The role of cult and feasting in the emergence of Neolithic communities. New evidence from Göbekli Tepe, south-eastern Turkey

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Göbekli Tepe is one of the most important archaeological discoveries of modern times, pushing back the origins of monumentality beyond the emergence of agriculture. We are pleased to present a summary of work in progress by the excavators of this remarkable site and their latest thoughts about its role and meaning. At the dawn of the Neolithic, hunter-gatherers congregating at Göbekli Tepe created social and ideological cohesion through the carving of decorated pillars, dancing, feasting—and, almost certainly, the drinking of beer made from fermented wild crops.

Keywords: Turkey, Epipalaeolithic, Pre-Pottery Neolithic A and B, monumentality, congregation, dancing, feasting, drinking, beer, alcohol

Introduction

Few fields of research have undergone such dramatic changes over a relatively short time span as the advent of the Neolithic in the Near East. Since the seminal work of Kenyon at Jericho, the roots of food-producing were sought in the southern Levant (Kenyon 1981). With the influential research of the Braidwoods at Jarmo, the focus shifted to the north-east

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of the Fertile Crescent, or, as Braidwood put it, to its 'hilly flanks' (Braidwood & Braidwood 1953; Braidwood 1974, 1981). In recent years it has become clear that the region between the middle and upper reaches of the Euphrates and Tigris and the foothills of the Taurus Mountains, Upper Mesopotamia, has the potential to be the cradle of the new way of life. Aurenche and Kozłowski (2001) termed this region, where wild forms of several early domesticated plant species concentrate, the 'Golden Triangle' and Lev-Yadun *et al.* (2000) refer to it as the 'cradle of agriculture' (Figure 1). The distribution areas of the wild forms of einkorn and emmer wheat, barley and the other Neolithic founder crops overlap here, and the transition of the two species of wheat to domesticated crops has been pinpointed to this area (Harlan & Zohary 1966; Nesbitt & Samuel 1996; Heun *et al.* 1997, 2008; Lev-Yadun *et al.* 2000; Özkan *et al.* 2002, 2011; Luo *et al.* 2007).

At the same time, this region has yielded evidence for a degree of social complexity that was hitherto quite unsuspected. Nearly every site excavated at the appropriate scale shows a spatial division of residential and specialised workshop areas, and special buildings or open courtyards for communal and ritual purposes, as well as evidence for extensive feasting (Hauptmann 1993; Cauvin 1994; Özdoğan & Özdoğan 1998: 583–88; Stordeur 2000; Watkins 2004; Schmidt 2006). Çayönü (Schirmer 1990: 378–85), Nevalı Çori (Hauptmann 1993, 1999: 70–78), Hallan Çemi (Rosenberg & Redding 2000), Nemrik (Kozłowski 2002: 41–47) and Qermez Dere (Watkins *et al.* 1995: 3–9; Watkins 2004: 7), as well as Mureybet, Jerf el Ahmar (Stordeur *et al.* 2001), Tell 'Abr 3 (Yartah 2004) and Tell Qaramel (Mazurowski 2003, 2004), are well-known examples. They date to the PPNA/early PPNB, the second half of the tenth and ninth millennia cal BC.

Göbekli Tepe: a PPN cultic centre

The tell of Göbekli Tepe on the Germuş range has an outstanding role, not as a settlement, but as a hill sanctuary (Schmidt 2001, 2006, 2010). Göbekli Tepe is characterised by an early layer (III) dating to the PPNA (for ^{14}C data compare Dietrich & Schmidt 2010; Dietrich 2011), which produced monumental architecture with huge, T-shaped pillars arranged in circle-like enclosures around two even taller central pillars (Figure 2). The pillars are interconnected by walls and stone benches and are decorated with varied animal motifs, including foxes, snakes, scorpions, boars, aurochs, gazelle, wild ass and birds, as well as, in some cases, arms and hands, showing that they are sculptures representing stylised human-like individuals. A later phase (layer II, early and middle PPNB) consists of smaller, rectangular buildings containing often only two small central pillars or none at all. A geophysical survey showed that the older, round megalithic enclosures were not restricted to a specific part of the mound but existed all over the site, and it seems very probable that at least 20 enclosures existed in total (Figure 3). The mound is the result of the rapid and intentional backfilling of these circles after some time of use.

The excavated enclosures A–H have been named in their order of discovery. Two of them (C and D) were excavated to floor level in the recent campaigns and can serve to give an impression of the architecture discovered at Göbekli. The central pillars of Enclosure C (Figure 4) were destroyed in ancient times, the smashed pieces being found in the lower part of a large pit dug to carry out the destruction work. By laser-scanning these pieces,

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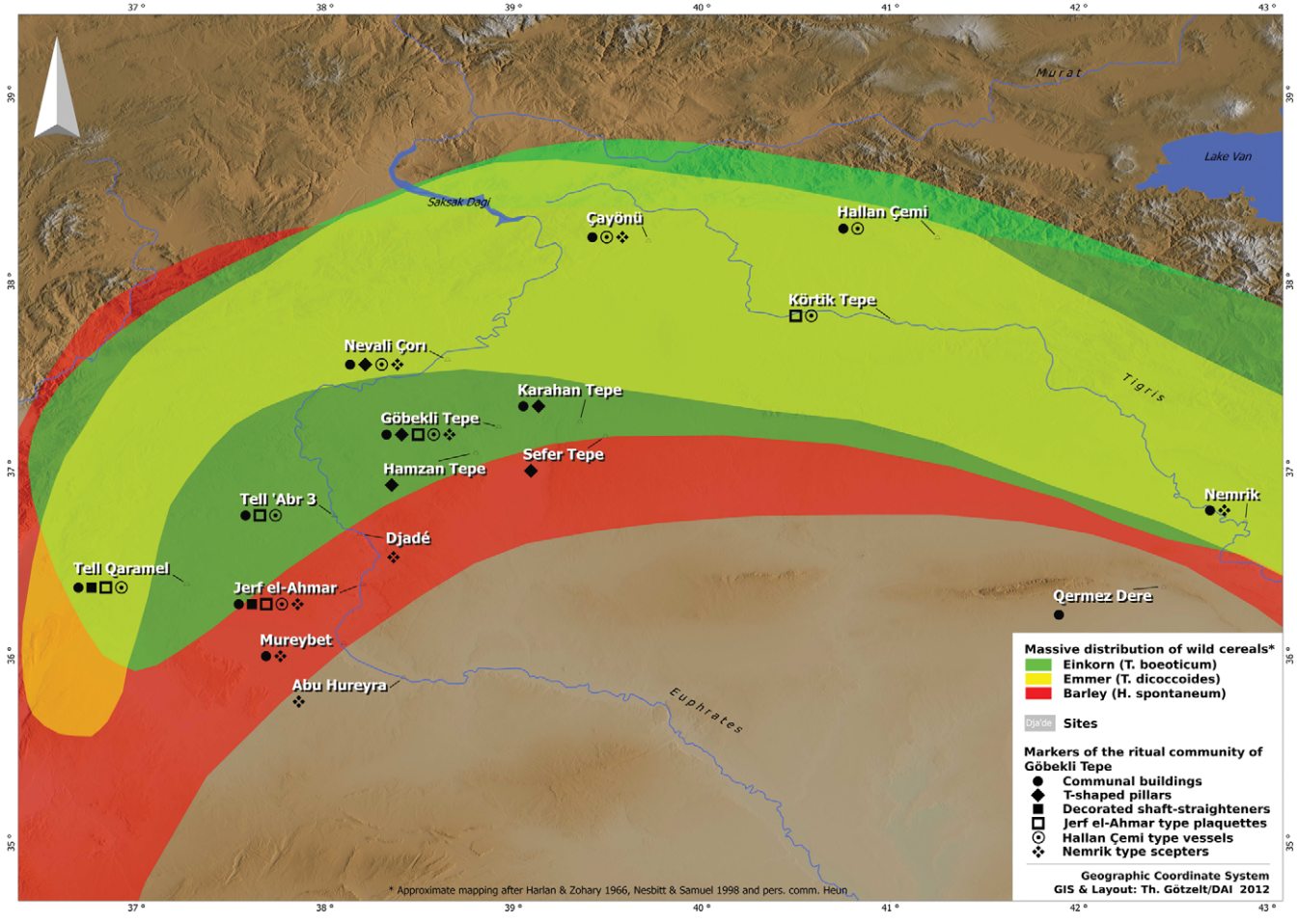

Figure 1. Map of Upper Mesopotamia showing the spatial overlapping of wild variants of the earliest domesticated cereals with key elements of the material culture of the ritual community of Göbekli Tepe (graphics: T. Götzelt, © DAI).

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Figure 2. Göbekli Tepe: overhead view of the main excavation area (photograph: N. Becker, © DAI).

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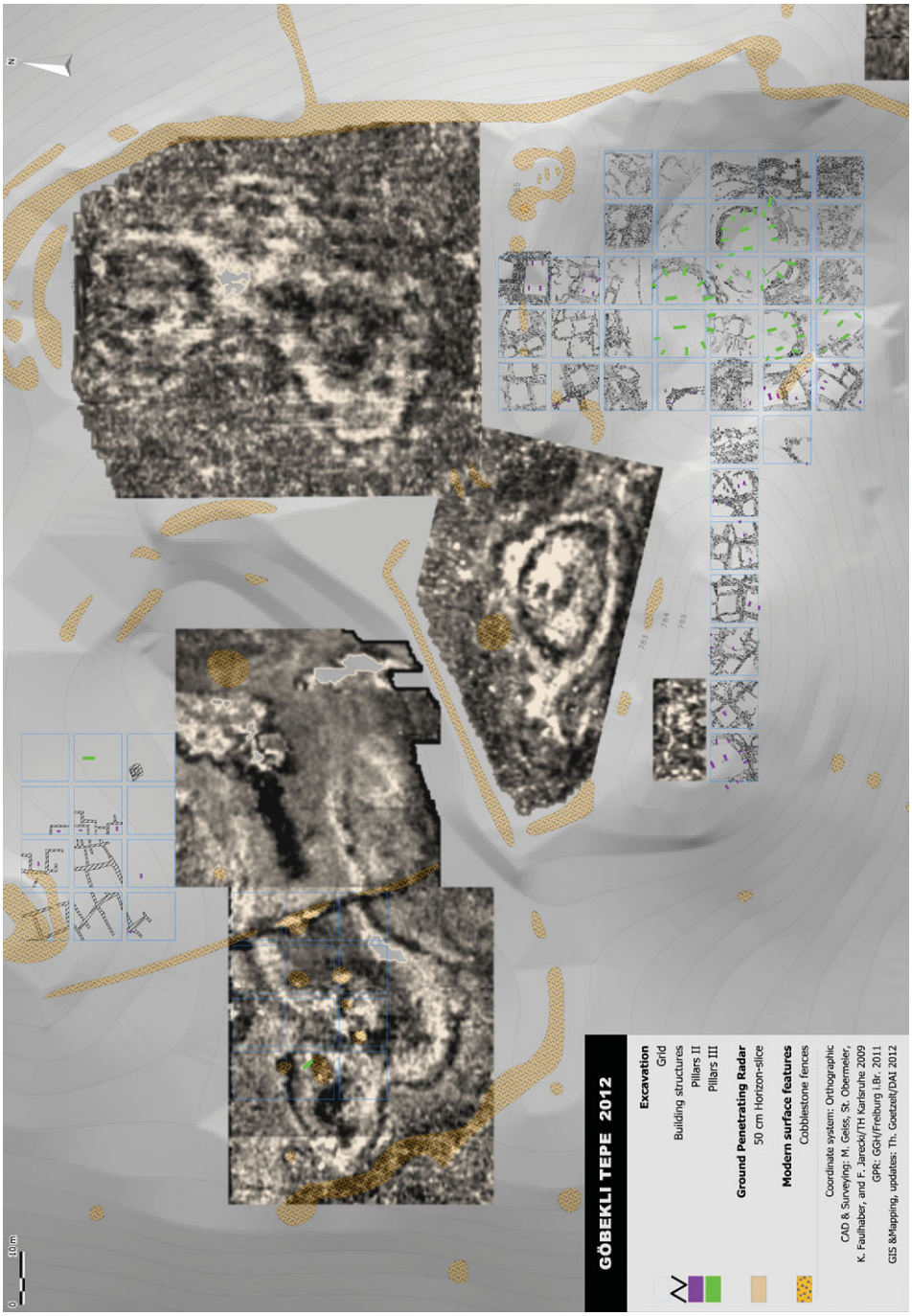

Figure 3. Plan of excavations and geophysical surveys at Göbekli Tepe (graphics: T. Götzelt, © DAI).

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Figure 4. Enclosure C seen from above (photograph: K. Schmidt, © DAI).

a virtual reconstruction was achieved, showing an original height of 5m. The floor was natural bedrock, carefully smoothed. Two pedestals for the central pillars had been cut out of the bedrock. In Enclosure C, there were three (possibly four) concentric rings of walls and pillars. On pillar 27, besides the low relief carving of a boar, there is a spectacular figure of a predator carved in high relief (Figure 5). Animals and pillar are carved from a single piece of stone. The images here are dominated by depictions of wild boars: of the wild boar sculptures found so far at the site, the majority have been discovered in Enclosure C (Figure 6).

Enclosure D (Figure 2, foreground) is the largest and is well preserved apart from some damage dating from ancient times that had been more or less successfully repaired. There are two huge central pillars and pillars in the surrounding walls, probably numbering 12 in all; 11 are visible so far, and the remaining one is thought to be hidden in the northern baulk. Among the animals on the pillars of Enclosure D, depictions of foxes and snakes are dominant, but in this enclosure a very wide range of creatures is depicted. When the floor level was finally reached in 2009, both central pillars were revealed as complete, with a breathtaking height of about 5.5m. The forms of hands and fingers were soon visible, carved on both pillars, and just below the hands were decorated belts and a loincloth hanging down (Figures 7 & 8). These abstracted, impersonal, but clearly anthropomorphic, T-shaped beings clearly belong to another, transcendent sphere.

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Figure 5. Pillar 27 in Enclosure C with the sculpture of a predator in high relief (photograph: D. Johannes, © DAI).

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Figure 6. Sculpture of a boar and stone plates discovered near one of the central pillars of Enclosure C (photograph: K. Schmidt, © DAI).

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Figure 7. Arms, hands and elements of clothing reveal the anthropomorphic character of the pillars (pillar 31 in the centre of Enclosure D; photograph: N. Becker, © DAI).

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Figure 8. The second central pillar of Enclosure D shows elements of clothing as well. Its socket is decorated with a row of ducks in high relief (photograph: N. Becker, © DAI).

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Emerging new concepts: the ritual community of Göbekli Tepe

Since neither domesticated plants nor animals are known from the site, it is clear that the people who erected this monumental sanctuary were still hunter-gatherers, but far more organised than researchers dared to think 20 years ago. The first time a cult building with T-shaped pillars, comparable to those of layer II of Göbekli Tepe, was uncovered was at Nevalı Çori, a settlement site now flooded due to the construction of the Atatürk barrage (Hauptmann 1993). In its immediate vicinity there are three more sites with T-shaped stones visible on the surface (Sefer Tepe, Karahan Tepe and Hamzan Tepe), but no excavations have been carried out there so far. These places form a group of sites belonging to one cult, but their community was not confined to these sites.

Observations in the field of iconography are the main argument for the existence of such a cultic community (cf. Figure 9). Shaft-straighteners often bear incised decorations of animals and symbols. Several examples from Jerf el Ahmar (Stordeur & Abbès 2002: fig. 16/1–3) and Tell Qaramel (Mazurowski & Jamous 2000: 341, figs 7–8; Mazurowski & Yartah 2001: 304, fig. 10; Mazurowski 2003: fig. 12, 2004: fig. 10) feature snakes and scorpions, quadrupeds and birds strongly reminiscent of the iconography of Göbekli Tepe (Figure 10). Similar motifs were incised into the so-called plaquettes of Jerf el Ahmar type (Stordeur & Abbès 2002: 586–91, fig. 16/1–3) discovered in significant numbers at Tell Qaramel (Mazurowski & Jamous 2000: 341, fig. 8; Mazurowski & Yartah 2001: 304, fig. 11; Mazurowski 2004: 509, fig. 10), Tell 'Abr 3 (Yartah 2004: 155, fig. 18/3) and Körtik Tepe (Özkaya & San 2007: fig. 19); several examples have been found so far at Göbekli Tepe.

These motifs also occur on thin-walled stone cups and bowls of the Hallan Çemi type (Rosenberg & Redding 2000: 50, fig. 5). Complete vessels of this group have recently been discovered at Körtik Tepe (Özkaya & San 2007: fig. 6, 15–18) as part of rich grave inventories. Fragments of such vessels have been found at Göbekli, Çayönü (Özdoğan 1999: 59), Nevalı Çori, Jerf el Ahmar (Stordeur & Abbès 2002: 583, fig. 12/1–4), Tell Ábr 3 (Yartah 2004: 155, fig. 18/2, 4–5) and Tell Qaramel (Mazurowski 2003: 369, fig. 11/1–2). Another connection is suggested by the zoomorphic sceptres of the Nemrik type. Their distribution coincides exactly with the so-called 'Golden Triangle': they are present at Hallan Çemi, Nevalı Çori, Çayönü, Göbekli Tepe, Abu Hureyra, Mureybet, Jerf el Ahmar and Dja'de (Kozłowski 2002: 77–80).

This explosion of images, with few forerunners in Palaeolithic art, offers a view of a symbolic world, which had commonalities shared among the residents of PPN sites in Upper Mesopotamia. They are part of a system of symbolic communication that preceded writing as an essential method of storing cultural knowledge (Watkins 2004, 2010; Morenz & Schmidt 2009). These people must have had a highly complicated mythology, including a capacity for abstraction. Following these ideas, we now have more evidence that Cauvin (1994) was right in his belief that the social systems changed before, not as a result of, the shift to farming.

This complex symbolic system continued for millennia. A prerequisite for its long life must have been an extensive network of supra-regional contacts sustained on a regular basis (Watkins 2008, 2010). For the large amount of quarrying, stone-carving and construction

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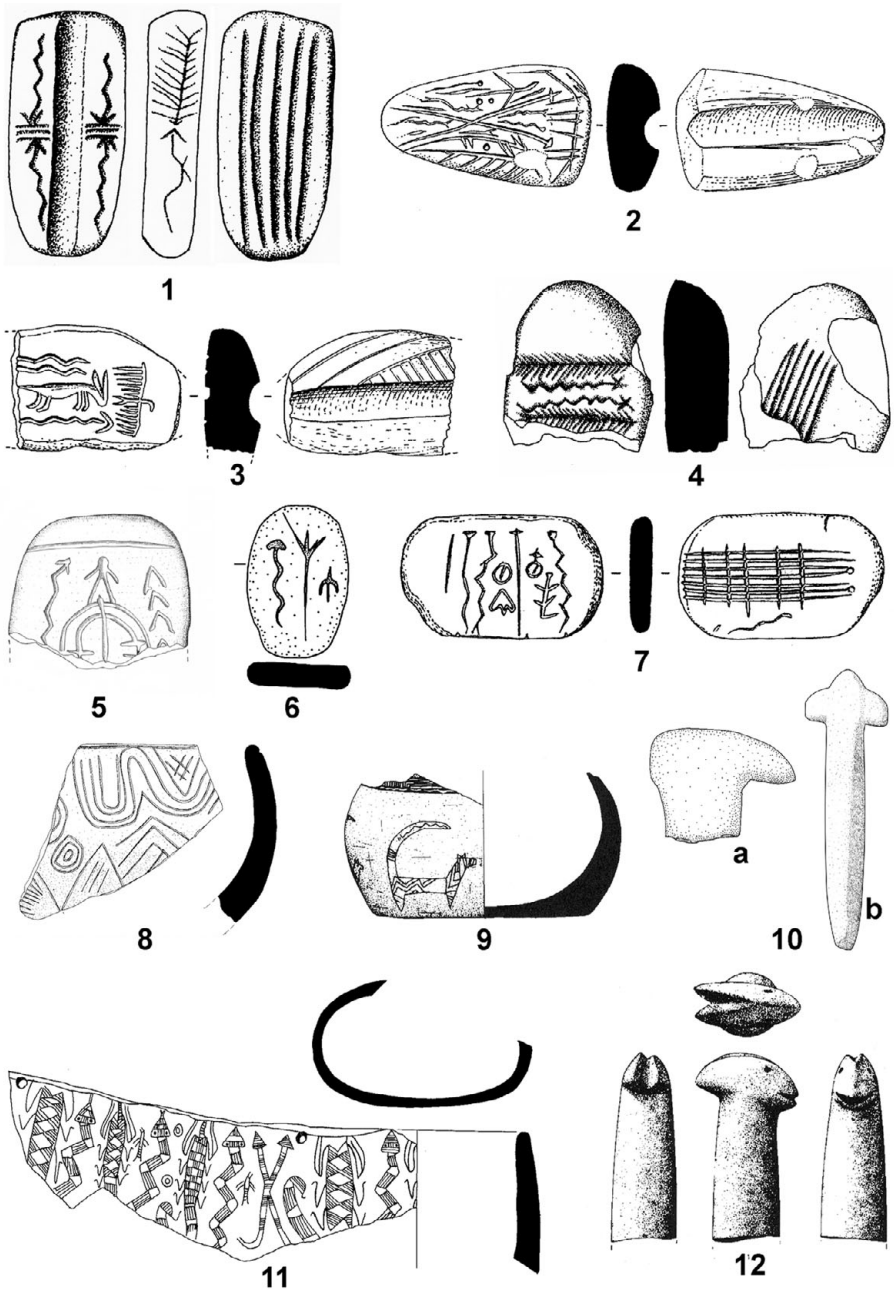

Figure 9. Symbolic objects defining the ritual community of Göbekli Tepe: 1–4) shaft straighteners; 5–7) plaquettes of Jerf el Ahmar type; 8, 9, 11) bowls of Hallan Çemi type; 10, 12) sceptres of Nemrik type. 1, 4) Tell Qaramel (after Mazurowski & Yartah 2001: fig. 10/636, 638); 2, 3, 7) Jerf el Ahmar (after Cauvin 1994: fig. 19/1, 2, 4); 5) Tell 'Abr 3 (after Yartah 2005: fig. 7/3); 6, 8, 10a–b) Göbekli Tepe; 9, 12) Hallan Çemi (after Rosenberg & Redding 2000: fig. 5, 6/1); 11) Körtik Tepe (after Özkaya & San 2007: fig. 18). Not to scale.

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Figure 10. Snakes and scorpions are important elements of Göbekli Tepe's iconography (photographs: C. Gerber, D. Johannes, I. Wagner, © DAI).

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work required to build a monumental sanctuary like Göbekli Tepe, there had to be a means of bringing together groups from different areas and organising communal work. An answer on how this was achieved lies in the widespread evidence for extensive feasting, including the consumption of—most likely alcoholic—beverages, in the PPN archaeological record.

Production and consumption of alcoholic beverages in the Near Eastern PPN

Until recently it was widely accepted that beer brewing and wine production started with the civilisations of Mesopotamia and Egypt (Sherratt 1995: 24–26), documented by literary and iconographical evidence (Röllig 1970; Samuel 1996: 3–4). But in recent years, the starting point for the production of alcoholic beverages has been pushed ever further into the past. Not only could the residues of alcoholic beverages be pinned down chemically in early dynastic Egypt at Hierakonpolis (Maksoud *et al.* 1994) or the late Uruk period site of Godin Tepe, Iran (Michel *et al.* 1993), and fifth-millennium BC Neolithic Greece (Valamoti *et al.* 2007), but wine has been detected even earlier in a Neolithic (mid sixth-millennium BC) jar from Hajji Firuz Tepe in northern Iran (McGovern *et al.* 1996) and in stone bowls from the PPN burial site of Körtik Tepe, south-eastern Turkey (McGovern 2009). It can be safely stated that people's first interest in wild grapes in western Asia was for alcohol production, evidence for domestication only following in the fourth millennium BC (Miller 2008: 944). From Göbekli Tepe now comes further chemical evidence this time for beer brewing, although it is not fully conclusive as yet.

There are two principal approaches to the identification of alcoholic beverages in the archaeological record. The first includes looking for material evidence of brewing and has been followed by Dineley (2004) in her work on Neolithic beer making. She concentrates on suitable vessels and especially on so-called 'malting floors' that could have been used for germinating and drying grain. The second and more direct approach is the examination of organic residues adhering to pottery or stone vessels; for example, residues on two stone bowls from Körtik Tepe gave preliminary evidence of tartaric acid, hinting at the production of grape wine (McGovern 2009: 81). Chemical analysis was recently conducted also on a group of large limestone basins from Göbekli Tepe. Six barrel- and trough-like vessels have been found in PPNB contexts. Due to their size and capacities of up to 160 litres they are static, integral parts of particular rooms (Figure 11), but fragments of such vessels appear in all strata. Some of them show grayish-black residues adhering to the lower parts of the vessels.

First results show probable evidence of oxalate for some samples, but the applied Feigl test was not sensitive enough to give reproducible results. Oxalate develops during the steeping, mashing and fermentation of cereals (barley, but also einkorn wheat and others, see Zarnkow *et al.* 2006: tab. 2) and can indicate the production of malt and beer. A complete scapula of an onager was found at the bottom of one vessel at Göbekli Tepe (Figure 11). A very similar find is known from Tell 'Abr 3 in Syria, where five large limestone vessels stood on the floor of a structure described as a "communal building", and a large bone lay within one of the vessels (Yartah 2005: 6). These bones could well have been used to stir up the contents of the vessels or to skim parts of it. At Jerf el Ahmar, Syria, three limestone basins

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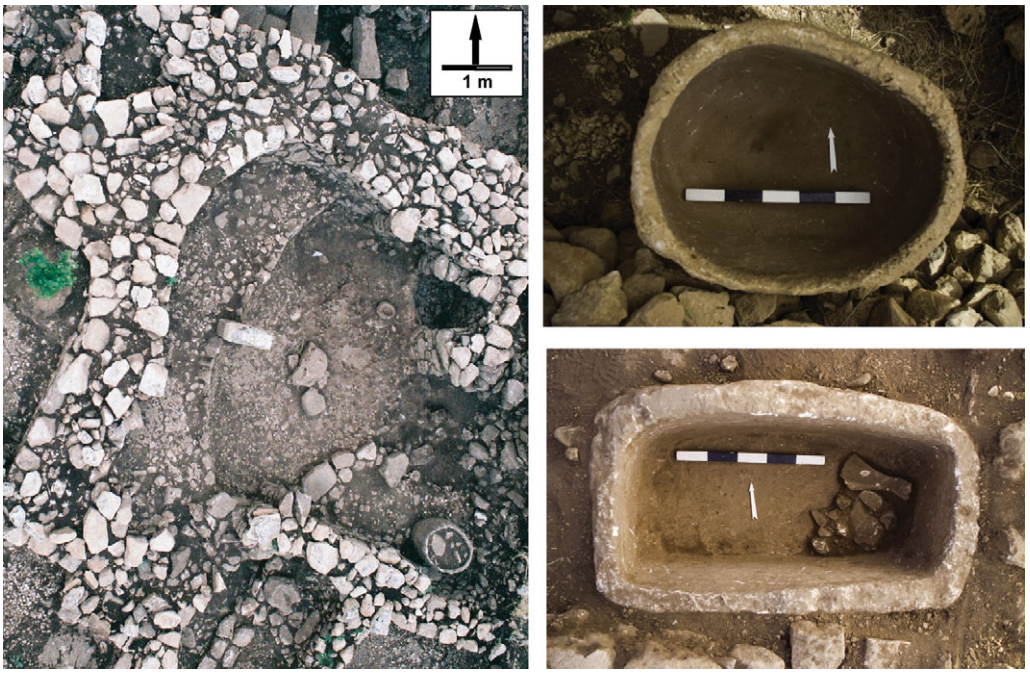

Figure 11. A barrel- (upper right) and a trough-like (lower right) limestone vessel from Göbekli Tepe (photographs: K. Schmidt, N. Becker, © DAI). Six vessels with capacities up to 160 litres have been so far discovered in situ (left).

of similar size stood in a domestic building with different activity zones, yielding evidence for food processing in the form of grinding stones, saddle querns, plates and two charred seed cakes, containing primarily *Brassica/Sinapis* seeds (Willcox 2002: 55–56). This and the presence of a hearth encouraged the excavators to interpret the room as a kitchen area. Since the simplest brewing process would need, in addition to cereal processing equipment, only large containers for malting and mashing, this 'kitchen' could have produced beer as well. In Göbekli Tepe, the occurrence of beer making is not yet certain, but as signs of habitation are also absent, it is a possibility that not every step of production was carried out there. The grain may have been malted at nearby settlements and been brought there only on special occasions. Genetic analyses have shown that the domestication of single-grained einkorn and emmer wheat took place around the Karacadağ (Heun *et al.* 1997; Luo *et al.* 2007) in close vicinity to Göbekli Tepe. It is an intriguing thought that brewing and the domestication of wheat might be interrelated.

The idea of alcoholic beverages at such an early date is not new. Since the so-called 'Braidwood Symposium' in 1953 there has been ongoing discourse on this topic. Based on finds of several kinds of cereals at Qalat Jarmo in eastern Iraq and encouraged by a remark by paleobotanist Sauer, Braidwood questioned the common assumption that the appearance of domesticated cereals in the Near East was linked with bread making. He and Sauer asked whether the discovery of fermentation (barley for example ferments naturally under certain conditions: Katz & Maytag 1991: 26–27) might have operated as the initial step towards experimental selection and domestication of cereals (Braidwood *et al.* 1953). However, the

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symposium was rather inconclusive, leaving no more than the awareness that the collection of wild grain as a basic food supply was not an option, due to small harvests resulting from its brittleness; early cereals were acknowledged as better suited to making gruel or beer than bread because of the glume adhering to the grain, although beer production was then seen as rather improbable. Katz and Voigt (1986) revisited this question stating that a diet containing beer was much more nourishing than one just based on gruel or bread. The discovery of fermentation and the use of beer in social and religious life could thus have led to the domestication of cereals. A similar approach was recently followed by Reichholf (2008). McGovern (2009) added the possibility of supply of alcohol through grape wine to the discussion.

Seen from the point of view of nutritional science, there are some advantages in favour of beer. Its lack of oxygen and its low pH value make it less perishable than other cereal products (Back 1994: 16). There is an ongoing discussion about the question of whether most cereals would have been toxic before mankind adapted to them, adverse reactions to gluten proteins (coeliac disease) being the result of a missing evolutionary adaption (Greco 1997). Malting and fermentation could have been a method to weaken these toxic effects as gluten is debranched, agglomerated and filtered to a high extent through malting and brewing. Interestingly, there seems to be a natural lack of toxicity in einkorn (Pizzuti *et al.* 2006). Whether one of these aspects was known to PPN people remains unknown, but prolonged observations could have led to that knowledge.

Although none of the elements discussed above necessarily implies the production of alcoholic beverages in itself, and chemical evidence is still sparse, all factors taken together support the idea that the possibility of creating alcoholic intoxicants was already known in the early PPN. The question remains why this should have happened just then and there.

Discussion and conclusion

At first sight early evidence for alcohol consumption may be surprising, but it fits well into a model that focuses on social incentives for the transition from hunting and gathering societies to food-producing early village-farming communities. Feasting has long been acknowledged as an integral part of Epipaleolithic (Munro & Grosman 2010) and early Neolithic societies. Evidence is present even at very early PPN sites like Hallan Çemi (with a main occupation between 9660 and 9320 cal BC, comp. Benz 2011). Here the settlement of a small hunter community was arranged around a central free area with large amounts of animal bones and fire-cracked stones. As an interpretation of these findings, Rosenberg and Redding (2000: 44) have proposed reciprocal feasting as a means of strengthening a group's coherence. Benz (2000, 2006: 440) argued for a similar role of feasting in the whole process of Neolithisation on the basis of ethnographic analogies. She widens the argument by stating that one basis for the shift to agriculture and long-term storage must have been the loosening of reciprocity usually visible in hunter-gatherer societies. In her view, this was achieved through large feasts, for which food had to be stored.

On the other hand, Hayden (1990) has argued that resources becoming abundant during the climatic optimum following the Ice Age enabled competitive individuals to accumulate surplus in order to obtain powerful social positions through lavish feasts. The need to furnish

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Figure 12. Overhead view of Enclosure F at Göbekli Tepe, showing the circle of pillars with interconnecting benches (photograph: K. Schmidt, © DAI).

food for these feasts is seen as a possible reason for the start of domestication (Hayden 2003). Regardless which position seems more compelling, ethnographic and archaeological records are abundant for the holding and managing of feasts. Large amounts of food were needed for this purpose and, of course, beverages, the latter often being alcoholic (cf. Everett *et al.* 1976; Douglass 1987; Hayden 1995; Jennings *et al.* 2005).

Göbekli Tepe adds a new dimension to this discussion. The sediments used to backfill the monumental enclosures at the end of their use consist of limestone rubble from the quarries nearby, flint artefacts and surprisingly large amounts of animal bones smashed to get to the marrow, clearly the remains of meals. Their amount exceeds everything known from contemporary settlements, and can be taken as a strong indication of large-scale feasting. The species represented most frequently are gazelle, aurochs and Asian wild ass, a range of animals typical for hunters at that date in the region. There is evidence for plant-processing, too. Grinders, mortars and pestles are abundant, although macro remains are few, and these are entirely of wild cereals (among them einkorn, wheat/rye and barley) (Neef 2003).

The character of Göbekli Tepe makes it clear that these feasts had a strong cultic significance. They can also be attributed to a special category of feast highlighted by Dietler

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Figure 13. A dancing scene on a bowl from Nevalı Çori shows how Neolithic feasts might have appeared. The turtle-like being dancing between two persons might well hint at the dancers' altered state of consciousness (after Hauptmann 1999: fig. 16).

and Herbich (1995): collective work events. To construct the monumental buildings, people from a wider area had to be drawn together. Records of the erection of megalithic graves on the island of Nias, Indonesia, dating from the beginning of the twentieth century can give us an idea on how many people could be attracted to help in construction by the prospect of a lavish feast. Schröder (1917) noted that 525 men hauled a megalith of $4m^3$ over a distance of 3km to its final location in three days using a wooden sledge. At Göbekli Tepe, the distances between the quarries and the enclosures are smaller, but the megaliths transported are much larger (up to 7m long weighing 50 metric tons with a volume of $20m^3$). The role of beer in such events is known, e.g. from the big building projects of ancient Egypt, where workers were paid, at least partly, in beer (Helck 1971: 53–65).

The requirements of collective work events have to be taken into account also for other sites, especially for the elaborate communal buildings of Tell 'Abr 3 or Jerf el Ahmar. Outlines of these buildings and of the enclosures at Göbekli Tepe illustrate their character as meeting places. They contain benches along the walls ready for gatherings (Figure 12), and at Göbekli Tepe, the setting of the anthropomorphic pillars seems to represent an assembly of some sort, with about a dozen stone figures around the perimeter bench, attendant on a pair of larger figures at the centre.

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A rich repertoire of PPN dancing scenes (Garfinkel 2003) sheds some light on the nature of early Neolithic feasts. One of the most remarkable examples is the sherd of a limestone bowl from Nevalı Çori (Figure 13) depicting two persons with raised arms (Hauptmann 1999: fig. 16). Between them, a turtle-like being is joining the dance, maybe reflecting the altered state of consciousness of the dancers (McGovern 2009: 80). The cemetery of Körtik Tepe, where numerous stone vessels were broken at the gravesite also suggests feasting with an ecstatic aspect.

In concordance with Hayden's thoughts, it seems obvious that repetitive feasts of the amplitude implied at Göbekli Tepe must have placed stress on the economic production of hunter-gatherer groups. Maybe in response to the demand, new food sources and processing techniques were explored. In this scenario, religious beliefs and practices may have been a key factor in the adoption of intensive cultivation and the transition to agriculture. Archaeological and chemical evidence further suggests that this innovation may have been fuelled by alcoholic beverages, giving a new response to Braidwood's question 'Did man once live by beer alone?' Probably not, but beer—and wine—may have played an important role in one of the most significant turning points in the history of mankind.

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Technical note on oxalate evidence in samples from Göbekli Tepe

The Feigl spot test (Feigl 1960) was performed on samples from two of the vessels. This is a common and recognised method for detecting the presence of these salts (Michel *et al.* 1993). Approximately 10g of deposit from the bottom of a dry, physically cleaned vessel was scraped free. For each analysis, 0.1g of material was used. The chemicals required for the colour reactions were supplied by Merck/Germany. Naphthalene-2.7-diol (no. 8.20851.0100) and 1.1′-binaphthyl-2.2′-diol (no. 8.41292.0005) and Sigma-Aldrich (Magnesium no. 31458-1EA) were employed for the oxalate and tartrate analyses. For the first series of tests comprising five vessel samples (sample nos. 10-115, 10-117, 10-121, 10-122, 10-126), one control sample of distilled water, two samples from the earth surrounding each vessel (sample nos. 10-17, 10-22) and a water sample inoculated with oxalate or tartrate were also analysed.

All samples were labelled with codes, which were not known to the laboratory personnel carrying out the analysis. No positive signal for any of the vessel samples was obtained in the first experiment. In a second experiment, sample 10-117 was positive for oxalate. In a third experiment, two samples gave a positive signal for oxalate in one of the replications, but not in the other, whereas sample 10-117 gave no positive signal. As the detection threshold of that spot test is 1μg and assuming that the occurrence of oxalate crystals is very low, creating homogeneous samples is impossible. Under light microscope we could not see any oxalate.

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