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Towards a sequence for Neolithic ceramics in the Milfield Basin and Northumberland

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SUMMARY

In the past thirty years, fieldwork in the Milfield Basin has revealed increasing evidence for Neolithic activity. This paper draws together all the available radiocarbon dates associated with Neolithic and Beaker period ceramics, together with a new analysis of the Neolithic and Beaker period pottery of the region. The findings provide the beginnings of a dated ceramic sequence for the area between Yorkshire and Scotland, whilst also tying in the ceramic chronology with the wider national picture. In addition, we highlight the identification of Beaker period ceramics derived from preceding indigenous Neolithic forms, but that are not Beaker pottery. We have termed these ceramics 'Neolithic derivative', and we view this material as filling the gap, and providing the typological link, between later Neolithic ceramics and Early Bronze Age ceramics such as Food Vessels and Urns.

INTRODUCTION

The ceramic assemblage typologies for the Neolithic and Early Bronze Age in Northumberland have been called into question in recent decades (e.g. Ferrell 1990; Gibson 2002a; Johnson and Waddington 2008; Miket *et al.* 2008). Disagreements have been caused by a paucity of certain ceramic types (e.g. Grooved Ware) and by a lack of reliable absolute radiocarbon dates. In response to this, the pottery from the Milfield Basin has been re-evaluated, and a significant number of new radiocarbon dates have been obtained and modelled. This has resulted in not only the establishment of a preliminary chronology and more detailed understanding of ceramic form and fabric, but also the identification of a tradition of ceramics, sometimes called 'domestic Beaker', that dates to the Beaker period, but is clearly separate from the imported Beaker tradition. It is this type of pottery, termed here 'Neolithic derivative', that is thought could form the link between later Neolithic ceramic forms and Early Bronze Age Food Vessels.

A NEOLITHIC CERAMIC CHRONOLOGY

In order to establish a more precise chronology for Neolithic ceramics in the Milfield Basin and its environs, a programme of scientific dating at various sites has been undertaken by the authors (for full dating and discussion see contributions in Passmore and Waddington 2009; Passmore and Waddington in press) as well as dating at various sites by other archaeologists, including, in particular, Thirlings (Miket *et al.* 2008) and Wether Hill (Topping 2001; 2004). The dates are presented in the Appendix in a series of tables (Tables 1–8) and figures (figs. 1 and 3). A handful of radiocarbon dates from a few key sites outside the strict confines of

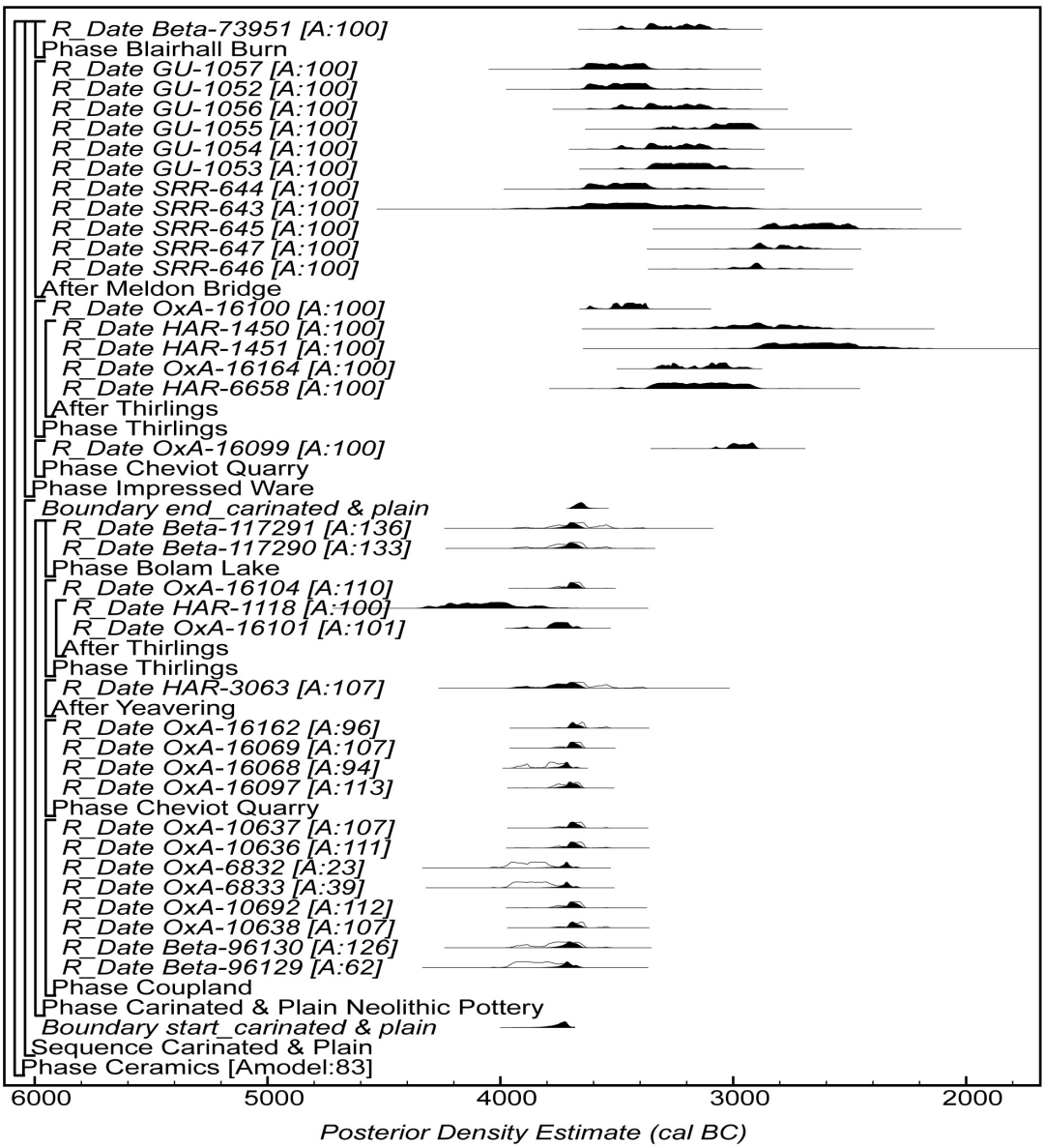

Fig. 1 Probability distributions of dates from Neolithic ceramics (independent or overlapping model). Each distribution represents the relative probability that an event occurs at a particular time. For each of the radiocarbon dates two distributions have been plotted, one in outline, which is the result of simple radiocarbon calibration, and a solid one, which is based on the chronological model used. Distributions other than those relating to particular samples correspond to aspects of the model. The distribution '*Boundary start*' is the estimated date for the start of use of Carinated and Plain Neolithic pottery. The large square brackets down the left-hand side, alongwith the OxCal keywords, define the model exactly.

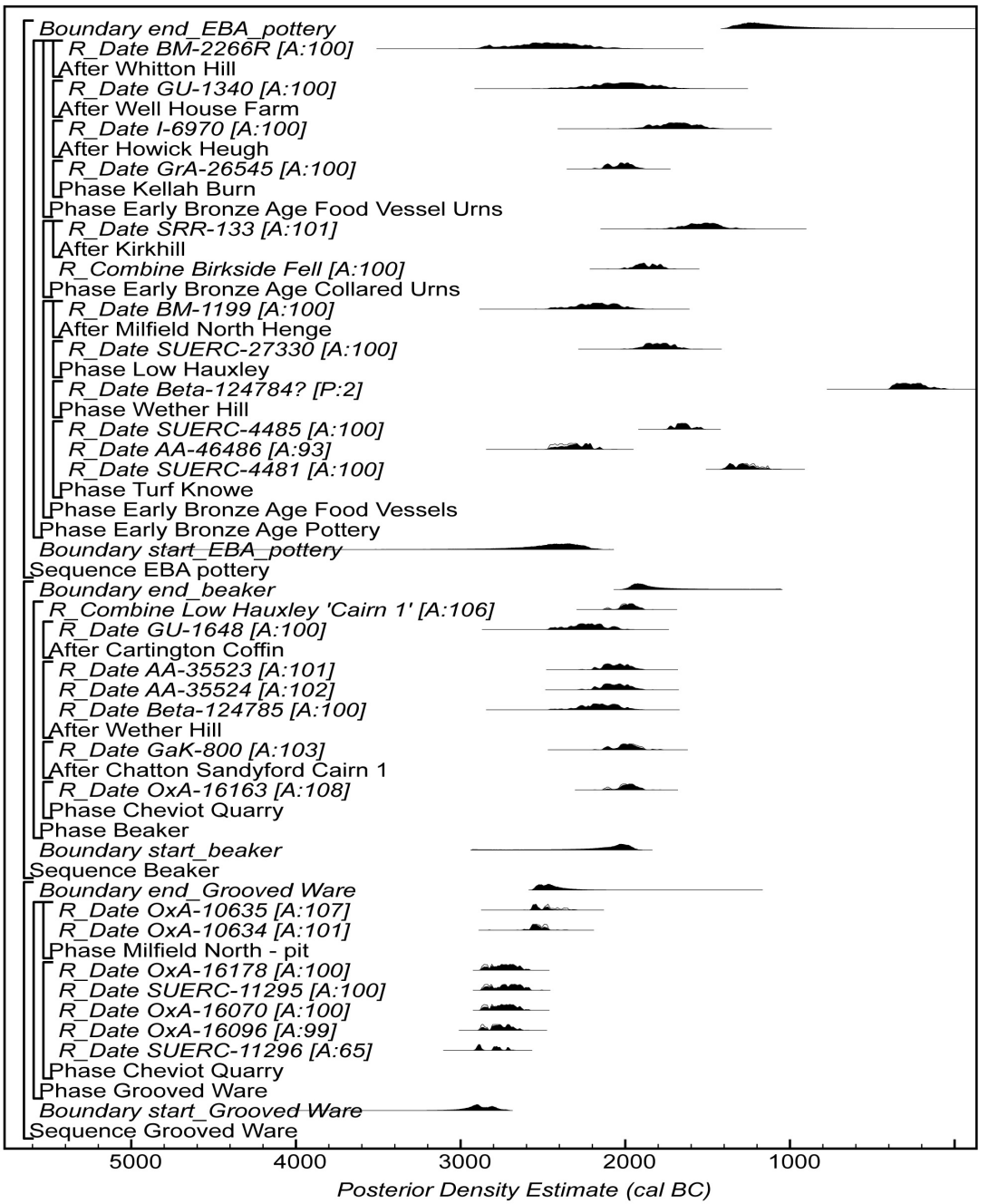

Fig. 1 Probability distributions of dates from Neolithic ceramics (continued)

Northumberland have been included in connection with the Impressed Ware dates as the site of Meldon Bridge, further up the Tweed valley, has the most comprehensive dating sequence associated with Impressed Ware in northern Britain.

The radiocarbon results are given in the Appendix in Tables 1–11, and are quoted in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986) and are conventional radiocarbon ages (Stuiver and Polach 1977).

Calibration

The calibrations of the results, relating the radiocarbon measurements directly to calendar dates, are given in the Appendix (Tables 1–8) and in outline in figs. 1 and 3. All have been calculated using the calibration curve of Reimer *et al.* (2004) and the computer program OxCal v4.0.5 (Bronk Ramsey 1995; 1998; 2001; 2009). The calibrated date ranges cited in the text are those for 95% confidence. They are quoted in the form recommended by Mook (1986), with the end-points rounded outwards to 10 years. The ranges quoted in italics are *posterior density estimates* derived from mathematical modelling of archaeological problems (see below). The ranges in plain type in Tables 1–8 have been calculated according to the maximum intercept method (Stuiver and Reimer 1986). All other ranges are derived from the probability method (Stuiver and Reimer 1993).

Methodological approach

A Bayesian approach has been adopted for the interpretation of the currency of ceramic types from the study area (Buck *et al.* 1996). Although the simple calibrated dates are accurate estimates of the dates of the samples, this is usually not what archaeologists really wish to know. It is the dates of the archaeological events, which are represented by those samples, which are of interest. Absolute dating information in the form of radiocarbon measurements can be combined with the relative information provided by archaeological context and associations to provide estimates for the dates of the activities.

Fortunately, methodology is now available which allows the combination of these different types of explicit information to produce realistic estimates of the dates of archaeological interest. It should be emphasised that the *posterior density estimates* produced by this modelling are not absolute. They are interpretative *estimates*, which can and will change as further data become available and as other researchers choose to model the existing data from different perspectives.

The technique used is a form of Markov Chain Monte Carlo sampling, and has been applied using the program OxCal v4.0.5 (http://c14.arch.ox.ac.uk/). Details of the algorithms employed by this program are available from the on-line manual or in Bronk Ramsey (1995; 1998; 2001; 2009). The algorithm used in the models described below can be derived from the structures shown in figs. 1 and 3.

The taphonomy of the samples that provided the measurements shown in figs. 1 and 3 has been interpreted as follows:

1. organic-rich material adhering to the interior of sherds, (i.e. food residues) dates the last use of the ceramic vessel;
2. short-lived material from 'single-event' or 'structured' deposits, associated with ceramics, dates the deposition of the ceramics;

3. unidentified or bulk charcoal that might not relate to the date of deposition of the ceramics, due to an age-at-death offset, only provide a *terminus post quem* for the ceramics from a context. [In the models (figs. 1 and 3) these can be identified by the use of the word 'After'];
4. bones not found in articulation, and charcoal not from 'single-event' deposits only provide a *terminus post quem* for the ceramics from a context because they are potentially residual.

The Ceramic Sequence

The major archaeological problem that has affected most previous attempts to provide precise dates for ceramic sequences, such as those from Danebury (Naylor and Smith 1988; Buck *et al.* 1992; Buck and Litton 1995), and for ceramic types, such as Peterborough Ware (Gibson and Kinnes 1997), has been the failure to fully appreciate the taphonomic relationship between the dated material and the 'associated' ceramic assemblage. For example, at Danebury, HAR-2581 is simply recorded as 'charcoal from P945 layer 1'. There is no reason to suggest any inherent association between the charcoal and ceramics from phase 1, beyond them both being in the same context. Clearly therefore the charcoal could be residual and also have an unknown age-at-death offset (Bowman 1990).

The advent of accelerator mass spectrometry (Linick *et al.* 1989) and the ability to directly date organic-rich material adhering to the interior of sherds, such as food residues (Hedges *et al.* 1992), overcomes this problem of archaeological interpretation. Although the dating of residues is not without its own problems (Hedges *et al.* 1992; Nakamura *et al.* 2001) these should be quantifiable.

Potential overlapping model

In order to see what inferences would be made about the start and end dates of the ceramic traditions we have constructed a model in which the traditions are not assumed to have abutted but that, rather, they were potentially overlapping (Buck *et al.* 1992; Naylor and Smith 1988). From this overlapping model it is possible to test whether the ceramic traditions are likely to be abutting or not. The results, showing good overall agreement (A_{model}=83%), are

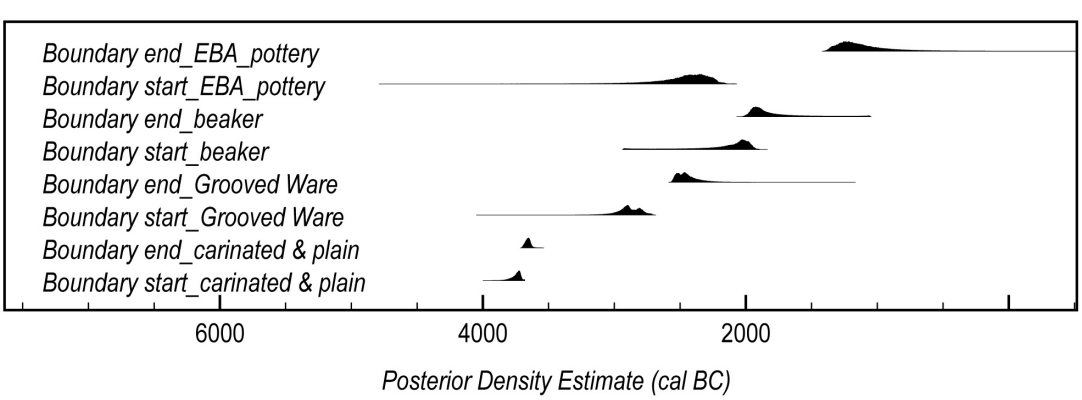

Fig. 2 Probability distribution of dates for the beginning and endings of ceramic traditions. The distributions are derived from the model shown in fig. 1.

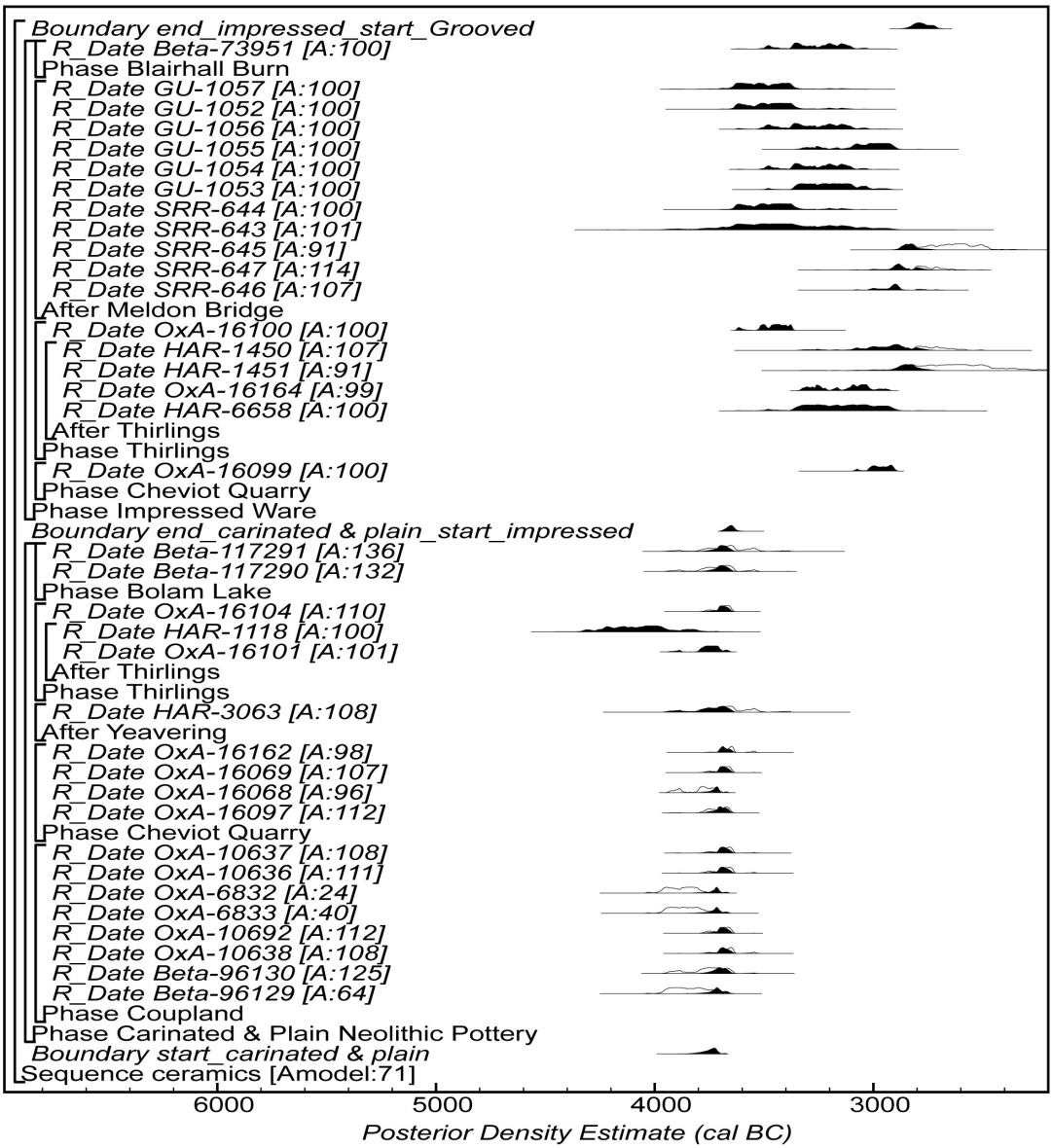

Fig. 3 Probability distributions of dates from Neolithic ceramics (abutting model). The format is identical to that of fig. 1. Distributions other than those relating to particular samples correspond to aspects of the model. The distribution *'boundary end carinated & plain, start impressed'* is the estimated date for the transition between the use of Carinated and Plain and Impressed Ware pottery. The large square brackets down the left-hand side, along with the OxCal keywords, define the model exactly.

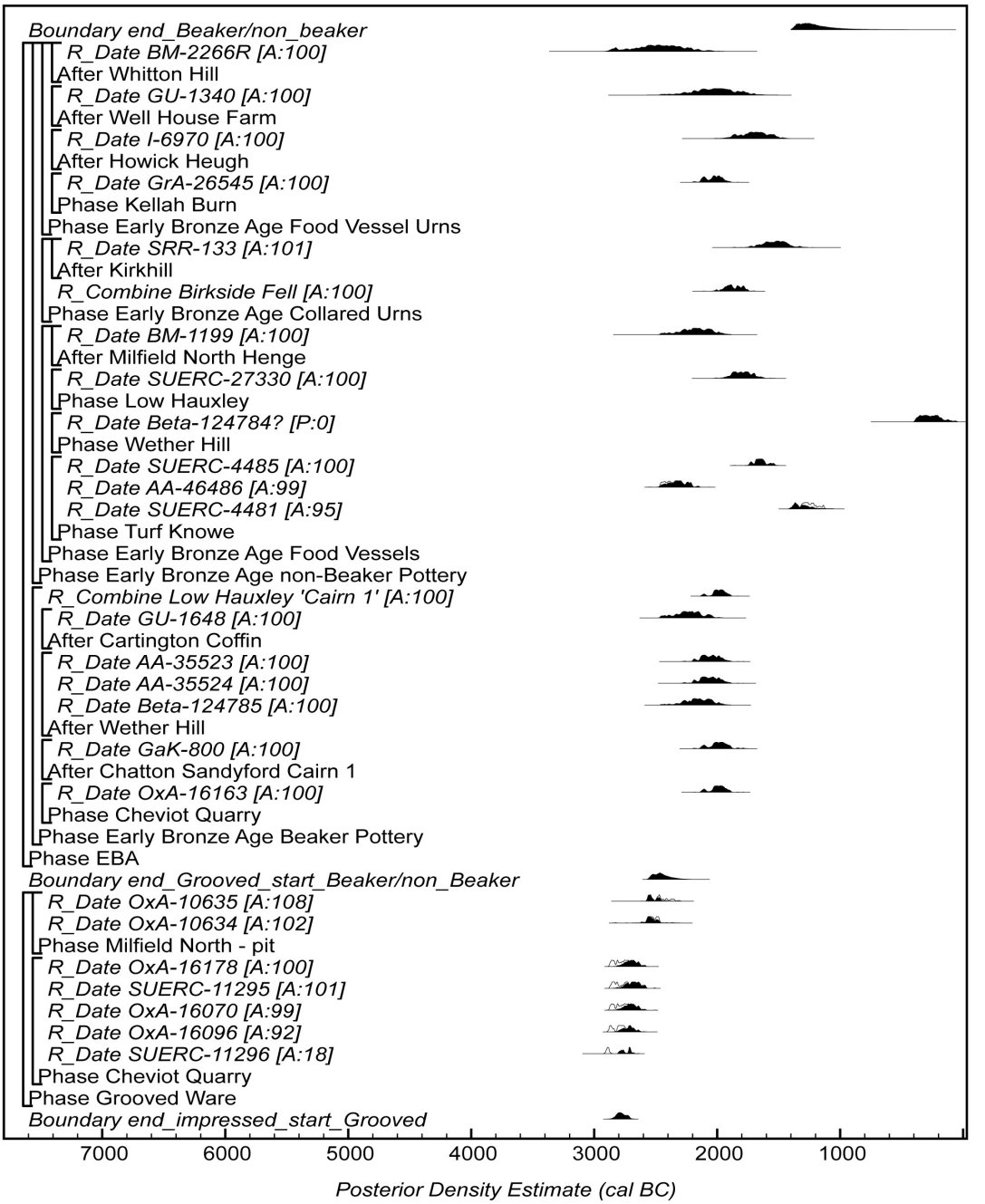

Fig. 3 Probability distributions of dates from Neolithic ceramics (continued)

shown in fig. 1 and summarised in the Appendix (Table 9). The Impressed Ware was left out of this analysis since, of the few dates available, most provide nothing more than a *terminus post quem* and this leaves only two other dates, which is insufficient to generate a reliable result.

Further analysis of the data from the individual models allows us to make an assessment of the relationship between events (i.e. the estimates for the start- and end-dates of the ceramic traditions; fig. 2). Table 10 in the Appendix shows the probabilities that the estimated start- and end-dates of a ceramic tradition precede the start- and end-dates of the other ceramic traditions. For example, the probability that Grooved Ware went out of use before the start of use of Beaker pottery is 84.8%, but this is partly accounted for by the relatively few Grooved Ware dates available being clustered towards the beginning of the tradition. However, it may also imply that there is very little chronological overlap between the two ceramic traditions.

The abutting model

We have therefore constructed a model in which the traditions are assumed to have abutted (Buck *et al.* 1992; Naylor and Smith 1988) given that this is suggested by the previous model (see above). This model (fig. 3) allows an estimate of the date of transition between ceramic phases to be calculated. The results show good overall agreement (A_{model}=71%), and estimates for the dates of transition between ceramic traditions are summarised in the Appendix (Table 11).

Discussion

Both of the models presented here rely on a series of interpretations of the past, in terms of the *a priori* ceramic sequencing, which we have sought to make explicit in the description of our procedures. It is therefore a matter of archaeological choice which of these interpretations should carry more weight. We would argue that a model of independent and potentially overlapping ceramic traditions is a more plausible interpretation of the archaeology of the region than one that does not allow for different ceramic traditions to be in use at the same time, although the period of overlapping use could be quite restricted in some instances.

TOWARDS A NEOLITHIC CERAMIC SEQUENCE

The ceramic sequence in the Milfield Basin, particularly the definition of Grooved Ware, has been a topic of debate for many years. Ferrell (1990) called for a re-evaluation of all of the pottery in the Milfield Basin because regional styles had not really been established; over a decade later, once more material had been found, Gibson (2002a) argued that many sites which had been classified as places where Grooved Ware had been used had been incorrectly identified due to a lack of clear evidence of what Grooved Ware looked like in the area. Gibson rejected the material from several sites as being Grooved Ware (e.g. that from Whitton Hill, Milfield North pit alignment, and Milfield North henge) and drew attention to the problems associated with the classification of pottery at many sites in the Milfield Basin. He stressed that simply comparing pottery from the excavations — many of them without associated radiocarbon dates — and then classifying these sites based on their similarities, created

circular arguments and took no real steps towards a better understanding of the local style of Grooved Ware.

In the past, part of this problem has been caused by the paucity of material available to study. Initial classification work was undertaken on Neolithic assemblages by Newbigin (1935) and in more recent times by Miket (1976; 1981; 1987; Miket *et al.* 2008), Harding (1981), Ferrell (1990), Waddington (2000; Johnson and Waddington 2008) and Gibson (Passmore and Waddington 2009). The other problem which has made understanding the Neolithic-Bronze Age ceramic sequence difficult is the rarity of stratified assemblages and, until now, a lack of scientific dating control. Many of the first radiocarbon dates associated with Neolithic and Early Bronze Age ceramics in the Milfield Basin were taken on unidentified charred wood, often in bulk samples, which typically came with large standard deviations and which were calibrated using early versions of calibration curves. The result was that many of the date ranges were so broad that they encompassed almost the entire period. Consequently, the ceramics had to be placed on traditional 'pegs' based solely on their similarity to pottery traditions in other regions (Gibson 2002a). These large date ranges have encouraged the conflation of different ceramic types, particularly in the Late Neolithic and Early Bronze interface, making it difficult to unpick sequence and style without the aid of scientific dating control. Between the 1990s and the present, much new fieldwork has been undertaken and our dataset has greatly increased, both in terms of ceramic assemblages, and associated radiocarbon dates (e.g. Topping 2001; Waddington 2000; 2006; Waddington and Davies 2002; Johnson and Waddington 2008; Passmore and Waddington 2009; Miket *et al.* 2008), finally making it possible to undertake a reassessment of the various Neolithic assemblages. Once this data was reorganised into a chronological sequence based on the new radiocarbon dates, on the recalibration of earlier dates using up-to-date calibration curves (see above, and figs. 1 and 3 and Appendix, Tables 1–8), on an assessment of fabric types and a review of typological styles, a clearer chrono-typological sequence has emerged. One result of this study has been to show that there is a type of ceramic coeval with Beaker pottery, but which is not Beaker, that incorporates many Neolithic traits from the Impressed Ware and Grooved Ware traditions, as well as anticipating some of the traits on Early Bronze Age vessels. We hope this work may start to address what Gibson has described as the '…embarrassing hiatus between the Impressed Wares and the Food Vessels of the Early Bronze Age' (Gibson 2002a, 83).

Examination of the ceramic material was undertaken at the Museum of Antiquities, Newcastle upon Tyne, at Berwick-upon-Tweed Museum, the British Museum, and at the offices of Archaeological Research Services Ltd. The fabric analysis was carried out over the course of six months as part of a Masters degree by one of the authors (DM). Initially, the purpose of the Masters study was to attempt to understand better the Grooved Ware in the Milfield Basin as a case study for the wider Borders Region, and to create an up-to-date catalogue of the Later Neolithic ceramic material. All of the Grooved Ware found up to that point (summer 2005) was analysed in terms of form, fabric, and decoration/surface treatment. To consider the place of Grooved Ware in time, most of the Carinated Bowl ceramics, all of the Impressed Ware, and some Beakers were examined for comparison. Since then, this work has been expanded (as research for a PhD at the University of Durham) to encompass the entire Tyne-Forth region from the Middle Neolithic to the Middle Bronze Age.

In order to evaluate form and fabric, careful measurements of sherd size, thickness and shape were taken using sliding callipers. The fabric of individual sherds was analysed for inclusion type, size, shape, and prevalence, and those inclusions were measured to the nearest

0.5 mm and placed within seven categories ranging from very fine to extremely large, as follows:

Very fine	< 0.5 mm
Fine	0.5 mm–1.0 mm
Small	1.0 mm–2.0 mm
Medium	2.0 mm–3.0 mm
Large	3.0 mm–5.0 mm
Very Large	5.0 mm–7.0 mm
Extremely large	> 7.0 mm

Where two sizes of inclusions were found, both were recorded and used in the statistical survey. The placement of decoration and the motifs used (and combinations thereof) was also recorded. These data were then used in a multivariate statistical study which considered the data in relation to the contexts from which the sherds derived and from which tradition they had been classified.

The results demonstrated that, although the sherds maintained elements of the form and decorative characteristics associated with their ceramic tradition, fabric was also an informative variable for classification, and was particularly useful in separating out 'Neolithic-derivative' ceramics from Grooved Ware and Impressed Ware *sensu stricto* (fig. 4). The variation in fabric may be accounted for by the use of different clay sources in prehistory, but the deliberately-added inclusions, which were also diagnostic, show different traditions of clay preparation. Along with the ceramic form, decorative motifs and dating information, the consideration of fabrics allowed the Grooved Ware sherds to be separated from those which had been previously classified as Grooved Ware, but which can now be seen as 'Neolithic-derivative' Beaker period ceramics (see below).

	Carinated Bowl	Impressed Ware	Grooved Ware	Neolithic-derivative ceramics
sand	20.3	0.0	21.2	14.4
extremely fine/fine	11.8	0.0	16.9	6.8
small	9.8	0.0	11.0	6.8
med.	14.4	0.0	13.0	6.1
large	11.1	9.9	9.8	22.7
very large/extremely large	1.3	70.3	1.2	8.3
quartzite	1.3	9.9	0.8	8.3
sand with sm/med	9.2	0.0	15.4	6.8
sand with large	3.8	0.0	2.4	5.3
sm/med quartzite	10.5	0.0	7.1	9.9
large/very large quartzite	6.5	9.9	1.2	4.6

Fig. 4 Percentage of inclusions used in different ceramic types from the Milfield Basin.

Carinated Bowls

The earliest ceramics found in the Milfield Basin are Carinated Bowls, which include 'traditional' and 'modified' forms (see also Sheridan 2007b; figs. 5 and 6). The traditional Carinated Bowl repertoire includes carinated vessels, S-profile pots, bag-shaped vessels, simple cups and bowls, some with vertical and rolled-over rims, as well as occasional examples of pots with flared rims. All the vessels are round-bottomed. The form of these vessels is, by and large, synonymous with the classic 'Grimston-Lyles Hill Ware' of Yorkshire, Ireland and Scotland, as defined by Piggott (1954, 114) and includes vessels with everted, semi-rolled, rolled-over and out-turned rims (fig. 5), as well as those with upright and flaring rims. Carinations can occur high up on the vessel (Herne's 'Shouldered Bowls': 1988) or lower in the vessel profile. Many of the pots are very well made and finished, sometimes with surprisingly thin walls, and with a high level of burnishing. Most pots are coil made, as can be seen by horizontal fracture lines, although some of the small bowls may have been made as pinch pots. There is little evidence for decoration, although some 'modified' Carinated Bowls have been identified that include forms with lugs or handles (e.g. fig. 6), usually positioned on the carination itself. Occasional finger-tip fluting on some rims occurs, suggesting links to some Scottish material. Other rims that are bent over at a right-angle to form a flat, elongated and projecting rim surface could, perhaps, anticipate the larger, moulded rims of Impressed Ware. The rim diameters of vessels range in size from *c.* 100 to 400 mm across, although most cluster

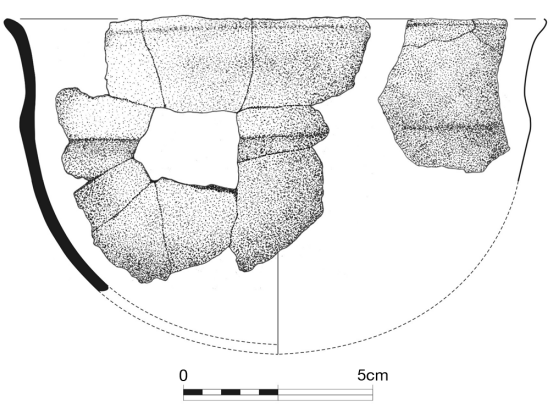

Fig. 5 An example of a classic Carinated Bowl from Lanton Quarry with everted rim, high carination and rounded profile.

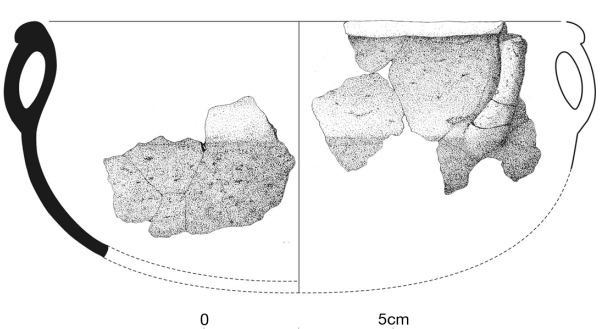

Fig. 6 In addition to the traditional style of Carinated Bowl pottery, modified forms are also prevalent and can include forms with handles, such as the vessel pictured here from Lanton Quarry.

around 220 mm, and there seems to be no real correlation between wall thickness and vessel diameter, as even the larger pots can have hard, thin sides.

Carinated Bowls and related ceramics have been found at the Yeavering Anglo-Saxon site (Hope-Taylor 1977; Ferrel 1990), Yeavering henge, pit E (Harding 1981), Thirlings (Miket 1987; Miket *et al.* 2008), Cheviot Quarry (Johnson and Waddington 2008), the Coupland 'henge' (Passmore and Waddington 2009), Lanton Quarry (Waddington 2009), Broomridge (Greenwell and Rolleston 1877; Newbigin 1935), and most recently during an excavation at Threefords, Milfield (Miket pers. comm.). Although it is not in the study area proper, the Bolam Lake site in mid-Northumberland was included in this study due to it being a sizeable assemblage with good dating associations (Waddington and Davies 2002). Interestingly, the Coupland site yielded a suite of radiocarbon dates from short-lived species (mostly single entity charred hazelnuts) that included the earliest date for Carinated Bowls in northern Britain (Passmore and Waddington 2009; also quoted in Sheridan 2007a). Early Neolithic ceramics are mainly found in 'midden' pits, hearth pits or from burial cairns, as at Broomridge (Greenwell and Rolleston 1877; Newbigin 1935), although occasional examples have been retrieved from postholes. Based on the latest calibrations, the date ranges for Carinated Bowls in Northumberland span the period 4040–3510 cal BC (95% confidence: Appendix, Table 1). Statistical modelling of these measurements produces an estimated start for the use of Carinated Bowls of *3815–3670 cal BC (95% probability; start_carinated & plain;* fig. 1) and an end of *3705–3625 cal BC (95% probability; end_carinated & plain;* fig. 1; see Appendix, Table 11). These dates are tightly grouped into the first half of the fourth millennium cal BC revealing a shorter period of use for this type of ceramic than had previously been envisaged. This is a result of the statistical scatter of the simple calibrated radiocarbon dates being relatively large in comparison to what could be the actual duration and date of the use of Carinated Bowls (see also Bayliss *et al.* 2008). If dates acquired in the future include further dates as early as OxA-6832 and Beta-96129 (both from Coupland), which are currently the earliest available measurements for Carinated Bowls in our area, then statistical remodelling of the Carinated Bowl dates would provide a slightly earlier start than is currently implied.

The fabric of the Carinated Bowls tends to consist of large amounts of sand and fine, small, and medium grit, often with angular crushed stone inclusions used as an opening agent. At many sites — such as Bolam Lake, Cheviot Quarry, Thirlings and Yeavering henge — there is a consistent use of sand with large, angular pieces of calcite used as the opening agent. Calcite is found in ceramics in many places around the world. It allows for thinner walls and is, therefore, advantageous for cooking pots (Hoard and O'Brien 1995, 823); however, it can cause a pot that is heated above 600° C to spall during firing, and increases the chance of the pot breaking during use. Ethnographic work demonstrates, however, that this is seen as a good compromise and the technique is common and frequently reported (Carlton 2003; Hoard and O'Brien 1995, 824; Rice 1987, 119). The use of calcite in Carinated Bowl pottery in the Milfield Basin demonstrates that the first potters in Northumberland had a sophisticated understanding of ceramic manufacturing methods and of how to manipulate their material to produce pots for specific uses. The pots tend to have relatively thin, well-built sides with walls ranging from 6 to 11 mm and are evenly fired producing a hard black or buff brown fabric. The surfaces are usually highly burnished, which can clearly be seen on both sides of most sherds. But on others, striations from wiping the surfaces are common (even though the material used could not be identified — leather, cloth or straw are possibilities, but even the potter's hands could have produced this effect).

Impressed Ware

Finds of Impressed Ware are relatively rare in Northumberland and the chronology and use of this type of Neolithic ceramic remains perhaps the most poorly understood in the region. The sherds from Cheviot Quarry, Lanton Quarry and Thirlings have a coarse fabric, often with a bright orange or orange-grey surface colour, and they are often unevenly fired (which may also explain why they are so rare). These vessels can vary in size but some very large vessels have been noted (Johnson and Waddington 2008). Most examples fall into the Meldon Bridge (or Ford) substyles of Impressed Ware, with a high shoulder just below the rim and slipped surfaces. In addition, the rims are often enlarged and distinctive and include flattened 'T' profiles, bevelled rims and large rounded rims — all of which can be richly decorated on their outer, upper and inner lips (figs. 7 and 8). Since it is usually rim and body sherds that have been found in Northumberland, the typical profile and base of these vessels are often difficult to discern, although tub-shaped, steeply angled and round-based forms are implied from the assemblages at Lanton Quarry and Cheviot Quarry respectively, as has also been found to be the case with Impressed Ware from elsewhere in the Borders (e.g. Speak and Burgess 1999; Shearer and McLellan 2008). Decoration can include repeated fingernail, comb, stab, bird bone, twisted cord and circular impressions, as well as incised lines and grooves, forming zones of decoration that consist of herringbone patterns, in-filled triangles, chevron patterns and rows of repeated impressions.

The Impressed Ware ceramics generally have a distinctive gritty and friable fabric being hard, thick-walled (typically 150 mm to 300 mm), and sometimes with fairly coarse fabric. They often contain large prepared angular crushed stone inclusions, typically quartzite, which can frequently be seen erupting on the surface. This said, the material from Lanton Quarry is generally made from a finer fabric than the Impressed Ware retrieved from other sites (such as Cheviot Quarry, for example). The fabric colour can vary considerably across any given vessel, although many are orange-brown (indicating they have been fired in an oxidizing atmosphere), whilst others can be almost black indicative of a reducing atmosphere. The firing of these vessels, some of which are very substantial, seems to have been more uneven than for the Carinated Bowls.

Few sites in Northumberland on which Impressed Ware was used have yet produced radiocarbon dates, but new dates are available from Thirlings (Miket *et al.* 2008) and Cheviot Quarry South (Johnson and Waddington 2008), and these correlate with the important suite of dates for Impressed Ware that were obtained from Meldon Bridge in Peeblesshire (Speak and Burgess 1999). Based on the dates currently available, the chronological span of Impressed Ware in Northumberland and the Tweed Valley (see above) ranges from the mid fourth millennium cal BC to the first quarter of the third millennium cal BC. This compares with estimates from a national survey of available radiocarbon measurements of *3560–3440 cal BC (68% probability)* for the start of the tradition and *2910–2790 cal BC (68% probability)* for its end (Marshall *et al.* forthcoming).

Other Northumbrian sites that have produced Impressed Ware include Elsdon (Tait 1968), Alnwick (Leeds 1927, 457), Allendale Town (Tait 1968), Kyloe Crags (Tait 1968), Ford (Crookham: Longworth 1969) and Redscar Bridge (Greenwell 1868; Greenwell and Rolleston 1877). Impressed Ware has been found in the Milfield Basin only at sites thought to be domestic: Thirlings (Miket *et al.* 2008), Cheviot and Lanton Quarries (Johnson and Waddington 2008), and Yeavering Palace (Hope-Taylor 1977; Ferrell 1990). The contexts in which they were found

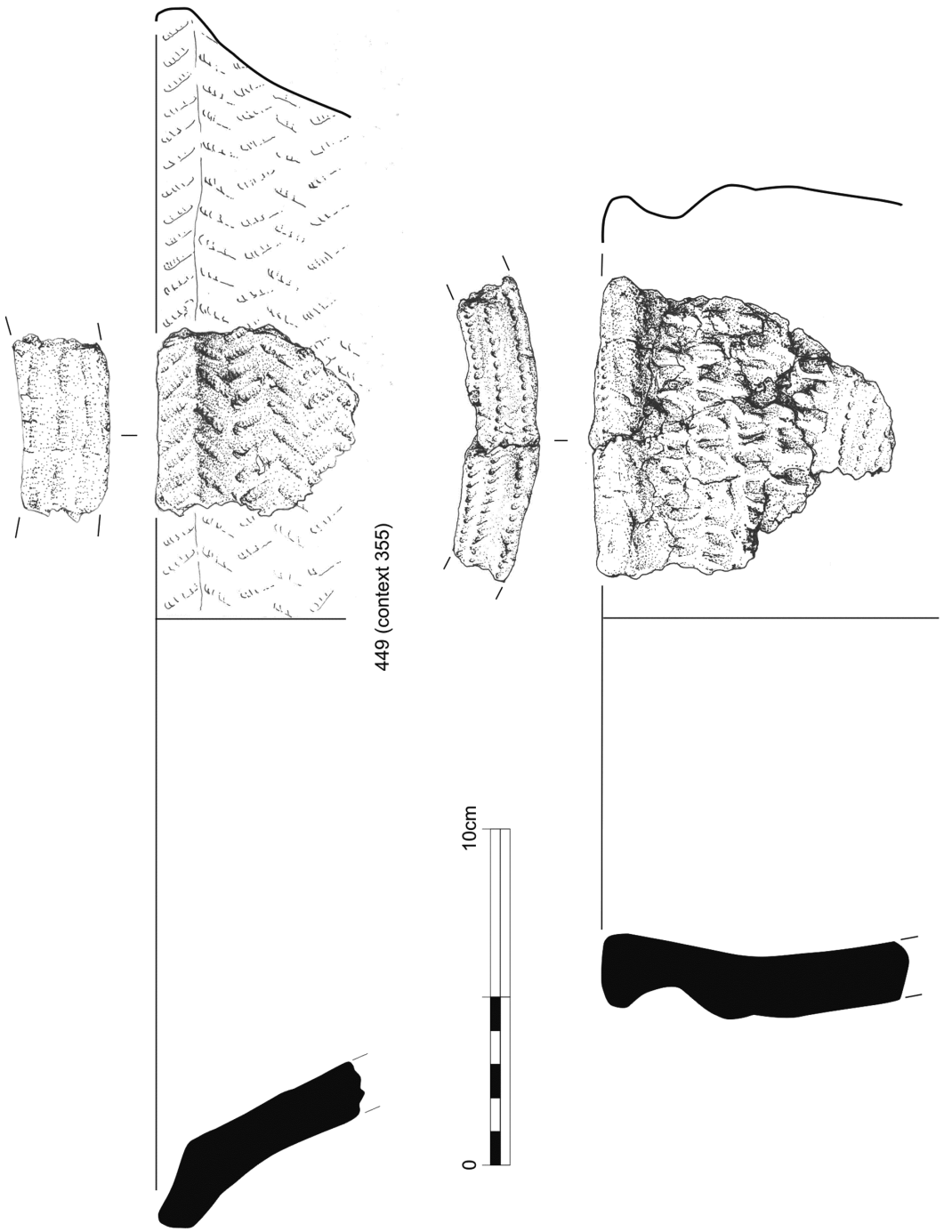

Fig. 7 Examples of Impressed Ware from Cheviot (top) and Lanton (bottom) Quarries.

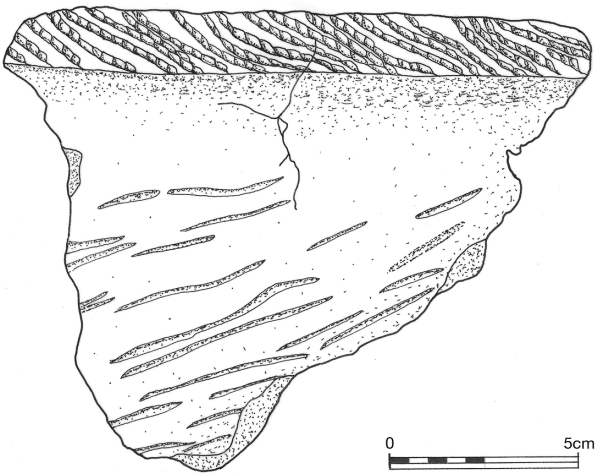

Fig. 8 Sherd 1743 from the Greenwell Collection has the typical 'T' shaped rim of Impressed Ware vessels together with decoration composed of cord-wrapped stick motifs below the collar of the vessel and on the rim.

tend to be domestic midden pits, revealing similar situations of use for this kind of ceramic as for Carinated Bowls.

Grooved Ware

Finds of Grooved Ware are not common in Northumberland — as noted by Gibson (2002a) in his re-evaluation of the material — and its chronology and use in the region is only just beginning to be understood. It is a ceramic tradition that has been the topic of much debate in the study area (Ferrell 1990; Gibson 2002a) and it is still poorly understood at the regional level. The sherds that have been firmly identified display typical characteristics of the wider Grooved Ware tradition: bucket-shaped profiles, simple rims, flat bottoms, grooved decoration, and elements of all of the national sub-styles of Clacton, Woodlands, Durrington Walls, and Rinyo are represented. However, in many cases, motifs typical of different substyles are found in the same assemblages or on the same pot. This follows MacSween's (1995) findings on Scottish Grooved Ware where an underlying grammar of what constitutes Grooved Ware is present, but no clear regional styles can be discerned. Within a general tradition there was clearly much room for personal creativity and design. It is perhaps for this reason that there has been so much argument and reconsideration of the definition of the substyles (Piggott 1954; Smith 1956; Wainwright and Longworth 1971). Although Grooved Ware was thought to have been found at Whitton Hill 1 (Miket 1985), Thirlings (Miket 1976; Miket *et al.* 2008), Yeavering Henge (Harding 1981) and the Milfield North pit alignment (Harding 1981), these sherds have been rejected as typical 'Grooved Ware' by Gibson (2002a) on the basis that they exhibit characteristics that can equally be found on Early Bronze Age material. In so far as the dates from these sites can be viewed as reliable, the latest recalibrations undertaken as part of this study (see above) show these dates to be statistically inconsistent with the dates associated with the classic Grooved Ware sites in the Milfield Basin. The sites that have produced classic Grooved Ware include the Ewart 1 pit alignment, Yeavering Anglo-Saxon site (Hope-Taylor 1977; Ferrell 1990), Milfield North Pit (Passmore and Waddington 2009), Cheviot Quarry North (Johnson and Waddington 2008) and Lanton Quarry. The radiocarbon determinations directly associated with the classic Grooved Ware assemblages provide date ranges spanning the first half of the third millennium cal BC (see Appendix, Table 3).

The Grooved Ware ceramics from Northumberland are usually well-made pots of varying size, which are typically well fired with burnt-out organics sometimes noted. They typically contain finely prepared crushed stone inclusions and grog was sometimes used. The body sherds tend to be straight-sided with occasional in-curved rims, whilst flat bases have been noted in the material from Yeavering (e.g. figs. 10–11), Cheviot Quarry (e.g. fig. 12) and Lanton Quarry (e.g. fig. 9). This evidence points, in the main, towards fairly substantial bucket-shaped vessels, although barrel-shaped and tub-shaped vessels are also noted. An unusually shaped and decorated sherd from Cheviot Quarry indicates an open dish vessel, perhaps with a rounded base, with a plain rounded rim but with tightly spaced parallel groove decoration running from the rim towards the base. The grooved decoration and suggestion of lozenge motifs on the decoration of some of the Cheviot Quarry sherds implies parallels with the Clacton style (Smith 1956), whereas the presence of fingernail impressions recall the Woodlands style, and the near-vertical internal bevel on one pot is suggestive of Durrington Walls style. This range of Grooved Ware sub-styles is present elsewhere in the Milfield Basin at the nearby sites of Yeavering, Ewart 1 pit alignment, Redscar Bridge and Milfield North (see Gibson 2002a for site reviews). Decorative motifs include herringbone patterns, chevrons, lozenges, parallel lines (including oblique) and fingernail impressions. Carbonised organic deposits have been noted on several pots indicating that some were used to hold foodstuffs prior to deposition, whilst occasional grain impressions have also been noted. Raised cordons also occur and can be in horizontal, vertical and converging arrangements.

The fabric analysis has shown that Grooved Ware manufacture employed the greatest use of sand and a consistent use of extremely fine and small grits, usually of quartzite, which were crushed into angular shapes. The resulting fabric is more homogenous than those of previous ceramics, smoother to the touch, and not gritty or friable like Impressed Ware. In some sherds grog was identified. The Grooved Ware found in the Milfield Basin displays the potters' thorough understanding of fabric preparation and ceramic manufacture, and the examples recovered tend to be hard, of more even wall thickness than Impressed Ware (10–12 mm), and smoothed to create even surfaces. Most pieces show consistent firing, as colour tends to be fairly constant across the surface of the sherd, and on some, internal 'ribs' display the coiling method that was employed to create the vessel.

Grooved Ware forms are usually described as 'bucket-shaped' or 'tub-shaped', due to their straight walls, simple rims, and flat bottoms. There is a range of pot sizes in the Milfield assemblages, with rims ranging from 140 mm to 260 mm in diameter, and there is a clear correlation between wall thickness and pot size. Grooving is the most commonly used motif; however, twisted cord, stab impressions, stamping, lugs and cordons are also employed. A particularly interesting piece with Woodlands and Durrington Walls affinities (cf. Wainwright and Longworth 1971; Gibson 2002b; Ferrell 1990; Smith 1956) found at Yeavering (Hope-Taylor 1977; Ferrell 1990; Manby 1999) makes use of horizontal cordons to create a zoned surface in which there are occasional stab marks.

Beaker

Northumberland has produced an extensive assemblage of Beakers of widely varying types (see Tait 1965), from early Bell Beakers and All-Over-Cord (AOC) forms through to short-neck and long-neck types. The typology of Beakers has formed a subject of intense archaeological debate over the last century and there is still no entirely satisfactorily established sequence. An evaluation of British Beaker dates by Kinnes *et al.* (1991) and more recent reviews by

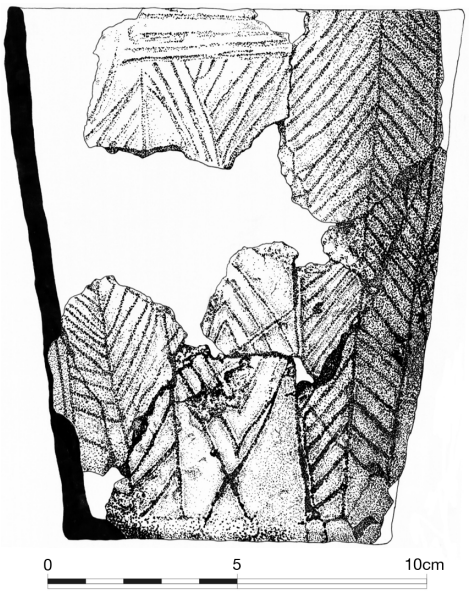

Fig. 9 Grooved Ware vessel from Lanton Quarry displaying the typical bucket-shape, as well as zones of decoration filled with diagonal grooves in opposing directions to create a herringbone pattern, and in some cases, lozenge and triangular shapes.

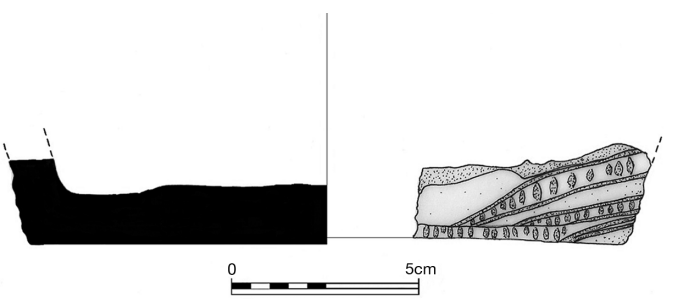

Fig. 10 Sherd 4 from Yeavering showing the flat base of a Grooved Ware vessel and decoration comprising rows of diagonal grooves, some of which are slashed to create a ladder pattern.

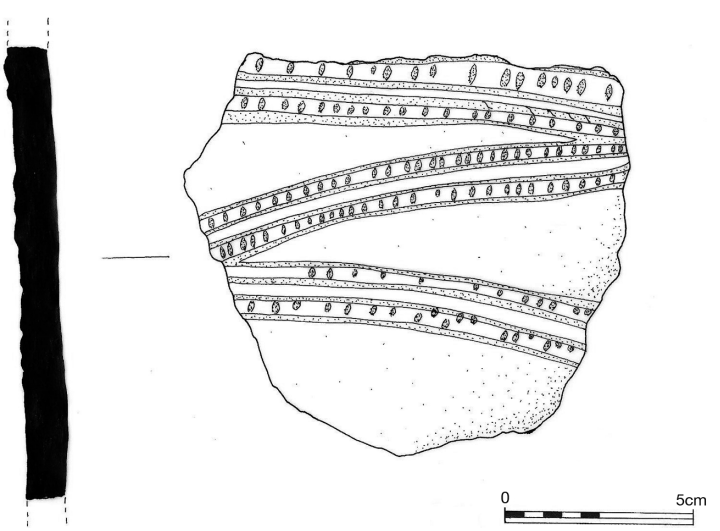

Fig. 11 A body sherd from Old Yeavering, likely to be from the same pot as Sherd 4, showing the straight-sided walls of the pot and decoration comprising converging, diagonal grooves that are filled with short slashes to create a ladder pattern.

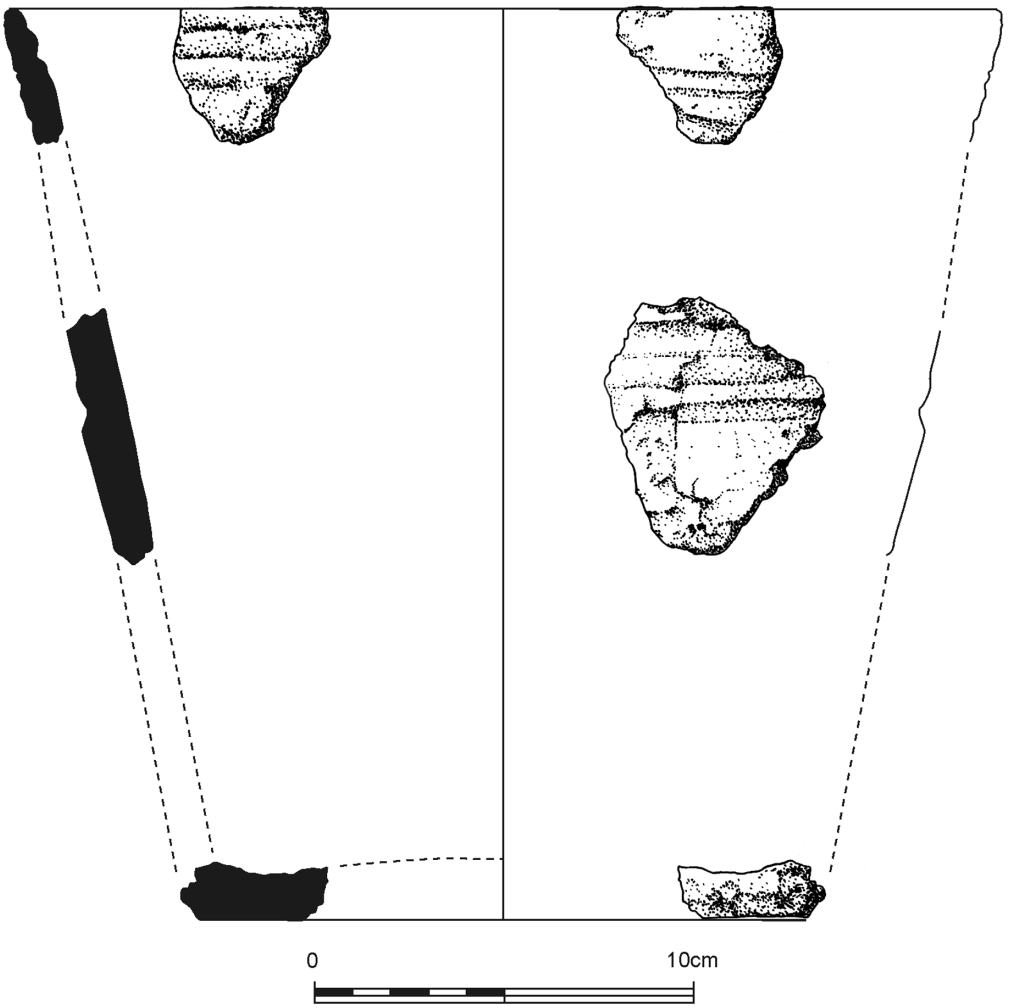

Fig. 12 Sherds from Cheviot Quarry: the remains of a straight-sided, bucket-shaped Grooved Ware vessel, much like the one from Lanton Quarry (fig. 9) and Yeavering (figs. 10, 11). Decoration on this pot is composed of parallel, horizontal rows of grooves on the outside of the pot, as well as just inside the rim.

Needham (2005) and Sheridan (2007b) have, however, brought together a corpus of the more reliable radiocarbon dates associated with different 'types' and have incorporated this data into the study of the processes of Beaker transmission in north-west Europe and the implications for possible cultural contacts. The Beaker ceramics from Northumberland are usually well-made pots with prepared, fine inclusions of stone, quartz and sand, and with thin-walls that have been evenly fired. Slips have been observed on many vessels and the attempt to achieve the typical reddish surface colour is evident. A wide range of decoration can be observed including comb impressions, grooves forming lozenges and triangles, cord and fingertip decoration as well as the presence of cordons. Zones filled with decoration and the

use of geometric patterns formed by grooves, jabbed and fingernail impressions are common. The majority of sites in Northumberland at which Beakers have been found were funerary — many typically in cists with inhumation burials. However, within the wider Northumberland-Scottish Borders' region, on three sites — Archerfield, Hedderwick and North Berwick Law, all in East Lothian, Beaker sherds were found within mixed deposits that were thought to be domestic in nature (Curle 1908; Callander 1929; Cree 1908; Gibson 1982), and this was also thought to be the case at a fourth site on the Northumberland coast at Ross Links (Brewis and Buckley 1928). Beaker pottery has also been found across the Milfield plain at Cheviot and Lanton Quarries (Johnson and Waddington 2008; Waddington 2009) close to Neolithic 'midden' pits, but this does not mean that the Beakers necessarily derive from domestic deposits as they could have accompanied burials which have since disappeared due to the acidic nature of the sediments.

The radiocarbon determinations associated with this type of pottery is found to have a consistent range spanning the second half of the third millennium cal BC, from approximately 2400 cal BC, and into the first century or two of the second millennium cal BC (see Appendix, Table 4).

Neolithic-derivative or 'Domestic Beaker' material

In addition to Beakers, other contemporary non-Beaker — or as it is sometimes termed 'domestic-beaker' (Burgess 1980, 69; Gibson 1982) — pottery can be ascribed to this same period. The naming of this pottery with reference to Beaker disguises the essential insular character of this material and fails to differentiate it from the domestic material that does bear Beaker-style decoration. However, a name referring to it as 'native', in order to distinguish it from the European-wide Bell Beaker tradition, might cause confusion with the material ceramics made during the Roman period. It also would not do justice to any influences that Beaker pottery may have had on this pottery style. The wide variability in its form, decorative motifs, and quality, provide few universal defining traits by which to classify the material and, indeed, defining it as a distinct type of pottery may only prove to be over-complicating an already complicated understanding of the transition between the British Neolithic and Bronze Age by simply creating a new 'box' in which to separate interconnected material. So here it is called 'Neolithic-derivative' simply so that it can be described separately from the existing styles; it is this material that has caused confusion about the definition of styles in Northumberland. The label is justified because this material — as yet unclassified and in some cases somewhat nondescript — frequently displays decorative motifs and techniques derived from the insular Neolithic ceramic styles of Impressed Ware, and more commonly Grooved Ware, and on occasions, Beaker material, though in Northumberland the influence of Impressed and Grooved Ware decoration features most prominently. It is for this reason that this Neolithic-derivative pottery has often been miscategorised. The decoration on this material can, in some cases, be more crudely executed than that on the earlier ceramic traditions to which they are related and, likewise, the pots themselves are sometimes more crudely made. Nevertheless, it is these stylistic connections, we believe, that has led to the confusion of what is and is not Grooved Ware, and in some cases Impressed Ware (see above), in the region; this confusion has only now started to be resolved as a result of Gibson's stylistic review (2002a), the radiocarbon dating sequence that is now emerging (see above), and the consideration of the different fabrics and stylistic forms. Examples of this Neolithic

derivative material from the Milfield Basin include sherds from three non-Beaker vessels found in pits containing Beaker sherds at Cheviot Quarry South (Johnson and Waddington 2008). Other Neolithic-derivative pottery has been found at the Milfield North pit alignment, the Milfield North henge, the Whitton Hill hengiform enclosure, Thirlings, and the Whitton Park site, all of which have also been dated to the Beaker period (see above). The review by Gibson (2002a) rightly contests the previous classifications of some of this material and instead draws attention to stylistic similarities with the Food Vessel tradition.

Many ceramics, other than Beakers, were used during the Beaker period. However, as so few settlement sites of this period are known it is the pottery from funerary settings (Beakers, as such) which has dominated ceramic studies of this period. This poses difficulties for archaeologists because the classification of the non-Beaker material on its own terms — without reference to the preceding Impressed and Grooved Wares, and to the subsequent Early Bronze Age forms — has to rely on the identification of a set of distinctive characteristics. However, the meagre pottery assemblages that are currently available rarely show any such distinctive characteristics as they typically bear decoration that draws on Impressed Ware, Grooved Ware and occasionally on Beaker decorative motifs, whilst also anticipating elements of the form and decoration of Early Bronze Age ceramics such as Food Vessels and, occasionally, Urns.

This pottery, though contemporary with Beaker, is very different in its shape, decorative style, mode of use, and in the types of sites on which it is found. Manby (1999, 64) and Cleal (1999, 2) have described a coarseware component to the Woodlands style of Grooved Ware in northern England and southern Scotland. It is likely that the material described here was directly derived from this and bridged the gap between truly Late Neolithic and Early Bronze Age vessels. Indeed, the relationship of this Neolithic-derivative pottery to Beakers may be akin to the relationship between the coarse ceramics found on later unenclosed platform settlements and the contemporary Food Vessels and cinerary urns, as described by Burgess (1995). The Neolithic-derivative material can be thought of as a local transitional ceramic that may have provided the typological, and perhaps 'cultural', link between the distinctive later Neolithic Impressed and Grooved Wares and the distinctive insular Early Bronze Age ceramic forms, such as Food Vessels. Beakers were clearly an introduced ceramic form, though they appear to have developed some insular variants (Needham 2005). Based on radiocarbon-dated associations the Neolithic-derivative type of ceramic has been found on at least five sites in the Milfield Basin: Milfield North Henge (Harding 1981), Milfield North Pit Alignment (Harding 1981), Yeavering Henge (Harding 1981), Whitton Hill 1 (Miket 1985) and Whitton Park (Waddington 2006). At Milfield North Henge, two of the three larger central pits (pits 'b' and 'c') produced pottery. Pit 'b' contained the sherds of a vessel (P1), which Harding (1981, 115) described as a, '... Beaker-like shape,' but makes it clear that it, '... also has characteristics reminiscent of certain Food Vessel types, notably the slight rib or carination' (fig. 13). The fabric is gritty and crumbly, and the decoration consists of vertical rows of thumbnail impressions. Harding (1981, 115) describes P1 as a hybrid vessel, similar to those of western Scotland that Simpson (1965, 35) termed 'Beaker-Food Vessels'.

The pit adjacent to this, pit 'c', contained a second pot, which at first glance, fits comfortably into Gibson's (2002b, 94–5) description of a Food Vessel bowl and which bears striking resemblance in form to his examples from the undated sites of Ford, Northumberland, and Jesmond, Tyne and Wear (Greenwell and Rolleston 1877; Blackbird 1828; fig. 14). However, the re-calibration of Harding's radiocarbon date places this bowl within a late third

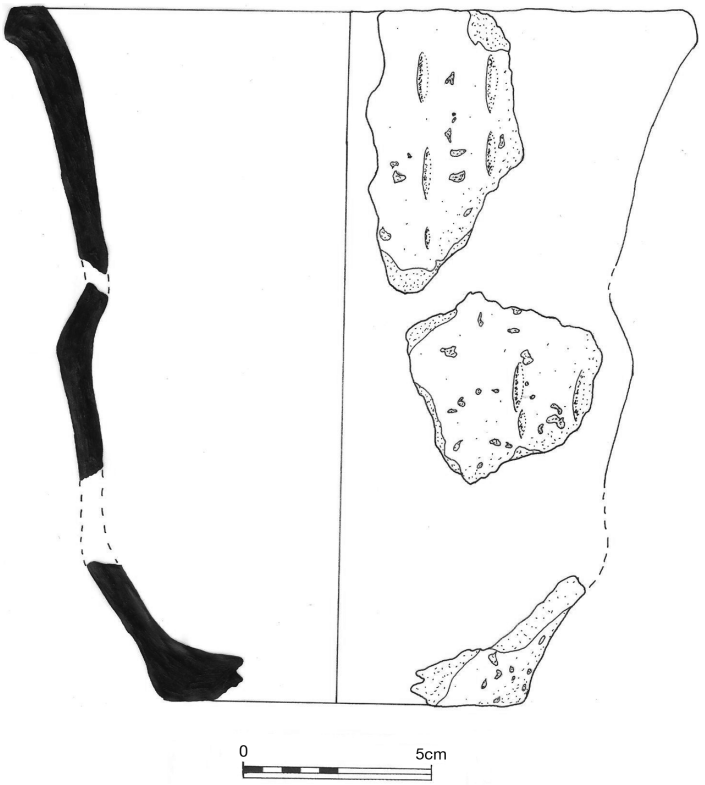

Fig. 13 P1 from Milfield North Henge has a Beaker-related shape, but has a much coarser and grittier fabric than is usual for a Beaker. The decoration on this pot is also atypical, with vertical rows of fingernail impressions. Harding (1981) concluded that this pot could only have been a hybrid of Beaker and Food Vessel, originally described by Simpson (1965), on account of its mixed characteristics. Redrawn from Harding (1981).

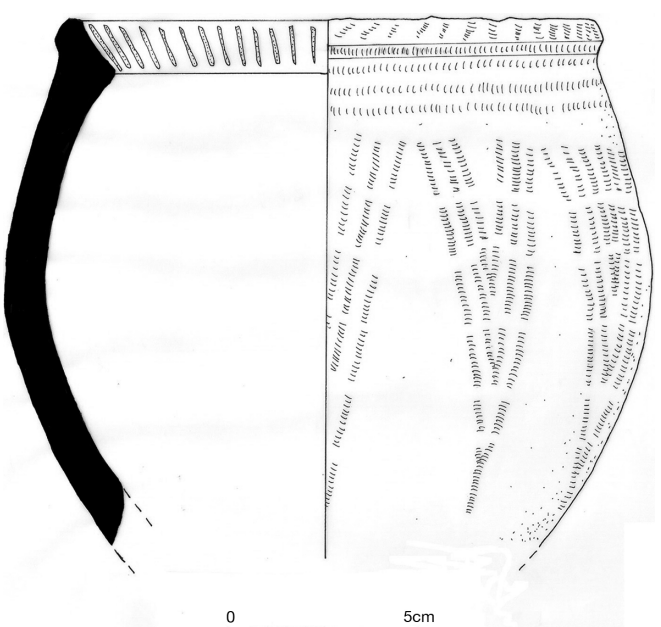

Fig. 14 P5 from Milfield North Henge was found in a pit adjacent to the findspot of P1. It bears characteristics of Food Vessel in its fabric, form and placement of decoration, but also of Beaker in the decoration that comprises triangular motifs spanning the height of the vessel. Parallels to this vessel were found at Ford, Northumberland, and Jesmond, Tyne and Wear in the nineteenth century, which Gibson (2002b) describes as overlapping types or very early Food Vessels. The date associated with this pot places it within the Beaker period.

millennium BC. Gibson (2002b, 93) noted that it is possible that Food Vessel bowls were made as early as 2400 cal BC, but the range is generally centred on 2000 cal BC and the following few centuries that define the Early Bronze Age. He asserted that these early dates may indicate overlapping styles, which is what is argued here. One vessel (P5) from Milfield North Henge does display some typically Early Bronze Age traits, but it has affinities with the 'Neolithic-derived' ceramics as well and may represent a precursor to the extensive Food Vessel tradition that was subsequently adopted in the region. In addition to these vessels, Harding (1981, 114) also reports a Neolithic and Beaker sherd found in the same middle fill of the henge ditch.

The Milfield North pit alignment produced sherds from seven vessels in two layers in pit 2, five of which are shown in fig. 15. Harding (1981, 119) described the upper layer material as similar to Grooved Ware in decoration, but stressed that it is not diagnostic of this tradition. From the lower layer, 'coarser and heavier' material was discovered, which Harding (1981, 119) connected to the pottery uncovered from Old Yeavering Henge (fig. 16). The re-calibration of Harding's radiocarbon determinations from pit 2 places these sherds within a Beaker range, but the vessels are clearly not of the Beaker tradition.

The ditch at Whitton Hill 1 produced a cremation burial associated with a pot (P1) that was originally described (for a lack of comparative material) as a Grooved Ware vessel (Miket 1985, 138). However, although the bucket-shaped form and incurving, simple rim is similar to Grooved Ware, it has a slightly embellished collar, unperforated horizontal lugs, a lack of decoration, and coarse fabric with larger inclusions, similar to Early Bronze Age examples (fig. 17). The radiocarbon date of 2300–1980 cal BC places the pot within the Beaker range, but

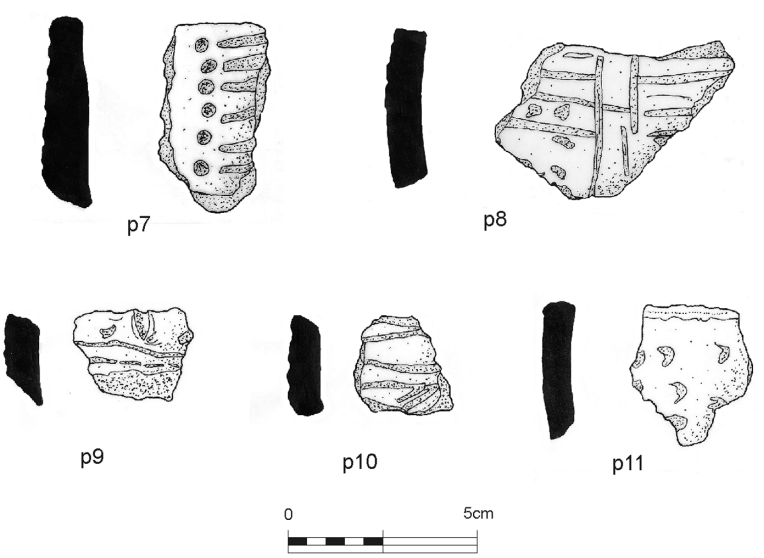

Fig. 15 The sherds found in one of the pits at the Milfield North Pit Alignment were described by Harding (1981, 114) as Grooved Ware in so far as they have decoration on them made by grooving, but in the original report Harding argues that they are not typical of Grooved Ware in terms of their fabric. These sherds are much coarser and grittier. Harding (1981, 119) draws parallels to the sherds found at Yeavering Henge.

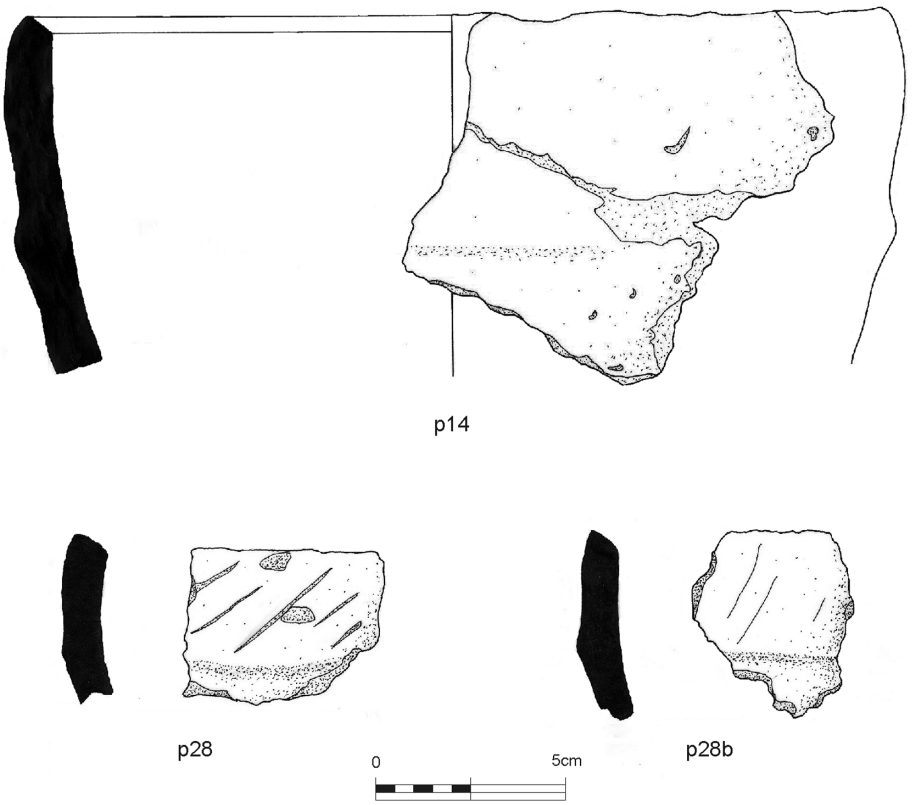

Fig. 16 Pots 28 and 14 from Yeavering henge are examples of the ceramics that Harding (1981, 119) compared to the sherds found at the Milfield North Pit Alignment. These have decoration that employs grooving as a technique, but the form of the pots differs as the walls are more flaring and the rim is emphasised to create a slight collar. The fabric of the sherds found at Yeavering have a coarser fabric than Grooved Ware, much more akin to Impressed Ware or Food Vessels.

it has no traits in common with Beaker pottery as such. The material from Whitton Park has a similar coarse fabric. A base sherd demonstrates the use of flat bases and the rim sherd was simple and incurving (fig. 18). Decoration consisted of plaited cord in horizontal rows on the body sherds of a round-bodied vessel (fig. 19). A radiocarbon date on a single entity hazelnut shell places the material in the period 2140–1890 cal BC.

In addition to these sites, it is thought that there may be 'Neolithic-derivative' material at the Thirlings site (see Gibson 2002a and Miket *et al.* 2008) but none of this material has directly associated radiocarbon dates and so the attribution of this material is currently reliant on typological associations. Gibson views the material as sharing Early Bronze Age traits as well as Neolithic ones (Gibson 2002a). Neolithic-derivative pottery has also been found associated with some of the Milfield henge sites. As with Beakers, the radiocarbon determinations associated with this type of pottery is found to have a consistent range spanning the second half of the third millennium cal BC and into the first century or two of the second millennium cal BC (see above; Appendix, Table 6; and figs. 1, 2 and 3).

Fig. 17 The pot found at Whitton Hill, P1, has coarse fabric and little surface treatment. Decoration is limited to unperforated lugs at the base of the collar of the pot. The form is bucket-shaped with an in-turned rim and a flat base. P1 was found in association with a cremation burial in the ditch of Whitton Hill I. It was placed on a prepared surface of whinstone and sandstone blocks (Miket 1985, 137–8).

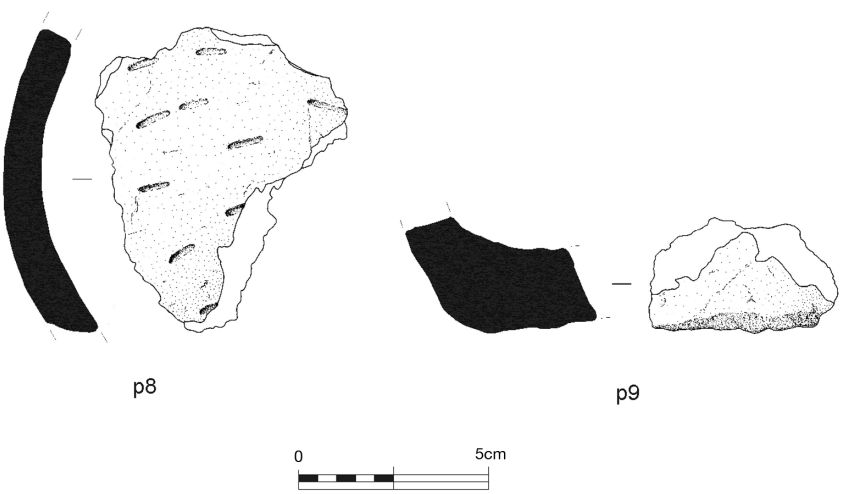

Fig. 18 Body sherd 8 and base sherd 9 from Whitton Park are believed to be parts of the same vessel. They are from a pot with a flat base with walls that flare outward and are rounded at the belly, possibly like the example, P1, from the Milfield North Henge. The fabric is coarse and decoration consists of horizontal rows of short, oblique impressions from a square-ended tool.

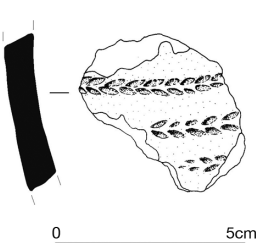

Fig. 19 Several body sherds from the same pot found at Whitton Park demonstrate a well-made vessel with coarse fabric and decoration comprising rows of plaited cord forming a vine pattern. This is a technique often seen on Beakers, but it is also seen on Food Vessels and Collared Urns.

The fabric of the Neolithic-derivative material is much grittier and more friable than Grooved Ware, although not quite as much as Impressed Ware, since, like Grooved Ware, it has a large proportion of sand in its make-up (fig. 4). Large (3–5 mm), very large (5–7 mm), and extremely large (>7 mm) grit inclusions are used as opening agents, as well as small (1–2 mm) to medium (2–3 mm) quartzite pieces. This differs from Beakers, in which crushed, fine (0.5–1 mm) stone and grit was employed. Moreover, despite their evident contemporaneity, these Neolithic derivative ceramics tend to have coarser fabrics than Beakers, the walls being on average much thicker (7 to 15 mm). Although there are a variety of sizes, on the whole these pots tend to be larger than Beakers, having rim diameters ranging from 100 to 320 mm, and there is a correlation between wall thickness and rim diameter.

The Neolithic-derivative ceramics usually have flat bases and flaring walls so that in the most extreme cases this produced a vase-shaped vessel, reminiscent of the Fengate style of Impressed Ware, but with a much more extreme wall angle in profile, which clearly anticipates Food Vessel forms *sensu stricto*. The rims can be flat and simple, with some being upright, but others may be slightly in-turned above a cordon or slight carination so as to form a slightly closed or bipartite vessel which again carries elements from the Impressed Ware tradition and anticipates that of the Food Vessels, and to some degree the form adopted for Collared Urns. The use of closed or in-turned rims appears to derive from Fengate pottery, but also from the Grooved Ware tradition, and this characteristic may account for why some of the Thirlings material has been classified as Grooved Ware when this may not be the case (see Gibson 2002a).

As well as sometimes displaying vessel forms more akin to Early Bronze Age pots, this Neolithic-derivative pottery can also have more varied decoration than can be found on Impressed or Grooved Wares, even though impressed and grooved decoration can occur on these pots. Other Neolithic-derivative ceramic sherds show little if any decoration and sometimes it can be very poorly executed, as in the case of the Whitton Park material (Waddington 2006). The decorative repertoire, which can range from being very carefully to very poorly executed, can include twisted and whipped cord impressions, lugs (often perforated), stab impressions, stamping, fingernail impressions, grooves and cordons. However, the placement of the decoration is usually different from Grooved Ware and there is evidence for zoned decoration focussing on the rim and neck zone which can include decoration on the outside, inside, and on top, much like later cinerary urns. This usually takes the form of repeating geometric shapes such as triangles, zigzags, cross-hatching, herringbone, and rows of fingernail impressions. Some of the body sherds have no decoration at all.

Food Vessels

Food Vessels are characterised partly by their coarse, gritty fabric that is highly friable and usually covered by a thick slip. Food Vessels are classified as being from 10 to 20 cm tall, which separates them from Enlarged Food Vessels (also called Vase Urns), and the pots were made in two forms: vases and bowls (Gibson 2002b: 95). The simplest form is bipartite with narrowing walls (often forming a vase shape) and a moulded rim that has a pronounced shoulder and a cavetto zone (Cowie 1978, 14). In the Tyne-Forth region, decoration is found covering the pot (although some are undecorated on their lower third). Cowie (1978, 24) described the most common techniques of decoration in five categories: 1) applied relief — cordons, chevrons, knobs, bosses, bars and stops (vertical applied or pinched cordons placed

at intervals in bevelled areas); 2) incision — cuneiform shapes, lines, slashes, nicks; 3) twisted, plaited, and whipped cord in horizontal and vertical rows, arcs and 'maggots'; 4) stamps of animal/bird bone, stick, fingertip and fingernail; and 5) grooves (differing from incision since they usually have flat bottoms). Food Vessel bowls tend to be more hemispherical in shape, with flat bottoms, but retain the bevelled, moulded rims and styles of decoration.

Food Vessels are generally found in the same contexts as Beakers — inhumation and cremation burials with similar grave goods — and are frequently found in the same burial mounds or flat cemeteries.

Contemporary ceramics are also found on domestic sites, providing evidence that the Food Vessels known from the graves represent a purely funerary aspect of the tradition. Burgess's (1995) work on enclosed platform settlements demonstrated that pottery used for everyday purposes retained the decorative style known from funerary Food Vessels, but was made in more functional forms. Tubs, buckets, barrels and bipartite vessels have been found on domestic sites, with both bevelled and rounded rims, but so far these important assemblages lack a related radiocarbon chronology.

Cordoned and Collared Urns

In the study area, cinerary urns are well represented, and Longworth's (1961; 1970; 1984) primary and secondary series of Collared Urns and Cordoned Urns, so common in southern Scotland, are also present. They are usually found inverted and buried in pits or within a cairn, sometimes with a cover, and contain cremated human remains.

DISCUSSION

The ceramic sequence in the Milfield Basin follows the typical progression for the British Isles. The earliest form is the Early Neolithic Carinated Bowl, displaying a variety of sizes, rims that are out-turned or vertical, carinations, a high level of burnishing, and a general absence of decoration. The Impressed Ware assemblage, albeit small, appears to follow the local Meldon Bridge sub-style for the region, having the usual heavy rims, an external bevel on the collar, and a plethora of decorative motifs, as well as including some Mortlake and Fengate-type pots.

It seems that much of the difficulty involved in identifying Grooved Ware in the Milfield Basin has been due to there being several pieces which had been misclassified. Until Gibson's recent reassessment, and the dating scheme presented in this paper, the Neolithic-derivative pottery had been put on the Grooved Ware 'peg', making the overall Grooved Ware assemblage confusing and misleading. Now that these pieces have been removed, there is an obvious Grooved Ware tradition recognisable in the Milfield Basin, which brings the material into line with Grooved Ware assemblages found elsewhere in England and parts of Scotland.

This leaves us with an assemblage of pottery which may begin to explain how people in the Milfield Basin responded to the arrival of Beakers. The Neolithic-derivative material dates from the same period as the Beakers, but it is clearly a different type of ceramic. Whereas Beakers are thin-walled and fine-tempered, with a distinct shape, and are found largely in funerary contexts, the Neolithic-derivative material is coarse and gritty, tends to be bowl or vase-shaped, and is found at a variety of sites: settlements, 'henges', a double pit alignment,

and with burials. A relationship can be seen between these two types of ceramic in the additional use of sand as an inclusion, and some shared decorative motifs — the use of twisted cord, geometric shapes, grooved triangles, and rows of fingernail impressions. But there are also influences drawn directly from Grooved Ware traditions (see above). The Neolithic-derivative material also bears some resemblance to Impressed Ware. Both can have flared walls and small flat bases, a distinct high shoulder which creates a well-defined rim which can sometimes be heavy and moulded, gritty, friable fabric with large grit inclusions, a heavy use of cord impressions and geometric designs, as well as decoration on the inside, outside and top of rims, although the latter can also be found on some Grooved Ware vessels. These characteristics are so striking that it seems clear that Neolithic-derivative material represents an insular continuation of ceramic development amid the arrival of Beakers and it is these same features which appear to influence the subsequent local Early Bronze Age ceramic traditions. R. A. Smith (1910, 347) first linked Impressed Ware to Early Bronze Age pottery, particularly Food Vessels, based on the similarities in decoration and form, and this was reiterated several times, particularly by Isobel Smith (1954; 1974) throughout her career. Indeed, the decoration used on Neolithic-derivative material — particularly its placement on and inside the rim — the v-shaped profile of some of the pottery, and the large grit inclusions, are all characteristics seen in both Impressed Ware and Food Vessels. Moreover, the novel use of cordons to create a defined collar on the pot and the simpler, closed rim give some Neolithic-derivative pots an appearance that could potentially anticipate Collared and Cordoned Urns, whilst also recalling Fengate Ware.

Understanding the context of 'Neolithic-derivative' pottery cannot be satisfactorily achieved without discussing the introduction of Beakers into Britain. It raises questions about the nature of their introduction and how important they actually were to the people of Northumberland. Although Beakers have formed the focus of ceramic studies for what, until recently, has been an ill-defined period in British prehistory, the last 20 years of Beaker studies have seen more data emerge, particularly as radiocarbon dates have become more precise and plentiful: the period 2400–1800 cal BC has been separated out from the Neolithic and Early Bronze Age as its own distinctive 'Beaker period' or 'Chalcolithic' (Needham 2005; 2007). Until recently, the authors of most modern studies of Beakers have assumed that the pottery was part of a received cult package from Europe that did not necessitate much in the way of movement of people or incomers to Britain. With new scientific data in the form of strontium and oxygen isotope tooth enamel analysis, it is clear that some individuals, and probably groups of people, did move (Evans *et al.* 2006; Needham 2005; 2007; van der Linden 2007).

Beakers represent the first type of pottery to have been used on an international scale, particularly across significant bodies of water, since the Carinated Bowl tradition of the Early Neolithic. The huge geographical extent of their use and the consistency of the associated artefacts found in similar contexts (e.g. flexed inhumation burials) is startling, and so some have returned to the idea that it must represent a common belief system that could only have spread through the movement of people. Needham (2005, 209; 2007, 42) believes the archaeological evidence points to the initial movement of people followed by the regionalisation of their ideas.

Others have proposed that the idea of Beakers may have spread by much smaller migrations. Case (1976) originally argued that the first Beakers may have arrived in Britain through trade. Either their form, associated ideology or contents attracted locals or the regional styles developed through a '…compromise between identity and emulation' (Case 1995, 55). How-

ever, petrology has increasingly shown that very few pots were actually traded and the majority were made from local raw materials (Salanova 2001, 95–6). For this reason, Brodie (1997; 2001), Salanova (2001) and van der Linden (2007a) have all suggested that the spread of Beakers seems more akin to a fashion, but one which moved as knowledge with individuals, perhaps as marriage partners, who brought with them the 'know-how' to make Beakers.

Each of these explanations — migration, trade and marriage — find some support in the available evidence, but they are not sufficient to explain the spread of Beakers and related material culture package in all areas. For example, occupation took place on Ross Island in order to mine copper (O'Brien 2004), but North East England also saw an influx of Beakers and yet does not have a copper resource; Wessex was popular for trade through the beginning and end of Beaker use, and may have controlled access to the tin found in Cornwall, but the Paris Basin, which has good access via the Seine, has produced much less evidence for Beaker manufacture and use. Indeed, the evidence seems to refer back to Clarke's (1976, 461) statement that, 'A universal, Pan European, single factor explanation is unlikely to be a realistic hypothesis to account for the variability in local densities, settlement and domestic contexts, association and distribution patterns and varied time depths.'

Gibson (2007) suggests that there is more continuation than abrupt change with the arrival of Beakers. In Beaker burials we expect to see a single, flexed inhumation in a stone cist with a pot and assemblage of 'standard' artefacts — barbed and tanged arrowheads, flint knives, scrapers, copper awls, and so forth, all covered by a mound. This expectation, however, has led some to conclude that any burial with one or more of the expected elements is Beaker, whether or not there was a pot present or even a radiocarbon date available (Gibson 2007, 49). Gibson assesses all of the 'Beaker elements' and concludes that each of these can be found during the Neolithic. In fact, he believes the evidence holds that the true transition lies between the Early and Late Neolithic and simply increases in complexity into the Bronze Age (Gibson 2007, 47). 'It is my opinion that the 'Beaker burial', with its all-too-familiar pottery and artefact package, might therefore be regarded as a veneer which catches the eye and draws attention away from the chipboard beneath' (Gibson 2007, 49). Although there may be some validity in this observation as a long-term trend in prehistory there is no denying the significant changes that occur in the Beaker period. Within the Milfield Basin there is an extension of settlement, as suggested by artefact scatters from fieldwalking (Passmore and Waddington 2009), an increase of burials high into the surrounding uplands, and new kinds of burial practice evident. Furthermore, new kinds of flint tools were produced, and perhaps most importantly of all, metal was introduced. Indeed, it is metal and the knowledge of the rituals involved in obtaining it, working it and making things from it that could lie behind the 'Beaker cult'.

The presence of another style of pottery, contemporary with Beakers, but following local traditions could suggest that in north Northumberland there was a continuation of insular beliefs and customs in the face of new ideas associated with Beakers. It is pertinent to note at this point that the radiocarbon dates currently available for the Milfield henges all date to the Beaker period (Passmore and Waddington, in press). Henges are an insular form of monument; they have their origins in the Late Neolithic, but their *floruit* in the Milfield Basin in the Beaker period could conceivably be part of a spiritual response to the arrival of Beakers and any attendant cult practice, in a similar way to the pottery that recalls Late Neolithic traditions.

Within this context the 'Neolithic-derivative' material does not necessarily represent a new type of pottery, but the continuation of local traditions. It is a local group with a coarse fabric but which features elements taken from indigenous Neolithic forms that were adopted in new and creative ways. Beakers are primarily associated with funerary activity in Northumberland and there has only been a hint of their use on a possible domestic site by the discovery of some Beaker sherds in the sand dunes at Ross Links (Brewis and Buckley 1928). This is in contrast to the evidence for other regions, like the Netherlands, where a whole repertoire of Beaker material was adopted for domestic, ritual and funerary functions (van der Waals and Glasbergen 1955). It is in this context that 'Neolithic-derived' ceramics could have functioned amidst the influence of new ideas, fashions and people arriving from distant (or nearby) places.

CONCLUSIONS

Until recently the early prehistoric ceramic assemblage for Northumberland had been conflated into Neolithic and Early Bronze Age time slices. This meant that non-Beaker material that showed decoration reminiscent of Neolithic decorative styles was usually placed into a Grooved Ware or Early Bronze Age category as this provided the best fit at the time, as for example in the case of the material from Milfield North henge, Milfield North pit alignment and the Whitton Hill hengiform enclosure. However, recalibration and reconsideration of the dates associated with these assemblages, together with the new date from Whitton Park, reveals that this material is not contemporary with the dates now available for Grooved Ware *sensu stricto* in the area. Rather, this material is undoubtedly contemporary with Beaker ceramics. Closer inspection of these ceramics shows that although they share some of the decorative motifs and styles associated with both Impressed Ware and Grooved Ware, the decoration is usually rather poorly executed, is more infrequent and can lack the zoning typical on Neolithic forms. Furthermore, this material shows a distinctive fabric different to that of Grooved Ware, or indeed Beaker. This material includes forms that, typologically, appear to anticipate Food Vessels and Urns. Elsewhere in Britain similar material has been variously described as 'Domestic Beaker' or simply labelled 'Early Bronze Age', but it has not been recognised before in Northumberland. Now that a preliminary scientific dating sequence has been developed for the region it is hoped this will assist in unpicking the typological sequence, as well as providing a platform for future study of a ceramic tradition that has remained in the shadow of Beakers for too long.

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APPENDIX: TABLES

Table 1 Radiocarbon dates for Carinated Bowl and plain Neolithic pottery in Northumberland.

Laboratory Number	Material and context	$\delta^{13}C$ (‰)	Radiocarbon Age (BP)	Calibrated date (95% confidence)	Reference
Coupland					
OxA-10638	Hazelnut shell from pit 1 (context 19)	-23.0	4880±45	3760–3530 cal BC	Passmore and Waddington 2009
OxA-10692	Hazelnut shell from pit 1 (context 19)	-22.7	4910±40	3780–3630 cal BC	Passmore and Waddington 2009
OxA-6833	Hazelnut shell from pit 2 (context 21)	-22.3	5060±60	3980–3700 cal BC	Passmore and Waddington 2009
OxA-6832	Hazelnut shell from pit 3 (context 27)	-22.4	5090±60	4040–3710 cal BC	Passmore and Waddington 2009
Beta-96129	Charcoal from early deposit probably cut into by west droveway ditch	-25.0	5040±70	3980–3650 cal BC	Passmore and Waddington 2009
Beta-96130	Charcoal from early deposit probably cut into by west droveway ditch	-25.0	4950±70	3950–3630 cal BC	Passmore and Waddington 2009
OxA-10636	Hazelnut shell from early deposit probably cut into by west droveway ditch	-25.9	4895±45	3780–3630 cal BC	Passmore and Waddington 2009
OxA-10637	Hazelnut shell from early deposit probably cut into by west droveway ditch	-23.9	4895±40	3770–3630 cal BC	Passmore and Waddington 2009
Cheviot Quarry					
OxA-16097	Charred hazelnut shell from pit fill 051 containing Carinated Bowl	-26.5	4933±35	3790–3640 cal BC	Johnson and Waddington 2008
OxA-16068	Charred hazelnut shell from pit fill 052 containing Carinated Bowl	-24.2	4999±32	3940–3700 cal BC	Johnson and Waddington 2008
OxA-16069	Carbonised residue from Carinated Bowl sherd from pit fill 052	-27.2	4906±34	3770–3630 cal BC	Johnson and Waddington 2008
OxA-16162	Carbonised residue on Carinated Bowl from pit fill 051	-27.4	4870±40	3710–3530 cal BC	Johnson and Waddington 2008
Yeavering					
HAR-3063	Charcoal from pit outside W entrance, middle fill		4890±90	3940–3380 cal BC	Harding 1981
Thirlings					
OxA-16101	Posthole from post alignment, burnt bone	-21.1	4972±34	3910–3650 cal BC	Miket *et al.* 2008
OxA-16104	Posthole from poss trapezoidal structure, charred hazelnut	-23.4	4912±35	3780–3640 cal BC	Miket *et al.* 2008
HAR-1118	Pit, oak and hazel charcoal	-26.2	5230±110	4340–3780 cal BC	Miket *et al.* 2008
Bolam Lake					
Beta-117290	Pit, hazelnut	-25.0	4910±70	3930–3530 cal BC	Waddington and Davies 2002
Beta-117291	Pit, hazelnut	-25.0	4880±80	3910–3510 cal BC	Waddington and Davies 2002

Table 2 Radiocarbon dates for Impressed Ware Pottery in Northumberland and selected Scottish Sites

Laboratory Number	Material and context	$\delta^{13}C$ (‰)	Radiocarbon Age (BP)	Calibrated date range (95% confidence)	Reference
Cheviot Quarry					
OxA-16178	Pit, carbonised residue	-27.2	4148±32	2880–2580 cal BC	Johnson and Waddington 2008
OxA-16099	Carbonised residue from Impressed Ware sherd from pit MAP/F204	-27.4	4348±34	3090–2890 cal BC	Johnson and Waddington 2008
Thirlings					
OxA-16100	Pit, charred hazelnut	-25.2	4678±34	3630–3360 cal BC	Miket *et al.* 2008
HAR-6658	Charcoal, AML 757515, *c.* 50% hawthorn and hazel, from fairly large branches and timbers, pit, bulk charred wood	-26.1	4450±100	3500–2880 cal BC	Miket *et al.* 2008
OxA-16164	Posthole from possible trapezoidal structure, burnt bone	-25.6	4442±35	3340–2920 cal BC	Miket *et al.* 2008
HAR-1451	Pit, bulk oak and hazel	-25.9	4080±130	2920–2210 cal BC	Miket *et al.* 2008
HAR-1450	Charcoal: *c.* 20% hawthorn type (*Crataegus/Pyrus/Sorbus/Malus* sp), hazel (*Corylus*), from pit	-26.5	4270±100	3270–2570 cal BC	Miket *et al.* 2008
Meldon Bridge					
SRR-646	Oak, hazel and possible ash charcoal from pit B12 inside large timber enclosure	-25.1	4286±50	3020–2770 cal BC	Speak and Burgess 1999
SRR-647	Charred hazelnut shells from pit B12 inside large timber enclosure	-26.0	4240±60	2930–2630 cal BC	Speak and Burgess 1999
SRR-645	Charred indeterminate wood in pit B06 inside large timber enclosure	-26.5	4080±80	2890–2460 cal BC	Speak and Burgess 1999
SRR-643	Hazelnut and wood charcoal from pit B14 inside large timber enclosure	-25.6	4676 ±180	3910–2910 cal BC	Speak and Burgess 1999
SRR-644	Wood charcoal from pit B15 inside large timber enclosure	-27.2	4686±90	3650–3120 cal BC	Speak and Burgess 1999
GU-1053	Wood charcoal from pit S13 inside large timber enclosure	-25.2	4505±65	3490–2930 cal BC	Speak and Burgess 1999
GU-1054	Wood charcoal from pit S14 inside large timber enclosure	-25.1	4560±65	3510–3020 cal BC	Speak and Burgess 1999
GU-1055	Wood charcoal from pit S15 inside large timber enclosure	-25.1	4380±65	3340–2880 cal BC	Speak and Burgess 1999
GU-1056	Wood charcoal from pit N40 inside large timber enclosure	-25.5	4570±75	3620–3020 cal BC	Speak and Burgess 1999
GU-1052	Wood charcoal from pit N43 inside large timber enclosure	-25.4	4685±85	3650–3130 cal BC	Speak and Burgess 1999
GU-1057	Wood charcoal from pit N45 inside large timber enclosure	-25.5	4725±90	3700–3340 cal BC	Speak and Burgess 1999
Blairhall Burn					
Beta-73951	Hazelnut from fill of posthole 328	-25.0	4560±60	3500–3090 cal BC	Strachan *et al.* 1998

Table 3 Radiocarbon dates for Grooved Ware in Northumberland

Laboratory Number	Material and context	$\delta^{13}C$ (‰)	Radiocarbon Age (BP)	Calibrated date range (95% confidence)	Reference
Cheviot Quarry					
SUERC-11296	Charred hazelnut shell from pit fill 2168 containing Grooved Ware	-26	4250±35	2920–2760 cal BC	Johnson and Waddington 2008
OxA-16096	Charred hazelnut shell from pit fill 2168 containing Grooved Ware	-23.3	4177±33	2890–2630 cal BC	Johnson and Waddington 2008
OxA-16070	Charred hazelnut shell from pit fill 2133 containing Grooved Ware	-23.7	4152±31	2880–2600 cal BC	Johnson and Waddington 2008
SUERC-11295	Charred hazelnut shell from pit fill 2133 containing Grooved Ware	-24.4	4130±35	2880–2570 cal BC	Johnson and Waddington 2008
Milfield North Pit					
OxA-10634	Charred hazelnut shell from pit 1 lower fill (9)	-24.9	3997±38	2620–2460 cal BC	Passmore and Waddington 2009
OxA-10635	Charred hazelnut shell from pit 1 lower fill (9)	-23.2	3955±38	2570–2340 cal BC	Passmore and Waddington 2009

Table 4 Radiocarbon dates for Beaker pottery in Northumberland

Laboratory Number	Material and context	$\delta^{13}C$ (‰)	Radiocarbon Age (BP)	Calibrated date range (95% confidence)	Reference
Cheviot Quarry					
OxA-16163	Carbonised residue on beaker sherd from pit	-25.8	3625±40	2140–1880 cal BC	Johnson and Waddington 2008
Chatton Sandyford, Cairn 1					
GaK-800	Charred oak stakes from stakeholes for Beaker inhumation grave B1 in cairn 1		3620±50	2140–1880 cal BC	Jobey 1968
Wether Hill					
Beta-124785	Timber cist		3740±70	2400–1940 cal BC	ASUD 2000
AA-35524	Plank from side of timber cist	-25.6	3675±55	2210–1890 cal BC	Pete Topping
AA-35523	Plank from lid of timber cist	-26.2	3670±50	2200–1910 cal BC	Pete Topping
Cartington coffin					
GU-1648	Sample of wood from the outer growth rings of a hollowed out oak coffin associated with a now lost 'drinking cup' (ie. Beaker)		3790±65	2470–2020 cal BC	Jobey 1984
Low Hauxley 'Cairn' 1					
OxA-5553	Skeletal material from Cairn 1 associated with a Bell Beaker		3615±45	2140–1880 cal BC	Drury *et al.* 1995
OxA-5554	Skeletal material from Cairn 1 associated with a Bell Beaker		3630±55	2200–1880 cal BC	Drury *et al.* 1995

Table 5 Radiocarbon dates for Beaker period Neolithic-derivative pottery in Northumberland

Laboratory Number	Material and context	$\delta^{13}C$ (‰)	Radiocarbon Age (BP)	Calibrated date range (95% confidence)	Reference
Whitton Hill					
BM-2206	Charcoal from timber set in upper fill of ditch	-25.3	3740±50	2300–1980 cal BC	Miket 1985
BM-2265	Charcoal from timber set in upper fill of ditch	-26.2	3680±80	2300–1880 cal BC	Miket 1985
BM-2266	Charcoal from central burial (pit 28) inside hengiform enclosure	-25.9	3660±50	2200–1890 cal BC	Miket 1985
Milfield North henge					
HAR-1199	Indeterminate charcoal from internal pit C from layer above the pot	-26.2	3750±80	2470–1930 cal BC	Harding 1981
Milfield Village (Whitton Park)					
Beta-194560	Charred wood from short-lived specie in posthole of structure	-25.9	3630±40	2140–1880 cal BC	Waddington 2006
Milfield North Double Pit Alignment					
BM-1650*	Charcoal from layer 11, Pit 2 associated with Grooved Ware, sample 1978/128	-25.7	3740±50	2300–1980 cal BC	Harding 1981
BM-1652*	Charcoal from layer 12, Pit 2 associated with Grooved Ware, sample 1978/125	-25.4	3770±50	2350–2030 cal BC	Harding 1981
BM-1653*	Charcoal from layer 13, Pit 2 associated with Grooved Ware, sample 1978/124	-23.8	3610±80	2200–1740 cal BC	Harding 1981

* Published BM radiocarbon results known to be in error but for which no correction can be issued (Bowman *et al* 1990).

Table 6 Radiocarbon dates for Food Vessels in Northumberland

Site	Laboratory Number	Material and context	$\delta^{13}C$ (‰)	Radiocarbon Age (BP)	Calibrated date range (95% confidence)	Reference
Turf Knowe, tri-radial cairn	SUERC-4481	Indeterminate charcoal from deposit on which food vessel was sitting	-24.9	3010±40	1400–1120 cal BC	ASUD pers. comm.
Turf Knowe, North Cairn	AA-46486	Cremated bone from inside food vessel urn from central cist	-24.9	3860±45	2470–2150 cal BC	ASUD pers. comm.
Turf Knowe, North Cairn	SUERC-4485	Cremated bone from burial in food vessel in SE of cairn	-26	3360±35	1750–1530 cal BC	ASUD pers. comm.
Wether Hill Cairn	Beta-124784	Barley seed embedded in food vessel fabric		2200±60	400–50 cal BC	Topping 2001
Low Hauxley Pit Burial	SUERC-27330	Cremated bone from an unusual food-vessel type pot	-24.7	3470±60	1950–1620 cal BC	Waddington 2010
Milfield North henge, Pit C	HAR-1199	Indeterminate bulked charcoal associated with burial in bowl food vessel	-26.2	3750±80	2470–1940 cal BC	Harding 1981

Table 7 Radiocarbon dates for Collared Urns in Northumberland

Site	Laboratory Number	Material and context	$\delta^{13}C$ (‰)	Radiocarbon Age (BP)	Calibrated date range (95% confidence)	Reference
Birkside Fell ring cairn	Beta-119667	Ash charcoal, from within the urn and fill of pit in which it was situated	-25.0	3570±60	2130–1740 cal BC	Tolan-Smith 2005
Birkside Fell ring cairn	Beta-119668	Ash charcoal, from within the urn and fill of pit in which it was situated	-25.0	3510±60	2020–1680 cal BC	Tolan-Smith 2005
Kirkhill	SRR-133	Indeterminate charred wood associated with inverted collared urn containing cremations in Pit A		3242±90	1740–1310 cal BC	Miket 1974

Table 8 Radiocarbon dates for Food Vessel urns in Northumberland

Site	Laboratory Number	Material and context	$\delta^{13}C$ (‰)	Radiocarbon Age (BP)	Calibrated date range (95% confidence)	Reference
Kellah Burn	GrA-26545	Cremated bone from within urn		3650±40	2140–1900 cal BC	Brindley 2007
Howick Heugh	I-6970	Charred wood accompanying cremation 1 in rock fissure within stone ring cairn associated with urn		3390±90	1930–1460 cal BC	Jobey and Newman 1975
Well House Farm	GU-1340	Indeterminate charred wood from cist packing. No burial survived in the acid conditions but two Food Vessel Urns were recovered		3635±120	2400–1680 cal BC	Gates 1981
Whitton Hill Pit 28	BM-2266R	Indeterminate bulked charcoal associated with cremation burial in a Food Vessel Urn	-25.9	3960±130	2890–2040 cal BC	Miket 1981

Table 9 Posterior density estimates for the beginnings and endings of ceramic traditions, derived from the model described in fig. 1

	95% probability	*68% probability*
start_carinated & plain	*3815–3670 cal BC*	*3760–3705 cal BC*
end_carinated & plain	*3705–3625 cal BC*	*3685–3640 cal BC*
start_grooved ware	*3100–2710 cal BC*	*2955–2780 cal BC*
end_grooved ware	*2570–2245 cal BC*	*2550–2415 cal BC*
start_beaker	*2935–2810 (4%) or 2595–1915 (91 cal BC)*	*2200–1940 cal BC*
end_beaker		
start_EBA pottery	*3120–2150 cal BC*	*2390–2230 cal BC*
end_EBA pottery	*1395–505 cal BC*	*1350–1020 cal BC*

Table 10 Percentage probabilities of the relative order of the beginnings and endings of the ceramic traditions. The cells show the probability of the distribution in the left-hand column being earlier than the distribution in the top row. For example, the probability that end of use of Grooved Ware was before the start of use of Early Bronze Age pottery is 49.0%

Parameter	*start_ carinated_ &_plain*	*end_ carinated_ &_plain*	*start_ grooved_ ware*	*end_ grooved_ ware*	*start_ beaker*	*end_ beaker*	*start_ EBA_ pottery*	*end_ EBA_ pottery*
start_carinated_&_plain		100.0%	99.9%	100.0%	100.0%	100.0%	99.0%	100.0%
end_carinated_&_plain	0.0%		99.9%	100.0%	100.0%	100.0%	98.8%	100.0%
start_grooved_ware	0.1%	0.1%		100.0%	98.0%	100.0%	91.1%	100.0%
end_grooved_ware	0.0%	0.0%	0.0%		84.8%	99.8%	49.0%	100.0%
start_beaker	0.0%	0.0%	2.0%	15.2%		100.0%	13.9%	100.0%
end_beaker	0.0%	0.0%	0.0%	0.2%	0.0%		0.0%	96.7%
start_EBA_pottery	1.0%	1.2%	8.9%	51.0%	86.1%	100.0%		100.0%
end_EBA_pottery	0.0%	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	

Table 11 Posterior density estimates for the beginnings and endings of ceramic traditions, derived from the model described in fig. 3

Parameter	*95% probability*	*68% probability*
start_carinated & plain	*3840–3670 cal BC*	*3775–3710 cal BC*
end_carinated & plain/start_impressed	*3700–3615 cal BC*	*3675–3635 cal BC*
end_impressed/start grooved ware	*2850–2705 cal BC*	*2825–2730 cal BC*
end_grooved ware/start_beaker/non-beaker	*2565–2310 cal BC*	*2540–2410 cal BC*
end_beaker/non-Beaker	*1400–830 cal BC*	*1375–1140 cal BC*

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