentified (38.85g); *Quercus* sp., sapwood (2.50g, 40.85%); *Quercus* sp., some fast-grown but mostly slow-grown, heartwood plus unknown maturity (3.62g, 59.15%) (R Gale 1999)

Initial comment: as HAR-6236. HAR-6237 was taken from rectangular timber building C.

Objectives: as HAR-6236

Calibrated date: 1 σ : cal AD 410–570
2 σ : cal AD 330–640

Final comment: see HAR-6236

HAR-6238 1520 ±80 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: P1861, submitted on 30 January 1984 by C F O'Brien

Material: charcoal (remaining very friable subsample identified): unidentified (11.92g); *Quercus* sp., heartwood plus unknown maturity (1.18g, 30.3%); *Quercus* sp., sapwood (2.71g, 69.7%) (R Gale 1999)

Initial comment: as HAR-6236. HAR-6238 was taken from rectangular timber building P.

Objectives: as HAR-6236

Calibrated date: 1 σ : cal AD 420–630
2 σ : cal AD 380–660

Final comment: see HAR-6236

HAR-6239 1510 ±70 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: N1666, submitted on 30 January 1984 by C F O'Brien

Material: charcoal (remaining subsample identified): *Quercus* sp., heartwood (2.03g, 100%) (R Gale 1999)

Initial comment: as HAR-6236. HAR-6239 was taken from rectangular timber building N.

Objectives: as HAR-6236

Calibrated date: 1 σ : cal AD 430–630
2 σ : cal AD 400–660

Final comment: see HAR-6236

HAR-6240 2060 ±150 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: 11467, submitted on 30 January 1984 by C F O'Brien

Material: charcoal (remaining subsample identified): *Quercus* sp., sapwood (0.07g, 6.9%); *Quercus* sp., heartwood (0.35g, 34.7%); *Betula* sp. (0.06g, 5.9%); *Corylus* sp. (0.53g, 52.5%) (R Gale 1999)

Initial comment: as HAR-6236. HAR-6240 was taken from the posthole in the foundation of building I.

Objectives: as HAR-6236

Calibrated date: 1 σ : 360 cal BC–cal AD 80
2 σ : 410 cal BC–cal AD 260

Final comment: see HAR-6236

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: English Heritage (3 January 2012), this result is published (Walker and Otlet 1988, 298), although a final certificate has not been found.

References: Otlet *et al* 1983
Walker and Otlet 1988, 298

HAR-6658 4450 \pm 100 BP

$\delta^{13}\text{C}$: -26.1‰

Sample: F470, submitted in December 1975 by R Miket

Material: charcoal (c 50% identified): *Corylus avellana* L., from fairly large branches and timbers; *Crataegus* sp., from fairly large branches and timbers (C Keepax)

Initial comment: from a pit containing a bucket shaped vessel. On the basis of the indented finger-tipping below the rim, this was at first thought to be native ware, and as such possibly relate to the Anglo-Saxon phase. Its form however, did not exclude a Neolithic date, and this was confirmed by the radiocarbon date.

Objectives: to date the feature and its content.

Calibrated date: 1 σ : 3350–2920 cal BC
2 σ : 3500–2890 cal BC

Final comment: R Miket (22 January 2007), dating showed the pit and its contents (bucket-shaped vessel) to have been of later Neolithic date. The pottery is not inconsistent with this date.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 298

HAR-6659 4530 \pm 130 BP

$\delta^{13}\text{C}$: -26.4‰

Sample: F430, submitted in December 1975 by R Miket

Material: charcoal (no identifiable fragments) (C Keepax)

Initial comment: circular timber structure.

Objectives: to date the structure.

Calibrated date: 1 σ : 3500–3020 cal BC
2 σ : 3640–2890 cal BC

Final comment: R Miket (22 January 2007), establishes a floruit within the later Neolithic range.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 298

Tintagel Castle: Lower Ward, Cornwall

Location: SX 05158897
Lat. 50.40.02 N; Long. 04.45.27 W

Project manager: S Hartgroves (Cornwall Archaeology Unit), January 1986

Archival body: Royal Cornwall Museum

Description: a small rescue excavation was undertaken in advance of engineering works to the walls of the Lower Ward of the Castle, on the mainland at Tintagel.

Objectives: obtaining a series of dates for the import and use of the Mediterranean wares, and for the associated stake-built structures, will be of enormous use, and crucial to our understanding of the early post-Roman scene in the West. Although commonplace and thus well dated on many sites around the eastern Mediterranean, the dissemination of these wares to a few places in Britain and Ireland at this time is not well understood.

Final comment: S Hartgroves (22 August 1996), it was hoped that a series of precise dates for this site might help to clarify the date range for the use of imported B-wares in the post-Roman period. The pottery typologies of the sherds found on the site present a rather different picture to the radiocarbon results, and it is assumed that in this case the pottery will have to serve to refine the radiocarbon dates rather than vice-versa, as had been hoped. A small standard deviation was required for the samples to be of use. These samples can just about be accepted as fitting with the dates anticipated from the pottery typologies, taking two standard deviations and allowing for the use of old timber. This range of dates is not unusual, and reflects the fact that conventional radiocarbon dating can give only relatively crude estimates of date, especially when the given standard deviation is large. The method is quite inappropriate for a situation such as this, where the whole Tintagel site is now believed on other grounds to have had a relatively limited phase (Period II, post-Roman) of intense usage, amounting perhaps to a maximum of two centuries.

It was assumed at the time that the samples submitted for dating, particularly those which came from stakeholes, would be from young wood, since no large structural timber was thought to be involved. With the benefit of hindsight, and particularly in view of the presumed short lifetime of the post-Roman occupation, future radiocarbon analyses from this phase of occupation, at Tintagel should be undertaken using carbon from known young samples such as carbonised grain, or thin twig charcoal, and the analysis may be better carried out at the AMS facility at Oxford, which seems to be a more reliable means of measuring carbon isotope levels.

Laboratory comment: Ancient Monuments Laboratory (2003), two further samples, AML-8650067 (HAR-8275) and AML-8650066 (HAR-8274) were submitted for dating but failed to produce a date.

References: Hartgroves and Walker 1988
Walker *et al* 1990, 193

HAR-8273 2740 ±100 BP

$\delta^{13}\text{C}$: -27.8‰

Sample: TCD/43, submitted in May 1986 by S Hartgroves

Material: soil and charcoal

Initial comment: from stakehole 43.

Objectives: to provide, if possible, upper and lower limits to the use of imported Mediterranean pottery, and to date the newly discovered timber phase.

Calibrated date: 1 σ : 1010–800 cal BC
2 σ : 1190–770 cal BC

Final comment: S Hartgroves (22 August 1996), the associated pottery indicated a date within the range of cal AD 500–550 approximately. HAR-8273 falls well outside the reasonably consistent cluster provided by the other three radiocarbon samples from this site. Contamination of the sample is suspected.

HAR-8276 2110 ±120 BP

$\delta^{13}\text{C}$: -29.0‰

Sample: TCD253, submitted in May 1986 by S Hartgroves

Material: soil and charcoal

Initial comment: from layer D 25 iii, overlying the stakeholes.

Objectives: to date this overlying layer and ascertain whether contemporary with the stakeholes.

Calibrated date: 1 σ : 360 cal BC–cal AD 20
2 σ : 410 cal BC–cal AD 130

Final comment: S Hartgroves (22 August 1996), Mediterranean imported pottery from closely associated contexts indicated a date range of cal AD 500–550. The latest maximum intercept for the three samples HAR-8276, HAR-8277, and HAR-8278 at 95% confidence were cal AD 340, 380, and 130 (Stuiver and Pearson 1986). It is difficult to accept these dates, even accepting old wood was used. Contamination of the samples is suspected. The date ranges at 95% confidence are too great to be useful for dating the post-Roman phase at Tintagel.

References: Stuiver and Pearson 1986

HAR-8277 1850 ±80 BP

$\delta^{13}\text{C}$: -27.9‰

Sample: TCD/71, submitted in May 1986 by S Hartgroves

Material: charcoal (remaining subsample very sparse): cf *Corylus* sp. (0.04g, 100%) (R Gale 2000)

Initial comment: from stakehole 71.

Objectives: as HAR-8273

Calibrated date: 1 σ : cal AD 70–250
2 σ : 40 cal BC–cal AD 390

Final comment: see HAR-8276

HAR-8278 1850 ±70 BP

$\delta^{13}\text{C}$: -27.5‰

Sample: TCD/102, submitted in May 1986 by S Hartgroves

Material: soil and charcoal

Initial comment: from stakehole 102.

Objectives: as HAR-8273

Calibrated date: 1 σ : cal AD 70–250
2 σ : cal AD 1–350

Final comment: see HAR-8276

Tiverton: Long Barrow, Devon

Location: SS 98501365
Lat. 50.54.46 N; Long. 03.26.38 W

Project manager: G Smith (Central Excavation Service), 1985

Archival body: Royal Albert Memorial Museum

Description: a prehistoric long barrow was excavated by the Central Excavation Unit in advance of construction of the Tiverton bypass.

Objectives: to prove that the monument is earlier Neolithic although this is not an unusual occurrence.

HAR-8544 8310 ±100 BP

$\delta^{13}\text{C}$: -26.9‰

Sample: 402-245, submitted in June 1987 by N Balaam

Material: charcoal: *Quercus* sp., mature (G Smith)

Initial comment: found in buried soil beneath the long barrow, in a spread close to the probable primary burial pit, towards the east end of the barrow.

Objectives: to give a date for the construction of the long barrow. No cultural artefacts were recovered and there are no further radiocarbon samples.

Calibrated date: 1 σ : 7520–7180 cal BC
2 σ : 7580–7070 cal BC

Final comment: G Smith (19 November 1990), the date suggests the material was residual, c 3000 years earlier than the monument.

Totley Moss, Derbyshire

Location: SK 27557885
Lat. 53.18.20 N; Long. 01.35.11 W

Project manager: R Morgan (University of Sheffield), 1983

Archival body: University of Sheffield

Description: a bog oak discovered by the Hunter Archaeological Society in the Pennine peats. Such fallen trees, killed by the deteriorating conditions, which led to the start of peat growth, have been regularly found in the Pennines along with birch stumps, but have never before been examined for identification, age, or date.

Objectives: absolute tree-ring dating is now potentially possible by cross-matching the tree's growth pattern with the dated chronologies from England, Ireland, and Germany. A radiocarbon date is often helpful in pinpointing the appropriate period of the trees life span before attempts at cross matching commence.

Final comment: C Tyers (16 June 2009), this single tree-ring series remains undated, which is not surprising considering its early radiocarbon date. Reference material for dendrochronology is still extremely sparse in this period and it is unusual to date an unreplicated sequence.

HAR-6184 5940 ±80 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: TOTMOSS1, submitted on 9 May 1984 by R Morgan

Material: wood (waterlogged): *Quercus* sp. (R Morgan)

Initial comment: from a horizontal tree trunk lying at the base of peat deposits about 150cm thick, resting on clay and gravel. The tree trunk was exposed by erosion of the Barbrook. The total trunk length is unknown, but exceeds 250cm; diameter 30cm+. The sample is cut from the outer 20 heartwood rings of the trunk; the sapwood is no longer present. 115 heartwood rings had survived: 10–55 sapwood rings had been lost, and possibly some heartwood rings.

Objectives: as guidance of approximate date to aid tree-ring comparisons with prehistoric chronologies, for absolute dating; and to date the onset of peat growth on Totley Moss, and the associated pollen evidence for clearance and archaeological evidence for Mesolithic activity.

Calibrated date: 1 σ : 4940–4720 cal BC
2 σ : 5020–4610 cal BC

Final comment: J Hillam (24 June 1996), although there are now several dated chronologies for the prehistoric period, no reliable tree-ring dating has been found for this bog oak.

Towcester Church, Northamptonshire

Location: SP 694487
Lat. 52.07.55 N; Long. 00.59.10 W

Project manager: D Haddon-Reece (Ancient Monument Laboratory), 1983

Archival body: Parish of St Lawrence and Towcester

Description: head of effigy of Archdeacon Sponne at Towcester Church, Northamptonshire. The effigy is of stone, originally with painted wooden head and hands, which were exchanged for rather grotesque florid replacements in 1884. The head and hands were lost until turning up in the attics of the vicarage in the early 1980s. The monument was relocated in 1835, thus some interference of that date might be expected.

Objectives: the aim of the dating exercise is to demonstrate whether the wooden head and hands were the originals, of c 1448, or were of later date.

Laboratory comment: English Heritage (2003), a third sample, HAR-6576 (TOW3) failed.

References: Walker and Otlet 1988, 311–2

HAR-6574 290 ±70 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: TOW1, submitted on 5 July 1984 by D Haddon-Reece

Material: wood: *Quercus* sp. (4.15g) (D Haddon-Reece)

Initial comment: the second of two cores from the head of an effigy thought to be of Archdeacon Sponne.

Objectives: to determine whether the monument is tenth century or not.

Calibrated date: 1 σ : cal AD 1480–1670
2 σ : cal AD 1440–1955*

Final comment: P Woodfield (4 July 2003), the results are not as uniformly precise as might be expected from a securely dated monument, although 2 σ of Sample 1 is credible and confirms that the head is in fact original. It suggests that there was a slight delay after Sponne's death during which the stone monument was designed, carved, and erected. The other calibrated date suggests a slightly later date.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-6575 240 ±70 BP

$\delta^{13}\text{C}$: -24.3‰

Sample: TOW2, submitted on 5 July 1984 by D Haddon-Reece

Material: wood: *Quercus* sp. (4.08g) (D Haddon-Reece)

Initial comment: one of two cores from the head of an effigy thought to be of Archdeacon Sponne.

Objectives: as HAR-6574

Calibrated date: 1 σ : cal AD 1520–1955*
2 σ : cal AD 1460–1955*

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: English Heritage (7 October 2011), the two results from this effigy are statistically consistent ($T'=0.3$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). The weighted mean of these measurements (265 ±50 BP) calibrates to cal AD 1480–1950 (95% confidence) or cal AD 1520–1800 (68% confidence) (Reimer *et al* 2004).

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

Trelan I, Cornwall

Location: SW 73561913
Lat. 50.01.42 N; Long. 05.09.43 W

Project manager: G Smith (Central Excavation Unit), 1981

Archival body: Royal Cornwall Museum

Description: a small oval enclosure of previously unknown date and function. This site lies near to the edge of Goonhilly Downs within an area of short heath vegetation, dominated by bent grass (*Agrostis setacea*), and, until the 1970s unenclosed and uncultivated.

Objectives: investigated as part of a general study of the archaeological effect of agricultural encroachment on the Lizard heathlands. This site was one of a well-known class of monuments of unproved date and function, although the subject of earlier unproductive and unpublished excavations and various theories (Hopkins 1980).

Final comment: G Smith (1988), the excavation suggested it was a turf-drying platform of the period thirteenth to fifteenth century AD, and provided useful corroboratory evidence for the many similar monuments (although varying shapes) which exist elsewhere on the Lizard heathlands, on Bodmin Moor, and on north-west Dartmoor.

References: Christie 1988
G Smith 1984
Hopkins 1980
Smith 1988b

HAR-9018 650 ±70 BP

$\delta^{13}\text{C}$: -27.6‰

Sample: 40-014, submitted in December 1982 by G Smith

Material: charcoal: unidentified

Initial comment: charcoal lens from middle fill of main ditch.

Objectives: to confirm probable medieval date.

Calibrated date: 1 σ : cal AD 1270–1400
2 σ : cal AD 1250–1430

Final comment: G Smith (15 July 1996), this determination is very useful because it is the first real confirmation of date for this type of monument, examples of which occur widely on the heathland of The Lizard, Bodmin Moor, and Dartmoor. It agrees with previously suggested dating, which suggests that these earthworks were associated with the main phase of activity of the medieval mining industry and therefore probably for industrial rather than domestic turf drying.

Trelan II, Cornwall

Location: SW 73411928
Lat. 50.01.47 N; Long. 05.09.51 W

Project manager: G Smith (Central Excavation Unit), 1981

Archival body: Royal Cornwall Museum

Description: Central Excavation Unit Site 41 was a mainly turf-built burial mound of two phases of construction.

Objectives: the site was investigated as part of a general study of the archaeological effect of agricultural encroachment on the Lizard heathlands. This particular site held out the possibility of providing the first good soil and pollen evidence about the environmental status of the heathland in the Bronze Age. The notable concentration of burial mounds on Goonhilly Downs indicates a hitherto unappreciated high settlement status for the Lizard area in the second millennium BC. As an area of rare flora, the environmental history of these heathlands is of great interest to botanists in the understanding of the part played by 'natural' development as against man's role through grazing, burning, and turf-stripping.

Final comment: G Smith (15 July 1996), this group of dates confirmed the suggested Bronze Age date of the monument, thought to be a burial mound. Their general range fits in well with the span or radiocarbon dates from barrows elsewhere in Cornwall (Christie 1988, 164–5) and their sequence fits in with their stratigraphic position.

Laboratory comment: Ancient Monuments Laboratory (2003), HAR-4539 (41-145) was submitted for dating but failed. During conversion to benzene the rig developed problems and these, combined with the fact that the sample was not full size, resulted in no benzene being produced and therefore no result could be obtained.

References: Christie 1988
G Smith 1984

HAR-4538 3040 ±90 BP

$\delta^{13}\text{C}$: -24.2‰

Sample: 41-041, submitted in August 1981 by G Smith

Material: charcoal: unidentified

Initial comment: from a backfill layer near the top of the phase 2 ditch of a round barrow.

Objectives: to provide a latest date for the barrow's silting sequence, giving a framework for its period of use.

Calibrated date: 1 σ : 1420–1130 cal BC
2 σ : 1500–1010 cal BC

Final comment: G Smith (16 July 1996), the date, even at 95% confidence, does provide a distinct latest date for the barrow's silting sequence, fitting in with the overall stratigraphic sequence and providing good evidence for the barrow's period of use.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 168

HAR-4540 3740 ±110 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: 41-149, submitted in August 1981 by G Smith

Material: charcoal: *Quercus* sp.

Initial comment: from the primary silts of a phase 2 ditch.

Objectives: to provide a date for the barrow's second phase of use.

Calibrated date: 1 σ : 2300–1970 cal BC
2 σ : 2480–1880 cal BC

Final comment: G Smith (16 July 1996), the date does not accord simply with the stratigraphic sequence, being somewhat older than HAR-5510, although from a possibly younger context. However, the observation that the material for HAR-4540 may be derived from a phase one context and the fact that the dates overlap may be taken that both provide an acceptable general date for the barrow's use.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1988, 335

HAR-5280 3970 \pm 120 BP

$\delta^{13}\text{C}$: -25.0‰

Sample: 41-203, submitted in November 1982 by G Smith

Material: charcoal (remaining subsample sparse and comminuted): unidentified (0.56g); *Prunus* sp., (*P. avium*, *P. padus*, or *P. spinosa*), narrow diameter roundwood (0.01g, 100%) (R Gale 2000)

Initial comment: from a stakehole beneath a Bronze Age barrow.

Objectives: to provide a date for the pre-barrow boundary of which the posthole was a part, or at least, if the charcoal was secondary, to provide a primary *post quem* date for the barrow construction.

Calibrated date: 1 σ : 2630–2290 cal BC
2 σ : 2880–2130 cal BC

Final comment: G Smith (16 July 1996), being generally earlier than other dates from the barrow this provides support for the idea that the pre-barrow boundary was in existence at or shortly prior to the barrow's construction and provides a good *post quem* framework for the barrow's beginning.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Hardiman *et al* 1992, 53
Otlet *et al* 1983
Walker and Otlet 1988, 300

HAR-5510 3530 \pm 80 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: 41-062, submitted in March 1983 by G Smith

Material: charcoal (remaining subsample sparse and comminuted): unidentified (0.29g); *Quercus* sp., heartwood (0.04g, 100%) (R Gale 2000)

Initial comment: from the primary fill of the first phase ditch of a Bronze Age barrow.

Objectives: to provide a primary date for the barrow construction.

Calibrated date: 1 σ : 1960–1740 cal BC
2 σ : 2130–1670 cal BC

Final comment: G Smith (16 July 1996), the date accords with the stratigraphic sequence, being later, even at 95% confidence, than HAR-5280, and falls within the expected range of dates for this type of monument.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 301

Treligga: Barrow 2, Cornwall

Location: SX 04508559
Lat. 50.38.12 N; Long. 04.45.54 W

Project manager: P Rose (Cornwall Archaeology Unit), 1941

Archival body: Royal Cornwall Museum

Description: a barrow on Treligga Common, a stretch of land between Treligga village and Start Point, running parallel to Treligga Cliffs.

Objectives: to date the barrow.

References: Christie 1988
Walker *et al* 1990, 190

HAR-8100 3380 \pm 80 BP

$\delta^{13}\text{C}$: -25.3‰

Sample: TR2 S4, submitted in July 1983 by P Christie

Material: charcoal (remaining subsample identified): unidentified (5.47g); *Quercus* sp., heartwood (3.65g, 100%) (R Gale 2000)

Initial comment: from burial 3, under a slate kerb.

Objectives: to date the secondary burial in the barrow.

Calibrated date: 1 σ : 1760–1530 cal BC
2 σ : 1890–1490 cal BC

Final comment: P Christie (1985), this dates the burial in the barrow.

Trevelgue Head, Cornwall

Location: SW 827630
Lat. 50.25.33 N; Long. 05.03.35 W

Project manager: G Wainwright (Ancient Monument Laboratory), 1983

Archival body: Cornwall Archaeology Unit

Description: Trevelgue Head is an impressive promontory cliff-castle located on the north Cornish coast on the outskirts of Newquay. The site is defined by a spectacular series of large earth and stone ramparts, which embrace the remains of an Iron Age settlement.

Objectives: to date the site.

References: Christie 1985
Christie 1988
Miles 1975

HAR-6218 3560 ±110 BP $\delta^{13}\text{C}$: -25.6‰*Sample*: 264-27, submitted in March 1984 by N Balaam*Material*: charcoal: *Quercus* sp., mature

Initial comment: from a secondary cremation burial in a round barrow within a promontory fort. The sample is assumed to be associated with a group of some 20 small sherds labelled '1983 Survey (27)'. (27) is recorded as 'a deposit of cremated bone' associated with 'a few sherds of pottery' retrieved from a disturbance in barrow (19). No archive notes or drawings can be located, which can be used to confirm and expand information about this context but there appears no reason to doubt that the sherds do in fact come from context (27) in the 1983 survey. The deposit was bagged for laboratory examination, during which the charcoal was abstracted by sieving and sorting.

Objectives: to date the sherds. All the sherds appear on fabric and decoration to be from the same vessel; not enough survives for a full reconstruction but it was small, of simple bipartite shape with a slight internal rim bevel. Twisted cord decoration formed a herringbone pattern bounded by a horizontal line above the body angle and another on the rim bevel. The surviving shape and decoration are best paralleled on P7 from the Treligga 5 barrow in the South of Tintagel parish (Christie *et al* 1985, fig 54); the Treligga vessel was however decorated all over, had one horizontally pierced lug and was assigned to an early place in the Trevisker series.

Calibrated date: 1 σ : 2040–1740 cal BC
2 σ : 2210–1620 cal BC

Final comment: H Quinnell (1996), the Trevelgue vessel is probably best assigned to the Trevisker series also, with the simple emphatic nature of the impressed cord decoration suggesting again a fairly early date. The dates for Cornish barrows presented by Christie and Healy (Christie 1988, 164–5) present a clustering in the centuries either side of 2000 cal BC. The overall 2 σ date spans this range very well and, while it is not informative about the close detail of the context involved, fits the pattern currently presented by early Bronze Age ceramic material from Cornwall. (Note however that the description of the cremation as 'secondary' needs qualification; secondary burials, in the sense of insertion subsequent to completion of burial mounds hardly occur in Cornwall (Miles 1975); while the deposit undoubtedly comes from a position in the barrow mound, it is likely to have been deposited either during the original construction of the barrow mound or during a phase of heightening.

References: Christie 1985
Christie 1988
Miles 1975

Ulwell, Dorset

Location: SZ 02268092
Lat. 50.37.39 N; Long. 01.58.05 W

Project manager: P Cox (Wessex Archaeology), 1982

Archival body: Dorset County Museum

Description: an extensive cemetery was discovered as a result of building extensions at Shepherds Farm, Ulwell. Three cist burials had previously been recorded on the site in 1949 when the present farm building was constructed. The character of this cemetery, its stratigraphic insertion into earlier arable fields (Iron Age/Roman?), the occurrence of a late Roman coin in a grave fill, the reuse of a Roman roof-tile in one of the cists discovered in 1949, and the inclusion of an iron knife in one grave, are indicative of a late/post-Roman or possibly Saxon cemetery. The range of age and sex within the cemetery also points to continuous use of the cemetery by family groups over several generations. The location of any associated settlement is not known.

Objectives: the samples represent no more than 7% of the partially excavated cemetery and is structured to provide both a mean date for the cemetery's use and, if the duration is sufficiently long, to suggest dates for elements defined as early and late in the development. The expected date range for the determinations would be *c* AD 400–700.

Laboratory comment: Ancient Monuments Laboratory (1988), on statistical examination (Ward and Wilson 1978) the two results from grave 8 (HAR-6124 and HAR-6125) were found not to differ significantly and, if archaeologically appropriate, could be combined as 1310 ±55 BP (cal AD 640–860 at 95% confidence; Reimer *et al* 2004). In fact the same test suggests that the group of four results could well be replicate determinations of the same date, in which case they could be combined as 1330 ±45 BP (cal AD 640–780 at 95% confidence; Reimer *et al* 2004).

References: Cox 1988
Reimer *et al* 2004
Ward and Wilson 1978

HAR-6124 1290 ±80 BP $\delta^{13}\text{C}$: -23.1‰*Sample*: W30/7, submitted in August 1983 by P Cox*Material*: human bone

Initial comment: from a secondary burial inserted into grave 8.

Objectives: to date the early/middle phase of the site.

Calibrated date: 1 σ : cal AD 650–810
2 σ : cal AD 600–940

Final comment: P Cox (1988), the radiocarbon determinations suggest that the cemetery was in use through the seventh century AD.

HAR-6125 1350 ±80 BP $\delta^{13}\text{C}$: -20.8‰*Sample*: W30/16, submitted in August 1983 by P Cox*Material*: human bone

Initial comment: from the primary burial in grave 8.

Objectives: to date the early phase of the site.

Calibrated date: 1 σ : cal AD 630–770
2 σ : cal AD 550–880

Final comment: see HAR-6124

HAR-6126 1450 ±80 BP $\delta^{13}\text{C}$: -22.9‰*Sample*: W30/50, submitted in August 1983 by P Cox*Material*: human bone*Initial comment*: from a burial inserted into grave 90, buried with an iron knife. This sample is thought to represent the late phase of the cemetery.*Objectives*: to date the late phase of the site.*Calibrated date*: 1 σ : cal AD 540–660
2 σ : cal AD 420–690*Final comment*: see HAR-6124**HAR-6127** 1230 ±80 BP $\delta^{13}\text{C}$: -23.6‰*Sample*: W30/3, submitted in August 1983 by P Cox*Material*: human bone*Initial comment*: from a cist burial in grave 4.*Objectives*: to date the earliest use of the site.*Calibrated date*: 1 σ : cal AD 670–900
2 σ : cal AD 650–990*Final comment*: see HAR-6124**Upper Teesdale: Simy Folds Bog,
Durham***Location*: NY 888277
Lat. 54.38.39 N; Long. 02.10.25 W*Project manager*: A Donaldson (University of Durham),
1980*Archival body*: University of Durham*Description*: a peat bog near a Viking-age settlement. The settlement lies on Holwick Fell, which forms the higher slopes of the south bank of the Tees valley, west of Middleton in Teesdale.*Objectives*: radiocarbon dates would provide a fixed context for a pollen diagram and would be of great interest in terms of the archaeology and local history of the whole dale, which has clearly undergone major environmental changes.*Final comment*: D Coggins (22 July 2003), the results of the dating of environmental samples HAR-5068, HAR-5069, and HAR-5070 are particularly interesting when complemented by results obtained from excavation of the site. Sample HAR-5070 (3390 ±110 BP; 1960–1430 cal BC at 95% confidence; Reimer *et al* 2004) showed a relatively open environment probably under pasture. A Bronze Age presence on the site is confirmed by the excavation of sherds from an urn and by charcoal from a floor dates to 1740–1210 cal BC (HAR-5347; 3200 ±110 BP at 95% confidence; Reimer *et al* 2004). Samples HAR-5068 and HAR-5069 may be considered together. They mark the end of cereal pollen and so presumably of agriculture and the beginning of a long period of relative stability. That the site was no longer farmed is alsosuggested by the presence of a heap of iron slag overlying the north boundary wall of the site. Charcoal from this (HAR-4506; 820 ±70 BP) gave a date of cal AD 1030–1290 (at 95% confidence; Reimer *et al* 2004), not incompatible with those from HAR-5068 (680 ±60 BP) and HAR-5069 (650 ±60 BP) of cal AD 1220–1410 and cal AD 1260–1420 (at 95% confidence; Reimer *et al* 2004). It seems possible that agriculture was replaced by more intensive iron-working for which there is documentary evidence.*Laboratory comment*: Ancient Monuments Laboratory (2003), two further dates (HAR-3791 and HAR-4076) were published in the first volume of *Radiocarbon Dates* (Jordan *et al* 1994, 199–200). One further sample SF/81/4 (HAR-5349) was submitted for dating but failed to produce a result.*References*: Coggins *et al* 1983
Coggins 1986
Coggins 2004
Jordan *et al* 1994, 199–200
Reimer *et al* 2004**HAR-5068** 680 ±60 BP $\delta^{13}\text{C}$: -29.8‰*Sample*: 30–31CM, submitted in June 1982 by A M Donaldson*Material*: peat (300g (wet))*Initial comment*: peat sample from 0.30–0.31m.*Objectives*: to date the pollen diagram, which would in turn date the environmental changes occurring on the dale.*Calibrated date*: 1 σ : cal AD 1270–1390
2 σ : cal AD 1220–1410*Final comment*: D Coggins (1986), the pollen diagram from this site shows that no important forest regeneration took place after the area had once been cleared, a process which seems to have begun in the Bronze Age and was virtually completed in the later prehistoric period.**HAR-5069** 650 ±60 BP $\delta^{13}\text{C}$: -29.6‰*Sample*: 32–35CM, submitted in June 1982 by A M Donaldson*Material*: wood (described as peat when submitted (500g wet), waterlogged wood and unidentified herbaceous material, remaining subsample now desiccated and very degraded; ??*Salix/Populus* sp., 0.09g (81.8%); 1 fragment impossible to identify but not *Salix/Populus* sp., 0.02g (18.2%)): unidentified (46.23g) (R Gale 2000)*Initial comment*: peat sample from 0.32–0.35m.*Objectives*: to date the pollen diagram, which would in turn date the environmental changes occurring on the dale.*Calibrated date*: 1 σ : cal AD 1280–1400
2 σ : cal AD 1260–1420*Final comment*: D Coggins (1986), this dates the disappearance of cereal pollen and presumably the end of cereal growing.

HAR-5070 3390 ±110 BP $\delta^{13}\text{C}$: -29.3‰

Sample: 60-64CM, submitted in June 1982 by A M Donaldson

Material: peat (45g (wet))

Initial comment: peat sample from 0.60–0.64m.

Objectives: to date the pollen diagram, which would in turn date the environmental changes occurring on the dale.

Calibrated date: 1 σ : 1880–1520 cal BC
2 σ : 1970–1430 cal BC

Final comment: D Coggins (22 July 2003), Mrs Donaldson's report on the pollen analysis for the site (1985) noted a definite rise in herbaceous pollen in the upper half of zone 2 (ie at a depth of c 0.6–0.7m) the layer from which this sample was taken. She considered that the presence of open-habitat species probably represented pastoral land use after selective clearance during the middle Bronze Age.

Confirmation of a Bronze Age presence on the site was provided by the discovery of urn-sherds in a posthole beneath the west gable of site 1, building 1.

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Upwich, Worcestershire

Location: SO 9010063503
Lat. 52.16.09 N; Long. 02.08.42 W

Project manager: J Price (Archaeology Section, Hereford and Worcester County Council), 1984

Archival body: Worcestershire County Museum

Description: a multi-period salt production site dating from the Iron Age onwards.

Objectives: HAR-9118 to HAR-9125 form four pairs of samples which were taken during the excavation as part of an overall strategy to analyse discrete and well preserved environmental remains, in this instance, from Saxon occupation levels. The *in situ* furnaces were located at similar stratigraphic horizons, and it is hoped that soil analysis will assist in providing a phase sequence for the intensive pre-medieval activity.

Final comment: J D Hurst (5 July 1996), radiocarbon dating provided a very useful series of dates. These determine the presence of a middle Saxon phase, as well as refining the ceramic dating of an earlier sub Roman/Anglo-Saxon phase.

References: Hurst 1991
Hurst 1997

HAR-9118 1550 ±60 BP $\delta^{13}\text{C}$: -25.3‰

Sample: 45753070, submitted in January 1988 by J P Hughes

Material: charcoal: *Ulmus* sp.; *Alnus* sp.; *Tilia* sp.; *Quercus* sp.; *Acer* sp. (A Miles 1988)

Initial comment: HAR-9118 and HAR-9119 were recovered from the same furnace feature, as *in situ* deposits, in area III. The feature and its contents were sealed by a heavy clay layer which seems to have marked the end of the identified period of Saxon occupation in area II.

Objectives: it is hoped that relative dates can be established for industrial activity in different areas of the site, in order to reconcile functions of apparently associated features with the general sequence.

Calibrated date: 1 σ : cal AD 420–580
2 σ : cal AD 390–640

Final comment: J D Hurst (5 July 1996), the radiocarbon date confirmed the Anglo-Saxon date of this feature, and suggested that a sequence of hearths maybe present rather than a single episode of hearth construction.

HAR-9119 1450 ±60 BP $\delta^{13}\text{C}$: -26.7‰

Sample: 45753088, submitted in January 1988 by J P Hughes

Material: charcoal: *Alnus* sp.; *Tilia* sp.; *Quercus* sp.; *Betula* sp.; *Acer* sp. (A Miles 1988)

Initial comment: as HAR-9118

Objectives: as HAR-9118

Calibrated date: 1 σ : cal AD 550–660
2 σ : cal AD 430–670

Final comment: see HAR-9118

Laboratory comment: English Heritage (2010), these two results on the same charcoal sample are statistically consistent ($T'=1.4$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). As they are bulk samples, a weighted mean may be taken (1500 ±42 BP), which provides a *terminus post quem* for the furnace of cal AD 430–650 (95% confidence) or cal AD 530–610 (68% confidence; Reimer *et al* 2004).

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

HAR-9120 1520 ±50 BP $\delta^{13}\text{C}$: -26.4‰

Sample: 45753059, submitted in January 1988 by J P Hughes

Material: charcoal: *Fraxinus* sp.; *Quercus* sp. (A Miles 1988)

Initial comment: HAR-9120 and HAR-9121 were retrieved from *in situ* fills of furnace features in area II. They were taken from deposits which were stratigraphically earlier than those associated with HAR-9122 and HAR-9123, but relate to the same period of occupation.

Objectives: the relative dates need to be established for assessment of the nature and length of Saxon activity.

Calibrated date: 1 σ : cal AD 440–610
2 σ : cal AD 420–650

Final comment: J D Hurst (5 July 1996), the radiocarbon dates confirmed the possibility of a chronological sequence of hearths during this site phase.

HAR-9121 1570 ±60 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: 45753061, submitted in January 1988 by J P Hughes

Material: charcoal: *Fraxinus* sp.; *Alnus* sp.; *Quercus* sp. (A Miles 1988)

Initial comment: as HAR-9120

Objectives: as HAR-9120

Calibrated date: 1 σ : cal AD 410–570
2 σ : cal AD 350–620

Final comment: see HAR-9120

Laboratory comment: English Heritage (2010), these two results on the same bulk charcoal sample are statistically consistent ($T'=0.4$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). As they are bulk samples, a weighted mean may be taken (1482 ±38 BP), which provides a *terminus post quem* for the furnace of cal AD 460–650 (95% confidence) or cal AD 540–620 (68% confidence; Reimer *et al* 2004).

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

HAR-9122 1420 ±50 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: 45753047, submitted in January 1988 by J P Hughes

Material: charcoal: *Rhamnus cathartica* sp.; *Fraxinus* sp.; Rosaceae; *Alnus* sp.; *Tilia* sp.; *Acer* sp. (A Miles 1988)

Initial comment: from an early to mid Saxon furnace feature, and formed part of an *in situ* deposit largely composed of charcoal residues. The context, 3047 in area II, was sealed by a blanket spread of charcoal into which a series of stakes was driven. See also HAR-9123.

Objectives: the phase of Saxon activity was sealed by a heavy clay layer, and it is hoped that radiocarbon dates will establish relative dates for this period of occupation.

Calibrated date: 1 σ : cal AD 590–660
2 σ : cal AD 540–680

Final comment: J D Hurst (5 July 1996), this hearth belonged stratigraphically to the latest part of its phase, and the radiocarbon date confirmed this position.

HAR-9123 1510 ±70 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: 45753049, submitted in January 1988 by J D Hurst

Material: charcoal: *Populus* sp.; Rosaceae; *Tilia* sp.; *Alnus* sp. (A Miles 1988)

Initial comment: from a furnace feature cut into the same horizon as the feature associated with HAR-9122. The context and deposit were found *in situ*.

Objectives: as HAR-9122

Calibrated date: 1 σ : cal AD 430–630
2 σ : cal AD 400–660

Final comment: J D Hurst (5 July 1996), this radiocarbon was consistent with other radiocarbon dates for the hearth of this site phase, and their relative stratigraphic positions.

HAR-9124 1440 ±60 BP

$\delta^{13}\text{C}$: -26.1‰

Sample: 45753807, submitted in January 1988 by J P Hughes

Material: charcoal: *Ulmus* sp.; *Fraxinus* sp.; *Populus* sp.; *Alnus* sp.; *Tilia* sp.; *Acer* sp. (A Miles 1988)

Initial comment: HAR-9124 and HAR-9125 were taken from *in situ* residues of two associated furnace features, and were stratigraphically earlier than those discussed under samples HAR-9122 in the same area of the site.

Objectives: the relative dates of the four deposits will help to establish the sequence of occupation.

Calibrated date: 1 σ : cal AD 560–660
2 σ : cal AD 470–680

Final comment: J D Hurst (5 July 1996), this radiocarbon date confirmed the stratigraphic sequence of the hearths in this site phase.

HAR-9125 1630 ±70 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: 45753821, submitted in January 1988 by J P Hughes

Material: charcoal: *Rhamnus cathartica* sp.; Rosaceae; *Quercus* sp.; Rosaceae; *Quercus* sp. (A Miles 1988)

Initial comment: as HAR-9124

Objectives: as HAR-9124

Calibrated date: 1 σ : cal AD 340–540
2 σ : cal AD 240–580

Final comment: see HAR-9124

Wasperton, Warwickshire

Location: SP 265585
Lat. 52.13.25 N; Long. 01.36.43 W

Project manager: G Hughes (Birmingham University Field Archaeology Unit), 1983 and 1985

Archival body: Warwickshire Museum

Description: the cropmark gravel site at Wasperton, extending south from the village and lying to the east of the Avon, was due to be destroyed by gravel extraction. It appears from the cropmarks that the site may form an archaeological land unit of definite territory, bounded to the north and south by pit alignments, to the west by the Avon and to the east by Thelsford Brook.

Objectives: to verify the above assumption and to establish its limits in time and space, its evolution and patterns of land usage, and its relationship to the archaeology of the region as a whole.

References: Hughes and Crawford 1995
Walker *et al* 1990, 190–1

HAR-8103 710 ±80 BP

$\delta^{13}\text{C}$: -31.9‰

Sample: WNPEAT 1, submitted in February 1986 by C Bowker

Material: peat (leaves, twigs, and plant material)

Initial comment: samples HAR-8103, HAR-8104 and HAR-8105 come from the same peat deposit, but are taken from three distinct stratigraphic layers. HAR-8103 was taken at 0–6cm from the base of the peat.

Objectives: Wasperton was a large gravel complex with little organic material surviving. The peat deposit was found adjacent to the site and is highly important for determining the environmental background to the site in particular and for lowland Warwickshire in general.

Calibrated date: 1 σ : cal AD 1250–1390
2 σ : cal AD 1160–1410

Final comment: G Hughes (21 November 2006), this date relates to a phase after the Anglo-Saxon cemetery went out of use and post dates the main chronological phase.

HAR-8104 550 ±80 BP

$\delta^{13}\text{C}$: -32.0‰

Sample: WNPEAT 2, submitted in February 1986 by C Bowker

Material: peat (leaves and plant material)

Initial comment: as HAR-8103. HAR-8104 was taken at 6–15cm from the base of the peat.

Objectives: as HAR-8103

Calibrated date: 1 σ : cal AD 1300–1440
2 σ : cal AD 1280–1470

Final comment: G Hughes (21 November 2006), *see* HAR-8105

HAR-8105 500 ±100 BP

$\delta^{13}\text{C}$: -31.5‰

Sample: WNPEAT 3, submitted in February 1986 by C Bowker

Material: peat (leaves and plant material)

Initial comment: as HAR-8103. HAR-8105 was taken at 15–23cm from the base of the peat.

Objectives: as HAR-8103

Calibrated date: 1 σ : cal AD 1320–1460
2 σ : cal AD 1280–1640

Final comment: G Hughes (21 November 2006), *see* HAR-8104

HAR-8106 2940 ±70 BP

$\delta^{13}\text{C}$: -25.7‰

Sample: 6644, submitted in February 1986 by C Crawford

Material: charcoal: unidentified

Initial comment: from the lower fill of a postpit. The context below 6644 comprised redeposited natural gravel.

Objectives: HAR-8106 was the initial fill following the withdrawal of a post and is therefore indicative of the first phase of disuse. The pit shows every sign of having been filled rapidly. The postpit was part of a structure, possibly a dwelling, different in character to the adjacent Iron Age features. Some nearby postholes contained late Neolithic Peterborough pottery. It may be the case that the structure to which this postpit belongs is a Neolithic hut or working area.

Calibrated date: 1 σ : 1270–1020 cal BC
2 σ : 1390–930 cal BC

Final comment: G Hughes (21 November 2006), late Bronze Age date, in an area in which there is known Neolithic activity. The date falls in between the late Neolithic suggested by the pottery but pre-dates the putative iron enclosure and settlement complex.

HAR-8107 2210 ±80 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: 5098, submitted in November 1985 by C Crawford

Material: charcoal (remaining subsample mostly too comminuted and friable to identify): unidentified (26.55g); *Alnus* sp. (1.04g, 87.4%); *Crataegus* sp., ?hawthorn/*Sorbus* group (Pomoideae) (0.15g, 12.6%) (R Gale 2000)

Initial comment: a dense lens of charcoal separating layers of silty sand from the defensive ditch surrounding a putative Iron Age settlement. It was situated close to the bottom of the ditch, just above a secondary cleaning slot. It appeared from this and other sections that the ditch was regularly cleaned, but that its overall lifespan was short.

Objectives: there is a wide variation in the settlement types attributable to the Iron Age at Wasperton. This sample relates to a defended enclosure and is important if the sequence is to be understood. In addition the Wasperton sequence should help anchor the dating of the Iron Age in Warwickshire.

Calibrated date: 1 σ : 390–170 cal BC
2 σ : 410–40 cal BC

Final comment: G Hughes (21 November 2006), the date appears to be unexpectedly early for an defended enclosure of this kind in the Avon Valley and perhaps suggest a longer chronology for these types of enclosures than previously understood.

Watchet: Daws Castle, Somerset

Location: ST 062433
Lat. 51.10.51 N; Long. 03.02.32 W

Project manager: F McAvoy (Central Excavation Unit), 1982

Archival body: Somerset County Museum

Description: a two-phase defended enclosure.

Objectives: as a response to possible cultivation the site was investigated.

References: McAvoy 1986
Walker and Otlet 1988, 300

HAR-5279 730 ±140 BP

$\delta^{13}\text{C}$: -25.0‰

Sample: 230-41, submitted in October 1982 by N Balaam

Material: charcoal: unidentified

Initial comment: from the old land surface beneath the bank around the probable early medieval burgh.

Objectives: to establish a date for the burgh.

Calibrated date: 1 σ : cal AD 1170–1400
2 σ : cal AD 1020–1450

Final comment: F McAvoy (1986), the radiocarbon date, the pottery, form of defences and the lack of documentary evidence all indicate a Saxon burgh.

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Welhambridge, Yorkshire (East Riding)

Location: SE 79303410
Lat. 53.47.49 N; Long. 00.47.45 W

Project manager: M Millett (University of Durham), 1985

Archival body: Hull and East Riding Museum

Description: a substantial iron slag heap was excavated as part of the Holme-on-Spalding Moor Project prior to its removal for agricultural reasons.

Objectives: the slag heap is one of a series located through field-walking generally associated with Iron Age and Romano-British settlements but otherwise undated. The objective was to date the iron-working industry and to characterise it, also relating it to the landscape development of the region.

Final comment: M Millett (6 January 1997), the two dates are compatible with the hypothesis that the slag heap was Iron Age, part of a substantial iron production industry in the area. This hypothesis is also supported by the field survey and other excavated evidence from the project. The scale of the iron production was substantial and this dating is of major importance for our understanding of the economy of the parish.

References: Halkon and Millett 1999

HAR-9234 2260 ±70 BP

$\delta^{13}\text{C}$: -27.9‰

Sample: WEL1, submitted in December 1987 by M Millett

Material: charcoal (remaining subsample identified): unidentified (4.13g); *Alnus* sp. (1.48g, 100%) (R Gale 2000)

Initial comment: the charcoal was extracted by crushing the slag, it was then boiled in HCl, washed in H₂O and dried. The slag was stratified within the slagheap overlying a possible Iron Age ditch underlying peat, in context 4.

Objectives: to establish the date for the major iron working industry in the area, thought to be late Iron Age but lacking artefactual dating.

Calibrated date: 1 σ : 400–200 cal BC
2 σ : 420–160 cal BC

Final comment: P Halkon and M Millett (6 January 1997), both are consistent with a mid-to-late Iron Age date. There is a little overlap in the dates at the 68 percent confidence level but the well stratified sample (HAR-9234) appears later than the other sample. The significance of these differences are impossible to evaluate in the absence of further samples but there can be little doubt that the iron production on this site took place sometime in the sixth to third centuries BC.

HAR-9235 2370 ±60 BP

$\delta^{13}\text{C}$: -28.4‰

Sample: WEL2, submitted in December 1987 by M Millett

Material: charcoal (remaining subsample identified): unidentified (13.44g); *Alnus* sp., probably roundwood (1.67g, 100%) (R Gale 2000)

Initial comment: the charcoal was removed from the slag as HAR-9234. The slag was taken from context 3.

Objectives: as HAR-9234

Calibrated date: 1 σ : 520–390 cal BC
2 σ : 760–360 cal BC

Final comment: see HAR-9234

Wenlock Priory, Shropshire

Location: SJ 625001
Lat. 52.35.49 N; Long. 02.33.13 W

Project manager: H Woods (Unknown), 1982

Archival body: English Heritage

Description: a twelfth-century church that belonged to the Cluniac monastery, refounded in 1079 and 1082, on the site of an earlier seventh-century foundation, by Roger de Montgomery. It is thought to be the final resting place of St Milburga, whose bones were discovered during restoration work in 1101. Following the reformation of the monastery, in the early fourteenth century, the priory church was lavishly and completely rebuilt. Considerable remains are left of the 350ft long church, including the north and south transept and the nave. Following the dissolution in 1540, several buildings, including the late fifteenth century Priors House were converted into a private residence.

Objectives: to expose the footings of all the medieval structures and clarify the architectural sequence.

Final comment: H Woods (1987), the radiocarbon results were intended to date a stratigraphically closely related sequence of burials: 53 (the latest), 57, 58, 59, and 68 (the earliest). However, the dates obtained show that the time span for the whole sequence was small and thus it is not possible to differentiate between phases. Layer 62 (HAR-6496) was the earliest at the site and the burial sequence provides a *terminus ante quem* for this.

Final comment: M Biddle and B Kjølbye-Biddle (1988), it appears to show a long lived masonry building beside which in the tenth–twelfth century there was an orderly cemetery which has produced a consistent group of radiocarbon dates. If there had been a Roman occupation of any significance at Wenlock much larger quantities of residual Roman material would be expected.

Laboratory comment: Ancient Monuments Laboratory (2003), one further sample AML-822565B (HAR-6447) was submitted for dating but failed to produce a result.

References: Biddle and Kjølbye-Biddle 1988
Woods 1987

HAR-6446 1100 ±80 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: 822565A, submitted in July 1982 by H Woods

Material: charcoal (remaining subsample of small fragments sparse): unidentified (0.07g); hawthorn type, *Sorbus* group, *Pomoideae* sp. (>0.01g, 20%); *Quercus* sp. (>0.01g, 20%); *Corylus* sp. (>0.01g, 20%); *Acer* sp. (0.02g, 40%) (R Gale 2000)

Initial comment: from midden layer 62, which is in two horizons, 62A and 62B. The charcoal is sandwiched between 62A and 62B and rests on the latter. 62B appears to be a ground surface as a layer of wall plaster was found face down on this surface, upon which it had fallen from an adjacent wall. The wall is thought to be Roman on stylistic grounds.

Objectives: to determine whether the stone building from which the wall plaster had fallen is Roman or Celtic/British.

Calibrated date: 1 σ : cal AD 870–1020
2 σ : cal AD 710–1150

Final comment: H Woods (1987), both this sample and HAR-6496 derive from the same context. HAR-6496 is more reliable as it is less likely to have been blown about the site as may have occurred to the charcoal in this sample. The radiocarbon determination makes it clear that layer 62a is not Roman, the artefacts must therefore be residual. It also strengthens the hypothesis that the building went out of use during the Roman period.

Final comment: M Biddle and B Kjølbye-Biddle (1988), even if this sample is derived from an unreliable source it provides an acceptable date in the documented period of the early monastery. The two dates are not significantly different.

Laboratory comment: English Heritage (10 October 2011), a second measurement (HAR-6910) was subsequently undertaken on this sample. The two measurements are statistically significantly different ($T'=27.0$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978
Woods 1987

HAR-6496 1290 ±70 BP

$\delta^{13}\text{C}$: -19.0‰ (assumed)

Sample: 822562, submitted in July 1982 by H Woods

Material: animal bone (not identified)

Initial comment: from midden layer 62. This is sealed by the ?early medieval layer 56 into which burials are cut. Layer 62 overlies alluvial silt layer 69, which was the limit of excavation. 62 is the earliest deposit on the site.

Objectives: to determine the date of the earliest human use of this site.

Calibrated date: 1 σ : cal AD 650–780
2 σ : cal AD 630–900

Final comment: see HAR-6446

References: Walker and Otlet 1988, 306

HAR-6553 950 ±80 BP

$\delta^{13}\text{C}$: -23.5‰

Sample: 53822545, submitted in July 1982 by H Woods

Material: human bone

Initial comment: from burial 53, sealed by ground surface 48 and which cut ground surface 56 and burials 57 and 58.

Objectives: to give a *terminus post quem* to the underlying midden layer 62 and to give a date to the cemetery level.

Calibrated date: 1 σ : cal AD 1010–1180
2 σ : cal AD 900–1260

Final comment: H Woods (1987), this sample is part of a group, HAR-6554 to HAR-6566 and HAR-6609 all cutting into layer 56. The radiocarbon determinations do not tally precisely with the stratigraphy. It is only possible to say of this group of burials that at the individual 68% levels of probability, they lie between AD 860–1140.

References: Walker and Otlet 1988, 306

HAR-6554 890 ±70 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: 59822548, submitted in July 1982 by H Woods

Material: human bone (without skull)

Initial comment: from burial 59, sealed by ground surface 48, which cut ground surface 56 and was cut by burial 57. Although burial 59 is cut by burial 57, the skeleton itself is entirely uncontaminated and should be completely reliable for dating.

Objectives: to give a *terminus post quem* to the underlying midden layer 62 and to give a date to the cemetery level.

Calibrated date: 1 σ : cal AD 1030–1220
2 σ : cal AD 1010–1280

Final comment: see HAR-6553

References: Walker and Otlet 1988, 306

HAR-6555 890 ±80 BP $\delta^{13}\text{C}$: -21.0‰ (assumed)*Sample*: 58822547, submitted in July 1982 by H Woods*Material*: human bone

Initial comment: the skeleton from burial 58 was sealed by ground surface 48, cut ground surface 56, and was cut by burial 53. The wooden bottom of the coffin rested on midden layer 62. Grave 58 was slightly cut at the top by grave 53, but the skeleton itself was entirely uncontaminated and should be completely reliable for dating.

Objectives: to give a *terminus post quem* to the underlying midden layer 62 and to give a date to the cemetery level.

Calibrated date: 1 σ : cal AD 1030–1230
2 σ : cal AD 990–1280

Final comment: see HAR-6553*References*: Walker and Otlet 1988, 306**HAR-6556** 960 ±80 BP $\delta^{13}\text{C}$: -23.7‰*Sample*: 68822549, submitted in July 1982 by H Woods*Material*: human bone

Initial comment: from burial 68, which was cut by construction trench 51 for wall 63, cut into wall 52, and which cuts layers 62, 66, and 69. The fact that the burial was cut by the construction trench for a wall and itself cuts a wall may diminish the sample reliability.

Objectives: to give a *terminus ante quem* to midden layer 62, and to establish the starting date of the cemetery. This is the earliest burial.

Calibrated date: 1 σ : cal AD 1010–1170
2 σ : cal AD 890–1260

Final comment: see HAR-6553*References*: Walker and Otlet 1988, 306**HAR-6609** 1020 ±70 BP $\delta^{13}\text{C}$: -22.1‰*Sample*: 57822546, submitted in July 1982 by H Woods*Material*: human bone (without skull)

Initial comment: from burial 57, which was sealed by ground surface 48 but cut ground surface 56 and burial 59, cut by burial 53. No part of the skeleton itself was cut, so the sample should be reliable.

Objectives: to give a *terminus ante quem* to the underlying midden layer 62 and to give a date to the cemetery level.

Calibrated date: 1 σ : cal AD 970–1120
2 σ : cal AD 880–1170

Final comment: see HAR-6553*References*: Walker and Otlet 1988, 307**HAR-6910** 1760 ±100 BP $\delta^{13}\text{C}$: -28.4‰*Sample*: 822656C, submitted in July 1982 by H Woods*Material*: charcoal: unidentified

Initial comment: the charcoal is sandwiched between two horizons of midden layer 62. Wall plaster was found face down on layer 62 (a ground surface) having fallen from a wall thought to be Roman on stylistic grounds.

Objectives: to date the occupation layer.

Calibrated date: 1 σ : cal AD 130–410
2 σ : cal AD 30–540

Final comment: H Woods (1987), this sample was from the same context as HAR-6446 and HAR-6496. This sample was probably charcoal that had been blown around so providing a Roman date.

Laboratory comment: see HAR-6446**West Heath Common, West Sussex**

Location: SU 786226
Lat. 50.59.49 N; Long. 00.52.47 W

Project manager: P Drewett (Institute of Archaeology, London), 1973–5, 1980, and 1984

Archival body: Chichester District Museum*Description*: a Bronze Age barrow cemetery.*Objectives*: to date the barrow cemetery.

Laboratory comment: English Heritage (17 June 2009), five radiocarbon dates were obtained for samples submitted in 1974, and were published in Jordan *et al* 1994, 203–4 (HAR-645–8, and HAR-1646.)

References: Drewett 1985
Drewett 1989
Jordan *et al* 1994

HAR-5281 3400 ±70 BP $\delta^{13}\text{C}$: -27.4‰*Sample*: 4988VI2, submitted on 9 November 1982 by C R Cartwright*Material*: charcoal: unidentified*Initial comment*: from the turf within the barrow structure.*Objectives*: to date the turf structure of Barrow VII.

Calibrated date: 1 σ : 1770–1610 cal BC
2 σ : 1890–1520 cal BC

Final comment: P Drewett (14 September 1995), this is an acceptable date for the construction of the barrow.

HAR-5282 3330 ±70 BP $\delta^{13}\text{C}$: -26.8‰*Sample*: 4988VI7, submitted on 9 November 1995 by C R Cartwright

Material: charcoal: unidentified

Initial comment: from the pit beneath the barrow structure.

Objectives: to date the pit beneath Barrow VII.

Calibrated date: 1 σ : 1730–1520 cal BC
2 σ : 1780–1440 cal BC

Final comment: P Drewett (14 September 1995), this is an acceptable date for a pit dug just before the construction of the barrow.

HAR-5283 3310 \pm 70 BP

$\delta^{13}\text{C}$: -27.4‰

Sample: 4988VI15, submitted on 9 November 1982 by C R Cartwright

Material: charcoal: unidentified (105g)

Initial comment: from Collared Urns containing cremated bone within the barrow structure.

Objectives: to date the primary burial of Barrow VII.

Calibrated date: 1 σ : 1690–1500 cal BC
2 σ : 1750–1430 cal BC

Final comment: P Drewett (14 September 1995), this is an acceptable date for a primary burial with Collared Urns.

HAR-5284 8180 \pm 210 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: 4988IV4, submitted on 9 November 1982 by C R Cartwright

Material: charcoal: unidentified (41.51g); *Quercus* sp., sapwood (0.07g, 1.6%); *Quercus* sp., heartwood (4.37g, 98.4%) (R Gale 2000)

Initial comment: from the landscape beneath the barrow.

Objectives: to date the landscape beneath Barrow IV.

Calibrated date: 1 σ : 7500–6830 cal BC
2 σ : 7600–6600 cal BC

Final comment: P Drewett (14 September 1995), this is an acceptable date for Mesolithic activity.

Laboratory comment: AERE Harwell (1985), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5285 4340 \pm 70 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: 4988IV22, submitted on 9 November 1982 by C R Cartwright

Material: charcoal: unidentified (9.57g); *Quercus* sp., sapwood (0.59g, 4.6%); *Quercus* sp., heartwood (12.30g, 95.4%) (R Gale 2000)

Initial comment: from Collared Urns containing bone within the barrow structure.

Objectives: to date the primary burial of Barrow VI.

Calibrated date: 1 σ : 3080–2890 cal BC
2 σ : 3320–2870 cal BC

Final comment: P Drewett (14 September 1995), this sample came from the charcoal within a Collared Urn associated with pit HAR-5321 and HAR-5322. This date is clearly too early for the Collared Urn and associated dates. Possibly old wood was used for the cremation?

HAR-5320 3570 \pm 70 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: 4988VII35, submitted on 9 November 1982 by C R Cartwright

Material: charcoal: unidentified (20.21g); *Quercus* sp., heartwood (9.98g, 100%) (R Gale 2000)

Initial comment: from an urn containing cremated bone within the barrow structure.

Objectives: to date the primary burial of Barrow VII.

Calibrated date: 1 σ : 2030–1780 cal BC
2 σ : 2140–1740 cal BC

Final comment: P Drewett (14 September 1995), this is an acceptable date for the primary burial of Barrow VII.

HAR-5321 3580 \pm 70 BP

$\delta^{13}\text{C}$: -26.2‰

Sample: 4988VI21, submitted on 9 November 1982 by C R Cartwright

Material: charcoal (very comminuted): unidentified (7.53g); fern, *Pteridium* sp. stem (0.02g, 1.04%); *Alnus* sp. (0.25g, 12.95%); *Quercus* sp., heartwood (1.66g, 86.01%) (R Gale 2000)

Initial comment: from an urn containing cremated bone within the barrow structure.

Objectives: to date the primary burial of Barrow VII.

Calibrated date: 1 σ : 2030–1830 cal BC
2 σ : 2140–1740 cal BC

Final comment: P Drewett (14 September 1995), this is an acceptable date for the primary burial of Barrow VII.

HAR-5322 3590 \pm 70 BP

$\delta^{13}\text{C}$: -26.9‰

Sample: 4988VI17, submitted on 9 November 1982 by C R Cartwright

Material: charcoal: unidentified (18.06g); *Quercus* sp., heartwood (5.72g, 100%) (R Gale 2000)

Initial comment: from a pit containing Collared Urns containing within the barrow structure.

Objectives: to date the primary burial of Barrow VI.

Calibrated date: 1 σ : 2040–1880 cal BC
2 σ : 2140–1740 cal BC

Final comment: P Drewett (14 September 1995), this is an acceptable date for the primary burial pit of Barrow VI.

HAR-5323 4220 ±80 BP $\delta^{13}\text{C}$: -26.7‰

Sample: 4988VI20, submitted on 9 November 1982 by C R Cartwright

Material: charcoal: unidentified (11.95g); *Quercus* sp., heartwood (1.97g, 100%) (R Gale 2000)

Initial comment: from an urn containing cremated bone within the barrow structure.

Objectives: to date the Collared Urn cremation.

Calibrated date: 1 σ : 2910–2690 cal BC
2 σ : 3020–2570 cal BC

Final comment: P Drewett (14 September 1995), the date is too early for the Collared Urn. Old wood may have been used for the cremation.

HAR-7036 8770 ±80 BP $\delta^{13}\text{C}$: -26.8‰

Sample: 49883E99, submitted on 30 April 1986 by C R Cartwright

Material: charcoal: unidentified

Initial comment: from trench 3E, context 99. A very thick layer of dark brown sand containing charcoal fragments.

Objectives: to date the pit on the hillslope east of the barrows.

Calibrated date: 1 σ : 7970–7650 cal BC
2 σ : 8220–7590 cal BC

Final comment: P Drewett (14 September 1995), this an acceptable date for a Mesolithic pit.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker *et al* 1990, 181

HAR-7037 9040 ±90 BP $\delta^{13}\text{C}$: -27.3‰

Sample: 49883E103, submitted on 30 April 1986 by C R Cartwright

Material: charcoal (a large volume of charcoal, a high proportion of which is degraded or vitrified (2.63g), the later probably resulting from a combination of high temperature burning and wood resin): unidentified (38.84g); *Pinus* sp. (3.19g, 100%) (R Gale 2000)

Initial comment: from trench 3E context 103. A small lens of light brown sand containing many charcoal fragments.

Objectives: to date the pit on the hillslope east of the barrows.

Calibrated date: 1 σ : 8300–8220 cal BC
2 σ : 8460–7960 cal BC

Final comment: P Drewett (14 September 1995), this an acceptable date for a Mesolithic pit.

References: Walker *et al* 1990, 182

**West Heslerton, Yorkshire
(East Riding)**

Location: SE 917765
Lat. 54.10.33 N; Long. 00.35.42 W

Project manager: D Powlesland (Landscape Research Centre), 1978–82, 1985, 1987, 1989–92, 1995

Description: West Heslerton and its hinterland have been the subject of continued archaeological research for more than three decades, including major excavations at Cook's Quarry, West Heslerton (Site1), started as a rescue excavation between 1978 and 1982 and currently continuing as the quarry continues to expand. Site 1, proved to be most important on account of the presence of extensive deposits of blown sand sealing evidence dating from the late Mesolithic to early medieval periods with the key phases including a late Neolithic and early Bronze Age barrow cemetery, parts of a late Bronze Age settlement and early Anglo-Saxon or Anglian cemetery. Following the publication of the excavations at Site 1, excavation continued covering Sites 2, 6 and 8, between 1984 and 1986, examining most of the remainder of the Anglian cemetery which had been superimposed on a late Neolithic and early Bronze Age monument complex. Small scale evaluation excavations at Sites 20 and 21 in 1984 were concerned with the sampling within a crop-mark complex, interpreted as a 'ladder settlement' dating from the middle Iron Age to post-Roman period. From 1986 until the end of 1995 work was concentrated on the rescue excavation of an Anglian settlement (Sites 2, 11, 12, 13), associated with the previously excavated cemetery but occupied from the fifth to ninth centuries a longer duration than the cemetery which ceased to be used by the mid-seventh century. The evidence gathered both from excavation and very intensive aerial and ground-based survey have revealed the most detailed picture of an archaeological landscape for its scale in Britain; providing context for the excavations and an unparalleled insight into the evolution of settlement covering several thousand hectares.

Objectives: the excavations and the associated dating programmes at West Heslerton have covered an important period in the development of radiocarbon dating and its application to excavated datasets. During the early years of the project the objectives were simply to secure dates for material where we were unsure of the date or to assist in defining the overall chronological sequence. As the precision of the dates returned has increased and the size of the samples required has reduced the dating programmes have been much more precisely targeted. Recently the dating programme has been directed towards two main objectives, the dating of the important prehistoric ceramic assemblage and the dating and sequencing of the vast excavation of the Anglian settlement.

References: Powlesland *et al* 1986
Powlesland 1998
Powlesland and Haughton 1999
Powlesland and Price 1988
Powlesland forthcoming

West Heslerton, North Yorkshire

Location: SE 917765
Lat. 54.10.36 N; Long. 00.35.45 W

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

Archival body: Hull and East Riding Museum

Description: excavations have shown that extensive deposits of aeolian sands along the southern edge of the Vale of Pickering have preserved detailed evidence of man's activity from the Mesolithic to the Anglo-Saxon periods. Occupation, beginning in the late Mesolithic, is followed by agricultural, domestic, and ritual activities in the Neolithic. The establishment of two barrow cemeteries indicates that the Vale of Pickering was at least as important as the Wolds to the south and the North York Moors in the early Bronze Age, during which period there is also limited evidence for contemporary settlement.

Objectives: the results of the excavation, which date from the later Mesolithic to medieval periods, have a significance which extends beyond the local context in Eastern Yorkshire; at a local level, our understanding of the role of the Vale of Pickering in the Prehistoric and Anglo-Saxon landscapes has been revolutionised. A number of charcoal and bone samples collected on the sites provide the basic material for a number of radiocarbon determinations required in order to compile the much needed chronological framework. The samples can be readily separated into a number of discreet groups, each able to fill a specific role in the compilation of the overall chronology.

Final comment: D Powlesland (9 November 2007), this series of dates address important issues regarding the dating of a number of round barrows, the ceramic assemblages associated with the burials, the dating of a number of Anglo-Saxon burials and other evidence related to the excavated and associated settlement, and other dates designed to enhance our understanding of the chronology of features which did not have independent dating evidence. They have revealed important new information which will facilitate the re-interpretation of some of the published evidence as part of the ongoing and iterative programme of publication by the Landscape Research Centre. In some cases the dates show that the original interpretation was in error (for example HAR-6630), or in the case of HAR-8416, that an object that was not securely datable on stratigraphic grounds is clearly of great importance.

References: Powlesland *et al* 1986

HAR-6450 1530 ±70 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: 21AA195, submitted in October 1984 by D J Powlesland

Material: charcoal: unidentified

Initial comment: sample from Site 21.

Objectives: to secure a date for a fire or cooking pit examined as part of an evaluation exercise directed towards securing a chronology for a part of a 'ladder settlement' thought to be Iron Age and Roman in date.

Calibrated date: 1 σ : cal AD 420–610
2 σ : cal AD 390–660

Final comment: D J Powlesland (9 November 2007), the date indicates that the fire pit is early Anglo-Saxon. Work on the Anglian settlement at West Heslerton has confirmed that these features are characteristic of early Anglo-Saxon settlements in the north of England.

References: Powlesland and Price 1988

HAR-6451 2380 ±100 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: HP21AB92, submitted in October 1984 by D J Powlesland

Material: charcoal: unidentified

Initial comment: sample from Site 21.

Objectives: to secure a date for a possible *Grubenhaus* located within the bounds of an Iron Age and Roman settlement complex.

Calibrated date: 1 σ : 750–380 cal BC
2 σ : 800–200 cal BC

Final comment: D J Powlesland (9 November 2007), clearly the sample submitted here was residual and although this failed to provide a date for the feature examined it does provide an important date for the Iron Age phase of the settlement within which this feature was identified.

References: Powlesland and Price 1988

HAR-6516 1690 ±70 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: HP00003C, submitted in November 1983 by D J Powlesland

Material: human bone

Initial comment: from context 2B00055. The burial was in the pit alignment boundary, with an iron object apparently lodged in the skeleton.

Objectives: the lack of any absolute chronology for the early Anglo-Saxon occupation of the north of England imposes serious limitations on any interpretation of excavated Anglian data. Although a typological approach may be helpful in the south, the same cannot be said of northern material, which is both much more limited in quantity and frequently accompanied by hybrid grave goods, which do not readily respond to typological treatment. The presence of later Saxon intrusive burials represented by prone unaccompanied burials may only be demonstrable on the basis of radiocarbon dates. Five samples were submitted (HAR-6516, HAR-6517, HAR-6907, HAR-8242, and HAR-8243) to provide a basic indication of date range and to test the relative date of the prone burial 1A00018 (HAR-6517).

Calibrated date: 1 σ : cal AD 250–430
2 σ : cal AD 140–540

Final comment: D J Powlesland (9 November 2007), this date is surprisingly early and therefore a further sample was submitted as UB-4641, which provided a date more in keeping with the estimated date.

Laboratory comment: Ancient Monuments Laboratory (2004), this result is statistically significantly different from the replicate measurement on this skeleton (UB-4641; 1510 ± 19 BP), and appears to be too old ($T'=6.3$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Powlesland and Haughton 1999
Walker and Otlet 1988, 308
Ward and Wilson 1978

HAR-6518 1700 ±80 BP

$\delta^{13}C$: -25.0‰

Sample: HP00007C, submitted in November 1983 by D J Powlesland

Material: charcoal: unidentified, powdered

Initial comment: from the fill of a sunken featured building, context 2M00217.

Objectives: HAR-6518 and HAR-6519 form a preliminary sample intended to determine whether the settlement pattern was static and to give more weight to the interpretation that the cemetery and the settlement are contemporary.

Calibrated date: 1 σ : cal AD 240–430
2 σ : cal AD 130–550

Final comment: D J Powlesland (9 November 2007), this date and HAR-6519 are both slightly earlier than we might have anticipated, like HAR-6516 which was re-dated as UB-4641, and the results should thus be treated with some caution.

References: Hardiman *et al* 1992, 60
Powlesland 1998
Powlesland forthcoming

HAR-6519 1650 ±100 BP

$\delta^{13}C$: -25.0‰

Sample: HP00008C, submitted in November 1983 by D J Powlesland

Material: charcoal: unidentified, powdered

Initial comment: from the second sunken featured building 250m to the south west of site 2M, context 2R0012.

Objectives: as HAR-6518.

Calibrated date: 1 σ : cal AD 250–540
2 σ : cal AD 130–610

Final comment: see HAR-6518

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Powlesland 1998
Powlesland forthcoming
Walker and Otlet 1988, 308

HAR-6907 1840 ±90 BP

$\delta^{13}C$: -21.0‰

Sample: HP00006C, submitted in November 1983 by D J Powlesland

Material: human bone

Initial comment: from context 2B00084; one of a group of burials all accompanied by weapons, located at what is considered to be the heart of the cemetery.

Objectives: as HAR-6516

Calibrated date: 1 σ : cal AD 70–320
2 σ : 40 cal BC–cal AD 410

Final comment: D J Powlesland (9 November 2007), this date is surprisingly early and therefore a further sample was submitted as UB-4642. The re-dating brings this burial within the anticipated range for the Anglian cemetery and associated settlement at Heslerton.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: Ancient Monuments Laboratory (2004), this result is statistically significantly different from the replicate measurement on this sample (UB-4642; 1487 ±19 BP) suggesting that this is too old ($T'=20.1$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978).

References: Otlet *et al* 1983
Powlesland and Haughton 1999
Walker *et al* 1990, 171–2
Ward and Wilson 1978

HAR-8242 1510 ±40 BP

$\delta^{13}C$: -20.6‰

Sample: HP00004C, submitted in November 1983 by D J Powlesland

Material: human bone

Initial comment: from context 2F00012. The burial was accompanied with a bent spear and cut grave 2F00013 (HAR-8243).

Objectives: as HAR-6516.

Calibrated date: 1 σ : cal AD 530–610
2 σ : cal AD 430–640

Final comment: A Bayliss (2001), this date is in good agreement with the recorded stratigraphic relationship.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Powlesland and Haughton 1999
Walker *et al* 1990, 171–2

HAR-8243 1610 ±40 BP

$\delta^{13}C$: -20.3‰

Sample: HP00005C, submitted in November 1983 by D J Powlesland

Material: human bone

Initial comment: from context 2F0013. The burial was accompanied with a cruciform brooch with an early music inscription, and cut grave 2F00012 (HAR-8242).

Objectives: as HAR-6516

Calibrated date: 1 σ : cal AD 400–540
2 σ : cal AD 350–550

Final comment: A Bayliss (2001), this date is in good agreement with the recorded stratigraphic relationship.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Powlesland and Haughton 1999
Walker *et al* 1990, 171–2

West Heslerton: Prehistoric, North Yorkshire

Location: SE 9176(centred)
Lat. 54.10.18 N; Long. 00.36.21 W,
(centred)

Project manager: D Powlesland (Landscape Research Centre), 1978–82 and 1985–7

Archival body: Hull and East Riding Museum

Description: the prehistoric sample series derive from a variety of contexts but essentially three groups; late Neolithic and early Bronze Age burials associated with Beakers and Food Vessels, carbonised hazelnut shells associated with a variety of late Neolithic ceramic types and residues on pottery, which on fabric alone could have been either middle Bronze Age or early Anglo-Saxon. One of the samples was of charcoal from a carbonised wooden shovel, another also of charcoal from a pit associated with Staple Howe type ceramics and a group of cattle ribs associated with a pottery vessel for which the fabric could be either Iron Age or Anglo-Saxon from Heslerton Site 28.

Objectives: excavations at West Heslerton between 1978 and 2001 on a variety of sites covering more than 28ha. This has involved the examination of a number of major prehistoric monuments including two barrow cemeteries, two hengiform enclosures, post-circles avenues, and pit groups incorporating the complete range of prehistoric ceramics known from eastern Yorkshire. Although a small number of radiocarbon dates were submitted to Harwell during the early years of the excavation programme their precision was relatively low. Following the excavation of further prehistoric features during the late 1980s and 1990s it was decided to attempt to develop the prehistoric data series to allow the monument and ceramic series to be sequenced more precisely than had previously been possible. In addition to refining the date series for the prehistoric ceramic series the date set is also intended to assist in developing our understanding of the construction and use sequence for some of the excavated barrows and other features in the broader landscape.

Laboratory comment: English Heritage, two further samples failed (HAR-3539; WH79.F9 and HAR-8412; HP 00009C).

References: Powlesland *et al* 1986
Powlesland and Haughton 1999

HAR-6517 2280 \pm 80 BP

$\delta^{13}\text{C}$: -23.3‰

Sample: HP00001C, submitted in November 1983 by D J Powlesland

Material: human bone

Initial comment: a prone burial from context 1A00018.

Objectives: the lack of any absolute chronology for the early Anglo-Saxon occupation of the north of England imposes serious limitations on any interpretation of excavated Anglian data. Although a typological approach may be helpful in the south, the same cannot be said of northern material, which is both much more limited in quantity and frequently accompanied by hybrid grave goods, which do not readily respond to typological treatment. The presence of later Saxon intrusive burials represented by prone unaccompanied burials may only be demonstrable on the basis of radiocarbon dates. Five samples were submitted (HAR-6516, HAR-6517, HAR-6907, HAR-8242, and HAR-8243) to provide a basic indication of date range and to test the relative date of the prone burial 1A00018 (HAR-6517).

Calibrated date: 1 σ : 410–200 cal BC
2 σ : 520–160 cal BC

Final comment: D J Powlesland (9 November 1007), this burial, was unaccompanied and cut across a small ring ditch within the prehistoric and Anglian cemetery at West Heslerton. There was no independent dating for the ring ditch and the central area where a burial might have been anticipated was beyond the limits of excavation. The date of this burial is therefore important as it reflects continued use of the late Neolithic/early Bronze Age phase of the cemetery in the mid-late Iron Age.

References: Powlesland and Haughton 1999
Walker and Otlet 1988, 308

HAR-6630 4060 \pm 80 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: HP00016C, submitted in November 1983 by D J Powlesland

Material: human bone (male adult)

Initial comment: from the primary burial within an early Bronze Age barrow, context IR340. The bones were later disturbed by the insertion of secondary burial IR304.

Objectives: HAR-6630, HAR-6631, HAR-8325, HAR-8413, HAR-8414, and HAR-8415: the rarity of undecorated Beakers coupled with the limited number of radiocarbon dates for Beakers and Food Vessels in general gives a high priority to all the barrow material. Rather than providing a few one-off dates, these represent a sample from over thirty graves from three barrows forming part of a barrow cemetery in an area, the Vale of Pickering, previously thought to be of minor importance in the early Bronze Age landscape of eastern Yorkshire. A second cemetery examined 300m to the south, though only examined in small parts, produced two Food Vessels and a single Beaker, indicating the density of activity at this period.

Calibrated date: 1 σ : 2860–2470 cal BC
2 σ : 2890–2410 cal BC

Final comment: D J Powlesland (9 November 2007), this is one of a series of important dates relating to the late Neolithic and early Bronze Age barrow sequence from Heslerton, reflecting nearly 1000 radiocarbon years in the life of Barrow 1R with this burial securely dated to the late Neolithic phase.

References: Powlesland *et al* 1986
Powlesland 2003a
Walker and Otlet 1988, 308

HAR-6631 3510 ±80 BP

$\delta^{13}\text{C}$: -21.9‰

Sample: HP00017C, submitted in November 1983 by D J Powlesland

Material: human bone (juvenile, 13–14 years, sex unknown)

Initial comment: from the secondary burial of the early Bronze Age barrow, context IR304. The burial was accompanied by a Beaker and inserted into the grave occupied by skeleton IR340 (HAR-6630), whose bones were stacked at the foot of the grave.

Objectives: as HAR-6630

Calibrated date: 1 σ : 1950–1740 cal BC
2 σ : 2040–1630 cal BC

Final comment: D J Powlesland (9 November 2007), this is one of a series of important dates relating to the late Neolithic and early Bronze Age barrow sequence from Heslerton, reflecting nearly 1000 radiocarbon years in the life of Barrow 1R, providing an important date contributing to the dating of the Beaker/Food Vessel ceramic series.

References: Powlesland *et al* 1986
Powlesland 2003a
Walker *et al* 1990, 171–2

HAR-6690 3840 ±40 BP

$\delta^{13}\text{C}$: -26.4‰

Sample: HP00012C, submitted in November 1983 by D J Powlesland

Material: charcoal (thin slivers, remaining subsample identified): unidentified (99.83gg); *Quercus* sp., heartwood (R Gale 2000) (2.56gg, 100%) (R Gale 2000)

Initial comment: from a large deposit of charcoal in context IL00034, sealed by a preserved barrow mound and adjacent to cremation burial IL00065.

Objectives: the three samples HAR-6690, HAR-8241, and HAR-8326 are absolutely essential if we are to reach any important conclusions about the constructional sequence in this early Bronze Age barrow cemetery, which appears to derive from a series of flat cemeteries.

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

Final comment: D J Powlesland (9 November 2007), this is one of a series of important dates relating to the late Neolithic and early Bronze barrow sequence from Heslerton, this dates and the others submitted for Barrow 1M reflect a use life for this monument of *c* 500 radiocarbon years. Although reflecting a shorter use span than for Barrow 1R in the same cemetery, the life span of this monument is once again rather longer than we might have anticipated.

Laboratory comment: AERE Harwell (1986), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Powlesland *et al* 1986
Powlesland 2003a
Walker and Otlet 1988, 308

HAR-8241 3510 ±40 BP

$\delta^{13}\text{C}$: -21.0‰

Sample: HP00013C, submitted in November 1983 by D J Powlesland

Material: human bone

Initial comment: from a secondary burial in context 1L00110. The burial was inserted through the barrow mound within a year of the mound's construction. This was probably sometime from the date of the primary burials.

Objectives: to date the early Bronze Age barrow cemetery. See HAR-6690.

Calibrated date: 1 σ : 1900–1750 cal BC
2 σ : 1950–1700 cal BC

Final comment: D J Powlesland (9 November 2007), this date contributes to our understanding of the duration of use of Barrow 1L. Stratigraphic evidence confirms that this burial was inserted shortly after the mound was constructed thus indicating that the mound was a relatively late feature of this monument which must originally have been established as a flat cemetery.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Powlesland *et al* 1986
Powlesland 2003a
Walker *et al* 1990, 171–2

HAR-8325 3640 ±40 BP

$\delta^{13}\text{C}$: -21.0‰ (assumed)

Sample: HP00020C, submitted in November 1983 by D J Powlesland

Material: human bone (juvenile, seven to nine years old)

Initial comment: from context IR101. An Iron Age burial inserted into an early Bronze Age burial. The burial was accompanied by an Arras type pot.

Objectives: as HAR-6630

Calibrated date: 1 σ : 2120–1940 cal BC
2 σ : 2140–1890 cal BC

Final comment: D J Powlesland (9 November 2007), this date clearly indicates that the original interpretation of this burial and the associated vessel was wrong, and it is now clear that the undecorated vessel should be reclassified as an undecorated Beaker.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Powlesland *et al* 1986
Powlesland 2003a
Walker *et al* 1990, 171–2

HAR-8326 3440 ±40 BP

$\delta^{13}C$: -21.8‰

Sample: HP00014C, submitted in November 1983 by D J Powlesland

Material: human bone

Initial comment: from a tertiary burial in context 1L00131, cut through the entirely filled barrow ditch.

Objectives: to date the early Bronze Age barrow cemetery. See HAR-6690.

Calibrated date: 1 σ : 1870–1690 cal BC
2 σ : 1890–1630 cal BC

Final comment: D J Powlesland (9 November 2007), this date reflects the end point in the use of Barrow 1L and thus contributes to the assessment of the life span and nature of the barrow development sequence of this monument over 500 radiocarbon years.

Laboratory comment: AERE Harwell (1987), this sample was processed using the larger sample, higher precision liquid scintillation system.

References: Powlesland *et al* 1986
Powlesland 2003a
Walker *et al* 1990, 171–2

HAR-8413 3440 ±60 BP

$\delta^{13}C$: -22.3‰

Sample: HP00015C, submitted in November 1983 by D J Powlesland

Material: human bone

Initial comment: from context 1M00365, the burial was accompanied by a perforated cow astragalus. In isolation this object was dated much later than the early Bronze Age. Other burials in the barrow were accompanied by Food Vessels and Beakers.

Objectives: as HAR-6630

Calibrated date: 1 σ : 1880–1680 cal BC
2 σ : 1920–1610 cal BC

Final comment: D J Powlesland (9 November 2007), this date is in accordance with the anticipated date and contributes to the dating of the late Neolithic and Bronze Age barrow sequence from Heslerton.

References: Powlesland *et al* 1986
Powlesland 2003a
Walker *et al* 1991a, 94

HAR-8414 2980 ±80 BP

$\delta^{13}C$: -23.1‰

Sample: HP00019C, submitted in November 1983 by D J Powlesland

Material: human bone (infant, two to four years old)

Initial comment: from 1R299, however the bones are recorded as context 1R298. The burial, from an early Bronze Age barrow, was accompanied by a bronze object and a flint blade.

Objectives: as HAR-6630

Calibrated date: 1 σ : 1380–1050 cal BC
2 σ : 1430–940 cal BC

Final comment: D J Powlesland (9 November 2007), this date is broadly in accordance with the anticipated date and contributes to the dating of the late Neolithic and Bronze Age barrow sequence from Heslerton. With reference to the sequence as a whole the date is slightly later than we might have suggested for the main Beaker/Food Vessel sequence.

References: Powlesland *et al* 1986
Powlesland 2003a
Walker *et al* 1991a, 94

HAR-8415 3470 ±60 BP

$\delta^{13}C$: -22.3‰

Sample: HP00018C, submitted in November 1983 by D J Powlesland

Material: human bone (adult female)

Initial comment: from context 1R272, however the bones are recorded as context 1R271. The burial, from within an early Bronze Age barrow, was accompanied by an undecorated beaker and a copper or bronze awl.

Objectives: as HAR-6630

Calibrated date: 1 σ : 1890–1690 cal BC
2 σ : 1950–1630 cal BC

Final comment: D J Powlesland (9 November 2007), in contrast with HAR-8414 which places that burial right at the end of the anticipated Beaker/Food Vessel sequence this date fits well within the anticipated date range.

References: Powlesland *et al* 1986
Powlesland 2003a
Walker *et al* 1991a, 94

HAR-8416 4010 ±80 BP

$\delta^{13}C$: -25.8‰

Sample: HP00010C, submitted in November 1983 by D J Powlesland

Material: charcoal (remaining subsample identified): unidentified (80.64g); *Quercus* sp., sapwood (0.67g, 6.2%); *Quercus* sp., heartwood (10.16g, 93.8%) (R Gale 2000)

Initial comment: a carbonised wooden shovel from context 1K00055.

Objectives: to provide a more precise date for the shovel, this could be anything from the Neolithic to the early Iron Age, but no later. Although the structural and boundary evidence for the late Bronze Age/early Iron Age settlement is a major feature of the site there is little datable material from this area.

Calibrated date: 1 σ : 2630–2460 cal BC
2 σ : 2870–2290 cal BC

Final comment: D J Powlesland (9 November 2007), this date is of considerable importance as it dates an object which was fully carbonised and not recoverable, the form of the shovel blade is not unlike medieval examples but is also like the Alderley Edges shovel (OxA-4050; 3470 ±90; 2030–1530

cal BC at 95% confidence; Reimer *et al* 2004) (Garner *et al* 1994). It is most likely that his shovel blade relates to the construction of one of the barrows (1L, 1M and 1R) which form part of West Heselton barrow cemetery 1, and thus its early date is of considerable importance. Its discovery was not covered in the original excavation report as we were awaiting return of this date.

References: Garner *et al* 1994
Powlesland *et al* 1986
Powlesland 2003a
Reimer *et al* 2004
Walker *et al* 1991a, 94

HAR-8417 2780 ±80 BP

$\delta^{13}\text{C}$: -26.1‰

Sample: HP00011C, submitted in November 1983 by D J Powlesland

Material: charcoal: unidentified

Initial comment: from a domestic rubbish pit in context 1F0098 containing large assemblage of Staple Howe type pottery.

Objectives: as HAR-6517. Although the structural and boundary evidence for the late Bronze Age/early Iron Age settlement is a major feature of the site there is little datable material from this area.

Calibrated date: 1 σ : 1020–830 cal BC
2 σ : 1190–800 cal BC

Final comment: D J Powlesland (9 November 2007), this is an important date contributing to the sequencing of the late Bronze/early Iron Age settlement sequence at West Heselton.

References: Powlesland *et al* 1986
Powlesland 2003a
Walker *et al* 1991a, 94

Westward Ho!, Devon

Location: SS 430297
Lat. 51.02.41 N; Long. 01.14.24 W

Project manager: N Balaam (Ancient Monument Laboratory), 1983–4

Archival body: Royal Albert Memorial Museum

Description: prehistoric activity preserved beneath beach deposits

Objectives: to obtain well provenanced samples for scientific dating of both the archaeological and 'natural' sediments and to carry out scientific analyses on the material from the midden and associated levels.

References: Balaam *et al* 1987
Churchill 1965
Coles and Coles 1986
Heyworth and Kidson 1982
Jacobi 1979
Welin *et al* 1972

HAR-5630 5630 ±80 BP

$\delta^{13}\text{C}$: -29.6‰

Sample: 8311024, submitted on 21 June 1983 by N Balaam

Material: wood (waterlogged): *Salix* sp.

Initial comment: from a tree stool on the surface of the peat.

Objectives: to provide a date for the marine transgression that halted peat growth in the vicinity of the midden.

Calibrated date: 1 σ : 4550–4360 cal BC
2 σ : 4690–4330 cal BC

Final comment: N Balaam (1987), comparison of this result, and that of HAR-5631, with the data published by Heyworth and Kidson (1982) shows that the Westward Ho! material falls within the height range predicted for the relevant period, that is, a sea level (however defined) approximately 7m below that of the present day. It is, however, worth noting the very significant variation in the results of the radiocarbon determinations on different materials and contexts at the site and this emphasises the need for well defined and consistent sampling and recording of materials that are to be used in the study of sea level change.

References: Heyworth and Kidson 1982

HAR-5631 6100 ±100 BP

$\delta^{13}\text{C}$: -28.9‰

Sample: 8311023, submitted on 21 June 1983 by N Balaam

Material: wood (waterlogged): *Quercus* sp.

Initial comment: from the outer rings (*c* 20) of a trunk lying on the surface of the peat.

Objectives: as HAR-5630

Calibrated date: 1 σ : 5220–4850 cal BC
2 σ : 5310–4780 cal BC

Final comment: see HAR-5630

HAR-5632 6580 ±150 BP

$\delta^{13}\text{C}$: -27.1‰

Sample: 8311026, submitted on 21 June 1983 by N Balaam

Material: charcoal: unidentified

Initial comment: combined samples from the upper part of the Mesolithic midden. There was surprisingly little charcoal in the midden, and it was therefore necessary to combine material from a number of small samples to provide sufficient for two dates (HAR-5632 and HAR-5645).

Objectives: to date the midden and compare with HAR-5645.

Calibrated date: 1 σ : 5640–5380 cal BC
2 σ : 5750–5290 cal BC

Final comment: N Balaam (1987), the two dates from the midden, HAR-5632 and HAR-5645, both fit well within the chronological sequence for material from the 1983 survey, however they are significantly later than those derived from previous investigations and which have been associated with the midden. These dates, 6810 ±140 BP (Q-1212; bone from the midden; 5990–5480 cal BC at 95% confidence;

Reimer *et al* 2004) and 6955 ±140 BP (Q-1211; burnt wood adjacent to the midden; 6080–5610 cal BC at 95% confidence; Reimer *et al* 2004) (Jacobi 1979) might be better associated with the material from the upper levels of the blue clay.

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: English Heritage (10 October 2011), the two results on this sample are statistically consistent ($T'=2.2$; $T'(5\%)=3.8$; $v=1$; Ward and Wilson 1978). As this was a bulk sample, a weighted mean may be taken (6391 ±77 BP), which provides a *terminus post quem* of 5490–5210 cal BC (95% confidence) or 5480–5300 cal BC (68% confidence; Reimer *et al* 2004).

References: Otlet *et al* 1983
Reimer *et al* 2004
Walker and Otlet 1988, 302
Ward and Wilson 1978

HAR-5640 5700 ±120 BP

$\delta^{13}C$: -30.5‰

Sample: 8311028, submitted on 21 June 1983 by N Balaam

Material: peat

Initial comment: from the top 2cm of peat immediately overlying the midden.

Objectives: to date the peat overlying the midden and compare with HAR-5641.

Calibrated date: 1 σ : 4710–4370 cal BC
2 σ : 4830–4330 cal BC

Final comment: N Balaam (1982), due to the extensive erosion the sequence of peat development is nowhere preserved *in toto*. In the immediate area of the midden only a few centimetres survive. A longer sequence is, however, preserved a few metres away where the surface of the peat is overlain and sealed by a deposit of upper clay. The samples dated, HAR-5640 and HAR-5641, were taken from the top and bottom of the peat which overlies the midden. On the basis of these results it can be estimated that the peat sequence which survives spans a period of 500 to 800 radiocarbon years. Two dates were obtained from earlier samples: 5004 ±105 BP (IGS-42; 4040–3540 cal BC at 95% confidence (Reimer *et al* 2004); Welin *et al* 1971) and 6585 ±130 BP (Q-672; 5720–5240 cal BC at 95% confidence (Reimer *et al* 2004); Churchill 1965). Of these two dates IGS-42 fits in quite well with the sequence of samples. However, the material retrieved by Churchill has produced dates very substantially earlier than any of the other peat samples and it is not clear to what this discrepancy can be attributed. The provenance of these earlier samples is too loosely described to allow any archaeological conclusions to be drawn from the differences in dating results. (See also HAR-6363).

References: Churchill 1965
Reimer *et al* 2004
Welin *et al* 1972

HAR-5641 5740 ±100 BP

$\delta^{13}C$: -30.4‰

Sample: 8311029, submitted on 21 June 1983 by N Balaam

Material: peat

Initial comment: from the base of the peat levels immediately overlying the midden.

Objectives: to date the peat overlying the midden and compare with HAR-5640.

Calibrated date: 1 σ : 4720–4460 cal BC
2 σ : 4830–4350 cal BC

Final comment: see HAR-5640

HAR-5642 4840 ±70 BP

$\delta^{13}C$: -29.2‰

Sample: 8311004, submitted on 21 June 1983 by N Balaam

Material: wood (waterlogged): *Corylus avellana*

Initial comment: from the bottom part of two pointed stakes, part of an alignment in area 2. The stakes were eroded flush with the surface of the peat, and so there is no indication of the original depth of peat or of the height of the stakes. It is clear, however, that they would have been driven into a considerably thicker layer of peat than exists today. They may have been driven in at a time when these particular peat areas were submerged or they may instead date from a period contemporary with peat formation.

Objectives: to date the structure.

Calibrated date: 1 σ : 3700–3530 cal BC
2 σ : 3770–3380 cal BC

Final comment: N Balaam (1987), the function of these features can only be guessed at. They could as well constitute some sort of woodland structure as an estuarine one, a possible function that might relate to the fen peat environment is that of a trackway. The stakes could represent the substructure of a trackway such as 'Tinney's A' in the Somerset Levels (Coles and Coles 1986).

References: Coles and Coles 1986

HAR-5643 8180 ±150 BP

$\delta^{13}C$: -27.1‰

Sample: 8311019, submitted on 21 June 1983 by N Balaam

Material: charcoal: unidentified

Initial comment: from a gully cut into the lower blue clay.

Objectives: to date the lower clay and compare with HAR-5644 and HAR-6215. The lower blue clay is the earliest deposit examined in Area 3.

Calibrated date: 1 σ : 7460–7040 cal BC
2 σ : 7550–6690 cal BC

Final comment: N Balaam (1987), in the absence of further information and in the light of the other radiocarbon and archaeomagnetic dates, this date seems unacceptably early as a date for the creation of the feature (context 32). It is possible that the early date may be a result of the inclusion

of unnoticed residual material or some other factor. For the time being the evidence of this particular date must be overlooked.

HAR-5644 6770 ±120 BP

$\delta^{13}\text{C}$: -26.2‰

Sample: 8311025, submitted on 21 June 1983 by N Balaam

Material: charcoal: unidentified

Initial comment: from the upper 10cm of lower blue clay.

Objectives: to date the lower clay and compare with HAR-5643 and HAR-6215.

Calibrated date: 1 σ : 5750–5560 cal BC
2 σ : 5900–5480 cal BC

Final comment: N Balaam (1987), the two dates HAR-5644 and HAR-6215 are not significantly different from the dates obtained for the midden and it must remain a possibility that the material on which they were based has become incorporated in the upper part of the lower clay significantly after its deposition. The question of the age of the lower clay must remain somewhat enigmatic for the time being. It cannot be presumed that it immediately predates the midden and its associated activity although evidence for lack of weathering and soil development would suggest that the formation of the two deposits are not greatly separated in time.

HAR-5645 6320 ±90 BP

$\delta^{13}\text{C}$: -26.6‰

Sample: 8311027, submitted on 21 June 1983 by N Balaam

Material: charcoal: unidentified

Initial comment: a combined sample from the lower part of the midden.

Objectives: to date the midden and compare with HAR-5632.

Calibrated date: 1 σ : 5380–5210 cal BC
2 σ : 5480–5050 cal BC

Final comment: see HAR-5632

Laboratory comment: see HAR-5632

HAR-6215 6250 ±110 BP

$\delta^{13}\text{C}$: -28.3‰

Sample: 248-1705, submitted in March 1984 by N Balaam

Material: charcoal: *Quercus* sp.

Initial comment: from the upper 10cm of lower blue clay sealed beneath peat dated to *c* 5000 cal BC.

Objectives: to date the lower clay and compare with HAR-5643 and HAR-5644.

Calibrated date: 1 σ : 5330–5050 cal BC
2 σ : 5480–4930 cal BC

Final comment: see HAR-5644

HAR-6363 5190 ±80 BP

$\delta^{13}\text{C}$: -28.7‰

Sample: 248-1701, submitted in March 1984 by N Balaam

Material: peat

Initial comment: from the top 3cm of the peat deposit, which sealed the midden. Although the peat was truncated by the midden, it survived, sealed by estuarine silt dated to *c* 130 cal BC by archaeomagnetic means.

Objectives: to date the peat overlying the midden and compare with HAR-5640 and HAR-5641.

Calibrated date: 1 σ : 4050–3950 cal BC
2 σ : 4240–3790 cal BC

Final comment: N Balaam (1987), on the basis of this sample and HAR-5640 and HAR-5641, it can be estimated that the peat sequence which survives spans a period of 500 to 800 years. This fits in well with a previous result (IGS-42; 5004 ±105 BP; 4040–3540 cal BC at 95% confidence; Reimer *et al* 2004) from roots within the peat (Welin *et al* 1971). However, the material retrieved by Churchill (1965) has produced dates very substantially earlier than any of the other peat samples (Q-672; 6585 ±130 BP; 5730–5310 cal BC at 95% confidence; and Q-1249; 6680 ±120 BP; 5790–5380 cal BC at 95% confidence; Reimer *et al* 2004), and it is not clear to what this discrepancy can be attributed. The provenance of these earlier samples is too loosely described to allow any archaeological conclusions to be drawn from the differences in dating results. The dates also provide a *terminus post quem* for the deposition of the 'upper clay'.

References: Churchill 1965
Reimer *et al* 2004
Welin *et al* 1972

HAR-6440 1600 ±80 BP

$\delta^{13}\text{C}$: -28.3‰

Sample: 8311718, submitted in December 1984 by N Balaam

Material: wood (waterlogged): *Corylus avellana*

Initial comment: the sample was taken from a line of closely set stakes on the foreshore. The stake feature had been exposed by erosion and there is no horizon, which overlies it. There is no associated dating evidence other than that of the clay into which they are driven which was dated by palaeomagnetic methods to *c* 7200 cal BC. The stakes are considered to be substantially later.

Objectives: to provide information on the dates of the range of features present at Westward Ho! There is already evidence of Mesolithic, Neolithic, and possibly Iron Age/Romano-British activity, and the stakes represent a class of feature not already dated.

Calibrated date: 1 σ : cal AD 380–560
2 σ : cal AD 250–630

Final comment: see HAR-6513

HAR-6513 1560 ±80 BP

$\delta^{13}\text{C}$: -24.6‰

Sample: 8311353, submitted in March 1985 by N Balaam

Material: animal bone (assorted bones, various species)

Initial comment: from extensive midden like deposit contained within the silted up estuarine channels.

Objectives: to confirm a late prehistoric or Romano-British date, suggested by the bone of some of the domesticates.

Calibrated date: 1 σ : cal AD 410–600
2 σ : cal AD 260–650

Final comment: N Balaam (1987), although it is possible that a number of different phases of channel development and infilling are represented it was not feasible to deduce a satisfactory chronological sequence for this area in the time that was available between the tides. It was immediately clear from the range of mammal taxa represented in the deposits that these channels constitute a substantially later phase than that of the Mesolithic deposits of Area 3. This was confirmed by the radiocarbon dating of bone (HAR-6513) from one of the channel fills and a sample of wood (HAR-6440) from an adjacent group of stakes.

References: Walker and Otlet 1988, 302

Wetwang Slack, Yorkshire (East Riding)

Location: SE 94055985
Lat. 54.01.33 N; Long. 00.33.51 W

Project manager: J Dent (Humberside Archaeology Unit), 1983–7

Archival body: Hull and East Riding Museum

Description: Beaker/Bronze Age cemetery, Iron Age settlement and cemetery, a continuation of the Garton Slack complex.

Objectives: to relate the cultural evidence to a fixed chronological scale.

Laboratory comment: Ancient Monuments Laboratory (1995), ten further dates from this site were funded prior to 1981 and were published in the first volume of Radiocarbon Dates (Jordan *et al* 1994, 206–7).

References: Dent 1983
Hardiman *et al* 1992, 51
Jordan *et al* 1994, 206–7
Manby *et al* 2003

HAR-8538 4490 ±90 BP

$\delta^{13}\text{C}$: -27.7‰

Sample: WK 023, submitted in March 1987 by J Dent

Material: charcoal (remaining subsample): unidentified (1.15g); *Corylus* sp. (0.52g, 100%) (R Gale 1999)

Initial comment: from a chalk gravel matrix from one of a series of pits with Neolithic pottery (WK 008), possibly part of a linear ritual monument.

Objectives: to provide a series of dates, together with HAR-8539 and HAR-8540, for an important stage of later Neolithic ritual activity and for the associated pottery.

Calibrated date: 1 σ : 3370–3020 cal BC
2 σ : 3500–2900 cal BC

Final comment: J Dent (15 January 2007), this pit measured 1.00m x 1.00m x 0.43m and contained burnt stones, charred hazelnut shells, four potsherds and two flints. The pottery included a variety of mounded, scored or impressed decoration characteristic of Grooved Ware. The flints consisted of a single scraper and a broad primary flake. This determination and HAR-8539 and HAR-8540 fall comfortably within the chronological range for pits with Grooved Ware associations, also found in Yorkshire at Marton-le-Moor

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Manby *et al* 2003
Otlet *et al* 1983

HAR-8539 3980 ±100 BP

$\delta^{13}\text{C}$: -27.8‰

Sample: WK 017, submitted in March 1987 by J Dent

Material: charcoal (remaining subsample): unidentified (0.03g); *Quercus* sp. (0.01g, 54.5%); *Corylus* sp. (0.01g, 45.5%) (R Gale 1999)

Initial comment: from a chalk gravel matrix in pit WK 010 which contained Neolithic pottery, one of a small group in line with a possible long barrow, or linear ritual monument.

Objectives: as HAR-8538

Calibrated date: 1 σ : 2620–2340 cal BC
2 σ : 2880–2200 cal BC

Final comment: J Dent (15 January 2007), this pit measured 0.70m x 0.70m x 0.24m deep and contained burnt stone, charred hazelnut shells and a potsherd. This determination and HAR-8539 and HAR-8540 fall comfortably within the chronological range for pits with Grooved Ware associations, also found in Yorkshire at Marton-le-Moor.

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Manby *et al* 2003
Otlet *et al* 1983

HAR-8540 4340 ±100 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: WK 031, submitted in March 1987 by J Dent

Material: charcoal (remaining subsample): unidentified; cf *Quercus* sp.; *Fraxinus* sp.; cf *Corylus* sp.; unidentified (0.16g); cf *Quercus* sp.; *Fraxinus* sp. (0.01g, 34.8%); *Corylus* sp., nutshell (0.01g, 52.2%) (R Gale 1999)

Initial comment: from a chalk gravel matrix in pit WK 009, found with pottery and flints and possibly part of a linear ritual monument.

Objectives: as HAR-8538

Calibrated date: 1 σ : 3100–2880 cal BC
2 σ : 3350–2690 cal BC

Final comment: see HAR-8538

Laboratory comment: AERE Harwell (1989), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Manby *et al* 2003
Otlet *et al* 1983

HAR-8541 1310 \pm 70 BP

$\delta^{13}\text{C}$: -28.2‰

Sample: WC 5 AO, submitted in March 1987 by J Dent

Material: charcoal: unidentified

Initial comment: from a pit in a *Grubenhäuser*-like feature.

Objectives: to confirm the probably Anglo-Saxon date, applied on typological grounds. This is the only Anglo-Saxon type feature from the site.

Calibrated date: 1 σ : cal AD 650–780
2 σ : cal AD 600–890

Final comment: J Dent (15 January 2007), the sample was taken from a small pit 0.68m x 0.63m x 0.16m deep, cut into the floor of a larger, rectangular pit (WC 4), which measured 2.98m x 2.37m x 0.35m. A small copper alloy ring was found in the large pit (WC 4 AD). At each end of this pit was a deep post or stake hole (WC 21, WC 22). The date confirms the probable post-Roman date of the feature and identification as a sunken-floored building. Similar features have been excavated in some numbers nearby at West Heslerton (Powlesland 2003, fig. 91).

References: Powlesland 2003b

HAR-8543 5670 \pm 160 BP

$\delta^{13}\text{C}$: -27.5‰

Sample: WG 10 AO, submitted in May 1980 by J Dent

Material: charcoal: unidentified

Initial comment: from an early Iron Age pit associated with pottery and part of a settlement, which included a line of four roundhouses.

Objectives: to provide an association date for early Iron Age pottery and related roundhouses. HAR-4425 (2270 \pm 100 BP; 740–50 cal BC at 95% confidence; Reimer *et al* 2004) dated one of the other round houses.

Calibrated date: 1 σ : 4710–4340 cal BC
2 σ : 4900–4230 cal BC

Final comment: J Dent (15 January 2007), this feature measured 1.70m x 1.40 x 0.59m, contained Iron Age pottery, animal bone, and fired clay, and formed part of an assemblage of settlement features which included four roundhouses in the immediate vicinity. The determination suggests that backfilling of the pit incorporated ancient charcoal, possibly the product of woodland clearance by the earliest agriculturalists in the region.

References: Reimer *et al* 2004

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, 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: to discover whether the phasing sequences proposed for the burials in different areas of the site have chronological integrity, and to put absolute dating onto the phasing structure.

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.

Laboratory comment: Ancient Monuments Laboratory, seven radiocarbon results from Wharram Percy: Early Cemetery (HAR-2208, HAR-2460, HAR-2462, HAR-2631, HAR-2672, HAR-3575, and HAR-3584) and two radiocarbon results from Wharram Percy: The Dam (HAR-1329 and HAR-1337) have already been published in Jordan *et al* (1994, 208–9).

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: bell pit, North Yorkshire

Location: SE 858642
Lat. 54.03.59 N; Long. 00.41.20 W

Project manager: formerly J G Hurst (English Heritage) now S Wrathmell (West Yorkshire Archaeological Service), 1969

Archival body: Hull and East Riding Museum

Description: a replacement sample from the bell pit in the medieval church; the previous sample was thought to be contaminated.

Objectives: to date the bell-casting pit.

HAR-5067 1580 ±70 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: BELLP1A, submitted in June 1982 by A Clark

Material: charcoal: unidentified

Initial comment: HAR-5067 was submitted as a replacement for HAR-4474 (BELLPIT1) which gave a preliminary result of 5900 ±130 BP (5210–4460 cal BC at 95% confidence (Reimer *et al* 2004). This result was thought to be anomalous as the church is medieval. The most likely explanation is that the sample contained coal. This sample, BELLP1A, included corroded bronze and so was closely associated with the actual bell casting process.

Objectives: to discover in what period the bell casting took place.

Calibrated date: 1 σ : cal AD 400–570
2 σ : cal AD 260–630

Final comment: A Clark (20 July 2004), this date is considerably earlier than the building of the church and is therefore probably contaminated as its predecessor was.

References: Reimer *et al* 2004

**Wharram Percy: site 12,
North Yorkshire**

Location: SE 858642
Lat. 54.03.59 N; Long. 00.41.20 W

Project manager: formerly J G Hurst (English Heritage)
now S Wrathmell (West Yorkshire
Archaeological Service), 1960–70

Archival body: Hull and East Riding Museum

Description: the site of a house within the main row of buildings within the village. The bones were in a pit from the earliest phase of activity.

Objectives: to explore the association of the human bones and the Anglo-Saxon cross and what that might imply for the continuity of the religious centre in the village.

Final comment: A Clark (20 July 2004), these samples were submitted in the hope of clarifying the date of their redeposition in the pit, and to ascertain whether they were contemporary with the cross fragment. The wide range of dates means that both questions remain unanswered.

Laboratory comment: Ancient Monuments Laboratory (1984), inspection of the results from the human bone from the pit in Area 6 suggested that they fell into two episodes. When tested by the methods of Ward and Wilson (1978) and Wilson and Ward (1981), this was found to be statistically acceptable, and the combined results were as follows: HAR-4948 and HAR-4950; 643 ±62 BP; cal AD 1260–1420 at 95% confidence (Reimer *et al* 2004); and HAR-4949, HAR-4951 and HAR-4952; 1056 ±57 BP; cal AD 880–1150 at 95% confidence (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978
Wilson and Ward 1981

HAR-4948 650 ±100 BP

$\delta^{13}\text{C}$: -20.8‰

Sample: 13093/1, submitted in December 1981 by J G Hurst

Material: human bone (J Henderson)

Initial comment: this series of five samples (HAR-4948 to HAR-4952) consists of disarticulated human bones, which represent five individuals. They were found under one of the medieval village houses (House 6), a fragment of a decorated Anglo Saxon cross was found nearby. House 6 is on the hillside above the streamside terrace where the church is sited.

Objectives: to ascertain if the bones are contemporary with each other and also with the cross fragment.

Calibrated date: 1 σ : cal AD 1270–1410
2 σ : cal AD 1210–1450

Final comment: A Clark (20 July 2004), the dating of this and HAR-4950 is contemporary with phases of building. The reason for redeposition is still unclear.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-4949 1060 ±100 BP

$\delta^{13}\text{C}$: -22.3‰

Sample: 13093/2, submitted in December 1981 by J G Hurst

Material: human bone (J Henderson)

Initial comment: as HAR-4948

Objectives: as HAR-4948

Calibrated date: 1 σ : cal AD 880–1040
2 σ : cal AD 710–1210

Final comment: A Clark (20 July 2004), this group, including HAR-4951 and HAR-4952, are at the earlier end of the range, contemporary with the cross fragment, but the reason for a date of deposition remains unclear.

HAR-4950 640 ±80 BP

$\delta^{13}\text{C}$: -23.1‰

Sample: 13093/3, submitted in December 1981 by J G Hurst

Material: human bone (J Henderson)

Initial comment: as HAR-4948

Objectives: as HAR-4948

Calibrated date: 1 σ : cal AD 1270–1410
2 σ : cal AD 1220–1440

Final comment: see HAR-4948

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-4951 1000 ±100 BP

$\delta^{13}\text{C}$: -22.2‰

Sample: 13093/4, submitted in December 1981 by J G Hurst

Material: human bone (J Henderson)

Initial comment: as HAR-4948

Objectives: as HAR-4948

Calibrated date: 1 σ : cal AD 900–1160
2 σ : cal AD 780–1260

Final comment: see HAR-4948

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-4952 1110 ±100 BP

$\delta^{13}\text{C}$: -24.1‰

Sample: 13093/5, submitted in December 1981 by J G Hurst

Material: human bone (J Henderson)

Initial comment: as HAR-4948

Objectives: as HAR-4948

Calibrated date: 1 σ : cal AD 770–1030
2 σ : cal AD 670–1160

Final comment: see HAR-4948

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

Wharram Percy: South Manor, North Yorkshire

Location: SE 858642
Lat. 54.03.59 N; Long. 00.41.20 W

Project manager: P Stamper (English Heritage), 1985

Archival body: Department of the Environment, Medieval Village Research Group, National Monuments Record Centre, Hull City Museums and Art Galleries

Description: a large area with intensive Saxon and medieval activity.

Objectives: to help clarify the phasing and dating of activities.

References: Stamper and Croft 2000

HAR-5624 1120 ±100 BP

$\delta^{13}\text{C}$: -26.7‰

Sample: 59/149, submitted on 16 June 1983 by J G Hurst

Material: charcoal: unidentified

Initial comment: from a Saxon smithy; from the fill of a small bowl hearth probably with a very short life. It was a well defined cut feature and there should be no contaminatory material.

Objectives: the associated pottery suggests a date in the early/mid Saxon period. The hearth is one of three associated within a timber post-built structure. The whole complex is very similar to that found at Ramsbury, Wiltshire.

Calibrated date: 1 σ : cal AD 770–1020
2 σ : cal AD 670–1160

Final comment: P Stamper (11 May 1995), the sample was one of three taken from hearths in a zone of smithying activity. This date is somewhat later than the other two (GU-5122; 1380 ±50 (cal AD 630–670 at 68% confidence, and cal AD 580–770 at 95% confidence (Reimer *et al* 2004)), and HAR-5625) although the 2 σ ranges overlap. Do these dates indicate long-term industrial/craft activity in this zone, or are they broadly contemporary? Even given these uncertainties, without radiocarbon dates we would have been hard pressed to be more chronologically specific than Saxon.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Reimer *et al* 2004
Walker and Otlet 1988, 300

HAR-5625 1230 ±70 BP

$\delta^{13}\text{C}$: -27.2‰

Sample: 59/55, submitted on 16 June 1983 by J G Hurst

Material: charcoal (remaining subsample consisted of a large quantity of charcoal fragments mostly too small and friable to identify): unidentified (12.02g); *Prunus spinosa* (0.02g, 0.7%); *Quercus* sp., sapwood (0.07g, 2.6%); *Fraxinus* sp. (0.16g, 5.9%); *Quercus* sp., heartwood (2.22g, 81.9%); *Betula* sp. (0.03g, 1.1%); *Corylus* sp. (0.21g, 7.8%) (R Gale 2000)

Initial comment: from a flat hearth where probable mid-Saxon smithying took place. It was found in association with a building, ditches, and large amounts of domestic debris in sealed contexts, for example *c* 300 sherds of pottery.

Objectives: this is one of the first good groups of mid-Saxon material from the north of England, and would provide a firm corpus of pottery forms, types and fabrics if their date could be established.

Calibrated date: 1 σ : cal AD 680–890
2 σ : cal AD 650–980

Final comment: P Stamper (11 May 1995), it is considerably earlier than HAR-5624, one of the two other samples taken from two other hearths, but more in accord with a third, GU-5122 (1380 ±50 BP; cal AD 630–670 at 68% confidence, and cal AD 580–770 at 95% confidence (Reimer *et al* 2004)). Do these dates indicate long-term industrial/craft activity in this zone or are they broadly contemporary? Even given these uncertainties, without the radiocarbon dates we would have been hard pressed to be more chronologically specific than Saxon.

References: Reimer *et al* 2004

Wharram Percy: The Dam, North Yorkshire

- Location:* SE 858642
Lat. 54.03.59 N; Long. 00.41.20 W
- Project manager:* formerly J G Hurst (English Heritage)
now S Wrathmell (West Yorkshire
Archaeology Service), 1981
- Archival body:* Hull and East Riding Museum
- Description:* dams and a pond at the southern end of the deserted medieval village.
- Objectives:* to investigate the sequence of dams, the millpond, and any other utilisation of water from the springs and stream.
- Final comment:* S Wrathmell (6 December 2006), the results provided a date for the start of grain processing in the area of the pond, as well as dating for some of the earliest associated water channels. There was no datable artefactual material to compare with the radiocarbon determinations; nor were the excavated timbers of sufficient scantling to permit dendrochronological analysis. The radiocarbon dates are, however, entirely credible in terms of their socio-economic context and the dating for later sequences on site.
- Laboratory comment:* Ancient Monuments Laboratory (2003), two further dates from this site (HAR-1329 and HAR-1337) were funded prior to 1981 and were published in Jordan *et al* (1994, 208). One further sample 811621A (HAR-6840) was submitted for dating but failed to produce a result.
- References:* Jordan *et al* 1994, 208
Treen and Atkin 2005
- HAR-4649** 1080 ±100 BP
- $\delta^{13}\text{C}$: -21.1‰
- Sample:* 30/1640A, submitted in August 1981 by J G Hurst
- Material:* animal bone
- Initial comment:* from below a carbonised grain layer. The layer was the deepest excavated.
- Objectives:* to confirm a probable middle Saxon date.
- Calibrated date:* 1 σ : cal AD 870–1030
2 σ : cal AD 680–1170
- Final comment:* S Wrathmell (6 December 2006), the dating lent support to the hypothesis, advanced on socio-economic grounds, that grain processing would have been taking place close to the putative mill pond by middle to late Saxon times.
- Laboratory comment:* AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).
- References:* Otlet *et al* 1983
Treen and Atkin 2005
Walker and Otlet 1988, 299–300

- HAR-4650** 1060 ±100 BP
- $\delta^{13}\text{C}$: -22.1‰
- Sample:* 30/1640B, submitted in August 1981 by J G Hurst
- Material:* animal bone
- Initial comment:* from the layer as HAR-4649.
- Objectives:* as HAR-4649
- Calibrated date:* 1 σ : cal AD 880–1040
2 σ : cal AD 710–1210
- Final comment:* see HAR-4649
- Laboratory comment:* AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).
- References:* Otlet *et al* 1983
Walker and Otlet 1988, 299–300

- HAR-4651** 860 ±70 BP
- $\delta^{13}\text{C}$: -28.4‰
- Sample:* 30/1641, submitted in August 1981 by J G Hurst
- Material:* wood (remaining subsample identified as slithers of dried-out waterlogged wood, structurally very collapsed): *Quercus* sp. (3g, 48%); Salicaceae, roundwood, some fragments from five growth rings (3.30g, 52%); unidentified (3.60g) (R Gale 1998)
- Initial comment:* from part of a line of wattle, which is part of the lowest dam feature on the site.
- Objectives:* to date the wattle found in the dam.
- Calibrated date:* 1 σ : cal AD 1040–1260
2 σ : cal AD 1020–1280
- Final comment:* S Wrathmell (6 December 2006), the samples came from what appeared, in terms of horizontal stratigraphy, to be the wattle lining for a secondary water channel. The dating, late twelfth to thirteenth centuries, is entirely plausible in terms of settlement history at Wharram.
- References:* Treen and Atkin 2005

- HAR-4652** 750 ±90 BP
- $\delta^{13}\text{C}$: -29.2‰
- Sample:* 30/1642, submitted in August 1981 by J G Hurst
- Material:* wood (waterlogged): unidentified
- Initial comment:* from another line of wattle, different from that in HAR-4651. Again the wattle is part of the lowest dam feature on the site.
- Objectives:* to date the wattle in the dam.
- Calibrated date:* 1 σ : cal AD 1210–1300
2 σ : cal AD 1040–1410
- Final comment:* see HAR-4651
- Laboratory comment:* AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).
- References:* Otlet *et al* 1983
Treen and Atkin 2005
Walker and Otlet 1988, 299–300

HAR-6787 660 ±90 BP

$\delta^{13}\text{C}$: -25.5‰

Sample: 1569/120, submitted in August 1981 by J G Hurst

Material: wood (waterlogged; remaining subsample identified as small fragments of desiccated worked wood (diameter 5mm), ?tree-nail/dowell/peg): *Quercus* sp., heartwood (0.12g, 100%) (R Gale)

Initial comment: from the bottom of waterlogged silt deposits.

Objectives: to date the water logged silt deposits.

Calibrated date: 1 σ : cal AD 1270–1410
2 σ : cal AD 1210–1440

Final comment., the sample was finally identified as part of a wooden shovel blade, of a type datable to the ninth to fourteenth centuries. Its stratigraphic position indicated that it should belong to the later part of this date range.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Treen and Atkin 2005
Walker and Otlet 1988, 299–300

Wherstead, Suffolk

Location: TM 14784140 to TM 15304084
Lat. 52.01.44 N; Long. 01.02.52 E, to
52.01.25 N, 01.08.18 E

Project manager: E Martin (Suffolk County Council), 1980

Archival body: Suffolk County Council

Description: Bronze Age ring ditches and associated features.

Objectives: to obtain dating evidence for the ring ditches.

Final comment: E Martin (18 September 1996), the dates from these ring ditches are disappointing as they do not appear to relate to the construction periods of the monuments. HAR-4631 is clearly too late and refers to an episode much later in the history of the site, whilst HAR-4640 is unexpectedly early and difficult to explain.

Laboratory comment: Ancient Monuments Laboratory (1983), one further sample (HAR-4632; WHR80106) failed.

References: Martin *et al* 1981

HAR-4630 4770 ±70 BP

$\delta^{13}\text{C}$: -25.2‰

Sample: WHR028-0102, submitted in February 1981 by P Murphy

Material: charcoal: unidentified

Initial comment: from a Bronze Age ring ditch.

Objectives: to obtain dating evidence for the ring ditch.

Calibrated date: 1 σ : 3650–3380 cal BC
2 σ : 3700–3370 cal BC

Final comment: E Martin (18 September 1996), the site was a 30m diameter ring ditch with a central pit but no signs of a

burial. Late Neolithic Grooved Ware sherds were recovered from the site. The sample was taken from a charcoal rich layer in the upper fill of the ring ditch, but the resulting date is much older than was expected and it is difficult to explain why. Even the Grooved Ware association would not explain such an early date (a date in the region of 4000 BP would have been more in line with dates elsewhere).

HAR-4631 1260 ±70 BP

$\delta^{13}\text{C}$: -25.5‰

Sample: WHR008-0104, submitted in February 1981 by P Murphy

Material: charcoal: *Prunus spinosa*, fruitstone; *Quercus* sp., largely; *Corylus* sp., charred shells (P Murphy)

Initial comment: from a Bronze Age ditch.

Objectives: as HAR-4630

Calibrated date: 1 σ : cal AD 660–880
2 σ : cal AD 640–950

Final comment: E Martin (18 September 1996), the site was a large ring ditch, 48m in diameter. No burials were identified but a small amount of ?Beaker pottery was recovered. The sample came from a charcoal rich deposit at a depth of 85cm in the upper loamy fill of the 2.24m deep ditch. The charcoal appears to have been derived from woodland scrub or even a hedge and clearly relates to an episode of clearance/burning in the Saxon period. The depth of the deposit shows that the ring ditch must still have been a visible earthwork at that time.

Widdington, Essex

Location: TL 536317
Lat. 51.57.42 N; Long. 00.14.07 E

Project manager: M Bridge (Independent), 1985

Archival body: English Heritage

Description: the scheduled ancient monument includes a complex moated site containing the remains of a pre-conquest manor and a medieval grange situated on high ground overlooking the River Cam. The timber-framed eight-bay aisled barn has curving braces and a crown-post roof. Repair works were undertaken in the 1970s and 1980s following gale damage.

Objectives: dating the barn was undertaken in association with repair works carried out when the building came into the guardianship of the Department of Environment in 1997. Dendrochronology failed to produce absolute dating (Bridge 1983), and so samples were submitted for radiocarbon dating to aid in the construction of a master tree-ring sequence and confirm the antiquity of the dated fabric.

Final comment: A Bayliss (16 June 2009), these results suggested that Widdington tithe barn dates to the fourteenth or early fifteenth century cal AD, dating confirmed by a subsequent programme of dendrochronology which placed its primary construction in the period cal AD 1417–1442 (Tyers and Groves 2000, 122).

References: Bridge 1983
Tyers and Groves 2000, 122

HAR-6668 500 ±40 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: LB9A, submitted in February 1985 by D Haddon-Reece

Material: wood: *Quercus* sp.

Initial comment: a timber from the tithe barn.

Objectives: to aid in the construction of a master tree-ting sequence.

Calibrated date: 1 σ : cal AD 1410–1440
2 σ : cal AD 1320–1450

Final comment: A Bayliss (16 June 2009), these measurements appear to be replicates on the same timber; they are statistically consistent ($T'=0.8$; T' (5%)=3.8; $v=1$; Ward and Wilson 1978), and so a weighted mean (525 ±28 BP) can be taken which calibrates to cal AD 1320–1440 at 95% confidence (Reimer *et al* 2004).

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

HAR-6669 550 ±40 BP

$\delta^{13}\text{C}$: -26.0‰

Sample: LB9B, submitted in February 1985 by D Haddon-Reece

Material: wood: unidentified

Initial comment: as HAR-6668

Objectives: as HAR-6668

Calibrated date: 1 σ : cal AD 1320–1430
2 σ : cal AD 1300–1440

Final comment: see HAR-6668

Willie Howe, Yorkshire (East Riding)

Location: SE 95506575
Lat. 54.04.44 N; Long. 00.32.25 W

Project manager: T Brewster (East Riding Archaeological Research Committee), 1967

Archival body: Malton Archaeological Partnership, Hull Museum

Description: a ploughed out round barrow defined by double ring-ditch. Near central pit (Burial 1) may have been the primary burial and though it had been disturbed, remains of three adult males were found in the remains of the primary fill. Secondary burial was of an adult male in an oak coffin associated with three worked flints. Grave 3 contained an adult female with a Beaker.

Objectives: to obtain a date for the coffin burial.

HAR-4995 3550 ±70 BP

$\delta^{13}\text{C}$: -23.0‰

Sample: WILLHOWE, submitted on 12 May 1982 by T Brewster

Material: human bone

Initial comment: from the remains of an oak coffin at a depth of 1.3m from the top of the rock cut grave. The grave was covered with 0.46m of plough soil and therefore the depth of the bone was 1.75m. The sample has not been cleaned or conserved in any way, but there are some fine rootlets. The white on the surface is lime.

Objectives: to date the coffin burial.

Calibrated date: 1 σ : 2010–1770 cal BC
2 σ : 2130–1690 cal BC

Final comment: A Gibson (July 2008), the date confirms the Bronze Age date for this secondary burial.

Wilsford Shaft, Wiltshire

Location: SU 108414
Lat. 51.10.16 N; Long. 01.50.44 W

Project manager: P Ashbee (Unknown), 1960–2

Archival body: Salisbury and Wiltshire Museum

Description: the excavation of the presumed pond barrow, Wilsford 33a, in 1960, led to the baring of a weathering cone and the top of a shaft 1.8m in diameter. Subsequent work during 1961 and 1962 revealed that it was of the order to 30m in depth. At the bottom of the shaft waterlogging has preserved a range of objects and materials in a manner not normally encountered upon the chalklands of Wiltshire.

Final comment: P Ashbee (1988), most of the dates from the lower part of the shaft (OxA-1214–7 and OxA-1229) are in good general agreement when compared to other Deverel-Rimbury dates from the south of England (Barrett 1976). Using the Ward and Wilson (1978) combining procedures and significance tests, it is possible to show that these dates form a group with a mean and standard deviation of *c* 3150 ±30 BP, suggesting that the lower part of the shaft was infilled quite quickly. The exception is OxA-1089 where the result is too early and is not easily explained. The upper four Iron Age dates (OxA-1210–3) conform to expectation (Ashbee *et al* 1989) and have a combined estimate of *c* 2415 ±32 BP, demonstrating that the top 10 feet or so of the shaft filled significantly later than the basal part.

Final comment: P Ashbee (1989), the two groups of dates can be separated significantly and their implications for the weathering, denudation, and silting of the shaft are considerable. They show that, presumably after the removal or disintegration of a timber shaft-head structure, silting was rapid, and that, during the currency of the Deverel-Rimbury pottery pieces from the accumulation, it was all but infilled. However, as in a ditch, the process dramatically decelerated and thus by Iron Age times the pond barrow would have been a circular, embanked, trumpet-mouth profiled cavity, some 3m in depth. The pond-like declivity, which gave rise to Colt Hoare's coinage (1812, 22) is clearly the creation of little more than the last two millennia. Iron Age pottery, besides abraded Romano-British sherds and some Deverel-Rimbury urn fragments, was found scattered in all layers between depths of 0.9m and 3.6m. The Iron Age dates are appropriate to such an assemblage and in general terms they

accord well with the pattern of radiocarbon dates for the Iron Age in southern England (Cunliffe 1978, 258). Although not indicative of the shaft's prime function, the pottery from its depths was of the Deverel-Rimbury series. Because of this and the radiocarbon date obtained in 1966 (NPL-74; 3330 ±90 BP; 1880–1420 cal BC at 95% confidence; Reimer *et al* 2004) the shaft has been considered as an integral component of that complex (S Piggott 1973b, 383).

References: Ashbee *et al* 1989
Ashbee 1963
Ashbee 1966
Barrett 1976
Colt Hoare 1812, 22
Cunliffe 1978
Hedges *et al* 1988
Piggott 1973b
Reimer *et al* 2004
Ward and Wilson 1978

OxA-1089 4640 ±70 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: WILS 329, submitted on 7 January 1986 by M Bell

Material: wood (waterlogged): *Fraxinus* sp.

Initial comment: from the depth of 97'6" in the waterlogged basal part of Wilsford Shaft. This sample consists of a bucket base and stave fragments.

Objectives: to obtain a secure date for Wilsford Shaft and the important assemblage of palaeoenvironmental evidence from its base (beetles, pollen, mosses, mollusca, wood, seeds etc) and the fine group of middle Bronze Age worked wood of which this bucket stave and base fragments are a part.

Calibrated date: 1 σ : 3520–3350 cal BC
2 σ : 3640–3120 cal BC

Final comment: P Ashbee (1989), OxA-1089 is anomalous and would be considered appropriate to the later Neolithic.

Final comment: R Housley and R Hedges (1989), OxA-1089 is anomalous being approximately two millennia (in calendar years) older than the other dated material from near the base of the shaft. Since it was known that much of the wood from the base of the shaft had been conserved by resin polyethylene glycol (PEG), the dated samples were deliberately selected from those items which had not been impregnated, but which had been conserved by freeze-drying instead. Subsequent microscopic examination of unprepared wood from this particular sample detected no resin, whilst the overall state of preservation was consistent with the sample having been freeze-dried. A second confirmatory dating run was undertaken, and a compatible result was achieved. Although it is possible that conservation work, for which there is no record, could be responsible for the older date obtained, this is thought to be an unlikely explanation. The alternative, that the date is a true measurement of the age of the bucket, does cause archaeological difficulties, since it is hard to explain the two millennia hiatus.

OxA-1210 2450 ±60 BP

$\delta^{13}\text{C}$: -20.0‰ (assumed)

Sample: WILS6025, submitted on 7 January 1986 by M Bell

Material: animal bone: *Equus* sp., calcaneum

Initial comment: from upper fill of shaft in chalky rainwash, at 7'8' depth in SW Quadrant III.

Objectives: to date prehistoric horse, to test contemporaneity of horse 'burial' with human 'burial' and to test contemporaneity of horse bones to one another.

Calibrated date: 1 σ : 760–400 cal BC
2 σ : 790–390 cal BC

Final comment: R Housley and R Hedges (1989), the uppermost four dates (OxA-1210 to OxA-1213) form a second group which is significantly later than the lower shaft group of dates. The difference is interesting, since it demonstrates that the top 10' (3m) filled about a millennia later than the lower regions (below 30' (9m) of the shaft. The two dated horse bones are believed to be from the same animal (C Grigson, pers comm) and produce a combined age estimate of 2465 ±42 BP (780–400 cal BC at 95% confidence; Reimer *et al* 2004).

References: Reimer *et al* 2004

OxA-1211 2320 ±80 BP

$\delta^{13}\text{C}$: -20.0‰ (assumed)

Sample: WILS127(1), submitted on 7 January 1986 by M Bell

Material: human bone (left femur)

Initial comment: from a depth of 8'6".

Objectives: the human bone samples (OxA-1211 and OxA-1212) are part of the series of samples, including animal bone and other material being tested as a means of obtaining information about the date of use, filling, and abandonment of the shaft. The human bone is from the upper level of the shaft fill and the date may help to support the suggested period of abandonment of the shaft (final fill) or, if much earlier than other samples, could provide supporting evidence for earlier activity on the site.

Calibrated date: 1 σ : 410–260 cal BC
2 σ : 750–190 cal BC

Final comment: R Housley and R Hedges (1989), the two human bones (OxA-1211 and OxA-1212) are from separate individuals and represent the deepest pieces of human bone in the shaft, all the remainder being above 2' (0.6m). Their dates are not sufficiently different to be distinguished from the horse bones, which bracket them stratigraphically. The human femur dates demonstrate that most of the shaft had already infilled before the human remains were deposited an important point when considering the question of the shaft's function. See also OxA-1210.

OxA-1212 2360 ±60 BP

$\delta^{13}\text{C}$: -20.0‰ (assumed)

Sample: WILS 127(2), submitted on 7 January 1986 by M Bell

Material: human bone (left femur)

Initial comment: from a depth of 8'6".

Objectives: as OxA-1211. As the two samples (OxA-1211 and OxA-1212) are from different individuals' similar dates will/may strengthen arguments while different dates may strengthen other interpretation regarding the shaft fill.

Calibrated date: 1 σ : 490–390 cal BC
2 σ : 750–260 cal BC

Final comment: see OxA-1210 and OxA-1211

OxA-1213 2480 \pm 60 BP

$\delta^{13}C$: -20.0‰ (assumed)

Sample: WILS 125, submitted on 7 January 1986 by M Bell

Material: animal bone: *Equus* sp., cuboid/tibia

Initial comment: from upper fill of shaft in brown wash, at 9'-9'6" depth in south half.

Objectives: as OxA-1210

Calibrated date: 1 σ : 780–410 cal BC
2 σ : 800–400 cal BC

Final comment: see OxA-1210

OxA-1214 3130 \pm 60 BP

$\delta^{13}C$: -20.0‰ (assumed)

Sample: WILS G35, submitted on 7 January 1986 by M Bell

Material: animal bone: *Bos* sp., part of skull (occipital)

Initial comment: from below upper fill of shaft, in chalk rubble, at 29'6" depth.

Objectives: to date the 'Celtic ox' and to date the relevant part of the shaft fill.

Calibrated date: 1 σ : 1460–1320 cal BC
2 σ : 1520–1260 cal BC

Final comment: R Housley and R Hedges (1989), OxA-1214, OxA-1215, OxA-1216, OxA-1217 and OxA-1229 are not significantly different at 95% confidence (Ward and Wilson 1978). This implies that the lower part of the shaft filled quite rapidly (probably in less time than indicated by the *c* 115 calendar year upper limit of the 2 σ age range), there being no significant difference, in radiocarbon terms, between the date of material at *c* 30' (9m) and that at *c* 95' (28.5m).

References: Ward and Wilson 1978

OxA-1215 3130 \pm 60 BP

$\delta^{13}C$: -20.0‰ (assumed)

Sample: WILS G35, submitted on 7 January 1986 by M Bell

Material: animal bone: *Ovis* sp., part of skull, occipital and basisphenoid

Initial comment: from the middle fill of shaft, in chalk rubble, at 44' depth.

Objectives: to date probable fleece burial, possibly ritually deposited and to date relevant part of shaft fill.

Calibrated date: 1 σ : 1460–1320 cal BC
2 σ : 1520–1260 cal BC

Final comment: see OxA-1214

OxA-1216 3160 \pm 60 BP

$\delta^{13}C$: -25.0‰ (assumed)

Sample: WILS 11C, submitted on 7 January 1986 by M Bell

Material: wood (waterlogged): *Alnus* sp., all the identified bucket-staves from AML 620369 were *Alnus* sp. but it is not certain that this particular stave has been identified

Initial comment: from a depth of 94'6"–94'10" WSW quadrant in the waterlogged basal part of Wilsford Shaft. Sample consists of bucket base and stave fragments.

Objectives: as OxA-1089

Calibrated date: 1 σ : 1500–1390 cal BC
2 σ : 1540–1300 cal BC

Final comment: see OxA-1214

OxA-1217 3150 \pm 60 BP

$\delta^{13}C$: -25.0‰ (assumed)

Sample: WILS 94, submitted on 7 January 1986 by M Bell

Material: wood (waterlogged): *Alnus* sp., all the identified bucket-staves from AML 620369 were *Alnus* sp. but it is not certain that this particular stave has been identified

Initial comment: from the waterlogged base of Wilsford Shaft, site find number 94, which is wood sorted from the shaft fill at the surface. Material came from a depth of *c* 95' in the fill of the shaft.

Objectives: as OxA-1089

Calibrated date: 1 σ : 1500–1390 cal BC
2 σ : 1530–1290 cal BC

Final comment: see OxA-1214

OxA-1229 3200 \pm 80 BP

$\delta^{13}C$: -20.0‰ (assumed)

Sample: WILS21, submitted on 7 January 1986 by M Bell

Material: animal bone: *Bos* sp., horncore

Initial comment: from waterlogged chalk rubble near base of shaft, at 95'2".

Objectives: to date the 'Neolithic ox' - possibly near its extinction and to date the relevant part of the shaft fill.

Calibrated date: 1 σ : 1530–1410 cal BC
2 σ : 1670–1300 cal BC

Final comment: see OxA-1214

Winchester: North Walls, Hampshire

Location: SU 486299
Lat. 51.03.57 N; Long. 01.18.23 W

Project manager: K Barber (University of Southampton), 1982

Archival body: University of Southampton

Description: an area of fen north of Winchester in the Itchen Valley, a peat deposit approximately 2km north-south and the width of the floodplain, 300–500m. The deposit is predominantly *Phragmites* peat 4.3m in depth, overlying chalky clay and gravel.

Objectives: to determine the development and composition of the middle post-glacial primary forest and the nature of its clearance.

References: Waton 1982

HAR-4342 5630 ±90 BP

$\delta^{13}\text{C}$: -29.5‰

Sample: WI1-1, submitted on 22 April 1981 by P V Waton

Material: peat (calcareous fen) (P V Waton)

Initial comment: from level of *Ulmus* sp. decline.

Objectives: to confirm an expected date of c 3000 BC.

Calibrated date: 1 σ : 4550–4350 cal BC
2 σ : 4690–4330 cal BC

Final comment: P V Waton (1982), an early date for the *Ulmus* sp. decline in southern Britain.

Windmill Farm (Lizard Mesolithic), Cornwall

Location: SW 693150
Lat. 49.59.23 N; Long. 05.13.08 W

Project manager: G Smith (Central Excavation Service), 1982

Archival body: Royal Cornwall Museum

Description: a Mesolithic site, 1.5km inland from Kynance Cove.

Objectives: to confirm the Mesolithic dates for these features.

References: Smith 1987b
Smith 1988a
Walker and Otlet 1988, 302

HAR-5667 5920 ±180 BP

$\delta^{13}\text{C}$: -26.8‰

Sample: 235-214, submitted on 14 July 1983 by G Smith

Material: charcoal: unidentified

Initial comment: from a presumed Mesolithic fire pit.

Objectives: to confirm a Mesolithic date.

Calibrated date: 1 σ : 5010–4550 cal BC
2 σ : 5300–4360 cal BC

Final comment: G Smith (1988), this confirms the expected Mesolithic date.

HAR-5668 5470 ±130 BP

$\delta^{13}\text{C}$: -24.5‰

Sample: 235-220, submitted on 14 July 1983 by G Smith

Material: charcoal: *Quercus* sp., mainly

Initial comment: from a charcoal rich Mesolithic feature.

Objectives: to confirm a Mesolithic date.

Calibrated date: 1 σ : 4460–4180 cal BC
2 σ : 4550–3990 cal BC

Final comment: G Smith (1988), this confirms the expected Mesolithic date.

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: English Heritage (6 January 2012), this result is published (Walker and Otlet 1988, 302), although a final certificate has not been found.

References: Otlet *et al* 1983
Walker and Otlet 1988, 302

Winterbourne Steepleton: Cowlease Pasture, Dorset

Location: SY 6128898
Lat. 50.41.55 N; Long. 02.32.54 W

Project manager: P J Woodward (Wessex Archaeology), 1982

Archival body: Dorset County Museum

Description: the excavation of a round barrow and associated ring ditch within surviving ancient fields, which had been severely modified by medieval agricultural strip ploughing and ploughed extensively in modern times. The barrow and ring ditch were constructed in the early Bronze Age, received a series of secondary Wessex cremations, and was enclosed by a small boundary ditch in the middle Bronze Age.

Objectives: to establish a chronology and environmental sequence for the site which is set within an ancient field system, and part of an extensive prehistoric settlement study for an area which contains one of the densest concentrations of Neolithic and Bronze Age barrows in southern England.

Laboratory comment: English Heritage (2003), a further sample (HAR-5621; 1249) failed.

References: Woodward 1991

HAR-5617 3390 ±100 BP

$\delta^{13}\text{C}$: -24.5‰

Sample: 968, submitted on 14 June 1983 by P J Woodward

Material: charcoal: *Quercus* sp. (24g)

Initial comment: from clay enriched soil at the base of the accumulated soil profile in barrow ditch 850.

Objectives: to establish dates for horizons within the soil development profile.

Calibrated date: 1 σ : 1880–1530 cal BC
2 σ : 1950–1450 cal BC

Final comment: P J Woodward (26 April 1996), this sample from the base of the soil profile provided a date 280 years earlier than that at the top of the profile (HAR-5618), and thus a timescale for its accumulation. The determination provides a date soon after the construction of the barrow ditch and mound in the early Bronze Age.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Walker and Otlet 1988, 301

HAR-5618 3110 \pm 80 BP

$\delta^{13}\text{C}$: -24.5‰

Sample: 838, submitted on 14 June 1983 by P J Woodward

Material: charcoal: Pomoideae; *Quercus* sp.

Initial comment: from soil at the top of the accumulated soil profile in barrow ditch.

Objectives: to establish dates for horizons within soil development profile.

Calibrated date: 1 σ : 1460–1290 cal BC
2 σ : 1530–1130 cal BC

Final comment: P J Woodward (26 April 1996), provides a timescale, together with HAR-5617, for the accumulation of soil silts in the barrow ditch prior to a stabilisation horizon.

Laboratory comment: AERE Harwell (1987), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Walker *et al* 1990, 169

HAR-5619 4080 \pm 140 BP

$\delta^{13}\text{C}$: -25.8‰

Sample: 1266, submitted on 14 June 1983 by P J Woodward

Material: charcoal: *Quercus* sp.; *Prunus* sp.

Initial comment: from cremation 1, associated with a barbed and tanged arrowhead.

Objectives: to establish a date for the cremation.

Calibrated date: 1 σ : 2890–2460 cal BC
2 σ : 2930–2200 cal BC

Final comment: P J Woodward (26 April 1996), a date rather too early to be acceptable for a barbed and tanged arrowhead. A date contemporary with the other early Bronze Age Wessex Cremations on the site was expected (HAR-5620). This charcoal may be derived from a clearance prior to barrow construction and be associated with Mortlake and Beaker pottery in the buried soil below the nearby barrow mound.

HAR-5620 3140 \pm 130 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: 1281, submitted on 14 June 1983 by P J Woodward

Material: charcoal: *Carpinus* sp.; *Quercus* sp.

Initial comment: from cremation 2, which is associated with a jet toggle and a bronze awl.

Objectives: to establish a date for the cremation.

Calibrated date: 1 σ : 1530–1260 cal BC
2 σ : 1740–1040 cal BC

Final comment: P J Woodward (26 April 1996), it provides a date for the deposition of Wessex style objects with cremated bone, and falls within the range of Wessex dates.

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Walker and Otlet 1988, 301

HAR-5622 3410 \pm 80 BP

$\delta^{13}\text{C}$: -26.6‰

Sample: 1221, submitted on 14 June 1983 by P J Woodward

Material: charcoal: *Quercus* sp.

Initial comment: large fragments of charcoal from the base of the primary fill of a funerary enclosure.

Objectives: to establish a date for its construction.

Calibrated date: 1 σ : 1880–1610 cal BC
2 σ : 1930–1510 cal BC

Final comment: P J Woodward (26 April 1996), this determination provides a date for the funerary enclosure construction in the early Bronze Age which can be taken to predate the Wessex burials within.

Laboratory comment: AERE Harwell (1984), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983

HAR-5623 2670 \pm 150 BP

$\delta^{13}\text{C}$: -26.2‰

Sample: 1150, submitted on 14 June 1983 by P J Woodward

Material: charcoal: Pomoideae (2g)

Initial comment: from the primary fill of the field/cemetery boundary enclosure.

Objectives: to provide a date for the construction of this ditch, which bounds the barrow cemetery.

Calibrated date: 1 σ : 980–670 cal BC
2 σ : 1260–400 cal BC

Final comment: P J Woodward (26 April 1996), the determination provides a date in the later Bronze Age for the fully developed field system, a little later than the ‘contemporary’ huts at Rowden (HAR-5249; 2920 \pm 80 BP; 1400–910 cal BC at 95% confidence; Reimer *et al* 2004), and also an additional date for South Dorset (Dorset Downs) middle Bronze Age pottery.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

References: Otlet *et al* 1983
Reimer *et al* 2004

Winwick: Southworth Hall Barrow, Cheshire

Location: SJ 619936
Lat. 53.26.15 N; Long. 02.34.25 W

Project manager: D Freke (University of Liverpool), 1980

Archival body: Warrington Museum

Description: a two-phase mound; a ditched mound of sand followed by a much larger ditched turf mound. An excavation prior to destruction by sand quarrying.

Objectives: to aid as independent dating for the pottery sequences, which are presently the subject of much controversy.

Laboratory comment: Ancient Monuments Laboratory (2003), two further samples 14980108 (HAR-5257) and 14980152 (HAR-5263) submitted for dating failed to produce results.

References: Freke and Holgate 1990
Freke and Thacker 1990
Walker *et al* 1988, 330–1

HAR-5258 3390 ±70 BP

$\delta^{13}C$: -26.7‰

Sample: 14980112, submitted in October 1981 by D Freke

Material: charcoal: unidentified

Initial comment: from context no 84; from the fill of a cremation pit, in the fill of the second-phase ditch of a two-phase barrow. The sample is associated with a Collared Urn and an accessory vessel. The context was well stratified, undisturbed, and should not be contaminated.

Objectives: a date will give independent dating for the pottery sequences which are presently the subject of much controversy.

Calibrated date: 1 σ : 1760–1610 cal BC
2 σ : 1890–1510 cal BC

Final comment: D Freke (23 February 2008), the date is close to HAR 5261 obtained from the burnt structure under the second phase mound, suggesting a short period, possibly decades, between the construction and the natural filling of its ditch. There was no evidence that the ditch had been recut, despite the continued use of the mound for cremation depositions.

HAR-5259 4090 ±80 BP

$\delta^{13}C$: -27.2‰

Sample: 14980130, submitted in October 1981 by D Freke

Material: charcoal: unidentified

Initial comment: from context no 327; from a large pit filled with burnt stones, charcoal, and fragments of Bronze Age pottery, 10m outside the outer ditch of a two-phase barrow. The context is well stratified and should not be contaminated.

Objectives: as HAR-5258

Calibrated date: 1 σ : 2870–2490 cal BC
2 σ : 2890–2460 cal BC

Final comment: D Freke and A Thacker (1990), there was no *in situ* burning and the contents of the pit do not relate directly to the adjacent mound and its cremations because the charcoal from the earliest phase of the mound is approximately 300 years later and there were no other features as early as the radiocarbon date. The material indicates that funerary activity pre-dated the construction of this particular barrow.

HAR-5260 3630 ±70 BP

$\delta^{13}C$: -28.2‰

Sample: 14980141, submitted in October 1981 by D Freke

Material: charcoal: unidentified

Initial comment: from context no 386; from a layer of charcoal at the bottom of the inner ditch. The charcoal was not burnt *in situ* but dumped. The charcoal represents one of several patches. The context was well stratified, undisturbed, and should be uncontaminated.

Objectives: as HAR-5258

Calibrated date: 1 σ : 2130–1890 cal BC
2 σ : 2200–1770 cal BC

Final comment: D Freke (23 February 2008), this sample from the bottom of the ditch of the first phase mound is consistent with HAR 5262 from a pit under the first mound. It may have been derived from activities in the vicinity associated with the barrow, but since lost to later disturbance.

HAR-5261 3470 ±70 BP

$\delta^{13}C$: -27.9‰

Sample: 14980145, submitted in October 1981 by D Freke

Material: charcoal: unidentified

Initial comment: from context no 400; from a thick layer of charcoal under the second phase mound, interpreted as a burnt mortuary structure. The context is well stratified, undisturbed, and should not be contaminated.

Objectives: as HAR-5258

Calibrated date: 1 σ : 1890–1690 cal BC
2 σ : 1960–1610 cal BC

Final comment: D Freke and A Thacker (1990), this structure was burnt and demolished before the raising of the second mound.

HAR-5262 3690 ±80 BP

$\delta^{13}C$: -27.6‰

Sample: 14980159, submitted in October 1981 by D Freke

Material: charcoal: unidentified

Initial comment: from a small pit under the first-phase mound, context no 921.

Objectives: as HAR-5258

Calibrated date: 1 σ : 2200–1950 cal BC
2 σ : 2300–1880 cal BC

Final comment: D Freke (1990), the earliest date for the barrow. Consistent with HAR-5260 from the bottom of the first-phase ditch.

Wraysbury, Berkshire

Location: TQ 00137397
Lat. 51.27.19 N; Long. 00.33.31 W

Project manager: S Lobb (Wessex Archaeology), 1980

Archival body: Reading Museum

Description: Wraysbury is situated on the Thames floodplain near the east bank of the river about 2km from the Saxon palace at Old Windsor which lies on the opposite bank. The church, probably a late Saxon foundation, occupies a slight knoll, the highest point in the area, overlooking meadows, with the modern settlement of Wraysbury lying 400m to the north-west. This suggests that the settlement has shifted, perhaps during the medieval period. In view of the prolific material from the site it was decided that the excavation should be designed to recover primarily the economic data for this rural settlement. Secondly, the structural sequence which would probably merely replicate that recovered from other settlement sites such as Chalton and Cowdery's Down, both in Hampshire, where economic evidence was largely lacking.

Objectives: it was hoped that the pottery from the site would provide a relative chronology. This has, however, proved difficult as there appears to be a certain amount of prehistoric as well as Saxon pottery present on the site and it is impossible to separate the two. Furthermore there are few, if any, pottery assemblages of comparable size in this area which have been securely dated which could provide a basis for comparison. There are also very few metal objects from the site, which may provide relative dates. The submitted samples for dating are from features across the excavated area and they should provide some indication of the date range for the whole site or at least a good mean date. It may also go some way towards resolving the problem of dating the pottery.

HAR-5865 1800 ±120 BP

$\delta^{13}\text{C}$: -20.0‰ (assumed)

Sample: W181/537, submitted on 23 June 1983 by S Lobb

Material: human bone (right femur and right humerus)

Initial comment: skeleton of a young adolescent female in shallow grave 537, fill 515; within a possible timber structure.

Objectives: the location of a burial within the occupation area is very unusual. A radiocarbon date will establish whether it is contemporary or not.

Calibrated date: 1 σ : cal AD 70–390
2 σ : 50 cal BC–cal AD 540

Final comment: G G Astill and S J Lobb (1989), the two Roman dates (HAR-5865 and HAR-5866) are perhaps more surprising as evidence for activity in this period is very slight. Ditch 423 is thought to have been dug in the Saxon period and continued in use into the early medieval period, on the basis of the pottery in the fill. The charcoal from the ditch which produced the date (HAR-5866) and human burial (HAR-5865), found adjacent to the ditch, clearly indicate more extensive activity in the area than was discernible in the archaeological record. This creates an obvious problem in interpreting the occupation of this phase. The date from the ditch suggests a later Roman date and it is interesting to note the late Roman coin (Valens) from an adjacent area.

HAR-5866 1710 ±70 BP

$\delta^{13}\text{C}$: -25.6‰

Sample: W181/198, submitted on 23 August 1983 by S Lobb

Material: charcoal (remaining comminuted and friable subsample identified): unidentified (43.70g); Pomoideae (0.03g, 1.2%); *Quercus* sp., heartwood and sapwood (0.90g, 37.3%); *Fagus* sp. (0.97g, 40.3%); *Prunus* sp. (0.05g, 2.1%); *Betula* sp. (0.46g, 19.1%) (R Gale 1997)

Initial comment: from the fill of ditch 423, which may form the eastern boundary of the site.

Objectives: to date the activity of the site.

Calibrated date: 1 σ : cal AD 240–420
2 σ : cal AD 130–540

Final comment: see HAR-5865

HAR-5867 2370 ±100 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: W181/201, submitted on 23 August 1983 by S Lobb

Material: charcoal (remaining comminuted and friable subsample identified): unidentified (65.20g); *Cornus* sp. (0.19g, 27%); *Quercus* sp. (0.26g, 37%); *Prunus* sp. (0.25g, 36%) (R Gale 1997)

Initial comment: from a layer in pit 582 which may have been a hearth or an oven; located immediately adjacent to one of the structures recognised in the excavated area.

Objectives: to date the activity of the site.

Calibrated date: 1 σ : 740–380 cal BC
2 σ : 790–200 cal BC

Final comment: G G Astill and S J Lobb (1989), this sample confirms a later Bronze Age/early Iron Age date for feature 588, indicating that pottery fabric type E, which was the largest and most amorphous group from the site, with forms which can be paralleled in both Bronze Age and Saxon assemblages, is probably more likely to be prehistoric in date. This date is consistent with the range of dates determined for contemporary settlement at the nearby late Bronze Age settlement at Petters Sports Field.

HAR-5868 1120 ±100 BP

$\delta^{13}\text{C}$: -25.0‰ (assumed)

Sample: W181/70, submitted on 23 August 1983 by S Lobb

Material: charcoal (remaining subsample identified): unidentified (54.70g); *Fagus* sp. (6.10g, 100%) (R Gale 1997)

Initial comment: from the top layer in ditch 541, which may be part of a field system. The sample is associated with large quantities of burnt flint and some slag.

Objectives: to date the activity of the site.

Calibrated date: 1 σ : cal AD 770–1020
2 σ : cal AD 670–1160

Final comment: G G Astill and S J Lobb (1989), this date accords well with the date for the site suggested by the metalwork and the pottery from the Saxon phase.

Wrekin Hillfort, Shropshire

Location: SJ 630083
Lat. 52.40.15 N; Long. 02.32.50 W

Project manager: S Stanford (University of Birmingham),
1973

Archival body: Acton-Scott History Working Farm

Description: a hillfort. The Wrekin is an isolated lump of rhyolite thrusting from the Shrewsbury Plain near Telford. The environs are extremely steep on all sides and locally include precipices. The approach tracks, from north-east and south-west, enter the Outer Camp and continue along the spine to similarly placed entrances in the Inner Camp, the defences of which enclose three hectares with a stone-revetted rampart. The south-western of the two returned entrances had stone-and-timber guard-rooms constructed over a previously occupied surface (Kenyon 1942, 103). It would therefore appear that this earlier occupation was associated with the Outer Camp defences. Post-holes and pits reported near the south-west gate showed that at some stage the Wrekin was permanently occupied. Excavations took place prior to the BBC constructing a television relay station within the Outer Camp.

Objectives: to help establish a chronology for the site. Apart from a little Iron Age A pottery there is no other evidence of date for this occupation. A section across the north defences of the Outer Camp provided no hint of the relative dates of the two defence systems or of the use of the Outer Camp.

Final comment: S C Stanford (1984), four radiocarbon dates indicate a disastrous fire in the Outer Camp, probably *c* 400 BC. These date the charcoal from a final socket of hut 3 to 2290 ±100 BP (Birm-530); grain from a final socket of hut 2 to 2470 ±180 BP (Birm-531); charcoal from a penultimate socket of hut 3 to 2340 ±70 BP (HAR-4452); and charcoal from the final socket of F40 to 2400 ±70 BP (HAR-4454). There are difficulties in bringing these to a common focus since the first and last refer to the wood of the buildings and so to the date of construction rather than burning; they should be somewhat earlier than the latter event. The date from hut 2 should refer to the destruction of the hut but the standard error quoted here is large. Finally, the earlier hut 3 date should be up to one hut life earlier than the date for the final phase of that hut. It is actually 50 radiocarbon years earlier and this satisfactory relationship encourages greater emphasis being placed on these dates.

Laboratory comment: English Heritage (2009), the results from the three Birmingham dates are published in Shotton *et al* (1975, 268) and calibrate as follows: Birm-530, 750–100 cal BC at 95% confidence; Birm-531, 1000–110 cal BC at 95% confidence; Birm-532 (1960 ±90 BP), 180 cal BC–250 cal AD at 95% confidence (Reimer *et al* 2004).

References: Clark 1975
Kenyon 1942
Reimer *et al* 2004
Shotton *et al* 1975
Stanford 1981
Stanford 1984

HAR-4450 2080 ±80 BP

$\delta^{13}\text{C}$: -23.0‰

Sample: S3, submitted on 27 April 1981 by S C Stanford

Material: grain (carbonised)

Initial comment: from burnt soil on a terrace T1(2).

Objectives: to ascertain whether the date is fourth century BC or first century AD.

Calibrated date: 1 σ : 200 cal BC–cal AD 10
2 σ : 370 cal BC–cal AD 80

Final comment: S C Stanford (1984), Terrace F8. Radiocarbon dates of 370 cal BC–cal AD 80 and 400–1 cal BC (at 95% confidence; Reimer *et al* 2004) were obtained for grain (HAR-4450) and for wood charcoal from layer 2 (HAR-4451). There were two post-holes north of F8. The socket of F16 was 300mm diameter and full of black soil with carbonised grain dated 180 cal BC–cal AD 250 (at 95% confidence; Reimer *et al* 2004; Birm-532). Four small fragments of bronze, SF8, came from the socket. An earlier phase of F16 was marked by a ledge. F29 was 1.1m away, covered by 550 mm of old turf, so not a recent hole. Since there was no charcoal in its packing it had not been cut through the destruction layer involving F16; nor was there any charcoal in the socket. F29 must have preceded F16. These may have been hut-posts or free-standing haytrees; but between them they indicate three phases, the last close to the Roman conquest, since Birm-532 calibrates to AD 48 (Clark 1975, 264). If free-standing, and of oak, like the gate-posts of Midsummer Hill (Stanford 1981, 57) they may have lasted thirty-three years each and carry the use of this area back to *c* 50 BC. If they were members of a four-post hut they could each have been in place for a hundred years (Stanford 1981, 113) and the first would date from *c* 250 BC. Even if F29 belonged to a much earlier phase, F16's two phases would carry the date back to at least 150 BC and so into the bracket indicated by the other two radiocarbon dates from F8, -125 and 215 BC.

References: Clark 1975
Reimer *et al* 2004
Stanford 1981

HAR-4451 2160 ±70 BP

$\delta^{13}\text{C}$: -26.3‰

Sample: S9, submitted on 27 April 1981 by S C Stanford

Material: charcoal: unidentified

Initial comment: from the same context as the grain for HAR-4450.

Objectives: to act as a check on HAR-4450.

Calibrated date: 1 σ : 360–100 cal BC
2 σ : 400 cal BC–cal AD 1

Final comment: see HAR-4450

HAR-4452 2340 ±70 BP

$\delta^{13}\text{C}$: -26.1‰

Sample: S31, submitted on 27 April 1981 by S C Stanford

Material: charcoal: unidentified

Initial comment: from a hut post-hole, T1 F31b.

Objectives: to confirm a possible fifth-century date for the construction of the hut.

Calibrated date: 1 σ : 420–380 cal BC
2 σ : 750–200 cal BC

Final comment: S C Stanford (1984), these comments are on uncalibrated dates and taken from Stanford (1984, 70–1: hut 3). The four-post building had clearly defined final sockets in F31 and F35 although the large F31a may have resulted from the collapse of earth-packing rather than the rotting of a stump as large as 480mm diameter. The socket in F35a was 300mm diameter and filled with carbonized grain and wood charcoal, the latter dated 340 \pm 100 bc (Birm-530) or 420 BC. The fourth post in F31b had been packed with large stones which had collapsed into the socket in which was much carbonised grain and wood charcoal. The latter was dated 390 \pm 70 bc; HAR-4452), equivalent to 445 BC, so twenty-five years older than its successor.

References: Stanford 1981

HAR-4453 1740 \pm 90 BP

$\delta^{13}\text{C}$: -26.5‰

Sample: S12, submitted on 27 April 1981 by S C Stanford

Material: charcoal: unidentified

Initial comment: from a late post-hole, T1 F28.

Objectives: to confirm a late fifth century BC construction date, but a first century AD construction is not ruled out.

Calibrated date: 1 σ : cal AD 170–410
2 σ : cal AD 70–540

Final comment: S C Stanford (1984), these comments are on uncalibrated dates and taken from Stanford (1984, 73). Wood charcoal from this socket was dated 280 \pm 100 ad (HAR-4453), unbelievably late for a site that has produced no Roman sherds from two seasons of excavation. Some of the charcoal was recorded as ‘possibly twigs’ and may have been the burnt roots of more recent vegetation. It is likely that hut 6, like terrace F8, dates to the late Iron Age.

References: Stanford 1981

HAR-4454 2400 \pm 70 BP

$\delta^{13}\text{C}$: -25.5‰

Sample: S36, submitted on 27 April 1981 by S C Stanford

Material: charcoal: unidentified

Initial comment: from the socket of an isolated post-hole, T1 F40.

Objectives: to confirm a similar date as HAR-4453, late fifth century BC, or possibly first century AD.

Calibrated date: 1 σ : 740–390 cal BC
2 σ : 780–370 cal BC

Final comment: S C Stanford (1984), these comments are on uncalibrated dates and taken from Stanford (1984, 70). F40 was of two or three phases with fragments of charred post in the final socket; this gave a date of 410 \pm 80 bc (HAR-4454), or 485 BC, close enough to the lowest date of 635 \pm 180 bc for the destruction of hut 2 to encourage the view that F40 was burnt in the same fire. F40 may have belonged to a neighbour of hut 2;

the other posts here may have been free-standing posts of the later Iron Age occupation. No artefacts were found in these three holes. It may be pointed out that the burning of huts was not a routine procedure; for although nearly all the final sockets had been burnt, there was seldom any amount of charcoal in the post-hole packing. The replacements had not normally been dug through a burnt surface. So far there are only indications of two disastrous fires, one in the fifth century BC or earlier, the other in the first century AD.

References: Stanford 1981

Wroxeter, Shropshire

Location: SJ 565088
Lat. 52.40.29 N; Long. 02.38.36 W

Project manager: K B Pretty (Unknown), 1980

Archival body: Shropshire Museums Service

Description: excavations carried out from 1966 to 1990 on the northern half of insula 5 in the Roman town of *Viroconium Cornoviorum*, uncovered the entire floor of the basilica and the frontages of buildings on the adjacent insulae 2 and 6. The samples were taken from phase pre-Z, the partial demolition of the basilica, construction of the gravel street, and robbing of some of the portico colonnades.

Objectives: to investigate the latest occupation of the Baths Basilica and understanding the transition between the Roman and medieval times at Wroxeter.

References: Barker *et al* 1997

HAR-5628 1810 \pm 80 BP

$\delta^{13}\text{C}$: -26.2‰

Sample: WP 288D394, submitted on 8 October 1982 by K B Pretty

Material: charcoal: *Corylus avellana*

Initial comment: the charcoal was obtained from next to the furnace in the north portico of the Basilica.

Objectives: to date the basilica.

Calibrated date: 1 σ : cal AD 80–330
2 σ : cal AD 20–410

Final comment: P Barker, R White, K Pretty and M Corbishley (1997), these dates have no relevance for the dating of the phasing but are of interest on their own account. These samples came from charred beams and were probably from the basilica itself, which was no doubt constructed from trees, which had been growing well before the foundation of the town.

HAR-5629 1940 \pm 100 BP

$\delta^{13}\text{C}$: -27.3‰

Sample: WP 14BD345, submitted on 8 October 1982 by K B Pretty

Material: charcoal: unidentified

Initial comment: the charcoal was obtained from a charred beam in the portico of the Basilica

Objectives: as HAR-5628

Calibrated date: 1 σ : 50 cal BC–cal AD 140
2 σ : 200 cal BC–cal AD 330

Final comment: see HAR-5628

Yapton, West Sussex

Location: SU 96540245
Lat. 50.48.47 N; Long. 00.37.46 W

Project manager: D Rudling (Institute of Archaeology, London), 1984

Archival body: Worthing Museum

Description: a late Bronze Age settlement situated on the coastal plain of West Sussex.

Objectives: the purpose of the investigations in 1984 was to establish the date, nature and extent of a prehistoric site subject to plough damage.

References: Rudling 1987
Walker *et al* 1990, 182

HAR-7038 2600 \pm 70 BP

$\delta^{13}\text{C}$: -26.4‰

Sample: 1984 1944, submitted in September 1985 by C Cartwright

Material: charcoal: *Salix/Populus* sp.; Leguminosae; *Quercus* sp.; *Corylus* sp.; *Crataegus* sp. (C Cartwright 1985)

Initial comment: from context 4, one of the fills of pit 2.

Objectives: although this site contained prehistoric pottery comparable with other prehistoric sites on the coastal plain, this is the only site of the type to provide material in close association with the pottery which is suitable for radiocarbon dating. By dating this pit fill and associated pottery many valuable comparative dating brackets for pottery from other coastal plain sites may be established.

Calibrated date: 1 σ : 820–760 cal BC
2 σ : 900–540 cal BC

Final comment: D Rudling (26 November 1996), Sussex generally lacks adequately dated stratified pottery of the late Bronze Age. The Yapton excavations therefore provided a useful opportunity to improve this situation. The radiocarbon date obtained is compatible with a ninth, or possibly eighth century BC date, which Dr Sue Hamilton has suggested for the associated pottery finds on the basis of comparisons with pottery from other sites in Sussex and elsewhere in the south-east.

York: 16-22 Coppergate, North Yorkshire

Location: SE 60445168
Lat. 53.57.27 N; Long. 01.04.44 W

Project manager: R A Hall (York Archaeological Trust), 1976–81

Archival body: York Archaeological Trust

Description: Coppergate, one of many York streets with a name of Scandinavian derivation, runs through the heart of modern York, though it lies some way outside the Roman legionary fortress. A late Saxon, Viking and medieval settlement.

Objectives: during a watching brief, an Anglo-Saxon helmet was unearthed, only the third, after the Sutton Hoo and Benty Grange examples, to have been found. The surrounding area was cleaned and excavated. Samples HAR-5974 and HAR-5975 were submitted to help clarify when the helmet was deposited; HAR-6433 from the well shaft was thought to be Anglian, but confirmation was needed.

Laboratory comment: Ancient Monuments Laboratory (1995), four further dates (HAR-2915, HAR-2916, HAR-3088, and HAR-3089) from this site were published in the first volume of *Radiocarbon Dates* (Jordan *et al* 1994, 235–6).

References: Addyman *et al* 1982
Hall 1984
Jordan *et al* 1994, 235–6
Tweddle 1992

HAR-5974 1160 \pm 70 BP

$\delta^{13}\text{C}$: -29.1‰

Sample: 82.22/68, submitted in September 1983 by A Jones

Material: wood (waterlogged): *Fraxinus* sp., air dried

Initial comment: stake fragments from a pit lining a few metres from the pit which contained the Coppergate helmet. They were overlain by modern building rubble and some medieval layers but finds from the pit are not accurately datable.

Objectives: the Coppergate helmet is thought to be Anglian because of its decoration and style yet the finds from the area were medieval. We want to know if the helmet was deposited during the Anglian period or if it was lost or discarded some time later. Radiocarbon dating should provide an answer.

Calibrated date: 1 σ : cal AD 770–980
2 σ : cal AD 680–1020

Final comment: R A Hall (11 December 1996), the date from the lining of the pit allows an Anglian or Anglo-Scandinavian date for it, although taken together with other dating evidence, including radiocarbon determinations, a date within the Anglian period seems most likely.

References: Walker *et al* 1988, 339

HAR-5975 1250 \pm 70 BP

$\delta^{13}\text{C}$: -27.4‰

Sample: 82.22/72, submitted in September 1983 by A Jones

Material: wood (waterlogged): *Quercus* sp., twigs

Initial comment: from the same fills as the Coppergate helmet.

Objectives: see HAR-5974. This sample only differs from HAR-5974 in that the twigs come from the fills of the pit rather than from an adjacent feature.

Calibrated date: 1 σ : cal AD 670–890
2 σ : cal AD 650–970

Final comment: R A Hall (11 December 1996), this date suggests an Anglian date for the use of this pit is most likely, and this is supported by other evidence.

References: Walker *et al* 1988, 339

HAR-6433 1290 \pm 80 BP

$\delta^{13}\text{C}$: -29.8‰

Sample: 80.71922, submitted on 26 October 1984 by A Jones

Material: wood: *Corylus* sp., brushwood

Initial comment: from a well thought to be Anglian in date. The sample was collected from the wattle surrounding the main well shaft. It is thus contemporary with the well's construction.

Objectives: a radiocarbon date would establish whether or not to include the material from the well within any publication on the Anglo-Scandinavian archaeology of York.

Calibrated date: 1 σ : cal AD 650–810
2 σ : cal AD 600–940

Final comment: R A Hall (11 December 1996), the wattle sample came from the cut dug to receive a hollowed tree which presumably acted as a well shaft. On stratigraphic grounds the well is consigned to the period *c.* 850–900 rather than to the mid-tenth century, as originally thought: the scientific dating supports this earlier attribution.

York: Aldwark, Ebor Brewery, North Yorkshire

Location: SE 60655208
Lat. 53.57.41 N; Long. 01.04.31 W

Project manager: J Magilton (York Archaeological Trust), 1974 and 1976

Archival body: York Archaeological Trust

Description: an extensive cemetery and pre-conquest church, extended in the twelfth century and widened in the thirteenth century (probably St Helen on the Walls).

Objectives: to elucidate the origins and growth of a York parish church of relatively low status and its cemetery.

Laboratory comment: Ancient Monuments Laboratory (1995), three further samples (HAR-2898, -2899–2900) were dated before 1981 and published in Jordan *et al* (1994, 238).

References: Dawes and Magilton 1980, 10, 15, 18
Jordan *et al* 1994, 238
Walker and Otlet 1988, 316

HAR-6887 680 \pm 80 BP

$\delta^{13}\text{C}$: -21.3‰

Sample: EBR5556, submitted on 30 August 1977 by H Kenward

Material: human bone (145g) (fragmentary skull of man 25 to 35 years old, with widespread ulceration of external surface of both parietals and frontal bone)

Initial comment: the sample is part of a human skull, the remaining elements which show possible signs of syphilis. From context 1162, described as 'late medieval level,' northwest (ie, on liturgical north side) of church of St Helen-on-the-Walls, Ebor Cemetery, Aldwark.

Objectives: to determine whether the skull was pre-1500.

Calibrated date: 1 σ : cal AD 1260–1400
2 σ : cal AD 1210–1420

Final comment: K Cullen (27 July 2010), this result confirms that the burial dates to before AD 1500.

Laboratory comment: AERE Harwell (1986), this sample was measured in the miniature gas proportional counter (Otlet *et al* 1983).

Laboratory comment: English Heritage (1 February 2012), a replicate determination on this skull (OxA-24162, 434 \pm 24 BP; Harper *et al* 2011, table 3) is statistically significantly younger (T'=8.9; T'(5%)=3.8; v=1; Ward and Wilson 1978).

References: Harper *et al* 2011
Otlet *et al* 1983
Ward and Wilson 1978

York: Bedern-Aldwark, North Yorkshire

Location: SE 6052
Lat. 53.57.00 N; Long. 01.05.00 W

Project manager: B Howes (York Archaeological Trust), 1976

Archival body: York Archaeological Trust

Description: the fills of a series of pits cut through late Roman surfaces were investigated by Kenward *et al* (1986, 268–88). These deposits have considerable implications for land-use in central York; the site is within the area of the Roman fortress, and little more than 200m from the Minster (Dobney *et al* 2000, 134).

Objectives: to date the pit.

References: Dobney *et al* 2000
Kenward *et al* 1986

HAR-5666 1210 \pm 80 BP

$\delta^{13}\text{C}$: -30.4‰

Sample: BED ALD01, submitted on 11 July 1983 by H Kenward

Material: peat

Initial comment: from the fill of a late-/post-Roman pit, context 19. Fine plant material which is unlikely to be reworked or residual. Large plant and insect assemblages from this and related contexts show non-urban habitats within the Roman fortress. Insect identification initially suggested gradual *in situ* formation of the layer. A reinterpretation of the evidence has been made by Dobney *et al* (2000).

Objectives: to ascertain if this is a late-Roman or Anglo-Saxon pit.

Calibrated date: 1 σ : cal AD 680–940
2 σ : cal AD 650–1000

Final comment: K Dobney, A Hall, and H Kenward (2000), this dates the pit to the Anglo-Saxon period, although there has been some suggestion that the deposits are Anglo-Scandinavian in date; if so they remain extremely significant for different reasons, since this period is also poorly represented in this part of York, despite abundant evidence from other areas of the city (Dobney *et al* 2000, 135).

References: Dobney *et al* 2000

York: St Mary Bishopshill Junior, North Yorkshire

Location: SE 59985148
Lat. 53.57.21 N; Long. 01.05.09 W

Project manager: C Briden (University of York), 1980

Archival body: York Archaeology Trust, Yorkshire Museum

Description: the church is a complex multi-period structure; the earliest standing fabric is probably eleventh century. The nave roof dates to 1860/1 AD, but incorporates a fifteenth century roof which in turn incorporated still earlier reused rafters, some of which had primitive sockets. Fishbones found in a stratigraphically ambiguous position in an excavation in the churchyard had initially been ascribed to a Viking Age fish factory.

Objectives: to date the early, reused rafters, and the fish bone deposit.

References: Hall *et al* 1987
Jones 1988

HAR-5131 890 \pm 70 BP

$\delta^{13}C$: -28.5‰

Sample: STM1, submitted in June 1982 by H Kenward

Material: wood: *Quercus* sp.

Initial comment: from the outer rings of a roof timber, EAU No. 41. Dendrochronological analysis is also being made by J Hillam at Sheffield University.

Objectives: to date early, reused rafters in the nave roof.

Calibrated date: 1 σ : cal AD 1030–1220
2 σ : cal AD 1010–1280

Final comment: R A Hall (11 December 1996), some of the associated reused rafters were dated to the late eleventh century AD by C A Hewett on the basis of the primitive sockets; this date is a useful adjunct to discussion of the building's chronology.

Laboratory comment: English Heritage (12 January 2010), dendrochronological dating of the rafters gave an estimated felling date of AD 1151+. C A Hewett claimed that the only parallel with these timbers was St Mary's Church, Sompting, Sussex. The felling date range is earlier than

the range obtained for the Sompting timbers of AD 1300–1330 (published in Tyers 1990, 45) (Hillam and Groves 1992, 45–7).

References: Hillam and Groves 1992
Tyers 1990

HAR-5545 2760 \pm 100 BP

$\delta^{13}C$: -21.8‰

Sample: 1975.27A, submitted on 31 March 1983 by A Jones

Material: animal bone (herring bones)

Initial comment: from a layer found on top of a Roman floor and sealed by Viking Age graves. A piece of wind-dried ling from the North Sea was also enclosed in order to assess the levels of C14 in fish.

Objectives: to ascertain whether the bones are late Roman or medieval in date.

Calibrated date: 1 σ : 740–380 cal BC
2 σ : 800–300 cal BC

Final comment: R A Hall (11 December 1996), this suggested date range is obviously unacceptable, as the sample could not be earlier than the later Roman period.

Laboratory comment: AERE Harwell (3 May 1985), the Bishopshill fish result was a rather more depressed age than we might have expected considering that research into shells has shown that the 'apparent age' of the waters around the coast of the United Kingdom is 410 years (Harkness 1983). However, the modern fish also showed a rather greater depletion as it produced a result of 84% modern, equivalent to a radiocarbon age of 1330 \pm 80 BP, when the atmospheric level of carbon-14 in 1983 was running at 126% modern. If we applied a depletion of this magnitude to your result then the age of the fish would be ridiculously recent. Our assumption at this point was that the modern ling was probably giving a spuriously old age because of its habitat, which could have been close to some upwelling from the deeper ocean.

Laboratory comment: English Heritage (10 October 2011), this measurement has been calibrated using the marine calibration data of Hughen *et al* (2004) and a ΔR value of 5 \pm 40 BP for the coastal waters off England (Stuiver and Braziunas 1993). Given the archaeological context of this sample, this is patently incorrect. Assuming this radiocarbon age is accurate, a more depleted marine source is indicated for the herring. This is by no means impossible.

If salt herring was imported from the western Baltic, for example, the measurement could be calibrated using a ΔR correction of 569 \pm 58 BP (Randers Fjord, Heier-Nielsen *et al* 1995), producing a calibrated date of 130 cal BC–cal AD 440 (95% confidence), or cal AD 30–300 (68% confidence), which is not incompatible with a late Roman date for this deposit.

References: Harkness 1983
Heier-Nielsen *et al* 1995
Hughen *et al* 2004
Stuiver and Braziunas 1993

York: Walmgate, North Yorkshire

Location: SE 60965149
Lat. 51.57.21 N; Long. 01.04.15 W

Project manager: D Brinklow (York Archaeological Trust),
1979

Archival body: York Archaeological Trust

Description: domestic occupation and industrial activity on the street front in the Anglo-Scandinavian and medieval periods.

Objectives: to assist the chronological analysis of a sequence of features from which artefactual evidence was poor.

Final comment: R Hall (28 September 2007), no comments, since the material awaits post-excavation analysis.

Laboratory comment: Ancient Monuments Laboratory (1995), nine further dates (HAR-3756, HAR-3757, HAR-3758, HAR-3790, HAR-3844, HAR-3881, HAR-3907, HAR-3910, HAR-3916) were published in Jordan *et al* (1994, 241–2).

References: Jordan *et al* 1994, 241–2

HAR-3917 1060 ±80 BP

$\delta^{13}\text{C}$: -28.2‰

Sample: WLM134, submitted on 20 March 1980 by H K Kenward

Material: charcoal (remaining subsample identified): unidentified (0.51g); *Quercus* sp., heartwood (0.01g, 3.7%); *Alnus* sp. (0.07g, 25.9%); *Quercus* sp., sapwood (0.19g, 70.4%) (R Gale 2000)

Initial comment: from a layer within a putative ditch; context 3284. Artefactual evidence is poor.

Objectives: to confirm probable twelfth-century AD date.

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

Final comment: see series comment

References: Brinklow 1979a
Brinklow 1979b

HAR-3930 950 ±70 BP

$\delta^{13}\text{C}$: -25.9‰

Sample: WLM8006, submitted on 20 March 1980 by H K Kenward

Material: wood (waterlogged): *Quercus* sp. (A R Hall)

Initial comment: the outer wood split from an upright pit lining support; context 3478.

Objectives: to clarify whether late Saxon or early medieval.

Calibrated date: 1 σ : cal AD 1010–1170
2 σ : cal AD 970–1230

Final comment: see series comment

References: Brinklow 1979a
Brinklow 1979b

Bibliography

- Addyman, P V, Pearson, N, and Tweddle, D, 1982 The Coppergate helmet, *Antiquity*, **56**, 189–94
- Ainslie, R, and Wallis, J, 1987 Excavations on the Cursus at Drayton, Oxon, *Oxoniensia*, **52**, 4–6
- Aldsworth, F, 1983 *A bronze hoard from Ferring*, unpubl rep, West Sussex County Council
- Allen, D, and Dalwood, C H, 1983 Iron Age occupation, a middle Saxon cemetery, and twelfth to nineteenth century urban occupation: excavations in George Street, Aylesbury, 1981, *Rec Buckinghamshire*, **25**, 1–60
- 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
- Allen, M J, and Green, M G, 2000 Soils, pollen and lots of snails, in *A landscape revealed: 10 000 years on a chalkland farm* (ed M Green), 36–49, Stroud: Tempus
- Allen, M J, and Scaife, R, 2007 A new downland prehistory: long term environmental change on the southern English chalklands, in *Prehistoric and Roman landscapes* (eds A Fleming and R Hingley), 1–256, Macclesfield: Windgather Press
- Allen, M J, and Walker, K E, 2000 Landscape and economy: a discussion of the environmental evidence, in *Twyford Down, Hampshire: archaeological investigation on the M3 motorway from Bar End to Compton, 1990–93* (ed D E Farewell), Hampshire Fld Club Monogr, **9**, 158–9, Winchester: Hampshire Fld Club Archaeol Soc
- Allen, M J, Morris, M, and Clark, R H, 1995 Food for the living: a reassessment of a Bronze Age Barrow at Buckskin, Basingstoke, Hampshire, *Proc Prehist Soc*, **61**, 157–89
- Allen, T G, 1990 *An Iron Age and Romano-British enclosed settlement at Watkins Farm, Northmoor, Oxon*, Thames Valley Landscapes: The Windrush Valley, **1**, Oxford: Oxford Univ Comm Archaeol
- Allen, T G, 1993 *The prehistoric landscape and Iron Age enclosed settlement at Mingies Ditch, Hardwick-with-Yelford, Oxfordshire*, Thames Valley Landscapes: the Windrush Valley, **2**, Oxford: Oxford Archaeol Unit
- Allen, T G, Darvill, T C, Green, L S, and Jones, M U, 1993 *Excavations at Roughground Farm, Lechlade, Gloucestershire: a prehistoric and Roman landscape*, Oxford: Oxford Archaeol Unit
- Andrews, D, and Merriman, N, 1986 A prehistoric timber structure at Richmond Terrace, Whitehall, *Trans London Middlesex Archaeol Soc*, **37**, 17–21
- Andrews, P, 1997 *Excavations at Hamwic, volume 2: excavations at Six Dials*, CBA Res Rep, **109**, Southampton Archaeol Monogr, York: CBA
- ApSimon, A M, 1954 Dagger graves in the Wessex Bronze Age, *Annual Rep Univ London Inst Archaeol*, **10**, 37–62
- ApSimon, A M, 1985 The carbon dates for the Collared Urn burials, in A Bronze Age barrow cemetery and associated settlement at Roxton, Bedfordshire, (eds A F Taylor and P J Woodward), *Archaeol J*, **142**, 120
- Armstrong, P, Tomlinson, D, and Evans, D H, 1991 *Excavations at Lurk Lane Beverley 1979–82*, Sheffield Excavation Rep, **1**, Sheffield: Collis
- Ashbee, P, 1963 The Wilsford Shaft, *Antiquity*, **37**, 116–30
- Ashbee, P, 1966 The dating of Wilsford Shaft, *Antiquity*, **40**, 227–8
- Ashbee, P, 1978 Amesbury Barrow 51, Excavations 1960, *Wiltshire Archaeol Natur Hist Mag*, **70/71**, 1–60
- Ashbee, P, 1979–80 Amesbury Barrow 39, Excavations 1960, *Wiltshire Archaeol Natur Hist Mag*, **74/75**, 3–34
- Ashbee, P, 1984 The excavation of Amesbury barrows 58, 61a, 61, 72, *Wiltshire Archaeol Natur Hist Mag*, **79**, 39–91
- Ashbee, P, 1986 The excavation of Milton Lilbourne barrows 1–5, *Wiltshire Archaeol Natur Hist Mag*, **80**, 23–96
- Ashbee, P, 1992 Amesbury Barrows 61 and 62: a Radiocarbon Postscript, *Wiltshire Archaeol Natur Hist Mag*, **85**, 140–1
- Ashbee, P, Bell, M, and Proudfoot, E, 1989 *Wilsford Shaft: excavations 1960–2*, Engl Heritage Archaeol Rep, **11**, London: Engl Heritage
- Ashmore, P, 1999 Radiocarbon dating: avoiding errors by avoiding mixed samples, *Antiquity*, **73**, 124–30
- Atkinson, R J C, Piggott, C M, and Sanders, N K, 1951 *Excavations at Dorchester, Oxon*, Oxford: Ashmolean Museum
- Atkinson, R J C, Vatcher, F de M, and Vatcher, H L, 1976 Radiocarbon dates for the Stonehenge Avenue, *Antiquity*, **50**, 239–40
- Audouy, M, and Chapman, A, 2009 *Raunds: the origin and growth of a midland village AD 450–1500: excavations in north Raunds, Northamptonshire 1977–87*, Oxford: Oxbow Books
- Austin, D, 1980 Barnard Castle, Co Durham. Second interim report: excavation in the inner ward 1976–8, the later medieval period, *J Brit Archaeol Ass*, **133**, 86–96
- Austin, D, 1984 Dartmoor and the Upland village of the south-west of England, in *Medieval villages: a review of current work* (ed D Hooke), Oxford Univ Comm Archaeol Monogr, **5**, 71–9, Oxford: Oxford Univ Comm
- Austin, D, and Walker, M J C, 1985 A new landscape context for Houndtor, Devon, *Medieval Archaeol*, **29**, 147–52
- Austin, D, Daggett, R H, and Walker, M J C, 1980 Farms and fields in Okehampton Park, Devon: the problems of studying medieval landscape, *Landscape Hist*, **2**, 39–58
- Austin, D, Gerrard, G A M, and Greeves, T A P, 1989 Tin and agriculture in the Middle Ages and beyond: landscape archaeology in St Neot Parish, Cornwall, *Cornish Archaeol*, **28**, 5–251
- Ayers, B S, 1994 *Excavations at Fishergate, Norwich, 1985*, E Anglian Archaeol Rep, **68**, Dereham: Norfolk Museums Service, Fld Archaeol Division
- Baillie, M G L, 1990 Checking back on an assemblage of published radiocarbon dates, *Radiocarbon*, **32**, 361–6

- Bain, M G, 1991 *Palaeoecological studies in the Rivington Anglezarke Uplands Lancashire, Volume I, II, III*, unpubl PhD thesis, Univ Salford
- Balaam, N, Bell, M, David, A, Levitan, B, MacPhail, R, Robnson, M, and Scaife, R, 1987 Prehistoric and Romano-British sites at Westward Ho!, Devon: archaeological and palaeoenvironmental surveys 1983 and 1984, in *Environmental studies in south-west Britain* (ed N Balaam), BAR Brit Ser, **181**, 163–264, Oxford: Brit Archaeol Rep
- Bamford, H M, 1982 *Beaker domestic sites in the Fen Edge and East Anglia*, E Anglian Archaeol Rep, **16**, Dereham: Norfolk Archaeol Unit
- Bamford, H M, 1985 *Briar Hill excavation 1974–78*, Northampton Devel Corp Archaeol Monogr, **3**, Northampton: Northampton Devel Corp
- 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, Lambrick, G, Moore, J, and Robnson, M, 2003 *Lines in the landscape. Cursus monuments in the Upper Thames Valley: excavations at the Drayton and Lechlade cursuses*, Thames Valley Landscapes Monogr, **15**, Oxford: Oxford Univ School Archaeol
- Barker, H, Burleigh, R, and Meeks, N, 1971 British Museum Natural Radiocarbon Measurements VII, *Radiocarbon*, **13**, 157–88
- Barker, P, White, R, Pretty, K, Bird, H, and Corbishley, M, 1997 *The Baths Basilica, Wroxeter excavations 1966–90*, Engl Heritage Archaeol Rep, **8**, London: Engl Heritage
- Barrett, J, 1976 Deverel-Rimbury: problems of chronology and interpretation, in *Settlement and economy in the third and second millennia BC* (eds C B Burgess and R Miket), Brit Archaeol Rep, **33**, 289–307, Oxford: BAR
- Barrett, J, Bradley, R, and Green, M, 1991 *Landscape, monuments and society: the prehistory of Cranborne Chase*, Cambridge: Cambridge Univ Press
- Batchelor, D, 1977 Dorchester excavations, in Dorset Archaeology in 1977, *Dorset Natur Hist Archaeol Soc Proc*, **99**, 121
- Batchelor, D, 1983 Church Street, Dorchester, *Dorset Natur Hist Archaeol Soc Proc*, **105**, 150
- Bayliss, A, 2002 Radiocarbon analyses of human bone from Baines (Site 46), in *Cataractonium: Roman Catterick and its hinterland, excavations and research 1958–1997* (ed P Wilson), CBA Res Rep, **129**, 381–2
- Bayliss, A, 2009 Rolling out Revolution: using radio-carbon dating in archaeology, *Radiocarbon*, **51**, 123–47
- Bayliss, A, and Atkins, C, 2011 Chapter 15: Specialist Studies 1, Interpreting Chronology, in *St Peter's, Barton-upon-Humber, Lincolnshire: a parish church and its community. Volume 1: History, Archaeology and Architecture, Part 2* (eds W Rodwell with C Atkins), 753–88, Oxford: Oxbow Books
- Bayliss, A, and Bronk Ramsey, C, 2004 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, Barclay, A, Lambrick, G, and Robnson, M, 2003 Radiocarbon determinations, in *Cursus monuments in the upper Thames valley: excavations at the Drayton and Lechlade cursuses* (eds A J Barclay, G Lambrick, J Moore, and M Robnson), Thames Valley Landscapes Monogr, **15**, 180–5, Oxford: Oxford Univ School Archaeol
- Bayliss, A, Bronk Ramsey, C, van der Plicht, J, and Whittle, A, 2007 Bradshaw and Bayes: towards a timetable for the Neolithic, *Cambridge Archaeol J*, **17(1) suppl**, 1–28
- Bayliss, A, Healy, F, Bronk Ramsey, C, McCormac, F G, and Mercer, R, 2008 Interpreting Chronology, in *Hambledon Hill, Dorset, England: excavation and survey of a Neolithic monument complex and its surrounding landscape* (eds R Mercer and F Healey), 378–411, Swindon: Engl Heritage
- Bayliss, A, Healy, F, Bronk Ramsey, C, McCormac, F, and Mercer, R, 2009 Interpreting chronology, in *Hambledon Hill, Dorset, England. Excavation and Survey of a Neolithic Monument Complex and its Surrounding Landscape (English Heritage Archaeological Report)* (eds R Mercer and F Healy), 378–411, Swindon: Engl Heritage
- Bayliss, A, McCormac, F G, van der Plicht, J, 2004 An illustrated guide to measuring radiocarbon from archaeological samples, *Physics Education*, **39**, 137–44
- Bayliss, A, and Tyers, I, 2004 Interpreting radiocarbon dates using evidence from tree rings, *Radiocarbon*, **46**, 957–64
- Beck, C, and Shennan, S, 1991 *Amber in prehistoric Britain*, Oxbow Monogr, **8**, Oxford: Oxbow Books
- Beckett, S C, 1979 The Palaeobotanical background to the Meare Lake village sites, *Somerset Levels Pap*, **5**, 18–24
- Beckett, S C, and Hibbert, F A, 1979 Vegetational change and the influence of prehistoric man in the Somerset Levels, *New Phytol*, **83**, 577–600
- Bedwin, O, 1991 Asheldham Camp - an early Iron Age hill fort: the 1985 excavations, *Essex Archaeol and Hist*, **22**, 13–37
- Bell, M, 1990 *Brean Down excavation 1983–1987*, Engl Heritage Archaeol Rep, **15**, London: Engl Heritage
- 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
- Bennett, P, Tatton-Brown, T, and Blockley, K, 1980 Interim report on excavations in 1980 by the Canterbury Archaeological Trust, *Archaeol Cantiana*, **96**, 396–410
- Beresford, G, 1979 Three deserted medieval settlements on Dartmoor: a report of the late E. Marie Minter's excavation, *Medieval Archaeol*, **23**, 98–158
- Bewley, R H, 1960 Excavations on two crop-marks sites in the Solway plain, Cumbria. Ewanrigg settlement and Swarthy Hill 1986–1988, *Trans Cumberland Westmorland Antiqu Archaeol Soc*, **92**, 23–47
- Bewley, R H, 1986 Ewanrigg Bronze Age cremation cemetery, *Antiquity*, **60**, 225–6
- Bewley, R H, 1987 Ewanrigg, *Current Archaeol*, **103**, 230–3
- Bewley, R H, Longworth, I H, Browne, S, Huntley, J P, and Varndell, G, 1992 Excavation of a Bronze Age cemetery at Ewanrigg, Maryport, Cumbria, *Proc Prehist Soc*, **58**, 325–54

- Biddle, M, and Kjølbye-Biddle, B, 1988 The churches of Much Wenlock, *Brit Archaeol Ass*, **141**, 178–83
- Blake, B, 1960 Excavations of native (Iron Age) sites in Cumberland, 1956–8, *Trans Cumberland Westmorland Antiq Archaeol Soc*, **59**, 1–15
- Boddington, A, 1987 Raunds, Northamptonshire: analysis of a country churchyard, *World Archaeol*, **18**, 411–25
- Boddington, A, 1996 *Raunds Furnells: the Anglo-Saxon church and churchyard, Raunds Area Project*, Engl Heritage Archaeol Rep, **7**, London: Engl Heritage
- Bond, D, 1991 An excavation at Wall Camp, Kynnersley, *Trans Shropshire Archaeol Hist Soc*, **67**, 98–105
- Bonsall, C, 1984 Low Hauxley, Northumberland, *Proc Prehist Soc*, **50**, 398
- Booth, P M, 1989 Roman store buildings at Alcester, *Trans Brimingham Warwickshire Archaeol Soc*, **94**, 63–106
- Booth, P, and Evans, J, 2001 *Roman Alcester series, volume 2. Roman Alcester: northern extramural area, 1969–1988 excavations*, CBA Res Rep, **127**, York: CBA
- Bowman, S, 1990 *Radiocarbon dating*, London: Brit Museum
- Boyson, D, 1995 The outer curtain wall at Aydon Castle: an assessment, unpubl rep, The Archaeol Practice, Univ Newcastle Upon Tyne
- Bradley, R, 1970 The excavation of a Beaker settlement at Belle Tout, East Sussex England, *Proc Prehist Soc*, **36**, 312–79
- Bradley, R, 1992 The excavations of an oval barrow beside the Abingdon causewayed enclosure, Oxfordshire, *Proc Prehist Soc*, **58**, 127–43
- Bradley, R, and Thomas, J, 1985 Some new information on the henge monument at Maumbury Rings, *Dorset Natur Hist Archaeol Soc Proc*, **106**, 132–5
- Bradley, R, Chowne, P, Cleal, R M J, Healy, F, and Kinnes, I, 1992 *Excavations on Redgate Hill, Hunstanton, Norfolk, and at Tattershall Thorpe, Lincolnshire*, E Anglian Archaeol, **57**, Dereham: Norfolk Fld Archaeol Division
- Bradley, R, Lobb, S, Richards, J, and Robinson, M, 1980 Two late Bronze Age settlements on the Kennet Gravels: excavations at Aldermaston Wharf and Knight's Farm, Burghfield, Berkshire, *Proc Prehist Soc*, **46**, 217–95
- Bradshaw, R H W, 1981 Quantitative reconstruction of local woodland vegetation using pollen analysis from a small basin in Norfolk, England, *J Ecol*, **69**, 941–55
- Brew, D S, Holt, T, Pye, K, and Newsham, R, 2000 Holocene sedimentary evolution and palaeocoastlines of the Fenland embayment, eastern England, *Geol Soc London Spec Publ*, **166**, 253–73
- Brewster, T C M, 1965 *Ancient Monuments in England and Wales: a list prepared by the Ministry of public Building and Works, corrected to 31st December 1963*, London: HMSO
- Brewster, T C M, 1968 Prehistoric sites on the Wolds, *Archaeol J*, **125**, 320
- Brewster, T C M, 1969 *Kemp Howe. Annual reports on excavations 1968*, **13**, London: HMSO
- Brewster, T C M, and Finney, A E, 1995 *The excavation of seven Bronze Age barrows on the moorlands of north-east Yorkshire*, Yorkshire Archaeol Rep, **1**, Leeds: Yorkshire Archaeol Soc
- Bridge, M C, 1983 *The use of tree ring widths as a means of dating historic timbers*, unpubl PhD thesis, Portsmouth Polytechnic
- Brinklow, D, 1979a Walmgate, *Interim, Bull York Archaeol Trust*, **6**, 29–33
- Brinklow, D, 1979b Walmgate, *Interim, Bull York Archaeol Trust*, **6**, 27–32
- 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, 2001 Development of the radiocarbon calibration program OxCal, *Radiocarbon*, **43**, 355–63
- Bronk Ramsey, C, 2009 Bayesian analysis of radiocarbon dates, *Radiocarbon*, **51**, 37–60
- Bronk Ramsey, C, Pettitt, P B, Hedges, R E M, Hodgins, G W L, and Owen, D C, 2000 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 29, *Archaeometry*, **42**, 243–54
- Brown, A E, 1980 Archaeology in Northamptonshire 1979, *Northamptonshire Archaeol*, **15**, 169–70
- Brown, N, 1988 A late Bronze Age enclosure at Lofts Farm, Essex, *Proc Prehist Soc*, **54**, 249–302
- Brown, N, 1999 *The archaeology of Ardleigh, Essex: excavations 1955–1980*, E Anglian Archaeol Rep, **90**, Chelmsford: Essex County Council, Heritage Conservation
- Bryant, R, and Heighway, C, 2003 Excavations at St Mary de Lode Church, Gloucester, 1978–9, *Trans Bristol Gloucestershire Archaeol Soc*, **121**, 97–178
- Buck, C E, Cavanagh, W G, and Litton, C D, 1996 *Bayesian Approach to Interpreting Archaeological Data*, Chichester: Wiley-Blackwell
- Buck, C E, Christen, J A, Kenworthy, J B, and Litton, C D, 1994b Estimating the duration of archaeological activity using ¹⁴C determinations, *Oxford Journal of Archaeology*, **13**, 229–40
- 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 Scott, E M, 1994a Making the most of radiocarbon dating: some statistical considerations, *Antiquity*, **68**, 252–63
- 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
- Buckley, D G, 1983 Excavation of a Bronze Age ring-ditch, Clacton Rush Green, *Essex Archaeol Hist*, **15**, 121–8
- Buckley, D G, Hedges, J D, and Brown, N, 2001 Excavations at a Neolithic cursus, Springfield, Essex, 1979–85, *Proc Prehist Soc*, **67**, 101–62

- Burgess, C, 1974 The Bronze Age, in *British Prehistory, a new outline* (ed C Renfrew), 165–72, London: Duckworth
- Burgess, C, 1980 *The age of Stonehenge*, London: Dent
- Burgess, C, 1986 Urnes of no small variety: Collared Urns reviewed, *Proc Prehist Soc*, **52**, 339–51
- Burgess, G R, and Fitzpatrick-Matthews, K J, forthcoming *Excavations at Baldock 1978–94, volume 2: Late Iron Age and early Romano-British cemeteries*, N Hertfordshire District Council and N Hertfordshire Archaeol Soc
- Burleigh, G, 1982 Excavations at Baldock 1980–81: an interim report, *Hertfordshire's Past*, **12**, 3–18
- Burleigh, G R, and Fitzpatrick-Matthews, K J, 2009 *Excavations at Baldock 1978–94, volume 1: a cemetery at Wallington Road*, N Hertfordshire District Council and N Hertfordshire Archaeol Soc
- Burleigh, R, Hewson, A, and Meeks, N, 1976 British Museum natural radiocarbon measurements VIII, *Radiocarbon*, **18**, 16–42
- Burleigh, R, Longworth, I H, and Wainwright, G J, 1972 Relative and absolute dating of four late Neolithic enclosures, *Proc Prehist Soc*, **38**, 389–407
- Butcher, S A, 1978 Excavations at Nornour, Isles of Scilly, 1969–73: the pre-Roman settlement, *Cornish Archaeol*, **17**, 29–112
- Butcher, S, and Garwood, P, 1994 *Rescue excavation: 1938–1972: a report for the Backlog Working Party of the Ancient Monuments Advisory Committee of English Heritage*, London: Engl Heritage
- Butterworth, C A, and Lobb, S J, 1992 *Excavations in the Burghfield Area, Berkshire: developments in the Bronze Age and Saxon landscapes*, Wessex Archaeol Rep, **1**, Salisbury: Wessex Archaeol
- Callow, W J, and Hassall, G I, 1970 National Physical Laboratory radiocarbon measurements VII, *Radiocarbon*, **12**, 181–6
- Callow, W J, Baker, M J, and Hassall, G I, 1965 National Physical Laboratory Radiocarbon measurements III, *Radiocarbon*, **7**, 156–61
- Carr, R, 1992 The Middle-Saxon settlement at Staunch Meadow, Brandon, Suffolk – a final update, *The Quarterly: J Norfolk Archaeol Res Group*, **5**, 16–22
- Carr, R D, Tester, A, and Murphy, P, 1988 The middle Saxon settlement at Staunch Meadow, Brandon, *Antiquity*, **62**, 371–7
- Carver, M, 2010 *The birth of a borough: an archaeological study of Anglo-Saxon Stafford*, Woodbridge: The Boydell Press
- Case, H J, 1977 The Beaker Culture in Britain and Ireland, in *Beakers in Britain and Europe: four studies* (ed R Mercer), BAR, **26**, 71–89, Oxford: Brit Archaeol Rep
- Case, H J, 1995 Stone Wiltshire Beakers and their contexts, *Wiltshire Archaeol Natur Hist Mag*, **88**, 1–17
- Caseldine, A E, 1984 Palaeobotanical investigations at the Sweet Track, *Somerset Levels Pap*, **10**, 65–78
- Caseldine, A E, 1986 The environmental context of the Meare Lake Villages, *Somerset Levels Pap*, **12**, 73–96
- Caseldine, A E, 1988 A reinterpretation of the pollen sequence from Meare, *Somerset Levels Pap*, **14**, 53–6
- Chambers, R A, 1987 The late- and sub-Roman cemetery at Queenford Farm, Dorchester-on-Thames, Oxon, *Oxoniensia*, **52**, 35–69
- Cherry, J, 1965 Flint-chipping sites at Drigg, *Trans Cumberland Westmorland Antiq Archaeol Soc*, **65**, 66–85
- Cherry, J, 1969 Early Neolithic sites at Eskmeals, *Trans Cumberland Westmorland Antiq Archaeol Soc*, **69**, 40–53
- Cherry, J, 1982 Sea cliff erosion at Drigg, Cumbria: evidence of prehistoric habitation, *Trans Cumberland Westmorland Antiq Archaeol Soc*, **82**, 1–6
- Chitty, G, 1986 Greater London's Rescue Archaeology Service – a Rescue News special report, *Rescue News*, **38**, 108
- Chowne, P, 1994 The Bain Valley Survey, in *Looking at the land: archaeological landscapes in eastern England, recent work and future directions* (eds R T Schadla-Hall and M Parker Pearson), 27–32, Leicester: Leicestershire Museums
- Chowne, P, Girling, M, and Grieg, J, 1986 Excavations at an Iron Age defended enclosure at Tattershall Thorpe, Lincs, *Proc Prehist Soc*, **52**, 159–88
- Chowne, P, Healy, F, Bradley, R, and Bradley, R, 1993 The excavation of a Neolithic settlement at Tattershall Thorpe, Lincolnshire, in *Excavations on Redgate Hill, Humstanton, Norfolk, and at Tattershall Thorpe, Lincolnshire* (eds P Chowne, R M J Cleal, F Healy, and I Kinnes), *E Anglian Archaeol*, **57**, 79–117, Dereham: Norfolk Fld Archaeol Division
- Christen, J A, and Litton, C D, 1995 A Bayesian approach to wiggle-matching, *J Archaeol Sci*, **22**, 719–25
- Christie, P M, 1967 A barrow-cemetery in the second millennium BC in Wiltshire, England, *Proc Prehist Soc*, **33**, 336–66
- Christie, P M L, 1985 Barrows on the North Cornish Coast: wartime excavations by C K Croft Andrew 1939–44, *Cornish Archaeol*, **24**, 23–121
- Christie, P M L, 1988 A barrow cemetery on Davidstow Moor, Cornwall: wartime excavations by C K Croft Andrew, *Cornish Archaeol*, **27**, 27–169
- Churchill, D M, 1965 The kitchen midden at Westward Ho!, Devon, England: ecology, age and relation to changes in land and sea level, *Proc Prehist Soc*, **31**, 74–84
- Churchill, D M, 1970 Post-Neolithic to Romano-British sedimentation in the southern Fenlands of Cambridgeshire and Norfolk, in *The Fenland in Roman times: studies of a major area of peasant colonisation with a Gazetteer covering all known sites and finds* (ed C W Phillips), Roy Geogr Soc Res Ser, **5**, 132–46 London: Roy Geogr Soc
- Clapham, A R, 1978 *Upper Teesdale: the area and its natural history*, London: Collins
- Clark, A J, Tarling, D H, and Noël, M, 1988 Developments in archaeomagnetic dating in Britain, *J Archaeol Sci*, **15**, 645–67
- Clark, J G D, 1933 Report on an Early Bronze Age site in the south-eastern Fens, *Antiq J*, **13**, 266–96

- Clark, J G D, and Godwin, H, 1962 The Neolithic in the Cambridgeshire Fens, *Antiquity*, **36**, 10–23
- Clark, J G D, Godwin, H, Godwin, M E, and Clifford, M H, 1935 Report on recent excavations at Peacock's Farm, Shippea Hill, Cambridgeshire, *Antiq J*, **15**, 284–319
- Clark, R M, 1975 A calibration curve for radiocarbon dates, *Antiquity*, **49**, 251–64
- Clarke, A, 1990 *Seeing beneath the soil: prospecting methods in archaeology*, Batsford, London: Routledge
- Clarke, D L, 1970 *Beaker pottery of Great Britain and Ireland*, Cambridge: Cambridge Univ Press
- Clay, P, 1986 A watching brief and salvage excavations at Hemington Fields, Castle Donington, *Leicestershire Archaeol Hist Soc Trans*, **60**, 80–1
- Clay, P, 1992 A Norman mill dam at Hemington Fields, Castle Donington, Leicestershire, in *Alluvial Archaeology in Britain: Proceeding of a Conference sponsored by the RMC Group plc 3–5 January 1991*, British Museum (eds S Needham and M G Macklin), Oxbow Monogr, **27**, 163–8, Oxford: Oxbow Books
- Clay, P, and Salisbury, C R, 1991 A Norman mill dam and other sites at Hemington Fields, Castle Donington, Leicestershire, *Archaeol J*, **147**, 276–307
- Clay, R C C, 1924 An inhabited site of La Tène I, on Swallowcliffe Down, *Wiltshire Archaeol Natur Hist Mag*, **43**, 59–93
- Cloutman, E W, 1988a Palaeoenvironments in the Vale of Pickering. Part 1: Stratigraphy and palaeogeography of Seamer Carr, Star Carr and Flixton Carr, *Proc Prehist Soc*, **54**, 21–36
- Cloutman, E W, 1988b Palaeoenvironments in the Vale of Pickering. Part 2: Environmental history at Seamer Carr, *Proc Prehist Soc*, **54**, 37–58
- Coggins, D, 1986 *Upper Teesdale: the archaeology of a north Pennine valley*, BAR Brit Ser, **150**, Oxford: Brit Archaeol Rep
- Coggins, D, 2004 Simy Folds: twenty years on, in *Land, sea and home: proceedings of a conference on Viking-period settlement, at Cardiff, July 2001* (eds J Hines, A Lane, M Redknap, and C M Gerrard), Soc Medieval Archaeol Monogr, **20**, 325–34, Leeds: Maney Publishing
- Coggins, D, Fairless, K J, and Batey, C E, 1983 Simy Folds: an early medieval settlement site in Upper Teesdale, Co Durham, *Medieval Archaeol*, **27**, 1–26
- Coles, B J, and Dobson, M J, 1989 Calibration of radiocarbon dates from the Somerset Levels, *Somerset Levels Pap*, **15**, 64–9
- Coles, B, and Coles, J, 1986 *Sweet Track to Glastonbury: the Somerset Levels in prehistory*, London: Thames and Hudson
- Coles, J, Caseldine, A, and Morgan, R, 1982 The Eclipse Track 1980, *Somerset Levels Pap*, **8**, 26–39
- Coles, J M, 1987 Meare Village East, the excavations of A Bulleid and H St George Gray 1932–56, *Somerset Levels Pap*, **13**, 1–254
- Coles, J M, 1989 The world's oldest road [Sweet Track, Somerset Levels], *Sci American*, **261**, 78–84
- Coles, J M, and Harding, A F, 1979 *The Bronze Age in Europe*, London: Methuen
- Coles, J M, and Orme, B J, 1976 The Sweet Track, railway site, *Somerset Levels Pap*, **2**, 34–65
- Coles, J M, and Orme, B J, 1979 The Sweet Track: drove site, *Somerset Levels Pap*, **5**, 43–64
- Coles, J M, and Orme, B J, 1981 The Sweet Track 1980, *Somerset Levels Pap*, **7**, 6–12
- Coles, J M, and Orme, B J, 1983 The Sedgemoor Survey 1982, *Somerset Levels Pap*, **9**, 6–8
- Coles, J M, and Orme, B J, 1984 Ten excavations along the Sweet Track (3200 BC), *Somerset Levels Pap*, **10**, 5–45
- Coles, J M, Caseldine, A E, and Morgan, R A, 1988a Some Neolithic brushwood structures 1984–5, *Somerset Levels Pap*, **14**, 34–43
- Coles, J M, Caseldine, A E, and Morgan, R A, 1988b A Neolithic hurdle on Franks' ground 1984, *Somerset Levels Pap*, **14**, 44–9
- Coles, J M, Orme, B J, Caseldine, A E, and Morgan, R A, 1985a A Neolithic jigsaw: the Honeygore complex, *Somerset Levels Pap*, **11**, 51–61
- Coles, J M, Orme, B J, Caseldine, A E, and Morgan, R A, 1985b Godwin's Track: a Bronze Age structure at Sharpham, *Somerset Levels Pap*, **11**, 69–79
- Coles, J M, Orme, B J, Morgan, R A, and Caseldine, A E, 1988c The Meare Heath Track, 1985, *Somerset Levels Pap*, **14**, 6–33
- Colt Hoare, R, 1812 *The ancient history of south Wiltshire*, London: William Miller
- Cotton, J, and Poulton, R, 1991 The ESSO pipeline 1981: archaeological observations, *Surrey Archaeol Collect*, **80**, 161–6
- Cowan, C, Seeley, F, Wardle, A, Westman, A, and Wheeler, L, 2009 *Roman Southwark settlement and economy: excavations in Southwark 1973–91*, Museum of London Archaeol Monogr, **42**, London: Museum of London Archaeol
- Cowie, R, 1987 Lundenwic – 'unravelling the Strand', *Archaeol Today*, **8**, 30–4
- Cowie, R, Layard Whytehead, R, and Blackmore, L, 1988 Two Middle Saxon occupation sites: excavations at Jubilee Hall and 21–22 Maiden Lane, *Trans London Middlesex Archaeol Soc*, **39**, 47–163
- Cox, P W, 1988 A seventh century inhumation cemetery at Shepards Farm, Ulwell, near Swanage, Dorset, *Proc Dorset Natur Hist Archaeol Soc*, **110**, 37–47
- Cracknell, S, 1996 *Roman Alcester series, volume 2. Roman Alcester: defences and defended area, Gateway Supermarket and Gas House Lane*, CBA Res Rep, **106**, York: CBA
- Cracknell, S, and Hingley, R, 1995 Hob ditch linear earthworks: survey and excavations 1987, *Birmingham Warwickshire Archaeol Soc*, **99**, 47–56
- Cramp, R J, and Daniels, R, 1987 New finds from the Anglo-Saxon monastery at Hartlepool, Cleveland, *Antiquity*, **61**, 424–33

- Crowther, D, and Didsbury, P, 1988 Redcliff and the Humber, in *Recent research in Roman Yorkshire: studies in honour of Mary Kitson Clark (Mrs Derwas Chitty)* (eds J Price, P R Wilson, C S Briggs, and S J Hardman), BAR Brit Ser, **193**, 3–20, Oxford: Brit Archaeol Rep
- Crummy, P, 1984 *Excavations at Lion Walk, Balkerne Lane, and Middleborough, Colchester, Essex*, Colchester Archaeol Rep, **3**, Colchester: Colchester Archaeol Trust
- Crummy, P, 1992 *Excavations at Culver Street, the Gilbert School and other sites in Colchester 1971–85*, Colchester Archaeol Rep, **6**, Colchester: Colchester Archaeol Trust
- Cunliffe, B, 1978 *Iron Age communities in Britain: an account of England, Scotland and Wales from the seventh century BC until the Roman conquest*, London: Routledge and Kegan Paul
- Cunliffe, B W, 1984 *Danebury: an Iron Age hillfort in Hampshire, Volumes 1 and 2*, CBA Res Rep, **52**, York: CBA
- Curwen, E C, 1933 Excavations on Thundersbarrow Hill, Sussex, *Antiq J*, **13**, 109–33
- Dacre, M, and Ellison, A, 1981 A Bronze Age urn cemetery at Kimpton, Hampshire, *Proc Prehist Soc*, **47**, 147–203
- Daniels, R, 1988 The Anglo-Saxon monastery at Church Close, Hartlepool, Cleveland, *Archaeol J*, **145**, 158–210
- Daniels, R, 1990 The development of medieval Hartlepool: excavations at Church Close, 1984–85, *Archaeol J*, **147**, 337–410
- Davies, G, and Turner, J, 1979 Pollen diagrams from Northumberland, *New Phytologist*, **82**, 783–804
- Davies, S M, Bellamy, P S, Heaton, M J, and Woodward, P J, 2002 *Excavations at Alington Avenue, Fordington, Dorchester, Dorset 1984–87*, Dorset Natur Hist and Archaeol Soc Monogr, **15**, Dorchester: Dorset Natur Hist Archaeol Soc
- Davies, S M, Stacey, L C, and Woodward, P J, 1986 Excavations at Alington Avenue, Fordington, Dorchester, 1984/5: Interim report, *Dorset Archaeol Natur Hist Soc Proc*, **107**, 101–10
- Davies, S, and Woodward, P, 1995 Dorchester, *Current Archaeol*, **9**, 38–41
- Dawes, J D, and Magilton, J R, 1980 *The cemetery of St Helen-on-the-Walls, Aldwark*, Archaeol York, **12/1**, London: CBA
- Day, S P, 1993 Preliminary results of high-resolution palaeoecological analyses at Star Carr, *Cambridge Archaeol J*, **3**, 129–33
- Day, S P, 1996 Devensian late-glacial and early Flandrian environmental history of the Vale of Pickering, *J Quat Sci*, **11**, 9–24
- De Coninck, F, 1980 Major mechanisms in formation of spodic horizons, *Geoderma*, **24**, 101–28
- Dennis, G, 1978 1–7 St Thomas Street, in *Southwark excavations 1972–1974* (T B Barry Southwark and Lambeth Archaeol Excavation Committee), London and Middlesex Archaeol Soc and Surrey Archaeol Soc Joint Publ, **1**, 291–422 London: London and Middlesex Archaeol Soc and Surrey Archaeol Soc
- Dennis, M, and Schaaf, L, 1975 A Roman building at St Thomas Street, Southwark, *The London Archaeol*, **2**, 270–4
- Dent, J S, 1983 A summary of the excavations carried out in Garton and Wetwang Slack 1964–80, *E Riding Archaeol*, **7**, 1–14
- 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
- Dimbleby, G W, and Evans, J G, 1979 Pollen analysis and land snail analysis of calcareous soils, *J Archaeol Sci*, **1**, 117–33
- Dobney, K, Hall, A, and Kenward, H, 2000 The bioarchaeology of Anglo-Saxon Yorkshire: present and future perspectives, in *Early Deira: archaeological studies of the East Riding in the fourth to ninth centuries AD* (eds H Geake and J Kenny), 133–40, Oxford: Oxbow Books
- 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
- Downey, R, King, A, and Soffe, G, 1980 The Hayling Island temple and religious connections across the Channel, in *Temples, churches and religion: recent research in Roman Britain* (ed W Rodwell), BAR Brit Ser, **77**, 289–304, Oxford: Brit Archaeol Rep
- Dresser, Q, 1970 *A study of sampling and pretreatments of materials for radiocarbon dating*, unpubl PhD thesis, Queen's University, Belfast
- Drewett, P, 1982 *The archaeology of Bullock Down, Eastbourne, East Sussex: the development of a landscape*, Sussex Archaeol Soc Monogr, **1**, Lewes: The Sussex Archaeol Soc
- Drewett, P, 1989 Anthropogenic soil erosion in prehistoric Sussex: excavations at West Heath and Ferring, 1984, *Sussex Archaeol Collect*, **127**, 11–29
- Drewett, P L, 1976 The excavation of four round barrows of the second millennium BC at West Heath, Harting, 1973–5, *Sussex Archaeol Col*, **114**, 126–50
- Drewett, P L, 1985 The excavation of Barrows V–IX at West Heath, Harting, 1980, *Sussex Archaeol Collect*, **123**, 35–60
- Drewett, P L, 1986a The excavation of a Neolithic oval barrow at North Marden, West Sussex, 1982, *Proc Prehist Soc*, **52**, 31–51
- Drewett, P L, 1986b The excavation of a Saxon sunken building at North Marden, West Sussex, 1982, *Sussex Archaeol Collect*, **124**, 109–18
- Eddy, M R, and Turner, C, 1982 *Kelvedon: the origins and development of a Roman small town*, Essex County Council Occas Pap, **3**
- Egan, G, 1991 Industry and economics on the medieval and later London waterfront, in *Waterfront archaeology, proceedings of the third international conference, Bristol, 1988* (eds G L Good, R H Jones, and M W Ponsford), CBA Res Rep, **74**, 9–18, York: CBA
- Ellaby, R L, 1983 *Charkwood: Mesolithic site*, Surrey Archaeol Soc Bulletin, **182**

- Ellaby, R L, 1987 The upper Palaeolithic and Mesolithic in Surrey, in *The archaeology of Surrey to 1540* (eds J Bird and D G Bird), 53–69, Guildford: Surrey Archaeol Soc
- Ellis, P, 1982 Excavations at Silver Street, Glastonbury, 1978, *Somerset Archaeol Natur Soc*, **126**, 17–31
- Ellis, P, 1993 *Beeston Castle, Cheshire, a report on the excavations 1968–85 by Laurence Keen and Peter Hough*, Engl Heritage Archaeol Rep, **23**, London: Engl Heritage
- Ellison, M, 1976 Excavation at Aydon castle, Northumberland, 1975, *Archaeologia Aeliana*, **4**, 133–8
- Erith, F H, and Longworth, I H, 1960 A Bronze Age urnfield on Vincas Farm, Ardleigh, Essex, *Proc Prehist Soc*, **26**, 178–92
- Evans, C, and Hodder, I, 2006a *A woodland archaeology: the Haddenham Project*, MacDonald Inst Archaeol Res, **1**, Cambridge: MacDonald Inst Archaeol Res
- Evans, C, and Hodder, I, 2006b *Marshland communities and cultural landscape: The Haddenham Project*, MacDonald Inst Archaeol Res, **2**, Cambridge: MacDonald Inst Archaeol Res
- Evans, C, and Serjeantson, D, 1988 The backwater economy of a fen-edge community in the Iron Age: the Upper Delphs, Haddenham, *Antiquity*, **62**, 360–70
- Evans, D H, and Tomlinson, D G, 1992 *Excavations at 33–35 Eastgate, Beverley 1983–86*, Sheffield Excavation Rep, **3**
- Evans, J G, Pitts, M W, and Williams, D, 1985 An excavation at Avebury, Wiltshire, 1982, *Proc Prehist Soc*, **51**, 305–10
- Farrar, R, 1951 Archaeological fieldwork in Dorset in 1951, *Proc Dorset Nat Hist Arch Soc*, **73**, 85–115
- Fasham, P, 1977 M3 archaeology, *Curr Archaeol*, **5**, 347–9
- Fasham, P J, 1975 *M3 archaeology, 1974: first report of the M3 Archaeological Rescue Committee*, Winchester: MARC3
- Fasham, P J, 1976a *M3 archaeology, 1975: second report of the M3 Archaeological Rescue Committee*, Winchester: MARC3
- Fasham, P J, 1976b *The archaeological implications of the alternative route (A33) to the proposed M3 motorway*, Winchester: MARC 3
- Fasham, P J, 1978a The excavation of a triple barrow in Micheldever Wood, Hampshire, *Proc Hampshire Fld Club Archaeol Soc*, **35**, 5–40
- Fasham, P J, 1978b *M3 archaeology, 1976–1977: third report of the M3 Archaeological Rescue Committee*, Winchester: MARC3
- Fasham, P J, 1979 Excavations on Bridget's and Burntwood Farms, Itchen Valley Parish, Hampshire, 1974 (Marc 3 sites R5 and R6), *Proc Hampshire Fld Club Archaeol Soc*, **36**, 37–86
- Fasham, P J, 1982 The excavations of four ring ditches in central Hampshire, *Proc Hampshire Fld Club Archaeol Soc*, **38**, 19–56
- Fasham, P J, 1983 Fieldwork in and around Micheldever Wood, Hampshire, 1973–1980, *Proc Hampshire Fld Club Archaeol Soc*, **39**, 5–45
- Fasham, P J, 1985 *The prehistoric settlement at Winnal Down, Winchester: excavations of MARC 3 site R17 in 1976 and 1977*, Hampshire Fld Club Monogr, **2**, M3 Archaeol Rescue Comm Res Rep, Winchester: Hampshire Fld club
- Fasham, P J, 1987 *A 'banjo' enclosure in Micheldever Wood, Hampshire (MARC3 site R27)*, Hampshire Fld Club Archaeol Soc Monogr, **5**, Hampshire: Hampshire Fld Club
- Fasham, P J, and Ross, J M, 1978 A Bronze Age flint industry from a barrow site in Micheldever Wood, Hampshire, *Proc Prehist Soc*, **44**, 47–67
- Fasham, P J, and Whinney, R J B, 1991 *Archaeology and the M3: the watching brief, the Anglo-Saxon settlements at Abbots Worthy and retrospective studies*, Hampshire Fld Club Archaeol Soc Monogr, **7**, Winchester: Hampshire Fld Club Archaeol Soc
- Fenwick, V, 1984 Insula de Burgh: excavations at Burrow Hill, Butley, Suffolk, 1978–1981, in *Anglo-Saxon Studies in Archaeology and History* (eds S C Hawkes, J Campbell, and D Brown), Anglo-Saxon Stud Archaeol Hist, **3**, 35–54, Oxford: Oxford Univ Comm Archaeol
- Ferretti, E, and Graham, A H, 1978 201–211 Borough High Street, in *Southwark excavations 1972–1974* (eds J Bird, A H Graham, H Sheldon, and P Townsend), 53–176, London: London and Middlesex Archaeol Soc and Surrey Archaeol Soc
- Ferris, I, 2010 *The beautiful rooms are empty: excavations at Binchester Roman fort, County Durham, 1976–1981 and 1986–1991*, Durham: Durham County Council
- Ferris, I M, and Jones, R F J, 1980 Excavation at Binchester 1976–1979, in *Roman Frontier Studies, Proceedings of the XIIth International Limes Congress* (eds W S Hanson and L J F Keppie), BAR Int Ser, **71**, 233–54 Oxford: Brit Archaeol Rep
- Ferris, I M, and Wilson, P, 2000 Transforming an elite: reinterpreting late Roman Binchester, in *The late Roman transition in the North* (eds R F J Jones and A Wilmott), BAR Brit Ser, **299**, 1–13, Oxford: Archaeopress
- Field, F N, 1983a Rand Church, in Archaeology in Lincolnshire and South Humberside 1982, *Lincolnshire Archaeol Hist*, **18**, 101–3
- Field, F N, 1983b Rand, St Oswald's Church, in Medieval Britain and Ireland in 1982, *Medieval Archaeol*, **27**, 190–1
- Field, N, 1981 Cherry Willingham, *Lincolnshire Hist Archaeol*, **16**, 70
- Field, N, 1984 Stow Church [excavations in nave], *Lincolnshire Hist Archaeol*, **19**, 105–6
- Field, N, 1986 An Iron Age timber causeway at Fiskerton, Lincolnshire, *Fenland Res*, **3**, 49–53
- Field, N, and Parker Pearson, M, 2004 *Fiskerton. An Iron Age timber causeway with Iron Age and Roman votive offerings: the 1981 excavations*, Oxford: Oxbow Books
- Fleney, J R, 1987 The meres of Holderness, in *East Yorkshire: Field Guide* (ed S Ellis), 73–81, Cambridge: Quat Res Ass
- Frank, R, 1982 A Holocene peat and dune-sand sequence on the coast of north-east England preliminary report, *Quat Newsletter*, **36**, 24–32
- Freke, D J, and Holgate, R, 1990 Excavations at Winwick, Cheshire, in 1980, 1: excavations of two second millennium BC mounds, *J Chester Archaeol Soc*, **70**, 9–30

- Freke, D J, and Thacker, A T, 1990 Excavations at Winwick, Cheshire, in 1980, 2: the inhumation cemetery at Southworth Hall Farm, Winwick, *J Chester Archaeol Soc*, **70**, 31–8
- French, C, and Pryor, F, 2005 *Archaeology and Environment of the Eton Landscape*, E Anglian Archaeol Rep, **109**, Peterborough: Fenland Archaeol Trust
- Gale, R, and Cutler, D, 2000 *Plants in Archaeology*, Otley/London (Westbury Publishing and Royal Botanic Gardens, Kew)
- Garner, A, Prag, J, and Housley, R, 1994 The Alderley Edge shovel, *Curr Archaeol*, **137**, 172–5
- Garton, D, 1983 Newton Cliffs, Lincs/Notts, in *Archaeology in Lincolnshire and South Humberside, 1982*, (eds A J White and M C Solly), *Lincolnshire Hist Archaeol*, **18**, 100–2
- Garton, D, 1987 Buxton, *Current Archaeol*, **9**, 250–3
- Garton, D, 1991 Neolithic settlement in the Peak District: perspective and prospects, in *Recent developments in the archaeology of the Peak District* (eds R Hodges and K Smith), 3–21, Sheffield: Univ Sheffield
- Gates, T, 1983 Unenclosed settlements in Northumberland, in *Settlement in North Britain 1000 BC–AD 1000* (eds J Chapman and H Mytum), BAR, **118**, 103–48, Oxford: Archaeopress
- Gates, T, and O'Brien, C, 1988 Cropmarks at Milfield and New Bewick and the recognition of Grubenhäuser in Northumberland, *Archaeol Aeliana*, **16**, 1–9
- Gibson, A, 1995 First impressions: a review of Peterborough Ware in Wales, in *Unbaked urns of rudely shape: essays on British and Irish pottery for Ian Longworth* (eds I Kinnes and G Varndell), Oxbow Monogr, **55**, 23–39, Oxford: Oxbow Books
- Gibson, A M, 1982 *Beaker domestic sites, a study of the domestic pottery of the late third and early second millennia BC in the British Isles*, BAR, **107**, Oxford: Archaeopress
- Gibson, A, and Kinnes, I, 1997 On the urns of a dilemma: radiocarbon and the Peterborough Ware problem, *Oxford J Archaeol*, **16**, 65–72
- Gillespie, R, Hedges, R E M, and White, N R, 1983 The Oxford radiocarbon accelerator facility, *Radiocarbon*, **25**, 729–37
- Gillespie, R, Hedges, R E M, and Wand, J O, 1984 Radiocarbon dating of bone by Accelerator Mass Spectrometry, *Journal of Archaeological Science*, **11**, 165–70
- Gillespie, R, Gowlett, J A, Hall, E T, Hedges, R E M, and Perry, C, 1985 Radiocarbon dates from the Oxford AMS system: *Archaeometry* datelist 2, *Archaeometry*, **27**, 237–46
- Gingell, C, and Lawson, A J, 1984 The Potterne Project: excavation and research at a major settlement of the late Bronze Age, *Wilts Archaeol Natur Hist Mag*, **78**, 31–4
- Gingell, C, and Lawson, A J, 1985 Excavations at Potterne, 1984, *Wilts Archaeol Natur Hist Mag*, **78**, 101–8
- Giot, P R, 1971 The impact of radiocarbon dating on the establishment of the prehistoric chronology of Brittany, *Proc Prehist Soc*, **27**, 208–17
- Godwin, H, 1940 Studies of the post-glacial history of British vegetation III. Fenland pollen diagrams IV. Post-glacial changes of relative land and sea-level in the English Fenland, *Phil Trans Roy Soc London B*, **230**, 239–303
- Godwin, H, and Clifford, M H, 1938 Studies of the post-glacial history of British vegetation I. Origin and stratigraphy of Fenland deposits in southern Fenland, *Phil Trans Roy Soc London B*, **229**, 323–406
- Godwin, H, and Godwin, M E, 1933 Pollen analyses of Fenland peats at St Germans, near King's Lynn, *Geol Mag*, **70**, 168–80
- Godwin, H, and Switsur, V R, 1966 Cambridge University natural radiocarbon measurements VIII, *Radiocarbon*, **8**, 390–400
- Godwin, H, and Vishnu-Mittre, 1975 Studies of the post-glacial history of British vegetation. XVI. Flandrian deposits of the Fenland margin at Holme Fen and Whittlesey Mere, Hunts, *Phil Trans Roy Soc London B*, **270**, 561–604
- Godwin, H, and Willis, E H, 1961 Cambridge University natural radiocarbon measurements III, *Radiocarbon*, **3**, 60–76
- Godwin, H, Godwin, M E, and Clifford, M H, 1935 Controlling factors in the formation of fen deposits, as shown by peat investigations at Wood Fen, near Ely, *J Ecol*, **23**, 509–35
- Godwin, H, Godwin, M E, Clark, J G D, and Clifford, M H, 1934 A Bronze Age spearhead found in Methwold Fen, Norfolk, *Proc Prehist Soc E Anglia*, **7**, 395–8
- Gowlett, J A J, Hall, E T, Hedges, R E M, and Perry, C, 1986a Radiocarbon dates from the Oxford AMS system: *Archaeometry* datelist 3, *Archaeometry*, **28**, 116–25
- Gowlett, J A J, Hedges, R E M, Law, I A, and Perry, C, 1987 Radiocarbon dates from the Oxford AMS system: *Archaeometry* datelist 5, *Archaeometry*, **29**, 125–55
- Gowlett, J A J, Law, I A, Perry, C, and Perry, C, 1986b Radiocarbon dates from the Oxford AMS system: *Archaeometry* datelist 4, *Archaeometry*, **28**, 206–21
- Gray, H G, 1935 The Avebury excavations, *Archaeologia*, **84**, 99–162
- Green, C, and Rollo-Smith, S, 1984 The excavation of eighteen round barrows near Shrewton, Wiltshire, *Proc Prehist Soc*, **50**, 255–318
- Greenfield, E, 1984 The excavation of three round barrows at Puncknowle, Dorset, 1959, *Proc Dorset Natur Hist Archaeol Soc*, **106**, 65–76
- Gregory, T, 1991 *Excavations in Thetford, 1980–82, Fison Way*, E Anglian Archaeol Rep, **53**, Norfolk: Norfolk Fld Archaeol Division
- Greig, J, 1994 A possible hedgerow flora of Iron Age date from Alcester, Warwickshire, *Circaea*, **11**, 7–16
- Griffith, F M, 1986 Salvage observations at the Dark Age site at Bantham Ham, Thurlestone, in 1982, *Proc Devon Archaeol Soc*, **44**, 39–57
- Griffiths, S, 2012 *Chronological modelling of the Mesolithic/Neolithic transition in the North and Midlands of England*, unpubl PhD thesis, Cardiff Univ

- Grinsell, L V, 1979 The Druid Stoke megalithic monument, Bristol, *Trans Bristol Gloucestershire Archaeol Soc*, **97**, 119–21
- Groves, C, 1987 *Dendrochronological analysis of wood from Alcester, 1985–86*, Anc Mon Lab Rep, **134/87**, London: Engl Heritage
- Groves, C, and Locatelli, C, 2004 *Tree-ring analysis of oak samples from Bushmead Priory, Near Colmworth, Bedfordshire*, Centre for Archaeol Rep, **2004/42**, London: Engl Heritage
- Haddon-Reece, D, 1986 The radiocarbon dates from Milton Lilbourne, their statistical analysis, and a comparison with the dates from Amesbury, in The excavation of Milton Lilbourne barrows 1–5, *Wiltshire Archaeol Natur Hist Mag*, **80**, 81–5
- Haddon-Reece, D, Miles, D H, and Munby, J T, 1990 Tree-ring dates from the Ancient Monuments Laboratory, Historic Buildings and Monuments Commission for England, *Vernacular Architecture*, **21**, 46–9
- Halkon, P, and Millett, M, 1999 *Rural settlement and industry: studies in the Iron Age and Roman archaeology of lowland East Yorkshire*, Yorkshire Archaeol Rep, **4**, Leeds: Yorkshire Archaeol Soc, Roman Antiquities Section
- Hall, D N, 1987 *The Fenland Project, number 2: Fenland landscapes and settlement between Peterborough and March*, E Anglian Archaeol Rep, **35**, Cambridge: Cambridgeshire Archaeol Comm
- Hall, D, and Coles, J, 1994 *Fenland survey: an essay in landscape and persistence*, Engl Heritage Archaeol Rep, **1**, London: Engl Heritage
- Hall, R A, 1984 *The Viking dig*, London: Bodley Head
- Hall, R A, and Woodward, P J, 1977 Radwell excavations, 1974–5: the Bronze Age ring ditches, *Bedfordshire Archaeol J*, **12**, 1–16
- Hall, R A, Briden, C M, and Stocker, D A, 1987 St Mary Bishophill Junior, in *St Mary Bishophill Junior and St Mary Castlegate* (eds L P Wenham, R A Hall, C M Briden, and D A Stocker), *The Archaeol of York*, **8/2**, 75–146 London: CBA
- Hallam, S J, 1970 Settlement around the Wash, in *The Fenland in Roman times: studies of a major area of peasant colonisation with a gazetteer covering all known sites and finds* (ed C W Phillips), Roy Geogr Soc Res Ser, **5**, 22–113 London: Roy Geogr Soc
- Hamilton, W D, Marshall, P D, Miket, R, and Bronk Ramsey C, 2009 Radiocarbon dating, in Thirlings: A Neolithic site in Northumberland (eds R Miket and B Edwards), *Archaeol J*, **165**, 39–44
- Hamilton, W D, Marshall, P D, Hayden, C, and Bronk Ramsey, C, 2010 Radiocarbon dating, in *Berinsfield, Mount Farm* (ed G Lambrick), Thames Valley Landscape Monograph, **19**, Appendix 1, Oxford: Oxford Univ School Archaeol
- Hannaford, H, 2002 The Queen Anne house site: excavated buildings, in *Shrewsbury Abbey: studies in the archaeology and history of an urban abbey* (ed N Baker), Shropshire Archaeol Histor Soc Monogr Ser, **2**, 70–86, Shropshire Archaeol Hist Soc
- Harcourt, R A, 1971 Animal bones from Durrington Walls, in *Durrington Walls excavations 1966–1968* (eds G J Wainwright and I H Longworth), Rep Res Comm Soc Antiq, **39**, 338–50 London: Soc Antiq London
- Hardiman, M A, Fairchild, J E, and Longworth, G, 1992 Harwell radiocarbon measurements XI, *Radiocarbon*, **34**, 47–70
- Harding, A F, and Ostoja-Zagorski, J, 1994 Prehistoric and early medieval activity on Danby Rigg, North Yorkshire, *Archaeol J*, **151**, 6–97
- Harding, D W, 1974 *The Iron Age in lowland Britain*, London: Routledge and Kegan Paul
- Harkness, D D, 1983 The extent of the natural ¹⁴C deficiency in the coast environment of the United Kingdom, *PACT*, **8**, 351–64
- Harman, M, Molleson, T I, and Price, J L, 1981 Burials, bodies, and beheadings in Romano-British and Anglo-Saxon cemeteries, *Bull Brit Mus Natur Hist (Geol)*, **35**, 145–88
- Harper, K N, Zuckerman, M K, Harper, M L, Kingston, J D, and Armelagos, G J, 2011 The origin and antiquity of syphilis revisited: an appraisal of Old World Pre-Columbian evidence for treponemal infection, *Yearbook Physical Anthr*, **54**, 99–133
- Harris, D, Hooper, S, and Trudgian, P, 1984 Excavation of three cairns on Stannon Downs, St Breward, *Cornish Archaeol*, **23**, 141–54
- Hartgroves, S, and Walker, R, 1988 Excavations in the Lower Ward, Tintagel Castle, 1986, *Cornish Stud*, **16**, 9–30
- Haskins, L E, 1978 *The vegetational history of south-east Dorset*, unpubl PhD thesis, Univ Southampton
- Hawkes, J W, and Fasham, P J, 1997 *Excavations on Reading waterfront sites 1979–1988*, Wessex Archaeol Rep, **5**, Salisbury: Trust for Wessex Archaeol
- Hayes, P, and Lane, T, 1992 *The Fenland Project, number 5: Lincolnshire survey, the south-west fens*, E Anglian Archaeol Rep, **55**, Sleaford: Heritage Trust for Lincolnshire
- Hayfield, C, 1987 *An archaeological survey of the Parish of Wharram Percy*, BAR Brit Ser, **172**, Oxford: BAR
- Healy, F, 1984 Farming and field monuments: the Neolithic in Norfolk, in *Aspects of Anglian prehistory* (ed J C Barringer), 77–140, Norwich: Geo Books
- Healy, F, 1988 *The Anglo-Saxon cemetery at Spong Hill, North Elmham, Part VI: occupation during the seventh to second millennia BC*, E Anglian Archaeol Rep, **39**, Dereham: Norfolk Archaeol Unit
- 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
- Hedges, J D, and Buckley, D G, 1978 Excavations at a Neolithic causewayed enclosure, Orsett, Essex, 1975, *Proc Prehist Soc*, **44**, 219–308
- Hedges, R E M, 1981 Radiocarbon dating with an accelerator: review and preview, *Archaeometry*, **23**, 1–18

- Hedges, R E M, Housley, R A, Law, I A, and Perry, C, 1988 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 7, *Archaeometry*, **30**, 155–64
- 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, 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, 1991a Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 12, *Archaeometry*, **33**, 121–34
- Hedges, R E M, Housley, R A, Bronk, C R, and van Klinken, G J, 1991b Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 13, *Archaeometry*, **33**, 279–96
- Hedges, R E M, Housley, R A, Bronk, C R, and van Klinken, G J, 1992 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 14, *Archaeometry*, **34**, 141–59
- Hedges, R E M, Housley, R A, Law, I A, Perry, C, and Gowlett, J A J, 1987 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 6, *Archaeometry*, **29**, 289–306
- Heier-Nielsen, S, Heinemeier, J, Nielsen, H L, and Rud, N, 1995 Recent reservoir ages for Danish fjords and marine waters, *Radiocarbon*, **37**, 875–82
- Heighway, C M, 1978 Excavations at Gloucester: fourth interim report, St Oswald's Priory 1975–6, *Antiq J*, **58**, 103–32
- Heighway, C M, 1980 Excavations at Gloucester: 5th interim report: St Oswald's Priory 1977–8, *Antiq J*, **60**, 207–26
- Heighway, C M, and Bryant, R M, 1999 *The Saxon Minster and medieval priory of St Oswald at Gloucester*, CBA Res Rep, **117**, York: CBA
- Heyworth, A, and Kidson, C, 1982 Sea level changes in southwest England and Wales, *Proc Geol Assoc*, **93**, 91–111
- 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, 1985 *Fiskerton: tree-ring analysis of an Iron Age structure*, Anc Mon Lab Rep, **4692**, London: Engl Heritage
- Hillam, J, 1987 *Tree-ring dating of oak timbers from the Hasholme logboat*, Anc Mon Lab Rep, **35/87**, London: Engl Heritage
- Hillam, J, 1992 The dating of archaeological sites in the United Kingdom, in *Tree rings and environment: proceedings of the International symposium. Lundqua report 34* (eds T S Bartholin, B E Berglund, D Eckstein, F H Schweigruber, and O Eggertsson), 146–9, Lund: Lund Univ
- Hillam, J, and Groves, C, 1992 Tree-ring dates from Sheffield University, *Vernacular Architecture*, **23**, 45–7
- Hillam, J, Groves, C M, Brown, D M, Baillie, M G L, Coles, J M, and Coles, B J, 1990 Dendrochronology of the English Neolithic, *Antiquity*, **64**, 210–20
- Hillam, J, and Morgan, R M, 1986 Tree-ring analysis of Roman timbers, in *The Roman quay at St Magnus House, London: excavations at New Fresh Wharf, Lower Thames Street, London, 1974–1978* (eds T Dyson, L Miller, J Schofield, and M Rhodes), London Middlesex Archaeol Soc Spec Pap, **8**, 75–85, London: London Middlesex Archaeol Soc
- Hinchcliffe, J, 1986 An early medieval settlement at Cowage Farm, Foxley, near Malmesbury, *Archaeol J*, **143**, 240–59
- Hodgson, J, and Brennand, M, 2006 The prehistoric period, in *Research and archaeology in North West England: an archaeological research framework for North West England, volume 1: resource assessment* (ed M Brennand), 23–58, Manchester: CBA North West
- Hodgson, J, and Brennand, M, 2007 The prehistoric period, in *Research and archaeology in North West England: an archaeological research framework for North West England, volume 2: research agenda and strategy* (ed M Brennand), 31–54, Manchester: CBA North West
- Hollinrake, C, and Hollinrake, N, 1991 A late Saxon monastic enclosure ditch and canal, Glastonbury, Somerset, *Antiquity*, **65**, 117–8
- Hollinrake, C, and Hollinrake, N, 1992 The abbey enclosure ditch and a late Saxon canal: rescue excavations at Glastonbury, 1984–8, *Proc Somerset Archaeol Natur Hist Soc*, **136**, 73–93
- Hopkins, J J, 1980 Turf huts in the Lizard District, *J Roy Instit Cornwall*, **8**, 247–9
- Hough, P R, 1984 Beeston Castle, *Curr Archaeol*, **91**, 245–9
- Housley, R A, 1986 *The environment of Glastonbury Lake Village*, unpubl PhD thesis, Univ Cambridge
- Howard-Davis, C, 1996 Seeing the sites: survey and excavation on the Anglezarke Uplands, Lancashire, *Proc Prehist Soc*, **61**, 133–66
- Hughen, K A, Baillie, M G L, Bard, E, Beck, J W, Bertrand, C J H, Blackwell, P G, Buck, C, Burr, G S, Cutler, K B, Damon, P E, Edwards, R L, Fairbanks, R G, Friedrich, M, Guilderson, T P, Kromer, B, McCormac, G, Manning, S, Bronk Ramsey, C, Reimer, P J, Reimer, R W, Remmele, S, Southon, J R, Stuiver, M, Talamo, S, Taylor, F W, van der Plicht, J, and Weyhenmeyer, C E, 2004 Marine04 Marine Radiocarbon Age Calibration, 0–26 cal kyr BP, *Radiocarbon*, **46**, 1059–86
- Hughes, G, and Crawford, G, 1995 Excavations at Wasperton, Warwickshire, 1980–85. Introduction and part 1: the Neolithic and Early Bronze Age, *Trans Birmingham Warwickshire Archaeol Soc*, **99**, 9–45
- Hughes, M, Milsom, S J, and Leggett, P A, 1981 Sapwood estimates in the interpretation of tree-ring dates, *J Archaeol Sci*, **8**, 381–90
- Hunter, K, and Foley, K, 1987 The Lincoln hanging bowl, in *From pinheads to hanging bowls: the identification, deterioration, and conservation of applied enamel and glass decoration on archaeological artefacts* (eds L Bacon and B Knight), UKIC Occas Pap, **7**, 16–18, London: UKIC

- Hurst, J D, 1991 Major Saxon discoveries at Droitwich - excavations at the Upwich brine pit, *Curr Archaeol*, **126**, 252-5
- Hurst, J D, 1997 *A multi-period salt production site at Droitwich: excavations at Upwich*, CBA Res Rep, **107**, York: CBA
- Hutty, B D F, 1975 Hob Ditch Causeway, first excavation report, *Birmingham Warwickshire Archaeol Soc*, **87**, 89-110
- Iles, R, 1988 West Wansdyke: recent archaeological research and future prospects, *Bristol Avon Archaeol*, **7**, 6-10
- Innes, J B, and Frank, R M, 1988 Palynological evidence for Late Flandrian coastal changes at Druridge, Northumberland, *Scott Geogr Mag*, **104**, 14-23
- International Study Group, 1982 An inter-laboratory comparison of radiocarbon measurements in tree-rings, *Nature*, **298**, 619-23
- Jackson, D, 1983 The excavation of an Iron Age site at Brigstock, Northants, 1979-81, *Northampton Archaeol*, **18**, 7-32
- Jackson, J R, 1987 Excavations at Southchurch Hall: an interim report, *Essex Archaeol Hist*, **18**, 34-8
- Jacobi, R M, 1979 Early Flandrian hunters in the south-west, *Proc Devon Archaeol Soc*, **37**, 48-93
- Jacobi, R M, 1980 The Mesolithic of Essex, in *Archaeology in Essex to AD 1500* (ed D G Buckley), CBA Res Rep, **34**, 14-25, London: CBA
- Jarvis, K S, and Horsey, I P, 1992 *Excavations in Poole 1973-1983*, Dorset Natur Hist Archaeol Soc Monogr Ser, **10**, Dorset: Dorset Natur Hist Archaeol Soc
- Jennings, J N, 1950 The origin of the Fenland mere: Fenland homologues of the Norfolk Broads, *Geol Mag*, **87**, 217-25
- Jobey, I, and Jobey, G, 1987 Prehistoric, Romano-British and later remains on Murton High Crags, Northumberland, *Archaeol Aeliana*, **15**, 151-98
- Johnson, A M, 1986 Wisbech and West Walton highway bypass: an archaeological survey, *Proc Cantab Antiq Soc*, **75**, 43-60
- Johnston, A G, 1993 Excavations in Oundle, Northants: work carried out at Stoke Doyle Road 1979, Black Pot Lane 1985 and St Peter's church 1991, *Northamptonshire Archaeol*, **25**, 99-117
- Jones, A K G, 1988 Fishbones from excavations in the cemetery of St Mary Bishophill Junior, in *Bones from the General Accident site, Tanner Row* (ed T P O'Connor), *The Archaeol of York*, **15/2**, 126-30 London: CBA for York Archaeol Trust
- Jones, M J, 1994 St Paul-in-the-Bail: Britain in Europe?, in *Churches built in ancient times: recent studies in early Christian archaeology* (ed K Painter), *Specialist Studies on the Mediterranean*, **1**, 325-47 London: Soc Antiq London
- Jones, M J, Stocker, D, and Vince, A G, 2003 *The City of the Pool: accessing the archaeology of the City of Lincoln*, Oxford: Oxbow Books
- 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, 1982 The Umfravilles, the castle and the barony of Prudhoe, Northumberland, *Anglo-Norman Stud*, **5**, 165-84
- Kenward, H K, Hall, A R, and Jones, A K G, 1986 *Environmental evidence from a Roman well and Anglian pits in the legionary fortress*, *The Archaeology of York*, **14**, London: CBA
- Kenyon, K M, 1942 Excavations at the Wrekin, Shropshire, *Archaeol J*, **99**, 99-109
- King, A C, and Soffe, G, 1994 The Iron Age and Roman temple on Hayling Island, in *The Iron Age in Wessex: recent work* (eds A P Fitzpatrick and E L Morris), 114-6, Salisbury: Trust for Wessex Archaeol
- Kinnes, I, 1979 *Round barrows and ring ditches in British Neolithic*, Brit Mus Occas Pap, **7**, London: Brit Mus
- Kinnes, I, 1992 *Non-megalithic long barrows and allied structures in the British Neolithic*, Brit Mus Occas Pap, **52**, 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
- Keuppers, L M, Southon, J, Baer, P, and Harte, J, 2004 Dead wood biomass and turnover time, measurement by radiocarbon, along a subalpine elevation gradient, *Oecologia*, **141**, 641-51
- Kromer, B, Rhein, M, Bruns, M, Schoch-Fischer, B, Münnich, K-O, Stuiver, M, and Becker, B, 1986 Radiocarbon calibration data for the 6th to the 8th millennia BC, *Radiocarbon*, **28**, 954-60
- Lambrick, G, 2010 *Neolithic to Saxon social and environmental change at Mount Farm, Berinsfield, Dorchester-on-Thames*, Oxford Archaeol Occas Pap Ser, **19**
- Lambrick, G H, 1978 Berinsfield, Mount Farm, CBA *Regional Group 9 Newsletter*, **8**, 108-10
- Lambrick, G H, 1979 Berinsfield, Mount Farm, CBA *Regional Group 9 Newsletter*, **9**, 113-5
- Lanting, J W, and van der Waals, J D, 1972 British Beakers as seen from the continent, *Helium*, **12**, 20-46
- Lawson, A J, 1986 *Barrow excavations in Norfolk 1950-82*, E Anglian Archaeol Rep, **29**, Norwich: Norfolk Archaeol Unit
- Lawson, A J, 2000 *Potterne 1982-5: animal husbandry in later prehistoric Wiltshire*, Wessex Archaeol Rep, **17**, Salisbury: Wessex Archaeol
- Lawson, A J, and Le Hegarat, R, 1986 The excavation of a mound on Gallows Hill, Thetford 1978-9, in *Barrow excavations in Norfolk 1950-82* (ed A J Lawson), E Anglian Archaeol Rep, **29**, 65-9, Norwich: Norfolk Archaeol Unit
- Layard Whytehead, R, Cowie, R, and Blackmore, L, 1989 Excavations at the Peabody site, Chandos Place, and the National Gallery, *Trans London Middlesex Archaeol Soc*, **40**, 35-176

- Lewis, M J T, 1966 *Temples in Roman Britain*, Cambridge: Cambridge Univ Press
- Lindley, D V, 1985 *Making decisions*, 2nd edn, London: Wiley
- Linick, T W, Suess, H E, and Becker, B, 1985 La Jolla measurements of radiocarbon in south German oak tree-ring chronologies, *Radiocarbon*, **27**, 20–32
- Lobb, S J, and Rose, P G, 1996 *An archaeological survey of the Lower Kennet Valley, Berkshire*, Wessex Archaeol Rep, **9**, Salisbury: Trust for Wessex Archaeol
- Longworth, I H, 1984 *Collared Urns of the Bronze Age in Great Britain and Ireland*, Cambridge: Cambridge Univ Press
- Losco-Bradley, P M, and Salisbury, C R, 1988 Saxon and Norman Fish Weir at Colwick, Nottinghamshire, in *Medieval fish, fisheries and fishponds in England* (ed M Aston), BAR Brit Ser, **182**, 329–51 Oxford: BAR
- Losco-Bradley, S J C, 1983 Excavations on an Iron Age cropmark at Swarkestone Lowes, Derbyshire, 1983, *Derbyshire Archaeol J*, **113**, 5–15
- Loveday, R, and Petchey, M, 1982 Oblong ditches: a discussion and some new evidence, *Aerial Archaeol*, **8**, 17–24
- Lyne, M, 1991 A medieval earthwork at Binsted, near Alton, *Hampshire Fld Club Archaeol Soc*, **46**, 181
- Lyne, M, 1994 The Briquetage, Roman pottery and Saxon pottery, in *The Foundry: excavations on Poole Waterfront 1986–7* (ed D R Watkins), Dorset Natur Hist Archaeol Soc Monogr Ser, **14**, 51–2, Dorchester: Dorset Natur Hist Archaeol Soc
- Macphail, R I, 1992 Late Devensian and Holocene soil formation, in *Hengistbury Head, Dorset, volume 2: the late Palaeolithic and early Mesolithic sites* (ed R N E Barton), Oxford Univ Comm Archaeol Monogr, **34**, 44–51 Oxford: Oxford Univ Comm Archaeol
- Manby, T G, King, A, and Vyner, B, 2003 The Neolithic and Bronze ages: a time of early agriculture, in *The archaeology of Yorkshire: an assessment at the beginning of the 21st century* (eds T G Manby, S Moorhouse, and P Ottaway), Yorkshire Archaeol Soc Occas Pap, **3**, 35–116 Leeds: Yorkshire Archaeol Soc
- Manby, T G, Moorhouse, S, and Ottaway, P, 2003 *The archaeology of Yorkshire: an assessment at the beginning of the 21st century*, Yorkshire Archaeol Soc Occas Pap, **3**, Leeds: Yorkshire Archaeol Soc
- Mann, W B, 1983 An international reference material for radiocarbon dating, *Radiocarbon*, **25**, 519–27
- Marshall P D, and Hamilton, D, 2007 Phasing and dating: radiocarbon dating, in *Sutton Common: The excavation of an Iron Age ‘marsh-fort’* (eds R Van de Noort, H P Chapman, and J R Collis), CBA Res Rep, **154**, 93–4, York: CBA
- 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* (ed I Ferris), 527–38, Durham (Durham County Council)
- Martin, E A, and Denston, C B, 1986 A Bronze Age multiple burial at Exning, *Proc Suffolk Inst Archaeol Hist*, **36**, 131–4
- Martin, E A, and Murphy, P, 1988 West Row Fen, Suffolk: a Bronze Age fen-edge settlement site, *Antiquity*, **62**, 353–8
- Martin, E, Plouviez, J, and Ross, H, 1981 Archaeology in Suffolk 1980, *Proc Suffolk Inst Archaeol*, **35**, 79
- 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
- McArthur, C, 1987 Excavations at Nadbury Camp, Warwickshire, SP 390482, *Trans Birmingham Warwickshire Archaeol Soc*, **95**, 1–16
- McAvoy, F, 1986 Excavations of Daws Castle, Watchet, 1982, *Proc Somerset Archaeol Natur Hist Soc*, **130**, 47–60
- McCarthy, M R, 1983 Roman timber buildings at Castle Street, Carlisle, 1981, *Antiq J*, **63**, 124–30
- McCarthy, M R, 1991 *The Roman waterlogged remains and later features at Castle Street, Carlisle: excavations 1981–82*, Cumberland and Westmorland Antiq Archaeol Soc Res Ser, **5**, Kendal: Cumberland and Westmorland Antiq Archaeol Soc
- McDonnell, R R J, 1985 *Archaeological survey of the Somerset Claylands: report on survey work, 1984–85*, unpubl rep, Somerset County Council
- McDonnell, R R J, 1986 *Archaeological survey of the Somerset Claylands: report on survey work, 1985–86*, unpubl rep, Somerset County Council
- McGrail, S, 1978 *Logboats of England and Wales, with comparative material from Europe and other countries*, BAR Brit Ser, **51**, Oxford: Brit Archaeol Rep
- McGrail, S, and Millett, M, 1985 The Hasholme Logboat, *Antiquity*, **59**, 117–20
- McGrail, S, and Millett, M, 1987 The archaeology of the Hasholme logboat, *Archaeol J*, **144**, 69–155
- McKeague, P, 1988 Sutton Packhorse Bridge, *Bedfordshire Archaeol*, **18**, 64–80
- McKerrell, H, 1972 On the origins of British faience beads and some aspects of the Wessex-Mycenae relationship, *Proc Prehist Soc*, **38**, 286–301
- McKinley, J, 1998 Excavations at Ham Hill, Montacute, Somerset, 1994 and 1998, *Proc Somerset Archaeol Natur Hist Soc*, **142**, 77–137
- McNeil, R, 1982 Burial Mound (Church Lawton North) and (Church Lawton South), *Cheshire Archaeol Bull*, **8**, 46–50
- Meadows, J, 2003 *Dating Briar Hill: interpreting controversial radiocarbon results from the Neolithic causewayed enclosure at Briar Hill, Northamptonshire*, Centre for Archaeol Rep, **64/2003**, Portsmouth: Engl Heritage
- Meadows, J, Barclay, A, and Bayliss, A, 2007 A short passage of time: the dating of the Hazleton long cairn revisited, *Cantab Archaeol J*, **17**(suppl), 45–64
- Megaw, J V S, and Simpson, D D A, 1979 *Introduction to British Prehistory*, Leicester: Leicester Univ Press
- 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, J, 1999 The origins of warfare in the British Isles, in *Ancient Warfare* (eds J Carman and A Harding), 143–56, Stroud: Sutton Publishing Ltd
- Mercer, R, 1986 *Excavation of a Neolithic enclosure at Helman Tor, Lanlivery, Cornwall, 1986: interim report*, Dept Archaeol, Univ Edinburgh, Project Pap, 4
- Mercer, R, 2001 The excavation of a Neolithic enclosure complex at Helman Tor, Lostwithiel, Cornwall, *Cornish Archaeol*, 36, 5–63
- Mercer, R J, 1970 The excavation of a Bronze Age hut-circle settlement, Stannon Down, St Breward, Cornwall, 1968, *Cornish Archaeol*, 9, 17–46
- Mercer, R J, 1980 *Hambledon Hill: a Neolithic landscape*, Edinburgh: Edinburgh Univ Press
- Mercer, R J, 1981 Excavations at Carn Brea, Illogan, Cornwall: a Neolithic fortified complex of the third millennium bc, *Cornish Archaeol*, 20, 1–204
- Mercer, R J, 1985 A Neolithic fortress and funerary center, *Sci American*, 252/3, 76–83
- 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
- Miles, D, and Palmer, D, 1983 Claydon Pike, *Curr Archaeol*, 8, 88–92
- Miles, D, and Palmer, S, 1982 *Figures in a landscape: archaeological investigations at Claydon Pike, Fairford/Lechlade: an interim report 1979–82*, Oxford: Oxford Archaeol Unit
- Miles, D, and Palmer, S, 1990 Thornhill Farm and Claydon Pike, *Curr Archaeol*, 121, 19–23
- Miles, D, Palmer, S, and Perpetua Jones, G, 2007 *Iron Age and Roman settlement in the upper Thames valley: excavations at Claydon Pike and other sites within the Cotswold Water Park*, Thames Valley Landscapes Monogr, 26, Oxford: Oxford Univ School Archaeol
- Miles, H, 1975 Barrows on the St Austell Granite, Cornwall, *Cornish Archaeol*, 14, 5–82
- Mizoguchi, K, 1993 A historiography of a linear barrow cemetery: a structuralist's point of view, *Archaeol Rev Cambridge*, 11, 40–9
- Monk, M A, and Fasham, P J, 1980 Carbonized plant remains from two Iron Age sites in central Hampshire, *Proc Prehist Soc*, 46, 321–44
- Mook, W G, 1986 Business meeting: Recommendations/Resolutions adopted by the Twelfth International Radiocarbon Conference, *Radiocarbon*, 28, 799
- Mook, W G, and van der Plicht, J, 1999 Reporting 14C activities and concentrations, *Radiocarbon*, 41, 227–40
- Mook, W G, and Waterbolk, H T, 1985 *Radiocarbon Dating*, Handbook for Archaeologists, 3, Strasbourg: European Science Foundation
- Morgan, R, 1988 Tree-ring studies in the Somerset Levels: bog oaks from the Brue valley and Sedgemoor, *Somerset Levels Pap*, 14, 51–3
- Morgan, R, 1989 Tree-ring studies in the Somerset Levels: fifteen years of studying trackway wood, *Somerset Levels Pap*, 15, 62–9
- Morgan, R A, and Schofield, J, 1978 Tree-rings and the archaeology of the Thames waterfront in the City of London, in *Dendrochronology in Europe* (ed J Fletcher), BAR Int Ser, 51, 223–33, Oxford: BAR
- Mullin, D, 2001 Remembering, forgetting, and the invention of tradition: burial and natural places in the English early Bronze Age, *Antiquity*, 75, 533–7
- Murphy, P, 1988 *The Stumble (Site 28A, Blackwater Estuary, Essex): carbonised Neolithic plant remains*, Anc Mon Lab Rep, 157/1988, London: Engl Heritage
- Murphy, P, 1989 Carbonised Neolithic plant remains from The Stumble, an intertidal site in the Blackwater Estuary, Essex, England, *Circaea*, 6, 21–38
- Murphy, P, 1994 The Anglo-Saxon landscape and rural economy: some results from sites in East Anglia and Essex, in *Environment and economy in Anglo-Saxon England* (ed D J Rackham), CBA Res Rep, 89, 23–39, York: CBA
- Neal, D S, 1983 Excavations on a settlement at Little Bay, Isles of Scilly, *Cornish Archaeol*, 22, 47–80
- Neal, D S, 1989 The Stanwick villa, Northants: an interim report on the excavations of 1984–88, *Britannia*, 20, 149–68
- Needham, S, 1980 An assemblage of late Bronze Age metalworking debris from Dainton, Devon, *Proc Prehist Soc*, 46, 177–215
- Needham, S P, 1990 The Petters Late Bronze Age metalwork: an analytical study of Thames Valley metalworking in its settlement context, *Brit Museum Occas Pap*, 70, 1–45
- Needham, S P, 1991 *Excavation and salvage at Runnymede Bridge 1978: the Late Bronze Age waterfront site*, London: Brit Mus Press
- Nickson, D, and MacDonald, J H, 1955 A preliminary report on a microlithic site at Drigg, Cumberland, *Trans Cumberland Westmorland Antiq Soc*, 55, 17–29
- O'Brien, C, 1975–6 Excavations at Cossington - an interim report, *Trans Leicestershire Archaeol Hist Soc*, 51, 56–7
- O'Brien, C, 2000 Thirlings building C: a pagan shrine?, *Archaeol Aeliana*, 28, 47–9
- O'Connell, M, 1990 Excavations during 1979–85 of a multi-period site at Stanwell, *Surrey Archaeol Coll*, 80, 1–62
- Olivier, A C H, 1987 Excavation of a Bronze Age funerary cairn at Manor Farm, near Borwick, North Lancashire, *Proc Prehist Soc*, 53, 129–86
- Olivier, A C H, and Turner, R C, 1987 Excavations in advance of sheltered housing accommodation, Parsonage Avenue, Ribchester, 1980, in *Ribchester excavations part 2: excavations in the civil settlement, 1968–1980: A . Structures* (eds B J N Edwards and P V Webster), 55–80, Cardiff: Univ College Cardiff

- Olivier, A, and Clack, P, 1982 The Ribchester *vicus* and its context – the results of recent excavations, in *Rural settlement in the Roman North* (eds P Clack and S Haselgrove), 133–147, Durham: CBA
- Ó'Riordáin, S P, 1937 The halberd in Bronze Age Europe, *Archaeologia*, **86**, 195–321
- Olsson, I U, 1970 The use of Oxalic acid as a Standard, in *Radiocarbon Variations and Absolute Chronology, Nobel symposium, 12th Proceedings* (ed I U Olsson), 17, New York: Wiley
- Orme, B J, 1982 The use of radiocarbon dates from the Somerset Levels, *Somerset Levels Pap*, **8**, 9–25
- Orme, B J, Coles, J M, and Silvester, R J, 1983 Meare Village East 1982, *Somerset Levels Pap*, **9**, 49–74
- Orme, B J, Coles, J M, Caseldine, A E, and Morgan, R A, 1985 A later Bronze Age complex at Stileway, *Somerset Levels Pap*, **11**, 75–9
- 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**, 400–423
- Otlet, R L, 1979 An assessment of laboratory errors in liquid scintillation methods of ¹⁴C dating, in *Proceedings of the ninth International Radiocarbon Conference* (eds R Berger and H E Suess), 256–67, California: Univ California Press
- Otlet, R L, and Evans, G V, 1983 Progress in the application of miniature gas counters to radiocarbon dating of small samples, in *Proceedings of the First International Symposium 14C and Archaeology* (eds W G Mook and H T Waterbolk), *PACT*, **8**, 213–22, Strasbourg: Council of Europe
- Otlet, R L, Huxtable, G, and Sanderson, D C W, 1986 The development of practical systems for ¹⁴C measurement in small samples using miniature counters, *Radiocarbon*, **28**, 603–14
- 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 ¹⁴C in very small samples, *Radiocarbon*, **25**, 565–75
- Otlet, R L, and Polach, H A, 1990 Improvements in the precision of radiocarbon dating through recent developments in liquid scintillation counters, *Proceedings of the Second International Symposium: 14C and Archaeology* (eds W G Mook and H T Waterbolk), *PACT*, **29**, 225–38, Strasbourg (Council of Europe)
- Otlet, R L, and Slade, B S, 1974 Harwell radiocarbon measurements I, *Radiocarbon*, **16**, 178–91
- Otlet, R L, Walker, A J, Hewson, A D, and Burleigh, R, 1980 ¹⁴C interlaboratory comparison in the UK: experiment design, preparation, and preliminary results, *Radiocarbon*, **22**, 936–46
- Otlet, R L, and Warchal, R M, 1978 Liquid scintillation counting of low-level ¹⁴C dating, *Liquid Scintillation Counting*, **5**, 210–18
- Oxley, J, 1986 *Excavations at Southampton Castle*, Southampton Archaeol Monogr, **3**, Southampton: Southampton City Museums
- Oxley, J, 1988 A possible Saxon smithing site and further evidence from SOU 29, Southampton, *Proc Hampshire Fld Club Archaeol Soc*, **44**, 41–7
- Pagett, J, 1965 Note in, *W Midlands Archaeol News Sheet*, **8**, 16
- Pagett, J, 1967 Notes in, *Trans Caradoc Severn Valley Field Club XVI*, **67**, 83
- Palmer, R, 1976a Interrupted ditch enclosures in Britain: the use of aerial photography for comparative studies, *Proc Prehist Soc*, **42**, 161–86
- 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
- Parry, S, 2006 *Raunds Area Survey: an archaeological study of the landscape of Raunds, Northamptonshire 1985–94*, Oxford: Oxbow Books
- Pearson, G W, Pilcher, J R, Baillie, M G L, Corbett, D M, and Qua, F, 1986 High-precision ¹⁴C measurement of Irish oaks to show the natural ¹⁴C variations from AD 1840 to 5210 BC, *Radiocarbon*, **28**, 911–34
- Pearson, G W, 1986 Precise calendrical dating of known growth-period samples, using a 'curve-fitting' technique, *Radiocarbon*, **28**, 292–9
- Pearson, G W, 1987 How to cope with calibration, *Antiquity*, **61**, 98–103
- Phillips, P, 1989 *Archaeology and landscape studies in North Lincolnshire*, BAR Brit Ser, **208**, Oxford: Brit Archaeol Rep
- Piggott, S, 1938 The early Bronze Age in Wessex, *Proc Prehist Soc*, **4**, 52–106
- Piggott, S, 1971 An archaeological survey and policy for Wiltshire: Part III, Neolithic and Bronze Age, *Wiltshire Archaeol Natur Hist Mag*, **66**, 47–57
- Piggott, S, 1973a The Wessex Culture, in *The history of Wiltshire* (ed E Crittall), Victoria County History of Wiltshire, **1 (2)**, 352–75, Oxford: Clarendon Press
- Piggott, S, 1973b The final phase on bronze technology, in *The history of Wiltshire* (ed E Crittall), Victoria County History of Wiltshire, **1 (2)**, 376–407, Oxford: Clarendon Press
- Pitts, M W, 1982 On the road to Stonehenge: report on investigations beside the A344 in 1968, 1979, and 1980, *Proc Prehist Soc*, **48**, 75–132
- Pitts, M, and Whittle, A, 1992 The development and date of Avebury, *Proc Prehist Soc*, **58**, 203–12
- Polach, H A, 1972, Cross checking of the NBS oxalic acid and secondary laboratory radiocarbon dating standards, *Proceedings of the 8th International Radiocarbon Dating Conference, Lower Hutt, New Zealand* (eds Rafter, T A and Grant-Taylor, T) 688–717, Wellington Royal Soc of New Zealand
- Pollard, J, and Cleal, R M J, 2004 Dating Avebury, in *Papers in honour of an Avebury archaeologist, Isobel Smith* (eds R M J Cleal and J Pollard), 120–9, East Knoyle: Hobnob Books

- Powlesland, D J, 1998 West Heslerton – the Anglian settlement: assessment of potential for analysis and updated project design, *Internet Archaeol*, 5, http://intarch.ac.uk/journal/issue5/westhes_index.html
- Powlesland, D J, 2003a The Heslerton Parish Project: 20 years of archaeological research in the Vale of Pickering, in *The Archaeology of Yorkshire: an assessment at the beginning of the 21st century* (eds T G Manby, S Moorhouse, and P Ottaway), York Archaeol Soc Occas Pap, 3, 275–291 Leeds: York Archaeol Soc
- Powlesland, D J, 2003b *25 years of archaeological research on the sands and gravels of Heslerton*, Yedingham: Landscape Res Centre
- Powlesland, D J, forthcoming *West Heslerton: the excavation of the Anglian settlement*, Yedingham: Landscape Res Centre
- Powlesland, D J, and Price, J, 1988 Approaches to the excavation and interpretation of the Romano-British landscape in the Vale of Pickering, in *Recent research in Roman Yorkshire: studies in honour of Mary Kitson Clarke* (ed P R Wilson), BAR, 193, 139–51 Oxford: BAR
- Powlesland, D J, Haughton, C A, and Hanson, J H, 1986 Excavations at Heslerton, North Yorkshire 1978–82, *Archaeol J*, 143, 53–173
- Powlesland, D, and Haughton, C, 1999 *West Heslerton: the Anglian cemetery*, Landscape Res Centre Monogr, 1, Yedingham: Landscape Res Centre
- PPG16 1990 *Planning Policy Guidance: Archaeology and Planning*, Department of the Environment
- Pryor, F, 2001 *The Flag Fen basin: archaeology and environment of a fenland landscape*, Engl Heritage Archaeol Rep, London: Engl Heritage
- Rahtz, P A, 1974 *Rescue Archaeology*, Harmondsworth: Penguin
- Rahtz, P A, 1977 Late Roman cemeteries and beyond, in *Burial in the Roman World* (ed R Reece), CBA Res Rep, 22, 53–64, London: CBA
- Rahtz, P A, 1992 *Cadbury Congresbury 1968–73: a later/post-Roman hilltop settlement in Avon*, BAR Brit Ser, 223, Oxford: Tempus Reparatum
- Rahtz, P, Hirst, S, and Wright, S M, 2000 *Cannington Cemetery Excavations 1962–3 of prehistoric, Roman, post-Roman, and later features at Cannington Park Quarry, near Bridgwater, Somerset*, Britannia Monogr Ser, 17, London: Society for the Promotion of Roman Studies
- Ralph, E K, Michael, H N, and Han, M C, 1973 Radiocarbon dates and reality, *MASCA Newsletter*, 9, 1–20
- RCHME, 1970 *An inventory of the historical monuments in the county of Dorset, part 3 : 2*, South-east, Roy Comm Hist Monuments Engl
- RCHME, 1985 *Excavations at York Minster, volume 2: the Cathedral of Archbishop Thomas of Bayeux*, London: HMSO
- 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, 0–50,000 Years cal BP, *Radiocarbon*, 51, 1111–50
- Robinson, M, and Wilson, R, 1987 A survey of environmental archaeology in the south Midlands, in *Environmental archaeology: a regional review, volume 2* (ed H C M Keeley), Hist Build Monuments Comm Engl Occas Pap, 1, 16–100, London: HBMCE
- Rodwell, W, Atkins, C, 2011 *St Peter's, Barton-upon-Humber, Lincolnshire: a parish church and its community. Volume 1: history, archaeology and architecture*, Oxford: Oxbow Books
- Rodwell, W, and Rodwell, K A, 1982 St Peter's Church, Barton-upon-Humber: excavation and structural study 1978–81, *Antiq J*, 62, 283–315
- Rowlands, M J, 1976 *The production and distribution of metalwork in middle Bronze Age of southern Britain*, BAR Brit Ser, 31, Oxford: Brit Archaeol Rep
- Rudling, D, 1985 Trial excavations at Ditchling Beacon, East Sussex, 1983, *Sussex Archaeol Collect*, 123, 251–4
- Rudling, D, 1986 The excavation of a Roman tiler on Great Cansiron Farm, Hartfield, Sussex, *Britannia*, 17, 191–230
- Rudling, D, 1987 The excavations of a late Bronze Age site at Yapton, West Sussex, 1984, *Sussex Archaeol Coll*, 125, 51–67
- Salisbury, C R, 1980 The Trent, the story of a river, *Curr Archaeol*, 74, 88–91
- Salisbury, C R, 1984 Flandrian courses of the River Trent at Colwick, Nottinghamshire, *Mercian Geologist*, 9, 189–207
- Salisbury, C R, 1991 Primitive British fishweirs, in *Waterfront archaeology: proceedings of the third international conference on waterfront archaeology held at Bristol 23–26 September 1988* (eds G L Good, R H Jones, and M W Ponsford), CBA Res Rep, 74, 76–87, London: CBA
- Salisbury, C R, 1992 The archaeological evidence for palaeochannels in the Trent Valley, in *Alluvial Archaeology in Britain: Proceeding of a Conference sponsored by the RMC Group plc 3–5 January 1991, British Museum* (eds S Needham and M G Macklin), Oxbow Monogr, 27, 155–62, Oxford: Oxbow Books
- Salisbury, C R, 1995 The excavation of Hemington Fields, *Curr Archaeol*, 145, 34–5
- Salisbury, C R, 1996 Hemington Fields - a Medieval landscape, *Newsvarp*, 19, 24–32

- Saville, A, 1986 Radiocarbon dating of Hazleton North chambered tomb: a preliminary statement, in *Archaeological results from accelerator dating* (eds J A J Gowlett and R E M Hedges), Oxford Univ Comm Archaeol Monogr, **11**, 133–7, Oxford: Oxford Univ
- Saville, A, 1990 *Hazleton North, Gloucestershire, 1979–82: the excavation of a Neolithic long cairn of the Cotswold-Severn group*, Engl Heritage Archaeol Rep, **13**, London: Engl Heritage
- Saville, A, Gowlett, J A J, and Hedges, R E M, 1987 Radiocarbon dates from the chambered tomb at Hazleton (Glos): a chronology for Neolithic collective burial, *Antiquity*, **61**, 108–19
- Scaife, R G, 1980 *Late Devensian and Flandrian palaeoecological studies in the Isle of Wight*, unpubl PhD thesis, Univ London
- Scaife, R G, and Jones, M, 1988 The elm decline in the pollen record of south-east England and its relationship to early agriculture, in *Archaeology and flora of the British isles: human influences on the evolution of plant communities*, Oxford Univ Comm Archaeol Monogr, **14**, 21–33, Oxford: Oxford Univ Comm Archaeol Monogr
- Scaife, R G, and Macphail, R I, 1983 The post-Devensian development of heathland soils and vegetation, *Seesoil*, **1**, 70–99
- Schadla-Hall, R T, and Cloutman, E W, 1985 One cannot dig at random in a peat bog, in *The eastern Vale of Pickering and the archaeology of a buried landscape* (eds C Haselgrove, M Millett, and I M Smith), 77–86, Sheffield: J R Collis
- Schadla-Hall, R T, and Cloutman, E W, 1987 Recent investigations of the early Mesolithic lands and settlements in the Vale of Pickering, North Yorkshire, in *Mesolithic Northwest Europe: recent trends* (eds P Rowley-Conwy, M Zvelebil, and H P Blankholm), 46–54, Sheffield: Dept Archaeol, Univ Sheffield
- 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
- Seager Smith, R H, 1998 Further excavations at the Iron Age enclosure at Tattershall Thorpe, Lincolnshire, by Peter Chowne, 1986, *Lincolnshire Hist Archaeol*, **33**, 7–19
- Shennan, I, 1986 Flandrian sea-level changes in the Fenland 11: tendencies of sea-level movement, altitudinal changes, and local and regional factors, *J Quat Sci*, **1**, 155–79
- Sherlock, D, 1985 *Bushmead Priory*, London: HMSO
- Shoesmith, R, 1980 Report of sectional recorders, *Trans Woolhope Natur Fld Club*, **43**, 225–6
- Shoesmith, R, 1985 *Hereford City excavations, volume 3: the finds*, CBA Res Rep, **56**, York: CBA
- Shotton, F W, 1972 An example of hard-water error in radiocarbon dating of vegetable matter, *Nature*, **240**, 460–1
- Shotton, F W, and Williams, R E G, 1971 Birmingham University radiocarbon dates V, *Radiocarbon*, **13**, 141–56
- Shotton, F W, and Williams, R E G, 1973 Birmingham University radiocarbon dates VI, *Radiocarbon*, **15**, 1–12
- Shotton, F W, Williams, R E G, and Johnson, A S, 1975 Birmingham University radiocarbon dates IX, *Radiocarbon*, **17**, 255–75
- Sidell, J, Wilkinson, K, Scaife, R, and Cameron, N, 2000 *The Holocene evolution of the London Thames*, Museum London Archaeol Service Monogr, **5**, London: Museum of London Archaeol Service
- Silvester, R J, 1980 The prehistoric open settlement at Dainton, South Devon, *Devon Arch Soc Proc*, **38**, 17–48
- Simpson, S J, Griffith, F M, and Holbrook, N, 1989 The Prehistoric, Roman and early post-Roman site at Hayes Farm, Clyst Honiton, *Devon Archaeol Soc Proc*, **47**, 1–28
- Smith, A G, and Pitcher, J R, 1973 Radiocarbon dates and the vegetational history of the British Isles, *New Phytol*, **72**, 903–14
- Smith, G, 1984 Excavations on Goonhilly Down, the Lizard, 1981, *Cornish Archaeol*, **23**, 3–46
- Smith, G, 1987a A Beaker (?) burial monument and a late Bronze Age assemblage from East Northdown, Margate, *Archaeol Cantiana*, **104**, 237–89
- Smith, G, 1987b The Lizard Project, Landscape Survey, 1978–1983, *Cornish Archaeol*, **26**, 13–68
- Smith, G, 1988a Excavation of the Iron Age cliff promontory Fort and of Mesolithic and Neolithic flint working areas at Penhale Point, Holywell Bay, near Newquay, 1983, *Cornish Archaeol*, **27**, 171–99
- Smith, G, 1988b New radiocarbon dates from medieval and Bronze Age monuments on Goonhilly Downs, the Lizard, *Cornish Archaeol*, **27**, 213–4
- Smith, G, 1996 Archaeology and Environment of a Bronze Age Cairn and Prehistoric and Romano-British Field System at Chysauster, Gulval, near Penzance, Cornwall, *Proc Prehist Soc*, **62**, 167–219
- Smith, G H, 1983 Excavations at Ham Hill, *Proc Somerset Archaeol Natur Hist Soc*, **134**, 27–45
- Smith, G H, 1989 Evaluation work at the Druid Stoke megalithic monument, Stoke Bishop, Bristol, 1983, *Trans Bristol Gloucestershire Archaeol Soc*, **107**, 27–37
- Smith, G H, and Harris, D, 1982 The excavation of Mesolithic, Neolithic, and Bronze Age settlements at Poldowrian, St Keverne, 1980, *Cornish Archaeol*, **21**, 23–66
- Smith, I F, 1965 *Windmill Hill and Avebury, excavations by Alexander Keiller 1925–1939*, Oxford: Clarendon Press
- Smith, R J C, 1997 *Excavations along the route of the Dorchester by-pass, Dorset (1986–8)*, Wessex Archaeol Rep, **11**, Salisbury: Trust for Wessex Archaeol
- Smith, S R, 1984 An Iron Age site at Maddison Street, Southampton, *Proc Hampshire Fld Club Archaeol Soc*, **40**, 35–44
- 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
- Stanford, S C, 1981 *Midsummer Hill – an Iron Age hillfort on the Malverns*, privately printed

- Stanford, S C, 1982 Bromfield, Shropshire – Neolithic, Beaker, and Bronze Age sites 1966–79, *Proc Prehist Soc*, **48**, 279–320
- Stanford, S C, 1984 The Wrekin Hillfort, excavations 1973, *Archaeol J*, **141**, 61–90
- Stanford, S C, 1985 Bromfield excavations – from Neolithic to Saxon times, *Trans Shropshire Archaeol Soc*, **64**, 1–7
- Stanford, S C, 1995 A Cornovian Farm and Saxon cemetery at Bromfield, Shropshire, *Trans Shropshire Archaeol Soc*, 95–170
- Steane, K, 2003 *The archaeology of the Upper City*, Lincoln Archaeol Stud, **3**, Oxford: Oxbow Books
- Steane, K, Darling, M J, Mann, J, Vince, A, and Young, J, 2001 *Archaeology of Wigford and the Brayford Pool*, Lincoln Archaeol Studies, **2**, Oxford: Oxbow Books
- Strickland, T J, 1982 Chester: excavations in the Princess Street/Hunter Street area, *J Chester Archaeol Soc*, **65**, 5–24
- Stuiver, M, and Braziunas, T F, 1993 ¹⁴C ages of marine samples to 10,000 BC, *Radiocarbon*, **35**, 215–30
- Stuiver, M, and Kra, R S, 1986 Editorial comment, *Radiocarbon*, **28(2B)**, ii
- Stuiver, M, Kromer, B, Becker, B, and Ferguson, C W, 1986 Radiocarbon age calibration back to 13,300 years BP and ¹⁴C age-matching of German oak and US bristlecone pine chronologies, *Radiocarbon*, **28**, 969–79
- 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 Polach, H A, 1977 Reporting of ¹⁴C data, *Radiocarbon*, **19**, 355–63
- Stuiver, M, and Reimer, P J, 1986 A computer program for radiocarbon age calculation, *Radiocarbon*, **28**, 1022–30
- Stuiver, M, and Reimer, P J, 1993 Extended ¹⁴C data base and revised CALIB 3.0 ¹⁴C age calibration program, *Radiocarbon*, **35**, 215–30
- Stuiver, M, Reimer, P J, and Braziunas, T T, 1998 High-precision radiocarbon age calibration for terrestrial and marine samples, *Radiocarbon*, **40**, 1127–51
- Suess, H E, 1967 Bristlecone pine calibration of the radiocarbon time scale from 4100 BC to 1500 BC, in *Radiocarbon dating and methods of low level counting*, 143–51, Vienna (IAEA)
- Switsur, R, 1972 Combustion bombs for radiocarbon dating, in *Proceedings of the 8th International ¹⁴C Conference, Vol 1, B11–B23*, 11–23, Wellington: The Royal Society of New Zealand
- Switsur, R, and Waterhouse, J S, 1989 Benzene purity in radiocarbon dating samples, *Radiocarbon*, **31**, 260–3
- Switsur, V R, 1994 Radiocarbon Dating, in *The Fenland Project, Number 9: Flandrian Environmental Change in Fenland* (M Waller), East Anglian Archaeol, **70**, 27–34
- 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**, 113–17
- Switsur, V R, and West, R G, 1973 University of Cambridge Natural Radiocarbon Measurements XII, *Radiocarbon*, **15**, 534–44
- 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.: Pullman
- Taylor, A F, and Woodward, P J, 1983 Excavations at Roxton, Bedfordshire 1972–4: The post-Bronze Age settlement, *Bedfordshire Archaeol J*, **16**, 7–28
- Taylor, A F, and Woodward, P J, 1985 A Bronze Age barrow cemetery, and associated settlement at Roxton, Bedfordshire, *Archaeol J*, **142**, 73–149
- Taylor, H, and Taylor, E E, 1949 An early Beaker Burial? at Breaun Down near Weston-Super-Mare, *Proc Univ Bristol Spelaol Soc*, **6**, 88–93
- Taylor, M, and French, C, 1985 Desiccation and destruction: the immediate effects of de-watering at Etton, *Oxford J Archaeol*, **4**, 139–55
- Thomas, N, 2005 *Snail Down, Wiltshire. The Bronze Age Barrow Cemetery and Related Earthworks, in the parishes of Collingbourne Ducis and Collingbourne Kingston: Excavations, 1953, 1955 and 1957*, Wiltshire Archaeol Natur Hist Soc Monogr, **3**, Devizes: Wiltshire Archaeol Natur Hist Soc
- Thompson, A, Westman, A, and Dyson, T, 1998 *Archaeology in Greater London 1965–1990: a guide to records of excavations by the Museum of London*, London: Museum of London
- Toller, H S, 1980 An interim report on the excavation of the Orsett ‘Cock’ enclosure, Essex, *Britannia*, **11**, 35–42
- Tomalin, D J, 1984 The pottery: its character and implication and the evidence for sea transport, in The excavation of three round barrows at Puncknowle, Dorset, 1959, *Proc Dorset Natur Hist Archaeol Soc*, **106**, 73
- Tomalin, D J, 1988 Armorican vases, *Proc Prehist Soc*, **54**, 203–21
- 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
- Tutin, T G, Heywood, V H, Burges, N A, Valentine, D H, Walters, S M, and Webb, D A, 1964–80 *Flora Europaea*, 1–5, Cambridge (Cambridge Univ Press)
- Tweddle, D, 1992 *The Anglian helmet from 16–22 Coppergate*, The Archaeol of York, **17**, London: CBA
- Tyers, I, 1988 The Prehistoric peat layers (Tilbury IV), in *Excavations in Southwark 1973–6, Lambeth 1973–9* (ed P Hinton), Joint Publ London and Middlesex Archaeol Soc/Surrey Archaeol Soc, **3**, 5–17, London: London and Middlesex Archaeol Soc/Surrey Archaeol Soc
- Tyers, I, 1990 Tree-ring dates for Museum of London, *Vernacular Architecture*, **21**, 45–6
- Tyers, I, 1995 *Report on the tree-ring analysis of buildings in Essex 1994*, unpubl rep DEN02/95, MoLAS Dendrochronology Lab

- Tyers, I, 2001a *The tree-ring analysis of the timbers from the church of St Peter, Barton on Humber, North Lincolnshire*, Centre for Archaeol, **51/2001**, Portsmouth: Engl Heritage
- Tyers, I, 2001b *The tree-ring analysis of coffin timbers excavated at the church of St Peter, Barton on Humber, North Lincolnshire*, Centre for Archaeol, **48/2001**, Portsmouth: Engl Heritage
- Tyers, I, and Groves, C, 2000 List 114: Tree-ring dates from the University of Sheffield Dendrochronology Laboratory, *Vernacular Architect*, **31**, 118–28
- Tyldesley, J B, 1982 Exploration of cattle bone measurements by statistical techniques including principal component analysis, in *Proceedings of the micro-computer jamboree* (eds A Aspinall and S E Warren), 5–10, Bradford: Univ Bradford
- van der Veen, M, 1985 *The plant remains from Milburngate, Durham City*, Anc Mon Lab Rep, **4674**, London: Engl Heritage
- Vatcher, F de M, 1984 East Heselton Long Barrow, Yorkshire: the eastern half, *Antiquity*, **82**, 49–52
- Wade, K, 1988 Ipswich, in *The rebirth of towns in the West AD 700–1050*, CBA Res Rep, **68**, 93–100, London: CBA
- Wainwright, G J, 1979 *Mount Pleasant, Dorset: Excavations 1970–71*, Soc Antiq Res Rep, **37**
- Wainwright, G J, and Davies, S M, 1995 *Balksbury Camp, Hampshire, excavations 1973 and 1981*, Engl Heritage Archaeol Rep, **4**, London: Engl Heritage
- Walker, A J, and Otlet, R L, 1988 Harwell radiocarbon measurements VI, *Radiocarbon*, **30**, 297–317
- Walker, A J, Keyzor, R S, and Otlet, R L, 1987 Harwell radiocarbon measurements V, *Radiocarbon*, **29**, 78–99
- Walker, A J, Keyzor, R S, and Otlet, R L, 1988 Harwell radiocarbon measurements VII, *Radiocarbon*, **30**, 319–40
- 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
- Walker, A J, Young, A W, Keyzor, R S, and Otlet, R L, 1991b Harwell radiocarbon measurements IX, *Radiocarbon*, **33**, 79–86
- Waller, M, 1994 *The Fenland Project, Number 9: Flandrian Environmental Change in Fenland*, E Anglian Archaeol Rep, **70**, Cambridge: Cambridgeshire Archaeol Comm
- Wand, J O, Gillespie, R, and Hedges, R E M, 1984 Sample preparation for accelerator-based radiocarbon dating. *Journal of Archaeological Science*, **11**, 159–63
- Ward, G K, and Wilson, S R, 1978 Procedures for comparing and combining radiocarbon age determinations: a critique, *Archaeometry*, **20**, 19–31
- Ward, S, 1981 Hunters Walk, *Cheshire Archaeol Bull*, **7**, 45
- Ward, S, and Ward, S, 1994 Hunter Street School 1979 and 1981, in *Excavations at Chester, Saxon occupation within the Roman Fortress, sites excavated 1971–1981*, Chester City Council Archaeol Service Excavation and Survey Rep, **7**, 54–68, Chester: Chester City Council
- Waterbolk, H T, 1971 Working with radiocarbon dates, *Proc Prehist Soc*, **37**, 15–33
- Watson, P V, 1982 Man's impact on the chalklands: some new pollen evidence, in *Archaeological aspects of woodland ecology* (eds M Bell and S Limbrey), BAR Int Ser, **146**, 75–91, Oxford: BAR
- Watson, P V, 1983 *A palynological study of the impact of man on the landscape of central southern England*, unpubl PhD thesis, Univ Southampton
- Watson, P V, and Sieveking, G de G, 1986 Palynological evidence for early and permanent woodland on the chalk of central Hampshire, in *The scientific study of flint artefacts* (ed M B Hart), 169–74, Cambridge: Cambridge Univ Press
- Watts, L, and Leach, P, 1996 *Henley Wood, temples and cemetery, excavations 1962–69 by the late Ernest Greenfield and others*, CBA Res Rep, **99**, York: CBA
- Weddell, P J, 1987 Excavations within the Anglo-Saxon enclosure at Berry Meadow, Kingsteignton in 1985, *Proc Devon Archaeol Soc*, **45**, 75–96
- Welin, E, Engstrand, L, and Vaczy, S, 1972 Institute of Geological Sciences radiocarbon dates III, *Radiocarbon*, **14**, 331–5
- Wheeler, A, 1989 Flandrian deposits at Wood Fen: a palaeoecological investigation, *Fenland Res*, **6**, 34–8
- Whittle, A W R, 1985 Excavations at Peacock's Farm, Shippea Hill, Cambridgeshire, *Fenland Res*, **2**, 16–8
- Whittle, A, Healy, F, and Bayliss, A, 2011 *Gathering time: dating the early Neolithic enclosures of southern Britain and Ireland*, Oxford: Oxbow Books
- Whytehead, R, 1985 The Jubilee Hall site reveals new evidence of Saxon London, *Rescue News*, **37**, 4–5
- Wickenden, N P, 1986 Prehistoric settlement and the Romano-British settlement at Heybridge, Essex, *Essex Archaeol Hist*, **17**, 7–68
- Wilkinson, T J, 1988 *Archaeology and environment in south Essex: rescue excavation along the Grays bypass 1979/80*, E Anglian Archaeol Rep, **42**, Chelmsford: Essex County Council Archaeol Section
- Wilkinson, T J, and Murphy, P, 1986 Archaeological survey of an intertidal zone: the submerged landscape of the Essex coast, England, *J Fld Archaeol*, **13**, 177–94
- Wilkinson, T J, and Murphy, P, 1995 *The archaeology of the Essex coast, volume 1: the Hullbridge survey*, E Anglian Archaeol Rep, **71**, Chelmsford: Essex County Council Archaeol Section
- Williams, J H, Shaw, M, and Denham, V, 1985 *Middle Saxon palaces at Northampton*, Northampton Devel Corp Archaeol Monogr, **4**, Northampton: Northampton Devel Corp
- Williams, R J, 1993 *Pennylands and Hartingans two Iron Age and Saxon sites in Milton Keynes*, Buckinghamshire Archaeol Soc Monogr Ser, **4**, Aylesbury: Buckinghamshire Archaeol Soc

- Willis, E H, 1961 Marine transgression sequences in the English Fenlands, *Annals New York Acad Sci*, **95**, 368–76
- Willis, L, 1951 Dainton Earthworks, *Proc Devon Arch Exploration Soc*, **4.4**, 79–101
- Willis, E H, Tauber, H, and Munnich, K O, 1960 Variations in the atmospheric radiocarbon concentration over the past 1300 years, *Radiocarbon*, **2**, 1–4
- Wilson, P R, 2002 *Cataractonium. Roman Catterick and its hinterland: excavations and research, 1958-1997*, CBA Res Rep, **128-9**, York: CBA
- Wilson, S R, and Ward, G K, 1981 Evaluation and clustering of radiocarbon age paradigms, *Archaeometry*, **23**, 19–40
- Woodiwiss, S, 1992 *Iron Age and Roman salt production and the medieval town of Droitwich: excavations at the Old Bowling Green and Friar Street*, CBA Res Rep, **81**, London: CBA
- Woods, H, 1987 Excavations at Wenlock Priory, 1981–6, *Brit Archaeol Ass*, **140**, 36–75
- Woodward, P J, 1978 Flint distribution, ring ditches and Bronze Age settlement patterns in the Great Ouse valley, *Archaeol J*, **135**, 32–56
- Woodward, P J, 1982 Excavations at the South Street Methodist Chapel, Dorchester, *Dorset Natur Hist Archaeol Soc Proc*, **104**, 187–9
- Woodward, P J, 1988 Pictures of the Neolithic: discoveries from the Flagstones House excavations, Dorchester, Dorset, *Antiquity*, **62**, 266–74
- Woodward, P J, 1991 *The south Dorset ridgeway: survey and excavations 1977–84*, Dorset Natur Hist Archaeol Soc Monogr Ser, **8**, Dorchester: Dorset Natur Hist Archaeol Soc
- Woodward, P J, and Smith, R J C, 1987 Survey and excavation along the route of the southern Dorchester bypass 1986–1987 – an interim note, *Proc Dorset Natur Hist Archaeol Soc*, **109**, 84
- Woodward, P J, Davies, S M, and Graham, A, 1984 Excavations at Greyhound Yard car park, *Proc Dorset Natur Hist Archaeol Soc*, **106**, 99–106
- Woodward, P J, Davies, S M, and Graham, A H, 1993 *Excavations at the Old Methodist Chapel and Greyhound Yard, Dorchester 1981–4*, Dorset Natur Hist Archaeol Soc Monogr Ser, **12**, Dorchester: Dorset Natur Hist Archaeol Soc
- Wrathmell, S, and Nicholson, A, 1990 *Dalton Parlours: Iron Age settlement and Roman villa*, Yorkshire Archaeol Ser, **3**, Wakefield: West Yorkshire Archaeol Service
- Wyatt, R J, 1984 *Peterborough, British Archaeological Survey 1:50,000 sheet 158*, Southampton: Ordnance Survey
- Wymer, J, 1985 Bawsey, *Curr Archaeol*, **9**, 42–5
- Wymer, J J, and Brown, N R, 1995 *Excavations at North Shoebury: settlement and economy in south-east Essex 1500 BC–AD 1500*, E Anglian Archaeol Rep, **75**, Chelmsford: Essex County Council Archaeol Section
- Wymer, J J, and Healy, F, 1996 Neolithic and Bronze Age activity and settlement at Longham and Beeston with Bittering, in *Barrow excavations in Norfolk 1984–88* (ed J J Wymer), E Anglian Archaeol Rep, **77**, 28–53, Dereham: Norfolk Museums Service, Fld Archaeol Division
- Zeepvat, R J, Roberts, J S, and King, N A, 1994 *Caldecotte: excavation and fieldwork, 1966–91*, Buckinghamshire Archaeol Soc Monogr Ser, **9**, Aylesbury: Buckinghamshire Archaeol Soc

Index of laboratory codes

HAR-61-(S)252	HAR-442962	HAR-453161	HAR-469147
HAR-130-(S)252	HAR-443062	HAR-453261	HAR-469247
HAR-239-(S)241	HAR-443162	HAR-453361	HAR-471147-8
HAR-240-(S)241-2	HAR-443262	HAR-4538286	HAR-471748
HAR-1005238	HAR-4433137	HAR-4540286	HAR-474948
HAR-1450282	HAR-4435137	HAR-4568226	HAR-475048
HAR-1730191	HAR-4437137	HAR-4572173-4	HAR-4788132
HAR-1731192	HAR-4438137	HAR-458732	HAR-4789132
HAR-2284214	HAR-4443235	HAR-458832	HAR-479025
HAR-2369136	HAR-4444235	HAR-458932	HAR-479125
HAR-2650197	HAR-4445236	HAR-459032	HAR-479225
HAR-2651197	HAR-4446236	HAR-461447	HAR-479325
HAR-319692	HAR-4450319	HAR-462463	HAR-479426
HAR-320492	HAR-4451319	HAR-4627168-9	HAR-479526
HAR-336545	HAR-4452319-20	HAR-4629203	HAR-479626
HAR-338546	HAR-4453320	HAR-4630311	HAR-479726
HAR-342146	HAR-4454320	HAR-4631311	HAR-479826
HAR-3464137	HAR-4458267	HAR-4633171	HAR-479927
HAR-3465138	HAR-4459267	HAR-4634213	HAR-4800132
HAR-3917324	HAR-4471125	HAR-4635220	HAR-4809216
HAR-3930324	HAR-4472125	HAR-463623	HAR-4810216
HAR-396924	HAR-4473274-5	HAR-463723	HAR-481129
HAR-4110214-5	HAR-4475194	HAR-4638280	HAR-481229
HAR-42343-4	HAR-4485208	HAR-4639280	HAR-481329-30
HAR-4236252	HAR-4487208	HAR-4640227	HAR-481430
HAR-4239173	HAR-4488208	HAR-4641228	HAR-481530
HAR-4241253	HAR-4489208	HAR-4642228	HAR-481630
HAR-4300210	HAR-4490208	HAR-4643228	HAR-481730
HAR-4310253	HAR-4491151	HAR-4644228	HAR-481830
HAR-4313210	HAR-450146	HAR-4645228-9	HAR-481927
HAR-4315278	HAR-450246	HAR-464663	HAR-482027
HAR-4318172	HAR-450346	HAR-464763-4	HAR-482127
HAR-4323225-6	HAR-450646-7	HAR-4648263	HAR-482227
HAR-4324169	HAR-4522271	HAR-4649310	HAR-4823270
HAR-4342315	HAR-4523271	HAR-4650310	HAR-4827250
HAR-4367173	HAR-4524271	HAR-4651310	HAR-4828250
HAR-4390216	HAR-4525271	HAR-4652310	HAR-4829250
HAR-439992	HAR-4526272	HAR-466947	HAR-4830251
HAR-440120	HAR-4527220	HAR-467047	HAR-4831251
HAR-440520-1	HAR-4528192	HAR-467324	HAR-4832251
HAR-440621	HAR-452932-3	HAR-467425	HAR-4837229

Labcode Index

HAR-4843152-3	HAR-5012232	HAR-5125215	HAR-5248237
HAR-4844153	HAR-5013232	HAR-51268	HAR-5249237
HAR-4852225	HAR-5014232	HAR-512715	HAR-5258317
HAR-4853225	HAR-5015232	HAR-51288	HAR-5259317
HAR-4865254	HAR-5016232-3	HAR-51298	HAR-5260317
HAR-4866254	HAR-5019233	HAR-5130270	HAR-5261317
HAR-4867254	HAR-5020233	HAR-5131323	HAR-5262317
HAR-4868255	HAR-5054255	HAR-5134183	HAR-5271215
HAR-4895128-9	HAR-5066152	HAR-5135183	HAR-527260
HAR-4896129	HAR-5067308	HAR-5136183	HAR-527360
HAR-489772	HAR-5068289	HAR-5137183	HAR-527560
HAR-489872	HAR-5069289	HAR-5138183	HAR-527660
HAR-4903231	HAR-5070290	HAR-5139183	HAR-527760
HAR-49052	HAR-507135	HAR-5140183	HAR-5279293
HAR-492842	HAR-507235	HAR-5141184	HAR-5280287
HAR-4929221	HAR-5073280	HAR-5151225	HAR-5281295
HAR-493149	HAR-5074281	HAR-518258	HAR-5282295-6
HAR-493249-50	HAR-5075281	HAR-5216215	HAR-5283296
HAR-4933141	HAR-5086258	HAR-5217215	HAR-5284296
HAR-493530-1	HAR-5087184	HAR-5219186	HAR-5285296
HAR-493631	HAR-5088184	HAR-5220280	HAR-5291267
HAR-493713	HAR-5089184	HAR-5221163	HAR-5292267
HAR-493813	HAR-5090185	HAR-5222163	HAR-5293259
HAR-493913	HAR-5092185	HAR-5223166	HAR-5294259
HAR-494013	HAR-5093185	HAR-5224168	HAR-5295259
HAR-494113-4	HAR-5094185	HAR-5225166	HAR-5296260
HAR-494542	HAR-5095185	HAR-5226166	HAR-531850
HAR-494642	HAR-5096185	HAR-5227167-8	HAR-5320296
HAR-4948308	HAR-5097185-6	HAR-5228231	HAR-5321296
HAR-4949308	HAR-5098186	HAR-522958	HAR-5322296
HAR-4950308	HAR-5099186	HAR-523058	HAR-5323297
HAR-4951309	HAR-5100186	HAR-5236242	HAR-532481
HAR-4952309	HAR-5101186	HAR-5237242	HAR-532581
HAR-4995312	HAR-5102282	HAR-5238243	HAR-5339221
HAR-4998258	HAR-5103171	HAR-5239243	HAR-5340221
HAR-4999261	HAR-5104213	HAR-5240243	HAR-5341221
HAR-5000257	HAR-5105262	HAR-5241243	HAR-5342222
HAR-5001257	HAR-5106262	HAR-5242243	HAR-5343222
HAR-5002257	HAR-5107278	HAR-5243243-4	HAR-5344222
HAR-500662	HAR-5116247	HAR-5244244	HAR-5346222
HAR-500763	HAR-5117247	HAR-5245236	HAR-535081
HAR-5010231-2	HAR-5118248	HAR-5246236	HAR-535181
HAR-5011232	HAR-512415	HAR-5247236-7	HAR-5352225

Labcode Index

HAR-5354259	HAR-553965	HAR-5628320	HAR-5735165
HAR-5355194	HAR-554165	HAR-5629320-1	HAR-5736164-5
HAR-5356194	HAR-5542212	HAR-5630303	HAR-5737165
HAR-540567-8	HAR-5543213	HAR-5631303	HAR-574060-1
HAR-540668	HAR-5544213	HAR-5632303-4	HAR-5741193
HAR-540768	HAR-5545323	HAR-5634203	HAR-5742193
HAR-540868	HAR-5547244	HAR-5635203	HAR-57438
HAR-540968-9	HAR-5548237	HAR-5636203	HAR-57449
HAR-541069	HAR-5549164	HAR-5637203	HAR-57459
HAR-541169-70	HAR-5550164	HAR-5638203-4	HAR-577515-6
HAR-5459281	HAR-5551216-7	HAR-5639204	HAR-577616
HAR-5460281	HAR-5552217	HAR-5640304	HAR-5787244
HAR-5481190	HAR-5553217	HAR-5641304	HAR-5789244-5
HAR-548353	HAR-5554217	HAR-5642304	HAR-5790245
HAR-548453	HAR-5555217	HAR-5643304-5	HAR-5791245
HAR-548553	HAR-5556217	HAR-5644305	HAR-5792245
HAR-548653	HAR-5557218	HAR-5645305	HAR-5793245
HAR-548753	HAR-5558218	HAR-5646190	HAR-5794246
HAR-548853-4	HAR-5560214	HAR-5647190-1	HAR-5865318
HAR-548954	HAR-5561214	HAR-5648191	HAR-5866318
HAR-5492233	HAR-5579244	HAR-5649191	HAR-5867318
HAR-5493233	HAR-558050	HAR-565517	HAR-5868318
HAR-5494233	HAR-5583149	HAR-5657130	HAR-587284
HAR-5495233-4	HAR-5584149	HAR-565833	HAR-587384
HAR-5498180-1	HAR-5585149-50	HAR-565933	HAR-587484
HAR-5499181	HAR-5586150	HAR-566133-4	HAR-587584
HAR-5500181	HAR-5587150	HAR-5662150-1	HAR-587684-5
HAR-5501181	HAR-5588150-1	HAR-5666322-3	HAR-587785
HAR-5502181	HAR-5589150	HAR-5667315	HAR-587885
HAR-5503181-2	HAR-5590150	HAR-5668315	HAR-587985
HAR-5504182	HAR-5608266	HAR-5698237	HAR-588085
HAR-5505182	HAR-560921	HAR-5710257	HAR-588185
HAR-550650	HAR-561452	HAR-571283	HAR-588285
HAR-550750	HAR-561652	HAR-5721261	HAR-588385-6
HAR-550879	HAR-5617315-6	HAR-5722261	HAR-588486
HAR-5509272	HAR-5618316	HAR-5723261	HAR-588586
HAR-5510287	HAR-5619316	HAR-5724261	HAR-588686
HAR-553364	HAR-5620316	HAR-5725172	HAR-5887211
HAR-553464	HAR-5622316	HAR-5726260	HAR-593577
HAR-553564	HAR-5623316	HAR-5727261	HAR-5936224
HAR-553664	HAR-5624309	HAR-5732167	HAR-5942209
HAR-553764	HAR-5625309	HAR-5733164	HAR-5958191
HAR-553865	HAR-562633	HAR-5734165	HAR-5959198

Labcode Index

HAR-5960198	HAR-6186148	HAR-6363305	HAR-646522
HAR-5961198-9	HAR-6200210	HAR-6364153-4	HAR-646822
HAR-5962199	HAR-6201210	HAR-6365175-6	HAR-646922
HAR-596414	HAR-6202210-1	HAR-6366176	HAR-6470207
HAR-596514-5	HAR-6205172	HAR-6367201	HAR-6471204-5
HAR-596771	HAR-6206179-80	HAR-6368202	HAR-6472207
HAR-5974321	HAR-6207176	HAR-6389138	HAR-647435
HAR-5975321-2	HAR-6208178	HAR-6390138	HAR-647535-6
HAR-5981202	HAR-6209178	HAR-6392176	HAR-647617
HAR-5982202	HAR-6210176	HAR-6393193	HAR-647782
HAR-5983202	HAR-6211178-9	HAR-6394154	HAR-647882
HAR-598470	HAR-6212179	HAR-6395154	HAR-6496294
HAR-598571	HAR-6215305	HAR-6399277	HAR-6497276
HAR-598671	HAR-6216127	HAR-6400277-8	HAR-6498246
HAR-6037135	HAR-6217127	HAR-6416179	HAR-6500187
HAR-6038136	HAR-6218288	HAR-6417179	HAR-650117-8
HAR-6084151	HAR-6222133-4	HAR-6418179	HAR-650322
HAR-6115195	HAR-62255	HAR-6419180	HAR-650422
HAR-6116195-6	HAR-62265-6	HAR-6420177	HAR-6505211-2
HAR-6118196	HAR-62276	HAR-6421177	HAR-6513306
HAR-6120196	HAR-6236282	HAR-6422177	HAR-6516298
HAR-6121196	HAR-6237282	HAR-6423177	HAR-6517300
HAR-6122196	HAR-6238282	HAR-6424178	HAR-6518299
HAR-6123196	HAR-6239282	HAR-6425180	HAR-6519299
HAR-6124288	HAR-6240282-3	HAR-6433322	HAR-6529134-5
HAR-6125288	HAR-625554	HAR-6440305	HAR-6530135
HAR-6126289	HAR-625654	HAR-6441154	HAR-6531135
HAR-6127289	HAR-625954	HAR-6442170	HAR-654443
HAR-6128238	HAR-6263258	HAR-6443170	HAR-654543
HAR-6130238-9	HAR-6264260	HAR-6444170-1	HAR-654643
HAR-6131239	HAR-6265255	HAR-6445171	HAR-654743
HAR-6132239	HAR-6266265	HAR-6446294	HAR-654865
HAR-6133239	HAR-6268265	HAR-6450298	HAR-654966
HAR-6136239	HAR-626954	HAR-6451298	HAR-655086-7
HAR-6138239	HAR-627054-5	HAR-6453206	HAR-655187
HAR-6176130	HAR-6271265	HAR-6454206	HAR-655287
HAR-6177130	HAR-6296155-6	HAR-6455206	HAR-6553294
HAR-6179130	HAR-6297156	HAR-6456205	HAR-6554294
HAR-6181130	HAR-6298156	HAR-6457206	HAR-6555295
HAR-6182189	HAR-6349140	HAR-6458206	HAR-6556295
HAR-6183189	HAR-6353140	HAR-645921	HAR-655783
HAR-6184285	HAR-6361140-1	HAR-646221	HAR-656043-4
HAR-6185148	HAR-6362153	HAR-646421-2	HAR-656144

Labcode Index

HAR-656644	HAR-668780	HAR-7006155	HAR-7055157
HAR-656920	HAR-668880	HAR-7007155	HAR-7056158
HAR-6570265	HAR-668980	HAR-7010197-8	HAR-7057158
HAR-6574285	HAR-6690301	HAR-7011198	HAR-7058158-9
HAR-6575285	HAR-6698262	HAR-701234	HAR-7059157
HAR-6580265	HAR-6699262	HAR-701334	HAR-7060158
HAR-6581167	HAR-67009	HAR-701434	HAR-7061220
HAR-6589166	HAR-67019	HAR-701637	HAR-7062220
HAR-6604161	HAR-67029-10	HAR-701737	HAR-7063212
HAR-660536	HAR-671473	HAR-701837	HAR-7064256
HAR-6606254	HAR-671573-4	HAR-701938	HAR-7065256
HAR-6607254	HAR-671674	HAR-702038 (Brean Down)	HAR-7066256
HAR-6609295	HAR-672574	HAR-7020234 (Reading: Crane Wharf)	HAR-706728
HAR-661420	HAR-672674	HAR-702138	HAR-706828
HAR-6617161	HAR-672774	HAR-702238-9	HAR-706928
HAR-6618161	HAR-6728126	HAR-702339	HAR-707028-9
HAR-6621264	HAR-6729126	HAR-7024155	HAR-7071199
HAR-6622264	HAR-6730126	HAR-7025212	HAR-7072199
HAR-6623160	HAR-6748273	HAR-7026234	HAR-7073199
HAR-662563	HAR-6749273	HAR-7027235	HAR-7074199-200
HAR-6626266	HAR-6787311	HAR-7028235	HAR-7075200
HAR-6627266	HAR-6801141	HAR-702988	HAR-7076200
HAR-662851	HAR-6802141	HAR-703088	HAR-7077200
HAR-662951	HAR-680416	HAR-703188	HAR-709755
HAR-6630300-1	HAR-680516-7	HAR-703288-9	HAR-709855
HAR-6631301	HAR-6807190	HAR-7033124	HAR-804955
HAR-663476	HAR-683818	HAR-7034125	HAR-805055
HAR-663576	HAR-6841190	HAR-7035125	HAR-805155-6
HAR-664076	HAR-685734	HAR-7036297	HAR-805256
HAR-664376	HAR-6887322	HAR-7037297	HAR-805356
HAR-665166	HAR-6907299	HAR-7038321	HAR-805491
HAR-665266	HAR-6910295	HAR-7039268	HAR-805591
HAR-6653134	HAR-6921207	HAR-7040268	HAR-8082127
HAR-665466	HAR-692566	HAR-7041268	HAR-8083273
HAR-6658283	HAR-692666-7	HAR-7042268	HAR-8092131
HAR-6659283	HAR-692767	HAR-7044128	HAR-8093131
HAR-666379	HAR-6978226	HAR-7045128	HAR-8094131
HAR-666480	HAR-6979226	HAR-704659	HAR-8096131
HAR-6668312	HAR-6980226	HAR-7047218	HAR-8097211
HAR-6669312	HAR-6981227	HAR-7051218	HAR-809876
HAR-6682264	HAR-6982227	HAR-7053218-9	HAR-809959
HAR-6683264	HAR-6983227	HAR-7054161	HAR-8100287
HAR-668680	HAR-7005154-5		HAR-810122-3

Labcode Index

HAR-810223	HAR-8362223	HAR-8531195	HAR-8759151
HAR-8103292	HAR-8363223	HAR-8532142	HAR-8760151
HAR-8104292	HAR-8364223	HAR-8533142	HAR-8761151-2
HAR-8105292	HAR-836587-8	HAR-8534143	HAR-8762152
HAR-8106292	HAR-8366209	HAR-8535143	HAR-876873
HAR-8107292	HAR-8368162	HAR-8536143	HAR-876958
HAR-8154162	HAR-8369162	HAR-8537143	HAR-877058
HAR-818052	HAR-837018-9	HAR-8538306	HAR-8773141
HAR-8182248	HAR-837119	HAR-8539306	HAR-8774141-2
HAR-8183132-3	HAR-837219	HAR-8540306-7	HAR-8775172
HAR-8184133	HAR-837419	HAR-8541307	HAR-8776172
HAR-8185133	HAR-8413302	HAR-8543307	HAR-8778172-3
HAR-8223146	HAR-8414302	HAR-8544284	HAR-8779173
HAR-8224146-7	HAR-8415302	HAR-854639	HAR-8780173
HAR-8237269	HAR-8416302-3	HAR-854739	HAR-8781230
HAR-8238269	HAR-8417303	HAR-854839-40	HAR-8782230
HAR-8239269	HAR-8457159	HAR-854940	HAR-8783230
HAR-8240269-70	HAR-8458159	HAR-857631	HAR-8785246
HAR-8241301	HAR-8459159	HAR-857731-2	HAR-8786246
HAR-8242299	HAR-8460159	HAR-857877	HAR-8787142
HAR-8243299	HAR-8461159	HAR-857978-9	HAR-8788200
HAR-8253219	HAR-85051	HAR-8599139	HAR-8789201
HAR-8254219	HAR-85061	HAR-8600139	HAR-8790201
HAR-8255219	HAR-8507147	HAR-8602139	HAR-8791249
HAR-82561	HAR-8508147	HAR-8603139	HAR-8792249
HAR-8273284	HAR-8509147	HAR-8604139-40	HAR-8793249
HAR-8276284	HAR-8514188	HAR-8608140	HAR-8794249
HAR-8277284	HAR-8515188	HAR-8645156-7	HAR-8795249
HAR-8278284	HAR-851672	HAR-8646157	HAR-8796249
HAR-8325301	HAR-851772	HAR-8647168	HAR-8803276
HAR-8326302	HAR-8518126	HAR-8664174	HAR-8804276
HAR-8332273	HAR-8519126-7	HAR-8665174	HAR-880656
HAR-8333273	HAR-8520193	HAR-8666174	HAR-880756
HAR-8349144	HAR-8521188	HAR-8667174	HAR-8809273
HAR-8350144	HAR-85222-3	HAR-8668174	HAR-8810274
HAR-8351144	HAR-85233	HAR-867269	HAR-8812274
HAR-8354209	HAR-85243	HAR-867369-70	HAR-8813274
HAR-8355209	HAR-85253	HAR-867470	HAR-8815274
HAR-8356209	HAR-8526234	HAR-867570	HAR-8818145
HAR-8357129	HAR-8527278-9	HAR-867670	HAR-8819145
HAR-8358129	HAR-8528279	HAR-8677182	HAR-8820145
HAR-8360223	HAR-8529279	HAR-8678182	HAR-8821145
HAR-8361223	HAR-8530279	HAR-8758151	HAR-8822146

Labcode Index

HAR-8823146	HAR-9125291	HAR-969610	Q-2507101
HAR-8874153	HAR-9134189	HAR-1006110-1	Q-2508111
HAR-8875187	HAR-913556-7	HAR-1006211	Q-2509111
HAR-887681	HAR-913657	HAR-1006311	Q-2510111
HAR-8877162	HAR-913757	HAR-1006411	Q-2511115
HAR-8878160	HAR-913857	HAR-1032511	Q-2512115
HAR-8879158	HAR-913944	HAR-1032611-2	Q-2513115
HAR-8880160	HAR-914044-5	HAR-1032712	Q-2514115
HAR-8881160	HAR-914245	HAR-1050012	Q-2515107
HAR-8882197	HAR-914345	HAR-1050112	Q-2516107
HAR-890875	HAR-915141	HAR-1050212	Q-2517107
HAR-890975	HAR-915341	OxA-82167	Q-2518107
HAR-891075	HAR-915541	OxA-82267	Q-251995
HAR-891175	HAR-915641	OxA-823224	Q-252095
HAR-8914275	HAR-915877	OxA-824224	Q-252196
HAR-8915275	HAR-915977-8	OxA-831148	Q-252296
HAR-8916275	HAR-916078	OxA-83248	Q-252395
HAR-8917275-6	HAR-916178	OxA-83448-9	Q-252495
HAR-8936189	HAR-916383	OxA-83649	Q-2525108
HAR-8938227	HAR-91796	OxA-83749	Q-2526108
HAR-8939241	HAR-91806-7	OxA-83849	Q-2527108
HAR-8940240	HAR-91817	OxA-839229	Q-2528114
HAR-89734	HAR-91827	OxA-840230	Q-2529114
HAR-89744	HAR-91837	OXA-1054247	Q-2530114
HAR-89754	HAR-91847	OxA-1055229	Q-2531114
HAR-89764-5	HAR-91857	OxA-1056229	Q-2532101
HAR-89775	HAR-91867-8	OxA-105713	Q-2533101
HAR-897991-2	HAR-9187253	OxA-1089313	Q-2534101
HAR-8980241	HAR-9207127	OxA-1210313	Q-253599
HAR-8981240	HAR-9208128	OxA-1211313	Q-253699
HAR-899040	HAR-9234293	OxA-1212313-4	Q-2537113
HAR-899140	HAR-9235293	OxA-1213314	Q-2538113
HAR-899241	HAR-927336	OxA-1214314	Q-2539113
HAR-899341	HAR-927436	OxA-1215314	Q-2540113
HAR-9018286	HAR-927536	OxA-1216314	Q-2541113
HAR-902817	HAR-9276263	OxA-1217314	Q-2542113
HAR-9118290	HAR-9277263	OxA-1229314	Q-2543106
HAR-9119290	HAR-9278263	Q-2501100	Q-2544106
HAR-9120290-1	HAR-9449277	Q-2502100	Q-2545106
HAR-9121291	HAR-9450277	Q-2503100	Q-2546106
HAR-9122291	HAR-9693274	Q-2504100-1	Q-2547106
HAR-9123291	HAR-969410	Q-2505101	Q-254897-8
HAR-9124291	HAR-969510	Q-2506101	Q-254998

Labcode Index

Q-255098	Q-2573104	Q-2596116	Q-2819120
Q-255198	Q-2574104	Q-2597122	Q-2820120
Q-255296-7	Q-2575108	Q-2598122	Q-2821120
Q-255397	Q-2576108	Q-2599109	Q-2822120
Q-255497	Q-2577109	Q-2600109	Q-2823120-1
Q-255597	Q-2578109	Q-280198	Q-2824121
Q-2556118	Q-2579109	Q-280298	Q-2825102
Q-2557117	Q-258094	Q-2803110	Q-2826102
Q-2558117	Q-258194	Q-2804110	Q-2827102
Q-2559118	Q-2582124	Q-2805118	Q-2828102
Q-2560105	Q-2583124	Q-2806118	Q-309389
Q-2561105	Q-2584116-7	Q-2807118	Q-309489
Q-2562105	Q-2585117	Q-280894	Q-309589
Q-2563105	Q-2586123	Q-2809119	Q-309689-90
Q-2564105	Q-2587122-3	Q-2810121	Q-309890
Q-2565103	Q-2588123	Q-2811121	Q-309990
Q-2566103	Q-2589123	Q-2812121	Q-310090
Q-2567103	Q-2590110	Q-2813112	Q-314790
Q-256893	Q-2591110	Q-2814112	Q-314890
Q-2569103	Q-2592110	Q-2815112	Q-314990-1
Q-2570103-4	Q-2593116	Q-2816112	Q-315091
Q-2571104	Q-2594116	Q-2817119	
Q-2572104	Q-2595116	Q-2818119-20	

General Index

Page numbers in **bold** refer to figures, page numbers in *italic* refer to tables.

- Abingdon, Oxfordshire 50
Abington Pigotts; Downhall Gatehouse, Cambridgeshire 1
AERE Harwell vii–viii, vii, xiv–xv, **xv**, xvi, xx–xxi, xxvi, 1, 3, 5–6, 8, 14–15, 16, 16–17, 19, 21, 33, 34, 40, 41, 49–50, 52, 55–6, 61, 63, 64, 66–7, 68–9, 70, 72, 73, 74, 82, 87, 91–2, 127, 131, 136, 140, 142–3, 151–2, 153, 155, 156, 173, 176, 181, 182, 186, 194, 197, 198, 199–200, 207, 208, 210, 212, 214, 215, 217–18, 222, 226–7, 230, 235–6, 237, 238, 240, 241, 246, 247–8, 251, 252, 269–70, 272, 273, 276, 278, 282, 283, 285, 286–7, 290, 293, 296, 297, 299, 300, 301–2, 304, 306–7, 308–9, 310–11, 316, 322, 323
Æthelflæda 268
Æthelflædan 269
Æthelred 129
Alcester, Warwickshire
 Coulter's Garage 2
 site AL18 2–3
Alderton, A 92–6, 98–101, 107–8, 111, 114–15
Aldwincle xxvii
Allen, D 13–14
Allen, M 18–19, 249–51
Allen, M J 169–71
Allen, T G 180–2, 218–19
Amberley Wild Brooks, West Sussex 3–4
Amble: Low Hauxley, Northumberland 4–5
Amesbury: New Barn Down, Wiltshire 5–6
Ancient Monuments Laboratory vii, viii, xi, 5–6, 8, 16, 17, 18, 20, 24, 31, 33, 35, 36, 37–41, 42, 43, 51, 52, 62–3, 63, 68, 71, 81, 84, 92, 129, 140, 144, 153, 154, 168, 169, 173–4, 175, 184, 190, 202, 204, 206, 208, 212, 214, 225, 226, 227, 236, 238, 241, 242, 247, 248, 266, 274, 282, 284, 286, 288, 289, 299, 306–7, 307, 308, 310, 311, 317, 322, 324
Andrews, D 192–3, 263
Andrews, P 262
Anglezarke Moor, Lancashire
 Black Brook 176–7
 Mineral Horizon 177
 Pikestones, monument 177
 Pikestones, ploughings 178
 Round Loaf 178–9
Anglo-Saxon period
 burials 17–18, 60
 cemeteries 45–9, 231–4
 churches 17–18, 42
 monastery complex 138–40
 pits 307
 settlements 174–5, 221, 267, 281–3
 West Heselton: Prehistoric 300
Anslow's Cottages, Berkshire 6–8
antler xi, 11–2, 12, 74, 77, 79–80, 126, 144, 172, 173, 195–6, 197, 242, 248, 251
ApSimon, A 39
Archaeological Rescue Committee 195
archaeomagnetic samples 227
Ardleigh, Essex 8–9
Armstrong, P 28–31
Ashbee, P 5–6, 204–7, 312–14
Asheldham Camp, Essex 9–10
Ashwin, T 19–20
Astill, G G 318
Audouy, M 42, 231–4
Austin, D 155–6, 266–7
Avebury, Wiltshire xi, 10–12
Avon, Stoke Bishop: Druids Hill 272
Aydon Castle, Northumberland 12–13
Ayers, B 219–20
Aylesbury: George Street, Buckinghamshire 13–14

Bain, M G 177–80, 180
Balaam, N 8–9, 15, 60–1, 65–7, 127, 197–8, 224, 303–6
Baldock: Upper Walls Common, Hertfordshire 14–15
Balksbury xxvii
Balksbury Camp, Hampshire **xxiii**, 15
Bamford, H 214–15
Bantham Ham, Devon 15–16
Barber, K 314–15
Barber, K E 3
Barclay, A 82–3
bark, Foulmire Fen 99
Barnard Castle: Moss Mire, Durham 16–17
Barnes, B 176–80
barrows **xxiii**, 5–6, 18–9, 19–20, 24, 43–4, 49–50, 59, 64–5, 19, 19–20, 72, 75–6, 88–9, 90, 91, 99, 126–7, 130, 141–2, 172–3, 197–8, 204–7, 211, 212–3, 229–30, 230, 246, 249–51, 252, 272, 276, 276–7, 284, 286–7, 287, 288, 295–7, 298–300, 300–3, 306, 312, 312–4, 315–6, 317
Bartonhall Creek, Roach site 2, Essex 156–7
Barton-Under-Needwood; Catholme xxvii
Barton-upon-Humber: St Peter's Church, Humberside xxiv, 17–18
Basingstoke: Buckskin Barrows, Hampshire 18–19
Batchelor, D 79
Bawsey: Mintlyn Wood, Norfolk 19–20
Bayesian analysis **xxiii**, xxiii–xxiv, 45
Bayliss, A. 1, 2–3, 17–18, 41, 44, 56–7, 61, 72, 75, 79, 82, 89, 90, 126, 132, 134–5, 143, 145, 146, 147, 149, 155, 174–5, 181, 182, 191, 202, 223, 225, 228, 237, 240, 241, 244, 262, 299, 300, 311–12
Beaker period
 Brean Down 39, 40
 Bromfield 42–4, 44
 burials **xxiii**, 25, 200, 250, 251
 cemeteries 200, 306–7
 Etton Landscape 90
 Lechlade 181
 Longham 193
 pits 23
 pottery 5, 6, 15, 23, 40, 44, 193, 251
Beckford xxvii
Bede 184
Bedfordshire **xxiii**, xxiii, xxxiv, 51, 237–8, 276
Bedwin, O 9–10
Beeston Castle, Cheshire x, 20–3
Beeston with Bittering, Norfolk 23
Bell, A C 153–4
Bell, M 36–41, 37
Bellamy, P 79
Bennett, J 83

- Bennett, P 57–8
 Beodricsworth 45
 Berinsfield: Mount Farm, Oxfordshire 24–7
 Berkshire 6–8, 44–5, 234–5, 252–3, 318
 Bettison's Bridge, Lincolnshire 93
 Beverley, Humberside, Eastgate xxii, 28–9, 29–31
 Bewley, R 198–200, 201
 Biddle, M 294
 Bidford-on-Avon, Warwickshire xxviii
 Lloyds Bank Site VII 31
 Binchester cemetery, Durham 32
 Binsted, Hampshire 32–3
 Blackmore, L 189
 Blackwater 3, Maylandsea Essex 160
 Blackwater 7, St Lawrence Essex 160–1
 Blackwater 8, Bradwell-on-Sea Essex 161
 Blackwater 17, Goldhanger Essex 157
 Blackwater 18, Tollesbury Essex **xiii**, 157–8
 Blackwater 28, The Stumble Essex 158–60
 Blackwater Estuary 81–2
 Boddington, A 232
 Bond, D M 175–6
 bone, animal xi, xii, xiv, 11, 12, 14, 16, 25, 26, 30, 33–4, 41, 47–9, 59, 62–3, 68–9, 74, 78–9, 82, 83, 180–1, 182, 189, 191, 196, 197, 210, 214, 216–7, 218, 218, 225, 228, 233, 239, 277, 277–8, 294, 306, 310, 313, 314, 323
 Borwick: Manor Farm, Lancashire 33–4
 Bourne North Fen, Lincolnshire 93–4
 Bourne-Morton canal 108–9
 Brandon xxviii
 Brandon: Staunch Meadow, Suffolk 34–5
 environmental sequences 35–6
 wooden structures 36
 Brean Down, Somerset 36–41
 Brewster, T 312
 Brewster, T C M 49–50, 172
 Briden, C 323
 Bridge, M 311–12
 Brigstock, Northamptonshire 42
 Brinklow, D 324
 Brixworth Church, Northamptonshire xxii, 42
 Broadleaf taxa xxvi–xxvii
 Bromfield, Shropshire xxviii, 42–4
 Bronze Age
 Amble 4
 Anslow's Cottages 6–8
 Berinsfield 24, 25, 26
 burials 8–9, 19–20, 25, 33–4, 64–5, 65–7, 67–8, 78, 92, 235–6, 300–3
 cemeteries 42–4, 173–4, 198–200, 250, 252, 295–7, 306–7
 cremations 235–6
 funerary monuments 33–4
 hoard 124–5
 metalwork 34
 metal-working debris 73
 middens 226–7
 pits 264
 pottery 59, 65–7, 72, 90, 92, 134–5, 141, 188, 248, 250, 274–5
 rubbish 197
 settlements 36–41, 65–7, 89–91, 132–3, 158–60, 169, 188, 202–4, 213, 236–7, 238–9, 248, 270, 321
 Brown, A G 234
 Brown, N 8, 67–8, 188, 213, 264
 Bryant, R 128–9
 Buckinghamshire 13–14, 52, 224–5
 Buckskin 19
 burgage tenements 28–9
 Burghfield: Field Farm, Berkshire 44–5
 Burghfield: Knight's Farm xxviii
 burials. *see also* cemeteries; cremations
 Anglo-Saxon 17–18, 60
 Ardleigh 8–9
 Aylesbury 13–14
 Baldock 14–15
 Bawsey 19–20
 Beaker period **xiii**, 15, 25, 200, 250, 251
 Berinsfield 24, 25
 Bidford-on-Avon 31
 Binchester 32
 Borwick 33–4
 Brean Down 39–40
 Bronze Age 8–9, 19–20, 25, 33–4, 64–5, 65–7, 67–8, 78, 92, 235–6, 300–3
 Burythorpe 49–50
 Catterick 60–1
 cist 199
 Clacton 67–8
 Colchester 70–1
 crouched 53, 54, 60–1, 78, 181
 decapitated 71
 Dorchester Bypass 77–8
 Dorchester-Upon-Thames 80–1
 Easton Lane Interchange, Winchester 196
 Exning 92
 Gloucester 129
 Henley Wood 149
 Iron Age 13–14, 14–15, 25, 31, 219
 Kemp Howe 172
 knife 54
 Lincoln, St Paul-in-the-Bail 184–6
 Neolithic 24, 77–8, 272
 orientation 13, 55, 58, 149
 prone 189
 reused graves 14
 Roman period 31, 60–1, 70–1
 Saxon period 31, 32, 215–16, 273–4
 sub-Roman 80–1
 Wharram Percy: site 12 308–9
 Wraysbury 318
 Burleigh, G R 14
 Bury St Edmunds: Abbey, Suffolk 45–9
 Burythorpe: Whitegrounds Barrow, Yorkshire (East Riding) xxiii, 49–50
 Buscot Lock, Oxfordshire 50–1
 Bushmead Priory, Bedfordshire xxiii, **xxiii**, 51
 Butcher, S 241–2
 Butley: Burrow Hill, Suffolk 51–2
 Butterworth, C 44–5
 cairn
 Amble 4
 Hazleton 143–4
 Stannon 270
 Caldecotte: MK-117, Buckinghamshire 52
 calibration **xvii**, xvii–xviii
 Cambridge, University of, Godwin Laboratory viii, xv, xvi, xix–xx

- Cambridgeshire xiv, xv, 1, 89–91, 92, 94, 96–7, 99, 116, 99–100, 100–1, 103–4, 109–10, 111, 111–2, 112–3, 113–4, 114–5, 115–6, 116–7, 119, 123–4,
- Campbell, G 16–17, 175–6
- Cannington, Somerset 52–7
- Canterbury: 69a Stour Street, Kent 57–8
- Canti, M 187
- Carlisle, Cumbria
 Castle Street 58–9
 Cathedral 59
- Carr, R 35, 36
- Carrington, P 63
- Cartwright, C 124–5, 212–13
- Cartwright, C R 295–7
- Carver, M 267–70
- Caseldine, A E 256, 260
- Cataclews: Barrow 1, Cornwall 59
- Catterick: Baines Farm, North Yorkshire 60–1
- cemeteries. *see also* burials; cremations
 Anglo-Saxon period 45–9, 231–4
 Beaker period 306–7
 Binchester 32
 Brean Down 39–40
 Bromfield 42–4
 Bronze Age 42–4, 173–4, 198–200, 250, 252, 295–7, 306–7
 Cannington 52–7
 Maryport 198–200
 medieval 294–5
 Neolithic 173–4
 Roman period 52–7, 148–52
 Ulwell 288–9
 York: Aldwark, Ebor Brewery 322
- Chambers, R A 80–1
- Chaplin, J 229–30
- Chapman, A 231–4
- charcoal x–xi, x, xii, xiv, xvi, xxvii, xxviii, xxviii–xxix, xxx, xxxi, xxxii, xxxiii, xxxiii–xxxiv, xxxiv–xxxv, xxxvi, xxxviii–xxxix, xl, 5–6, 8–9, 10–11, 12, 13, 15, 16, 18–19, 20, 20–2, 23, 27, 30, 32–3, 33, 36, 37–9, 40–1, 41, 42, 43–4, 44–5, 45–7, 48, 52, 58, 59, 61, 62, 63, 64–5, 65–7, 67–8, 68, 69–70, 71, 72, 73, 75, 76, 78, 79, 81–2, 85, 86, 87, 88–9, 89, 90, 91, 124–5, 127, 129, 130, 131, 132–3, 133–4, 134–5, 136, 137, 138, 141–2, 142–3, 145–6, 152–3, 158, 162, 164, 168–9, 169, 171, 172–3, 173–4, 174–5, 182, 187, 188, 193, 194, 195, 197–8, 198–200, 201, 203–4, 205–7, 208, 210–1, 211, 212, 212–3, 213, 214–5, 217–8, 219, 221, 224, 225, 226, 226–7, 227–8, 228, 229–30, 230, 231, 233, 235–6, 236–7, 238, 241–2, 243, 244, 245–6, 246, 247–8, 250, 251, 252, 263, 264, 265, 267, 269–70, 270, 272, 273, 274, 278, 279, 280, 280–1, 282–3, 284, 286, 286–7, 287, 288, 290–1, 292, 293, 294, 295, 295–7, 298–300, 301, 302–3, 303–4, 304–5, 306–7, 308, 309, 311, 315, 315–6, 317, 318, 319–20, 320–1, 321, 324
- Charlwood, Surrey 61
- Cherry Willingham, Lincolnshire 61–2
- Cheshire x, 20–3, 62–3, 63, 64–5, 187, 317
- Chester, Cheshire
 Hunter School 62–3
 Hunter's Walk 63
- Chineham, Hampshire 63–4
- Chowne, P 129–30, 194–5, 278–80
- Christianity, early 53
- Christie, P 75–6, 211, 287
- Church Lawton, Cheshire 64–5
- churches
 Anglo-Saxon period 17–18, 42
 medieval 184–6, 293–5, 307–8, 323
 Roman period 184–6
 Saxon period 128–9, 231–4
- Chysauster, Cornwall **xiii**, 65–7
- Clacton 1, Jaywick Essex 162
- Clacton: Rush Green, Essex 67–8
- Clark, A 308–9
- Clay, P 72
- Claydon Pike, Gloucestershire 68–9
- Claylands, Huntspill Moor Somerset 253
- Cleveland, Hartlepool: Church Close 138–40
- Clyst Honiton, Devon 69–70
- Coffue Drove, Cambridgeshire 94
- Coggins, D 86–7, 289–90
- Colchester, Essex
 Culver Street 70–1
 East Hill House 71
- Coles, J 253–62
- collaborating facility **vii**
- Colne 1, Alresford Essex 162
- contamination 61
- Coppergate helmet, the 321
- Cornwall x, xii, **xiii**, 59, 65–7, 75–6, 114–6, 211, 224, 225–6, 241–2, 266, 266–7, 270, 283–4, 286, 286–7, 287, 287–8, 315
- Corston: Wansdyke, Avon 71
- Cossington, Leicestershire 71–2
- Cot Nab, North Yorkshire 72
- Cottage Field, Wattisfield, Suffolk 23
- Covent Garden, Jubilee Hall London 188–9
- Cow Green reservoir, Durham 86–7
- Cox, P 288–9
- Cracknell, S 2, 153
- Crawley: Broadfields **xxviii**
- cremations xi, **xiii**
 Amesbury: New Barn Down 5
 Ardleigh 8–9
 Bawsey 19, 20
 Berinsfield 25, 27
 Bromfield 43–4
 Bronze Age 235–6
 Burghfield 44–5
 Church Lawton 64, 65
 Chysauster 66
 Haddenham: Snow's Farm Barrow 130
 Roxton 237–8
 West Heath Common 296–7
 Winterbourne Steepleton 316
- Croft Andrew, C K 211
- crop marks
 Ardleigh, Essex 8
 Stanwell: Heathrow Airport 270
 Wasperton 291–2
- Crouch 1 Essex 163
- Crouch 2 Essex 164
- Crouch 4 Essex 166
- Crouch 8 Essex 167–8
- Crouch 11 Essex 163
- Crouch 19 Essex 163–4
- Crouch 22 Essex 164–5
- Crouch 23 Essex 165

- Crouch 29 Essex 165
 Crouch 52 Essex 166–7
 Crouch 56 Essex 167
 Crowther, D 266
 Crummy, P 70–1, 202
 Cullen, K 13, 63–4, 231, 241, 322
 Cumbria xvi, 58–9, 59, 83, 198–200, 201
 cursus monuments 82–3, 264–5
 curtain wall, Aydon Castle 12–13
- Dacre, M 173
 Dainton, Devon 73
 Dalton Parlours, West Yorkshire 73–4
 Dalwood, H 13
 Danby Rigg, North Yorkshire 74–5
 Danby Triple Dykes 74–5
 Danebury xxviii–xxix, 15
 Daniels, R 138–40
 Darlington, J 248–9
 data collection viii
 David, A 246
 Davidstow Moor, Cornwall 75–6
 Davies, S 15, 78–9
 de M Vatcher, F J 246
 Denham, V 217–18
 Dennis, G 192
 Dent, J 306–7
 Derbyshire 187, 276, 284–5
 Devon 15–16, 69–70, 73, 91–2, 155–6, 174–5, 284, 303–6
 Ditchling Beacon, East Sussex 76–7
 Donaldson, A 16–17, 289–90
 Donoghue, D 93–4, 109
 Dorchester, Dorset
 Allington Avenue 78–9
 Church Street 79
 Greyhound Yard 79–80
 Dorchester Bypass, Dorset
 Flagstones 77–8
 Middle Farm 78
 Dorchester-Upon-Thames: Bypass, Oxfordshire 80–1
 Dorset xvii, 78, 78–9, 79, 79–80, 134, 134–5, 135, 135–6,
 136, 136–7, 137–8, 148, 175, 229–30, 236–7, 288–9,
 315–6
 Dovercourt Bay, Essex 81–2
 Downhall Gatehouse, Cambridgeshire 1
 Drayton: Oxfordshire
 Cursus 82
 Cursus, Tree-throw holes 83
 Drewett, P 124–5, 212–13, 295–7
 Drigg, Cumbria 83
 Droitwich: Old Bowling Green, Worcestershire xiv, xxii,
 83–6
 Drury, P J 152–3
 Dubby Sike, Durham 86–7
 Durham xxix, xxiv, 16–17, 32, 86–7, 87–8, 289–90
 Durham, B G 221–3
 Durham: Milburgate, Durham 87–8
 Durrington Walls 10
- earthworks
 Hob Ditch 153
 Iron Age 42
 Neolithic 134–7
 East Heslerton, North Yorkshire 88–9
 East Meadowgate 2, Norfolk 94–5
- East Meadowgate A, Norfolk 95–6
 East Meadowgate B, Norfolk 96
 East Sussex 76–7, 138, 240, 240–1
 Easton Lane Interchange, Winchester, Hampshire 195–7
 Eddy, M 171
 Egan, G 192
 Ellaby, R 61
 Ellis, P 20
 Ellison, A 173–4
 Ellison, M 12–13
 English Heritage 12, 17, 21, 22, 27, 37, 38, 46, 47, 50, 56,
 68, 89, 92, 93, 94, 99, 101, 103, 106, 118, 136,
 137–8, 140, 144, 154, 156, 157, 170, 186, 201, 203,
 206, 213, 214, 216, 230, 233, 234, 235–6, 238, 245,
 248, 252, 268, 270, 273, 274, 279, 280, 283, 285,
 291, 294, 295, 319, 322, 323
 environmental sequences, Brandon 35–6
- Essex x, 8–9, 9–10, 67–8, 70–1, 71, 81–2, 152–3, 156,
 156–7, 157, 157–8, 158–60, 160, 160–1, 161, 162,
 163, 163–4, 164, 164–5, 165, 166, 166–7, 167,
 167–8, 168, 171, 188, 202, 213, 220, 263, 264,
 264–5, 265, 271–2, 311–2
 estuarine sedimentation 81–2
 Etton Landscape, Maxey, Cambridgeshire xv, 89–91
 Evans, C 99, 130, 131
 Evans, D 28–31
 Exeter: Albany Road, Devon 91–2
 Exning, Suffolk 92
- Farcet Fen, Cambridgeshire 96–7
 Fasham, P J 169–71, 195–7, 234–5
 Feltwell Common, Norfolk 97–8
 Fencott: Ivy Farm xxix
 Fengate: 38 Cat's Water, Cambridgeshire xiv, 92
 Fengate Road, Norfolk 98
 Fenland Project viii, xi, xv, 92–3
 Bettison's Bridge, Lincolnshire 93
 Bourne North Fen, Lincolnshire 93–4
 Coffue Drove, Cambridgeshire 94
 East Meadowgate 2, Norfolk 94–5
 East Meadowgate A, Norfolk 95–6
 East Meadowgate B, Norfolk 96
 Farcet Fen, Cambridgeshire 96–7
 Feltwell Common, Norfolk 97–8
 Fengate Road, Norfolk 98
 Foulmire Fen, Cambridgeshire 99, 116
 Foulmire Fen A, Cambridgeshire 99–100
 Foulmire Fen B, Cambridgeshire 100–1
 Friskney, Lincolnshire 102
 Gipsey Bridge, Lincolnshire 102–3
 Hobbs Lot Farm, March, Cambridgeshire 103–4
 Hobhole A, Lincolnshire 104–5
 Hobhole B, Lincolnshire 105
 Lade Bank, Lincolnshire 106
 Meadowgate Lane, Norfolk 107
 Midville, Lincolnshire 107–8
 Morton Fen 10/50, Lincolnshire 108–9
 Morton Fen South Drove, Lincolnshire 109
 Murrow, Cambridgeshire 109–10
 New Bridge Road, Cambridgeshire 111
 Ouse Haddenham, Cambridgeshire 111–12
 Peacock's Farm, Cambridgeshire 112–13
 Pymore, Cambridgeshire 113–14
 Railway Crossing, Wisbech, Cambridgeshire 114–15

- Redmere, Cambridgeshire 115–16
 Somersham, Cambridgeshire 116–17
 Swineshead A, Lincolnshire 117
 Swineshead B, Lincolnshire 117–18
 Thorpe Culvert, Lincolnshire 118
 Wallace's Drove, Cambridgeshire 119
 Welney Washes, Norfolk 119–21
 Whittlesey Mere, Cambridgeshire 121
 Wiggshall St Germans Site A, Norfolk 122–3
 Wiggshall St Germans Site B, Norfolk 123
 Willingham Mere, Cambridgeshire 123–4
 Fenland Survey Project 129–30
 Fenwick, V 51–2
 Ferretti, E 191
 Ferring, Littlehampton, West Sussex 124–5
 Ferris, I 32
 Field, N 61–2, 125, 231, 272–4
 field systems 65–7, 73, 92, 155–6, 266–7
 final comments viii–ix
 Finney, A B 72, 126–7
 Finney, A E 141–2, 172–3, 230, 246
 fishery management
 Norman period 147
 Saxon period 6–8
 Fiskerton, Lincolnshire 125–6
 Fitzpatrick, A 278–9
 Fleming, A J 45–9
 flintwork
 Berinsfield 27
 Ferring 124–5
 Hambledon Hill 135
 Hawsker 142
 Kelvedon 171
 Lismore Fields 187
 North Elmham 212
 Penhale 224
 Seamer Carr 244–5
 Tattershall Thorpe: Jeffs Farm 279–80
 floodplain deposits 91–2
 Folkton Wolds: Sharpe Howes 2, Yorkshire (East Riding)
 126–7
 Foreman, M 201, 266
 forest clearance
 Barnard Castle 16–17
 Blackwater 18, Tollesbury 158
 Burghfield 45
 Hallshill 133
 Itchen Valley 169–71
 Snelsmore Common 252–3
 Sproatley 266
 Wetwang Slack 307
 Winchester 315
 Foulmire Fen, Cambridgeshire 99, 116
 Foulmire Fen A, Cambridgeshire 99–100
 Foulmire Fen B, Cambridgeshire 100–1
 Foxley: Cowage Farm, Wiltshire 127
 Foxon, A 201–2
 fractionation xv, xvi
 freeze-drying 313
 Freke, D 317
 French, C 89–91
 Friskney, Lincolnshire 102
 Fulham Palace moated site London 189–90
 funding vii
 Gale, R viii, x, xi
 Gardiner, J 6–8
 Garton, D 187, 211–12
 gas-proportional counting ix
 Gates, T 131–3
 Gibson, A 312
 Gilmour, B 182–4
 Gingell, C 226–7
 Gipsy Bridge, Lincolnshire 102–3
 Glastonbury, Somerset
 Fairfield 127–8
 Magdalene Street 128
 Gloucester, Gloucestershire
 1 Westgate Street xxix
 Lechlade 180–2
 St Mary de Lode 128–9
 St Oswald's Priory 129
 Gloucestershire xvii, xxix, 68–9, 128–9, 129, 143–4
 Graham, A 191
 grain
 Asheldham Camp 9–10
 Orsett 220
 Rowden 237
 Stafford: St Mary's Grove 268
 Sutton Common 275
 Wrekin Hillfort 319
 grave goods 56, 300, 301
 Great Yarmouth, Fuller's Hill xxx
 Gregory, T 280–1
 Greig, J 2
 Griffith, F 15–16
 Groves, C 2, 2–3
 Guilbert, G 276
 Hacconby Fen, Lincolnshire 129–30
 Haddenham, Cambridgeshire
 Snow's Farm Barrow 130
 Upper Delphs Causewayed Enclosure, 131
 Haddon-Reece, D 1, 13, 51, 152, 285
 halberd pendants 205
 Halkon, P 293
 Hall, R 324
 Hall, R A 191, 321–2, 323
 Hallshill, Northumberland 131–3
 Ham Hill, Somerset 133–4
 Hambledon Hill, Dorset 134
 Everley Water Meadow 134–5
 Hanford Flint Mines 135
 Hanford Outer Outwork 135–6
 Main Enclosure 4 136
 Stepleton Inner Outwork, 136–7
 Hampshire **xiii**, xxx, xxxi, xxxviii–xxxix, xxxix, 15, 18–9,
 32–3, 63–4, 195–7, 142–3, 169–71, 173–4, 193–4,
 195, 197, 262, 262–3, 314–5
 Hamworthy: Shipwright's Arms, Dorset xvii, 137–8
 Hannaford, H 249
 Harding, A F 74–5
 Harris, D 270
 Hartfield: Cansiron Farm, East Sussex 138
 Hartgroves, S 283–4
 Hartlepool: Church Close, Cleveland 138–40
 Hascombe: Hillfort xxx
 Haseley Manor, Isle of Wight 140–1
 Hawkes, J 234
 Hawsker: Gnipe Howe Round Barrow, North Yorkshire 141–2

- Hayling Island: Iron Age and Roman Temple, Hampshire 142–3
- Hazleton, Gloucestershire xvii, 143–4
- Healy, F 59, 78, 135, 193, 212
- Heathrow Airport, Surrey 270
- Heaton, M 79
- Hedges, R **xvi**, 313–14
- Heighway, C M 129
- Helman Tor, Cornwall 144–6
- Hemington Fields, Leicestershire 146–7
- henge monuments, Avebury 10–12
- Hengistbury Head, Dorset 148
- Henley Wood, Somerset 148–52
- Hereford: King Street, Herefordshire 152
- Herefordshire 152, 182
- Heybridge, Essex 152–3
- higher precision liquid scintillation system xiv, 51, 55–6, 151, 152, 240, 241, 269–70, 299, 300, 301–2
- Hill, S viii
- Hillam, J 2–3, 29, 125, 126, 155, 285
- hillforts
 - Beeston Castle 21, 22
 - Ditchling Beacon 77
 - Ham Hill 133–4
 - Hambledon Hill 134–7
 - Hascombe xxx
 - Nadbury Camp 211
 - Penhale 224
 - Wrekin Hillfort 319–20
- Hinchcliffe, J 8, 127
- Hirst, S M 31, 52–7
- Hob Ditch, Warwickshire 153
- Hobbs Lot Farm, March, Cambridgeshire 103–4
- Hobhole A, Lincolnshire 104–5
- Hobhole B, Lincolnshire 105
- Hodder, I 99, 131
- Holbeach: Shell Bridge, Lincolnshire 153–4
- Holdsworth, P 262–3
- Hollinrake, C 127–8
- Hollinrake, N 127–8
- Holme-on-Spalding Moor: Hasholme Farm, Humberside 154–5
- Horse, I 137–8
- Hough, P 20–3
- Hound Tor, Devon 155–6
- Housley, R 242–6, 313–14
- Howes, B 322–3
- Hughes, G 42–4, 291–2
- Hughes, J P 290–1
- Hullbridge Survey, Essex 156
 - Bartonhall Creek, Roach site 2, 156–7
 - Blackwater 3, Maylandsea 160
 - Blackwater 7, St Lawrence 160–1
 - Blackwater 8, Bradwell-on-Sea 161
 - Blackwater 17, Goldhanger 157
 - Blackwater 18, Tollesbury 157–8
 - Blackwater 28, The Stumble 158–60
 - Clacton 1, Jaywick 162
 - Colne 1, Alresford 162
 - Crouch 1 163
 - Crouch 2 164
 - Crouch 4 166
 - Crouch 8 167–8
 - Crouch 9 168
 - Crouch 11 163
 - Crouch 19 163–4
 - Crouch 22 164–5
 - Crouch 23 165
 - Crouch 29 165
 - Crouch 52 166–7
 - Crouch 56 167
 - Thames Site II, Purfleet 168
- human skeletal remains xi, xiv, xvi, xx, 13–4, 14–5, 15, 19, 24, 25, 31, 32, 33, 34, 39–40, 49–50, 53–7, 58, 59, 60–1, 70–1, 72, 73–4, 77, 77–8, 78, 81, 92, 126–7, 129, 148–52, 172, 181, 184–6, 188, 196, 199, 202, 216, 231–3, 272, 273–4, 277, 288–9, 294–5, 298–300, 300–2, 308–9, 312, 313–4, 318, 322
- Humberside xxii, xxiv, 17–18, 28–9, 29–31, 154–5, 201–2, 266
- Hurst, D 84–6
- Hurst, J D 290–1, 310–11
- Hurst, J G 307–8
- Iles, R 71
- intertidal flats. *see* Hullbridge Survey
- Ipswich, Suffolk 168–9
- Iron Age
 - Berinsfield 24, 25, 26
 - Bromfield 43
 - burials 13–14, 14–15, 25, 31, 219
 - Caldecotte 52
 - Chysauster 65–7
 - earthworks 42
 - Fiskerton causeway 125–6
 - Heybridge 153
 - hillforts 21, 22, 133–4, 134–7, 211
 - Kynnersley 175–6
 - pits 32–3, 220, 225, 307
 - pottery 9, 13, 14, 25, 26, 32–3, 68, 134, 182, 197, 213, 219, 220, 242
 - settlements 13–14, 14–15, 15, 52, 65–7, 68–9, 73–4, 208–9, 213, 218–19, 220, 225, 241–2, 278–9, 287–8, 292
 - slag heap, Welhambridge 293
 - temple 142–3
 - wells 219
- iron working 61–2
- Isle of Wight, Haseley Manor 140–1
- Isles of Scilly: St Martin's, Little Bay 169
- Itchen Valley: M3 Watching Brief, Winnall Moors, Hampshire 169–71
- Jackson, D 42
- Jackson, D A 221
- Jackson, J 263
- Jackson, P 221
- Jacobi, R M 171, 194
- Jarrow, St Paul's xxx
- Jarvis, K 137–8
- Jobey, G 210–11
- Jobey, I 210–11
- Jones, A 321–2
- Jones, M 184–6
- Keen, L 227–9
- Kelling Heath, Norfolk 171
- Kelvedon, Essex 171
- Kemp Howe, Yorkshire (East Riding) 172–3
- Kennet Valley Survey 44

- Kent 57–8, 197–8, 247
 Kenward, H 322
 Kimpton: Kalis Corner, Hampshire xxx, 173–4
 King, A 142–3
 Kingsteignton: Berry Meadow, Devon 174–5
 Kingswood, Dorset 175
 Kjølbye-Biddle, B 294
 Kynnersley: Wall Fort, Shropshire 175–6
- laboratory codes xxiv
 laboratory methods **xiv**, xiv–xv, **xv**, **xvi**
 Lade Bank, Lincolnshire 106
 Lambrick, G 82–3
 Lambrick, G H 24–7
 Lancashire. *see also* Lancashire Peat Profiles 33–4, 235–6
 Lancashire Peat Profiles 176–80
 Anglezarke Moor, Black Brook 176–7
 Anglezarke Moor, Mineral Horizon 177
 Anglezarke Moor, Pikestones, ploughings 178
 Anglezarke Moor, Pikestones, monument 177–8
 Anglezarke Moor, Round Loaf 178–9
 Rivington Moor, Winter Hill 179–80
 Winter Hill, Martha Tree Delf 180
 landing stage, Anslow's Cottages 7
 Launceston, Castle xxx
 Lawson, A J 226–7
 Leach, P F 148–52
 leather 223
 Lechlade: Rough Ground Farm, Gloucestershire 180–2
 Leicestershire 71–2, 146–7
 Leintwardine, Hereford and Worcester 182
 Levington xxx
 Levitan, B 39, 40
 Lincoln: Lincolnshire
 Brayford Wharf East 182–4
 Silver Street xxx
 St Paul-in-the-Bail 184–6
 Lincolnshire xxx, 61–2, 93, 93–4, 102, 102–3, 104–5, 105,
 106, 107–8, 108–9, 109, 117, 117–8, 118, 125–6,
 129–30, 153–4, 182–4, 184–6, 194–5, 211–2, 231,
 272–4, 276–7, 277–8, 278–9, 279–80
 Lindow Man 187
 Lindow Moss, Cheshire 187
 liquid scintillation system viii, ix, xiv, 1, 3, 74
 Lismore Fields, Buxton, Derbyshire 187
 Little Hallingbury: Midfield xxx
 Little Waltham xxxi
 Lobb, S 6–8, 44–5, 318
 Lofts Farm, Essex 188
 log boats 154–5, 247
 London
 Baynard's Castle xxxi
 Covent Garden, Jubilee Hall 188–9
 Fulham Palace moated site 189–90
 Hampstead, West Heath Spa xxxi
 New Fresh Wharf 190
 Peninsular House 190–1
 Southwark, St Thomas Street 192
 Southwark, 207 Borough High Street 191
 Southwark, 213 Borough High Street xxxi
 Swan Lane 192
 Westminster, Cromwell Green xxxi
 Westminster, Jewel Tower xxxi
 Westminster, New Palace Yard xxxi
 Whitehall, Richmond Terrace 192–3
- Longham, Norfolk 193
 Longmoor, Hampshire 193–4
 Longworth 19
 Losco-Bradley, S 276
 Low Toynton, Lincolnshire 194–5
 Lyne, M A B 32–3
- McArthur, C 211
 McAvoy, F 292–3
 McCarthy, M 58–9
 McDonnell, R 253
 McKeague, P 276
 McNeil, R 64–5
 Macphail, R I 148
 Magilton, J 322
 Maiden Castle 78
 Manby, T G 49, 88–9
 manor house, fortified, Aydon Castle 12–13
 MARC 3, Hampshire 195
 Easton Lane Interchange, Winchester 195–7
 Micheldever Wood R4 xxxi
 Micheldever Wood R27 xxxi
 Winnall Down, R17 197
 Marden 10
 Margate: East Northdown, Kent 197–8
 marine incursions. *see* Fenland Project
 Marsden, P 240–1
 Marshall, P 32, 83
 Martin, E 92, 311
 Martin, E A 202–4, 275
 Maryport, Cumbria
 Ewanrigg, Bronze Age Cremation Cemetery 198–200
 Ewanrigg, Romano-British settlement xvi, 201
 Matthews, K 14–15
 Meadowgate Lane, Norfolk 107
 Meare, Stileway, Somerset xxxvii, 257
 Meare Heath Somerset 253–4
 Diffords Site 1 xxxvii
 Eclipse Track 254–5
 Frank's Hurdle Track 255
 Ten Acres 255
 Meare Village East, Somerset 255–6
 Mound 19 257
 medieval period
 bridge 276
 cemeteries 294–5
 churches 184–6, 293–5, 307–8, 323
 landscape 155–6
 manor house 263
 middens 228
 pottery 91, 127
 settlements 87–8, 127
 ships 240–1
 Melton Foreshore, Humberside 201–2
 Mercer, R 144–6
 Mercer, R J 134–7
 Mesolithic, the
 Amble 4
 Berinsfield 24
 Drigg 83
 Kelvedon 171
 landscape 242–6
 pits 245, 297
 pottery 193–4
 settlements 61

- Windmill Farm 315
 metal-working debris 73
 metalworking moulds 138–40
 Middleborough, Essex 202
 Midville, Lincolnshire 107–8
 Miket, R 281–3
 Mildenhall:
 Mildenhall: Suffolk
 West Row Fen, MNL-137 xxxii
 West Row Fen, MNL-165 202–4
 Miles, D 68–9
 Millett, M 154–5, 293
 Milton Keynes: Hartigan's Gravel Pit xxxii
 Milton Lilbourne: Barrows 1–5, Wiltshire 204
 Barrow 1 204–5
 Barrow 2 205
 Barrow 4 205–7
 Barrow 5 207
 Mingie's Ditch, Oxfordshire 207–9
 miniature gas proportional counter vii–viii, viii, xiv–xv, 8–9,
 14–15, 16, 16–17, 18, 19, 21, 33, 34, 37–41, 40, 52, 61,
 63, 66–7, 68–9, 70, 72, 73, 74, 82, 87, 91–2, 127, 131,
 136, 140, 142–3, 152, 153, 155, 173, 176, 181, 182, 186,
 194, 197, 198, 199–200, 207, 208, 210, 212, 214, 215,
 217–18, 222, 226–7, 230, 235–6, 237, 238, 246, 247–8,
 251, 272, 273, 276, 278, 282, 283, 285, 286–7, 290, 293,
 296, 297, 299, 304, 306–7, 308–9, 310–11, 316, 322
 Moffett, L 268
 Moor Monkton, North Yorkshire 210
 Morgan, R 284–5
 Morris, M 18–19
 Mortimer's Barrow 72
 Morton Fen 10/50, Lincolnshire 108–9
 Mucking xxxii
 Murphy, P 9–10, 35, 81–2, 92, 156–68, 223–4, 264–5
 Murrow, Cambridgeshire 109–10
 Murton High Crag, Northumberland 210–11

 Nadbury Camp, Warwickshire 211
 Nancekuke: Penhale Barrow, Cornwall 211
 Neal, D 169
 Needham, S 238–9
 Neolithic
 Beeston Castle 20–1
 Berinsfield 24, 27
 Brean Down 39
 Bromfield 42–4
 Burghfield 44–5
 burials 24, 77–8, 272
 cairns 143–4
 cemeteries 173–4
 cremations 44–5
 earthworks 134–7
 henge monuments 10–12
 monuments 79–80
 Northampton, Briar Hill 214–15
 pits 27, 78, 79–80, 237, 282
 pottery 9, 44–5, 78, 89, 130, 158, 187, 212, 236–7, 283,
 306, 311
 ring ditches 44–5
 settlements 20–1, 89–91, 144–6, 157–8, 165, 187, 225–6,
 236–7, 238–9, 279–80, 281–3
 New Bridge Road, Cambridgeshire 111
 New Fresh Wharf London 190
 Newman, P 210

 Newton Cliffs, Lincolnshire 211–12
 Norfolk xxxiii, 19–20, 23, 94–5, 95–6, 96, 97–8, 98, 107,
 119–21, 122–3, 123, 171, 193, 212, 219–20, 280–1
 Norman period 147
 North Elmham: Spong Hill, Norfolk 212
 North Marden, Sussex 212–13
 North Shoebury, Essex x, 213
 North Yorkshire xxii, xiv, xl, 60–1, 72, 74–5, 88–9, 141–2,
 210, 230, 242–6, 246, 298–300, 300–3, 307, 307–8,
 308–9, 309, 310–1, 321–2, 322, 322–3, 323, 324
 Northampton, Northamptonshire
 Black Lion Hill 213–14
 Briar Hill xxxii, 214–15
 Gregory Street 215–16
 St Peter's Gardens 216–18
 St Peter's Street xxxii
 Northamptonshire xiv, xxii, xxxii, 42, 213–4, 214–5, 215–6,
 216–8, 221, 231–4, 234, 285
 Northchurch xxxii
 Northmoor: Watkins Farm, Oxfordshire 218–19
 Northumberland xxxiv, 4–5, 12–3, 131–3, 210–1, 227–9,
 281–3
 Norwich: Norfolk
 Anglia TV xxxiii
 Bowthorpe xxxiii
 Fishergate 219–20

 Oakley xxxiii
 O'Brien, C 71–2, 281–3
 O'Connell, M 270
 Odell xxxiii
 Olivier, A C H 33–4, 235–6
 Orsett: Rectory Road, Essex 220
 Oundle, Northamptonshire 221
 Ouse Haddenham, Cambridgeshire 111–12
 Oving xxxiii
 Oxford, Oxfordshire
 65 St Aldate's 221
 89–91 St Aldate's 221–3
 Oxford Radiocarbon Accelerator Unit viii, xv, xvi, **xvi**, xx,
 143
 Oxfordshire 24–7, 50, 50–1, 80–1, 82, 83, 207–9, 218–9,
 221, 221–3
 Oxley, J 263
 oyster middens 137–8

 Pakenham, Suffolk 223–4
 palaeoenvironmental reconstructions 93, 93–4, 94, 94–5,
 95–6, 96, 96–7, 97–8, 98, 99, 99–100, 100–1, 102,
 102–3, 104–5, 105, 106, 107, 107–8, 108–9, 109–10,
 111, 111–2, 112–3, 113–4, 114–5, 116, 116–7, 117,
 117–8, 118, 119, 119–21, 121, 122–3, 123, 123–4
 Palmer, R 134
 Parker Pearson, M 125–6, 275
 Peacock's Farm, Cambridgeshire 112–13
 Pearson, T 174–5
 peat xi, 3–4, 4–5, 16–7, 28, 35–6, 39, 63–4, 93, 94, 95, 95–6,
 96, 96–7, 97–8, 98, 100, 100–1, 102, 103, 103–4, 105,
 106, 107, 108, 108–9, 109, 110, 111, 112, 113, 114,
 115, 116, 116–7, 117, 118, 119, 119–21, 121, 122–3,
 123, 124, 153–4, 154–5, 155–6, 166, 168, 170–1, 175,
 175–6, 176–7, 177, 178, 178–9, 179–80, 180, 190, 191,
 193, 220, 224, 243–4, 244–5, 252–3, 253, 254–5, 255,
 256, 257, 259, 260, 261, 261–2, 267, 271–2, 275, 289,
 290, 292, 304, 305, 315, 322–3

- Peglar, S 111–12
 Penhale: Holywell Bay, Cornwall 224
 Peninsular House London 190–1
 Pennylands, Buckinghamshire 224–5
 Perrin, R 234
 Petchey, M 52
 Peterborough xxxiii
 Phillips, P 276–8
 Pitchbury Ramparts xxxiii
 pits xii
 Anglo-Saxon period 307
 Beaker period 23
 Bronze Age 264
 Hayling Island 143
 Iron Age 32–3, 220, 225, 307
 Mesolithic 245, 297
 Mildenhall 203
 Neolithic 27, 78, 79–80, 237, 282
 Roman period 322–3
 rubbish 90
 salt making 84, 85
 Saxon period 168–9
 Pitts, MW 10–12
 plant macrofossils x, xi
 Clacton 1, Jaywick 162
 Crouch 56 167
 Fulham Palace moated site 189
 Hambledon Hill 136
 North Shoebury x, 213
 Poldowrian 225–6
 Poldowrian, Cornwall xii, 225–6
 pollen profile 4–5, 16–7, 22–3, 63–4, 95, 96–7, 102, 106,
 148, 104, 105, 106, 107, 108, 110, 111, 111–2, 115,
 120, 153–4, 169–71, 175, 254–5, 255–6, 265, 266,
 289–90
 polyethylene glycol (PEG) 313
 Porter, T E 247
 postholes
 Asheldham Camp 10
 Basingstoke 18–19
 Beeston Castle 21
 Beverley: Lurk Lane 29
 Chester 63
 Dainton 73
 Hallshill 132
 Helman Tor 145
 Northampton: St Peter's Gardens 217, 218
 Penhale 224
 Raunds: Furnells Manor 233
 Rowden 237
 Wrekin Hillfort 319–20
 postpipes
 Beeston Castle 21
 Dorchester 80
 Foxley 127
 Prudhoe Castle 228–9
 Wasperton 292
 Potterne, Wiltshire 226–7
 pottery
 All Cannings Cross/Meon Hill style 73
 Amesbury: New Barn Down 5, 6
 Asheldham Camp 9
 Baldock 14
 Balksbury Camp 15
 Beaker 5, 6, 15, 23, 40, 44, 193, 251
 Beeston with Bittering 23
 Bronze Age 59, 65–7, 72, 90, 92, 134, 141, 188, 248, 250,
 274–5
 Collared Urns 18–19, 44–5, 198–200, 235, 250, 251,
 296–7
 Darmsden-Linton 188
 Deverel-Rimbury 45, 213
 Grimston-style 49, 50
 Grooved Ware 75–6, 89, 130, 180–1, 251, 277, 306, 311
 Hembury type 236
 Horsham-type 193–4
 Iron Age 9, 13, 14, 25, 26, 32–3, 68, 134, 182, 197, 213,
 219, 220, 242
 La Tène 224
 medieval 91, 127
 Mediterranean wares 283–4
 Mesolithic 193–4
 Mildenhall 131
 Mortlake 264–5
 Neolithic 9, 44–5, 78, 89, 130, 158, 187, 212, 236–7,
 283, 306, 311
 Peterborough Ware 50, 131
 prehistoric 55
 Rinyo-Clacton ware 72
 Roman period 54
 Romano-British 128
 St Catherine's Hill-Worthy Down 'saucepan' 32–3
 Saxon period 142, 168, 269–70, 309, 318
 Stafford Ware 267, 269–70
 Thetford-type ware 168
 the Trevelgue vessel 288
 Trevisker 59, 75–6
 Poundbury xxxiii–xxxiv
 Powlesland, D 297–303
 Pretty, K B 320–1
 Price, J 290
 Prudhoe Castle, Northumberland xxxiv, 227–9
 Pryor, F 92
 Puncknowle, Dorset 229–30
 Pymore, Cambridgeshire 113–14

 quality assurance xviii–xix, xix–xxii, **xx**, **xxi**, **xxii**
Radiocarbon (journal) viii
 Rahtz, P A 40, 148–52
 Railway Crossing, Wisbech, Cambridgeshire 114–15
 Raisthorpe Manor, North Yorkshire 230
 Ramsbury: High Street xxxiv
 Rand Church, Lincolnshire 231
 Raunds, Northamptonshire
 Furnells Manor 231
 Stanwick 234
 Reading: Crane Wharf, Berkshire 234–5
 Redmere, Cambridgeshire 115–16
 Reed, S 69–70
 rescue archaeology vii
 Rhodes, M 190
 Ribchester, Lancashire 235–6
 Ringmer xxxiv
 ritual activity
 Avebury 10
 Basingstoke 19
 Caldecotte 52
 Crouch 1 163
 Dubby Sike 86–7
 Hayling Island 142–3

- Rivington Moor, Winter Hill, Lancashire 179–80
 Robinson, M 50–1, 207–9
 Rodwell, W 17–18
 Roe, A 247–8
 Rogerson, A 23, 212
 Rollo-Smith, S 250–1
 Roman period
 Alcester 2–3
 burials 31, 60–1, 70–1
 cemeteries 52–7
 Chester 62–3
 churches 184–6
 Dorchester 79
 London 190, 190–1, 192
 pits 322–3
 pottery 54
 settlements 60–1, 61–2, 73–4, 180–2, 182, 223–4, 234, 320–1
 temple 142–3
 temples 148–52
 tilery site 138
 Romano-British
 pottery 128
 settlements xvi, 14–15, 15, 65–7
 Rose, P 59, 75–6, 287
 Rowden, Dorset 236–7
 Roxton: Bedfordshire xxxiv
 ring ditch (C) 237–8
 Rudling, D 76–7, 138, 321
 Rudling, D R 248
 Runcorn: Norton Priory xxxiv
 Runnymede Bridge, Surrey xxxiv–xxxvi, 238–9
 Rye Bay, East Sussex
 steering oar 240
 sternpost rudder 240–1
 St. Kew Tregilders xxxvi
 St Neot: Colliford, Cornwall
 Colliford Mill 266
 Stuffle Farm 266–7
 St. Stephen-In-Brannel, Watch Hill xxxvi
 Salisbury, C R 146–7
 salt making 83–6, 164, 290–1
 samples
 context **xi**, xi–xii, **xii**, xiv
 eligibility vii
 identification x–xi, **x**
 materials ix, **ix**, ix
 selection and characterisation ix–xiv, **ix**, ix, **x**, **xi**, **xii**, **xiii**
 size vii–viii, **ix**, ix, **x**
 Saville, A 143–4
 Sawle, J 83–6
 Saxon period
 Anslow's Cottages 6–8
 Berinsfield 27
 Beverley: Eastgate 28–9
 burials 31, 32, 215–16, 273–4
 cellared building 57–8
 churches 128–9, 231–4, 272–4
 pits 168–9
 pottery 142, 168, 269–70, 309, 318
 settlements 34–6, 61–2, 127, 152, 168–9, 183–4, 188, 216–18, 220, 267, 268, 309, 318
 water channel management 6–8
 Scaife, R 187
 Schaaf, L 192
 Schadla-Hall, R T 242–6
 Schofield, J 190
 Scilly Isles: Nornour, Cornwall 241–2
 Seamer Carr, North Yorkshire 242–6
 Seamer Moor, North Yorkshire 246
 Seasalter, Kent 247
 Sedgemoor, Fordgate, Somerset 258
 Sedgemoor, Henley Bridge, Somerset 258
 sediment xi
 Bartonhall Creek, Roach site 2, 156–7
 Fulham Palace moated site 189
 Meare Village East 256
 Mingie's Ditch 209
 New Bridge Road 111
 Ouse Haddenham 112
 sediment sequences. *see* Fenland Project
 settlements
 Anglo-Saxon period 174–5, 221, 267, 281–3
 Bronze Age 36–41, 65–7, 89–91, 132–3, 158–60, 169, 188, 202–4, 213, 236–7, 238–9, 248, 270, 321
 Iron Age 13–14, 14–15, 15, 52, 65–7, 68–9, 73–4, 208–9, 213, 218–19, 220, 225, 241–2, 278–9, 287–8, 292
 medieval 87–8, 127
 Mesolithic 61
 Neolithic 20–1, 89–91, 144–6, 157–8, 165, 187, 225–6, 236–7, 238–9, 279–80, 281–3
 palisaded 210–11
 Roman period 60–1, 61–2, 73–4, 180–2, 182, 223–4, 234, 320–1
 Romano-British xvi, 14–15, 15, 65–7, 201
 Saxon period 34–6, 61–2, 127, 152, 168–9, 183–4, 188, 216–18, 220, 267, 268, 309, 318
 Sharpham, Godwin's Tracks, Somerset 258
 Shaugh Moor
 Cairn Field, Site 10 xxxvi
 Enclosure 15, Site 15 xxxvi
 Wooter Playground, Site 201 xxxvi
 Shaw, M 213–14, 215–16, 216–18
 Sheldon, H 191
 shell, Hamworthy 137–8
 Shennan, I 93, 93–4, 102–3, 108–9, 109, 118
 Sherlock, D 1, 51
 Shifnal: Castle Farm, Shropshire 247–8
 ships, medieval 240–1
 Shoemsmith, R 152
 Shoreham: Thundersbarrow Hill, West Sussex 248
 Shrewsbury: Holy Cross, Queen Anne House, Shropshire 248–9
 Shrewton, Wiltshire 249–51
 Shropshire xxviii, 42–4, 175–6, 247–8, 248–9, 293–5, 319–20, 320–1
 Sidell, J 190–1
 Sigebert, King of East Anglia 45
 Slade, B **xv**
 Smallburgh: Wayford Bridge xxxvi
 Smith, A 68–9
 Smith, G 65–7, 73, 197–8, 224, 225–6, 272, 284, 286–7, 315
 Smith, G H 133–4
 Smith, S 262–3
 Snail Down, Wiltshire 252
 Snelsmore Common, Berkshire 252–3
 Soffe, G 142–3
 soil samples xiv, 19, 148, 153, 191, 203, 223, 266, 284

- Somerset. *see also* Somerset Levels, Somerset 36–41, 52–7, 127–8, 128, 133–4, 148–52, 292–3
- Somerset Levels, Somerset 253
- Ashcroft Heath, Roland's track xxxvi
 - Ashcroft Heath, Signal Pole Ground xxxvi
 - Claylands, Huntspill Moor 253
 - East Moors, Ashcroft Heath xxxvii
 - Meare, Meare Heath Field 12.3 xxxvii
 - Meare, Stileway xxxvii, 257
 - Meare Heath 253–4
 - Meare Heath, Diffords Site 1 xxxvii
 - Meare Heath, Eclipse Track 254–5
 - Meare Heath, Frank's Hurdle Track 255
 - Meare Heath, Ten Acres 255
 - Meare Lake Village West xxxvii
 - Meare Village East 255–6
 - Meare Village East, Mound 19 257
 - Sedgemoor, Chedzoy, Track 5 xxxvii
 - Sedgemoor, Fordgate 258
 - Sedgemoor, Henley Bridge 258
 - Shapwick Heath, Sweet Track Terminal Site 1 xxxvii
 - Sharpham, Godwin's Tracks 258
 - Sharpham, Tinney's Ground xxxvii
 - Sutton Hams 259
 - Sweet Track 259–60
 - Walton Heath 260
 - Walton Heath, Bisgrove xxxvii
 - Walton Heath, Foster's Walton 260
 - Walton Heath, Garvin's Track xxxviii
 - Walton Heath, Jone's Track xxxviii
 - Walton Heath, Walton Meare xxxviii
 - West Edington 260–1
 - Westhay Level, Baker Platform xxxviii
 - Westhay Level, Honeygore Complex 261–2
- Somersham, Cambridgeshire 116–17
- South Yorkshire, Sutton Common: Enclosures xii, 275–6
- Southampton: Hampshire
- Hamwic, Six Dials 262
 - Hamwih xxxviii–xxxix
 - Maddison Street 262–3
 - Upper Bugle Street xxxix
- Southchurch Hall, Essex 263
- Southwark, London
- 207 Borough High Street 191
 - 213 Borough High Street xxxi
 - St Thomas Street 192
- Sponne, Archdeacon **xiii**, xiv, 285
- Springfield: Essex
- Cursus 264–5
 - Sandon Culvert 265
- Springfield Lyons, Essex 264
- Chelmer Bridge 264
- Sproatley, Humberside 266
- Stafford, Staffordshire
- Bath Street 267
 - Eastgate Street 267
 - St Mary's Grove x, 268
 - Tipping Street 269–70
- Staffordshire x, 267, 268, 269–70
- Stamper, P 309
- Stanford, S 42–4, 319–20
- Stannon, Cornwall 270
- Stanwell: Heathrow Airport, Surrey 270
- statistical modelling xxii–xxiv, **xxiii**
- Steane, K 183
- Stifford: Ardale School, Essex 271–2
- Stoke Bishop: Druids Hill, Avon 272
- Stonehenge 5, 6
- Stow Church, Lincolnshire 272–4
- Stowmarket, Suffolk 274–5
- Straker, V 91–2, 128, 190–1
- Strickland, T J 62
- sub-Roman period, burials 80–1
- Suffolk xxxii, 23, 34–5, 45–9, 51–2, 92, 168–9, 202–4, 223–4, 274–5, 311
- Surrey xxxiv–xxxvi, 61, 238–9, 270
- Sussex, North Marden 212–13
- Sutton Common: Enclosures, South Yorkshire xii, 275–6
- Sutton Hams, Somerset 259
- Sutton: Packhorse Bridge, Bedfordshire 276
- Swan Lane London 192
- Swarkestone Lowes, Derbyshire 276
- Sweet Track, Somerset 259–60
- Swineshead A, Lincolnshire 117
- Swineshead B, Lincolnshire 117–18
- Swinhope, Lincolnshire
- Ash Hill Long Barrow 276–7
 - Hoe Hill Long Barrow 277–8
- Sydes, R 275–6
- target events xi
- Tarraby xxxix
- Tattershall Thorpe, Lincolnshire 278–9
- Jeffer's Farm 279–80
- Tatton-Brown, T 57–8
- Taylor, A F 237–8
- Taylor, H 39
- techniques **viii**, viii
- temples 142–3, 148–52
- Tester, A 34–5
- Tewksbury: Holme Castle, Windmill Hill xxxix
- Thacker, A 317
- Thames palaeochannel organic deposit 50–1
- Thames Site II, Purfleet Essex 168
- Thetford: Fison Way, Norfolk 280–1
- Thirlings, Wooler, Northumberland 281–3
- Thomas, N 252
- Thomson, R 262–3
- Thorpe Culvert, Lincolnshire 118
- Tintagel Castle: Lower Ward, Cornwall x, 283–4
- Tipping, R 4–5
- Tiverton: Long Barrow, Devon 284
- Totley Moss, Derbyshire 284–5
- Towcester Church, Northamptonshire xiv, 285
- trackways, Somerset Levels 253–62
- tree-ring analysis 17, 18, 51, 126, 188, 258, 263, 285
- tree-throw holes 83
- Trelan I, Cornwall 286
- Trelan II, Cornwall 286–7
- Treligga: Barrow 2, Cornwall 287
- Trevelgue Head, Cornwall 287–8
- Trondheim Convention, the xvi
- Tyers, C 285
- Ullwell, Dorset 288–9
- Upper Teesdale: Simy Folds Bog, Durham xxxix, 289–90
- Upwich, Worcestershire 290–1
- van der Veen, D 87–8
- Viking period 74–5, 277, 289, 323

- Wade, K 168, 274–5
 Wainwright, G 10, 287–8
 Wainwright, G J 15
 Walker, J 40, 41
 Walker, M J C 156
 Wallace's Drove, Cambridgeshire 119
 Waller, M 92–124
 Walton Heath, Somerset 260
 Bisgrove xxxvii
 Foster's Walton 260
 Garvin's Track xxxviii
 Jone's Track xxxviii
 Walton Meare xxxviii
 Wansdyke, the 71
 Ward, S 62, 63
 Warwickshire xxviii, 2, 2–3, 31, 153, 211, 291–2
 Wasperton, Warwickshire 291–2
 Watchet: Daws Castle, Somerset 292–3
 water, Seamer Carr 244
 water channel management
 Saxon period 6–8
 Wharram Percy: The Dam 310–11
 Waton, P 175
 Waton, P V 3–4, 63–4, 252–3, 315
 Watts, L R J 148–52
 Weddell, P 174–5
 Weekley xxxix
 Welhambridge, Yorkshire (East Riding) 293
 wells 219, 262
 Welney Washes, Norfolk 119–21
 Wenlock Priory, Shropshire 293–5
 Wensleydale: Old Gayle Lane xxxix
 Wessex Culture 204–7
 West Edington, Somerset 260–1
 West Heath Common, West Sussex 295–7
 West Heslerton, North Yorkshire 298–300
 Prehistoric xiv, 300–3
 West Heslerton, Yorkshire (East Riding) 297
 West Kennet Avenue 10, 12
 West Sussex 3–4, 124–5, 248, 295–7, 321
 Westhay Level, Somerset
 Baker Platform xxxviii
 Honeygore Complex 261–2
 Westward Ho!, Devon 303–6
 Wetwang Slack, Yorkshire (East Riding) 306–7
 Wharram Percy, North Yorkshire 307
 bell pit 307–8
 The Dam 310–11
 site 12 308–9
 South Manor 309
 Wherstead, Suffolk 311
 Whitegrounds Barrow, Yorkshire (East Riding) 49–50
 Whitehall, Richmond Terrace London 192–3
 Whitehouse, K R 189
 Whytehead, R 188
 Wickenden, N 153
 Widdington, Essex 311–12
 Wiggshall St Germans Site A, Norfolk 122–3
 Wiggshall St Germans Site B, Norfolk 123
 Wilkinson, T 220
 Wilkinson, T J 156, 183–4, 271–2
 William of Malmesbury 129
 Williams, J 213–14, 214–15, 216, 216–18
 Williams, R J 224–5
 Willie Howe, Yorkshire (East Riding) 312
 Willingham Mere, Cambridgeshire 123–4
 willow, Amble 5
 Wills, J 182
 Wilmington: Gravel Pit xxxix
 Wilsford Shaft, Wiltshire xiv, 312–14
 Wilson, P 60
 Wiltshire xi, xiv, 5–6, 10–2, 204–7, 127, 226–7, 249–51, 252, 312–4
 Winchester: North Walls, Hampshire 314–15
 Windmill Farm (Lizard Mesolithic), Cornwall 315
 Winklbury xl
 Winnall Down, R17 Hampshire 197
 Winter Hill, Lancashire 179–80
 Martha Tree Delf, Lancashire 180
 Winterbourne Steepleton: Cowlease Pasture, Dorset 315–16
 Winwick: Southworth Hall Barrow, Cheshire 317
 wood x, xii, xvi, xxiii, **xxiii**, xxviii, xxix, xxxi, xxxii, xxxiii, xxxv–xxxvi, xxxvi–xxxviii, xxxviii–xxxix, xxxix, xl, 1, 2–3, 6–8, 13, 17–8, 26–7, 28–9, 29–30, 30–1, 36, 42, 51, 52, 58, 80, 83, 84–6, 86–7, 87–8, 89–91, 91–2, 92, 99, 108, 125–6, 127–8, 128, 130, 140–1, 146–7, 152, 154, 155, 157, 157–8, 158–60, 160, 161, 162, 163, 164, 165, 166, 167, 168, 183–4, 188, 190, 192, 193, 201–2, 208, 209, 211–2, 219, 221, 222–3, 223, 229, 234, 234–5, 238–9, 240, 241, 242, 243, 246, 247, 249, 254, 255, 257, 258, 260, 261–2, 262, 263, 264, 265, 266, 267, 268, 270, 271, 275, 276, 278–9, 279, 280, 285, 289, 303, 304, 305, 310–1, 312, 313, 314, 321–2, 323, 324
 Woodfield, P 285
 Woods, H 293–5
 Woodward, A 173–4, 249–51
 Woodward, P 77–8, 79
 Woodward, P J 236–7, 237–8, 315–16
 Worcestershire xiv, xxii, 83–6, 290–1
 Wrathmell, S 73–4, 307–8, 310–11
 Wraysbury, Berkshire 318
 Wrekin Hillfort, Shropshire 319–20
 Wroxeter, Shropshire 320–1
 Wymer, J 19–20, 193
 Yapton, West Sussex 321
 York
 16–22 Coppergate 321–2
 58–9 Skeldergate, Bishop Hill 1 xl
 Aldwark, Ebor Brewery xiv, 322
 Bedern-Aldwark 322–3
 Minster xl
 St Mary Bishophill Junior xxii, 191, 323
 Walmgate 324
 Yorkshire (East Riding) xxiii, 49–50, 126–7, 172–3, 293, 297, 306–7, 49–50, 312
 Young, R 140–1

If you require an alternative accessible version of this document (for instance in audio, Braille or large print) please contact our Customer

Services Department:

Telephone: 0870 333 1181

Fax: 01793 414926

Textphone: 0800 015 0516

E-mail: customers@english-heritage.org.uk