EXPLORING THE SIGNIFICANCE OF BEAKER POTTERY THROUGH RESIDUE ANALYSES

Summary. Unlike other components of the Bell Beaker assemblage, Beaker pottery itself lacks an intrinsic value since fabric analyses have demonstrated that it was locally produced. It is thought, therefore, that it was the contents, rather than the container, which were valuable. Traditionally, Bell Beakers have been said to contain alcoholic beverages which were consumed in the course of male feasting ceremonies. However, whilst beer and mead have been identified from certain examples, not all Beakers were drinking cups. Some were used as reduction pots to smelt copper ores, others have some organic residues associated with food, and still others were employed as funerary urns. It is suggested here that a symbolic connection can, however, be observed, since these activities all imply some kind of transformation.

INTRODUCTION

The Bell Beaker phenomenon is one of the most intriguing horizons in European Prehistory. It stretches across a vast territory in which different groups can be distinguished. Over the last century a number of hypotheses have been proposed to explain its spread but none seems to be totally convincing. Its most distinctive artefact is the Beaker pottery which frequently appears in grave goods assemblages along with other items like copper daggers and Palmela points, flint arrowheads, stone wristguards, V-perforated buttons and, occasionally, gold ornaments. Unlike other components of such assemblages, Beaker pottery lacks intrinsic value. Instead, it is thought that it was contents, rather than the container, which were valuable. The results obtained from recent residue analyses carried out on Beaker sherds are presented here, with the aim of shedding some light on the question of the function of these vessels.

WHAT WERE BELL BEAKERS USED FOR?

Traditionally Bell Beakers have been related to the consumption of liquids, hence their name (Abercromby 1912). According to Childe (1925), not only might they have contained alcoholic beverages, but these drinks were also supposed to play a significant role in the establishment of the supremacy of the Beaker users over the territories into which these people
In 1929 traces of mead were detected inside a birch-bark bucket deposited in the Bronze Age burial of a young woman in Egtved, Denmark (Thomsen 1929), and since then Bell Beakers have been interpreted in a similar way as cups for drinking beer or mead in the course of male feasting ceremonies (Sherratt 1987; 1991). The rapid spread of this ceramic type and the items related to it were seen as evidence of an alcohol drinking ritual, similar to the Peyote Cult in North America, centred on the consumption of that hallucinogenic cactus (Burgess and Shennan 1976). Additional support for the idea of Beaker use in drinking rituals comes from the Ciempozuelos group in Iberia, one of the late regional styles there, where hemispherical bowls and shouldered bowls are often found with Beakers in what seem to be ‘drinking sets’ since, while sizes may differ between ‘sets’, the size ratio between the vessels remains fairly consistent (Delibes 1977, 89).

These ideas were firmly supported by the discovery of mead in the Beaker deposited in a burial cist at Ashgrove belonging to an adult male (Dickson 1978) which confirmed the importance of alcohol in Beaker rituals. These might also be connected, according to Andrew Sherratt (1987; 1991), to the consumption of Cannabis, hence the cord impressions on some of these vessels as a means to emphasize the value of this plant. Likewise, other authors have suggested the relation between Beakers and altered states of consciousness. Several years earlier, Scott (1977) had considered the function of Beaker pottery in the celebration of a ritual involving the use of the hallucinogenic fly agaric (Amanita muscaria) [after ingesting it, the psychotropic properties of the mushroom remain unaltered in the urine of the consumer, something that a number of traditional Siberian tribes have known for a long time (Wasson and Wasson 1957)] suggesting that Beaker pottery might have been used to collect the urine of people under the effects of the mushroom. This idea did not, however, arouse much interest.

In recent years, additional residue analyses have been carried out. They show that Beaker pottery was used to consume alcohol and drugs on some occasions. However as A Gibson notes, Beakers themselves are not the best designed of drinking vessels, perhaps intentionally because they ‘imbued their users with a certain amount of kudos should they manage to drain the vessel without spilling any of its contents. An intentional by-product of these drinking challenges is, of course, an increased rate of intoxication. It is therefore obvious that function and design may not always be logically linked’ (Gibson 2002, 91–2). Even if the design of some Beakers (handled pots being the most representative) can indicate their relation to liquids, the wide variety of shapes, sizes and capacities points towards other functions. Indeed, other substances have also been detected suggesting a diversity of uses apart from drinking cups (Fig. 1).

**Drinking cups for alcoholic beverages**

The analysis of the Beaker found at Ashgrove revealed the presence of pollen from the lime tree (Tilia cordata) and possibly meadowsweet (Filipendula ulmaria), among other species, which was interpreted as the residues of a drink containing honey, perhaps mead or sweetened ale (Dickson 1978). More recently R Tipping (1994) has considered other options but nonetheless concludes that Dickson’s hypothesis is the most reasonable.
Despite this controversial finding, others support the interpretation of Beakers as drinking vessels (Fig. 2). Residues of alcoholic brews have been identified from several Beakers from Spain. In the burial cave of Calvari d’Amposta (Amposta, Tarragona), one of the Maritime Beakers (Herringbone variety) deposited in one of the five undisturbed graves located inside showed the presence of the alkaloid hyoscyamine and traces of beer. This highly psychotropic alkaloid is found in several members of the Solanaceae family, including henbane (Hyoscyamus niger), deadly nightshade (Atropa belladonna), mandrake (Mandragora officinarum), woody nightshade (Solanum dulcamara) and black nightshade (Solanum nigrum), all of which belong to the European flora. This residue seems, therefore, to indicate that the pot was filled with a hallucinogenic beverage consisting of beer to which some Solanaceae member was added.
In the funerary mound known as Túmulo de la Sima (Miño de Medinaceli, Soria) three Maritime Beakers deposited in the burials of two adults, possibly female, contained beer (Rojo et al. 2005). One was decorated according to the ILV pattern; the other two, discovered in the same grave, showed different motifs: one was ornamented in the MHV fashion, and the other was an atypical vase decorated with impressed lines in a MLV fashion. Likewise, beer has been detected in another Maritime Beaker (MHV variety) found in a severely disturbed Beaker grave dug in the barrow covering the collective tomb of La Peña de la Abuela (Ambrona, Soria), located nearby (ibid.).

Not only has alcohol been found in Maritime Beakers, but also in other vessels belonging to one of the late regional groups in Iberia, the Ciempozuelos style. In the cemetery of rock-cut tombs of Valle de las Higueras (Huecas, Toledo) beer has been located in a Ciempozuelos bowl deposited in one of the secondary chambers of rock-cut tomb 3 where two male adults had been buried. In another of the secondary chambers of the same tomb, where a collective burial was found, one of the 21 plain vessels contained traces of mead (Bueno et al.

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2 We are grateful to Dr Primitiva Bueno Ramírez for informing us of this finding which was presented at the International Congress on Beer in Prehistory and Antiquity, held in Barcelona (Spain) between the 4th and the 6th of October 2004. Further details can be found in the proceedings of this conference which will be published in the British Archaeological Reports Series.
2005). In addition, residue analyses have revealed the presence of animal fats in vessels from the same deposit, as we shall see later.

The pit with Beaker material at the site of La Calzadilla (Almenara de Adaja, Valladolid) is not strictly a grave but it must be linked to mortuary practices since two human ribs were discovered at the bottom. Among the rich Beaker materials deposited there (many fine Beaker pots, including a Ciempozuelos bowl with symbolic decoration on the outside) a Ciempozuelos bowl yielded beeswax and traces of cereals, although it is difficult to determine whether the vessel was used for mead consumption, processing of honey or beeswax, or whether beeswax was applied as a sealant to the vessel (Guerra forthcoming a). So far the only finding of alcohol in a Beaker vessel not coming from a mortuary context is that of La Loma de la Tejería (Albarracín, Teruel), a small mining camp related to the extraction of copper ores (Rodríguez and Montero 2003), where beer has been found in several Ciempozuelos sherds (Montero pers. com.)³.

Pots for provision of food and storage

Generally speaking, Beaker pottery is a fine ware whose normal capacity ranges between 500 and 2000 cc, but it also includes larger pots, simply decorated and roughly made, whose capacities can be as much as 20 litres (Case 1995). In Iberia these giant vessels make up a distinctive category, the so-called Silos style (Harrison and Mederos 2001). Those supporting the hypothesis of Beakers as drinking vessels consider these huge containers might have been passed around among the participants of communal ceremonies but this argument has been criticized ‘as the fundamental premise of the “cult package” hypothesis is that the Beaker was for the use of an individual’ (Brodie 1998, 47). It has also been proposed that they could have been used for preparing the brews (Garrido 2005, 40).

Nevertheless we should bear in mind that some evidence suggests that not all Beakers held liquids (Case 1995, 63). In grave 28 in the Round Barrow at Barnack, Cambridgeshire, a viscous and yellowish substance, similar to porridge, had oozed from a Beaker deposited near the feet of the interred male, reaching his left foot bones, although the substance has not been identified (Donaldson 1977, 208, 227, 230, fig. 8). Organic matter has also been found with an unburnt flint scraper from a small Beaker within a larger one at Yarnton, Oxfordshire (Case 1995, 63). In cist 2 at Broomed, Aberdeenshire, an antler ladle was laid inside a Beaker in which some bones and a black substance were noticed (Davidson 1869, 117), as if it was a scoop for serving a thick gruel or a stew (Sheperd 1986, 10). Likewise, the Corded Beaker from Tusculum, North Berwick, had a black crust adhering to its body on the inside (Cree 1908, 271).

A number of Beakers from the Netherlands are known to contain burnt food substances, as can be observed in Aartswoud I (Iterson Scholten and de Vries-Metz 1981, 117, 128). With this in mind, and given the lack of evidence for considering these vessels as drinking pots, one may conclude that in this area Beakers might have been used for preparing and serving food (van der Beek and Fokkens 2001, 305). This is also the case for other regions of Europe. The plain carinated bowl from El Túmulo de la Sima contained animal fat (Garrido et al. 2005, 445). A similar residue was found in a couple of plain vessels from rock-tomb 3 at El Valle de las

³ We would like to thank Dr Ignacio Montero Ruiz for communicating to us this information which was presented at the International Congress on Beer in Prehistory and Antiquity, held in Barcelona (Spain) between the 4th and the 6th of October 2004. See previous note.
Higueras, where a fish dish was also detected in a plain plate from the same deposit (Bueno et al. 2005, 75–7).

The finds of animal bones and cattle skulls in Beaker tombs might then be interpreted as the leftovers of choice pieces of meat (Harrison 1980, 55). The best example of this comes from the Beaker period Round Barrow at Irthlingborough (Stanwick, Northamptonshire) where parts of at least 40 cattle, together with the skulls of at least 145 cattle, were deposited over the tomb of a man (Davis and Payne 1993). The paleonutritional analysis of skeletal remains from the Beaker site of Aldeagordillo (Ávila, Spain) has revealed that the level of animal protein is higher than that of the samples from the Early Bronze Age site of El Tomillar, located nearby (Trancho et al. 1996). It can be assumed, therefore, that the users of Beaker pottery might have enjoyed a select diet or, at least, that their burial rites included the celebration of feasts with special meals possibly served in these vessels.

As large Beakers are usually considered to be storage jars owing to their capacity and their frequent occurrence in settlements, it is difficult to see this pottery as a fine ware. Nevertheless we should not forget the importance of control over surplus in prehistoric societies since some individuals could enhance their status by the management of resources (Barker and Gamble 1985), and the role that giant Beakers might have played in storage of the surpluses of production. Their owners would have boasted of their wealth through the display of their possessions and intentionally decided to decorate their storage jars according to the patterns of the finest ware, namely Beaker pottery.

Reduction pots for smelting copper ores

A handful of crucible fragments, encrusted with copper slag on their interiors and decorated with Beaker patterns on the exterior, have been found in situ in several sites in south-western Europe (Fig. 3). This is very interesting since copper metallurgy was thought to be the driving force behind the spread of Beakers over nearly all of Europe (Castillo 1928; Childe 1925). At least this seems to be the case in the British Isles where the copper extraction at Ross Island (Co. Kerry, Ireland) is associated with the occurrence of Beakers there (O’Brien 1995). In other parts of Europe a strong link between copper metallurgy and Beakers can also be observed. The mining camp of La Loma de la Tejería has already been mentioned but there are other examples. In settlement sites such as Zambujal (Torres Vedras, Portugal) (Kunst 1987, 188–9) or El Ventorro (Villaverde, Madrid, Spain) (Priego and Quero 1992) Beaker pottery remarkably tends to cluster in metalworking areas. However, a thriving metalworking tradition had existed in Iberia since pre-Beaker times and some evidence suggests that metallurgy could have developed independently as early as the fifth millennium BC in south-eastern Spain (Montero and Ruiz-Taboada 1996).

The use of Beaker vessels as crucibles in the process of copper ore reduction has been reported albeit infrequently. This was first observed at El Ventorro where two Ciempozuelos sherds from one of the huts had copper slag on their interior (Harrison et al. 1975, 273). Since then other Beakers with copper residues on their interior have been found: one Maritime sherd and one comb-impressed fragment belonging to the Carmona complex from El Acebuchal (Sevilla, Spain) (Harrison et al. 1976, 90, 94, figs. 9: 25a and 25: 132); two incised sherds in a chequered pattern, possibly from the same bowl, at the workshop area in the rock-shelter of Son Matge (Valldemosa, Mallorca, Spain) (Waldren 1979, 53); a couple of incised sherds from two bowls of the Pyrenaean style at the workshop of La Bauma del Serrat del Pont ( TORTELLÀ, Gerona,
Spain) (Alcalde et al. 1998); three incised sherds of the Pyrenaean style at the settlement site of Travers des Fourches (Veyrac, Villeveyrac-Hérault, France) (Montjardin 1996). All these examples suggest that Beakers were also used as reduction pots to smelt copper ores.

Funerary urns

In the middle of the third millennium BC Beaker pottery was the funerary ware *par excellence* and is frequently recovered from tombs across Europe, as well as from settlements
and ritual contexts such as henges (Bradley 1984, 79–82). Some Beakers were even used as funerary urns (Fig. 4). At Barrow Hills (Radley, Oxfordshire) a flat grave of a child also contained a second funerary deposit inside a Wessex/Middle Rhine Beaker, consisting of the near-complete skeleton of a newborn baby and a small amount of cremated bones from a 2–3 year old (Barclay and Halpin 1999, 56). One femur and one vertebra occurred in a Maritime Beaker from one of the rock-cut tombs at the funerary complex of Palmela (Quinta do Anjo, Portugal) (Cardoso 2001, 150, fig. 11). In one of the shafts at the flint mines on Church Hill (Findon, Sussex) a Beaker was found in the upper part of the fill, containing a cremation accompanied by two flint axes (Curwen 1937, 121). Another cremation was discovered in a Beaker deposited in cairn 3 at Carvinack (Tregavethan, Cornwall) (Dudley 1964, 437). A vessel found at Drumstaple (Co. Derry) containing a quantity of bones and ashes and a wristguard may be another example; however, the urn was broken and the sherds and the bracer are now lost, making it impossible to know whether this was a Beaker or a Food Vessel (Harbison 1977, 7).

THE SYMBOLIC USE OF BEAKER POTTERY

Residue analyses of Beakers have not solved the question of their function since their contents reflect a wide range of activities (drinking, food provision, copper ore reduction and funerary urns) which do not seem to be connected. A link between them can nevertheless be observed: all involve an alteration of some kind.

Let us begin by looking at the use of Beakers as drinking vessels. In Neolithic Europe alcohol was a valuable and scarce substance. Brewing required quantities of cereals and fruits rich in sugar which otherwise would have been served to meet the nutritive needs of the group. In this sense, alcoholic drinks played a similar role to other prestige items: they were consumed in the course of ritual feasts whose ultimate aim was to boast of the social status of the hosts as part of their legitimating strategies (Joffe 1998). Psychoactive substances temporarily alter the normal state of consciousness of the user, and allow him to escape from everyday reality. Prehistoric societies might have interpreted this altered state as a means to communicate with the
In the supernatural realm, in a similar way to traditional peoples under the influence of strong hallucinogens, since both drugs and alcohol have been found in ritual contexts (Guerra forthcoming b; Sherratt 1995). Bell beakers or those ‘cups that cheered’ as Sherratt (1987) called them might serve as ceremonial chalices to distribute alcohol, sometimes strengthened with drugs (Calvari d’Amposta). These drinks would have been passed around a selected group in the course of ritual meetings, possibly connected to activities involving transformation as the contexts suggest: mortuary practices, metalworking, and probably rites of passage. The use of Beakers as funerary urns would thus have a symbolic meaning. Just as they bring escape from reality when filled with alcohol, they might help the deceased do the same in their journey to the Otherworld. In such a scenario we could imagine that their presence became essential during mortuary rites.

As for their use as reduction pots, it should be noted that the process ends with the vessels being smashed (Rovira and Ambert 2002, 97). It has been pointed out, therefore, that worn Beakers would have served this purpose, which subsequently can be seen as an indication that this ware was not special at all (Alcalde et al. 1998, 95). However, some evidence suggests that fragments of Beakers may have been in circulation as broken vessels for a long period of time, being employed as heirlooms or relics, before they eventually came to be deposited (Bradley 2000; Woodward 2002). In our opinion, the employment of Beakers as reduction pots could be deliberate; in fact it is quite unusual to find decorated crucibles from any period (Harrison et al. 1975, 273). The symbolic and magical aspects of mining and metallurgical activities amongst traditional societies cannot be overlooked either (Bradley 2005; Budd and Taylor 1995). Specialized knowledge is required to succeed in finding the ores, extracting the metals from their ores, and finally turning them into useful tools, so the metallurgists may well carry out a number of propitiatory rites to accomplish it (Eliade 1962).

We also have some evidence for the association of Beakers with food. Beaker pottery may be related to special meals including prized ingredients, such as selected joints of meat, which would be consumed in the course of ritual feasts, hence its association with deposits of animals in the north of Europe and the British Isles. Nonetheless, the present data are not conclusive; so much additional work is still needed. Moreover, giant Beakers may serve as storage jars for the surpluses of production. Some evidence suggests the existence of a ritual link between human remains and the storage of grain in some cultures (Bradley 2005, ch. 1). A similar link can be observed in relation to Beakers, since they are the most desired pottery in burial contexts and are also used as storage jars. If we assume this hypothesis, Beakers should no longer be considered entirely as a domestic ware since they are imbued with symbolic meaning, independently of the context.

**FINAL REMARKS**

Residue analyses carried out on Beaker sherds so far allow us to associate this pottery with a wide range of activities. The traditional hypothesis considering Beakers as drinking vessels has proved correct, since traces of substances of species of plants most plausibly associated with alcohol have been found in some of them. Nonetheless, others have been shown to be used for the provision of food, the reduction of copper ores, and as funerary urns. No connection is apparent between any of these functions and any of the different styles of Beaker, since diverse substances have been detected in both Maritime and late regional style Beakers. Yet, we suggest that a symbolic connection can be observed, since these activities imply a
transformation. We propose, therefore, that initially Beaker pottery was a ritual ware used in activities involving some transformation. As time went by and Beakers were adopted by different groups, their significance faded away and new pots appeared. Fine ware was then represented by metal vessels (Sherratt and Taylor 1989) in which food and drink were served, whereas huge storage jars or pithoi were used as containers and funerary urns as well, emphasizing again the ritual link between grain and human remains.

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REFERENCES


BRADLEY, R. 1984: The social foundations of prehistoric Britain: Themes and variations in the archaeology of power (London).


BUENO RAMÍREZ, P., BARROSO BERMEJO, R., BALBÍN BEHRMANN, R. de, JUAN-TRESSERRAS, J. and MATAMALA, J.C. in press: Contextos para las bebidas alcohólicas en la Prehistoria Reciente del centro de la


GIBSON, A. 2002: Prehistoric Pottery in Britain and Ireland (Stroud).

GUERRA DOCE, E. forthcoming a: Sobre la función y el significado de la cerámica campaniforme a la luz de los análisis de contenidos. Trabajos de Prehistoria 63(1).


PRIEGO, M.C. and QUERO, S. 1992: El Ventorro, un poblado prehistórico de los albores de la metalurgia (Madrid, Estudios de Prehistoria y Arqueología Madrileñas, 8).


soares, j. 2003: Os Hipogeus da Quinta do Anjo (Palmela) e as Economias do Simbólico (Setúbal, Museu de Arqueologia e Etnografia do Distrito de Setúbal/Assembleia Distrital de Setúbal).

thomsen, t. 1929: Egekistefundet fra Egtved (København, Nordiske Fortidsminder, 2).


