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SUMMARY
The *Dating the Earliest Neolithic Ceramics of Wessex* project was part of a training programme in the Bayesian chronological modelling of radiocarbon dates funded by Historic England. Its original scope was to target ceramic assemblages for dating in four areas: the Middle Thames, the Avebury area, the Stonehenge area of Salisbury Plain, and an area centred on Dorchester, Dorset. The outcome of a review of charred food residues on pottery from selected assemblages resulted in a scaled-down project that targeted four assemblages from south, central, and north Wessex (Rowden and Flagstones, Dorset; Coneybury Anomaly, Salisbury Plain, Wiltshire; and Cherhill, near Avebury, Wiltshire). The radiocarbon results from these four sites have been incorporated into a new framework for the development of early Neolithic ceramics in Wessex.

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The archive has been deposited under Wessex Archaeology Project Number WA73601 by site at the following museums:

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INTRODUCTION

The *Dating the Earliest Neolithic Ceramics of Wessex* project was part of a training programme in the Bayesian chronological modelling of radiocarbon dates funded by Historic England. The original scope of the project was to consider early Neolithic pottery assemblages in four areas: the Middle Thames Valley, the Avebury area, the Stonehenge area of Salisbury Plain, and an area centred on Dorchester, Dorset. The outcome of a review of selected assemblages that targeted carbonised food residues on pottery resulted in a scaled-down project that looked at four published assemblages from south, central, and north Wessex (Fig 1: Rowden and Flagstones, Dorset; Coneybury Anomaly, Salisbury Plain, Wiltshire; and Cherhill, near Avebury, Wiltshire). All four sites had one or more radiocarbon measurements obtained during the original investigation and publication (see Tables 1–4).

The earliest pottery from southern England, generally referred to as Plain Bowl (previously the Grimston Style or Grimston/Lyles Hill Ware; Smith 1976, 106 and subsumed within Whittle's Eastern and South-western Styles; 1977, 77 and fig 11), was redefined by Herne (1988) who suggested that the earlier element of these assemblages is characterised by a high proportion of carinated vessels and suggested the name Carinated Bowl. These assemblages are characterised by a range of forms that include fine and coarse bowls, deeper bowls, and cups. Other traits include simple undeveloped rims, a lack of decoration, and the use of surface treatment including smoothing and burnishing (including ripple and fluting). In critically reviewing the radiocarbon dates, Herne was able to distinguish between an early Carinated Bowl phase and one that was dominated by high-shouldered vessels with developed and sometimes heavy rims and the use of decoration. Following on from earlier writers, Herne was able to demonstrate the similarity and primacy of this material across Britain and Ireland. This re-established previous ideas that this type of pottery developed into regional styles and a wider range of plain forms including S-profile, high-shouldered, round, and hemispherical bowls. The other, arguably slightly later, development was the appearance of decoration and the decorative styles (Decorated Bowl) across lowland England with a notable concentration in the south-east (eg Abingdon, Mildenhall, and Whitehawk styles). However, the use of decoration was not widespread and appears to have been restricted to certain types of site and context (eg causewayed enclosures, pit and some mortuary sites). Outside of south-east England Decorated Bowl is rare in comparison to Plain Bowl. In the south-west of England (including Wessex) the pottery (South-Western style formerly Hembury Ware or Style; Piggott 1954, 74; Whittle 1977, 77) of the earlier Neolithic is notably plain but has its own distinctive characteristics including forms (in particular open hemispherical bowls and deeper neutral bowls), surface treatments (black coating), and use of cylindrical and sometimes expanded (trumpet) lugs. Most significant is the use of gabbroic fabrics from the Lizard, Cornwall (Peacock 1969), which indicates both its place of manufacture and its distribution (extending east as far as Dorset and Wiltshire). It can be noted that the origins of the South-Western style also lie with Carinated Bowl, and its development follows that of the Eastern style in that the earliest assemblages are typologically the same as Carinated Bowl but include an element of ovoid uncarinated vessels.

The earliest pottery from Wessex, like all pottery from Great Britain and Ireland, has its stylistic origins in the Neolithic bowl pottery of Western mainland Europe and arrived as part of the Neolithic package (and lifeways) towards the end of the fifth millennium cal BC and the start of the fourth millennium cal BC. It is generally agreed that stylistic influences can be traced to Belgium and North France (Chasséen and Michelsberg cultures) and from Normandy (late Castellic and Chasséen cultures) (Ray and Thomas 2018, 81). The complexity, dynamic, and tempo of this cultural contact is beyond the scope of this paper, although it is hoped that the results and sequence presented below provide greater clarity from which future models can be built and tested.

The revised study area of Wessex covers several known overlapping distributions of early Neolithic pottery (Fig 1), including the eastern extent of the South-Western style, the western extent of Decorated Bowl, and the western extent of Carinated Bowl. However, this nomenclature almost certainly masks a more complex regional picture (see Herne 1988, 12) as Cleal's earlier work on the pottery from the south-west has demonstrated (2004). In reviewing potentially early pottery from Wessex, Cleal identified a number of early assemblages, not all of which fit easily within the category Carinated Bowl as defined by Herne (1988). One problem highlighted by Cleal (2004) that has hindered a better understanding of pottery of this date has been a general failure to characterise the diversity of forms that occur from the 40th/39th centuries cal BC onwards. One criticism made by Cleal is that too much attention has been placed on carinated vessels at the expense of other forms and that this has distracted from the small number of anomalous vessels. As several authors have recognised, it is amongst this group of vessels that connections with continental assemblages may be found. In addition, little detailed work has been undertaken on the range of forms and their currency.

In the last twenty years our understanding of Carinated Bowl has been helped by the study and publication of assemblages from the Eton Rowing Course (Barclay 2013) and Ascott-under-Wychwood (Barclay and Case 2007), which have enabled the further characterisation of this material. A review of comparable assemblages as part of this work led to the suggestion that Carinated Bowl could be divided into an early and late phase that pre- and post-dated *c* 3800 cal BC (classic and developed or modified respectively). In reality this division may just mark various developments in rim and vessel forms and, whilst this scheme may be applicable to parts of the Thames Valley and Wessex, there are other regions where such a development is harder to recognise. This could include Kent and also the south-west of England (Cleal 2004). In Wessex 'classic' Carinated Bowl is rare and limited to only a few finds spots.

It can be noted that 'classic' Carinated Bowl assemblages (eg Ascott-under-Wychwood, Oxfordshire, Cannon Hill, Berkshire, and Rowden, Dorset; Barclay and Case 2007; Bradley *et al* 1976; Davies *et al* 1991) do actually contain a variety of vessel forms. At a simplistic level they include fine relatively shallow bowls, cups/small bowls and deeper often coarser vessels. Fabrics can be fine and well-made but they can also be coarse (see Barclay and Case 2007). Shoulder forms vary from the very elaborate, marked with a lip, to a step, a change of angle or simple carination, or a point of inflection. One notable feature in the shoulder profile of some bowls is a step created by a double point of inflection. The neck zone is relatively long in Carinated Bowls, often, but not always, with a concave profile. Some necks are distinctly straight. Occasionally necks have a point of inflection near the rim, so as to give the mouth of the vessel an open flared profile. Rims are generally simple and very rarely semi- or completely rolled.

Project aims

The main aims of the project were:

- To provide a precise chronology for the earliest ceramics in Wessex;
- To understand when pottery was first used in Wessex during the 40th–38th centuries cal BC;
- To record any trends within the Bowl assemblages for typological development (eg vessel and rim forms);
- To determine the currency of the Carinated Bowl phase, including its start and end;
- To situate the revised chronology for the earliest ceramics in Wessex in its wider context.

CHRONOLOGICAL MODELLING

The methods adopted follow the standard Bayesian approach to chronological modelling as outlined by Bayliss and Bronk Ramsey (2004), a heuristic procedure that starts by defining a problem and involves the building of simulation models to inform sample selection. The radiocarbon dates obtained from samples will determine whether the initial model fits expectation or needs modification or further dated samples. The success of the above is all influenced by the nature of the relevant section of the calibration curve together with archaeological prior information. For the period under study (*c* 4000–3600 cal BC) the curve is reasonably conducive for calibration and Bayesian modelling despite the wiggle occurring between 3900–3700 cal BC (Fig 2).

All the chronological modelling discussed in this review has been undertaken using the program OxCal v4.4 (Bronk Ramsey 2009a–b; Bronk Ramsey and Lee 2013) and the atmospheric calibration curve for the northern hemisphere (IntCal20) published by Reimer *et al* (2020). The algorithms used are defined exactly by the brackets and OxCal CQL2 keywords on the left-hand side of the technical graphs which define each model (http://c14.arch.ox.ac.uk/). The posterior density estimates output by the model are shown in black, with the unconstrained calibrated radiocarbon dates shown in outline. The other distributions correspond to aspects of the model. For example, *start_coneybury_anomaly* is the estimated date when activity associated with the digging and infilling of the pit known as the Coneybury Anomaly began (Fig 10). In the text and tables, the Highest Posterior Density intervals of the posterior density estimates produced by the models are given *in italics*, followed by a reference to the relevant parameter name and the figures in which the model which produced it is defined.

Sample selection

The selection of samples was based on the following criteria:

1. Samples directly associated with the pottery, eg carbonised residue from cooking adhering to the interior vessel walls (Fig 3), were targeted. Preference was given to featured sherds, in particular rims and shoulders, and to those belonging to re-constructible forms. The condition of the material was noted with preference given to only selecting freshly broken pottery (ie smashed vessels that had been collected and buried in antiquity). This work was principally undertaken by Alistair Barclay with the exception of the Coneybury Anomaly where the work was split between Alistair Barclay and Ros Cleal.

Each assemblage was scanned for suitable charred food residues. To avoid the possibility of contamination (eg carbon from old wood used as fuel) only internal residues were selected (see Fischer 2003). These generally had the appearance of a black or dark brown crust (see Fig 3). Ideally these deposits needed to cover a large area of the sherd (≥30x30mm) and have a thickness of 1–3mm. However, in a number of cases residues were often quite thin and not very extensive. In these cases, they were still considered food residues rather than soot deposits, which often have a more waxy appearance.

2. Articulated and articulating animal bone samples were selected (by Lorrain Higbee – Fig 4) where charred residue was not present and/or only poorly preserved. Consideration was given to such factors as the stratigraphic relationship between the bone samples and the ceramics, the nature of deposition (ie placed deposits) and any taphonomic issues; by their nature such samples are likely to be close in date to the associated feature and or context.

3. Carbonised plant remains (CPR), in particular cereal grain, hazelnut shell, and short-lived wood charcoal, were considered, but only where they could be demonstrated to derive from a recorded deposit such as a layer, lens or deliberate dump of burnt material in direct association with a key ceramic assemblage. Possible taphonomic issues were considered and only single entity samples were dated (Ashmore 1999). Identification and selection of CPR and short-lived wood charcoal was undertaken by Chris Stevens and Ruth Pelling respectively.

A radiocarbon determination on carbonised cooking residue refers to when the pot was still in use, possibly but not certainly last used, and, therefore, should always pre-date the age of deposition (eg refuse within a pit; with the notable exception of intrusive sherds). Pottery used for cooking is likely to have been replaced either within a year or a few years once a vessel had become damaged or had gone sour or bad. The probably semi-sedentary nature of habitation and the likely use of some form of portable home could have led to an increase in vessel breakage rate and a shorter use-life. Pots broken during a period of settlement could have been stored in a temporary midden. Possible sources of pottery fragments for deposition could have derived from areas of occupation (cooking, eating, or storage areas) or from organised collections of broken material. It is unlikely that residue would survive long on broken sherds unless quickly buried.

RADIOCARBON PRE-TREATMENT AND MEASUREMENT

The pre-treatment and measurement methods employed for the dates used in this study are summarised in Table 5.

SITE ASSEMBLAGES

Carinated Bowl assemblages are relatively rare in southern England. Within the Upper and Middle Thames Valley and Wessex key assemblages were identified from the work of Barclay (Barclay and Case 2007) and Cleal (2004). In nearly every case each assemblage represents a key group within an area or region, and most of these feature in narratives on the earliest Neolithic (eg Whittle *et al* 2011).

Of the seven sites selected for assessment, those chosen from the Middle Thames Valley, Staines Road Farm, Shepperton (Jones 2008) and Cannon Hill near Maidenhead (Bradley *et al* 1976), have no potential for charred residue dating (see Table 6). In the case of Shepperton radiocarbon dates exist from the original investigations and there is certainly further potential to confirm the date of the ring ditch and various deposits of animal bone. However, it is likely that the Carinated Bowl from the ring ditch fill is earlier and was redeposited. In other words further dating will not answer the question concerning the date of this pottery and could, depending on the interpretation of the site, produce a misleading younger date for a pottery assemblage of this type. A third assemblage from Roughridge Hill, Wiltshire (information provided by Edwina Proudfoot) was found to contain no surviving charred food residues and, at the time of this study other potential archive material (animal bone and charred plant remains) could not be located at the museum.

Four sites with key assemblages were selected for radiocarbon dating. The pottery from Rowden is typologically early (classic Carinated Bowl) and close in appearance to the assemblages from Cannon Hill (Bradley *et al* 1976) and Ascott-under-Wychwood (Barclay and Case 2007). Based on typological studies and a critical review of old radiocarbon dates the expectation is that such assemblages represent the earliest pottery to be made in Britain. Two published radiocarbon programmes on pre-cairn occupation deposits at Ascott-under-Wychwood (Oxfordshire) and Hazleton North (Gloucestershire) certainly support this view (Bayliss *et al* 2007a; Meadows *et al* 2007).

One aspect of this work was to re-examine key vessel material against publication drawings to check that the vessel forms and profiles were correctly shown. In the case of Rowden the existing publication drawings (Woodward 1991, fig 52) fail to show that most of the pottery is actually carinated, that vessel 4 has a slight shoulder groove typical of some carinated bowls (eg Ascott-under-Wychwood: Benson and Whittle 2007, fig 10.1:2), that the whole carinated profile of vessel 5 can be determined, and that the profile of vessel 7 may be different – exhibiting lower carination and shallower bowl profile. This one example demonstrates that any reassessment of pottery needs to examine the actual material.

Rowden and the assemblages from the Coneybury Anomaly and Flagstones were included as they were considered by some authors to possibly pre-date 3800 cal BC (Sheridan 2010; Cleal 2004). However, the Coneybury assemblage is arguably not typical of an early style Carinated Bowl assemblage (Ros Cleal pers comm) and is more in keeping with later Carinated Bowl assemblages in which vessels appear thicker-walled, generally heavier and include a higher number of non-carinated forms (Barclay and Case 2007, 280; Barclay 2013). Elements of the pottery from Coneybury are closer in style to the much smaller assemblage from Cherhill and similar to the unpublished assemblage from Roughridge Hill, also near Avebury (Barclay pers obs).

The Flagstones pit (00221) contained a neutral uncarinated bowl and part of a carinated bowl (Cleal 1997, fig 6:14 and 8–9). Part of the latter vessel – a classic carinated bowl with stepped shoulder - stands out from an assemblage (including pit 00274) of neutral bowls, cups, and lugged bowls more typical of Plain Bowl assemblages that are characteristic of the South-Western style.

Rowden

Rowden is a relatively large pit (327) deposit with Carinated Bowl found during the excavation of a Bronze Age site on the Dorset Ridgeway (Woodward 1991) in the same area as the Maiden Castle causewayed enclosure and the Flagstones enclosure (Fig 1). As noted above the pottery illustrations in the original report suggested the assemblage contained carinated and round-bodied bowls. However, re-examination of the material showed that the profiles are incorrect and that many if not all the vessels are carinated, one with a distinctive 'stepped' shoulder carination.

Pit 327 (1m deep), cut by posthole 282, contained a sequence of 12 fills (Woodward 1991; Fig 5 *upper*). The uppermost fill (326) consisted of a thick deposit of soil and abundant flint nodules. Within the pit were a series of charcoal and material-rich layers (634, 628, 571, 560, and 523) described as 'ashy occupation tips' that were interspersed between more sterile clay-rich fills. Refits between lithics (upper layers 326, 424, and 425; upper and lower fills) and conjoining vessel sherds were noted from the upper and lower fills with most of the pottery coming from the lowest fills. The articulated remains of a single pig were found in layer 634, while other bones probably from the same individual were noted in other fills (536 and 560 including a cross-context re-articulation between the left distal epiphysis of a pig humerus from the primary fill (634) and the left distal shaft of a pig humerus from fill 536 several fills above).

Collectively this suggests that the pit filling was probably a single event. The context information (labels) for individual sherds that make up the nine recognised vessels had been separated out and, therefore, it was not possible to identify sherds to particular fills, although the other finds could still be attributed to their contexts.

The upper southern edge of pit 327 was cut by a feature described as a posthole. This feature had a large post-pipe that was packed with charcoal (fill 287).

For the original publication four radiocarbon measurements were obtained on bulk charcoal (HAR-5245–HAR-5248). These samples came from the primary fill (634; HAR-5248), and above this and in stratigraphic order from 'tips' 571 (HAR-5247) and 523 (HAR-5246). A single date (HAR-5245) came from the fill of the later post-pipe (287). The radiocarbon dates on these samples have all been incorporated into the chronological model (see below) as providing *termini post quos* for their contexts given that they all contain material that could be significantly older than the date of deposition.

A further seven measurements were obtained as part of The *Dating the Earliest Neolithic Ceramics of Wessex* project (Table 1). Five measurements were obtained from short-lived carbonised material, three (OxA-25000 and OxA-25001, SUERC-35956) were from single fragments of *Corylus avellana* (560 and 628), SUERC-35957 was from a single cereal grain (*Triticum spelta/dicoccum*) from 628 and SUERC-35955 was from a fragment of Pomoideae (560).

A partial pig skeleton (Fig 3a) was was recovered from several fills (536, 560, and 634) with one of two articulating phalanges from 560, the uppermost of the primary fill sequence dated (OxA-24985). Finally a single measurement (OxA-25085) was obtained from the carbonised residue adhering to vessel G/7 (Woodward 1991, fig 2.7).

The model (Fig 6) incorporates the stratigraphic sequence between pit 327, the later posthole 282, and the series of fills within pit 327. The single measurement (OxA-25085) from a vessel G/7 can only be attributed to the fill of the pit (although it can be noted that most of the pottery was recovered from the primary fill). The model has poor agreement (Amodel= 32) with the date on the bulk charcoal sample from the primary fill (*HAR-5248*) clearly being too young (A:11). A model that excludes HAR-5248 (Fig 7) has good overall agreement (Amodel=65) and provides an estimate for the digging of the pit of *4005–3770 cal BC* (*95% probability*; Fig 7; *start_rowden_pit_327)* probably of *3915–3880 cal BC* (*10% probability*) or *3865–3780 cal BC* (*58% probability*), and an estimate for the date of its final infilling of *3890–3865 cal BC* (*2% probability*; Fig 7; *end_rowden_pit_327*) or *3800–3600 cal BC* (*93% probability*) probably of *3785–3690 cal BC* (*68% probability*).

As the pottery mostly consists of large freshly broken refitting fragments the estimates for the digging and infilling of the pit are very likely to be close to that of the age of the pottery assemblage.

It is argued here that this pit assemblage is of early Carinated Bowl type and in terms of typology is similar to classic type (see Discussion below). Reassessment of the assemblage by Alistair Barclay and also Ann and Peter Woodward (pers comm) indicates that most of the vessels are actually carinated and that in certain cases (eg Woodward 1991, fig 52:5) more of the profile is represented by refitting sherds. That the original illustration omits this detail is a significant oversight, as it removes what could potentially be interpreted as an assemblage that contains some 'S-profile/Inflected' vessels and replaces it with one that should be labelled early 'classic' Carinated Bowl (see Cleal 2004, 173–6; fig 4).

Coneybury Anomaly

The Coneybury Anomaly was a large pit discovered near the Coneybury henge on King Barrow Ridge during the Stonehenge Environs Project (Richards 1990). It is one of the earliest Neolithic features known from Salisbury Plain and is located between the nationally important sites of Blick Mead and Stonehenge. The pit is important as it contains wild animal remains as well as Neolithic artefacts, the bones from domesticated animals, and charred cereal grain (Gron *et al* 2018). Its potentially early date, as well as nature of the deposit, is seen as representing activity during the 'transitional' Mesolithic/Neolithic. Determining where this pit sits within its local sequence, therefore has wider implications for the continuation of a Mesolithic lifestyle at a time when Neolithic practices had become relatively more widespread in southern England. It could also hint that the take up of a Neolithic lifestyle in this area was less immediate than elsewhere. A later date for this feature, as suspected from the character of the pottery, could also help explain the near absence of classic Carinated Bowl from this area of Salisbury Plain. Precisely dating the Coneybury Anomaly would have important ramifications beyond settling the typo-chronology of the pottery.

This was a large pit with an occupation or feasting deposit in the primary fill (context numbers 2247–48) (Richards 1990). This deposit was recorded in a series of spits and, as a whole, was probably composed of a series of dumps (see Richards 1990, fig 24 and other plans in archive) of broken vessels, animal bone, and other material (lithics, charred plant remains, ash, and charcoal). Some of this material may have been placed and/or arranged. It is very likely that the whole deposit accumulated rapidly as a short event given the placements of partially articulated animal bone and nested groups of sherds (Fig 8). Two fragments of antler refit to form a possible pick (Fig 4b). One suggestion is that this was used in the digging of the pit. The pottery assemblage includes large sherds from freshly broken vessels and comprises carinated and non-carinated forms. It is not a classic Carinated Bowl assemblage, but it can be characterised as having a strong carinated component. However, although it includes a number of carinated vessels, these are generally thick-walled and heavy and not typical of early type. In addition, a number of non-shouldered vessels are present including ones with rounded neutral hemispherical or closed globular profile (see Cleal 1990, figs 28–31 and 2004, fig 4). However, re-examination of one of these vessels (Cleal 2004, fig 4, P7) by A Barclay revealed that it is also a weakly carinated bowl (Fig 9). This detail may seem trivial but attention has been drawn to the published drawing and parallels sought and connections made with Castellic (Middle Neolithic II) pottery from France (Sheridan 2010, 101).

A single radiocarbon determination (OxA-1402 on cattle bone) was obtained for the original publication. This measurement (5050±100 BP) with its large error and calibrated span (4050–3640 cal BC; 2σ) has been used to suggest a possible very early date for the feature and its associated pottery (see Whittle *et al* 2011, 762 for a summary and discussion of this point; also Cleal 2004 and Sheridan 2010, 101).

An additional 11 radiocarbon determinations were obtained as part of The *Dating the Earliest Neolithic Ceramics of Wessex* project (Table 2) from eight samples. Three measurements are from carbonised food residues adhering to the interior of pottery sherds (OxA-25086–OxA-25088), seven from articulating animal bone groups, and one from an antler pick (OxA-24986). Pairs of replicate radiocarbon measurements on beaver (SUERC-35959 and OxA-25766), roe deer (SUERC-35960 and OxA-24987), and cattle (OxA-24988 and -24989) bones are statistically consistent at the 5% significance level (Ward and Wilson 1978) and weighted means have been calculated as providing the best estimates for the age of the samples (Table 2).

Although beavers (*Castor fiber*) are completely vegetarian their diet will include aquatic plants and, given the potential for a freshwater radiocarbon reservoir offset (Keaveney and Reimer 2012), the date of the beaver has been included as a *terminus post quem*.

The available dates from the Coneybury Anomaly have been modelled as deriving from a single uniform phase of activity (Buck *et al* 1992), although excluding the measurement on the beaver bone the remaining eight age determinations are statistically consistent at the 5% significance level (T′=12.4; ν=7; T′(5%)=14.1; Ward and Wilson 1978) supporting the suggestion that they could derive from a single short-lived event. The model has good overall agreement (Amodel: 94) and provides an estimate for the digging of this pit of *3815–3655 cal BC (95% probability; start_coneybury_anomaly*; Fig 10*)* probably *3725–33655 cal BC (68% probability)*, and an estimate for the date of its infilling of *3710–3605 cal BC (95% probability; end_coneybury_anomaly),* probably *3685–3640 cal BC (68% probability)*.

Flagstones pre-enclosure pit 00221

The site of the Flagstones enclosure and pits is located just west of the Mount Pleasant henge and only 3km from the Maiden Castle causewayed enclosure all within the environs of Dorchester, Dorset (Fig 1). The enclosure probably belongs to a period when early Neolithic Bowl was no longer in use. The pottery assemblage from the two pits includes South-Western and Carinated Bowl, and could represent a mixed rather than a coherent group.

There are a pair of adjacent features described as pits (00221 and 00274). Pit 00221 was probably cut by a segment (36) of the Flagstones enclosure ditch (Healy 1997, figs 18 and 20). Pit 00221 has an ‘early’ radiocarbon measurement on oak charcoal with a calibrated range of 3960–3630 cal BC (2σ; HAR-9161; 4960±80 BP) and was associated with pottery that is described as of South-Western type (Cleal 1997, 89), although some vessels are of carinated form (eg vessel 8/9) (Fig 11). The associated pottery consisted of mixture of freshly broken and more fragmentary material. The single date on bulk charcoal has been used to suggest a relatively early date for the pottery (Cleal 2004, 173). It can be noted, however, that most of the pottery was recovered from the undated pit (00274), while the possible presence of sherds from the same vessel in the two pits suggests that their contents derive from a related source (eg midden or occupation deposit with some potential for the mixing of material). In section, pit 00221 has an irregular and shallow profile (*contra* description given in Smith *et al* 1997, 30) and could alternatively be seen as a natural feature perhaps a tree-throw hole. The top of this feature was cut by segment 36 of the later Flagstones enclosure.

Re-examination of vessel 8/9 (including sherds 11 and 15) by Alistair Barclay concluded that its form may have a slightly longer neck than illustrated (Fig 11: compare vessel 15 with 8/9), and that it is very like other Carinated Bowls with a stepped shoulder profile (eg Cissbury, Sussex;: Curwen 1937, fig 23; Ascott-under-Wychwood, Oxfordshire, vessels 36 and 38; Barclay and Case 2007). It is not impossible that the Flagstones vessel represented by sherds 8/9/11/15 is older than the South-Western component of the two pit assemblages.

Pit 00274 had no potential for further dating and none of the pottery from the two pits had surviving carbonised food residue.

Three further determinations were obtained for pit 00221 from samples of charcoal and carbonised cereal grain (re-examined as part of this project by Ruth Pelling, two on *Corylus avellana* charcoal and one on cereal grain). The cereal grain returned a post-medieval calibrated date (cal AD 1660–1955*; SUERC-35954), and so is therefore intrusive and is excluded from the model.

The original Harwell measurement (HAR-9161) and the two new determinations (OxA-25084 and SUERC-35950) were modelled in order to estimate a date for the pit assemblage. As with the other pits discussed above, its construction and filling is likely to have been a short-lived event.

HAR-9161, a sample of bulk oak charcoal, is considerable older than the two new measurements. This sample probably contained a proportion of old wood and, therefore, could have an age-at-death offset of up to 200 years or more. For this reason, in the model, it is treated as a *terminus post quem* (Fig 12). The model, which has good overall agreement (Amodel: 96), provides an estimate for the digging of the pit of *4095–3635 cal BC* (*95% probability*; Fig 12; start_*flagstones _00221*) probably *3770–3645 cal BC* (*68% probability*) and its infilling of *3700–3330 cal BC* (*95% probability*; Fig 12; *end_flagstones _00221*).

The model also provides an estimate for the construction of the Flagstones enclosure of *3580–2970 cal BC* (*95% probability*; Fig 12; *start_flagstones_ditch*) probably *3425–3090 cal BC* (*68% probability*).

Cherhill, near Avebury

Cherhill is located 7km west of Avebury and is on the distant edge of the cluster of long barrows and enclosures found in that area. The site consists of ditch-like features with occupation material in the primary fill (26) including pottery, charcoal (oak, alder, hazel, *Prunus/Crataegus* sp., and ash), flint, worked stone, and animal bone (Fig 13). Although considered to be a monument its irregular character and shallow depth make this an unlikely explanation (Evans and Smith 1983). The pottery is similar in character to that from the Coneybury Anomaly being relatively thick-walled and carinated. Typologically it fits within the developed phase of Carinated Bowl.

For the original report a single radiocarbon measurement was obtained on part of a hazel timber (BM-493; 4715±90 BP). Unfortunately, the charcoal could not be located and nothing remains of the British Museum sample (Janet Ambers pers comm). The pottery, which was identified as South Western type/Carinated Bowl, included one dump of freshly broken material as well as mostly small and potentially reworked material. Re-examination of this deposit of sherds suggests that it is mostly from a single vessel. Many of the sherds were not only similar in appearance but also had internal charred food residue. Within the archive similar sherds occurred in a small tin with illustrated rim P17 (Smith 1983: a heavy rolled rim from a thick-walled coarse vessel). The presence of these and other heavy rims alongside simple and everted rims and a relatively high number of carinated sherds indicate an assemblage of later Carinated Bowl type or early South-Western type (see Barclay and Case 2007, 280; Barclay 2000: in general this assemblage, like the one from the Coneybury Anomaly, may represent local secondary developments from a more homogenous Carinated Bowl tradition).

Two further age determinations were obtained (OxA-24998 and OxA-24999: GU-24791, a replicate of OxA-24999 failed due to insufficient carbon). These two dated sherds (ON23 and 1439; Fig 3e–3f/g) are manufactured from different fabrics and therefore derive from separate vessels. OxA-24999 was obtained from a sherd that formed part of a dump of pottery that probably represents a single vessel (see above).

A model (Fig 14) containing the two new dates and BM-493 was constructed and has good overall agreement (Amodel:105). All three age determinations are statistically consistent at the 5% significance level (T'=3.2; ν=2; T'(5%)=6.0; Ward and Wilson 1978) supporting the interpretation that they could derive from a single short-lived event.

The model provides an estimate for the beginning of the formation of primary deposit 26 of *4160–3535 cal BC* (*95% probability*; Fig 14: *start_cherhill_deposit_26*) probably *3760–3635 cal BC* (*68% probability*) and an esimate for its ending of *3655–2980 cal BC* (*95% probability*; Fig 14: *end_cherhill_deposit_26*) probably *3650–3460 cal BC* (*68% probability*).

CURRENCY OF THE FOUR ASSEMBLAGES

Each deposit represents an accumulation of refuse from activities, such as feasting, in which the burial of selected materials was simply a final act (after pottery had become broken). In the case of pottery, we are interested in directly dating its period of use – we simply do not know for how long ceramic vessels were kept. Some were evidently repaired, and the possibility that they were used over a number of years has to be considered.

Key parameters for the currency of the ceramic assemblages from the four sites (Rowden, Coneybury Anomaly, Cherhill and Flagstones) are given in Table 7. Figure 15 is a schematic diagram summarising the estimated dates for the times when the ceramics at each site were used; the horizontal bars represent the relative probability that ceramics where in use in a particular 50-year period (light shading is less probable, darker shading more probable).

The results do confirm the development of pottery outlined by Herne (1988) and developed by the first author and others. The date for the earliest group, Rowden, is consistent with the suggestion that the earliest type (classic) of Carinated Bowl occurred in the first centuries of the 4th millennium cal BC (Barclay 2007, 280). Rowden is also closest in character to the assemblages recovered from pre-cairn deposits at Ascott-under-Wychwood and Hazleton North. Unfortunately, the other key assemblage of this type, Cannon Hill, Berkshire had no further potential for dating.

OUTLINE FOR A NEW CHRONOLOGY FOR THE DEVELOPMENT OF EARLY NEOLITHIC CERAMICS IN SOUTHERN BRITAIN

This study should be seen perhaps as a starting point in producing an outline and framework for the chronology, terminology, and understanding of the early development of pottery in southern England. The present study focussed on Wessex but mirrors what one of the authors (A Barclay) had already suggested for the Upper and Middle Thames valley (Barclay and Case 2007; Barclay 2007), which could also be applicable to the Lower Thames and East Anglia. Other neighbouring regions: Kent and Sussex, central England, and the south-west remain to be investigated and may present alternative histories, more so as we test multi-strand models for the Neolithisation of Britain (see Sheridan 2010; Whittle *et al* 2011, and Collard *et al* 2010).

A model for the currency of Carinated Bowl in southern England is shown in Figure 16. Since there are enough data to enable the currency of 'classic' Carinated Bowl to be estimated separately, this is also included in the model. This model estimates that Carinated Bowl first appeared in *4245–3975 cal BC* (*95% probability*; *start_carinated_bowl*; Fig 16), probably *4095–3990 cal BC* (*68% probability*) and ended in *3625–3395 cal BC* (*95% probability*; *end_carinated_bowl*; Fig 16), probably *3615–3525 cal BC* (*68% probability*). Classic Carinated Bowl is estimated to have first been used in *4005–3835 cal BC* (*95% probability*; *start_classic_carinated_bowl*; Fig 16), probably *3970–3950 cal BC* (*7% probability*) or *3930–3850 cal BC* (*61% probability*) and finished in *3760–3585 cal BC* (*95% probability*; *end_classic_carinated_bowl*; Fig 16), probably *3700–3620 cal BC* (*68% probability*)

However, within this model for Carinated Bowl are the sites of Yabsley Street and Little Waltham. The former represents the earliest date for a group of Carinated Bowls, accepting the single measurement (KIA-20157) on the wooden plank as accurately reflecting the true date of the inhumation burial (Coles *et al* 2008). The pottery from the burial is too fragmentary to be exactly certain of its type (Coles *et al* 2008, fig 4:1-4). Certainly, if these sherds, along with the more complete vessel found from the adjacent sand deposit, are considered together then they would not be out of place in a classic Carinated Bowl assemblage. In contrast the pottery pit group from Little Waltham (Drury 1978, fig 36) lacks carinations and is more in keeping with S-profiled bowls that are found in developed Carinated Bowl and plain bowl assemblages.

The model for the currency of Decorated Bowl is shown in Figure 17. This model estimates that Decorated Bowl first appeared in *3740–3655 cal BC* (*95% probability*; *start_decorated_bowl*; Fig 17), probably *3705–3665 cal BC* (*68% probability*) and ended in *3340–3260 cal BC* (*95% probability*; *end_decorated_bowl*; Fig 17), probably *3330–3295 cal BC* (*68% probability*).

The model for the currency of South-Western style pottery is shown in Figures 18–20. This model estimates that South-Western style pottery first appeared in *3890–3805 cal BC* (*95% probability*; *start_south_western_style*; Fig 18), probably *3860–3815 cal BC* (*68% probability*) and went out of use in *3465–3285 cal BC* (*95% probability*; *end_south_western_style*; Fig 18), probably *3400–3375 cal BC* (*7% probability*) or *3360–3300 cal BC* (*61% probability*).

Figure 21 and Table 8 summarises the currency of early Neolithic ceramics in southern England.

For Wessex and its wider region, the following sequence is suggested. By the 40th and certainly the 39th century cal BC what can be termed classic Carinated Bowl was in use in the Thames valley and in the area of Wessex. The type assemblages are Rowden, (Dorset), Ascott-under-Wychwood and Hazleton North (Cotswold Hills), and Cannon Hill (Maidenhead, Berkshire). The two earliest known assemblages are from the midden and occupation deposits beneath the Ascott-under-Wychwood long barrow and the pre-cairn deposits at Hazleton North (Table 9). The two assemblages being typologically very similar, which is perhaps not surprising given their spatial proximity and site histories. The Ascott-under-Wychwood assemblage (39 vessels) makes it is possible to characterise the range of vessels that were current by the early 39th century cal BC. Forms present include cups (no 19), fine carinated bowl with pronounced 'lipped' shoulder (no 2), a possible straight-necked carinated bowl (no 38), and deeper bodied coarseware bowls (no 36: here with a stepped shoulder). In addition, is the possible slightly globular fineware bowl (no 1). Note must also be made that some vessels were marked at the shoulder not with a clear carination but with a more rounded point of inflexion. Both the Ascott-under-Wychwood and Hazleton North assemblages are earlier than the Rowden assemblage (*55.2% probable*; Table 9), which is of similar character and likely to belong to the close of the 39th century.

Of significance within the wider region and to this sequence is the short horizon provided by the Sweet Track and its associated vessels that show close affinity with classic Carinated Bowl and, what could be seen as the beginnings of the South-Western regional style. Whether this style spread from the south-west or from Wessex is a moot point, although other early finds of classic Carinated Bowl are known from Tregunnel, Penhale Round, Broadsands and from a submerged forest off the coast near Paignton (Tom Brindle pers comm; Sheridan 2010, 101 and pers comm) and from the north-west coast of Wales, in particular the assemblage from a pit in the forecourt area of the earlier western chamber at Dyffryn Ardudwy (Powell 1973).

At this point in time there is no firm evidence to place any of these assemblages any earlier than the Sweet Track (ie before 3807/6 BC).

The Sweet Track can be seen as a useful horizon after which Neolithic lifeways became more regional in character and marking the more widespread building of monuments (the beginnings of long barrows and cairn construction from the second half of the 38th century cal BC onwards: see Whittle *et al* 2011). It was during this century that pottery assemblages became more diverse with the increased appearance of various non-carinated forms including closed and open vessels with S-shaped profiles. Here the use of existing terminology is confusing as it is possible to describe the same groups of pottery as developed/non-classic Carinated Bowl or as Plain Bowl.

The Coneybury Anomaly assemblage can now be placed confidently in the 38th century cal BC. Although the group of vessels contains a number of carinated bowls (eg P1 and shoulder and rim sherds possibly from other similar vessels), it also includes a significant number of S-profiled and hemispherical bowls. One vessel (P7) stands out as it carries a single vertical perforated lug (Cleal 1990, fig 29). This vessel is represented by four joining sherds that make up about 25% of the upper part of the vessel. Due to the fragmentary and incomplete nature of this vessel it is possible to offer a slightly different interpretation of its form from what is published. The rim diameter could be slightly wider than what is drawn, and the lug sits flush with a definite point of inflection or carination. The form is that of a classic shouldered bowl and this assemblage could mark its earliest known occurrence in Wessex (Cleal 1990, 53). A further observation noted by Cleal (1990) is the occurrence of possible decoration on a small number of sherds, including a cup/bowl rim with multiple scored lines (P30).

On present evidence the date for the Coneybury Anomaly is earlier than the construction of long barrows on Salisbury Plain and from the general area. The earliest known long barrow is Fussell's Lodge whose initial phase (construction, use and extension of the mortuary house or 'box') was constructed towards the end of the 38th or start of the 37th century cal BC. The assemblage of pottery associated with this barrow and its primary use is significant as it is mostly decorated (Smith 1966, 18 and figs 5–6). Of particular significance is the high shouldered lugged bowl W1, which would not be out of place in the decorated assemblage from the Windmill Hill causewayed enclosure or, as Smith (1966) suggested, amongst some of the decorated assemblages from Eastern England. The strong use of decoration sets it apart from the South-Western regional style. However, the deep baggy bowls (W3–5) are of a form that occurs, albeit at a later date, at enclosures in the area. As with the Coneybury Anomaly, the assemblage from Fussell's Lodge is important as it marks the unambiguous appearance of decorated pottery in the 37th century cal BC and the manufacture of potentially new forms - baggy bowls, alongside the continued use of shouldered bowls.

The same development of deep bodied or baggy pots and, possibly lugged bowls, by the beginning of the 38th century is also found in the Greater Dorchester area. Again, such innovation appears to predate the construction of enclosures and assemblages considered to be more typical of the South-Western style.

One observation is that the use of carination appears to decrease over time. It is a trait that clearly dominated the earliest assemblages of the 40th and 39th centuries BC (eg Ascott-under-Wychwood) but certainly became less important by the time the Sweet track was in use towards the end of the 39th. The Coneybury Anomaly assemblage provides a useful snapshot at the close of the 38th century. Its composition, as an assemblage used perhaps only for a single feast, indicates that carination was a significant but less dominant trait and that a wide variety of other forms were in use. In contrast, later in the 37th century the carinated bowl as a recognisable form was reduced to a minor component (eg at Maiden Castle). Accurately produced Bayesian models and a greatly refined chronology now presents the potential to go beyond the simple division of pre-enclosure assemblages into early/late Carinated Bowl. The future challenge will be to examine the ebb and flow of particular traits and what could be a more dynamic picture of ceramic development during the first four centuries of the Neolithic in southern Britain.

The present terminology for describing Early Neolithic pottery is far from adequate and, based on this study, could be replaced with one that is more sympathetic to chronology and the complexity and range of vessel forms. Any attempt to impose a periodization framework would mask the dynamics of this ceramic development and how this plays out with the other strands of early Neolithic evidence (eg the ebb and flow of monument building). No standard system presently exists for the description of vessel forms in the required detail and one of the challenges for the future would be to determine the currency of particular types of vessels (eg the fine carinated bowl with lipped shoulder, neutral deep baggy bowls, high shouldered bowls etc) and if and when particular vessel forms change (eg, could baggy bowls replace deep bodied carinated bowls). This level of detail may in turn tell us more about the people behind the pots, their geographical connections and origins.

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FIGURES

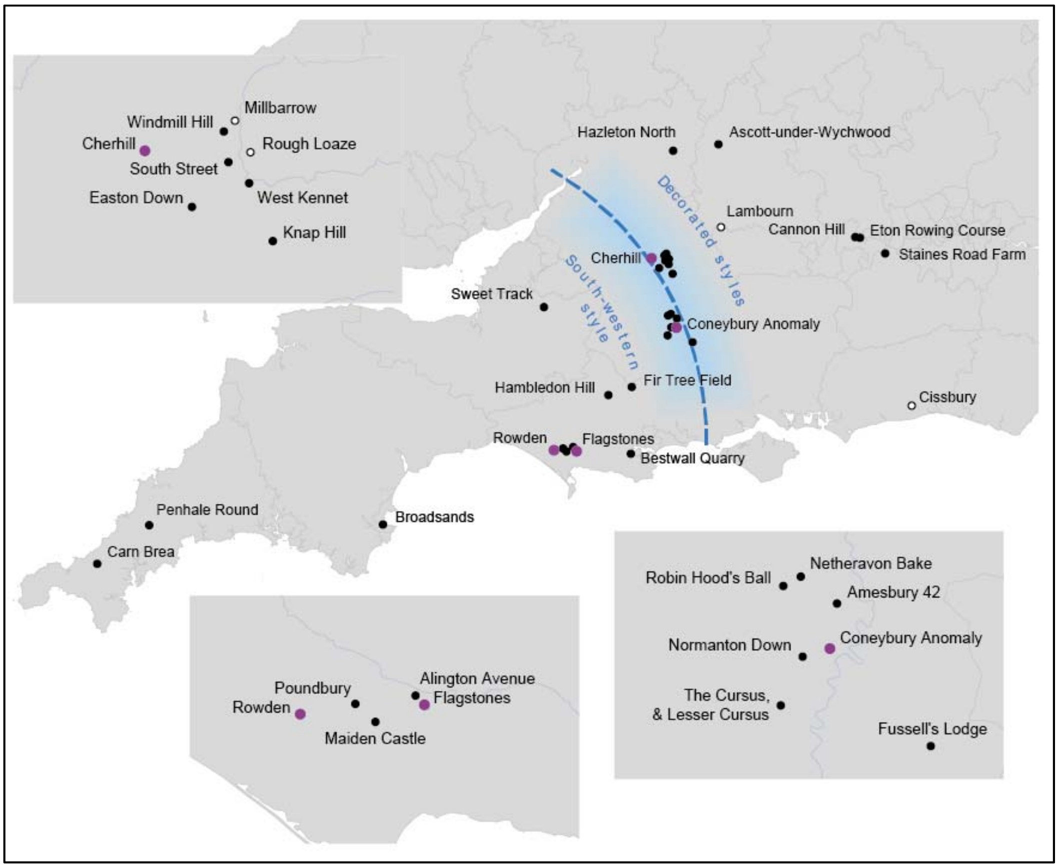


Figure 1: Rowden and Flagstones, Dorset (with inset of nearby sites); Coneybury Anomaly, Salisbury Plain, Wiltshire (with inset of nearby sites); and Cherhill, near Avebury, Wiltshire (with inset of nearby sites), with additional sites referred to in the text

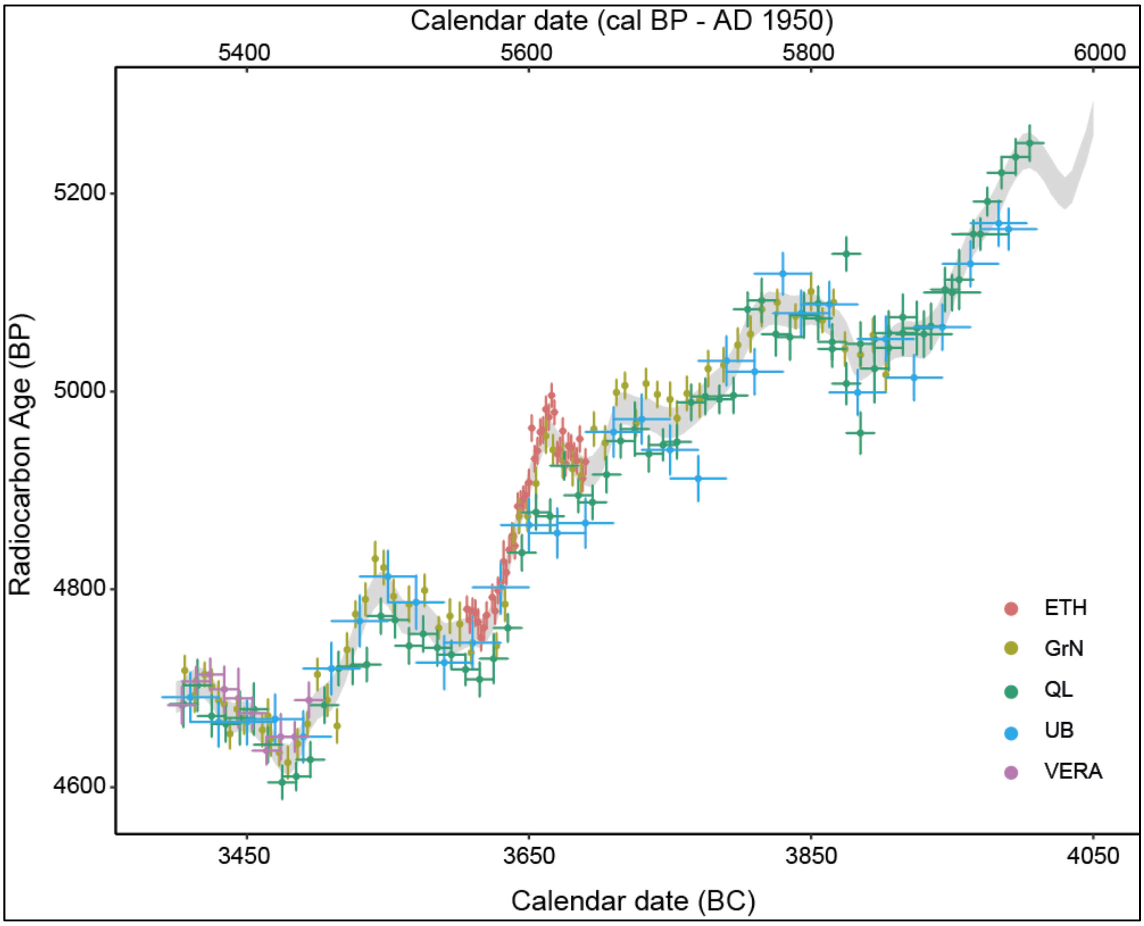


Figure 2: Radiocarbon calibration curve 3400–4050 BC and radiocarbon measurements included in IntCal20 (Reimer et al *2020) shown in grey (ETH: Eidgenössische Technische Hochschule, Zürich, GrN: Rijksuniversiteit Groningen, QL: University of Washington, Seattle, UB: The Queen's University, Belfast; VERA: Vienna Environmental Research Accelerator)*

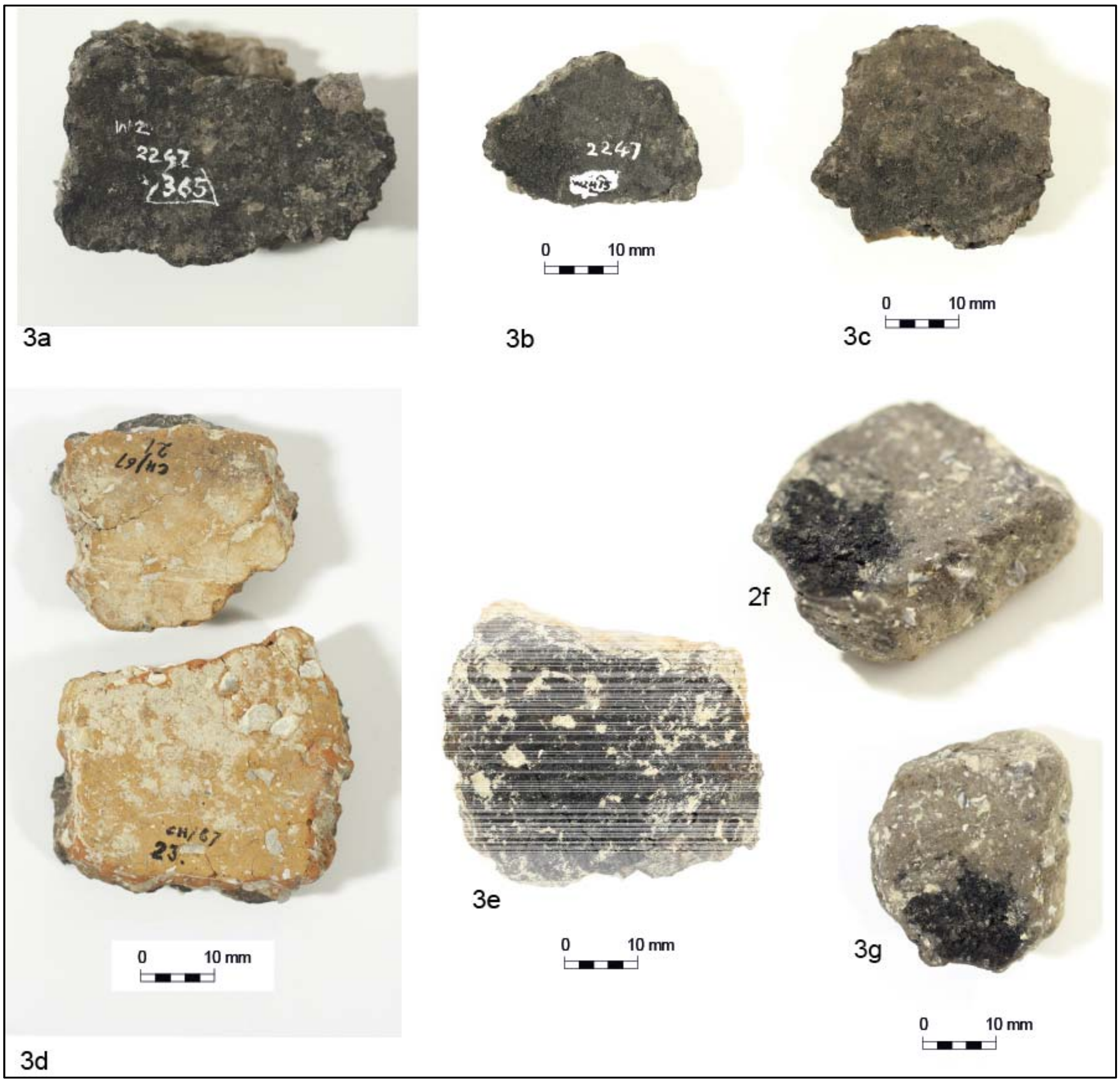


Figure 3: Pottery with internal carbonised food residue. 3a–c from the Coneybury Anomaly and 3d–g from Cherhill. 3a=OxA-25086, 3b=OxA-25087, and 3c=SUERC-35958. 3d=outer surface with sherd numbers (21 and 23). 3e=inner surface of sherd 23 (OxA-24999). 3f and g=inner surface of sherd from ditch I (OxA-24998)

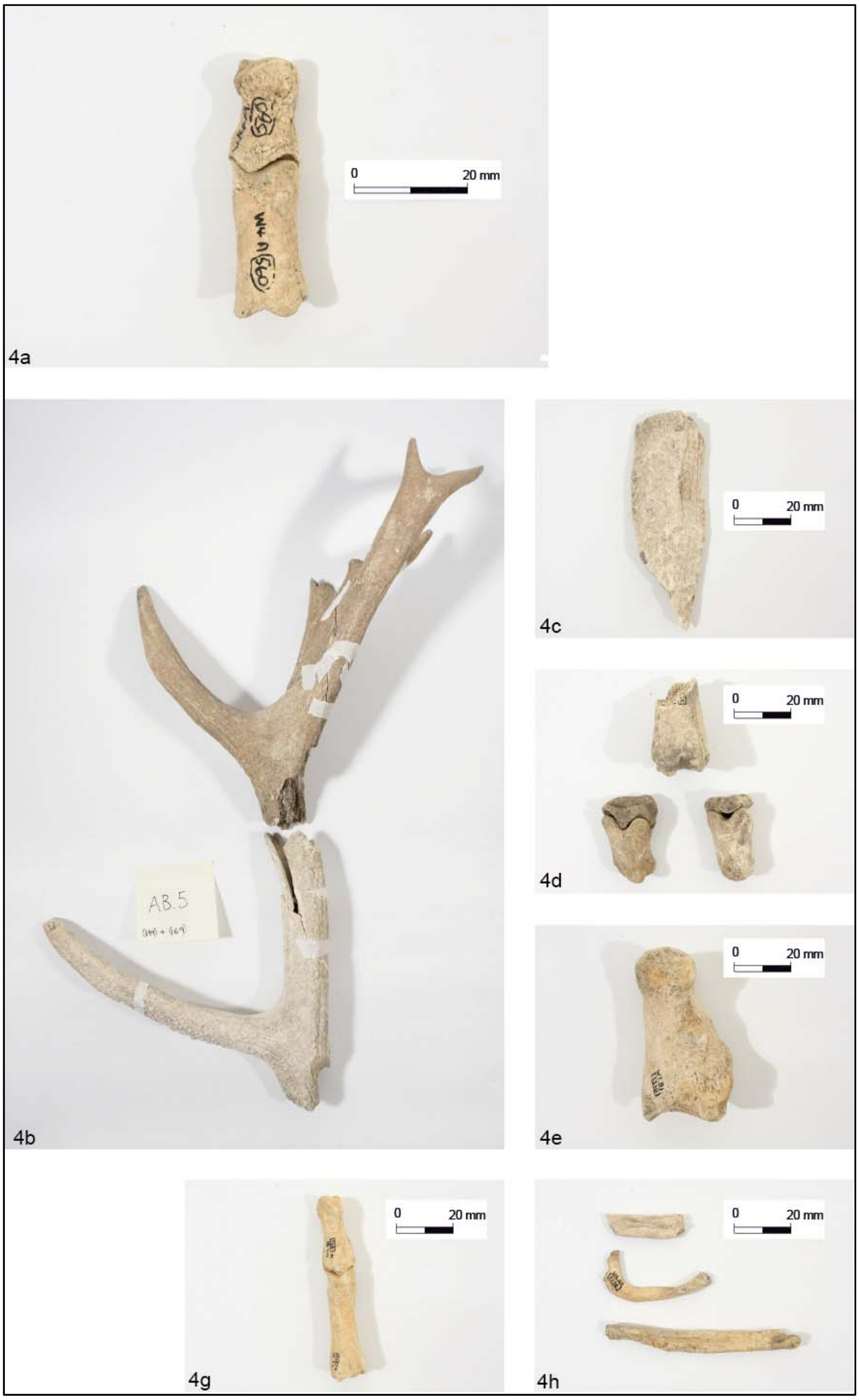


Figure 4: Animal bone samples from Rowden (4a) and the Coneybury Anomaly (4b–h). 4a=pig bone (OxA-24985), 4b–c=antler (OxA-24986), 4d=neonate cattle (OxA-24988 and OxA-24989), 4e= cattle (SUERC-35964), 4g=roe deer (OxA-24987 and SUERC-35960), and 4h=beaver bones (SUERC-35959 and OxA-25766)

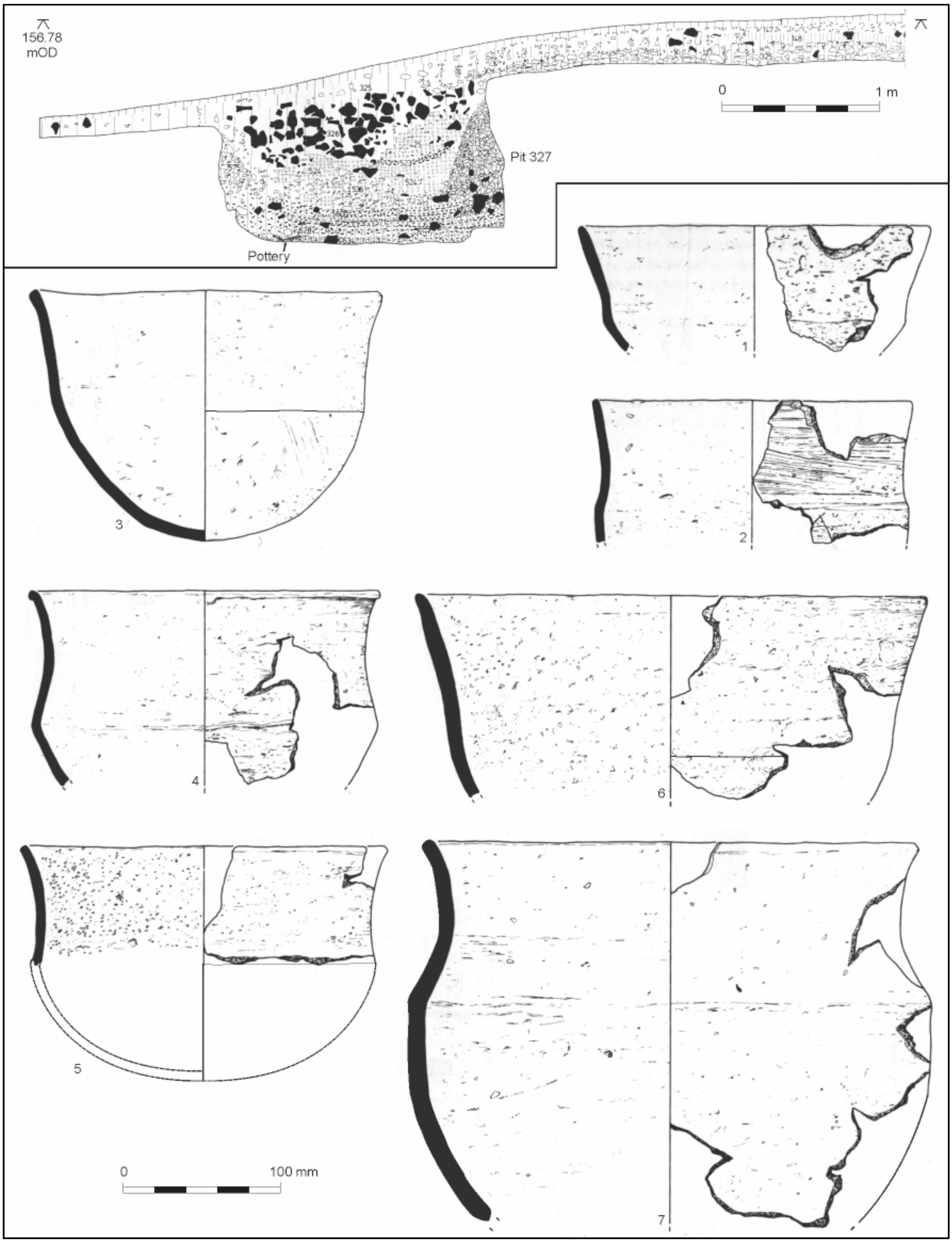


Figure. 5: Rowden, Dorset. Section of pit 327 and associated classic Carinated Bowl pottery (after Woodward 1991).

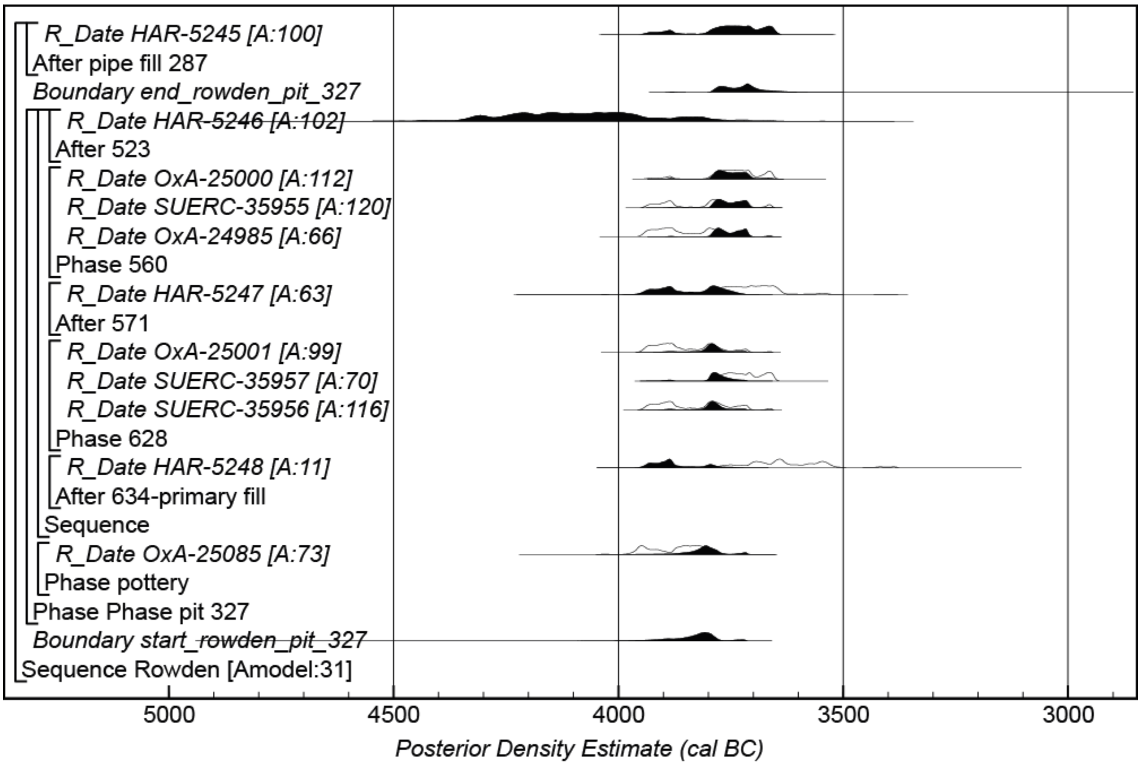


Figure 6: Probability distributions for the dates from the Rowden pit. Each distribution represents the relative probability that an event occurred at a particular time. For each of the dates two distributions have been plotted, one in outline which is the result produced by the independent calibration of the radiocarbon measurement and a solid one which is based on the chronological information provided by the model. For example, the distribution 'end_rowden_pit_327' is the estimated date for the end of deposition within pit 327. The large square brackets down the left-hand side of the diagram, along with the OxCal keywords, define the overall model exactly.

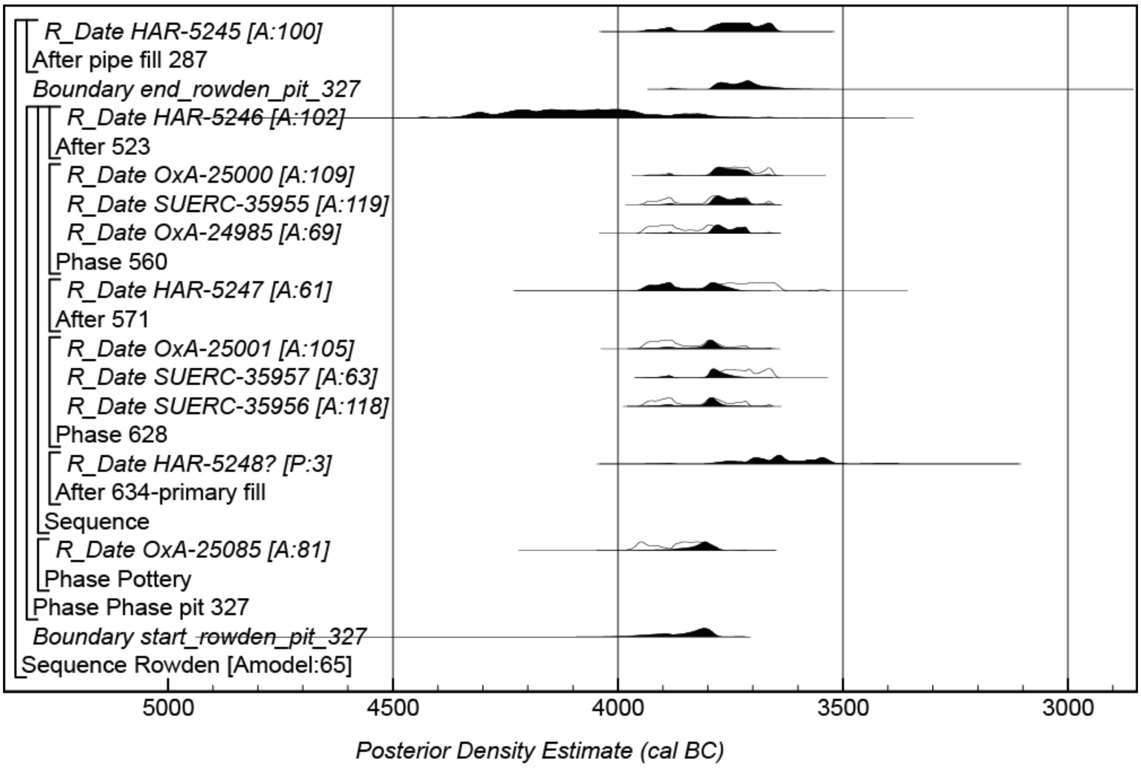


Figure 7: Probability distributions for the dates from the Rowden pit. The format is identical to that shown in Figure 6.

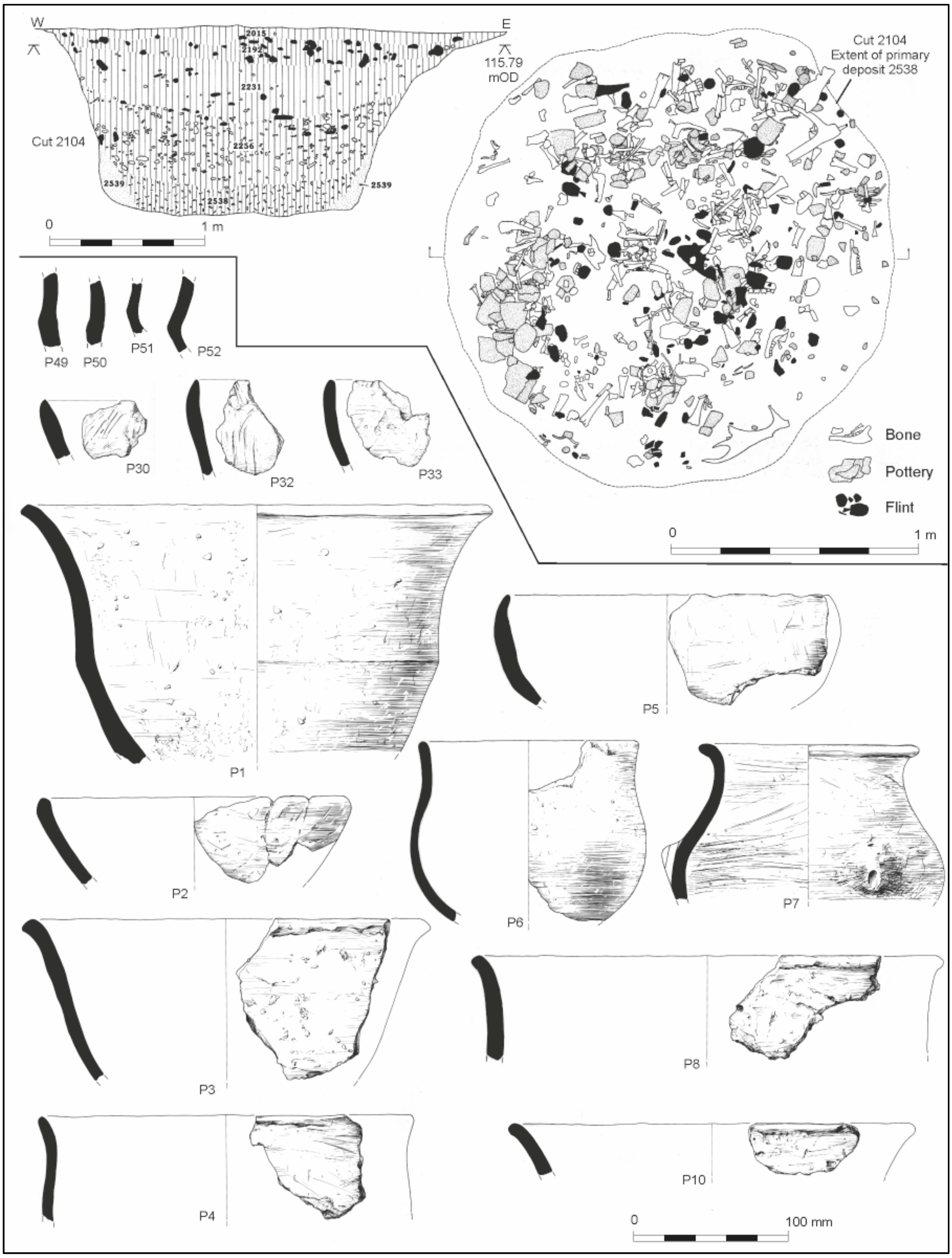


Figure 8: Coneybury Anomaly. Plan and section of pit 2104. Selected pottery (after Cleal 1990). The pottery is in the South-Western style and includes a proportion of carinated vessels. Typologically it is developed Carinated Bowl. Note P7 is shown with a sinuous profile but actually has a carination (see Fig 9)

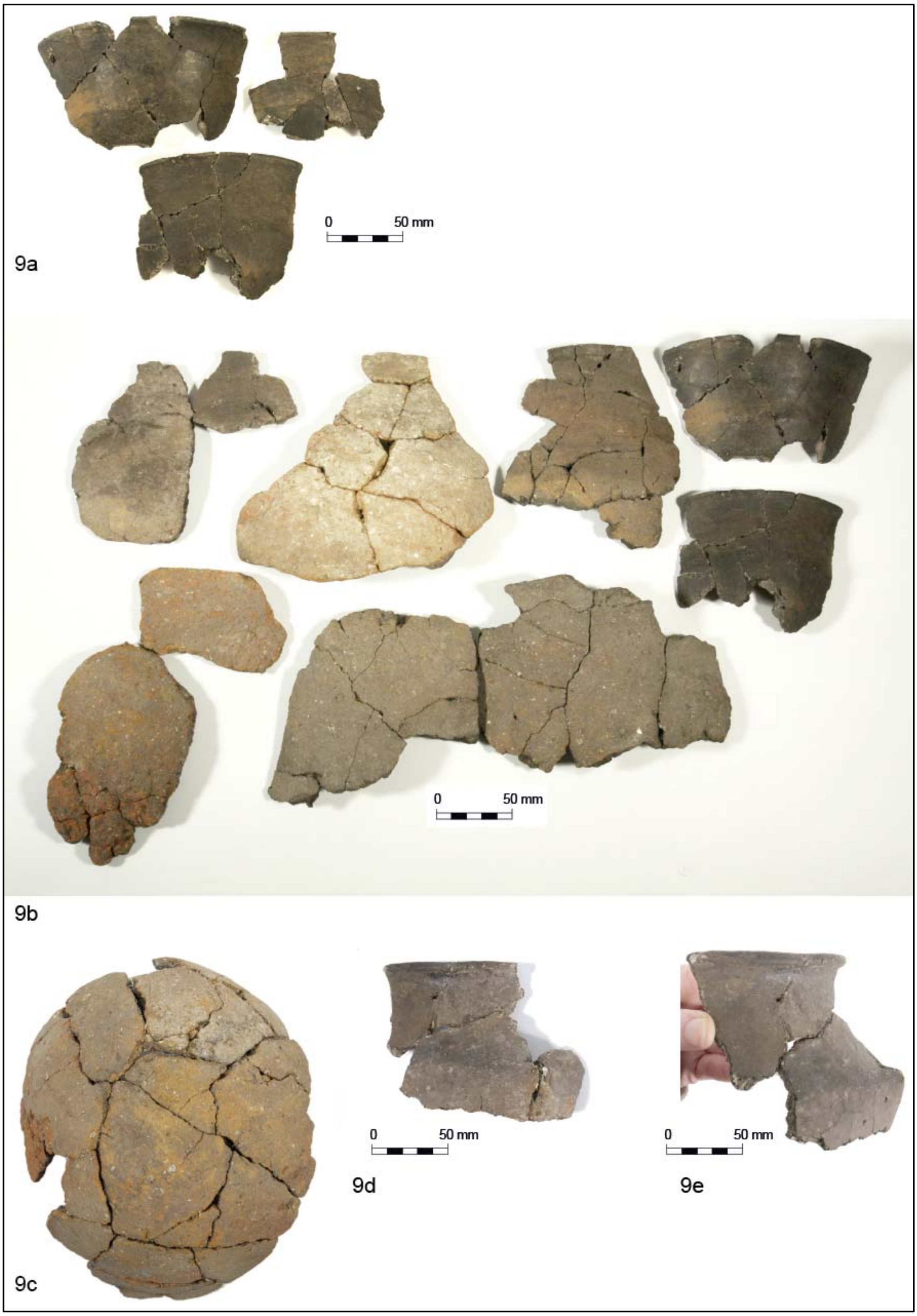


Figure 9: a–c Carinated Bowl pottery from Roughridge Hill, d–e vessel P7 from the Coneybury, Anomaly. Note carination (see Fig 8 above)

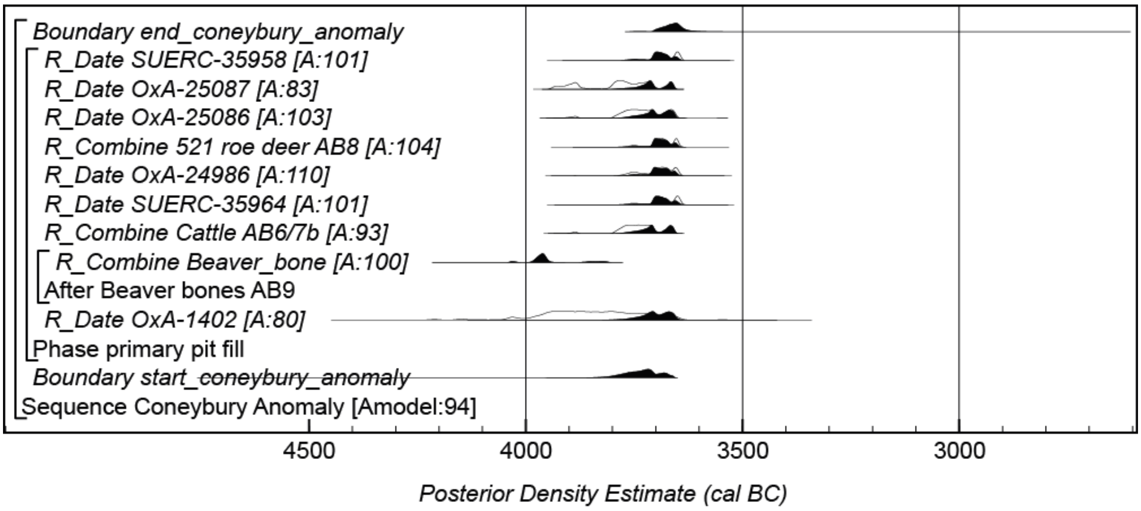


Figure 10: Probability distributions of dates from the Coneybury Anomaly pit. The format is identical to that shown in Figure 6

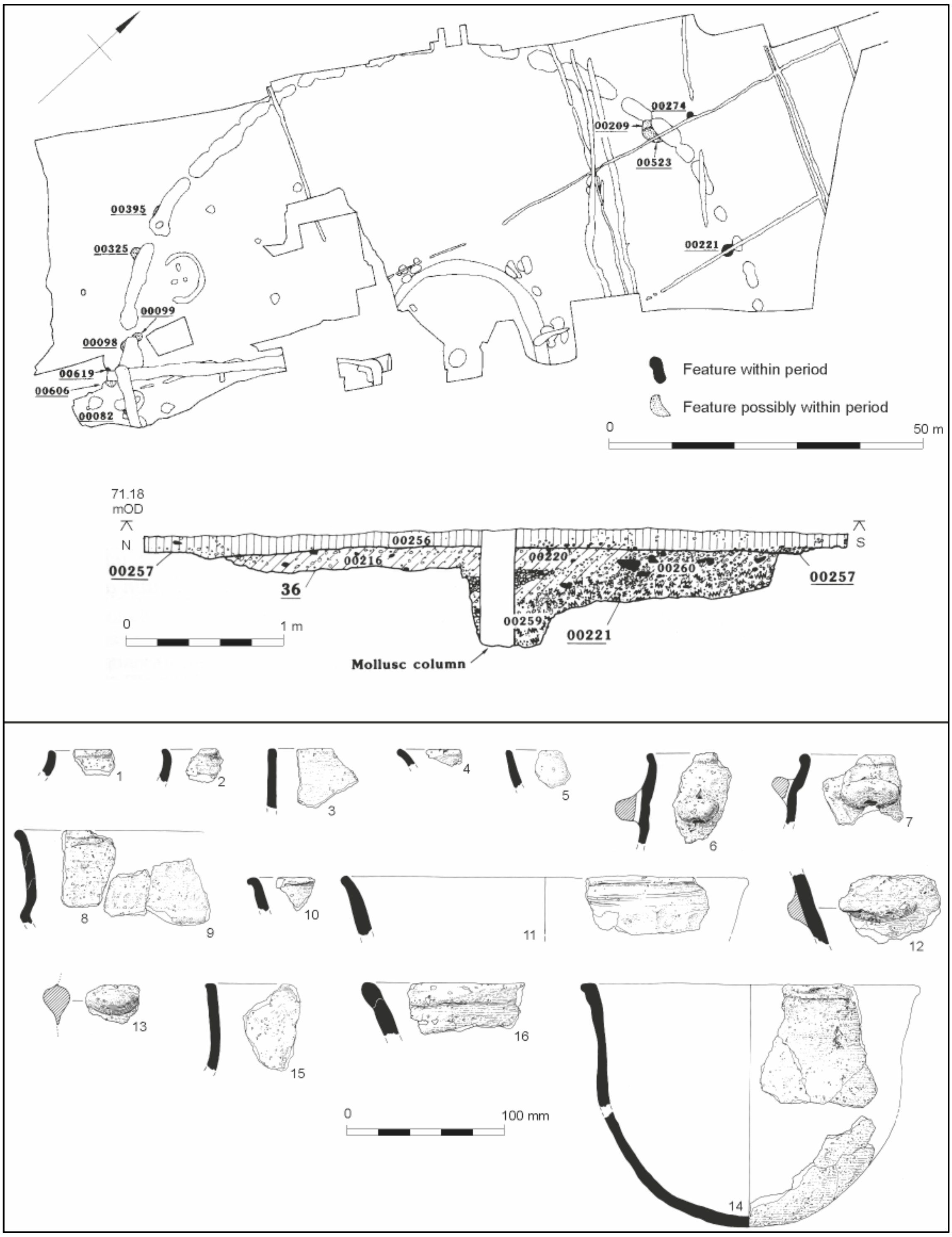


Figure 11: Plan and section of the Flagstones pre-enclosure pit 00221 (note irregular profile and fills). Selected pottery from pits 00221 and 00274 (after Cleal 1997). The pottery mostly belongs to a developed phase of the South-Western style but includes fragments from one or more Carinated Bowls (Nos 8/9, 15).

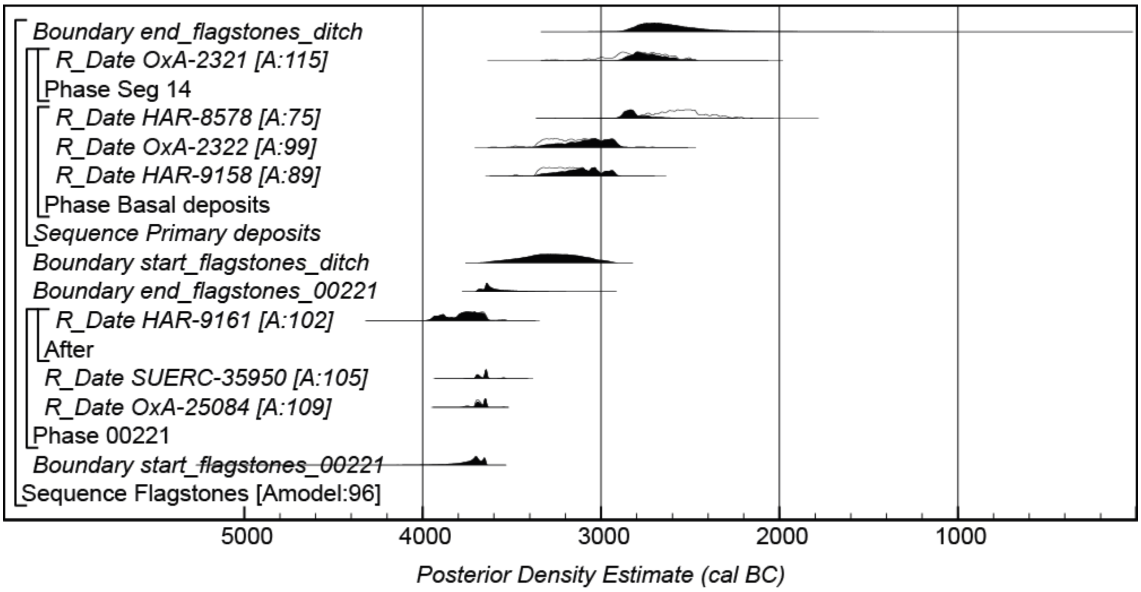


Figure 12: Probability distributions of dates from the pre-enclosure pit 00221 at Flagstones. The format is identical to that shown in Figure 6.

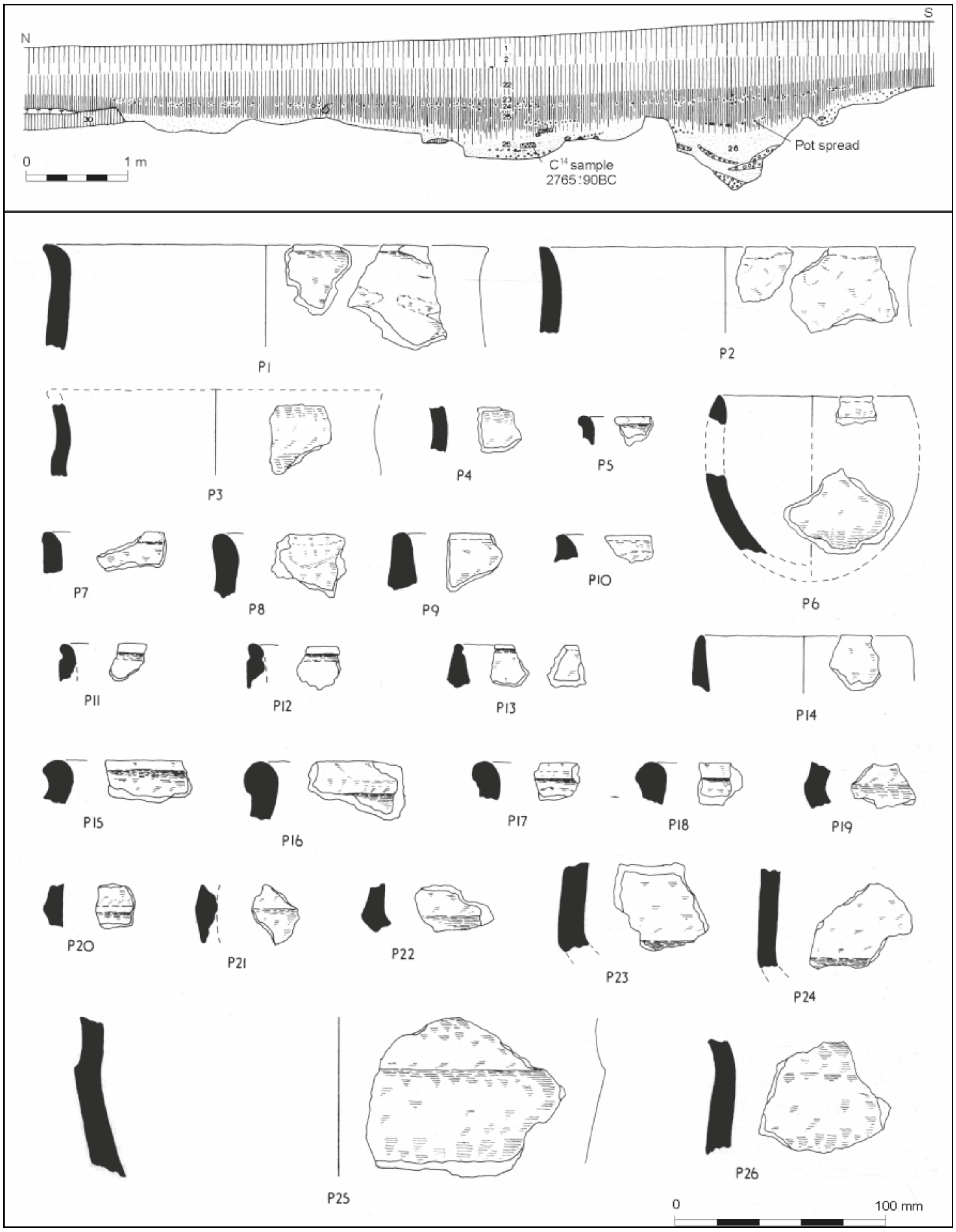


Figure 13: Cherhill near Avebury. Section of ditch I. Selected pottery (after Smith 1983). The pottery is in the South-Western style and typologically belongs to the developed Carinated Bowl phase. It includes a number of thick-walled carinated vessels along with some heavy rim forms.

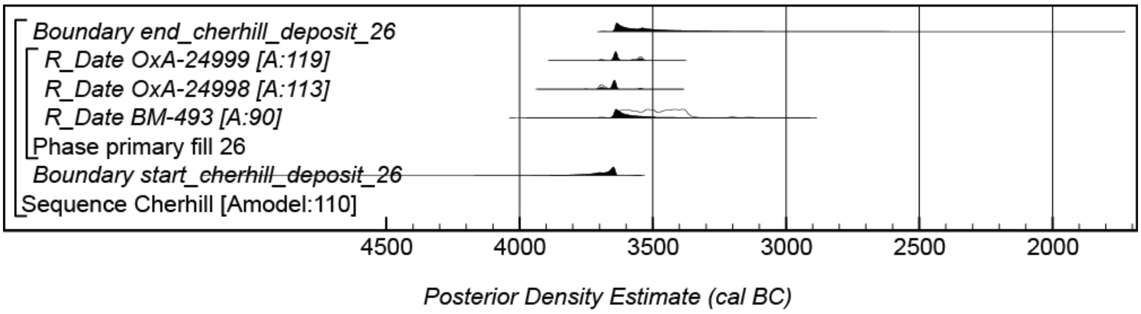


Figure 14: Probability distributions of dates from ditch I, Cherhill. The format is identical to that shown in Figure 6

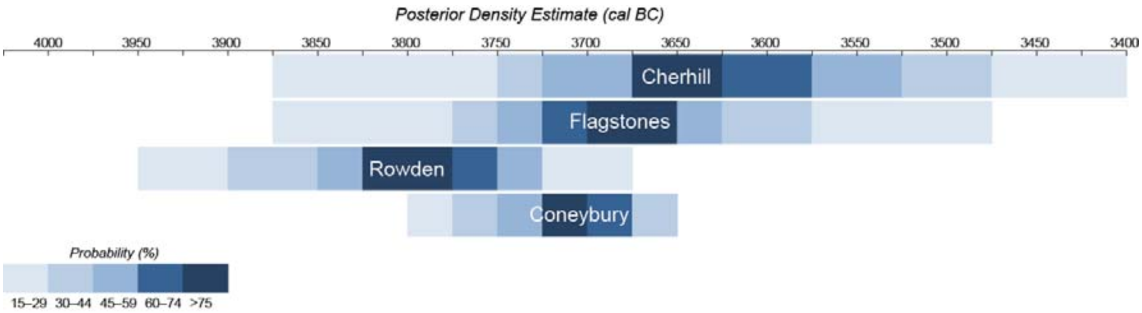


Figure 15: Schematic diagram showing the currency of dated ceramics at Rowden, the Coneybury Anomaly, Cherhill and Flagstones

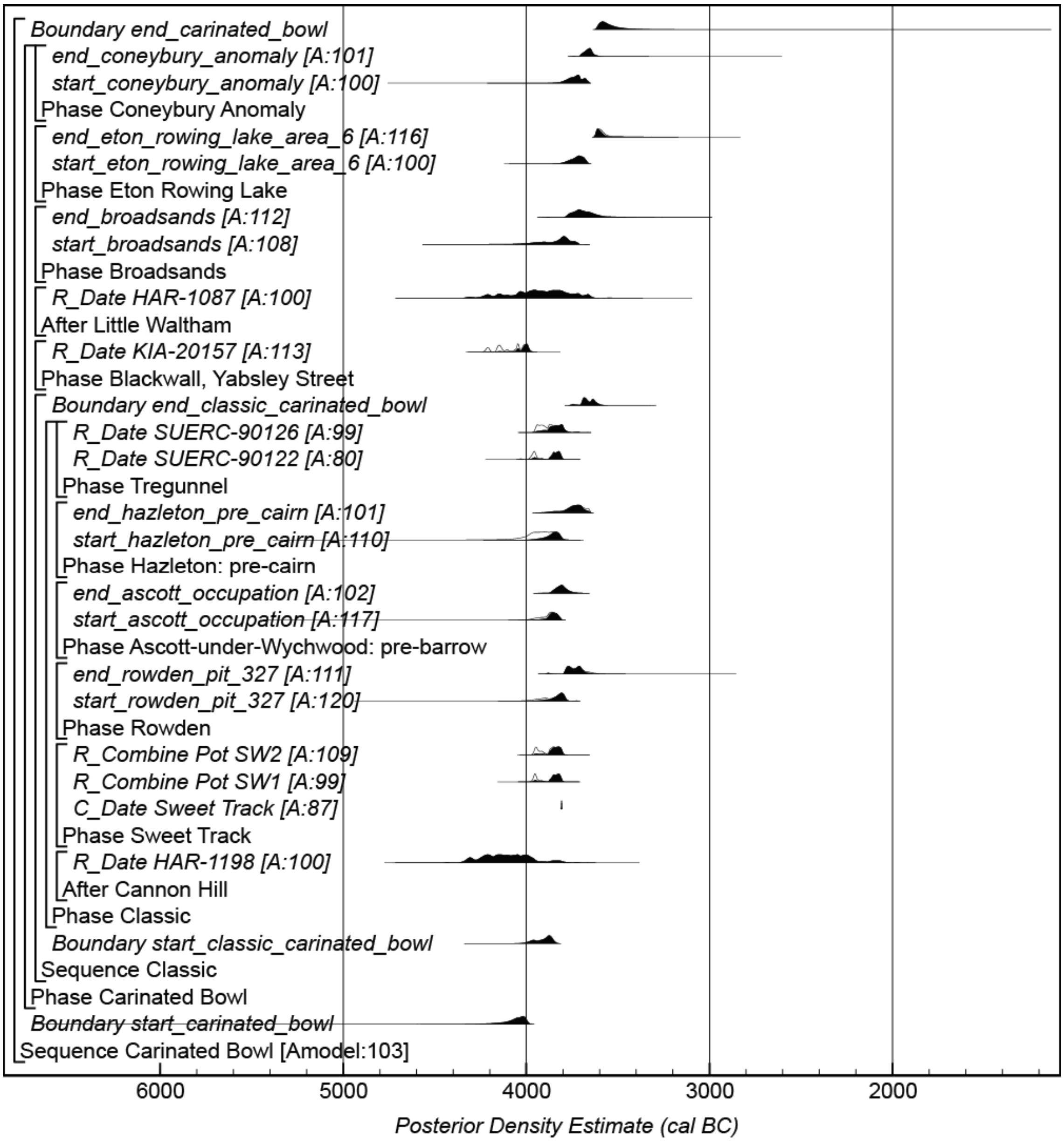


Figure 16: Probability distribution of dates associated with Carinated Bowl. The format is identical to Figure 6. Distributions have been taken from the models defined in Figure 7 (Rowden) and Figure 10 (Coneybury Anomaly), and by Bayliss et al *2007a (figs 3 and 5–7; Ascott-under-Wychwood), Meadows* et al *2007 (figs 6–9; Hazleton), Sheridan* et al *2008 (fig 5; Broadsands), and Allen* et al *2008 (fig 5.72; Eton Rowing Lake) recalculated using IntCa20 (Reimer* et al *2020). Details of the radiocarbon dates for the Sweet Track are given in Casanova* et al *(2020, table 1); the dates published in Berstan* et al *(2008) have been excluded as the more recent lipid dating demonstrates that these dates are inaccurate*

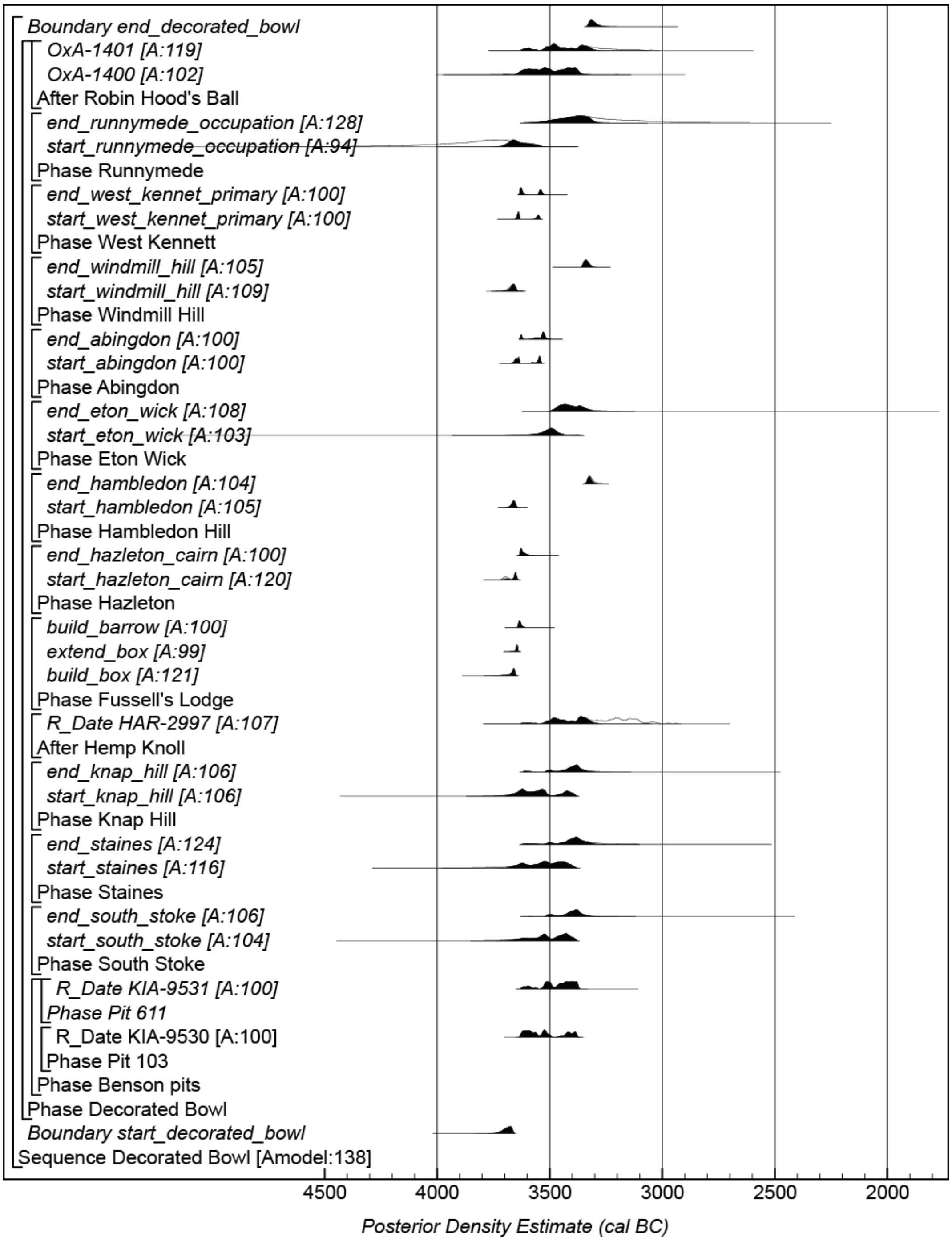


Figure 17: Probability distribution of dates associated with Decorated Bowl. The distributions have been taken from the models defined by Whittle et al *2011 (fig 3.25; Knap Hill; figs 4.7–4.13; Hambledon Hill; fig 8.5; Eton Wick; figs 8.18–8.21; Abingdon; figs 3.8–3.11; Windmill Hill; fig 8.3; Staines; fig 8.28; South Stoke; fig 8.6; Runnymede; and fig 4.51; Robin Hood's Ball), Wysocki* et al *2007 (fig 10; Fussell's Lodge), Meadows* et al *2007 (figs 6–9; Hazleton), and Bayliss* et al *2007b (fig 6; West Kennet), recalculated using IntCa20 (Reimer* et al *2020). Details of the radiocarbon dates for Hemp Knoll and Benson are given in Whittle* et al *(2011, tables 3.4 and 8.6)*

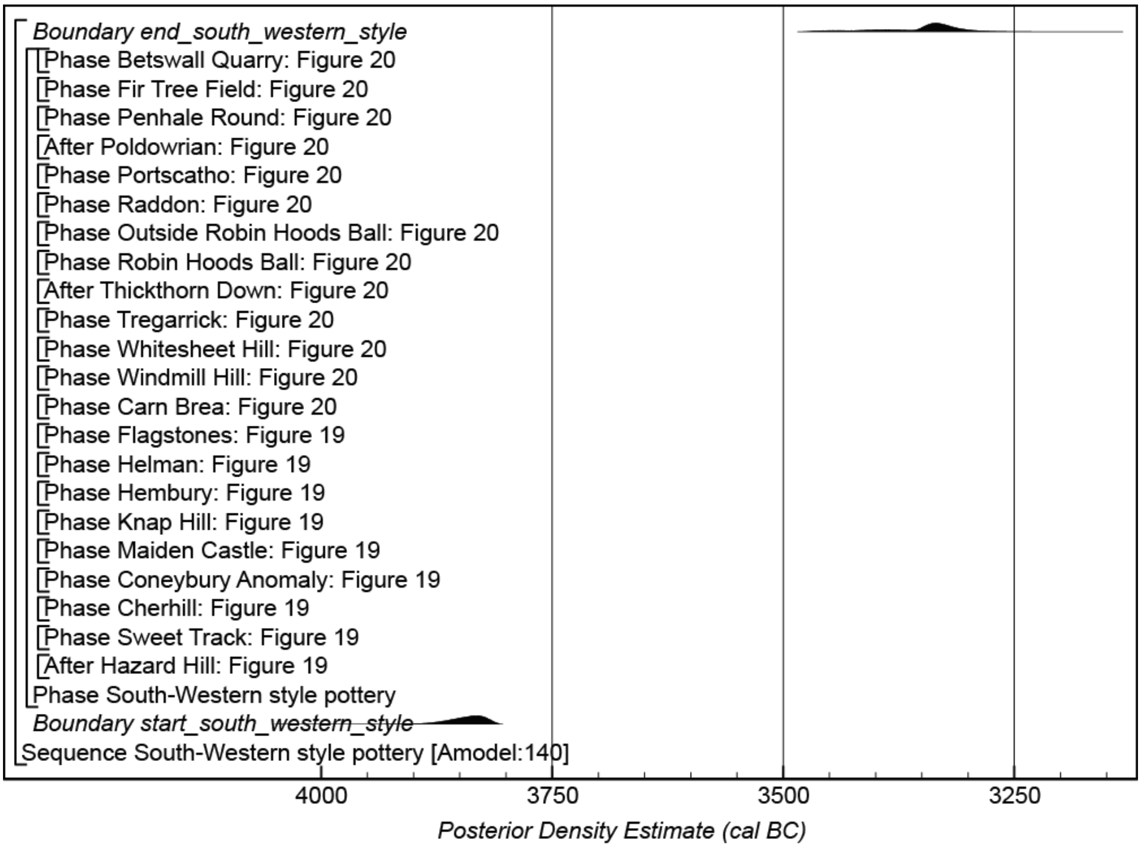


Figure 18: Overall structure of the chronological model for the currency of South-Western style pottery. The component sections of this model are shown in detail in Figures 19 and 20. The large square brackets down the left-hand side of the figures along with the OxCal keywords, define the model exactly

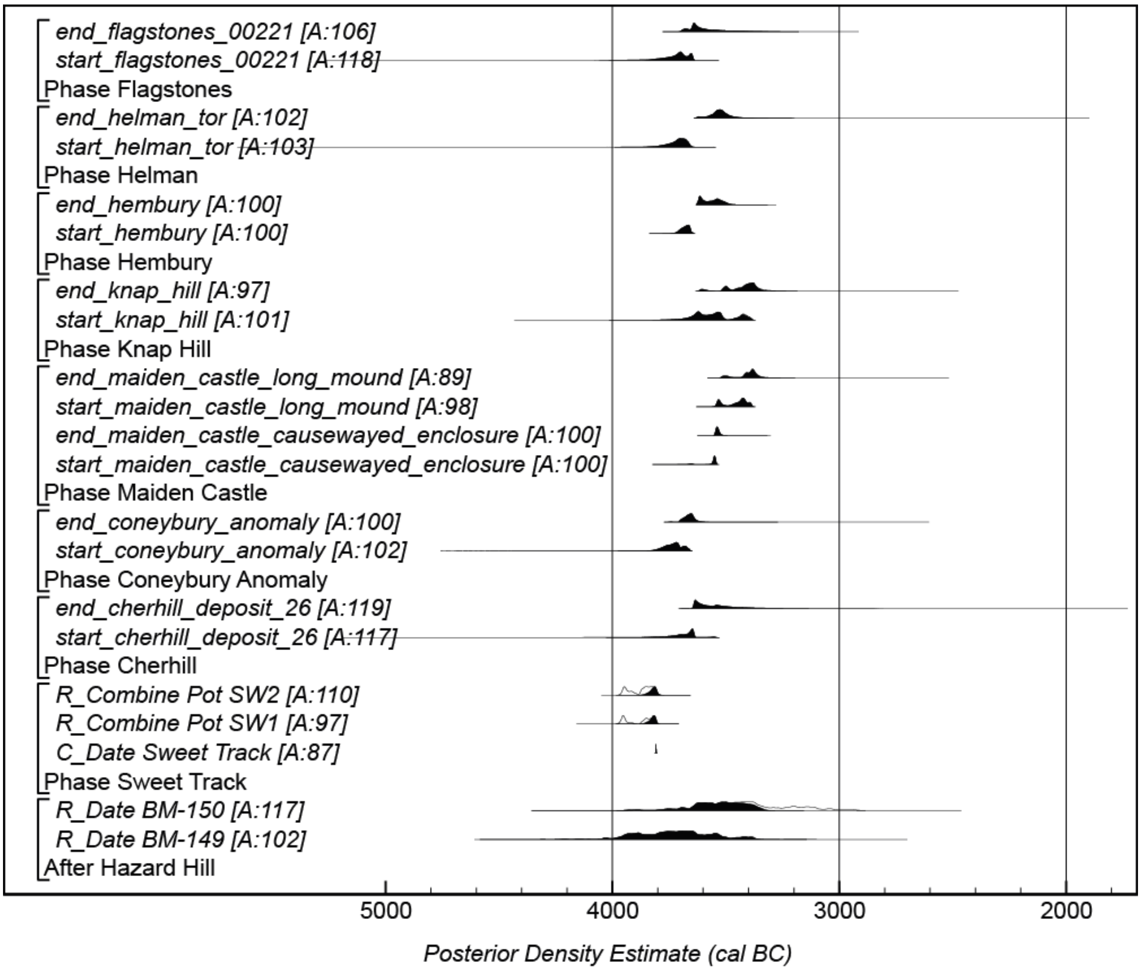


Figure 19: Probability distribution of dates associated with South Western style pottery. The distributions have been taken from the models defined in Figure 14 (Cherhill), Figure 10 (Coneybury Anomaly), and Figure 12 (Flagstones) by Greaney et al *2020 (figs S1.a–d; Maiden Castle) and by Whittle* et al *2011 (fig 3.25; Knap Hill; figs 10.9–10.12; Hembury; and fig 10.22; Helman Tor), recalculated using IntCa20 (Reimer* et al *2020). The overall structure of this model is shown in Figure 18 and its other component in Figure 20*

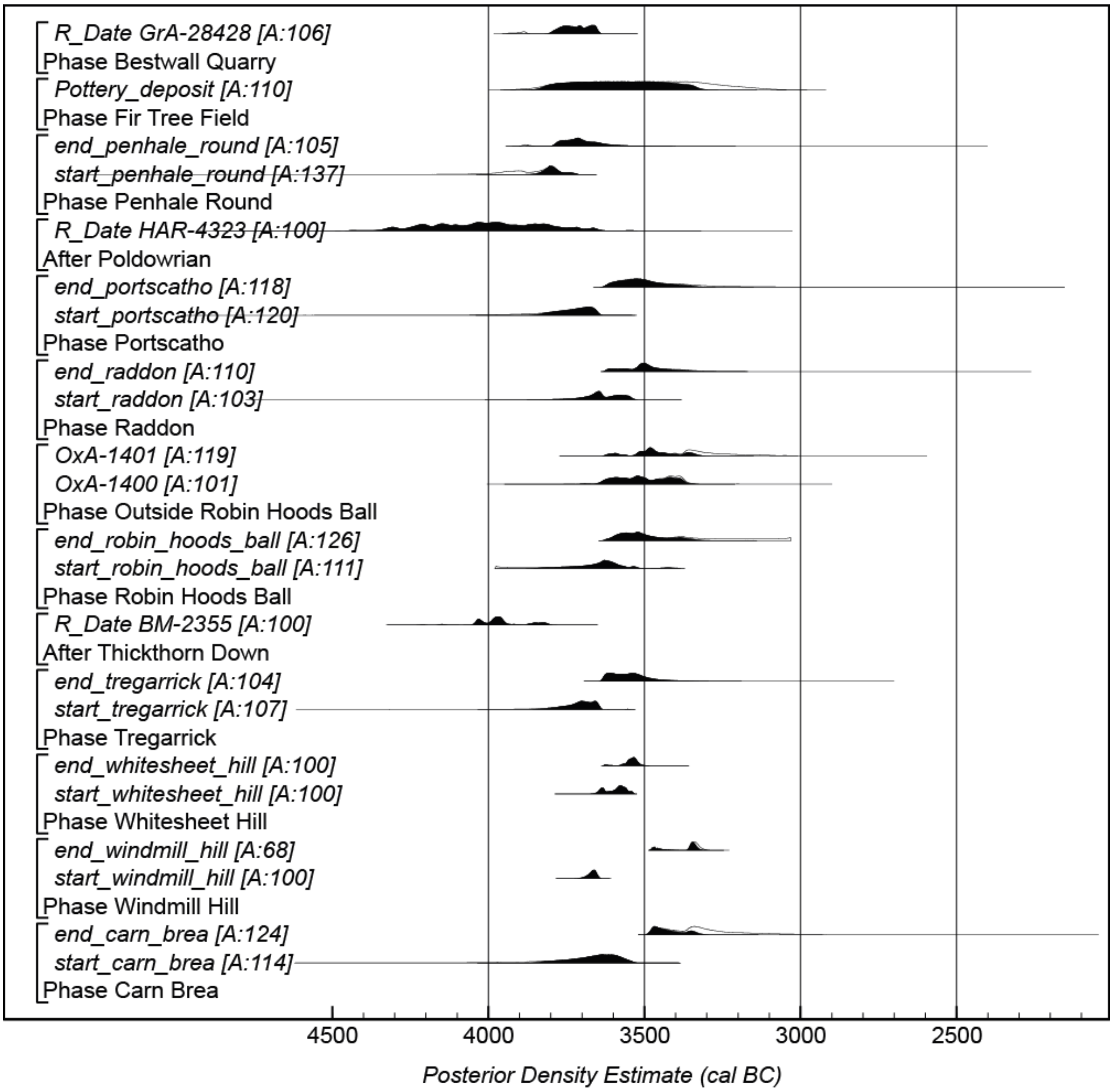


Figure 20: Probability distribution of dates associated with South Western style pottery. The distributions have been taken from the models defined by Nowakowski and Johns 2015 (fig 3.11a; Penhale Round) and Whittle et al 2011 (fig 2.21;Fir Tree Field; fig 10.25; Carn Brea; figs 3.8–3.11; Windmill Hill, fig 4.26; Whitesheet Hill, fig 14.103; Tregarrick and Portscatho; fig 14.103 Robin Hood's Ball, fig 10.16; Raddon; and fig 3.25; Knap Hill), recalculated using IntCa20 (Reimer et al *2020). The overall structure of this model is shown in Figure 18 and its other component in Figure 19*

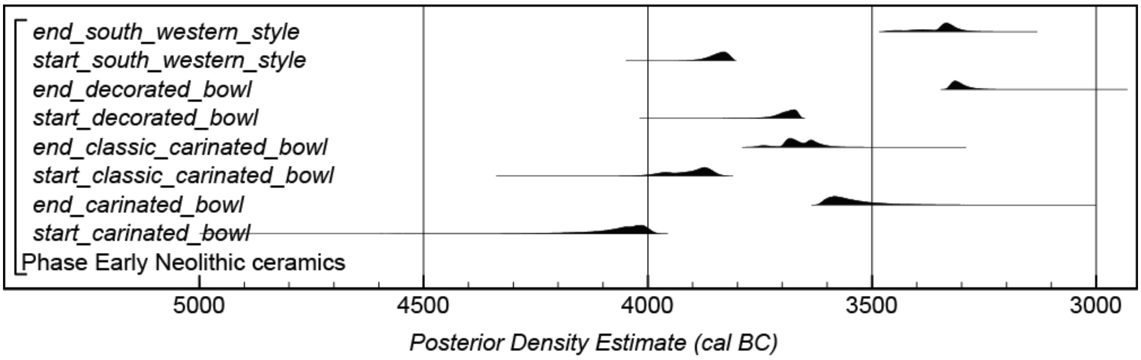


Figure 21: Probability distributions for the beginnings and endings of use of different types of early Neolithic ceramics in southern Britain. The distributions are derived from the models defined in Figures 16–20. The format is identical to Figure 6, although the tails on some distributions have been shortened

TABLES

Table 1: Radiocarbon and stable isotope measurements from Rowden (Pasture) Site A pit 327 and post-pit

Laboratory Number	Sample, material and context	Radiocarbon Age (BP)	$\delta^{13}C$ (‰)	$\delta^{15}N$ (‰)	C/N ratio
HAR-5245	RD82287 Unidentified bulk charcoal from pipe fill 287. Charcoal from the context comprised *Quercus* sp., *Corylus* sp., *Fraxinus* sp. and Pomoideae (Woodward 1991, 43)	4970±45	−26.5		
HAR-5246	RD82523 Unidentified bulk charcoal from layer 523	5250±140	−26.3		
HAR-5247	RD82571 Unidentified bulk charcoal from layer 571. Undated remainder includes *Quercus* sp. sapwood and heartwood (30%), Pomoideae (29%), *Fraxinus* sp. (22%), *Corylus* sp. (19%), and unidentified (Whittle *et al* 2011, table 4.11)	4940±70	−26.7		
HAR-5248	RD82634 Unidentified bulk charcoal from primary fill 634. Undated remainder includes *Quercus* sp. (77%), *Corylus* sp. (14%), *Fraxinus* sp. (9%), and unidentified (Whittle *et al* 2011, table 4.11)	4860±70	−26.5		
OxA-24985	W4 1984 560 AB2 Animal bone. Pig, two articulating phalanges. Possibly same animal as 634 from upper most primary fill	5031±32	−20.1±0.2	7.0±0.2	3.2
OxA-25000	W4 1984 560 CH Charcoal. *Corylus avellana* from upper most primary fill	4974±30	−23.9±0.2		
OxA-25001	W4 1984 628 CH5 (2) Charcoal. *Corylus avellana* from layer above basal fill	5032±29	−25.3±0.2		
OxA-25085	W4 1984 327 VESG (1) Carbonised residue adhering to interior of pottery sherd, from pit 327, layer unknown	5095±34	−27.1±0.2		
SUERC-35955	W4 1984 560 CH8 Charcoal. Pomoideae, from upper most primary fill	5005±30	−26.3±0.2		
SUERC-35956	W4 1984 628 CH5 (1)	5020±30	−23.2±0.2		

Laboratory Number	Sample, material and context	Radiocarbon Age (BP)	$\delta^{13}C$ (‰)	$\delta^{15}N$ (‰)	C/N ratio
	Charcoal. *Corylus avellana* from layer above basal fill				
GU-24796	W4 1984 327 VES C (b) Carbonised residue adhering to interior of pottery sherd, from pit 327, layer unknown	Failed			
GU-24797	W4 1984 327 VES G (2) Carbonised residue adhering to interior of pottery sherd, from pit 327, layer unknown	Failed			
SUERC-35957	W4 1984 628 CH6 Carbonised grain *Triticum spelta/dicoccum*, from layer above basal fill	4960±30	−22.7±0.2		

Table 2: Radiocarbon and stable isotope measurements from the Coneybury Anomaly. Replicate measurements have been tested for statistical consistency and combined by taking a weighted mean before calibration as described by Ward and Wilson (1978; T′(5%)=3.8, ν=1).

Laboratory Number	Sample, material and context	Radiocarbon Age (BP)	$\delta^{13}C$ (‰)	$\delta^{15}N$ (‰)	C/N ratio
OxA-1402	W2 1981, IL, 2538, 420 Animal bone. Cattle from primary pit fill	5050±100	−21.0*		
OxA-24986	W2 1981 ON169 AB5 Antler. Red deer from primary pit fill. Fragment from beam modified as a pick	4925±30	−21.4±0.2	3.7±0.3	3.2
OxA-24987	W2 1981 ON521 AB8 (1) Animal bone. Roe deer, articulating 1st and 2nd phalanges from primary pit fill	4941±32	−23.4±0.2	4.7±0.3	3.2
SUERC-35960	Replicate of OxA-24987	4900±30	−23.7±0.2	4.8±0.3	3.2
521 roe deer AB8; ^{14}C: 4919±22 BP T′=0.9; $\delta^{13}C$: −23.55±0.14, T′=1.1; $\delta^{15}N$ 4.75±0.21; T′=0.1					
OxA-24988	W2 1981 ctx2538 AB6/7b Animal bone. Cattle from primary pit fill. Two first phalanges with fitting unfused epiphyses articulating with distal metatarsal shaft from a neonate	4952±32	−22.0±0.2	4.0±0.3	3.3
OxA-24989	Replicate of OxA-24988	4997±31	−22.0±0.2	3.7±0.3	3.2
Cattle AB6/7b; ^{14}C: 4975±23 BP; T′=1.0; $\delta^{13}C$: −22.0±0.14, T′=0.0; $\delta^{15}N$ 3.9±0.21; T′=2.8					
OxA-25086	W2 1981 ctx2247 ON365 Carbonised residue adhering to interior of pottery sherd, from the primary pit fill	4966±31	−26.1±0.2		
OxA-25087	W2 1981 ctx2247 ON475 Carbonised residue adhering to interior of pottery sherd, from the primary pit fill	5003±30	−25.9±0.2		
SUERC-35958	W2 1981 ctx 2538 ON1213 a+b Carbonised residue adhering to interior of pottery sherd, from the primary pit fill. Two refitting sherds (a+b) with internal charred residue	4905±30	−25.8±0.2		
SUERC-35959	W2 1981 ctx2538 AB9 Animal bone. Beaver, immature. Rib and radius shaft, from the primary pit fill	5135±30	−23.5±0.2	5.8±0.3	3.2
OxA-25766	Replicate of SUERC-35959	5149±32	−23.2±0.2	6.1±0.3	3.1
Beaver bone: ^{14}C; 5142±22 BP, T′=0.1; $\delta^{13}C$: −23.35±0.14, T′=1.1; $\delta^{15}N$ 5.95±0.21; T′=1.1					
SUERC-35964	W2 1981 ctx2538 AB6/7a Animal bone. Mature adult cattle phalanx articulating with other phalanges, from the primary pit fill	4905±30	−22.3±0.2	4.6±0.3	3.3

* = assumed value

Table 3: Radiocarbon and stable isotope measurements from Flagstones (Site 3).

Laboratory Number	Sample, material and context	Radiocarbon Age (BP)	δ13C (‰)
HAR-9161	18325989 Charcoal. Oak bulk sample from the basal fill of pit 00221	4960±80	−26.0
HAR-9158	18341731 Human bone. Skeleton 2–3 year-old child. Child burial beneath stone slab at base of segment 19 of enclosure ditch 00399	4490±70	−23.0
OxA-2322	581 92 Red deer antler pick from the base of segment 27 of enclosure ditch 00399	4450±90	−24.1
OxA-2321	364 76 Human bone. Right femur. Child burial on base of pit 00363, cut into bottom *c* 700mm of fill of segment 14 of enclosure ditch 00399	4210±110	−23.0
HAR-8578	18338244 Red deer antler beam from the base of segment 13 of enclosure 00399	4030±100	−23.6
OxA-25084	W137 1988 00259 45 CH9 (2) Charcoal. *Corylus avellana*, from the primary pit fill	4901±32	−27.7±0.2
SUERC-35950	W183 1988 00259 45 CH9 (1) Charcoal. *Corylus avellana*, from the primary pit fill	4875±30	−24.9±0.2
SUERC-35954	W183 1988 00259 416 CH11 Carbonised cereal grain. *Triticum aestivum type*	150±30	−23.4±0.2

Table 4: Radiocarbon and stable isotope measurements from Cherhill

Laboratory Number	Sample, material and context	Radiocarbon Age (BP)	δ13C (‰)
BM-493	Layer 26 Charred wood hazel (*Corylus*), from the primary fill of ditch I	4715±90	NM
OxA-24998	CH67 0N1439 Carbonised residue adhering to interior of pottery sherd from the primary fill of ditch I	4880±30	−27.0±0.2
OxA-24999	CH67 ON23a (1) Carbonised residue adhering to interior of pottery sherd from the primary fill of ditch I	4846±31	−27.0±0.2
GU-24791	CH67 ON23a (2) Carbonised residue adhering to interior of pottery sherd from the primary fill of ditch I	Failed	

NM = not measured

Table 5: Details of radiocarbon measurements, laboratory pre-treatment, measurement, and reporting

Laboratory	Laboratory numbers	Material	Samples	Pre-treatment	Measurement and reporting
Scottish Universities Environmental Research Centre	SUERC-35950, SUERC-35954–SUERC-35957	Charcoal	1	Acid-base-acid	Combusted to carbon dioxide Vandeputte *et al* (1996), graphitised (Slota *et al* 1987); dated by Accelerator Mass Spectrometry as described by Xu *et al* (2004) and Freeman *et al* (2007).
	SUERC-35960, 35964 and 35959	Bone	3	Light mechanical cleaning or, if consolidant or other contaminant suspected, surface sanding followed by base wash if humic acid contamination suspected, followed by collagen extraction as described by Longin (1971)	
	SUERC-35958	Carbonised residue	1	Acid-base-acid	
Oxford Radiocarbon Accelerator Unit	OxA-1402	Bone	1	Prepared as described by Gillespie *et al* (1984; 1986)	Combusted to produce carbon dioxide (Hedges *et al* 1992), placed into the carbon dioxide ion source in the AMS and dated (Gillespie *et al* 1983; Hedges 1981)
	OxA-25084, and -25000–25001	Charcoal	3	Acid-base-acid (Brock *et al* 2010, 104, 107)	Combusted to carbon dioxide and graphitised as described by Brock *et al* (2010, 110) and dated by Accelerator Mass Spectrometry as described by Bronk Ramsey *et al* (2004)
	OxA-24986	Antler	1	Acid-base-acid wash followed by gelatinisation (Longin 1971) and ultrafiltration (Brown *et al* 1988); preceded by solvent extraction where consolidants or other chemical contaminants are suspected Brock *et al* 2010, 106–7)	
	OxA-24985, 24987–24989	Bone	4		
	OxA-25085–25087, and 24998–24999	Carbonised residue	3	Sequence of demineralization with 1M HCl; ultrasonication in fresh 1M HCl; rinsing in ultrapure; ultrasonication in fresh ultrapure water; acidification in 1M HCl; rinsing in ultrapure water (Brock *et al* 2010, 108)	
British Museum	BM-493		1	Samples were pre-treated for the removal of contaminants, with dilute hydrochloric acid and,	Ages not corrected for fractionation, although

Laboratory	Laboratory numbers	Material	Samples	Pre-treatment	Measurement and reporting
				where appropriate dilute alkali also (Barker *et al* 1971). Liquid Scintillation Counting of benzene (Barker *et al* 1969a; 1969b)	reported error includes ±80 for fractionation without the ±100 for the 'de Vries effect' previously used in addition to the counting errors (Barker *et al* 1969b, 279)
AERE Harwell	HAR-5246	Charcoal	1	pretreated using the standard acid-base-acid protocol (Otlet and Slade 1974)	Dated by minature gas proportional countind as described by Otlet and Warchal (1978), Otlet and Evans (1983), and Otlet *et al* (1983; 1986)
	HAR-5245, HAR-5247–8, and HAR-9161	Charcoal	4		Dated by liquid scintillation counting as described by Otlet (1977; 1979), Otlet and Warchal (1978) and Tamers (1965)

Table 6: Targeted assemblages from the original study showing the degree to which the sample-hunt succeeded

Assemblage	Context	Typological characterisation	Quantification(Vessels and sherds numbers where quantified)	Identified charred food residue	Comment	Other sample material	Reference
Cannon Hill, Maidenhead, Berkshire	Occupation layer within natural solution hollow	Classic Carinated Bowl	Ten vessels	None	No potential for this type of dating	None	Bradley *et al* 1976, 12–15; Herne 1988, 17
Staines Road Farm, Shepperton, Surrey	Occupation materials within ring ditch	Developed Carinated Bowl/Plain Bowl and some Peterborough Ware	1180 sherds, 8.3kg 112 vessels including Peterborough Ware	A single example on a Peterborough Ware vessel	No potential for this type of dating	None	Jones 2008, 24–32
Cherhill, Wiltshire	Occupation deposits within ditch-like feature	Plain Bowl and Peterborough Ware South-Western and/or developed Carinated Bowl	210 sherds, 23 vessels (excluding Peterborough Ware)	Six sherds including Peterborough Ware	Limited potential	None	Smith 1983, 84–6; Barclay and Case 2007
Coneybury Anomaly, Wiltshire	Large pit deposit	Developed Carinated Bowl/South-Western style	1744 sherds, 16.182kg 41 vessels	On six sherds		Good animal bone including articulations	Cleal 1990
Roughridge Hill, Wiltshire	Multiple pits	Classic Carinated Bowl and other forms more typical of plain bowl assemblages, notably some	-	None	No potential for this type of dating	Not located	Pollard 1993

Assemblage	Context	Typological characterisation	Quantification(Vessels and sherds numbers where quantified)	Identified charred food residue	Comment	Other sample material	Reference
		vessels have a black finish reminiscent of South-Western style					
Rowden, Dorset	Large pit deposit	Classic Carinated Bowl	644 sherds, 8.7kg 9 vessels	On three vessels		Some animal bone, cereal, good short-lived carbonised plant remains/charcoal	Davies *et al* 1991, 98–9
Flagstones, Dorset	Pits 00274 and 00221	Mixed assemblage of Carinated Bowl and South-Western style	252 sherds , 2.0kg 13 vessels (NB sherds from same vessel occur in both pits)	None		Some cereal, good short-lived carbonised plant remains/charcoal	Cleal 1997, 86–100

Table 7: Key parameters for the currency of assemblages from Cherhill, Flagstones, the Coneybury Anomaly and Rowden

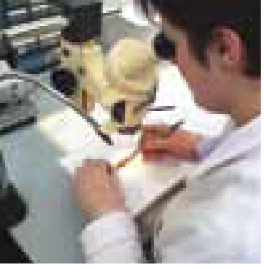
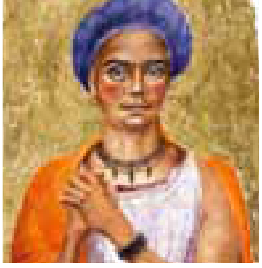
Site	*Parameter*	*Posterior Density Estimate (cal BC)*		Pottery
		95% probability	*68% probability*	
Cherhill	*start_cherhill_deposit_26*	*4160–3535*	*3760–3635*	Non typical South-Western style (Smith 1983, 91). Original report noted the high number of carinated sherds
	end_cherhill_deposit_26	*3655–2980*	*3650–34602*	
Flagstones	*start_flagstones_0021*	*4095–3635*	*3770–3640*	South-Western style (Cleal 1997, 89) One vessel stands out as classic Carinated Bowl type. Possibly mixed
	end_flagstones_0021	*3705–3330*	*3695–3560*	
Coneybury Anomaly	*start_coneybury_anomaly*	*3815–3655*	*3775–3700 (59%)* or *3690–3670 (9%)*	South-western style (Cleal 1990, 53). However, not typical (Ros Cleal pers comm). Not included by Herne (1988) but widely considered to be Carinated Bowl
	end_coneybury_anomaly	*3710–3605*	*3685–3640*	
Rowden	*start_rowden_pit_327*	*4005–3770*	*3915–3880 (10%)* or *3865–3780 (58%)*	South-Western style (Davies *et al* 1991, 98). Re-assessment as a classic Carinated Bowl assemblage
	end_rowden_pit_327	*3890–3865 (2%)* or *3800–3600 (93%)*	*3785–3690*	

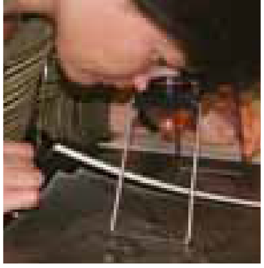
Table 8: Key parameters for the currency of early Neolithic ceramics

	Highest Posterior Density Interval: cal BC	
	95% probability	*68% probability*
start_carinated_bowl	*4245–3975*	*4095–3990*
end_carinated_bowl	*3625–3395*	*3615–3525*
start_classic_carinated_bowl	*4005–3835*	*3970–3950 (7%)* or *3930–3850 (61%)*
end_classic_carinated_bowl	*3760–3585*	*3700–3620*
start_south_western_style	*3890–3805*	*3860–3815*
end_south_western_style	*3465–3285*	*4000–3375 (7%)* or *3360–3300 (61%)*
start_decorated_bowl	*3740*–3655	*3705*–3665
end_decorated_bowl	*3340–3260*	*3330*–3295

Table 9: Percentage probabilities of the relative order for the beginnings of use of class Carinated Bowl. The cells show the probability of the distribution on the left-hand column being earlier than the distribution on the top row. For example, the probability that start_ascott_occupation *is earlier than* start_hazleton_pre-cairn *is 51%*

	start_rowden_pit_327	*start_ascott_occupation*	*start_hazleton_pre_cairn*	*Sweet_Track*
start_rowden_pit_327		24.7	26.8	68.4
start_ascott_occupation	75.3		51.0	99.5
start_hazleton_pre_cairn	73.2	49.0		96.2
Sweet_Track	31.6	0.5	3.8	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