

Centre for Archaeology Report 19/2001

**THE USE OF CEREAL GRAIN TEMPER IN A BRONZE AGE
VESSEL FROM WETHER HILL, NORTHUMBERLAND**

Wendy Smith

© English Heritage 2001

ISSN 1473-9224

The Centre for Archaeology Report Series incorporates the former Ancient Monuments Laboratory Report Series. Copies of Ancient Monuments Laboratory Reports will continue to be available from the Centre for Archaeology (see back cover for details).

THE USE OF CEREAL GRAIN TEMPER IN A BRONZE AGE VESSEL FROM WETHER HILL, NORTHUMBERLAND

Wendy Smith

Summary

This report presents the results of the archaeobotanical analysis of both preserved charred grain and grain impressions in the fabric of a Bronze Age vessel recovered from excavations of pit at Wether Hill, Northumberland.

Keywords

Ceramic
Environmental Studies
Grain, Carbonised
Plant Remains
Pottery

Author's address

Wendy Smith: English Heritage Centre for Archaeology, Fort Cumberland, Fort Cumberland Road, Eastney, Portsmouth, PO4 9LD. Telephone: 02392 856781. Email: wendy.smith@english-heritage.org.uk

Many CfA reports are interim reports which make available the results of specialist investigations in advance of full publication. They are not subject to external refereeing, and their conclusions may sometimes have to be modified in the light of archaeological information that was not available at the time of the investigation. Readers are therefore advised to consult the author before citing the report in any publication and to consult the final excavation report when available.

Opinions expressed in CfA reports are those of the author and are not necessarily those of English Heritage.

1 Introduction

The 1999 excavations of a Beaker and Bronze Age period burial pit at Wether Hill, Northumberland by the Northumberland Archaeological Group resulted in the recovery of a number of sherds from two late Neolithic/ Early Bronze Age beakers and three Bronze Age food vessels. Sherds from a small bipartite vase food vessel, which clearly contained charred grain preserved *in situ* (Figure 1) and seed impressions (Figures 2-3), were sent to the English Heritage Centre for Archaeology for archaeobotanical analysis. During an initial assessment of this material, Gill Campbell extracted one charred, straight, hulled barley (*Hordeum* sp.) grain and one indeterminate cereal grain from the vessel (Topping and McOmish 2000: 4). These were submitted for ¹⁴C dating and dated to 3550±50 BP [cal BC 2020-1745] (Beta-139947) (Topping and McOmish 2000: 5).

2 Method – seed impressions and archaeobotanical analysis

Examination of the Wether Hill sherds established that most observable seed impressions appeared on the external surface or within the matrix of the sherds. Since so many preserved charred grains and seed impressions were present on several sherds, each sherd examined was given an individual number.

As a result of the initial observations on the location of incised designs/seed impressions, it was determined that making casts of these features would have limited effect on the internal surfaces, which may still preserve residues (see below). There are two exceptions to this basic methodology. Cast impressions were made on the internal surface of a rim sherd WH99-001 and on part of the base of a vessel on sherd WH99-008. No obvious residue was detected on the internal surface of WH99-001. The internal surface of sherd WH99-008 was quite damaged at the base, and therefore unlikely to have preserved the original surface. Since the internal walls of the body of the vessel remained untouched on this sherd, it was determined that taking impressions from the internal face at the base of this vessel would not impair any subsequent residue analysis. In addition, a second sherd (WH99-007) clearly formed the remainder of the base of this vessel and did not have casts made on its internal surface. Therefore, a portion of the intact internal surface of the base of this vessel is still available for any residue analysis work.

Coltène lab-putty, an elastomeric putty typically used for dental casts, was used to make positive casts of seed impressions and/or incised designs on the vessel. Preparation and use of the Coltène lab-putty followed the manufacturer's instructions. In total, eleven sherds (out of an approximate total of 40 sherds) were selected to have casts made of impressed/incised designs, pits, or obvious cereal grain impressions. Examples of some the barley grain impressions made using this method are presented in Figures 4-5.

In addition to collecting cast impressions from the vessel, the soil from the interior of the vessel was also available for study. Since there was a possibility that the soil may preserve microscopic evidence of the material contained in the vessels, it was dry sieved over a 1mm, 500µm and 250µm mesh sieved.

The >1mm, >500µm and >250µm fractions were sorted under a low-power, binocular microscope at a magnification of x12 for charred plant remains. All soil less than 250µm was not sorted for charred plant remains, but was retained.

Identifications were made using a low-power, binocular microscope at magnifications of x25 to x50 and in comparison to the English Heritage comparative seed collection housed at the Centre for Archaeology, Fort Cumberland, Portsmouth. Nomenclature follows the traditional binomial system presented in Zohary and Hopf (1994: 24 and 58, Tables 3 and 5).

3 Analysis of the vessel

The first stage in the analysis was simply to study the various fragments (or sherds) of the vessel in order to determine whether any residues were present and where the location of seed impressions or preserved charred grain occur on the vessel.

3.1 Presence of residues

All vessel fragments were scanned by eye for patches of soil or other material adhering to the vessel. Those sherds with material adhering to the vessel were examined under a low-power, binocular microscope at magnifications between x10 to x25 to determine if the accretions were just soil or something else. Although soil is adhering to several sherds, no obvious patches of 'residue' were observed to be adhering to the interior of the vessel.

3.2 Location seed impressions or in situ charred grain

During the process of examining the vessel sherds to determine how many vessels were present and whether any residues adhering to the sherds were obvious, the location of any intentionally decorative pits, seed impressions, or *in situ* charred grain (Figure 1) was also noted. The horizontal impressed or incised designs on these sherds were always on the external surface. Many obvious 'pits' or seed impressions exist on these sherds, but primarily occurred either on the exterior (Figure 2) or within the matrix of the vessels fabric (Figure 3). However, a few impressions were observed on an internal surface, as well. The location of seed impressions is also recorded in Table 1.

4 Results

The archaeobotanical results from the both the fill of the vessel and eleven vessel sherds studied is presented in Table 1. The vast majority of plant impressions on the Wether Hill food vessel sherds were either on the exterior or within the matrix of the vessels' walls (see Table 1). All but two impressions (from sherd WH99-008) are of cereal grain and all of the charred plant remains recovered are cereal grain, with the exception of one which could be either cereal grain or large grass. Two

impressions from WH99–008 did not form discernible casts and, therefore, it is not possible to determine if these casts are of smooth, rounded gravel or unidentified seeds.

In most cases, it was possible to identify the grain to barley (*Hordeum* sp.) but, most likely as a result of the coarse fabric used in the vessel, it often was not possible to determine whether hulled or naked barley was present. In addition, no determination could be made as to whether the barley grains are from two-rowed or six-rowed varieties.

5 Discussion

Two issues are particularly worth discussion – the significance of the location of impressions and of the apparently exclusive use of barley grain for temper.

5.1 Significance of the location of impressions

Analysis of the seed impressions from the Wether Hill Bronze Age vessel was intended to determine if the seed impressions were part of the overall design of the vessel or the temper. In most cases, impressions visible on the exterior of the vessel nearly completely preserved the entire grain. This suggests, that the grain was either intentionally pushed deeply into the vessel or was incorporated into the clay as temper for the vessel. The recovery of five additional seed impressions located completely within the matrix of the sherds (only appearing at breaks or where a surface had eroded away) suggests that cereal grain was intentionally used as temper for the vessel, and has no apparent decorative function.

The presence of cereal grain impressions in British pottery is known to occur from Neolithic through Anglo-Saxon times (e.g. Alvey 1978, 1987; Anonymous 1937; Donaldson 1981a, 1981b; Hinton 1982, 1987; Hubbard 1986; Jones 1980; Murphy 1982, 1988; Renfrew 1965; van der Veen, M. 1984; 1993). Possible explanations for the presence of cereal grain impressions include accidental inclusion of food or inclusion of plant material for decorative purposes, as well as the use of plant remains for temper. Peter Murphy (pers. comm.) has suggested ‘that craftsmen and women are generally very careful with their raw materials, so as to produce a good sound artefact’ and, therefore, would argue that the incorporation of plant material as temper was intentional.

In an example of Anglo-Saxon pottery from the site of Mucking with similar locations of impressions, van der Veen (1993: 81) suggested that ‘[t]he presence of grain impressions on the outside, inside, and breaks of the pottery sherds indicates that the plant remains were deliberately incorporated as a tempering agent, rather than accidentally incorporated from food remains scattered on the surface on which the pots were built’. She also observed that ‘[t]he incorporation of complete grains must have weakened the pottery fabric, as the grains [left] relatively large holes behind’ (van der Veen, M 1993: 81). However, this weakening effect would only result if there was a high proportion of grains or other organic voids present (pers. comm. Alex Gibson).

The Wether Hill food vessel was recovered from a grave and, therefore, there is high potential to imbue the inclusion of cereal grain temper with a 'ritual' meaning directly related to funerary practice. Most vessels with seed impressions are recovered from Neolithic and Bronze Age burial contexts (e.g. Alvey G. 1987; Anonymous 1937; Donaldson 1981a), as well as burials associated with causeway camps (e.g. Murphy 1982) and henge monuments (e.g. Donaldson 1981a, 1981b). Since most Neolithic through Bronze Age pottery comes from such contexts, this pattern is 'hardly surprising' (pers. comm. Alex Gibson). However, we must not rule out a more prosaic reason behind the inclusion of cereal grain temper in vessels.

The Wether Hill vessel was clearly a coarse ware fabric. A tempering agent such as plant material may have been essential to the production of the vessel. Addition of temper (including plants) helps clays which are overly plastic to retain their shape by 'allowing water to evaporate more freely' (Gonen 1973: 18). Gonen (1973: 18) states that tempering agents help 'reduce excessive shrinkage, secure even drying, and lessen the risk of cracking.' Certainly, it is clear that inclusions of small pebbles and gravel <1 mm² exist throughout the matrix of this vessel and that the vessel fabric is quite friable and, therefore, not made of an 'ideal' pottery clay. The inclusion of plant material as temper may have simply been necessary in order to improve the chances of a successful pottery firing, by providing a means for water to escape from the clay during pottery production.

5.2 Significance of the use of barley grain as temper

The well-preserved impressions and charred grain from the Wether Hill vessel were all identified as barley. As early as 1952, Hans Helbaek (1952: 204-5) examined the 231 seed impressions available at that time and determined that there is a clear change in the type of cereal grain impressions between the Neolithic and Bronze Age. In the Neolithic, archaic hulled wheat (primarily emmer – *Triticum dicoccum* Schübl.) predominates; whereas, in the Bronze Age barley (*Hordeum* sp.) grain impressions are most dominant. At present it is not clear whether this change is significant, perhaps reflecting a change in the treatment of cereal crops. For example, Jones (1980: 61 citing Hubbard 1975) suggests that 'the sharp decrease in the frequency of impressions of emmer wheat in the Bronze Age, may reflect its careful storage for human consumption, in contrast to barley which, as animal feed, would be more likely to get scattered around the site and incorporated into pottery'.

6 Conclusion

Cereal grain impressions were found throughout (i.e. within the matrix, and on the external and internal surfaces) the Wether Hill food vessel fabric. This suggests that the vessel was made up of clay that included cereal grain used as temper. In all cases where it was possible to identify the grain to genus level, barley (*Hordeum* sp.) grain was identified. In a few cases it was possible to determine that the barley grain was hulled.

The inclusion of cereal grain temper does appear to be intentional, but whether this had a ‘ritual’ purpose or was for more prosaic reasons is not clear. What is clear from this research, however, is that archaeobotanists working with seed impressions do need to include information on the basic location of the impressions. The location of plant impressions clearly is crucial in order to determine whether the seeds were accidentally incorporated (e.g. Hubbard 1986), were used as part of the overall decoration of the vessel, or were intentionally incorporated as temper within the clay.

Figure 1 Charred barley (*Hordeum* sp.) grain preserved *in situ* within the matrix of sherd WH99-009



Figure 2 Impression of ventral side of barley (*Hordeum* sp.) grain on external wall of sherd WH99-002



Figure 3 Indeterminate cereal/ large grass (*Poaceae*) impression in matrix of sherd WH99-003



Figure 4 Positive cast of the dorsal side of a hulled barley (*Hordeum* sp.) grain from sherd WH99-011



Figure 5 Positive cast of the ventral side of a barley (*Hordeum* sp.) grain in sherd WH99-009



Table 1 Results of archaeobotanical analysis of charred plant remains and seed impressions from the Wether Hill Bronze Age food vessel

CONTEXT WH99 3:5 006									
Vessel Fill Or Sherd Number	CARBONISED SEED				SEED IMPRESSION				
	<i>Hordeum</i> sp. – hulled grain (hulled barley)	<i>Hordeum</i> sp. – grain (barley)	cf. <i>Hordeum</i> sp. – grain (???) barley)	Indeterminate POACEAE cereal grain/ large grass	<i>Hordeum</i> sp. – hulled grain (hulled barley)	<i>Hordeum</i> sp. – grain (barley)	cf. <i>Hordeum</i> sp. – grain (???) Barley)	Indeterminate POACEAE cereal grain/ large grass	Indeterminate – possibly seed
Vessel Fill ¹	-	1	-	-	-	-	-	-	-
Removed from sherds by Gill Campbell ²	1	-	-	1	-	-	-	-	-
Sherd WH99 – 001	-	-	-	-	-	-	1e	1i	-
Sherd WH99 – 002	-	-	-	-	-	1e	-	-	-
Sherd WH99 – 003	-	-	-	-	-	-	-	1m	-
Sherd WH99 – 004	-	-	-	-	1m	-	-	-	-
Sherd WH99 – 005 ³	-	-	-	-	-	-	-	-	-
Sherd WH99 – 006	-	-	-	-	-	-	-	-	-
Sherd WH99 – 007	-	-	-	-	-	-	1m	-	-
Sherd WH99 – 008	-	-	-	-	-	-	-	-	2m
Sherd WH99 – 009	-	1m	1m ⁴	-	-	1e	-	-	-
Sherd WH99 – 010	-	-	-	-	-	-	-	-	-
Sherd WH99 – 011	-	-	-	1e	1e	-	-	-	-
TOTAL	1	2	1	2	2	2	2	2	2
OVERALL TOTAL	6				10				

Key to codes used for location of charred grain or impressions on vessel: e = external, i = internal and m = matrix.

¹ Vessel fill (context WH99 3:5 006) was 100ml in volume. The sample was dry sieved, in order to protect any possible residues that might be present.

² G. Campbell (pers. comm.) collected and identified one loose grain and one *in situ* grain in order to supply material for ¹⁴C dating. She did not record the location of the *in situ* grain at the time.

³ Sherds WH99–005, –006 and –010 did not produce seed impressions.

⁴ The grain is still embedded in the sherd and it was only possible to see a small portion of the grain. On the basis of what is visible, the charred grain does compare favourably with barley.

Acknowledgements

Assessment of the charred plant remains and seed impressions from the Wether Hill Bronze Age food vessel was funded by English Heritage. I am indebted to Alex Gibson for confirming that the sherds were all from the same vessel and to Peter Topping for providing background information for the site. I also would like to thank Gill Campbell for assisting in some of the identifications presented here, Jen Heathcote for providing the Gonen reference, and Peter Murphy for generally discussion seed impressions and suggesting several of the references included here. I am particularly grateful to Gill Campbell, Alex Gibson and Peter Topping for their helpful comments on an earlier draft of this report. Finally, I most grateful to Roger Wilkes for photographing Figures 1-5.

References

- Alvey, R 1978 'Grain impressions' pp. 54-5 in de Brisay, K (ed) 'The excavation of a red hill at Peldon, Essex, with notes on other sites'. *Antiquaries Journal*, **58**, 73-6
- Alvey, R 1987 'Plant impressions' p. 39 in Chowne, P and Lane, T (eds) 'Bronze Age cremation cemeteries at Old Somerby and Ropsley and Humby'. *Lincolnshire History and Archaeology*, **22**, 35-40
- Anonymous 1937 [identification of seed impression], in Mears, J B (ed) 'Urn burials of the Bronze Age at Brackmont Hill, Leuchars, Fife'. *Proceedings of the Society of Antiquaries for Scotland*, **71**, 252-78
- Donaldson, A 1981a 'Grain impression' p. 133 in Harding, A F (ed) 'Excavations in the prehistoric ritual complex near Milfield, Northumberland'. *Proceedings of the Prehistoric Society*, **47**, 87-135
- Donaldson, A 1981b [identification of seed impression] p. 48 in Gates, T (ed) 'A food vessel burial from Well House Farm Newton, Northumberland'. *Archaeologia Aeliana (5th Series)*, **9**, 45-50
- Gonen, R 1973 *Ancient Pottery*. (Cassell's Introducing Archaeology Series, Volume 2). London: Cassell
- Hinton, P 1982 'Analyses of seed and pot impressions' in Drewett, P L (ed) *The archaeology of bullock Down, Eastbourne, East Sussex: The development of a landscape*. Sussex Archaeological Society Monograph, **1**, 15, Lewes: Sussex Archaeological Society
- Hinton, P 1987 'Seed impression' p. 65 in Rudling, D R (ed) 'The excavation of a Late Bronze Age site at Yapton, West Sussex, 1984'. *Sussex Archaeological Collection*, **125**, 51-67
- Hubbard, R N L B 1975 'Assessing the botanical component of human paleo-economies'. *Bulletin of the Institute of Archaeology, University of London*, **12**, 197-205
- Hubbard, R N L B 1986 'The cereal impression and some comments on the interpretation of such evidence' in O'Connell, M (ed) *Peters Sports Field, Engham. Excavation of a Late Bronze Age/ Early Iron Age site*. (Surrey Archaeological Society Research Monograph 10). Guildford: Surrey Archaeological Society, microfiche 44-6
- Jones, M 1980 'Carbonised cereals from grooved ware contexts'. *Proceedings of the Prehistoric Society*, **46**, 61-3
- Murphy, P 1982 'Impressions of plant remains' in Case, H and Whittle, A (eds) *Settlement patterns in the Oxford region; Excavations at the Abingdon causewayed enclosure and other sites*. Council for British Archaeology Research Report 44). Oxford: Council for British Archaeology and Department of Antiquities, Ashmolean Museum, 47-9

- Murphy, P 1988 'Botanical evidence (summary)' in Healy, F (ed) *The Anglo-Saxon Cemetery at Spong Hill, North Elmham, Part VI: Occupation during the seventh to second millennia BC*. (East Anglian Archaeology Report 39). Dereham: The Norfolk Archaeological Unit, 103 and microfiche Appendix III
- Renfrew, J 1965 'Grain impressions from the Iron Age sites' pp. 10-11 in Cars'ter, M D (ed) 'Aldwick, Barley: recent work on the Iron Age sites'. *Proceedings of the Cambridge Antiquaries Society*, **58**, 1-11
- Topping, P and McOmish D 2000 'Excavations at Wether Hill, Northumberland, 1999: Final Interim Report', *NAGNews: The Newsletter of the Northumberland Archaeological Group (May 2000 edition)*
- van der Veen, M 1984 *Pottery impressions from Thorpe Thewles*. (Ancient Monuments Laboratory Report, Old Series, 4372). London: English Heritage, Ancient Monuments Laboratory
- van der Veen, M 1993 'Grain impressions in early Anglo-Saxon pottery from Mucking' in Hamerow, H (ed) *Excavations at Mucking. Volume 2: The Anglo-Saxon settlement*. (English Heritage Archaeological Report 21). London: English Heritage, 80-81
- Zohary, D. and Hopf, M. 1994 *Domestication of plants in the Old World: The origin and spread of cultivated plants in West Asia, Europe and the Nile Valley*. Oxford: Clarendon Press