MEGALITHS SOCIETIES LANDSCAPES

EARLY MONUMENTALITY **AND SOCIAL DIFFERENTIATION** IN NEOLITHIC EUROPE

VOLUME 3

Frühe Monumentalität und soziale Differenzierung 18

Eds.:
Johannes Müller
Martin Hinz
Maria Wunderlich

Megaliths – Societies – Landscapes
Early Monumentality and Social Differentiation in Neolithic Europe

Schwerpunktprogramm 1400

Frühe Monumentalität und soziale Differenzierung

Band 18 | Volume 3/3

Herausgegeben von Johannes Müller

in Kommission Verlag Dr. Rudolf Habelt GmbH, Bonn
2019

Institut für Ur- und Frühgeschichte der CAU Kiel

Megaliths – Societies – Landscapes

Early Monumentality and Social Differentiation in Neolithic Europe

Volume 3

Proceedings of the international conference »Megaliths – Societies – Landscapes. Early Monumentality and Social Differentiation in Neolithic Europe« (16th–20th June 2015) in Kiel

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in Kommission

Verlag Dr. Rudolf Habelt GmbH, Bonn
2019

Gedruckt mit Unterstützung der Deutschen Forschungsgemeinschaft, Bonn
und des Institutes für Ur- und Frühgeschichte der CAU zu Kiel

Frühe Monumentalität
und soziale Differenzierung
DFG Schwerpunktprogramm 1400

Verlag Dr. Rudolf Habelt GmbH, Bonn
Redaktion Martin Hinz, Maria Wunderlich & Julia Menne (CAU Kiel)
Bildbearbeitung Nicole Schwerdtfeger & UFG-Graphic Department (CAU Kiel)
Satz & Grafik Nicole Schwerdtfeger & UFG-Graphic Department (CAU Kiel)
Design-Konzept Janine Cordts (CAU Kiel)
Umschlaggestaltung Janine Cordts (CAU Kiel)
Umschlagfoto Vol. 3: Sara Jagiolla (CAU Kiel)
Kapitelfotos Ch. 5, Ch. 6 & Ch. 7: Sara Jagiolla (CAU Kiel)
Konferenzfotos Sara Jagiolla (CAU Kiel)

ISBN 978-3-7749-4213-4
Titel auch als E-Book (PDF) erhältlich unter www.habelt.de

Druck BELTZ Grafische Betriebe GmbH, Bad Langensalza

Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie.
Detailliertere Informationen sind im Internet über
<http://dnb.d-nb.de> abrufbar.

Preface of the Series Editor

The DFG Priority Program 1400 »Early Monumentality and Social Differentiation: On the origin and development of Neolithic large-scale buildings and the emergence of early complex societies in Northern and Central Europe« started its work in 2009. Its research agenda focused on the investigation of the phenomenon of monumental structures, in particular on megalithic constructions and their social and economic backgrounds during the Neolithic with a focus on Northern Central Europe. Already in May 2010 a workshop on the topic »Megaliths and Identities« took place in Kiel. The vivid dialogue that had started on this early workshop continued throughout the years after. In consequence the international conference »Megaliths, Societies, Landscapes« was organized five years after on a broader scale. Many experts gathered to discuss research on megalithic and monumental structures and the societies that built them on not only a European scale.

The three volumes, which you hold in your hands, may inspire again new ideas and perhaps new insides for future research on the development of these early monumental landscapes!

Johannes Müller


MEGALITHS
SOCIETIES
LANDSCAPES
AND
SOCIAL DIFFERENTIATION
16. – 20.06.2015/KIEL

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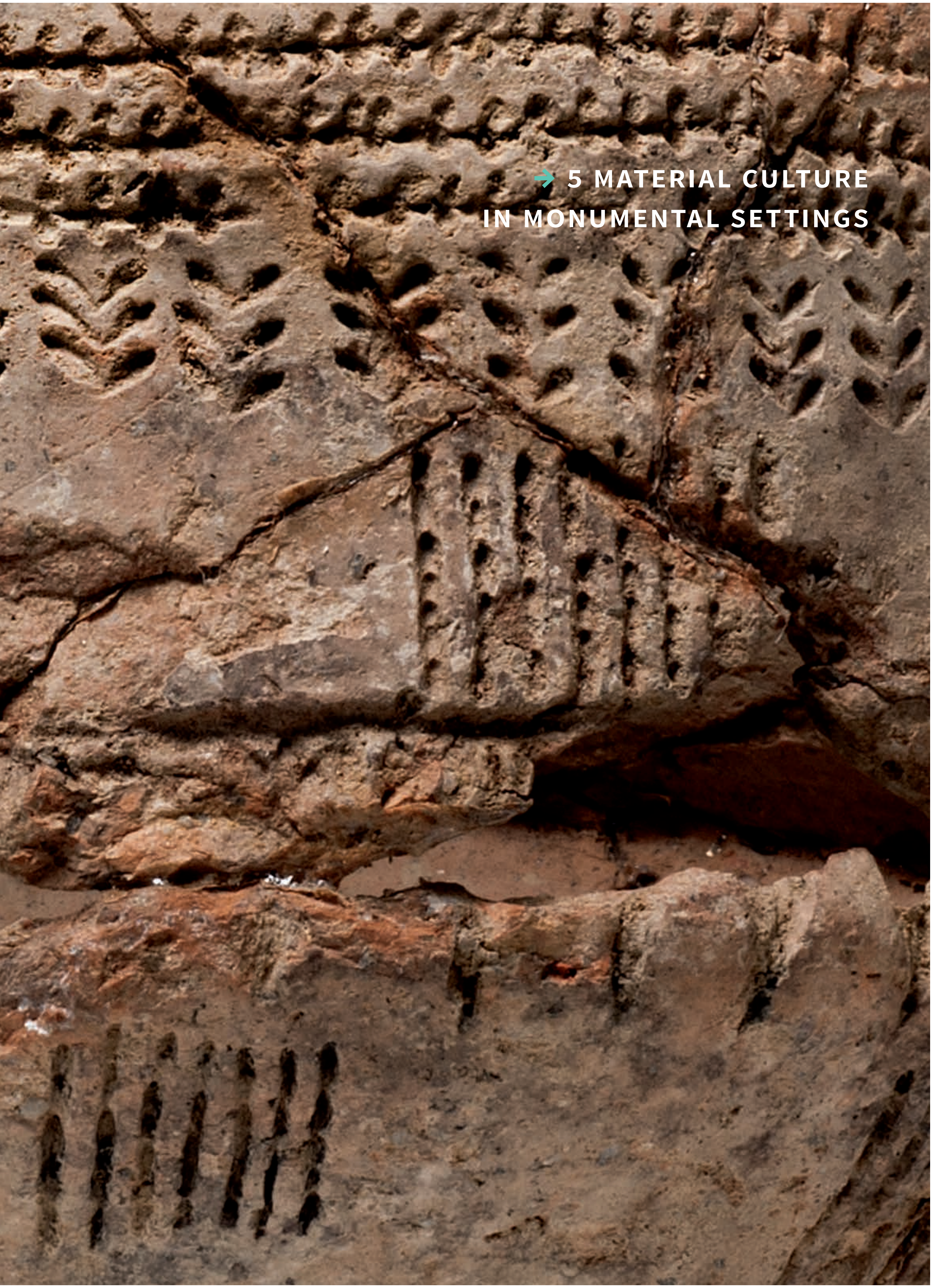

5 MATERIAL CULTURE IN MONUMENTAL SETTINGS

Flint use in ritual contexts

Lars Larsson

ABSTRACT

In South Scandinavia as in other areas, flint had a special position as a raw material for making a variety of tools. Flint was not only an important element in daily activities; moreover, it also became a catalyst of exchange and ritual. Flint became a very important element in marking the relationship between people and their conceptions of a different world populated by deities and dead ancestors. Flint axes played a very special role in this relationship. The deliberate deposition of axes in southern Scandinavia chiefly occurs in wetland but also at megalithic graves. The transformation of flint tools could also involve changing the material through heating. A small number of sites have a large amount of material, while the majority of other sites – such as megalithic graves – have a smaller number of objects altered by fire, primarily axes.

INTRODUCTION

Flint was not only an important element of daily activities, but it was also the material that provided the foundation for what was almost industrial-scale mining and specialised flint knapping. Therefore, flint represented an important economic basis for the prosperity of certain societies, becoming an extremely significant commodity for contact between societies. Its distribution was so extensive that flint became a very important part of the goods that were exchanged as well as the knowledge about the manufacture and repair of more advanced flint tools.

Especially the flint axe – an object that was produced in large numbers – became a catalyst of exchange, function and ritual.

The linkage of rituals to depositions of flint and flint artefacts also helped to maintain the demand for flint as a raw material or finished tool forms.

It is necessary to highlight that there may be rational explanations for the deposition of objects; for example, the intention many have been to hide valuable possessions in times of uncertainty. Nonetheless, the fact that there are so many depositions – chiefly in wetland – suggests deliberate action related to ideas of a ritual character (BRADLEY 2005; SWENSON 2015). This is even clearer when it comes to repeated depositions within a limited area over a long space of time. The occurrence of the same type of tool – the flint axe – also strengthens the assumption that the depositions are related to well-established ideas and traditions in Neolithic societies in southern Scandinavia.

In this context, the term »axe« denotes axe heads, both axes and adzes.

AXES AND MEGALITHS

The deposition of flint – and especially flint axes – is a ritual use that holds major interest in South Scandinavia. However, the intensity of depositions and the intention behind them vary both geographically and chronologically.

In southern Sweden, the number of dolmens is about 100 and the figure for passage graves is about 300, of which about 200 are found in Falbygden, western Sweden (MALMER 2003; SJÖGREN 2003). There are about 7,000 megalithic tombs today in Denmark, of which about 700 are passage graves (JENSEN 2002; EBBESEN 2008, 23; 2011, 122 ff.).

Despite divergences concerning the destruction of tombs, they can hardly make any major changes to the disproportional relations. Indeed, the disproportion might be even greater between Zealand – with the majority of dolmens (JENSEN 2002) – and nearby Scania, the southernmost part of Sweden. It should be considered that whereas megalithic graves are scattered over almost all of Zealand, the same form of grave occurs in Scania along the coast, with a few exceptional cases inland. This means that geological conditions with good agricultural districts comparable to Zealand are only found in half the area of Scania. With this situation in mind, the relation between Scania and Zealand might be as much as 1:50 (Eriksen/Andersen 2014). The ratio of passage graves in Denmark and Sweden is only about 1:2 (Jensen 2002; Ebbesen 2011, 214).

The marked difference in dolmens can be related to the number of axe hoards with thin-butted axes, which means depositions with two or more finds. In the whole of Denmark, 171 hoards (one per 250 km^2) with a total of about 500 axes are known (Nielsen 1977). This may be compared to 122 hoards from Scania (one per 90 km^2), with a total of 316 axes (Karsten 1994). It may be thought that the recovery procedure for the hoards was not very different between these two areas, nor that the difference in time between the publications led to any great number of new finds; rather, this shows that the intensity of axe deposition was greater in southernmost Sweden compared with Denmark. The interest in building megalithic tombs – especially dolmens – seems to have been much greater in Denmark compared with southernmost Sweden. Here, the deposition of valuable parts of the material culture such as flint axes took priority over the creation of monuments for the deceased.

However, we also find that the number of axes per deposition was larger in Denmark compared with Scania. Likewise, in the later part of the Neolithic, the number of axes is larger in Denmark compared with southernmost Sweden (Nielsen 1977; Karsten 1994).

One possible explanation for this considerable difference between the two areas is that in the more densely populated Zealand there was a greater need for the rulers to mark their position by building grave structures as a visual marker of the significance of the ancestors to maintain a continuous power position. Depositing flint tools in wetlands marks the relationship to higher beings. A larger number of objects per deposition may mean that it was important to mark one's control of the flint supply, even through such activities.

Nonetheless, these numbers are relatively low compared to the northern Swedish hoards such as Kusmark – with more than 50 axes – or Bjurselet, with the richest finds, with approximately 200 axes dated to late in the Middle Neolithic and early in the Late Neolithic (Becker 1952; Knutsson 1988) (Fig. 1). At Bjurselet, thirteen hoards have been found where the axes were deposited in different constellations in the form of a circle or placed radially. Despite having been found in dry land, the method of deposition indicates that they are actually ritual depositions. On the other hand, finds of flint axes on settlement sites are very limited (Larsson (In print)).

Most scholars define depositions as two or more tools found together (Nielsen 1977; Rech 1979; Ebbesen 1983). However, what prevents single axes from having been ritually deposited if they show features such as bog patina indicating deposition in wetland? The notion that single axes were intentionally deposited is evident from an excavation at Långåker on the south coast of Scania. During an excavation of a Funnel Beaker site from the Middle Neolithic, an intact flint axe was found in a thin peat layer below the site, indicating the former shoreline of a lagoon (Larsson 1992) (Fig. 2). Judging by the typology, this point-butted axe belongs to an early part of the Early Neolithic. No other finds were made in the peat. Just about 100 m further along the former shore, a thick-butted axe dating to the late part of the Funnel Beaker culture and a flint stone were found in a similar position, with no other finds of the same date.

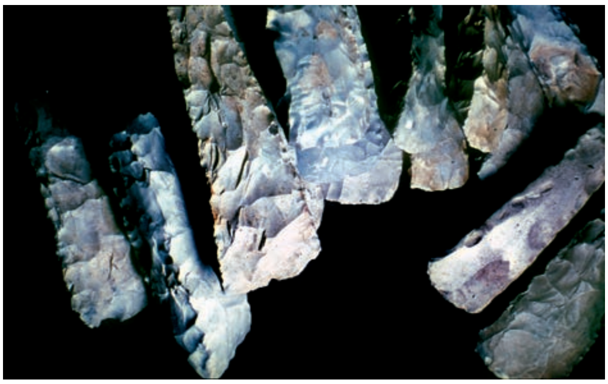

Fig. 1. Flint axes from the ritual depositions at Bjurselet, northern Sweden. (photo: Archive of the Swedish National Heritage Board).

AXES AND THE DECEASED

Flint axes in mortuary practices can also be included as part of ritual use. The relationship between axes used as grave goods and those deposited also shows some interesting differences. From the Early Neolithic, about 50 thin-butted axes have been recorded in Danish megalithic graves, compared with about 500 in depositions. During the late stage of the Funnel Beaker culture of the Middle Neolithic, the number increases to more than 500 axes in Danish megalithic tombs but less than 100 in depositions (Nielsen 1977; Ebbesen 2011, 320 ff.). The use of axes as grave goods shows a conspicuous increase during this period. Most of the axes found in megalithic graves show signs of intensive use, with several examples of reshaping (EBBESEN 2011, 319). However, the majority of axes in depositions show no sign of use or only limited traces.

The status of research on the late Funnel Beaker culture provides much more detailed knowledge about the deposition of material culture than about the deposition of humans. We actually know more about how axes were treated and placed in megalithic tombs than about the mortuary practices relating to humans in tombs of the same type. Most human remains in megalithic tombs have been dated to an early stage in the use of the tomb or a much later stage of use, during the Late Neolithic (PERSSON/SJÖGREN 1996), whereas almost nothing is known about how human remains were deposited during the middle part of the Neolithic (EBBESEN 2011, 337).

Axes found in connection with tombs but located outside the chamber – most probably indicating that they were not directly intended as grave goods – exemplify a relationship between megaliths and depositions. Even among these finds, a marked chronological difference is observed. Axes of the thin-butted type have only been located at three dolmens, in comparison with 29 Danish megaliths having axes of the late Funnel Beaker culture (EBBESEN 2011, 284). The intentional fragmentation of axes in tombs is rather rare. Edge or butt fragments have been found, albeit rarely parts of the same axe (EBBESEN 2011, 285). However, some have parts of one edge knapped off in a way that is regarded as an act of ritual importance.

THE BIOGRAPHY OF AXES

The biography of an axe comprised different stages (STRASSBURG 1998, 2000). The question is how early in its lifetime its destiny was decided. In some cases, the axe had only been roughly shaped, while in other cases it had undergone advanced knapping when it was transformed into a ritualised object. In some instances, it was shaped into its final form, while in other cases it was actually used – or even heavily used – before it ended its life as an object that seems to have held symbolic importance (OLAUSSON 1983; WENTINK 2005).

Only one – indeed, a most uncertain find – out of a total of 63 thin-butted flint axes from graves in Denmark is not polished (NIELSEN 1977, Fundliste II). Unpolished axes have been found at tombs, although in these cases as finds in connection with the frame of stones outside the chamber (NIELSEN 1977).

More than half of the thin-butted axes in hoards from Denmark (54 %) are unpolished (NIELSEN 1977: Fundliste I). One can identify an interesting change, with the lowest percentage of unpolished axes in hoards with axes of the earliest types (24 %) and the highest

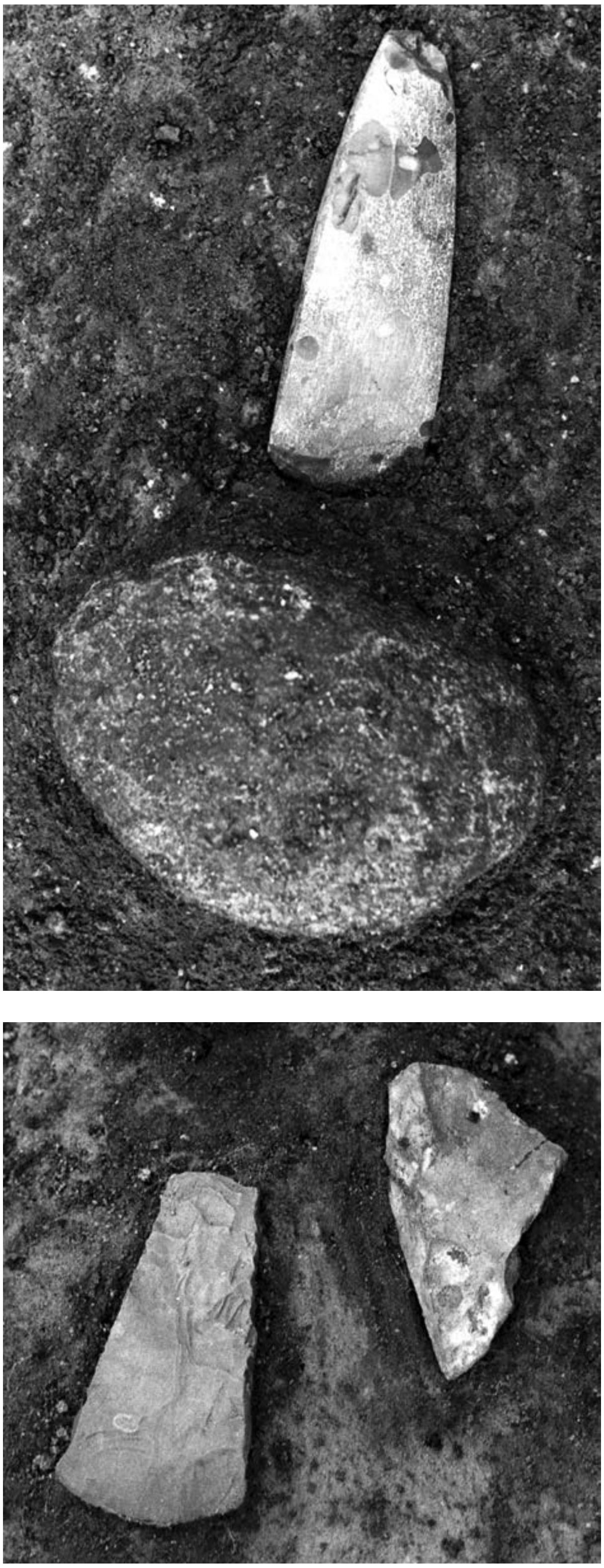

Fig. 2. Two axe finds interpreted as ritual depositions at the Långåker site, southern Scania, southern Sweden. Top: A thin-pointed axe found below the central part of the site. Bottom: An unworked piece of flint was found next to an unpolished thick-butted axe just outside the site (photo: L. Larsson).

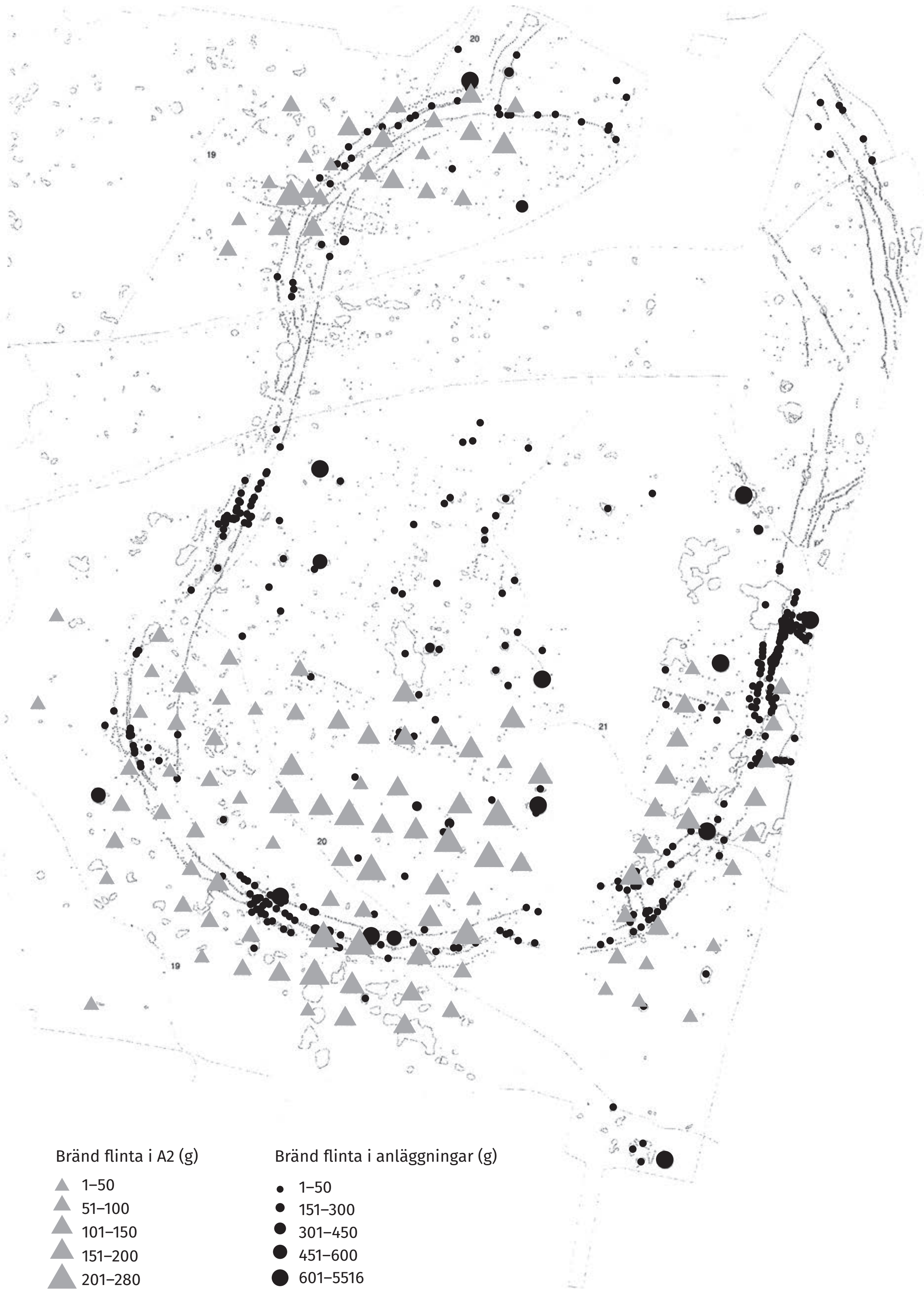

Fig. 3. A palisade at Hindby, southern Sweden, dated to an early part of the late Middle Neolithic (MN B). The triangles mark the intensity of flint affected by fire in the topsoil and dots the same kind of flint from features (BRINK/HYDÉN *2006).*

percentage among the youngest axes (87 %). The hoards of thin-butted axes from Scania show the same percentages of unpolished axes as in Denmark (KARSTEN 1994).

The norm for selecting polished axes as grave gifts can also be acknowledged in the later Single Grave culture of Jutland and northernmost Germany. Out of 174 axes from 161 graves, only one is unpolished; indeed, it is just a preform (EBBESEN 1983). However, in depositions the unpolished thick-butted axes account for 47 % and among the thick-butted gouges the figure is as high as 76 % (EBBESEN 1983).

In Sweden, all grave gifts of thick-bladed flint axes are polished, reflecting a total of 142 (MALMER 1962). Most of these are concave-edged and thereby used as adzes. In hoards, 65 % are unpolished (KARSTEN 1994).

These numerical exercises demonstrate a major difference in how polished and unpolished axes were handled. Never – or very rarely – was an unpolished axe deposited in a grave, while it was completely accepted as part of a deposition. There may be a subtle meaning behind the relationship of polished and unpolished axes in one and the same deposition. The fact that the number of polished axes in depositions discovered in firm ground is much higher than those in wetland hints at similarities to the practices of depositing axes in graves, where polished axes are the norm (KARSTEN 1994). However, the most important standpoint is that the main norms for axes were the same in 3400 BC as in 2400 BC.

AXE PRODUCTION IN A RITUAL ENVIRONMENT

Nonetheless, indications of the ritual use of flint axes are not restricted to finished axe heads. During rescue excavation in a valley at Dösjebro in western Scania, a Neolithic ritual complex was revealed on both sides of a small river. It included an enclosure, graves from the Battle Axe culture as well as an area with intensive flint axe production (LAGERGREN 2008; SVENSSON 2008; RUNCIS 2008). In this case, there is a close relationship between the manufacture of axes and a site of seemingly ritual use. Debris from axe production was found in a number of the post-holes of the palisade enclosure. The area in question does not have flint nodules useful for axe manufacture, meaning that the raw material had to be brought from the south-west, at least 20 km away. The palisade enclosure structure is dated to the transition from MNA to MNB and the axes produced seem to be of the same age (SVENSSON 2002).

A similar connection is evident at another palisade enclosure – in this case, partly excavated – at Järavallen in the very south-west of Scania (SVENSSON 2002). The palisade enclosure is located just a few hundred metres from a beach where flint nodules are numerous. A large number of axe preforms have been found along the beach. At two other palisade enclosures in the same region, a large quantity of burnt debris – mostly from axe fabrication – was found in post-holes (BRINK 2009; 2014) (Fig. 3).

The close chorological and chronological connection between a structure of ritual use and axe production indicates that manufacture – or part of the manufacturing process – was included in communal ceremonies related to a sacred area from a late stage of the Middle Neolithic Funnel Beaker culture or an early part of the late Middle Neolithic.

In this case, the fabrication or birth of axes was connected to wooden structures. This suggests a special perspective on the biography of axes. Axes occupied major importance when building the palisade enclosure, which incorporated thousands of posts.

The relationship between wood as a relatively soft material and stone as a harder material has been presumed to encapsulate an important dualism between birth and death, when the human body grows harder with time and is transformed into stone after death (PARKER PEARSON/RAMILISONINA 1998a, 313; 1998b).

The relationship between axe manufacture and structures that have been interpreted as places of ritual character can be followed back to an earlier stage of the Neolithic. In certain cases, causewayed enclosures in Denmark are located close to areas rich in flint (SØRENSEN 2014, 173). With one exception, palisades are located in the most south-westerly part of Scania where flint was easily available (RUDEBECK 1998). By linking axe manufacture to central structures, the manufacture became involved in a system that had both practical and ritual connections.

AXES, FRAGMENTS AND HUMANS

We will continue to concentrate on something that could be seen as the death or passage of axes (BRADLEY 1990). Like humans, axes became integrated into the part of the conceptual world that concerned those who had physically left the community, despite still being active as agents between worlds.

Most axes – like humans – ended up in anonymity: the former as raw material for other tools; some of

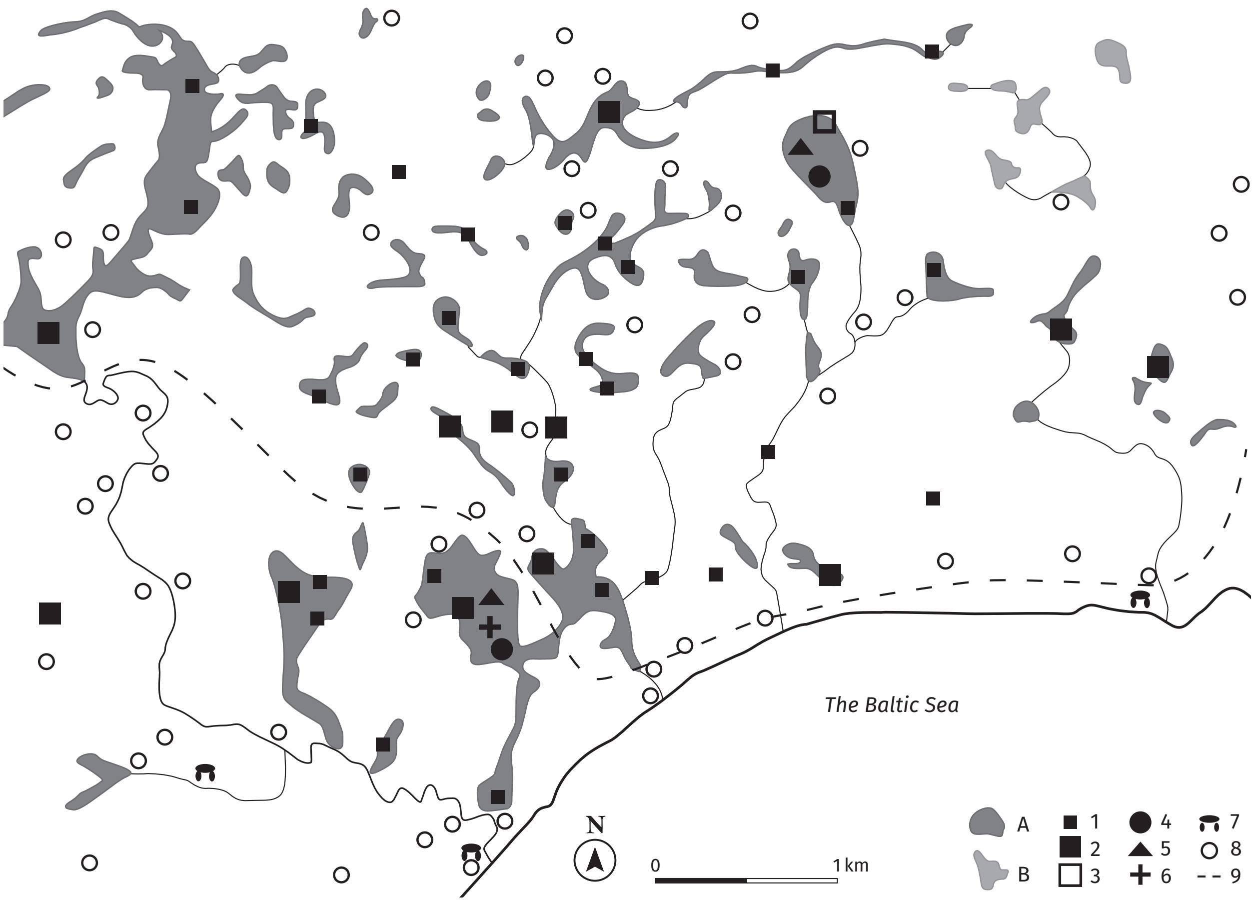

Fig. 4. Wetland depositions from the Neolithic within a research area in southernmost Scania, southern Sweden. Legend: 1. deposition of a single object; 2. deposition of at least two objects; 3. deposition of several objects; 4. deposition of objects made of antler or bone; 5. depositions from the Bronze Age; 6. depositions from the Iron Age; 7. megalithic tombs, know destroyed; 8. Neolithic settlement; 9. the extent of the hummocky area; A. wetlands and B. present lakes.

the latter – at best – as fragments within megalithic tombs, causewayed enclosures or other sites of ritual importance (Andersen 1997; Malmer 2003).

Humans – like axes – were deposited in their entirety or as fragments in wetlands (Koch 1998). Some bog finds include depositions of axes as well as humans (Bennike/Ebbesen 1986). Our knowledge of fragmented finds of humans and axes in wetlands is scanty. One example might offer a hint that they were more common than previously considered. An excavation of the small bog of Hindby in south-western Scania presents the same situation: remains of votive practice were found running through the Late Mesolithic, most of the Neolithic and into the Bronze Age (Berggren 2007). While there are examples of axes deposited in pairs, it is more common to find combinations of tools – in some cases broken up before deposition – as well as bones of animals and humans, such as a deposition comprising a burnt fragment of an axe, two human bones and three canines of pig (Berggren 2007). These indicate fragmentation by cracking and burning, followed by sorting, before deposition.

Since depositions with fragmented objects are the most difficult to recognise, they may well have been much more common. The simplicity of the artefacts makes it difficult for the layman to identify objects as belonging to intentional votive depositions.

This can be supported by the results obtained from surveys of an area of about 20 km² in the southernmost part of Sweden, where about 80 combinations were recognised, most of them including flint axes (Larsson 2007) (Fig. 4). Rarely have the objects been recovered together simultaneously; rather, they have been found at the same spot during ploughing or drainage activities over the course of several years. In several cases, former wetlands have produced tools from different periods.

Most of the artefacts were found in farm collections, some of which included broken tools, while objects of indeterminable type were identified during surveys. For example, a combination comprising a thick-butted flint axe of the late type, a fragmentary stone axe of the same type, a flint core with a shape resembling an axe and a small polishing stone were recovered in a very small bog less than 10 m in diameter (Fig. 5). Another example is an accumulated deposition comprising a battle axe dated to the Early Neolithic and a flint axe from the Late Neolithic in a very small former well. An interesting insight concerning the intensity of deposition is that most wetlands – even the very small ones – contain tools that might be related to ritual actions. The majority of axes in farm collections were intact, while most axes found during the surveys were fragmentary.

When axes are deposited, they usually are of very similar or even identical form. This is easiest to identify in cases where axes were deposited in pairs (Karsten 1994), as well as cases in which more than two axes were deposited; for example, the thin-bladed axes in the largest hoard in the special area of survey mentioned above. These axes are so similar in form and raw material that they were most probably made by the same flintsmith. Accordingly, they belonged to the same delivery, from which all or a significant majority were directly chosen for deposition.

Fig. 5. A deposition of a thick-butted flint axe of type B, a fragmentary stone axe of the same type, a flint core with a shape resembling an axe and a small polishing stone recovered in a very small bog.

Fig. 6. Chisels and axe affected by fire from Kverrestad, south-eastern Scania, southern Sweden, dated to the late Battle Axe culture (photo: L. Larsson).

PASSAGE BY FIRE

A special form of fragmentation is the effect of fire. Fire alteration of tools is relatively frequent at sites throughout the Neolithic (KARSTEN 1994; MALMER 2003). At almost every site, axes are more affected than any other type. This phenomenon is independent of chronology, spanning the period from the earliest Early Neolithic to the latest Late Neolithic. However, alteration by fire seems to be most common during the Middle Neolithic and specifically during its latest part, including the late Funnel Beaker culture and the Single Grave culture.

A special and hitherto rare type of site with examples of fire-altered flints – including a large number of fragments of thin-butted and thin-bladed axes – is found on a prominent hill at Svartkylle, south-eastern Scania. In a survey of the area, at least three concentrations of fragments were found on the surface (LARSSON 1989). However, no features were found in a test excavation, possibly due to heavy ploughing. Two other sites with a large number of axes affected by fire have been identified, namely Strandby on Funen (ANDERSEN 2009) and Stensborg in central Sweden (LARSSON/BROSTRÖM 2014), close to Stockholm, dated to the Early Neolithic/early Middle Neolithic.

A similar kind of site but different in date was discovered only some 17 km from Svartkylle. Within an area of approximately 70 × 70 m at Kverrestad, south-eastern Scania, a large number of flints affected by fire were found (LARSSON 2000; 2014). Excavation revealed a number of pits of varying size and depth, in which flint artefacts affected by fire had been deposited together with a considerable amount of fragmentary

Fig 7. Fragments of flint axes affected by fire from Prinshaga, western Sweden (photo: L. Larsson).

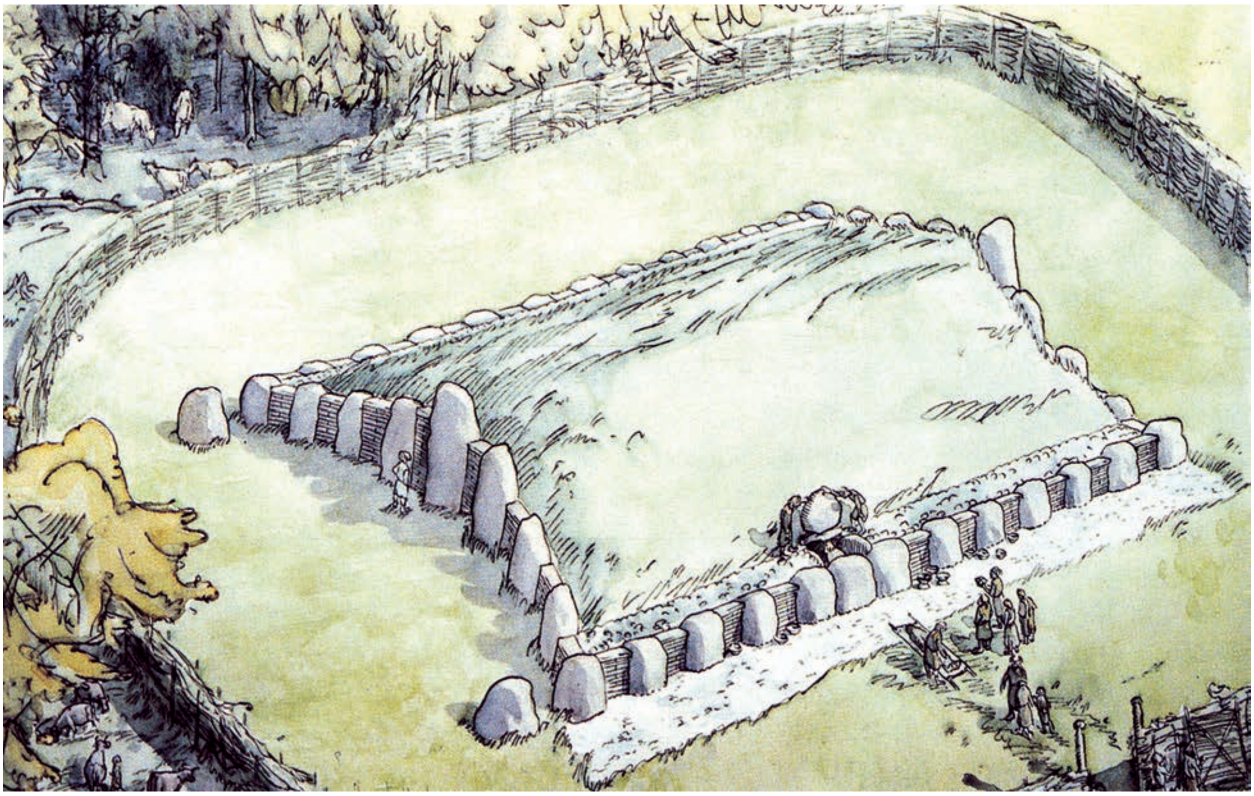

Fig. 8. A thick layer of burnt white flint covered the surface along the southern side of a passage grave at Kong Svends Høj on the Danish island of Lolland (Dehn et al. 1995).

pottery. The largest pit was about 4 m long, the shortest less than 0.5 m. Finds were made throughout the fill, which shows that the artefacts were deposited during the entire process of filling in the pits. Fragments from around 100 thick-butted, concave-edged axes and chisels have been found, as well as arrowheads and other flint and stone tools (Fig. 6). A small number of burnt human bones – intentionally broken into small pieces – were also found, providing another example of the combination of humans and axes. The finds are dated to the late stage of the Battle Axe culture.

As an interesting aspect of the ›life cycle‹ of axes, it should be stressed that the axes at Kverrestad included rough, unpolished examples, where only the form had been shaped, as well as examples with very well-executed polish of the entire body.

The choice of axes for destruction – or should we say transition – is also obvious among the finds at Kverrestad. While more than 90 % of the axe finds display changes by fire, two-thirds of the scrapers, half of the tanged arrowheads and one-third of the arrowheads made by pressure-flaking – an exotic artefact without parallels in Scania – exhibit the same kind of alteration by fire. These marked differences point to intentional selection regarding which tool types were to be put in fire and which were not.

Other find sites have a significant proportion of objects affected by fire, albeit not on the same scale as those mentioned above.

At Hansted Ådal, eastern Jutland, a number of fire-damaged thick-butted, thin-bladed axes, point-butted axes with hollow ground edges and chisels were found by surveys. As there is no indication of a megalithic tomb, they are regarded as a ritual deposition. The finds can be dated to the final part of the Funnel Beaker culture (information from T. Madsen, Århus).

Another similar place is Prinshaga in western Sweden, located on a rise that forms a headland in a small lake. A considerable proportion of fire-transformed flints have been found there (Fig. 7), as well as finds of intact flint axes not affected by fire. Judging by axe forms comprising thick-butted axes and thin-bladed axes, the site was used during the Battle Axe culture (information from Leif Arvidsson, Skara). It is unclear whether the activities on this site included large-scale deformation of axes in particular, in combination with other activities of settlement-like character, or whether we observe activities that were separated in time. No archaeological excavation has been undertaken.

None of these places has any artificial boundary corresponding to causewayed enclosures and palisades.

On the other hand, there are natural boundaries in the form of wetlands and ravines that could have influenced the choice of site. There are also places where a large number of people could assemble with a good view of what was taking place.

It should be stressed that it is not solely axes and other tools that were exposed to fire; rather, a significant number of the flakes from axe manufacture found in the post-holes of the palisades mentioned above were also affected by fire. The extent of the activity that caused the fire damage to the flakes is uncertain. However, a study of the ground surface conducted before the palisade at Hyllie was excavated showed that it was covered with fire-altered flakes (BRINK/HYDÉN 2006), highlighting it was hardly a random activity.

It should also be noted that alteration of flint by direct fire provides different products of fragmentation than those found at the sites mentioned above. Axes were heat-treated before being placed on the fire (LARSSON 2000); otherwise they would have been fragmented into small pieces, rather than the large parts that are normally found. Therefore, the intention was not to destroy the axes but rather to retain parts as large as possible, even after transformation by fire.

Flint tools affected by fire appear in many instances in relation to megalithic tombs. Burnt tools seem to be less common in burial contexts dated to the Early Middle Neolithic. However, during a late stage of the Funnel Beaker culture, axes destroyed by fire are frequently found outside the entrances of some tombs (TILLEY 1999).

The fact that axes and fire can be agents in various rituals connected with a wider aspect of mortuary practice is exemplified by finds in northern Jutland, where special types of individual graves – stone setting graves – were created. The majority are dated to a late stage of the Funnel Beaker culture (JØRGENSEN 1977; FABRICIUS/BECKER 1996). Despite a predominance of flint axes in the graves, none of these have been affected by fire. However, burnt axes of the same period as those in graves were found outside the entrances in megalithic tombs at Vroue Hede, showing a connection with stone setting graves (JØRGENSEN 1977). This indicates that axes were burned in ceremonies relating to collective manifestations, while axes connected with individual interments were buried unaffected.

While fire is the destroyer, it could also be regarded as the cleanser. The artefact undergoes remarkable changes during the act, whereby a colour transformation takes place from natural black or grey to white. Some changes are similar to the cremation of a human body, when the colour of the bones changes to white. Ritual burning might have a public, direct, evocative and even magical appearance. Fire as a medium for transformations connected with rites of passage has mainly been applied in mortuary practices, as well as being used in many other circumstances.

We see quite different contexts where large quantities of unworked flint are found in connection with megalithic tombs. In such cases, the flint was exposed to direct heating, but not such great heat that it broke into splinters. Burnt flint is found mixed with clay, which covers the orthostats and sometimes the entire chamber. A mixture of burnt flints and clay as floor cover is very common. In these cases, the flint has been interpreted as constituting a material with a special quality, namely the ability to absorb moisture to keep the chamber dry (STRÖMBERG 1971). Another purpose relates to the aesthetic quality of burnt flint, namely its white colour. A thick layer of burnt flint covered the surface along the southern side of a passage grave at Kong Svends Høj on the Danish island of Lolland. Based on the quantity of finds from some test pits, between 4 and 5 tonnes of burnt flint were used (DEHN et al. 1995) (Fig. 8). However, the relationship between fire, flint and cremation adds to the symbolic meaning of burnt flint in relation to the megalithic tomb, or even as an integral part of the tomb.

SOME COMMENTS

Ritual relations involving flint are not something that only concern the Neolithic. Depositions of fragmented microliths are dated to the Early Mesolithic (LARSSON 1978). Late Mesolithic flint axes occur in wetland contexts (KARSTEN 1994). Nonetheless, there is no doubt that flint acquired a greater significance as a ritual marker during the Neolithic.

We have a large number of objects – chiefly axes – deposited primarily in wetland. However, although the number of depositions and objects is very large – probably representing a five-figure number of axes – ritual deposition in wetlands is not exclusive to southern Scandinavia. In central parts of continental Europe such as eastern France and southern Germany, up to half of the examples of a particular early form of axe have been found in similar environments (SØRENSEN 2014, 162). The south Scandinavian finds of early copper axes – which are regarded as a model for the early south Scandinavian axe forms – were also deposited in the same way (SØRENSEN 2014, 164). During a late part of the Neolithic, the axe was replaced by the dagger as the most common tool with an individual connection and the predominant object of deposition (Apel 2001). No find spot with a large number of fire-altered daggers has been discovered, although it does occur that occasional daggers show exposure to fire, so the custom did not disappear.

It is clear that different tools received varying attention during deposition and fire alteration, as axes have a special position. However, there are also depositions of only scrapers or blades, for example (Salomonsson 1956; Strömberg 1982). These have sometimes been interpreted as deposits intended to be dug up later. Nonetheless, already during the Middle Mesolithic we find blade depositions where it is obvious that one blade or a couple were selected for a special function while the remainder were deposited with the intention that they should not be dug up again (Larsson/Sjöström 2011).

People's surroundings in their day-to-day work, in relations between different settlements and in different beliefs about contact with the ancestors and with supernatural beings were marked in different ways by flint, whereby one can certainly speak about a flintscape.

CONCLUSIONS

The occurrence of flint axes in contexts that can be described as being outside their day-to-day function as tools is extensive in southern Scandinavia. A look through farm collections gives the impression that only a share of the deliberate depositions has ended up in museums. Depositions of axes are of such a scale that they constituted a frequent activity with a ritual character, possibly with varying intentions and not always necessarily linked to religious beliefs. Ideas about the choice of place for deposition and the status of the object were extremely tenacious, in several cases persisting throughout the Neolithic. By contrast, there seem to have been considerable variations – both chronologically and probably also chorologically – in the outlook on the role of the axe in relation to megalithic graves. Regarding the intensity of deposition, likewise significant changes can be chiefly discerned in wetland.

What is expressed at sites with massive destruction by fire differs from the destruction of single artefacts by fire evidenced at settlement sites and graves. This type of public sacrifice of rare objects and with a direct effect may have been practised on special occasions, probably in connection with external or internal threats. In addition, this could be an act that was primarily meant to legitimate power by impressing representatives of another community. Despite their different settings, both Svartkylle and Kverrestad had a topography that made it feasible for a large crowd of people to watch the ceremonies.

The cosmology that dictated burning was active throughout most of the Neolithic. The change of colour of the flint artefacts from the natural black or grey to white might be connected to a *rite de passage*, possibly linked to the process when a human being is cremated. In this sense, the use of fire on axes could be regarded as the cremation of these flint objects, whereby the mortuary practice as well as rules related to votive depositions might have been interrelated.

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Causewayed enclosures under the microscope: Preliminary results of a large-scale use-wear analysis project

Peter Bye-Jensen

ABSTRACT

This paper examines the phenomenon of monumentality at the micro scale. It focuses on use-wear analysis of flint assemblages from the primary phases of a number of well-excavated Early Neolithic causewayed enclosures in southern Britain and southern Scandinavia as a way of characterising activities at these sites. The sites included in this preliminary study are Etton (Cambridgeshire, Britain), Staines (Surrey, Britain) and Sarup (Denmark), with reference also made to preliminary analyses of assemblages from Hambledon Hill (Dorset, Britain) and Windmill Hill (Wiltshire, Britain).

INTRODUCTION

Causewayed enclosures are some of the most significant monuments in the Early Neolithic, with a distribution across most of Europe. A recent programme of radiocarbon dating has refined our understanding of the chronology of this important class of monuments in Britain, as well as highlighting how many sites have relatively restricted periods of use (WHITTLE et al. 2011). The first causewayed enclosures are constructed in Britain around 3700 BC, and are visited with regular intervals for only a couple of centuries (WHITTLE 2014). However, the precise character of the activities that occur at these sites remains unclear, or at least debatable: are these sites gathering places, mortuary sites, stock enclosures, defensive structures, or perhaps all of the above?

Fig. 1. Sites mentioned in this paper (approximate location).

TAKING A CLOSER LOOK

One route to understanding activities at causewayed enclosures is through a detailed study of the artefactual assemblages recovered from them, and particularly through characterising the use of such artefacts. Here, the focus is on understanding the role and biographies of flint tools through systematic micro-wear analysis. The selection of the material for analysis in this paper will mainly come from the primary phases of the ditches of the causewayed enclosures, as these contexts provide the best evidence for the initial use of these sites. In addition to the comparison of sites across southern Britain, the British sites will also be compared to the well-excavated site of Sarup on Fyn, Denmark (ANDERSEN 1997). This is to make a trial transect across Britain, and potentially showcase life biographies of the prehistoric flint tools, as well as perhaps similarities and differences in flint tool use traditions between the northern Funnelbeaker Culture and Early Neolithic British cultures. By ›life biographies‹, what is meant is the reconstruction of signs of temporality in deposition, of the treatment, activities and the practices in which the flint artefacts were involved in pre-depositional environments, and possibly during the event of deposition itself. The methodology uses a *chain of operations* as a step-by-step analysis to attempt to identify and understand changes in use and surface modification from freshly struck flint tool to patinated and/or intensively-used tools via use-wear analysis (SCHIFFER 1972, 156–165).

METHOD

The use of high-powered microscopes as an instrument for functional analysis of flint artefacts was developed by S.A. Smemenov in the 1960s, and later refined by Lawrence Keeley in the early 1970s (SEMENOV 1964; KEELEY 1980). The core in this analysis is to answer what function a flint artefact has had and what material or materials it could have worked with. The method used in this project differs from the conventional analysis by using a high-end digital microscope (Dinolite Edge-series). This equipment is crucial, as it changes many of the limitations of using a conventional microscope. For instance, the analysis can be conducted on site or where the flint assemblage is stored. This practical feature makes most museums much more willing to facilitate analysis of their curated flint artefact collections, as the artefacts do not have to leave their home in the museum stores.

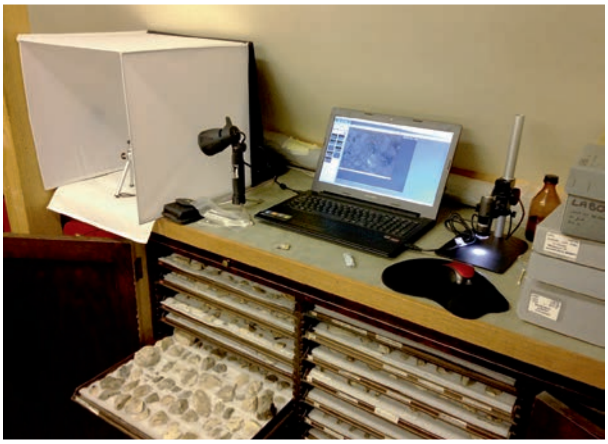

Fig. 2. Photo of transportable use-wear lap at the Windmill Hill assemblage at Avebury (photo: Peter Bye-Jensen).

Furthermore, the reproduction of results via microscopic pictures has sometimes been a technical problem that is solved with this new technology (VAN GIJN 2014, 166–169, 167). The microscope used in this project has a fix point at ×20 and ×200 time's magnification with a built-in polariser to regulate any very reflexive surfaces. The digital microscope offers a portable and easy solution, although it is crucial to have observed use-wear, both experimentally and original, in a conventional microscope, as the images of the digital microscope can look different from the crystal-clear images the conventional indirect light microscope. As a footnote, some polishes, like plant polish, can be observed better in the digital microscope when the negative filter is on. Observing the polish in negative can support in determining the degree of development of the polish. The digital microscope has a wide array of tools for imagery manipulation that can aid in observing the polishes left from working in different contact materials. Nevertheless, my experience is that you have to have gained thorough experience with observing use-wear traces in a conventional microscope to fully use the digital microscope.

Although the method of use-wear analysis is widely known, the implementation and application of the method remains slightly deficient (DEBERT 2013, 83–88). Use-wear analysis seems to have developed a stigma of being a very expensive and time-consuming type of analysis. While the analysis might be as time consuming, the expensiveness is exaggerated compared to the results that might be achieved. Perhaps the pronounced focus on the quantification of science-based archaeological analysis and their results is the reason, as it *is* time consuming to apply use-wear analysis across a very large lithic assemblage.

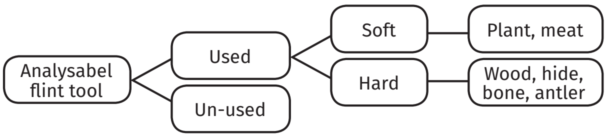

Fig. 3. The simplified possibilities of use-wear analysis-tree (illustration: Peter Bye-Jensen).

Use-wear analysis is typically divided into either a thematic analysis or an analysis focusing on a specific site or features of a site. The thematic analysis can focus on a specific type of artefact, e.g. scrapers. Site orientated use-wear analysis will give a more inward interpretation of the function of the site. This analysis can then be compared to other sites of the same type (Jensen 2000). Use-wear analysis gives qualitative results, and one thus should not expect that thousands of units can be analysed and processed easily. However, with the digital equipment used in the method presented here, analysis of results of a larger quantity of artefacts are made much easier.

What can the use-wear analysis contribute to the interpretation of the site or assemblage? The interpretive possibilities and perspectives of the analysis lies in the answering questions such as:

— has this selection of flint artefacts been used?
— what has the artefacts been used for?
— how intensively have the tools been used?

Therefore, this method potentially answers questions about the general usage of the flint artefacts in pre-depositional environments.

The first question to ask of a selection of flint artefacts for analysis is obviously whether the selection of artefacts is analysable (see figure 3 above). Many factors are in play when this question is asked, such as how have the flint artefacts been treated during and post-excavation, and if the flint artefacts have been in an archaeological context that prohibits visibility of the use-wear traces, like waterlogged flint artefacts or mostly surface finds. In general, the flint artefacts are quite resilient to post-excavation damage, but the best thing is to be mindful when cleaning (if at all) and storing the artefacts (Evans/Donahue 2005, 1733).

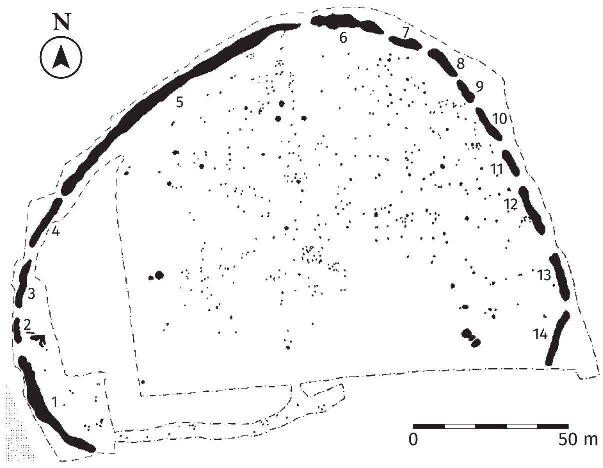

Fig. 4. The causewayed enclosure at Etton (after Pryor 1998).

The second stage in use-wear analysis – when concluded that the flint artefacts have been used – is to determine if the material they have been worked on could be hard or soft. Some softer contact materials like plants can generate wear traces and polish after relatively low intensity work, while some harder materials like bone occasionally leave only few traces of polish from the contact material (van Gijn 1990, 21; Bamforth/Woodman 2004, 30).

The last stage investigates the different categories of contact materials, as some of the traces, are distinct to their respective contact material, e.g. plant polishes. However, in the category of contact materials some overlap, like hard wood, antler and dry hide (Jensen 2000; van Gijn 2014, 166–169). This is also why one should at no time solely rely on typology or morphology in the interpretation of a flint assemblage, as form and shape can never reveal the function of a flint tool.

The presented study uses a combination of the so-called Low-Power Approach (LPA) and High-Power Approach (HPA). The LPA deals with lower magnifications (× 10–100) that characterises use from edge-damage and edge-rounding. The HPA uses the higher magnifications (× 100–500) that affords the possibility of determining worked contact materials via polishes, micro-fractures and striations in the polishes. The striations are streaks in the polishes that reveal the kinematics; for example, a sawing motion.

SELECTED SAMPLES FOR THE PROJECT

The frequency of preserved artefacts at causewayed enclosures varies, e.g. the enclosure at Etton (see figure 4) had much organic material such as wood and bone preserved (Pryor 1998), while other enclosures only have stone and pottery artefacts. Consequently, a selected sample of material for analysis that is found in all of the assemblages, flint artefacts. The predominant flint artefacts at causewayed enclosures are scrapers, utilised flakes, axe heads, serrated-edge flakes, and in Britain, leaf shaped arrowheads (Saville 2002). The ratio

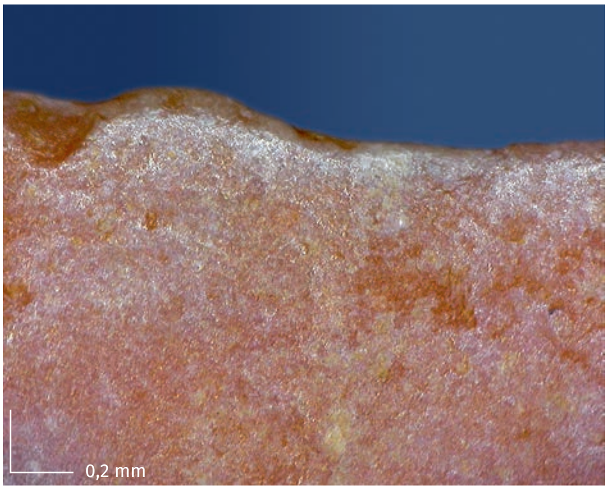

Fig. 5. Developed edge-rounding on a tool from Etton and a generic weak polish from use (photo: Peter Bye-Jensen).

between the categories of flint artefacts fluctuates slightly, but it seems that almost all types of flint artefacts are represented in the assemblages from the enclosures. Although this paper focuses on all categories of flint tools, the serrated-edge flakes have been given a special attention here because the function of this kind of utilised flake has been questioned for almost a century, and they have exhibited a strong presence at many causewayed enclosures (CURWEN 1930, 179–186; JENSEN 1994). They are made from a flake that has had several small denticulations cut into it by another flake perpendicular to the edge. Sometimes the cutting of the denticulations or »teeth« has been done from the ventral side, and sometimes from the dorsal. The worked contact material of the serrated-edge flakes seems to be of plant origin, but no direct match for the contact material has been established with certainty to date (JENSEN 1994, 62). The polish is characterised by having features that looks like both a plant polish and a hide-like polish, made with the tool at a tilted angle, working in a transverse motion.

The selection of material has mainly been from the primary layers of the causewayed enclosures as these layers relate to the initial use of the monuments, and thus these deposits reflect the initial sets of practices associated with the monuments. A few artefacts have been selected from the succeeding phases to make a diachronic analysis for comparison with the primary results. This can ultimately lead to a result that shows the similarities and differences in depositional practice and activities over time.

The significance of this study is not necessarily to relate the individual tools to their potential worked contact materials, but rather to recognise if they have been used at all. There are many interpretations of the function of causewayed enclosures, and hence also the artefacts related to them.

- Do the flint artefacts play a role in the construction of the monuments?
- Are they related to the feasting that seems to have left traces as the many bones of meat rich animals?

Each flint artefact has a life biography, a part it has played after its use-life, and then ended up in the activities at the causewayed enclosures; even the waste flakes and debitage that had no direct use.

RESULTS

The condition of the flint assemblages from Etton, Staines and Sarup have proven to be suitable for use-wear analysis. All previous examinations of the flint assemblages have shown that the flint artefacts from these sites seem »fresh« and un-abraded (JEPPESEN 1984, 31–60; PRYOR 1998, 216).

The results of the preliminary use-wear analysis have shown that all types of flint artefacts show traces of use (see figure 5). Only very few tools seemed to have been unused. Amongst the many tools scrapers and some flakes seems to be those that had been used most extensively (see figure 5a and b). Overall, the relation between identifiable contact materials and type of flint tool revealed no surprises in tool use. The scrapers had been used for both hide and wood working, but with a slight predominance to wood working. The flint flakes analysed generally show light use, although only some flakes had use-wear traces that were in such developed condition that worked contact materials could be identified. Amongst the observed activities were wood working, cutting of meat and hide.

All categories of flint artefacts from cores to debitage to retouched tools at Etton had been analysed, and involved 149 flint artefacts, and amongst them 37 utilised tools and 101 so-called waste flakes. The excavation and recovery of the artefacts at Etton had been done

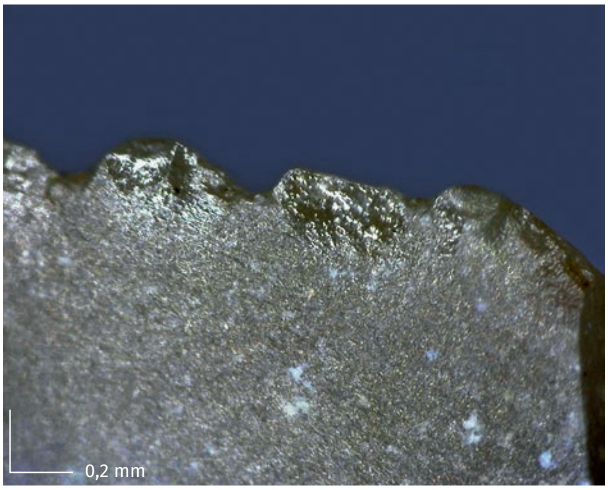

Fig. 6. Serrated-edge flake from Etton × 20 (left) and × 200 (right) (photo: Peter Bye-Jensen).

meticulously and the archaeological deposits were well preserved. Therefore, the excavated material can be regarded to reflect the structured depositions from the Early Neolithic in their entirety (PRYOR 1998). The flint artefacts had signs of the use one might expect, but the surprise came when looking amongst other categories of worked flint. 65 of 101 of the so-called waste flakes (roughly two-thirds) had signs of having been used. This result raises two questions: what is waste, and what is a tool? The waste flakes are often regarded as a »bin category« and is close to being regarded as debitage if put up against flint tools that require more work in manufacturing, such as retouched or polished flint tools. These results mean that the interpretations of many Early Neolithic sites, or any site with flint artefacts for that reason, should take the role of the so-called waste flakes considerably more serious. It is the norm to focus on utilised flint tools when interpreting site function or functions, e. g. a site for hide processing. Normally, a site is interpreted as being a place where a lot of hide processing has taken place. In a study of scrapers from the well-known causewayed enclosure Sarup I, Jeppesen's use-wear analysis showed that most of the scrapers in this study were in fact used for processes involving the working of wood (JEPPESEN 1984, 31–60).

The serrated-edge flakes from Etton (fig. 6) did have signs of use, and the special polish that comes with this type of tool (HURCOMBE 2007). As mentioned above, there is no direct experimental analogue as to which contact material these flint tools have been worked on, and the examples analysed here have a polish that looks slightly different to those analysed by others and those from Sarup in Denmark. Perhaps this suggests a different way of using the tool? Or perhaps even a slightly different contact material? Further use-wear analysis of the flint assemblages from the causewayed enclosures will hopefully be able to give us a better understanding of this problem.

On the serrated-edge flakes analysed from the enclosures at Etton and Staines the polish is restricted to the »teeth« of the flint artefacts and does not proceed to spread further over the edge. The same traits have been observed on a serrated-edge flake from the Danish causewayed enclosure Sarup. Consequently, this flint tool looks like it might have been used in a process to split or peel a hard plant material (JENSEN 1994, 65). The association that serrated-edge flakes have with plant working became suddenly plausible as one of the serrated-edge flakes from Etton had a piece of plant fibre stuck to it (see below, fig. 7). It can of cause be debated where the fibre came from, prehistory or post-excavation, but it is very likely that prehistoric fibre could survive as a bit of string made from plant fibre has been found in a ditch segment of the same causewayed enclosure (PRYOR 1998).

Overall, the flint assemblages at causewayed enclosures represent a selection from a larger assemblage. The ratio between debitage, such as »waste flakes«, and retouched artefacts is simply not large enough to make up a complete inventory from knapping to finished tool (WHITTLE et al. 1999, 331). This underlines the fact that the flint artefacts have been brought to the monuments from somewhere else. The assemblages are simply »missing« something, which is also exemplified in the assemblages of fragmented pottery found at the causewayed enclosures (BEADSMOORE et al. 2010). The aim of this study is also to find a plausible answer to this link. Thus far, the hypothesis of the present study is that the deposited material derives from a curated assemblage that again comes from a settlement context. The curation of the

Fig. 7. Plant fibre on a serrated-edge flake from Etton × 200 (photo: Peter Bye-Jensen).

flint assemblage at causewayed enclosures can be observed by weathering or so-called surface modification. The flint assemblages of both Etton and Stains, but also Sarup I, had traces of surface modification, such as wind-polish and white patina. Wind-polish or dessert-polish is the result of dirt and sand particles mechanically abrading the surface of the flint artefacts (HOWARD 2002). The white patina observed on the analysed flint artefacts is most likely due to exposure to sunlight (BURRONI et al. 2002). Therefore, these surface alterations of the flint artefacts suggest that a majority of the the artefacts had been exposed to weathering before deposition. It is unlikely that the artefacts gained this surface modification in the ditches, as they were backfilled more or less immediately (MIDGLEY 1992, 345). Additionally, the surface weathering is also observed on parts of the bone and pottery assemblages from the analysed sites.

This paper shows the first valuable step in this promising research project. Further experiments with surface modification is needed to understand the formation of these features, and their relation to the analysed assemblages taphonomy. Additionally, more material needs to be analysed. When this study concludes it will have analysed material from Wales to Eastern Britain, and Scandinavia. Furthermore, it will compare these results to a contemporary settlement from this area.

CONCLUSIONS

The preliminary use-wear analysis of the selected flint assemblages has added to our understanding of tool traditions in the time of enclosures and across the space of Britain and Scandinavia. Furthermore, the results of the use-wear analysis of the Etton assemblage questions the grounds of our understanding of the typology of the inventory of flint artefacts. The interpretation of lithic sites often rests on the frequency of utilised tools and neglects the waste flakes, although here it is shown how problematic this can prove.

It is perhaps most productive to think of causewayed enclosures as not having had one sole function, but rather encapsulating a broad basic meaning or purpose, and thereafter multiple particular functions that altered concerning who used them or where they were constructed, e. g. the South-West in opposition to Thames area (OSWALD et al. 2001, 108). Use-wear analysis of the selected enclosure assemblages will ultimately bring us closer to understanding the activities that went on at these sites, and perhaps the rhythm of such activities. Additionally, the results of the analyses will provide us with an enhanced sense of the relationship between the flint artefacts and their context and origin (e. g. ditches, pits, surface middens or settlements), and further the way in which we see the artefacts' association to the construction of these monuments… or not.

ACKNOWLEDGEMENTS

This project is funded by the South West and Wales Doctoral Training Partnership (SWW DTP) and Arts and Humanities Research Council (AHRC). I would like to acknowledge the advice and guidance of my supervisors: Professor Dr Alasdair Whittle (Cardiff University), Professor Dr Andrew M. Jones and Dr Joshua Pollard (University of Southampton).

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Pottery traditions in the Funnel Beaker Culture – Archaeometric studies on pottery from Flintbek (Germany)

Katrin Struckmeyer

ABSTRACT

This paper presents archaeometric analyses that were carried out on pottery fragments from the Flintbek region. In order to obtain detailed information about the pottery traditions, various analytical methods were employed to understand technological aspects such as raw material and temper. In the course of the study, it could be ascertained that the pottery found in an Early Neolithic pit can be clearly distinguished from the younger pottery from the monuments by the presence or absence of grog and flint as tempering agents. In particular, the absence of grog in the younger inventories indicates a discontinuous development of pottery technology in the Flintbek region.

INTRODUCTION

In research on the Funnel Beaker culture, the usually highly-decorated pottery vessels play a central role as a key element in both chronological studies and the investigation of the communication systems that existed at the time. Traditionally, the focus has been on the shape and decoration of the vessels, while technological aspects such as the selection and preparation of the clay and the production technique were devoted less attention. However, if the technological steps followed by the potter are reconstructed, significant information can be obtained regarding the social organisation of the Funnel Beaker culture at a local, regional and supra-regional level.

The study presented here addresses these aspects with archaeometric analyses of pottery sherds. Pottery finds from different micro-regions within the overall Funnel Beaker culture area were analysed as part of the DFG Priority Programme »Early Monumentality and Social Differentiation«. One of these sites is the burial ground at Flintbek in the district of Rendsburg-Eckernförde, which was excavated between 1976 und 1996 by the archaeological department of Schleswig-Holstein (Zich 1992/1993; Mischka 2011; 2012). In the course of the study of the pottery technology, a total of 103 sherds – which represented 74 pottery units (PU) from different sites in the Flintbek region – were analysed[1]. The study devoted particular attention to questions of continuity in the micro-region Flintbek. A point to be clarified was whether the technology of pottery making changed during the different periods of activity in Flintbek or whether continuous development can be detected.

The graves in the Flintbek region lay over a distance of about 3.3 km along a ridge formed during the last glacial period. The dating of the different sites ranges from the end of the Early Neolithic to the Early Bronze Age. As well as the graves, some traces of Early Neolithic settlement were excavated. One focus of the pottery study was on finds from an Early Neolithic pit on the site LA 48 (Fig. 1). The contents of the pit included several vessels from the middle Michelsberg culture (II/III), which can be projected into the correspondence analysis carried out by Höhn (2002; Mischka et al. 2015, 471–474). In addition, the pit contained pottery from the Early Neolithic Funnel Beaker culture (Oxie group), especially one funnel beaker that was classified as Koch's type 0 (Koch 1998; Mischka et al. 2015, 469). Frequent decorations on this Early Neolithic pottery are impressions below the rim, bosses and arcade rims. This local group – the so-called Wangels group – has been dated to 4100–3900 cal BC (Hartz et al. 2000, 134–135).

1 The pottery was kindly provided by Prof. Dr. Doris Mischka, Institut für Ur- und Frühgeschichte Universität Erlangen, and by Dr. Sönke Hartz, Archäologisches Landesmuseum Schloss Gottorf, Schleswig.

METHODS

In order to obtain detailed information on pottery technology, various analytical methods are employed, including the analysis of the sherds under a digital reflected-light microscope. For this purpose, a vertical edge on each sherd is wet-ground und polished, so that the texture and temper can be very clearly seen under the microscope. The components of the temper, their sizes and quantities can thus be precisely determined. To investigate the clays used as raw material for the pottery, thin sections from 23 sherds were prepared and analysed under a polarising microscope: the minerals in the clay can be identified by their optical characteristics such as colour, habit and relief. Moreover, it is possible to classify the material as fine, medium or coarse depending on the natural silt and sand content in the clay. If calcareous or ferruginous clays have been used in pottery production, this can also be seen in the thin sections. Occasionally, diatoms and foraminifera can be detected in the thin sections, which suggest the use of marine or fluvial clay sediments. Strong similarity in significant petrographic features indicates the use of the same clay deposit for the production of the pottery. Finally, inclusions in the clay are clearly visible in thin sections

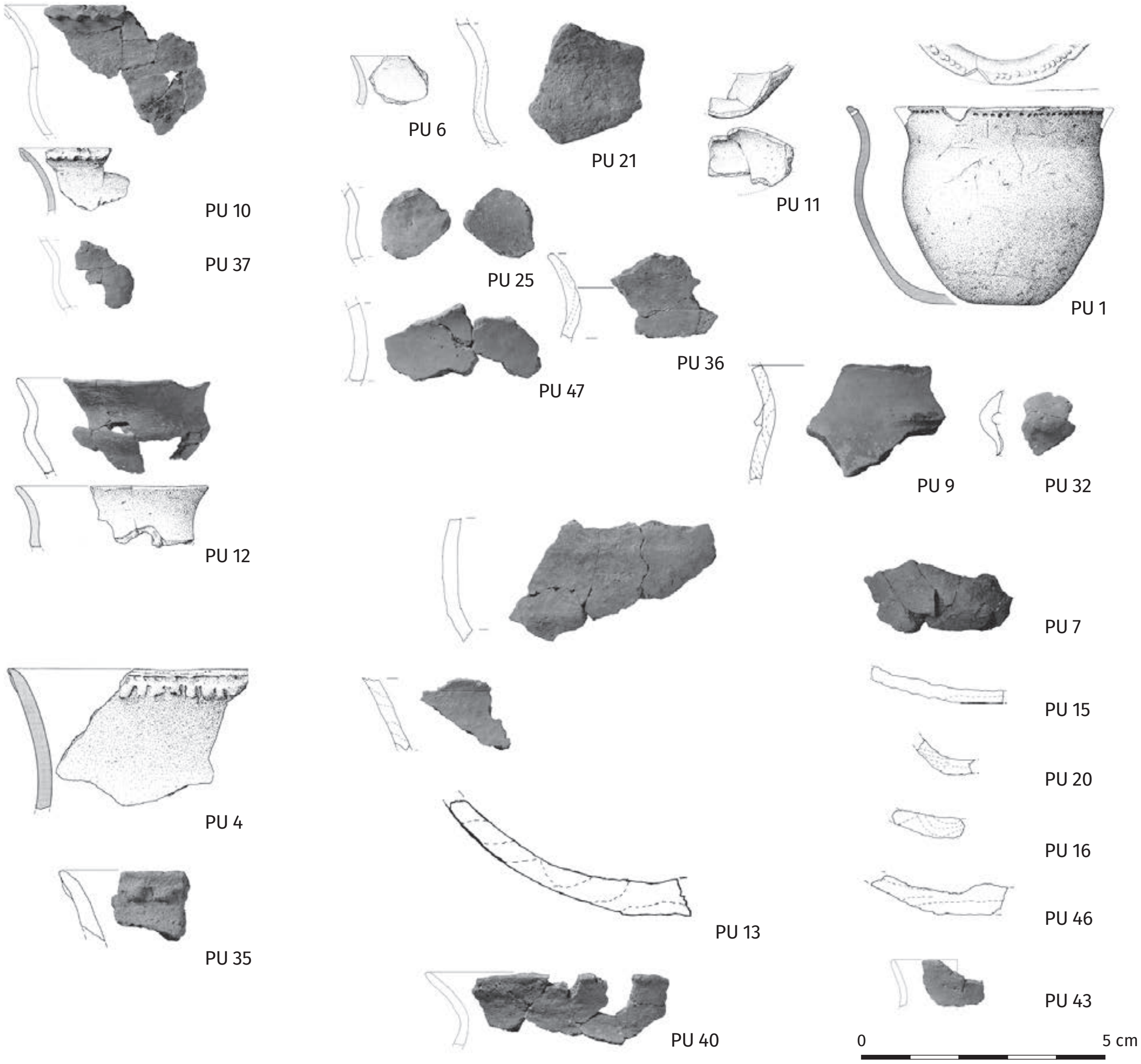

Fig. 1. Selection of the most important pottery units (PU) from the pit LA 48. (A. Heitmann, D. Mischka; PU 8 drawing from Zich 1992/1993, 21 fig. 5.1).

and can also be identified: the shape, size, frequency and distribution of the inclusions indicate whether they are natural or have been added as tempering agents. For example, a regular distribution of grain sizes suggests that the minerals are natural components of the clay. By contrast, the existence of temper can be supposed if there are gaps between the different grain sizes of the minerals (STILBORG 1997, 105–106). For instance, tempering agents can comprise crushed granite – mostly with angular edges – or plant material, which is usually destroyed in the firing, so that only rounded or longish cavities in the clay indicate its former presence: sometimes small, charred residues remain in the cavities. Another material used as temper is grog. The fragments are usually angular and hard. They often have an orientation that is different from that of the surrounding clay matrix and sometimes cracks can be seen at their edges (STILBORG 1997, 106). Granite particles from the original tempering material in the crushed pottery can often be observed in the grog. In addition, nine sherds from Flintbek were chemically analysed by ICP-AES (Inductively Coupled Plasma – Atomic Emission Spectrometry). The measurement of twelve elements makes it possible to determine the chemical composition of the clay used for the production of the pottery. The data are analysed using statistical methods such as cluster analysis. Since the variation in chemical composition between different clay deposits is greater than within a single deposit, similar results can be taken as an indication that the sampled pottery is made of clay from the same raw material source (RICE 2005, 414).

ANALYSES OF THE CLAYS

The microscopic investigation of 23 thin sections provided detailed information about the raw clays used for making the pottery. When analysing the thin sections under a polarising microscope, it was noticed that some of the clays were largely identical in their main petrographic features, so that several groups could be identified (Fig. 2). The first group comprises four pottery fragments made of medium-coarse clay with a high proportion of silt and a small amount of sand. In addition, accessory minerals and organic material occasionally appear in the clay. Two of these sherds come from the passage grave LA 52 (Fig. 2a; PU 3, 26), while the other two were excavated in the passage grave LA 40 (Fig. 2b; PU 15) and the long barrow LA 4 (PU 128). Three fragments can be classified in the second group: these have sorted, fine-grained clay with a different amount of silt, but no sand. Plant residues as well as a few accessory minerals are found in the raw material of two fragments. Among these finds are a richly-decorated bowl from the passage grave LA 40 (PU 53) and a vessel from the long barrow LA 167 (PU 15). Furthermore, a vessel (PU 36) of the period FN Ia from an earth grave of LA 57 was made of a similar fine-grained clay. In the third group, there is one sherd from a tulip beaker found in the Early Neolithic pit LA 48 (Fig. 2c; PU 8) and a beaker of the Single Grave culture from the long barrow LA 167 (Fig. 2d; PU 20). Although their clays – which are fine-grained – have different amounts of silt and accessory minerals, they are very similar in their high iron content. Three pieces of pottery in the fourth group were again made of fine-grained clay. Their high iron content – in particular – as well as the large number of accessory minerals are characteristic features. All the sherds in this group come from the Early Neolithic pit LA 48 (Fig. 2e–f; PU 14, 15, 59), and it cannot be completely excluded that the analysed samples even come from the same vessel. Two further pottery fragments from the same pit are also similar in their medium-coarse clays with a very high proportion of silt (PU 25, 61). Again, it is possible that these sherds were part of the same vessel.

A total of nine sherds from Flintbek were chemically analysed by ICP-AES to verify the results of the thin-section investigations. The data obtained were subjected to a cluster analysis by BRORSSON (2013), Kontoret för Keramiska Studier (Sweden). The diagram shows that five samples have a very similar chemical composition and were thus probably made of clay from the same raw material source (Fig. 3, Flintbek 1–5). These finds include three sherds (PU 11, 15, 53) from the passage grave LA 40 and one fragment (PU 3) from the passage grave LA 52. Both megalithic tombs can be dated to the period MNIb to MNIII. In addition, the analysed sherd from one LA 57 vessel (PU 36) – which resembles an Ertebølle vessel as well as an Early Neolithic funnel beaker – largely agrees with the samples from the passage graves in terms of its chemical composition. It is noticeable that four of these analysed vessels were made of clays classified in the first and second groups of the thin-section study (Fig. 2a–b). This similarity in the chemical composition of the clay suggests that they were extracted from the same deposit. This is probably also true of one vessel from the long barrow LA 167 (Fig. 3, Flintbek 6; PU 15). Although this sample differs slightly from the others in its chemical composition, its thin section indicates that the same raw material source was used.

However, the cluster diagram shows that three pottery sherds significantly differ in their chemical composition. Among these samples are two sherds – a tulip beaker sherd from the Early Neolithic pit LA 48 (PU 8) and a beaker sherd of the Single Grave culture from the long barrow LA 167 (PU 20) – which mostly agree in their raw material (Fig. 3, Flintbek 7–8). The thin sections of both sherds are also very similar (Fig. 2c–d), whereby the chemical analysis confirms the results of the petrographic investigations. The analysis of another sample from the Early Neolithic pit LA 49 (PU 59) produced data that were different from the data for the rest of the material (Fig. 3, Flintbek 9). Therefore, it would seem that the raw material for this vessel came from another clay deposit. The thin-section study suggests that further fragments of pottery from the pit – which were not chemically analysed – were also made of this clay (Fig. 2e–f; group 4).

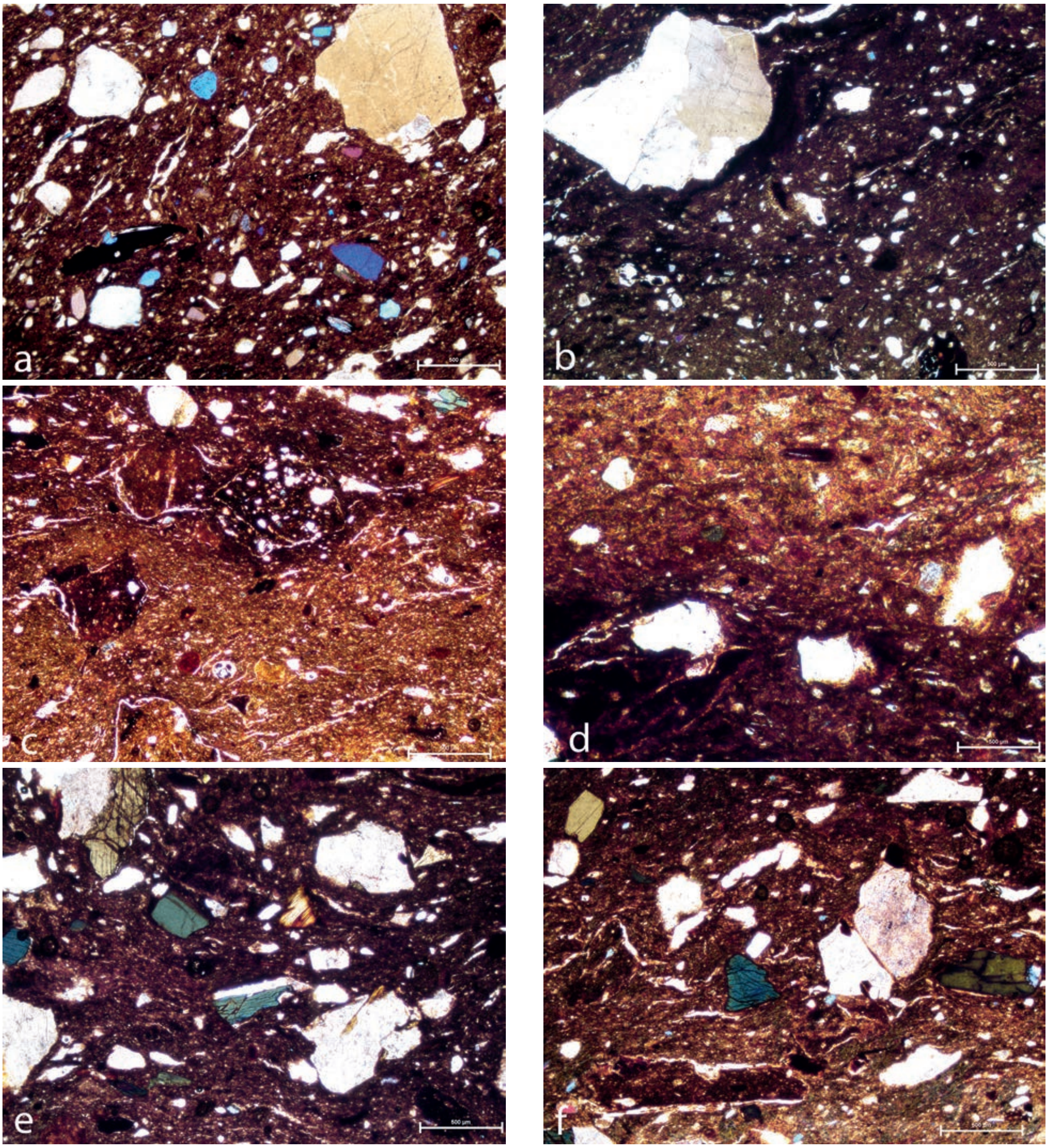

Fig. 2. Microscope photographs of thin sections. a. Flintbek LA 52, PU 3; b. Flintbek LA 40, PU 15; c. Flintbek LA 48, PU 8; d. Flintbek LA 167, PU 20; e. Flintbek LA 48, PU 15; f. Flintbek LA 48, PU 59.

ANALYSES OF THE TEMPER

A total of 35 sherds (29 PUs) from the Early Neolithic pit LA 48 were selected for a microscopic analysis of their temper. These included – for example – sherds from two tulip beakers (PU 2, 8) and several storage vessels (PU 3, 41, 42) of the Michelsberg type. Some other fragments – such as two funnel necks (PU 2, 25) – cannot be clearly assigned to either the Oxie or the Michelsberg group (Mischka et al. 2015, 467–470). Examination under the microscope revealed that the main tempering material was crushed granite, as is characteristic for the Funnel Beaker North group. Nearly 80 % of the analysed sherds were additionally tempered with grog and 14 % with flint (Fig. 2c, 2f, 4, 5). Organic remains of plants could be detected in less than 25 % of the sherds. Since several kinds of temper can be used together, the percentages do not add up to 100 %. The maximum average grain size was also determined, i. e. the average size of the five largest temper particles in each sherd. The averages for granite (1.2 mm) and grog (1.5 mm) show that they had been highly crushed before being used as tempering agents. In contrast, the fragments of flint with an average size of 2.5 mm were much coarser. The average quantity of temper is very low (9 %). A distinct correlation between the wall thickness of the sherds and the amount or the grain size of the temper could not be determined. No significant differences were detected when the tempering techniques for sherds of the Michelsberg type and those of the Oxie group were compared. Unfortunately, it was not possible to analyse the Koch's type 0 funnel beaker due to its almost complete state of preservation.

A further fourteen analysed sherds (10 PUs) – mainly from a settlement – can be attributed to the period FN Ia to Ib. These include pottery from the sites LA 18, 35 and 167. A vessel from an earth grave of LA 57 (PU 36)

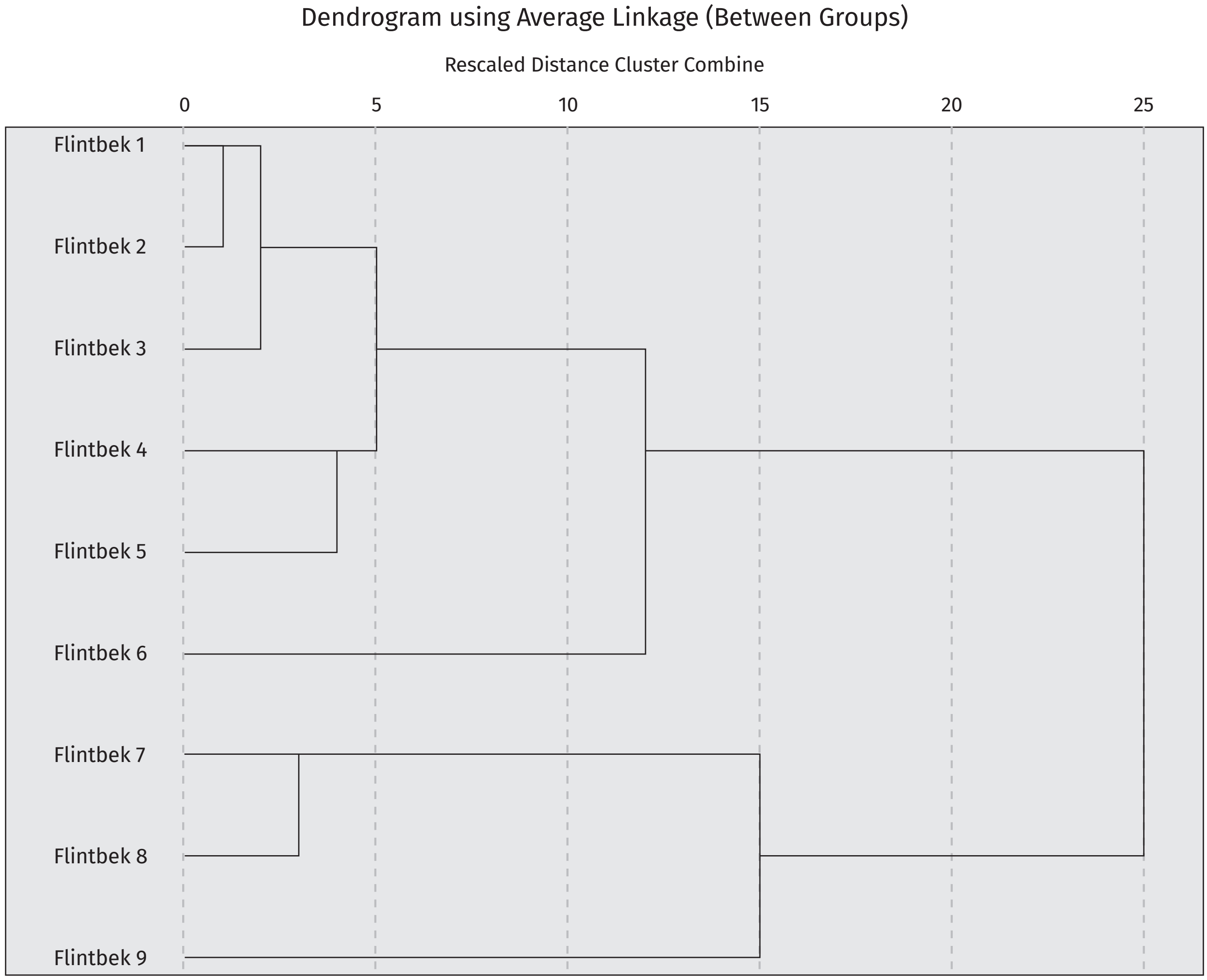

Fig. 3. Dendrogram using Average-Linkage method of the chemical analyses (Brorsson 2013, 5).

that is a transitional form between an Ertebølle pointed-base vessel and an Early Neolithic funnel beaker was also investigated. All of these Early Neolithic pottery sherds were exclusively tempered with crushed granite (Fig. 4). This also applies to the 52 Middle Neolithic pottery sherds that were analysed (33 PUs), which came from different graves and were also tempered with crushed granite. Additional tempering with organic material could occasionally be detected. Other materials – such as grog or flint – could not be identified (Fig. 4). Thus, all these sherds significantly differ from the pottery in pit LA 48 regarding the tempering agents employed. The maximum grain sizes of the granite fragments are only slightly larger than those of the sherds from pit LA 48. The average quantity is also very small, as was the case with the Early Neolithic pottery. A correlation between wall thickness and grain size or quantity of the temper could not be demonstrated here either. Finally, two sherds from the long barrow LA 167 can be classified as beakers of the Single Grave culture (PU 20, 38). One of the beakers (PU 20) was tempered with grog in addition to the granite. The use of grog as a tempering agent could also be detected in pottery from other Single Grave culture sites (e. g. HULTHÉN 1977, 157; ENGBERG 1986, 240). Apart from this beaker of the Single Grave culture, all of the analysed sherds that were tempered with grog can be dated to the Early Neolithic period.

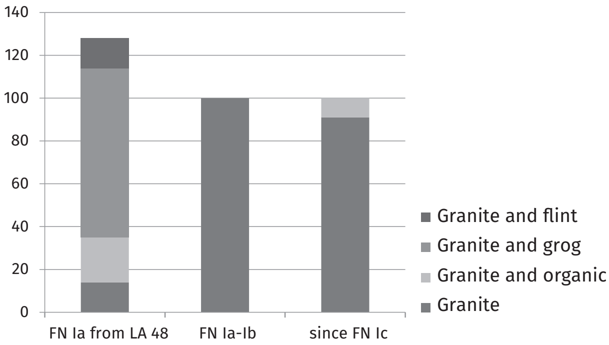

Fig. 4. Relative frequency of the tempering agents used. Since several kinds of temper can be used together, the percentages do not add up to 100 %.

GROG AS A TEMPERING AGENT IN EARLY NEOLITHIC SITES

The identification of grog as a tempering material is very difficult, especially if the grog was made from the same clay and therefore hardly distinguishable from the surrounding clay matrix. Often it is only possible to detect grog by thin-section analysis (Fig. 2c, 2f). Consequently, it can be assumed that in most cases the use of grog as a tempering agent has not been recognised in studies of the pottery material. However, the few archaeometric investigations carried out thus far suggest that Early Neolithic pottery – from sites in northern Germany in particular – was frequently tempered with grog. Besides the earliest pottery from Flintbek, grog has already been detected at some other Early Neolithic sites in Schleswig-Holstein, e. g. Siggeneben-Süd in the district of Ostholstein (MEURERS-BALKE 1983, 43–44 fig. 10–11). For instance, it was possible to identify grog in the thin section of a lugged beaker from this site (HULTHÉN 1983, 104–105 fig. 2, 107 fig. 6).

Another site is Neustadt LA 156 in the Neustädter Bucht, district of Ostholstein, which was excavated by Sönke Hartz between 2000 and 2006 (HARTZ/

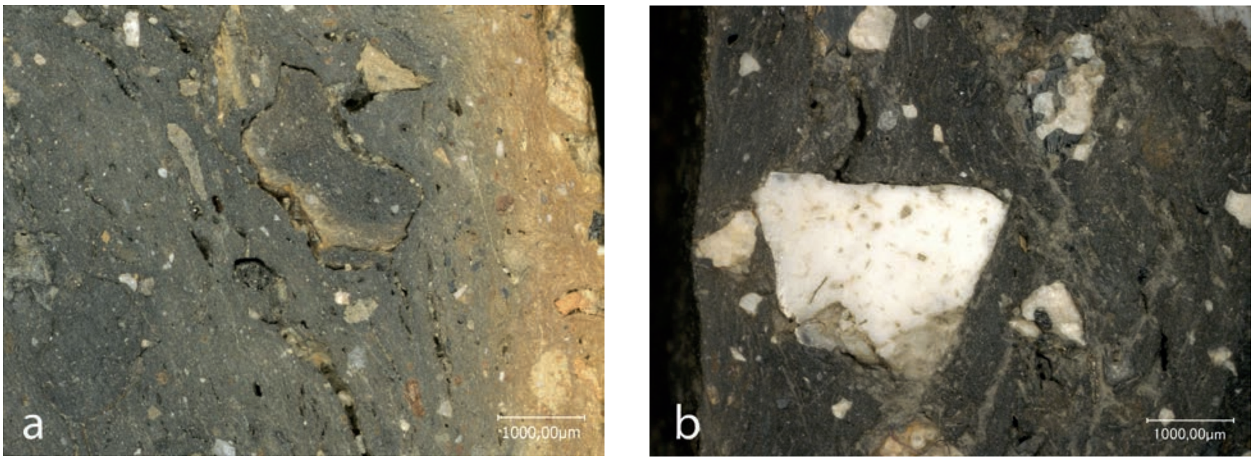

Fig. 5. Tempering agents of pottery from the pit LA 48. a grog (PU 8); b flint (PU 14).

Glykou 2008; Glykou 2011; 2016). As part of the DFG Priority Programme, twenty pottery sherds from the underwater site at Neustadt were selected for a detailed microscopic investigation. The site – dating to between 4600 and 3800 cal BC (Glykou 2016, 355) – was chosen for the study because the inventory includes pottery of the late Mesolithic Ertebølle culture, such as pointed-base vessels and lamps, as well as sherds of the earliest Neolithic Funnel Beaker period. The microscopic investigations of ten Early Neolithic pottery fragments revealed that four sherds were tempered with crushed granite and grog. By contrast, no fragments of grog could be detected in the analysis of the Ertebølle pottery from Neustadt. Moreover, there are further differences in the tempering techniques of the Ertebølle and Funnel Beaker cultures. Although crushed granite was used as a tempering agent in both cultures, it is remarkable that the Ertebølle pottery was tempered with much larger granite fragments than the pottery of the Funnel Beaker culture (cf. Koch Nielsen 1987, 108 fig. 2; Glykou 2016, 88). These differences in tempering techniques – especially in the use of grog – could be interpreted as an indication of the existence of two different pottery traditions. However, due to the small number of sherds from the Neustadt site that have been analysed, the results are only preliminary and have to be verified by further investigations. This is especially important because the use of grog as a tempering material in the Ertebølle culture has already been proven at other sites (Hulthén 1977, 27 tab. 2b, 37 tab. 6).

SUMMARY

The technological analyses of the pottery material from several Middle Neolithic sites in the Flintbek region point to a very homogenous pottery tradition. This applies to the tempering techniques as well as the use of the raw material sources. All of the analysed sherds from the different graves were tempered with crushed granite in only small quantities. Both the petrographic and chemical analyses show that the same clay deposits have occasionally been used to produce the pottery found in various graves. Thus, the clay used for vessels from dolmen II of the long barrow LA 4, the passage graves LA 40 and 52 as well as the long barrow LA 167 is so similar that the same raw material source can be assumed. This also applies to the Early Neolithic pottery material from the sites LA 18, 35, 57 and 167, which have the same tempering agents as those used for the pottery from the younger graves. Moreover, there is evidence that one vessel (PU 36) from an LA 57 earth grave dating to period FN Ia was made of clay from the same deposit as that used for most of the Middle Neolithic sherds that have been analysed.

This similarity makes it all the more remarkable that the pottery material from the LA 48 pit – which also dates to the FN Ia period – significantly differs from the rest of the pottery in the Flintbek region in terms of its technology. On the one hand, this applies to the tempering agents used. Besides crushed granite, it was possible to identify grog as another main component of the temper. Apart from one beaker of the Single Grave culture, grog is not found as a tempering agent in the rest of the analysed pottery material. The same also applies to flint, which occurs only occasionally in Early Neolithic sherds from LA 48 and is absent from later Neolithic sherds of the Flintbek region. On the other hand, the investigations of the raw materials indicate that different clay deposits have been used to produce this Early Neolithic pottery. Thus, the thin-section analyses of the pottery from the Early Neolithic pit and the other analysed sherds have revealed no evidence of clay of a similar mineralogical composition. This result is also confirmed by a comparison of the chemical components of the clays, although it has to be emphasised that only two fragments from the LA 48 pit have been chemically analysed. Moreover, it could be determined that the clay of one tulip beaker sherd among the Early Neolithic sherds from LA 48 and a beaker sherd of the Single Grave culture from LA 167 have a very similar mineral and chemical composition. However, a larger number of samples must be investigated to verify whether this similarity can be interpreted as being due to the fact that local clay deposits that were exploited for the production of the Early Neolithic pottery were used again during Late Neolithic times. In addition, the importation of early pottery to the Flintbek region cannot yet be excluded. Although this question remains open, the analyses have shown that the material from the LA 48 pit significantly differs from the pottery of the later grave complexes and that this Early Neolithic pottery tradition is unique in the Flintbek assemblage. Thus, not only the shape and decoration of the Early Neolithic vessels but also the technology indicate that there was a discontinuous development in the production of pottery in the Flintbek region.

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The Stein-Vlaardingen Complex and the TRB West Group. An inquiry into intercultural contacts and cultural diversity during the Dutch Neolithic as well as an impetus to demographic archaeology

Erik Drenth

ABSTRACT

The present paper discusses artefacts attesting to contacts between the Stein-Vlaardingen Complex (c. 3400–2650/2550 BC) and the TRB West Group in the Netherlands (c. 3400/3350/2800/2750 BC). The current archaeological record suggests that these connections were mainly unidirectional, i.e. *the latter influenced the former. The diffusion of ideas and goods probably intensified around 3100/3000 BC. Stone TRB battle-axes appear to have been popular among the inhabitants of the present-day provinces of Noord-Brabant and Limburg, a region traditionally linked by archaeologists with the Stein Group. On the other hand, it transpires that the diversity and the number of* TRB*(-related) ceramics in the context of the Stein-Vlaardingen Complex were larger in the western Netherlands and (the larger part of) the central river district. These regions are usually seen as the homelands of the Vlaardingen Culture. Therefore, in the discussion about cultural diversity, the contact finds are an important argument to legitimise the distinction between the two cultures, despite the fact that they share several similarities. Together with the ^{14}C dates, the artefacts under discussion may furthermore indicate a growth of the Stein-Vlaardingen population in the 3rd millennium BC. There is substantially more ^{14}C evidence available for the period 3400/3350–3000 BC than for the time span of 3000–2650/2550 BC.*

INTRODUCTION

For the Netherlands, between c. 3400/3350–2650/2550 BC several (archaeological) cultures have been distinguished (Fig. 1). The north, the east and a large portion of the centre were home to the West Group of the Funnel Beaker Culture (further TRB) until around 2850/2750 BC, when this culture was replaced by the Single Grave Culture, a branch of the Corded Ware Complex. Two or three centuries later, the latter also occupied the other parts of the Netherlands, which were hitherto inhabited by the Stein Group and Vlaardingen Culture. Especially LOUWE KOOIJMANS (1983) has emphasised the resemblances in the material culture of both. Therefore, they are frequently addressed to as one and referred to as the Stein-Vlaardingen Complex (hereafter SVC). Other scholars have stressed the differences in material culture (DRENTH et al. 2007, 121–122; VERHART 2010).

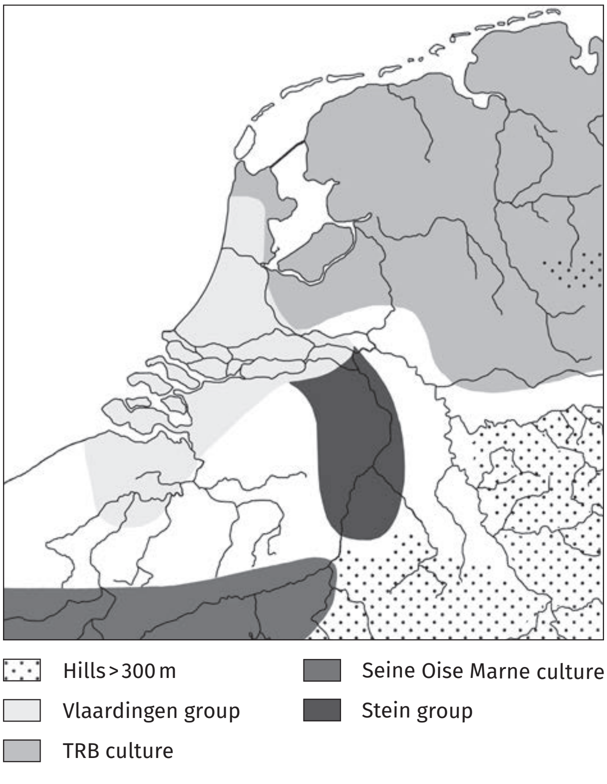


Fig. 1. Distribution of the various archaeological cultures in the Netherlands and the adjacent regions during the Middle Neolithic B (c. 3400–2800 BC) (from VAN GIJN/BAKKER *2005).*

The main question underlying the present paper concerns the extent to which it is legitimate to distinguish between the Stein Group and the Vlaardingen Culture from the perspective of materialised contacts between the SVC and the TRB. These intercultural contacts were already addressed in 1962, soon after the Vlaardingen Culture had been distinguished as a separate archaeological culture (BAKKER in: VAN REGTEREN ALTENA et al. 1962, 217–224). Several discoveries in the last decade make it worthwhile to discuss these connections once again, as well as the homogeneity/heterogeneity within the SVC. Furthermore, the contact finds are interesting from a demographic perspective. Together with ^{14}C dates, they are indicative of an increase in the SVC population over the course of time.

THE CHRONOLOGICAL FRAMEWORK

TEN ANSCHER (2012; 2015) has argued that an early pre-Drouwen TRB stage can be discerned for the Netherlands and north-west Germany, dating to c. 3900–3400 BC (*contra* LANTING/VAN DER PLICHT 1999/2000, 21–23). Despite showing influences from abroad, he sees this early TRB group as continuing habits and norms of the Swifterbant Culture. Therefore, the ›classical‹ TRB West Group – characterised by megalithic tombs and highly decorated pottery – is regarded as primarily the result of an indigenous development. Contrary to e.g. the ideas of LANTING/VAN DER PLICHT (1999/2000, 32), Ten Anscher believes that there is no need to explain its emergence in terms of a migration from the TRB North Group in northern Germany and southern Scandinavia.

The relative chronology of the ›classical‹ TRB by BRINDLEY (1986b) – embroidering on the chronological system designed by BAKKER (1979; cf. BAKKER 2009) – is widely accepted as being firmly established. She has distinguished seven horizons based on pottery. The absolute age of these horizons has been determined with the help of ^{14}C dates and pottery frequencies from megalithic tombs (Tab. 1; cf. BRINDLEY/LANTING 2003, 123). LANTING/VAN DER PLICHT (1999/2000, 32, 67–68) posit the ›classical‹ TRB as a whole c. 50–100 years forward in time, leaving the duration of the separate horizons unaltered (Tab. 1). Recent ^{14}C research with respect to Veldhoven-Habraken may indicate that the latter of the two absolute chronologies should be preferred (see below).

Furthermore, Lanting/Van der Plicht's chronology is not contradicted by other recent investigations. One of them has been carried out at Hattemerbroek-knooppunt Hattemerbroek (province of Gelderland), where the vestiges of a palisade (reconstructed diameter c. 100 m) were discovered (LOHOF et al. 2011). The associated pottery dates to horizon 4 (DRENTH/MEURKENS 2011, chapter 6.3.2). Five ^{14}C dates are available, four of them obtained on charcoal (3 × *Quercus* sp. and 1 × *Alnus* sp.) and one charred grain (*Hordeum vulgare*) (KNIPPENBERG/HAMBURG 2011 a, Tab. 4.6). The lower and upper limits of these dates after a 2σ calibration are 3501 and 3032 BC, respectively, whereas 3344–3136 BC is the timespan at which these dates all overlap.

Nearby the aforementioned site, a TRB settlement was excavated in 2007 at Hattemerbroek (Bedrijventerrein-Zuid) (HAMBURG et al. 2011). The discovered ceramics hint at horizon 6 (DRENTH/BAKKER, in: MEURKENS et al. 2011, 277–288). The lower and upper limits of the four obtained ^{14}C dates (2 × [charred?]) residue on sherds and 2 × nature of the dated

Tab. 1. The absolute chronology of the ›classical‹ TRB West Group according to BRINDLEY (1986b) and LANTING/VAN DER PLICHT (1999/2000).

HORIZON	AGE (BC) ACCORDING TO BRINDLEY 1986B	AGE (BC) ACCORDING TO LANTING/VAN DER PLICHT 1999/2000
1	*3400–3350*	*3350/3300–3300/3250*
2	*3350–3300*	*3300/3250–3250/3200*
3	*3300–3200*	*3250/3200–3150/3100*
4	*3200–3050*	*3150/3100–3000/2950*
5	*3050–2950*	*3000/2950–2900/2850*
6	*2950–2900*	*2900/2850–2850/2800*
7	*2900–2850*	*2850/2800–2800/2750*

material unpublished) are after a 2 σ calibration 3020 and 2670 BC, respectively (KNIPPENBERG/HAMBURG 2011 b, tab. 4.3). Their overlap is the period of 2920–2870 BC and this overall result is not contradictory to the ideas of Lanting/Van der Plicht.

In view of the above, the present paper uses the Lanting/Van der Plicht chronological framework. This is also done for the sake of convenience, because it is far too early to say the TRB absolute chronology is an open-and-shut case. Accordingly, the author symphasises with BAKKER (2010, 6: note 4), who has stated that »… despite seeming precision these estimates may still be some 50–100 years off the mark.« This may be true in the instance of Slootdorp-Bouwlust, prov. of Noord-Holland. According to HOGESTIJN/DRENTH (2000/2001, 45), the pottery from this settlement site dates to horizon 4/5 in the Brindley chronology and the transition from Late Drouwen (D) to Early Havelte (E) in the Bakker chronology. The habitation is thought to have occurred somewhere around 3000 BC (HOGESTIJN/DRENTH 2000/2001, 45). Recent radiometric investigations show that the site may be (slightly) older (BECKERMAN 2015, chapter 2.3.1, 170, tab. 4.3).

The chronology of the SVC is a hotly-debated issue. At present, there are two competing overall models, both of them considering only the temporal aspects of the Vlaardingen Culture (VL). LANTING/VAN DER PLICHT (1999/2000, 32–34) – who elaborate on schemes by GLASBERGEN et al. (1967, 26–28) and LOUWE KOOIJMANS (1976, 279–289) – hold the view that the ceramics allow for a subdivision into five stages (VL-1a, -1b, -1c, -2a and -2b). On the other hand, BECKERMAN/RAEMAEKERS (2009) distinguish only three phases (early, middle and late), also based on pottery. Whereas the former scholars ascribe chronological significance to the frequency of perforations and pits just below the rim, the latter do not. For Lanting/Van der Plicht, it is a means to set the phases VL-1b and VL-1c apart from one another; in the former phase, perforations and pits are said to have been substantially more frequent. Their ideas are underpinned by a recently-discovered archaeological stratigraphy during a trial excavation at Wijchen-Oostflank, province of Gelderland (DRENTH/CHTCHEGLOV 2012; see however the postscript). However, more of such stratigraphies are required to speak of conclusive evidence. Another issue is the final phase of the VL, upon which opinions are divided. Like LOUWE KOOIJMANS (1976, 287), LANTING/VAN DER PLICHT (1999/2000, 34) assume that during this phase Single Grave Culture pottery appeared (in substantial numbers) besides evolved Vlaardingen pottery. DRENTH et al. (2008) consider that several of the sites labelled by these scholars as VL-2b – like Voorschoten-Boschgeest (layers 10–11), province of Zuid-Holland – represent the Single Grave Culture (for the sake of clarity, these VL-2b sites are excluded from the present study). A third view is held by RAEMAEKERS (2005, 273; cf. BECKERMAN/RAEMAEKERS 2009, 65), who seriously reckons with the possibility of the co-existence of sites with and those without Single Grave Culture pottery within the youngest stage of Vlaardingen Culture. Nevertheless, there is consensus that over time the pottery of this culture developed in the direction of Single Grave Culture ceramics (*vide* BECKERMAN 2015, in addition to the aforementioned references). Moreover, there is more or less general agreement on the onset and the end of the Vlaardingen Culture: c. 3400/3350 BC and c. 2650/2500 BC, respectively.

To date, the relative chronology of the Stein Group has not been seriously addressed and consequently there is no generally-accepted subdivision. The absolute age is usually considered to equal that of the VL.

CONTACT FINDS

Pottery

In 1962, Bakker referred to two ceramic categories in particular to place the VL in time: collared flasks and clay discs. The former appeared to be a rather unreliable criterion for dating, at least when related to Danish finds of the TRB North Group. A different, albeit provisional conclusion was arrived at regarding clay discs. The ones from a VL context resemble Danish specimens and are said to concur with the periods MN III–IV in the Danish chronological system for the TRB North Group. MN III–IV are to be synchronised with the horizons 5 and 6 (BAKKER 2009, chapter 6.8; see also BRINDLEY 1986 b).

Later finds have more or less reinforced the chronological picture sketched above. As far as clay discs in SVC context are concerned, it might be the case that at Hazerswoude-Rijndijk (province of Zuid-Holland) VL clay discs from the second half of the 4th millennium BC have come to light (DIEPENDAELE/DRENTH 2010 a). However, since the site presently awaits further elaboration, this is but a possibility. More chronological certainty is present regarding a specimen coming from the level VL-1b at the Hazendonk, a river dune in the province of Zuid-Holland (LOUWE

KOOIJMANS 1976, 286 and fig. 23; RAEMAEKERS 1999, 171 fig. 4.10); it is among the earliest SVC clay discs discovered to date. With respect to this habitation level, no fewer than eleven ^{14}C dates are available. They have been obtained on charcoal (5 ×), unburnt wood from a canoe (1 ×) and peat (5 ×). LANTING/VAN DER PLICHT (1999/2000, 69) have suggested that the charcoal dates – ranging from 4435 ± 50 BP to 4535 ± 40 BP – are all too old. According to them, the site was inhabited around 2850 BC. The perspective accords reasonably well with two decorated sherds coming from the VL-1b level (Fig. 2). Their decoration – regarding both motif and execution (see in this connection BRINDLEY 1986b) – resembles the ornamentation on TRB pottery from the horizons 5 and 6 (LANTING/VAN DER PLICHT 1999/2000, 33). However, it is questionable whether it concerns imported pottery. LOUWE KOOIJMANS (1976, 286) reports that both sherds as well as a collared flask to be discussed below are not of a TRB fabric. They are quartz and/or sand tempered. Therefore, he arrives at the following conclusion (Ibid.): »We consider them as local products, in which TRB forms and decoration are copied… «.

As already noticed by Bakker (in: MODDERMAN et al. 1976, 51) and LOUWE KOOIJMANS (1976, 286), the current chronological evidence suggests that clay discs were not an original element in the material culture of the VL, but ceramics adapted from the TRB. A similar stance may be taken with respect to collared flasks (cf. Bakker, in: Modderman et al. 1976, 51). To the author's knowledge, the one from the VL-1b level at the Hazendonk is the earliest hitherto discovered in the VL context (Fig. 2). The situation for the Stein Group appears to have been different. The one from the eponymous site in the Dutch province of Limburg – a collective grave with the cremated remains of individuals – is considerably older than the specimen from the Hazendonk. A bone sample has been ^{14}C-dated to 4570 ± 60 BP (GrA-16185; LANTING/VAN DER PLICHT 1999/2000, 72–73). Morphologically, the collared flask from Stein is different than VL ones. The former has thickenings on its collar giving it a star-like appearance (MODDERMAN 1964, 7, fig. 7). This collar form is unparallelled in the VL.

What catches the eye is the uneven distribution of SVC clay discs in the Netherlands. Numerous specimens have been excavated in the western region and the central river district in the Netherlands, as exemplified by the aforementioned sites of Hazendonk and Hazerswoude-Rijndijk. By contrast, only two of the excavated sites in Noord-Brabant have produced the artefacts under discussion. Five undisputable clay disc fragments come from Tilburg-Schaapsven site B (DRENTH 2015b, 88), and two such fragments from Velhoven-Habraken (VAN KAMPEN et al. 2013, 92 and fig. 8.5: no. 4-V.32.21.1). To date, the investigations in the province of Limburg have not yielded any clay discs at all.

The pottery (possibly) hinting at influences from the TRB West Group on the SVC that has been recovered in the last decade stems from five sites. The first one is Groesbeek-Hüsenhoff, province of Gelderland (DRENTH 2012; DRENTH/GEERTS 2013). Only about 20 sherds have come to light, all of them tempered with crushed quartz. Two fragments – originating from different vessels – are decorated with more or less vertical groove lines. In one instance, it is clear that they cover the lower part of the vessel in any case. Whereas the fabric – in particular the quartz temper – is rather indicative of the SVC (cf. for example the pottery assemblages of the nearby VL sites Wijchen-Bijsterhuizen and Wijchen-Oosterweg (DRENTH 2010; 2011), the decoration is not. Usually vessels are plain and if ›ornamentation‹ is present it mainly comprises a horizontal row of perforations or pits just below the rim and/or knobs on the upper part of the body. However, vertical grooves are a well-known feature for TRB pottery, in particular funnel beakers having a lower body decorated in this way (e.g. BRINDLEY 1986a; 1986b). Therefore, it is very plausible that the decorated sherds from Groesbeek-Hüsenhoff originate from local copies of funnel beakers, all the more since röntgen fluorescence analysis does not point to a chemical composition of the clay that differs significantly from that of the plain fragments from the site under consideration (VAN OS 2012). Unfortunately, no absolute dates such as ^{14}C dates are available. Furthermore, the association of the pottery with the possible plan of a two-aisled house can only offer a generalised perspective in terms of dating. In any case, similar structures from the Netherlands date to the Middle and Late Neolithic as well as the Early Bronze; the first specimens may be Early Neolithic B in age (DRENTH et al. 2014; HOGESTIJN/DRENTH 2000/2001, both with further references). However, the supposed imitations provide a more precise chronological clue. In the context of the TRB, funnel beakers are not younger than horizon 5 (BRINDLEY 1986b).

The imitation hypothesis just mentioned is also corroborated by pottery recovered from a settlement at Haren-Groenstraat, province of Noord-Brabant (KNIPPENBERG 2013; 2014; MEURKENS 2013). Apart from fragmentary plain vessels with an S-shaped profile – which are so typical of the SVC – the assemblage includes several decorated sherds that can be interpreted as local copies of funnel beakers (Fig. 3). Both categories have been tempered with crushed quartz. Although no ^{14}C dates or other

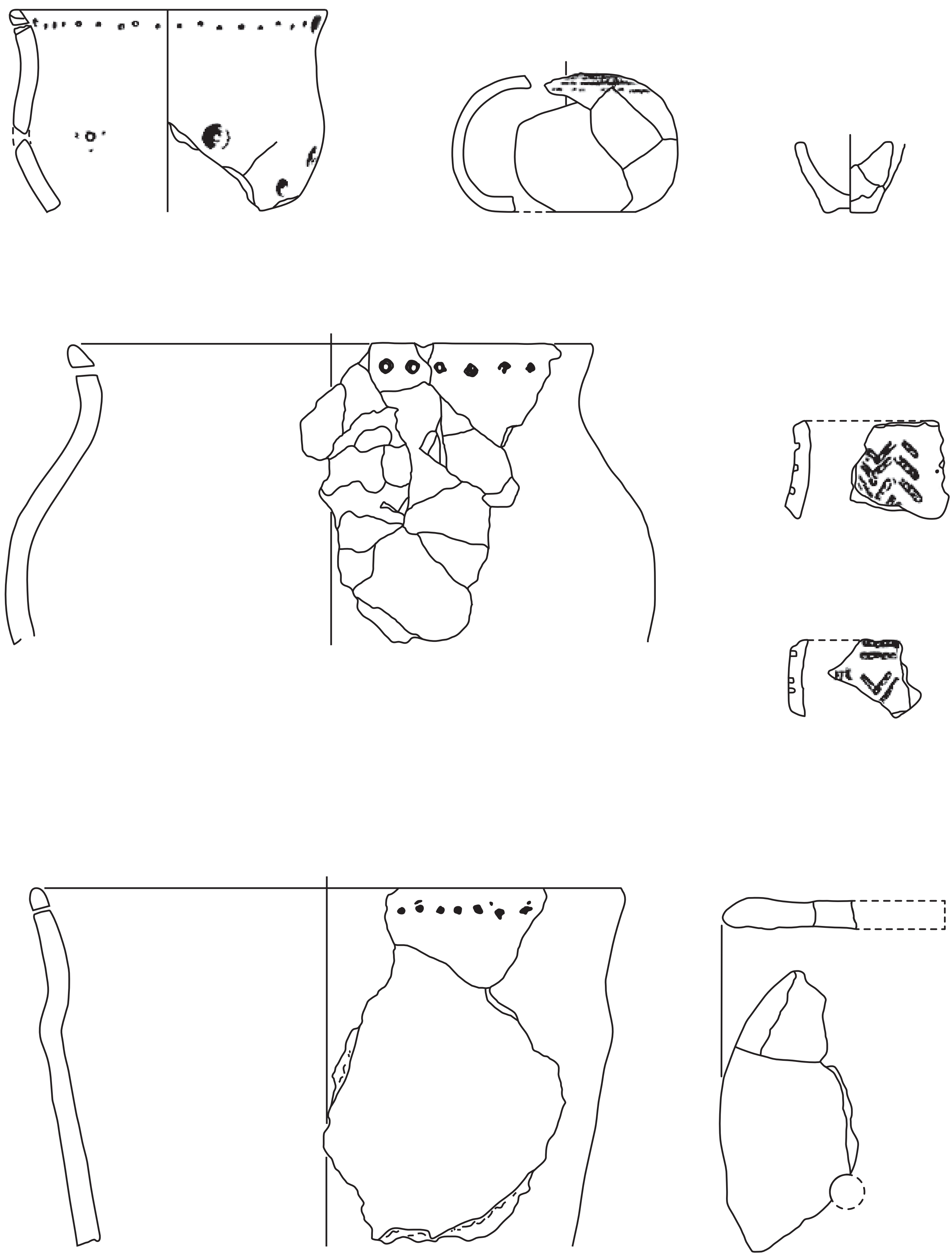


Fig. 2. Pottery finds from the level VL-1b at the Hazendonk. The actual height of the largest vessel fragment is c. 15.5 cm (from Louwe Kooijmans *1976).*

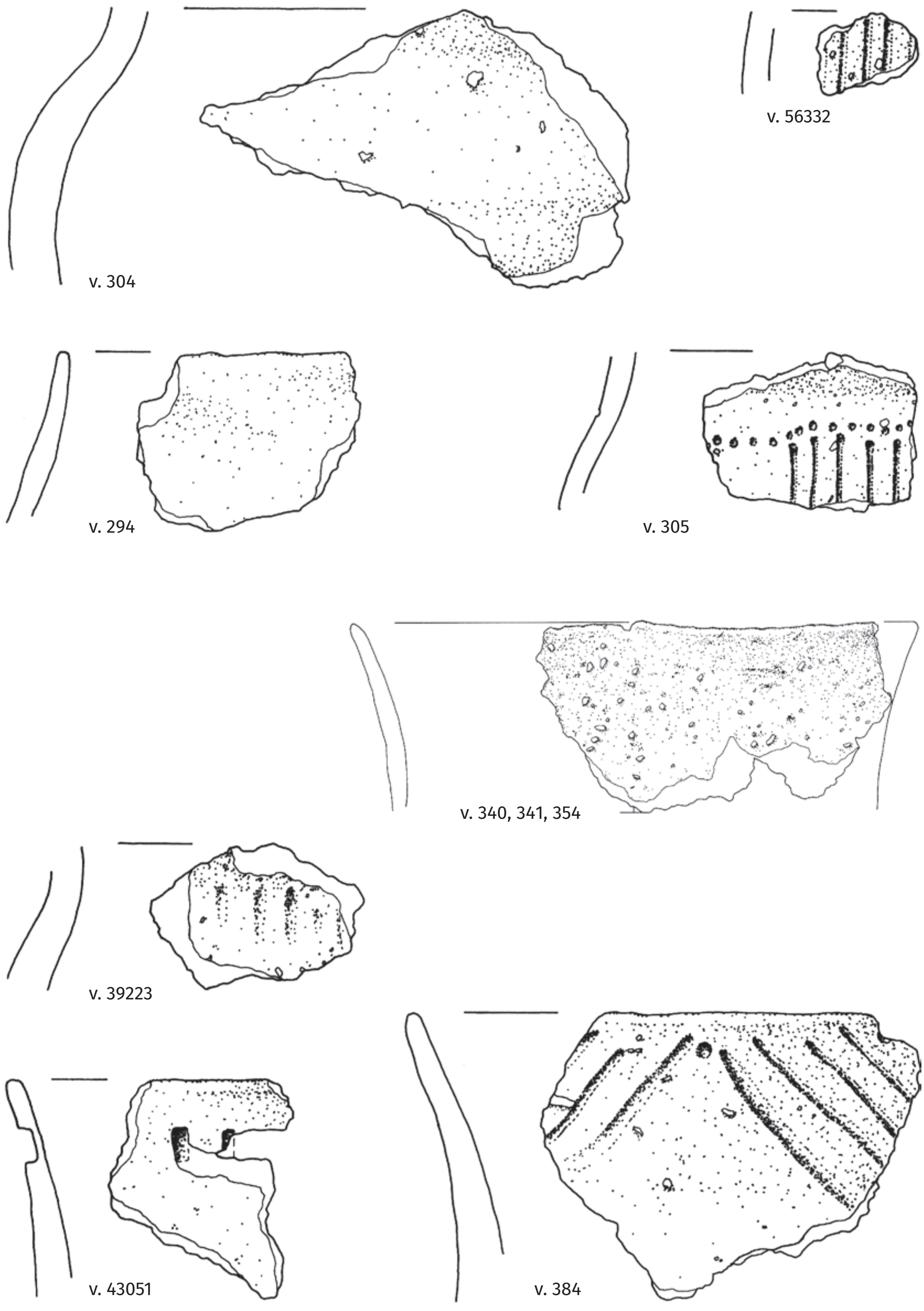


Fig. 3. Pottery from the Haren-Groenstraat site. The actual height of the vessel fragment numbered v. 340, 341, 354 is c. 7.2 cm. This fragment is scaled 1:2 in comparison to the other sherds (actual height v. 294 3.4 cm). (from Meurkens 2013).

absolute dates are available, the site can nevertheless be pinpointed rather precisely in time. One of the funnel beaker copies has large zigzags on the outer side of the neck. This motif is reminiscent of the Heek-Emmeln style, typical of TRB horizon 5 (BRINDLEY 1986b, 99), although BRINDLEY (1986a, 51) assumes that funnel beakers with a zigzag already existed in horizon 4.

A site substantiating the claim that TRB vessels were copied by the SVC is the already mentioned settlement complex of Hazerswoude-Rijndijk (DIEPENDAELE/DRENTH 2010a; 2010b). Trial excavations here brought to light an archaeological stratigraphy, with – to put it bluntly – vestiges of the Vlaardingen Culture in the lowermost strata and relicts of the Single Grave Culture in the top layers. Among the former is a fragment of a necked bowl (Fig. 4), which is characteristic of the youngest TRB, i.e. horizon 7 (BRINDLEY 1986b). There is every reason to assume a local or a regional production. To put it differently, the necked bowl is in all likelihood a product of the Vlaardingen Culture rather than an import from the TRB, as hinted at by the decoration. Although the block pattern is very well known from the latter culture, the composition of each block of four horizontal rows of impression is not. Accordingly, the search for counterparts from the northern and central Netherlands as well as north-western Germany – together constituting the territory of the TRB West Group – is fruitless (see e.g. BAKKER 2009; BRINDLEY 1986a; 1986b; KOSSIAN 2005). The results of the diatom analysis by DEMIDDELE (2010) also favour the hypothesis of a local/regional production by the VL.

Imported TRB ceramics may have been found in the case of the site Hellevoetsluis-Ossenhoek (GOOSSENS 2009; 2010), as already noted by VAN HOOF (2009, 78–79, caption to fig. 6.2.2). Fig. 5 shows a selection of the SVC and TRB(-related) pottery sherds. A handful of sherds appear to have been tempered with crushed granite. In this context, granite should be taken as a term encompassing granite, gneiss and other closely-related rock types, like migmatite. It a well-known fact that if the VL used mineral temper, as a rule it was – apart from possibly sand – crushed quartz. By contrast, granite was popular as a tempering agent in the TRB context (e.g. DRENTH/MEURKENS 2011, tab. 6.6 and 6.7 (with further references); VAN GIJN/RAEMAEKERS 2014, 200–201, tab. 1). Therefore, import of the Hellevoetsluis pottery in question is very likely, all the more because two of the granite-tempered sherds are decorated in TRB style. In addition, one of them has remains of a white filling in the vertical Tiefstich lines (Ibid., 78, fig. 6.2.2: find no. 107), a phenomenon well known from TRB pottery (for instance, BRINDLEY 1986a, 50). Unfortunately, it remains unknown from which type of vessel this sherd

Fig. 4. Fragments of a necked bowl from Hazerswoude-Rijndijk (from DIEPENDAELE/DRENTH 2010a).

originates, although a funnel beaker is far from likely. Despite being small, the other decorated sherd possesses sufficient traits to narrow down the typological and chronological classification to an amphora, a tureen or a tureen-amphora from horizon 4 or 5 (cf. VAN HOOF 2009, 79–80). The other TRB West Group sherds from Hellevoetsluis-Ossenhoek may very well have the same age, as also suggested by the ^{14}C dates (Tab. 2).

Among the pottery fragments from Voorschoten-Deltaplein (province of Zuid-Holland) are also specimens tempered with granite (DRENTH in prep.). One of them is a rim fragment stemming from a three-partite vessel with a sinuous profile and a short everted neck with a horizontal row of perforation just below the rounded-off rim. This kind of vessel is a textbook example of the VL. Nonetheless, the temper gives away influences from the TRB, as do the other granite-tempered discovered at Voorschoten-Deltaplein. In the same vein, the sherds from this site with dolerite or gabbro as a tempering agent may be interpreted. Natural occurrences of these rock types are among other places found in the central and northern Netherlands, which was once home to the TRB. Unfortunately, the site of Voorschoten-Deltaplein is not very well dated. Absolute dates are lacking and the artefacts recovered are both numerically and typologically insufficient to establish the precise age. Nevertheless, judging from the pottery with dolerite/gabbro-temper or with granite as a tempering agent, Voorschoten-Deltaplein dates from the TRB times and must therefore be – at least partially – older than c. 2850/2750 BC.

Hitherto, the contacts considered here have been unidirectional, namely the influence of the TRB on the SVC. Naturally, the question emerges concerning whether the exchange of ideas and goods was at the time like that or bilateral. As far as pottery is concerned, there are very few uncontestable clues for SVC imports into a TRB context. The most plausible example is a vessel that was found during the excavation of a Medieval settlement at Kootwijk in 1972 (LOUWE KOOIJMANS 2010). The site is located on the Veluwe,

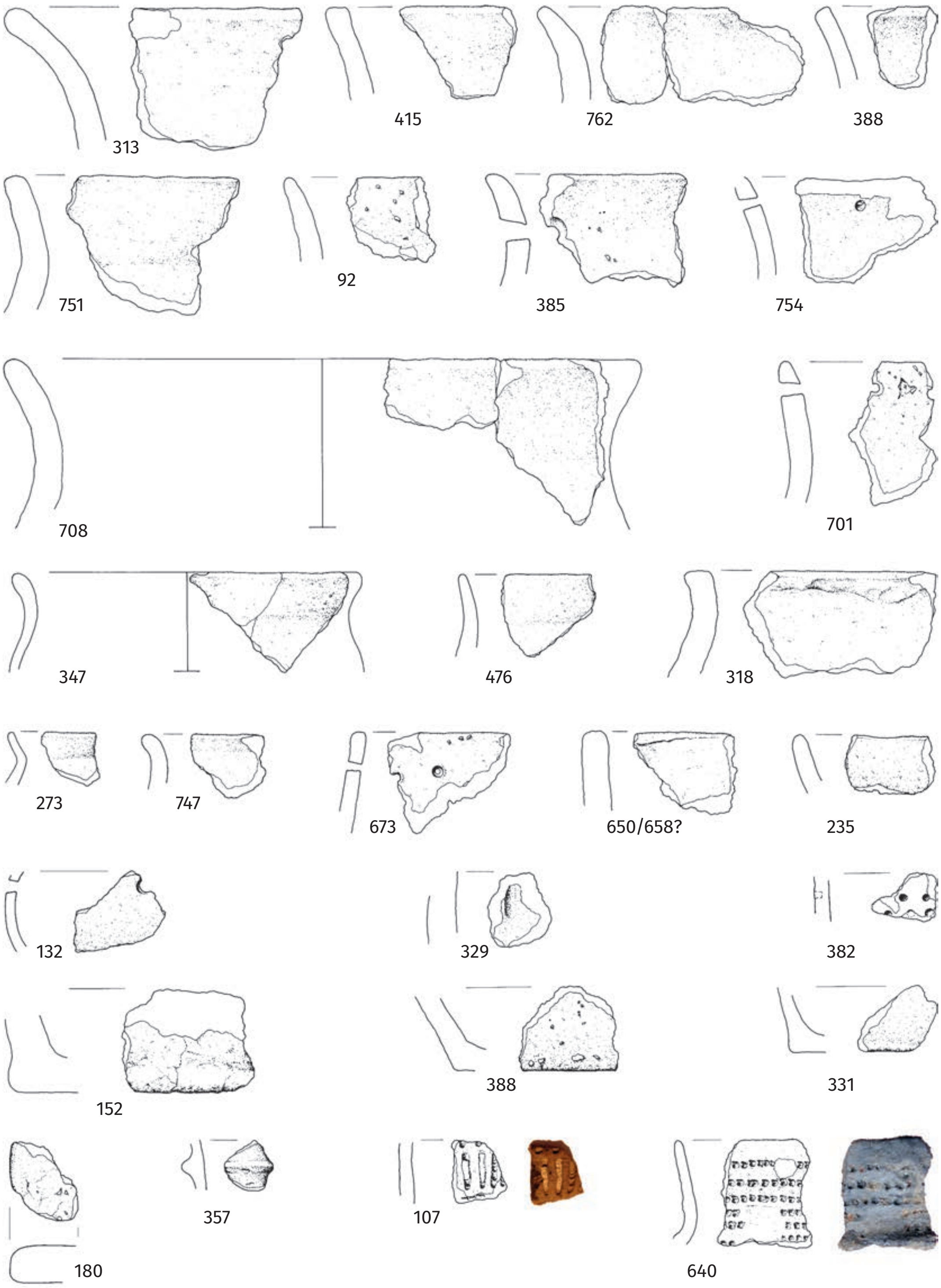


Fig. 5. Pottery from Hellevoetsluis-Ossenhoek. The actual height of the largest vessel fragment is c. 6.3 cm (from Van Hoof *2009).*

province of Gelderland, a district that may be regarded as part of the TRB territory. The vessel in question has a sinuous profile, a short and everted neck and quartz temper. Just below the rim, the wall has been perforated at regular distances. No (other) decoration is present. It concerns a single find. Since the bottom is lacking, the pot seems to have been deposited upside down, a phenomenon that has been has been observed more often for the Dutch Neolithic and Bronze Age. The Kootwijk vessel is assigned by LOUWE KOOIJMANS (2010, 198–199) on typochronological grounds to the early SVC, i.e. somewhere between 3300–2900 BC. However, it should be pointed out that a similar vessel has been unearthed in a younger VL context at Vlaardingen (GLASBERGEN et al. 1966, fig. 25). This site is said by LANTING/VAN DER PLICHT (1999/2000, 69; see also p. 33) to post-date 2800 BC.

Another vessel that has been labelled as Vlaardingen pottery has been discovered at Neede (LOUWE KOOIJMANS 2010, 201–202 fig. 7). It has many characteristics in common with the Kootwijk vessel, with respect to both intrinsic and contextual features. The Neede vessel has also been tempered with crushed quartz and it also possesses a horizontal row of perforations just below the rim, whereas the base is missing. The pot was furthermore found without archaeological associations and is said to have been buried upside down. However, the Neede pot is markedly different from the Kootwijk pot on one or two points. The former has a long neck and its largest belly circumference is in all likelihood substantially closer to the base. Therefore, LOUWE KOOIJMANS (2010, 202) attributes the Neede vessel to form group A according to the classification system by BECKERMAN/RAEMAEKERS (2009) and regard it as a representative of the early VL. However, the Neede vessel has a neck with a height well over 9 cm, whereas this attribute ranges from 3.5–5.8 cm within form group A according to the definition by BECKERMAN/RAEMAEKERS (2009, 68). This is why this artefact should perhaps not be interpreted as VL pottery but rated among the funnel beaker varieties. They have occasionally neck heights that are comparable to or even larger than that of the Neede vessel. They have been recovered e.g. from *hunebed* G2 on the Glimmer Es, province of Groningen (BRINDLEY 1986 a, fig. 28: no. 38, fig. 31: no. 97). Moreover, funnel beakers usually have a lowly-situated largest belly circumference, which is somewhere in the lower half of the vessel, as the specimens from the aforementioned megalithic tomb illustrate (Ibid., figs. 27–31). Among these vessels are also ones with a rounded-off belly, like in the case of Neede (Ibid., e.g. fig. 28: no. 38). Moreover, from *hunebed* G2 also stems a plain funnel beaker with a horizontal line of small pits immediately below the rim (BRINDLEY 1986 a, 51 fig. 30: no. 72). This find does not stand on its own. From various TRB contexts, similar pottery – including that with a horizontal row of perforations (including pits) – has been recovered. In a megalithic context, such funnel beakers have been – apart from *hunebed* G2 – encountered in the cases of D14 at Eext and D40 at Emmen, both located in the province of Drenthe (BRINDLEY 1986 a, 51; BRINDLEY/LANTING 1991/1992, fig. 12c: no. 28). The latter is datable to horizon 3 (BRINDLEY/LANTING 1991/1992, 117). Settlements at Beekhuizerzand near Harderwijk (province of Gelderland) and at the already mentioned location of Hattemerbroek-knooppunt Hattemerbroek have also yielded the pottery under consideration (BAKKER, in: MODDERMAN et al. 1976; DRENTH/MEURKENS 2011, 293 fig. 6.3: no. 10355 and no. 11319). These sites can be assigned to horizon 5 and 4, respectively. Besides, a fragment of presumably a pail found at a settlement(?) at Emmen-Oude Roswinkelerweg (province of Drenthe) has a horizontal row of pits immediately below the rim (DRENTH 1988, 28 (140) fig. 4: no. A). The associations are suggestive of horizon 1. More importantly, the phenomenon in question has also probably been observed for the pre-Drouwen stadium of the TRB habitation at the site of Schokland-P14, province of Flevoland (TEN ANSCHER 2012, figs. 5.16 and 5.19: no. 14). Because this stage pre-dates the SVC, pottery with horizontal rows of perforations (including pits) from the ›classical‹ TRB (horizons 1–7) may therefore have indigenous roots. In other words, such vessels do not necessarily attest SVC influences. This is also the perspective preferred by Bakker (in: MODDERMAN et al. 1976, 51) in an assessment of the pottery from a TRB settlement at Beekhuizerzand.

A substantial portion of the Beekhuizerzand pottery complex has been tempered with crushed quartz (Ibid., 47). Does this then give witness to influences from the SVC? Once again, Bakker is reserved in drawing such a conclusion; the preference of quartz as a tempering agent is related to the composition of the natural pebble and rock occurrences (Ibid.). Nevertheless, more investigations are needed to completely exclude the possibility that quartz tempering of TRB pottery has something to do with the SVC. Such an inquiry lies beyond the scope of the present contribution.

Stone battle-axes

There are no indications that the SVC had their own stone battle-axe type. However, they did import such artefacts from other cultures, among them the TRB; imports are also known from the Single Grave Culture (c. 2800–2400 BC). Detailed and extensive studies about the stone battle-axes of the former have been

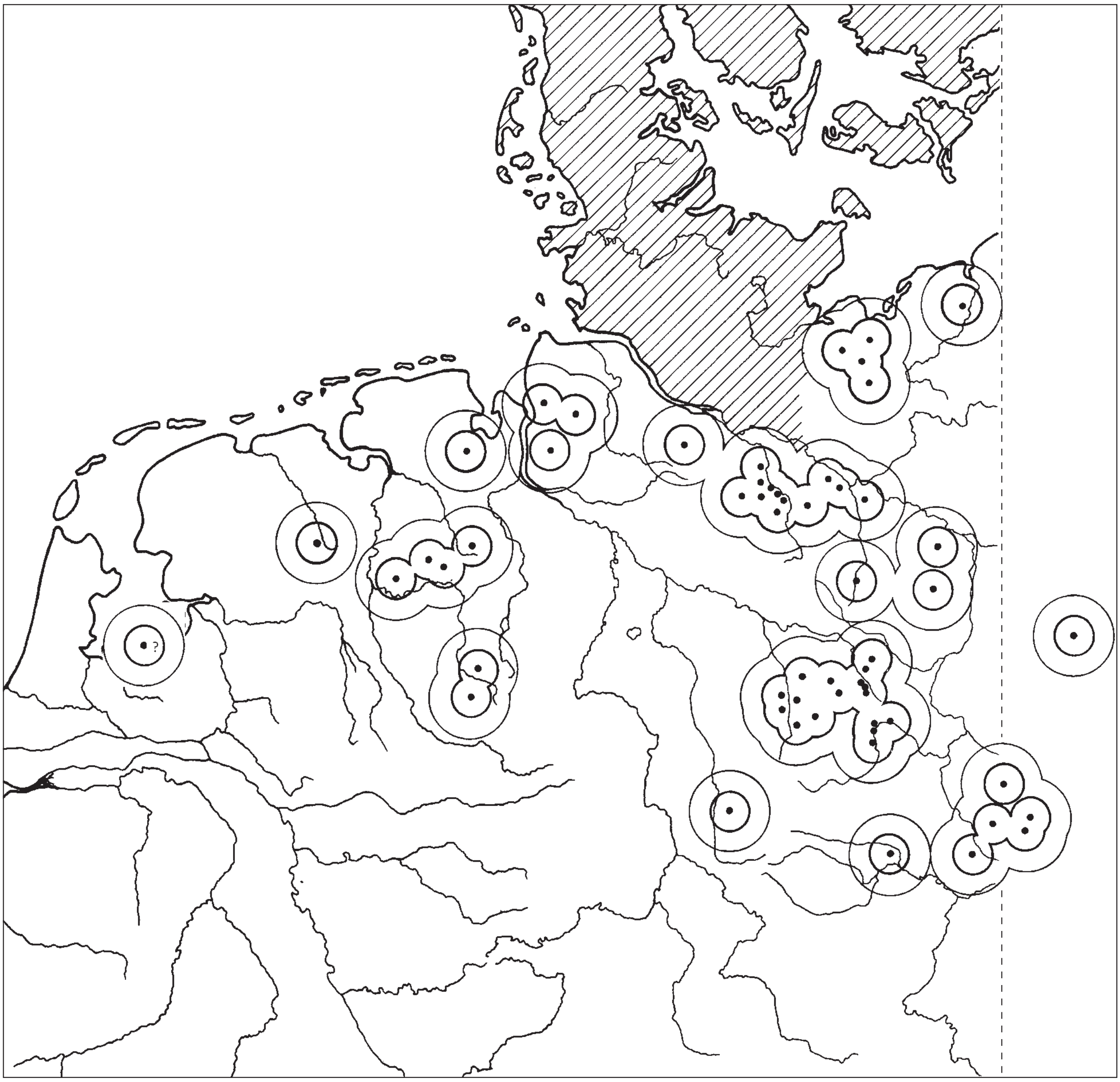


Fig. 6. Distribution of Troldebjerg-Fredsgårde battle-axes. After Bakker *1979, with a possible addition (*Hogestijn *1991, 110–111, although the provenance from the southern part of the province of Flevoland is not beyond doubt (hence the question mark). The location of the sites is approximate.*

published by bakker (2009, chapter 5.6) and A.E. lanting (1976–1977; 1978). The picture for the Netherlands emerging from these publications is that the artefacts were already known during the pre-Drouwen phase in the form of *flache Hammeräxte* (cf. drenth 2016, 250). During the ›classical‹ TRB (horizons 1–7), other types were current: Troldebjerg-Fredsgårde battle-axes, battle-axes of the Hanover type and knob-butted battle-axes. To a certain degree, they represent a sequence in time with the latter as the youngest.

The knob-butted battle-axes recovered from a datable TRB West Group context belong to the horizons 4 and 5. Attributable to the former horizon is a find made in grave a at Zuidwolde-Ekelberg, province of Drenthe (bakker 2009, 99, 187), although it is an atypical and badly shaped specimen. A knob at the end of the neck, collars and ›cheeks‹ alongside the shaft hole are traits that are characteristic of the knob-butted battle-axe type. The Zuidwolde specimen has neither knob nor collar and judging from Bakker's depiction (Ibid., fig. B16) it possesses only one weakly-developed ›cheek‹. A contemporary parallel has possibly been recovered from one of the graves in a cemetery at Heek (Ammert 54, *Landkreis* Borken) in Westphalia, Germany (kossian 2005, volume I,

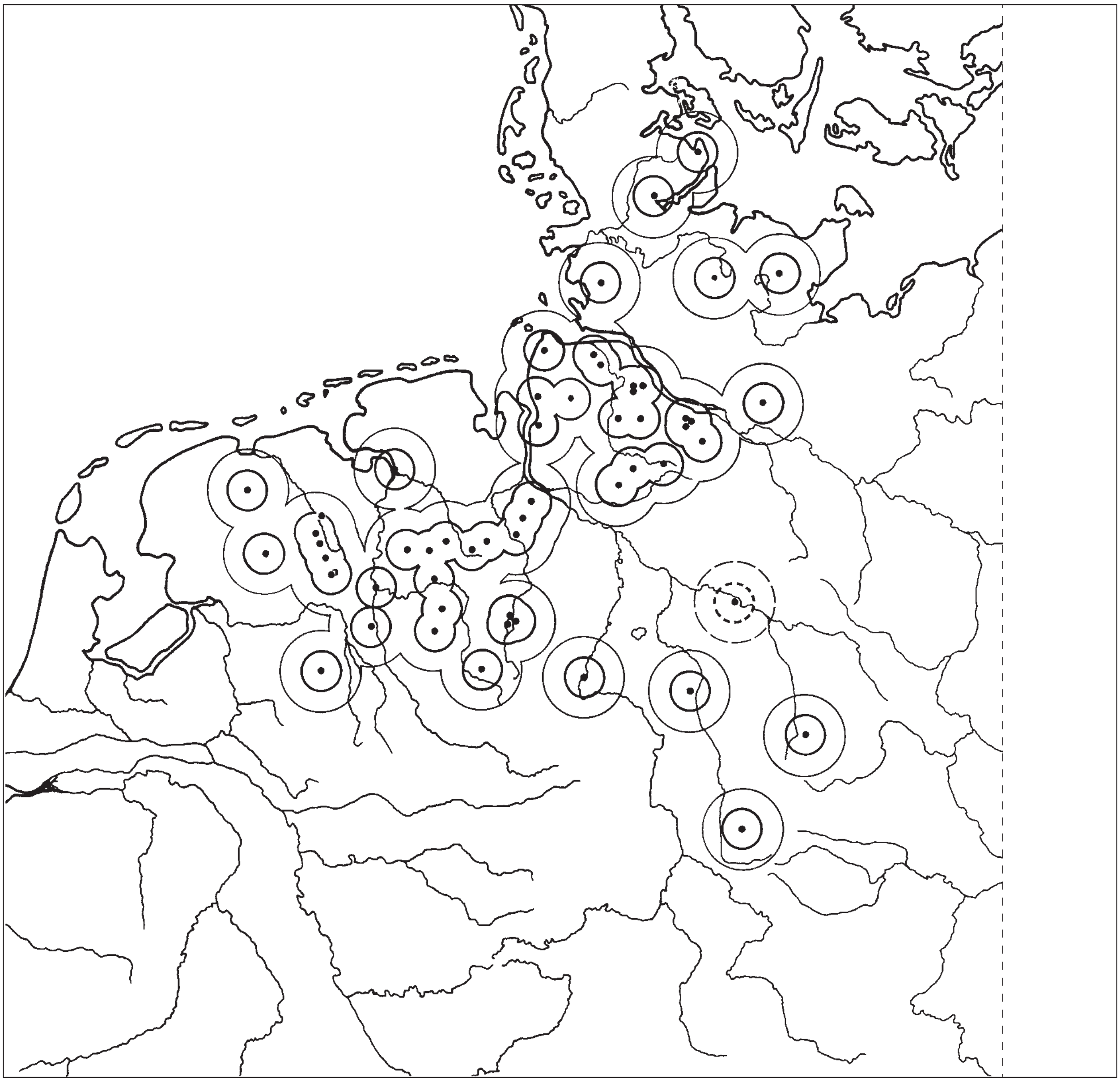


Fig. 7. Distribution of battle-axes of the Hanover type. After Bakker *1979, with two additions (*Brindley/Lanting *2003, 121, 123 fig. 3;* Van Der Sanden *2001, 179–181, fig. 10). The location of the sites is approximate.*

104–105, 376; with further reference; pers. observation). As far as undisputable horizon 5 finds are concerned, a list by Bakker (2009, 99–102, with further references) includes discoveries from Anlo (province of Drenthe), Beekhuizerzand (province of Gelderland) and Uddelermeer (province of Gelderland). This inventory can be expanded by a knob-butted battle-axe that was very recently unearthed during the excavation of a TRB cemetery at Oosterdalfsen, province of Overijssel, in 2015 (van der Velde/Bouma 2016; pers. observation author).

What is striking in Bakker's overview from 1979 is that Troldebjerg-Fredsgårde battle-axes and battle-axes of the Hanover type all stem from the ›TRB territory‹ (Figs. 6–7). Subsequent discoveries have not changed this situation; on the contrary, they are a reinforcement. By contrast, his map of knob-butted battle-axes shows several examples encountered outside this area, where the SVC is situated (Fig. 8). Recent finds reinforce this spatial pattern; this also holds for the distribution of finished and unfinished knob-butted battle-axes. The former have not come to light outside the TRB West Group territory. This data together strongly suggests that TRB battle-axes were imported by the SVC (Bakker 2006, 263–264;

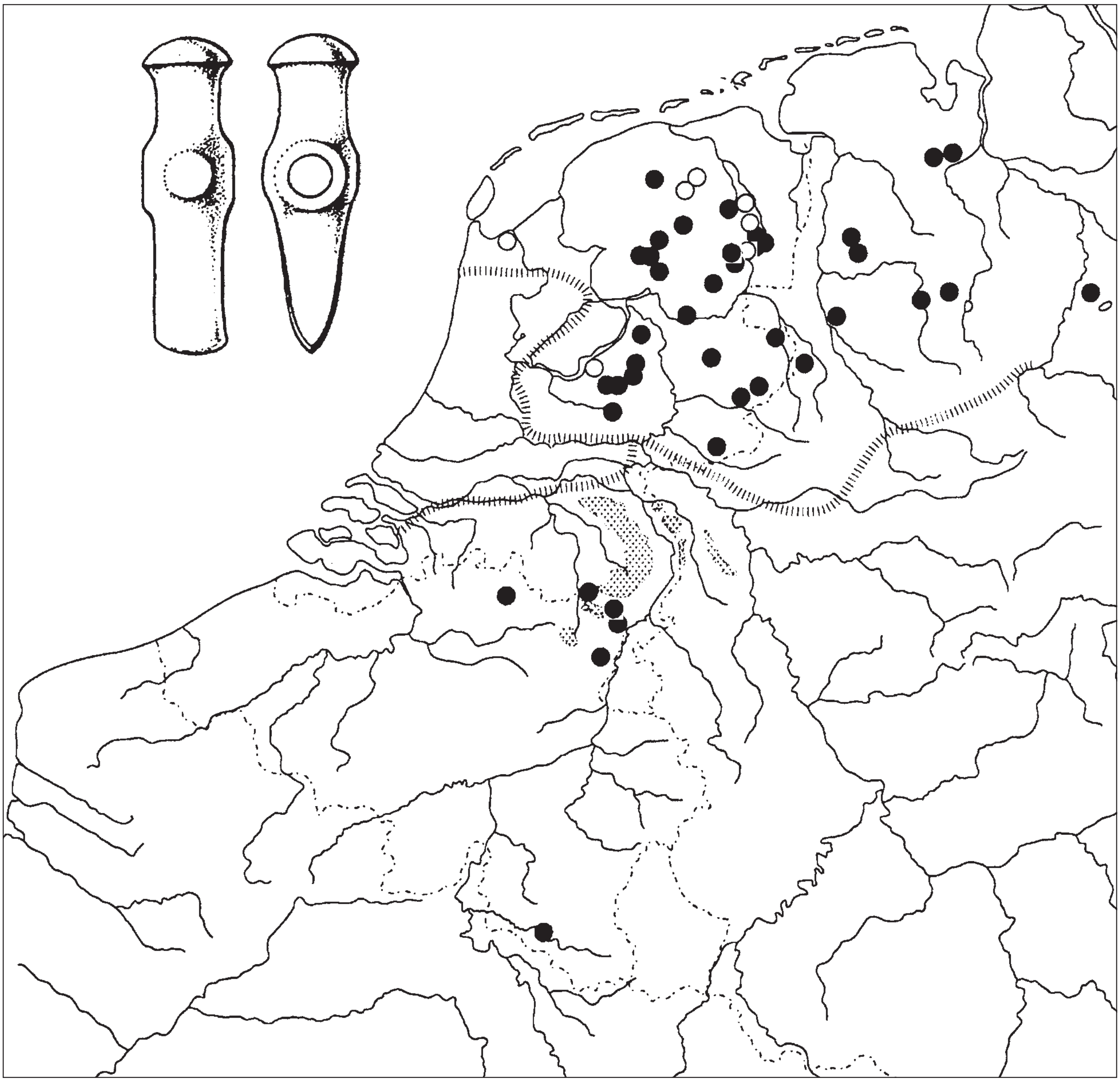


Fig. 8. Distribution of knob-butted battle-axes. After BAKKER *2006, with alterations and additions (see in this connection* ACHTEROP/BRONGERS *1979;* NIEKUS/BRINKHUIZEN *2003;* VAN DER VELDE/BOUMA *2016;* VAN DER WEERDEN *2008). The unfinished battle-axes are marked by an open circle, and the finished specimens by a black dot. The location of the sites is approximate.*

cf. DRENTH et al. 2007, 121) and these imports are not earlier than horizon 4.

Among the new discoveries is a fragment of a knob-butted battle-axe encountered in a trial excavation at Veldhoven-Habraken, province of Noord-Brabant (VAN DER WEERDEN 2008, 25–26 fig. 9: find no. 335). Subsequent investigations on this site exposed five house plans of the SVC (VAN KAMPEN/VAN DEN BRINK 2013). These houses all possessed a central row of roof-bearing posts, while (at least) four of them also had their walls placed in a trench. Thanks to an extensive ^{14}C programme, it transpires that the onset of the habitation dates to 2895 BC at the earliest (Tab. 2). Such an age is difficult to rhyme with both the finds made in a TRB context and the absolute chronology proposed by Brindley (*vide supra*). According to her chronological scheme, the Veldhoven battle-axe would be contemporary with horizon 7. This does not accord very well with the aforementioned general chronological picture for the artefact type in question. The Veldhoven find thus rather supports Lanting/Van der Plicht's ideas of the TRB being younger, as their chronological scheme indicates that 2895 BC may fall within horizon 5, although it cannot be completely excluded that the knob-butted battle-axe as a type persisted up to including the youngest section of the TRB. Besides, there is the possibility of an heirloom to explain the discrepancy.

Stone axes and chisels

Two other artefact categories to be briefly mentioned in the present framework are stone axes (including those in flint) and flint chisels. Unfortunately, the various types of non-flint stone axes – like the *Fels-Ovalbeile* and *Fels-Rechteckbeile* – cannot be used to determine the nature and intensity of the connections between the SVC and the TRB. They are mainly known as stray finds or do not come from an unmixed archaeological context like in the instance of Koningsbosch 27, province of Limburg (van Haaren/Modderman 1973). Although the site has yielded many SVC artefacts, including axes in Lousberg flint indicating the older facies of this cultural complex (see below), it remains to be seen whether a non-flint stone axe with a rectangular cross-section (a *Fels-Rechteckbeil*) should be rated among them. Another possibility is the Michelsberg culture, because the site in question (possibly) also yielded pottery of this culture, all the more since finds elsewhere show that this culture possessed the *Fels-Rechteckbeil*, as indicated by an overview by Schut (1991, 24–25, with further references). This study also shows that in the Netherlands the axe under discussion was persistent as a type, with the earliest specimens belonging to the Michelsberg culture, the youngest ones dating in any case to the Late Neolithic Beaker Cultures and perhaps even to the (Early) Bronze Age. The *Fels-Ovalbeil* was also a long-lived type in this region, with a duration from the Early Neolithic up to and including the Beaker times/Early Bronze Age (Ibid., 16–17, with further references). It goes without saying that this longevity of both axe types hampers an inquiry into the contacts between the SVC and the TRB.

The latter also holds true for the vast majority of the axes in flint (Ibid.). Nonetheless, a flint axe with an oval cross-section – classified by Bakker as a Buren type axe – from Denekamp-Klokkenberg, province of Overijssel should be mentioned as it is indicative of contacts between the cultural groups under discussion (Bakker 2006, especially 258, 272; with further references). The artefact was found by a member of the public together with a necked bowl, two collared flasks and possibly three flint artefacts in a foundation trench for a house. The pottery is diagnostic for the youngest TRB (horizon 7). In all probability, together these artefacts represent a grave inventory.

A comprehensive and detailed inquiry into the raw materials used for the flint axes from the Netherlands has yet to be carried out. Nonetheless, it may be surmised that axes in Rijckholt or Lanaye flint and Valkenburg flint rarely arrived in the province of Drenthe, the Dutch homeland of the vast majority of the megalithic tombs (*hunebedden*) erected by the TRB people. Here, only a handful of such artefacts have been discovered to date (Beuker 1988; pers. communication J.R. Beuker; see also the postscript), whereas especially Rijckholt-type flint is very distinctive (Beuker 1988, 10 [122]). The raw materials in question are rated among the group of ›southern flint‹, because their primary occurrences are located in the southern Netherlands, more precisely the province of Limburg and (adjacent) Belgian regions. Neither Rijckholt flint nor Valkenburg flint is culturally specific or confined to a particular period (Brounen 1998; de Grooth 1991; Marichal 1983). Furthermore, typological variation does not provide a clue. The axes in both Rijckholt flint and Valkenburg flint come as pointed-butted, thin-butted or thin-bladed. None of the three varieties is exclusive for the SVC (Schut 1991, chapter 4). It goes without saying that this hampers a determination of finds from the northern and central Netherlands as imports by the TRB West Group from the Stein-Vlaardingen Complex, all the more when chronologically diagnostic associations are practically absent, like in the instance of the province of Drenthe (see the postscript).

Another raw material from which Neolithic axes were manufactured is Lousberg flint. It was exploited systematically by open-air mining the mines located in Aachen (Germany). According to Schyle (2010, 79–83, 117) the exploitation most probably took place from c. 3800–3000 BC. In other words, the mining is assumed to have been started by the younger Michelsberg culture. Regarding later mining activities, van Gijn/Bakker (2005, 302) remark that the Stein people may have been involved. On the other hand, Schyle (2010) does not relate this period of mining to a particular culture. A similar stance is taken by Verhart (2010, 211, 219–220). He has emphasised that it remains to be seen what the distribution of the Stein Group was, especially in eastern direction. Be it as it may, the find distribution of axes in Lousberg flint suggests that they mainly circulated in the Aachen region and the adjacent areas, including the coversands and löss belt of the southern Netherlands. North of Rhine, the finds are mainly limited to the Veluwe region. This hints at a modest ›penetration‹ into the TRB territory, i.e. the axes usually did not reach beyond its southern fringe (cf. Beuker 1986, 32 [140]). Unfortunately, none of these discoveries from the province of Gelderland shed much light on chronology. An inventory by Schut (1991, 113) lists eight axes, which are (apparently) all stray finds. A ninth specimen from Ede is said to have been found together with other flint artefacts, among them nine fragments of (ground) axes. No cultural or chronological indication is given. However, a northern outlier from Odoorn, province of Drenthe, may be attributed to the TRB, judging from its associations and the dates available for the exploitation of the Lousberg (BEUKER 1986, 32 [140]).

The find distribution of cigar chisels shows similarities with that of the axes in Lousberg flint. It remains to be seen whether they were actually exchanged by the SVC with the TRB. The northernmost specimens from the Netherlands are mapped by VERHART (2010, fig. 9) as situated on the former's territory.

Flint and chisels axes of a rectangular cross-section are widely accepted as ›nordic‹ elements. Specimens from the southern Netherland may accordingly point to contacts between the SVC and the TRB. HOOF (1970, chapter 4, 162 and map 8) lists 23–24 specimens from his research area, the Lower Rhine-Meuse region. One of them – a specimen from Herpen (province of Herpen) – drops out because it most likely concerns a find spot forgery, as argued convincingly by LANTING (1977). The artefact is actually an adze, a representative of a thick-butted *hohlgeschliffene Querbeil*. This type is commonly found in Jutland (Denmark) and Schleswig-Holstein (Germany), where it dates to the late Single Grave Culture and the early *dolktid* (KÜHN 1979, 73–74; VANG PETERSEN 1993, 115). In addition, it should be noted about the ›Herpen axe‹ that the decorated pottery allegedly associated with the item does not belong to the TRB, as WOUTERS/GLASBERGEN (1956) thought. These ceramics are of Late Bronze Age signature (LANTING 1977). There is no reason to assume that the sherds also stem from another find spot than the one recorded.

According to HOOF (1970, 43), the ›Herpen‹ flint axe is the only example of the ›Nordic‹ axes and chisels listed by him for the Lower Rhine-Meuse region with associations indicating an origin somewhere in the TRB area. The other ones are all single finds. In his opinion, they should be linked first and foremost with the Single Grave Culture (c. 2800–2400 BC) and therefore post-date the TRB (Ibid.).

From the above, it follows that is difficult to judge the two axes with a rectangular cross-section from Barendrecht-Carnisselande, site 1, in terms of contacts between the SVC and the TRB (MOREE et al. 2011, 40–42 fig. 17: no. 1 and no. 2). Although two ^{14}C dates are available (Tab. 2), they do not clarify whether this VL site is contemporary with the TRB or the Single Grave Culture. Besides, according to MOREE et al. (2011, 42), the rectangular cross-section of one of the axes under consideration is due to the layered structure of the raw material and does not point to a northern origin.

Conclusions with respect to the SVC and TRB contact finds

From the current archaeological record, it may be inferred that the contacts between the SVC and the TRB intensified over the course of time. The majority of the contact finds date to the period after 3100/3000 BC, although their number still does not suggest a contact on a day-to-day basis. Furthermore, it transpires that the exchange of goods and ideas often had specific forms and directions. It looks like that the TRB ceramic repertoire was hardly affected by the SVC. By contrast, there is good reason to assume that clay discs and collared flasks as ceramic types were borrowed by the latter from the TRB, although it strikes the eye is that the former artefacts are hardly known from SVC contexts in the provinces of Noord-Brabant and Limburg. By contrast, there is abundant evidence of clay discs for the western region and the central river district in the Netherlands. Furthermore, the current archaeological records suggests a stronger diversity of vessels for these regions than the aforementioned provinces; for instance, necked bowls are unknown from Noord-Brabant and Limburg. Overall, the actual evidence of exchanged ceramics is scarce. It may very well be that the SVC mainly copied TRB examples. On the other hand, TRB stone battle-axes appear to have been items that were without exception imported by the SVC. They found their way within the Netherlands first and foremost to the provinces of Noord-Brabant and Limburg, where the Stein Group is situated.

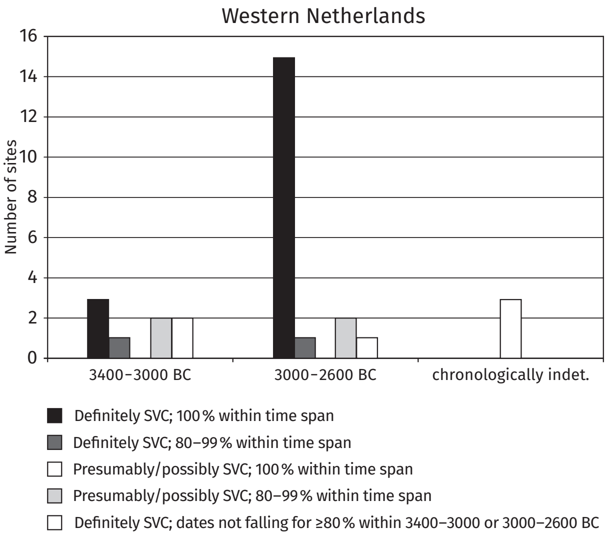
To conclude, at present the nature and distribution of TRB(-related) artefacts is such that they support the idea of cultural differentiation within the SVC. These artefacts may be used as arguments to distinguish between the Stein Group and Vlaardingen Culture.

DEMOGRAPHIC DEVELOPMENTS WITHIN THE SVC

Since the contact finds may indicate demographic changes – namely a growth of the SVC population over the course of time – the ^{14}C dates for this cultural complex were assessed by the following method: chronologically simple bar charts for both the western Netherlands on the one hand and the central and southern Netherlands on the other were made. The former area comprises the provinces of Noord-Holland, Zuid-Holland and Zeeland. An exception has been made in the case of Almkerk 1, which has also been assigned to this region despite its location in the utter west of the province of Noord-Brabant. Furthermore, the author assumes that the ›Donk van De Jong 1‹ – a site mentioned by LANTING/VAN DER PLICHT (1999/2000, 71) without a further geographical specification – is located in the province of Zuid-Holland. The SVC sites in the western Netherlands are (mainly) located in a Holocene landscape. The central and southern Netherlands encompass the provinces of Gelderland, Noord-Brabant and Limburg. In this instance, the majority of the ^{14}C dated SVC sites are situated in a Pleistocene environment.

Chronologically, the SVC was subdivided into two periods of equal duration – 3400–3000 and 3000–2600 BC – in accordance with the generally-accepted chronological ideas. Based on ^{14}C dates, sites were assigned to either time span. However, since not each and every (2 σ) calibrated date fits 100 % into this temporal bipartition, a third category had to be created, namely that of ›chronologically indeterminate‹. Apart from that, the question arose whether the 100 % threshold was not too rigid. Some of the calibrated ^{14}C dates do not fall completely but for the larger part within the epoch of 3400–3000 or 3000–2600 BC. Therefore, it was also decided to use a 80–99 % threshold, which is admittedly an arbitrary choice.

As far as the evaluation of the ^{14}C dates is concerned, the following remarks should be made. Firstly, in the case of several ^{14}C dates for one site, if possible, only the most reliable ones have been used, i.e. dates based on short-lived samples. In other words, charcoal dates were not highly rated. Furthermore, several dates for the western Netherlands are obtained on material from coring investigations. These find circumstances imply an element of uncertainty, which is indicated in Fig. 9 (cf. Tab. 2). In assessing the radiometric evidence, the archaeological evidence was taken into consideration, just like LANTING and VAN DER PLICHT (1999/2000, 33) have done. For example, the Single Grave Culture artefacts from Vlaardingen indicate that this site was inhabited in the first half of the 3rd millennium BC, although the ^{14}C dates may suggest earlier occupation. As far as Hazerswoude-Rijndijk is concerned, although it remains to be seen what the exact chronological development of this site was, two phases have been distinguished based on both the archaeological stratigraphy and the ^{14}C dates. One phase dates from before 3000 BC, the other in the first half of the 3rd millennium BC. Finally, it should be mentioned that for the sake of clarity and objectivity the data underlying Fig. 9 is presented in Tab. 2. This table includes information about the context, the nature of the dated material, the uncalibrated ^{14}C dates, the laboratory numbers, 2 σ calibrations with the help of OxCal version 4.3 and every now and then comments.



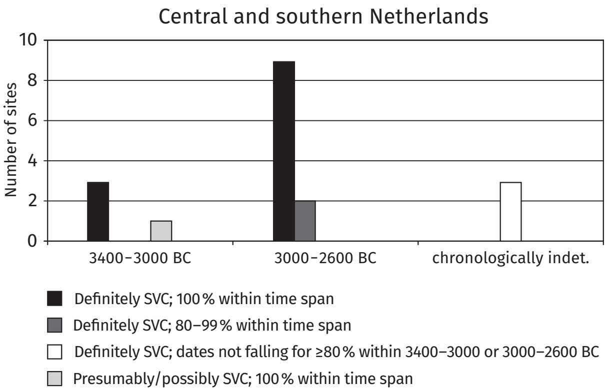


Fig. 9. Chronological distribution of the SVC *sites on the basis of ^{14}C evidence. The figure is based on TEN ANSCHER/BOSMAN 2010; BECKERMAN 2015; BAKELS 2008; BULTEN 2010; DRENTH 2015 a; DRENTH* et al. *2007; DORENBOS/KOOT 2010; HERMSEN 2011; HOUKES 2010; HOUKES/DORENBOS 2004; LANTING/VAN DER PLICHT 1999/2000; MEURKENS 2015; MOREE* et al. *2011; STEVENS 2010; STOKKEL in: DRENTH et al. 2014; TER WAL/TEBBENS 2012; VAN DEN BROEKE 2002; VAN HOOF/VAN WIJK 2005; VAN KAMPEN/VAN DEN BRINK 2013. Furthermore drs. Dorenbos provided by email d.d. 21-6-2016 information about ^{14}C dates with respect to sites in the Rijswijk district, province of Zuid-Holland. See Table 2 for detailed information.*

There are two exceptions to this rule: at the time of writing, the ^{14}C dates for the site Den Haag-Wateringse Tuinen were not at the author's disposal. However, according to a publication by Stokkel (in: DRENTH et al. 2014, 75), these dates suggest habitation in the first half of the 3rd millennium BC. Therefore, the site was included. The same was done in the case of Albrandswaard-Portland (province of Zuid-Holland), a possible VL site, which had probably been used for a very short period (HOUKES 2010, 150–151, with reference to a report by MEIRSMAN/MOREE from 2006, which could not be consulted by the author at the time of writing). An excavation here yielded charcoal, fish remains and hazelnut shells and remarkably no ceramics and flint. A sample of the former has been ^{14}C dated: after calibration (2 σ), the result ranges from 2877–2581 BC.

Despite all of the ifs and buts, a rather distinctive picture emerges from the bar charts in Fig. 9, for both the western Netherlands and the central and southern Netherlands. After calibration, the radiometric data points substantially more often to the 3rd rather than the 4th millennium BC. This hints at population growth, which may in turn explain the increasing number of artefacts over time, attesting contacts between the SVC and the TRB. Whether this implies an influx of people remains to be seen.

FINAL REMARKS

It should be stressed that the present ideas about a SVC population increase are a working hypothesis. Further investigations of existing data – e.g. by sum calibration – and new discoveries must scrutinise the vision presented here, through palynological as well as physical geographical investigations, among others. With respect to the latter, it is difficult to imagine that they will show that the markedly-uneven distribution of SVC sites in time is simply due to general environmental factors, because a similar pattern has been found for both the Holocene and Pleistocene landscape.

POSTSCRIPT

After the completion of this manuscript, two studies were carried out that hold relevance in the present context. First, the site Wijchen-Oostflank in the central river district of the Netherlands was excavated more or less completely (VAN KAMPEN in prep., with a chapter about pottery by Houkes and the author). Among other things, TRB West Group(-like) sherds – including fragments of several necked bowls – were discovered. It seems to concern both imports and locally-made copies. These ceramics can be dated to horizon 7 and thus reinforce the ideas postulated here. On the other hand, an assertion based on a trial excavation in a former fen has to be withdrawn (*vide supra* the section ›The chronological framework‹). Ultimately, there is no convincing evidence of a ceramic stratigraphy, in which SVC vessels with perforations or pits just below the rim occur statistically significantly more often in the lower stratum than the upper layer.

The second study to be mentioned is the one by H. de Kruyk and the present author (DRENTH/DE KRUYK in press) carried out in 2017 on artefacts in Valkenburg flint from the province of Drenthe. The results underline the statement above that axes made of this flint type are a very rare phenomenon in the northern Netherlands. Well over 300 (Neolithic) axes and chisels were examined and eight specimens at most were found to be of the raw material in question.

ACKNOWLEDGEMENTS

The author is grateful to Dr J.A. Bakker (Baarn) for his critical reading of the first draft of this paper. J.R. Beuker (Drents Museum, Assen) was furthermore so kind to give information about the occurrence of flint axes in the province of Drenthe. Thanks are also due to drs. O. Dorenbos (Bureau Monumentenzorg en Archeologie, municipality of Rijswijk) for putting several hitherto unpublished ^{14}C dates at the author's disposal. Last but not least, drs. T.A. Goossens and Dr S. Knippenberg (both Archol, Leiden) are thanked for providing the two figures of pottery from Haren-Groenstraat and Hellevoetsluis-Ossenhoek.

Tab. 2. ^{14}C dates upon which Fig. 9 is based.

LOCATION AND TYPE OF SITE	^{14}C DATE (BP)	LAB. NO.	CALIBRATION (2 Σ) WITH OXCAL 4.3 (BC)	NATURE OF DATED MATERIAL	REMARKS ABOUT SAMPLE
central and southern Netherlands					
Cadier en Keer-Keerderbosch, province of Limburg; a flint atelier	*4150 ± 60*	*GrN-10463*	*2888–2577*	*antler*	–
Ittervoort-Santfort, province of Limburg; ?	*4303 ± 40*	*UtC-1478*	*3023–2877*	*charcoal (Quercus sp.)*	*heartwood (Quercus sp.); from a pit with pottery*
Maastricht-A2 Landgoederenzone, province of Limburg; pottery concentration (with the remains of two vessels) with charcoal amidst the ceramics	*4515 ± 30*	*SUERC-37640 (GU25775)*	*3354–3263/3247–3100*	*charcoal*	–
Maastricht-Randwyck, province of Limburg; ? (probably one or more extensive activities or a visit of short duration)	*4180 ± 60*	*GrN-14237*	*2900–2617/2610–2583*	*charcoal*	*from a pit with amongst other things SVC pottery*
Maastricht-Randwyck; at least agricultural activities	*4215 ± 45*	*GrN-17122*	*2909–2834/2818–2665/2645–2639*	*peat*	*linked up with a pollen diagram*
Nijmegen-Ressen, Zuiderveld-West, province of Gelderland; a settlement?	*4510 ± 60*	*GrA-17369*	*3486–3474/3372–3017*	*charcoal*	*from a find layer*
Sittard/Geleen-Hof van Limburg, province of Limburg; ?	*4140 ± 60*	*GrN-27837*	*2887–2573*	*charcoal (young wood?; Prunus spinosa?)*	*from a pit with pottery*
Stein, province of Limburg; a collective grave	*4780 ± 60*	*GrN-4831*	*3660–3495/3464–3375*	*charcoal*	*probably too old due to the old wood effect?*
Idem	*4570 ± 60*	*GrA-16185*	*3516–3397/3385–3091*	*cremated bone*	–
Tilburg-Schaapsven, site B, province of Noord-Brabant; a settlement	*4290 ± 35*	*Poz-36020*	*3013–2876*	*organic residue on vessel fragment*	–
Tilburg-Fietspad [bike path]-Rauwbrakenweg, province of Noord-Brabant; a settlement	*4220 ± 35*	*GrA-56798*	*2906–2848/2814–2679*	*charred cereal grain*	*from a feature*
Idem	*4185 ± 35*	*GrA-56800*	*2891–2833/2819–2662/2648–2637*	*charred hazelnut shell*	*from a pit with amongst other things pottery*
Idem	*4105 ± 35*	*GrA-56799*	*2866–2804/2777–2571/2513–2503*	*charred cereal grain*	*from a feature*
Valkenburg-Biesbosch, province of Limburg; a flint extraction site	*4330 ± 60*	*GrN-19832*	*3313–3294/3287–3274/3266–3238/3108–2869/2803–2778*	*charcoal (Alnus sp.)*	*from a hearth*
Valkenburg-Hoornsberg (Geböske), province of Limburg; probably a flint extraction site	*4235 ± 45*	*GrN-6783C*	*2931–2836/2816–2670*	*antler*	–
Valkenburg-Plenkertstraat, province of Limburg; a flint extraction site	*4670 ± 60*	*GrN-19831*	*3634–3554/3540–3351*	*charcoal*	*dispersed charcoal from filling of shaft IV of a flint mine; perhaps the sample dates to the late Michelsberg culture or the Hazendonk Group and is therefore older than the SVC*

Continued Tab. 2. ^{14}C dates upon which Fig. 9 is based.

LOCATION AND TYPE OF SITE	^{14}C DATE (BP)	LAB. NO.	CALIBRATION (2 Σ) WITH OXCAL 4.3 (BC)	NATURE OF DATED MATERIAL	REMARKS ABOUT SAMPLE
Idem	*4610 ± 80*	*GrN-19830*	*3631–3566/3536–3095*	*charcoal*	*dispersed charcoal from filling of shaft II of a flint mine; perhaps the sample dates to the late Michelsberg culture or the Hazendonk Group and is therefore older than the SVC*
Valkenburg-Schaelsberg (Sangen), province of Limburg; probably a flint extraction site	*4385 ± 60*	*GrN-6782C*	*3329–3216/3182–3158/3124–2894*	*antler*	–
Veldhoven-Habraken, province of Noord-Brabant; a settlement	*4195 ± 35*	*Poz-41734*	*2895–2835/2817–2666*	*charred hazelnut shell*	*from a posthole of house plan 4*
Idem	*4190 ± 35*	*Poz-41763*	*2892–2835/2817–2666*	*charred hazelnut shell*	*from a posthole of house plan 1*
Idem	*4180 ± 35*	*Poz-41740*	*2889–2833/2819–2661/2649–2636*	*charred hazelnut shell*	*from a posthole of house plan 2*
Idem	*4160 ± 5*	*Poz-41751*	*2873–2848/2815–2678*	*charred cereal grain*	*from pit 8; standard deviation remarkably low (some kind of error?)*
Idem	*4155 ± 35*	*Poz-41738*	*2879–2625*	*charred cereal grain*	*from a posthole of house plan 3*
Idem	*4140 ± 35*	*Poz-41759*	*2875–2619/2605–2601*	*charred cereal grain*	*from a posthole of an outbuilding plan (no. 1)*
Idem	*4140 ± 35*	*Poz-41764*	*2875–2619/2605–2601*	*charred cereal grain*	*from a posthole of house plan 1*
Idem	*4120 ± 35*	*Poz-41735*	*2871–2801/2780–2577*	*charred hazelnut shell*	*from a posthole of house plan 3*
Idem	*4120 ± 35*	*Poz-41761*	*2871–2801/2780–2577*	*charred cereal grain*	*from a posthole of an outbuilding plan (no. 1)*
Idem	*4110 ± 35*	*Poz-41767*	*2870–2802/2779–2572/2508–2506*	*charred cereal grain*	*from a posthole of house plan 5*
Idem	*4100 ± 35*	*Poz-41739*	*2866–2804/2763–2568/2516–2500*	*charred hazelnut shell*	*from a posthole of house plan 2*
Idem	*4065 ± 35*	*Poz-41741*	*2853–2812/2744–2726/2696–2487*	*charred hazelnut shell*	*from a posthole of house plan 4*
Idem	*4060 ± 40*	*Poz-41736*	*2853–2812/2744–2726/2696–2476*	*charred cereal grain*	*from pit 5*
Idem	*4030 ± 35*	*Poz-41765*	*2832–2821/2631–2471*	*charred hazelnut shell*	*from a posthole of house plan 5*
Vlootbeek-findspot HVR-165 province of Limburg; ? (probably one or more extensive activities or a visit of short duration)	*4375 ± 40*	*GrN-15568*	*3261–3256/3098–2902*	*charcoal*	*from hearth containing mainly charcoal of Quercus sp. (90 %); the site has yielded furthermore two transverse arrowheads*
Well-Aijen, province of Limburg; a refuse dump of settlement debris/activities related to arable farming?	*4155 ± 35*	*SUERC-38061*	*2879–2625*	*charcoal*	*from layer 18 of a depression*
Idem	*4230 ± 35*	*SUERC-38062*	*2912–2851/2814–2742/2729–2694*	*uncharred seeds and buds*	*Idem*
Idem	*4095 ± 30*	*SUERC-38261*	*2861–2807/2757–2719/2705–2569/2516–2501*	*uncharred stone of Prunus spinosa*	*from a probably Iron Age pit cutting through the filling of the aforementioned depression, therefore probably intrusive*
Wijchen-Kleine Kamp, province of Gelderland; a settlement?	*4235 ± 35*	*GrA-47111*	*2915–2853/2813–2744/2726–2696*	*calcined mammal bone*	*from the (remaining) upper half of a pit with amongst other things pottery*

Continued Tab. 2. ^{14}C dates upon which Fig. 9 is based.

LOCATION AND TYPE OF SITE	^{14}C DATE (BP)	LAB. NO.	CALIBRATION (2 Σ) WITH OXCAL 4.3 (BC)	NATURE OF DATED MATERIAL	REMARKS ABOUT SAMPLE
Idem	*4140 ± 40*	*GrA-46023*	*2876–2618/2608–2599/2594–2586*	*charred hazelnut shell*	*from the midsection of the just mentioned pit as the afore-mentioned feature*
western Netherlands					
Almkerk 1, province of Noord-Brabant; ?	*4040 ± 35*	*GrN-18969*	*2835–2817/2665–2472*	*charcoal*	*found during coring in a river dune, therefore not unequivocally related to the SVC*
Barendrecht-Carnisselande, site 1, province of Zuid-Holland; probably a settlement of short duration	*4450 ± 70*	*GrN-21343*	*3344–2926*	*charcoal*	*from a find layer; the lab.nos. of this date and the following may have been interchanged, as the publication by* MOREE *et al. (2011, 43, Tab. 12) is in this respect confusing*
Idem	*4020 ± 40*	*GrN-25915*	*2833–2819/2660–2651/2634–2465*	*uncharred seed of Ranunculus sp.*	*from a find layer*
'Donk van De Jong 1', province of Zuid-Holland(?); ?	*4580 ± 40*	*GrN-19682*	*3500–3432/3380–3308/3298–3283/3276–3265/3240–3104*	*charcoal*	*found during coring in a river dune, therefore not unequivocally related to the SVC*
'Donk van Pierhagen', province of Zuid-Holland; ?	*4175 ± 50*	*GrN-19683*	*2893–2620*	*charcoal*	*found during coring in a river dune, therefore not unequivocally related to the SVC*
Den Haag/Ypenburg-Gavi kavel Rijp 25 [also spelled as Ryp 25]; a settlement	*4565 ± 30*	*GrA-27558*	*3491–3470/3374–3316/3293–3289/3274–3266/3238–3108*	*charred twig (4 years old) of Betula sp.*	*from a find layer*
Haamstede-Brabers, province of Zeeland; a settlement	*4410 ± 60*	*GrN-1577*	*3335–3212/3191–3152/3136–2906*	*charcoal*	*from a cultural layer; sample pretreated with acid, leach and acid; old wood effect?*
Hazendonk, province of Zuid-Holland, layer VL-1a; a settlement	*4535 ± 35*	*GrN-8235*	*3364–3263/3243–3102*	*uncharred wood*	*from a wooden pathway*
Idem	*4720 ± 70*	*GrN-8243*	*3638–3370*	*peat*	*related to VL-1a layer?*
Hazendonk, layer VL-1b; a settlement	*4535 ± 40*	*GrN-9134*	*3366–3262/3252–3098*	*charcoal*	*from a concentration in a cultural layer; old wood effect?*
Idem	*4505 ± 40*	*GrN-8234*	*3359–3089/3046–3037*	*charcoal*	*dispersed from a cultural layer; old wood effect?*
Idem	*4480 ± 40*	*GrN-6213*	*3349–3082/3069–3026*	*peat*	–
Idem	*4450 ± 40*	*GrN-9137*	*3339–3206/3196–3007/2986–2933*	*charcoal*	*dispersed from a cultural layer; old wood effect?*
Idem	*4445 ± 35*	*GrN-9136*	*3335–3211/3192–3152/3138–3007/2988–2931*	*charcoal*	*dispersed from a cultural layer; old wood effect?*
Idem	*4435 ± 50*	*GrN-9135*	*3336–3210/3193–3151/3139–2921*	*charcoal*	*dispersed from a cultural layer; old wood effect?*
Idem	*4400 ± 60*	*GrN-9190*	*3332–3214/3188–3155/3131–2902*	*uncharred wood (Quercus sp.)*	*from a logboat*
Idem	*4390 ± 170*	*GrN-9197*	*3519–2617/2611–2581*	*peat*	*layer corresponding with the onset of the VL-1b habitation*

Continued Tab. 2. ^{14}C dates upon which Fig. 9 is based.

LOCATION AND TYPE OF SITE	^{14}C DATE (BP)	LAB. NO.	CALIBRATION (2 Σ) WITH OXCAL 4.3 (BC)	NATURE OF DATED MATERIAL	REMARKS ABOUT SAMPLE
Idem	4290 ± 40	GrN-5175	3022–2871/2801–2779	*peat*	–
Idem	4220 ± 60	GrN-8239	2924–2620	*peat*	*layer corresponding with the end of VL-1b habitation*
Idem	4050 ± 120	GrN-9198	2899–2286/2247–2235	*peat*	*layer corresponding with the VL-1b habitation peak*
Hazerswoude-Rijndijk, province of Zuid-Holland; a settlement	4520 ± 35	SUERC-26358	3359–3262/3252–3098	*organic residue on vessel sherd*	*idem; 1 $\delta^{13}C$ value of -29.2 ‰*
Idem	4435 ± 35	SUERC-26359	3330–3215/3185–3157/3126–2926	*organic residue on vessel sherd*	*idem; $\delta^{13}C$ value of -26.5 ‰*
Idem	4285 ± 35	SUERC-26366	3013–2873	*unburnt phalanx of a large mammal and ditto indet. bone*	*idem; $\delta^{13}C$ value of -22.5 ‰*
Idem	4175 ± 35	SUERC-26589	2887–2833/2820–2659/2651–2634	*unburnt animal bone and ditto antler*	*idem; $\delta^{13}C$ value of -18.5 ‰*
Idem	4165 ± 35	SUERC-26371	2882–2831/2821–2631	*charred cereal grain*	*idem; $\delta^{13}C$ value of -23.2 ‰*
Idem	4130 ± 35	SUERC-26370	2872–2617/2611–2582	*charred organic material (3×hazelnut shell)*	*from a settlement layer; $\delta^{13}C$ value of -28.2 ‰; perhaps remains of the Single Grave Culture*
Hekelingen I, province of Zuid-Holland; a settlement	4200 ± 120	GrN-254	3264–3243/3103–2466	*charcoal*	*from a cultural layer; pretreated with acid, leach and acid*
Idem	4080 ± 85	GrN-684	2888–2463	*unburnt bone*	*from a cultural layer; pretreated with acid, leach and acid; collagen was dated; perhaps contamination due to humus*
Hekelingen III, phase 1, province of Zuid-Holland; a settlement	4310 ± 25	GrN-11844	3011–2950/2944–2887	*charcoal*	*from a hearth belonging to a residence*
Idem	4125 ± 40	GrN-11845	2872–2579	*charcoal*	*from a settlement layer of a another residence*
Hekelingen III, phase 2; a grave and a wooden construction in creek	4180 ± 35	GrN-11848	2889–2833/2819–2661/2649–2636	*charcoal*	*from a cremation grave*
Idem	4110 ± 40	GrN-11851	2871–2800/2792–2789/2780–2572/2512–2505	*uncharred wood*	*part of a wooden construction in a creek*
Hekelingen III, phase 3; a grave and a settlement	4135 ± 30	GrN-11850	2872–2620	*charcoal*	*from settlement refuse on top of 2 m thick creek filling formed during phase 2*
Idem	4080 ± 35	GrN-11847	2861–2808/2756–2719/2704–2559/2536–2491	*charcoal*	*from a cremation grave*
Idem	4040 ± 35	GrN-11846	2835–2817/2665–2472	*charcoal*	*from a settlement layer*

Continued Tab. 2. ^{14}C dates upon which Fig. 9 is based.

LOCATION AND TYPE OF SITE	^{14}C DATE (BP)	LAB. NO.	CALIBRATION (2 Σ) WITH OXCAL 4.3 (BC)	NATURE OF DATED MATERIAL	REMARKS ABOUT SAMPLE
Hellevoetsluis-Ossenhoek, province of Zuid-Holland; a settlement (including an arable field)	*4400 ± 40*	*Poz-25309*	*3321–3272/3266–3236/3171–3163/3115–2908*	*charred hazelnut shell*	*from a find layer*
Idem	*4310 ± 35*	*Poz-25252*	*3016–2885*	*charred cereal grain*	*from a post hole*
Idem	*4275 ± 35*	*Poz-25251*	*3011–2978/2942–2866/2805–2761*	*charred hazelnut shell*	*from a post hole*
Idem	*4250 ± 35*	*Poz-25310*	*2921–2858/2810–2752/2723–2701*	*charred hazelnut shell*	*from a find layer*
Laagbloklandse Donk 2, province of Zuid-Holland; ?	*4480 ± 70*	*GrN-18087*	*3362–3006/2989–2931*	*charcoal*	*found during coring in a river dune, therefore not unequivocally related to the SVC*
Rietveld 1, province of Zuid-Holland; ?	*4260 ± 70*	*GrN-16652*	*3086–3062/3030–2626*	*charcoal*	*found during coring in a river dune, therefore not unequivocally related to the SVC*
Rietveld 3, province of Zuid-Holland; ?	*4585 ± 30*	*GrN-19329*	*3499–3437/3379–3328/3218–3177/3160–3121*	*charcoal*	*found during coring in a river dune, therefore not unequivocally related to the SVC*
Rijswijk-De Schilp, province of Zuid-Holland; a settlement	*4215 ± 40*	*GrA-59412*	*2907–2836/2816–2671*	*charcoal of Alnus sp.*	*from the lower part of a settlement layer*
Idem	*4050 ± 40*	*GrA-17685*	*2850–2813/2742–2730/2694–2686/2681–2472*	*charcoal of Fraxinus sp.*	*from a settlement layer*
Rijswijk-De Strijp, province of Zuid-Holland; a settlement	*4115 ± 45*	*GrA-17054*	*2874–2573*	*charred hazelnut shell*	*from a settlement layer*
Idem	*4145 ± 40*	*GrA-17055*	*2878–2619/2606–2600/2592–2589*	*charcoal of Alnus sp. and charred hazelnut shell*	*from a settlement layer*
Rommertsdonk 4, province of Zuid-Holland; ?	*4425 ± 35*	*GrN-19080*	*3327–3219/3176–3159/3121–2922*	*charcoal*	*found during coring in a river dune, therefore not unequivocally related to the SVC*
Rotterdam-IJsselmonde 13–17, province of Zuid-Holland; probably habitation	*4470 ± 60*	*GrN-12223*	*3355–3008/2985–2934*	*?*	*from lower stratum with anthropogenic indicators in pollen diagram; sample pretreated with acid, leach and acid*
Rotterdam-IJsselmonde 13–17; probably habitation	*4395 ± 40*	*GrN-12224*	*3314–3294/3287–3274/3266–3238/3109–2906*	*?*	*from upper stratum with anthropogenic indicators in pollen diagram*
Vlaardingen, province of Zuid-Holland; a settlement	*4410 ± 100*	*GrN-2306*	*3363–2885*	*youngest 10 tree rings of (uncharred?) trunk*	*from a layer beneath the cultural layer and date thus a terminus post quem; sample only pretreated with acid*
Idem	*4330 ± 60*	*GrN-2303*	*3313–3294/3287–3274/3266–3238/3108–2869/2803–2778*	*charcoal*	*from a cultural layer; sample only pretreated with acid*
Idem	*4250 ± 75* *4420 ± 120* *mean* *4300 ± 70*	*GrN-2304* *GrN-4114*	*mean: 3308–3302/3282–3278/3265–3240/3105–2836/2816–2668*	*youngest 10 tree rings of worked (uncharred?) post*	*from a cultural layer; sample only pretreated with acid*

Continued Tab. 2. ^{14}C dates upon which Fig. 9 is based.

LOCATION AND TYPE OF SITE	^{14}C DATE (BP)	LAB. NO.	CALIBRATION (2 Σ) WITH OXCAL 4.3 (BC)	NATURE OF DATED MATERIAL	REMARKS ABOUT SAMPLE
Idem	*4280 ± 100*	*GrN-2487*	*3326–3231/3224–3220/3174–3161/3119–2580*	*youngest 10 tree rings of worked (uncharred?) post*	*from a cultural layer; sample only pretreated with acid*
Idem	*4130 ± 40*	*GrN-4948*	*2872–2617/2611–2581*	*unburnt bone*	*from the uppermost refuse layer in a creek filling*
Idem	*4190 ± 70*	*GrN-2480*	*2910–2578*	*charcoal*	*from the uppermost refuse layer in a creek filling sample only pretreated with acid*
Voorschoten-Boschgeest, province of Zuid-Holland, layers 2 and 4/5; probably a settlement	*4090 ± 40*	*GrN-4906*	*2866–2804/2776–2562/2535–2493*	*charcoal*	*coming from layer 2; sample pretreated with acid, leach and acid*
Idem	*4060 ± 40*	*GrN-5031*	*2853–2812/2744–2726/2696–2476*	*charcoal*	*coming from layers 4/5; sample only pretreated with acid*
Voorschoten-Boschgeest, layer 8; probably a settlement	*4080 ± 70*	*GrN-4907*	*2872–2800/2793–2787/2780–2476*	*charcoal*	*sample pretreated with acid, leach and acid*
Westbroek, site 3, province of Noord-Holland; ? (probably one or more extensive activities or a visit of short duration)	*4360 ± 70*	*UtC-1933*	*3331–3214/3186–3156/3128–2879*	*organic residue on vessel fragment with a knob*	*probably too old due to reservoir effect (vessel used for cooking fish?) in view of $\delta^{13}C$ value (-30.2 ‰)*
Zandwerven, province of Noord-Holland; a settlement	*4000 ± 65*	*GrN-2221*	*2853–2812/2745–2726/2697–2334/2324–2301*	*charcoal*	*from a pit containing amongst other things SVC pottery sherds*

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From pigment to symbol: The role of paintings in the ideological construction of European megaliths

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ABSTRACT

The documentation of paint accompanying the engraved decorations in dolmens in the Iberian Peninsula has enabled the development of a tested methodology. Its application to engraved dolmens in Brittany and to materials and architecture in the Orkney Islands has determined the range and variability in the depictions at megalithic sites in Atlantic Europe. The possibility of obtaining direct dates has achieved results in the case of the Bury Stela and some painted objects at Ness of Brodgar. A new line of research into the symbology of megaliths has opened up, as well as new potential for their dating.

INTRODUCTION

E. SHEE TWOHIG (1981) established the technical and thematic characteristics of the ensembles of engravings and paintings in Megalithic Art on the Atlantic seaboard of Europe (Fig. 1). Some graphic forms (Schematic Art), and the technique of painting, were then only known in the Iberian Peninsula, and a very specific area within it: the north of Portugal. Research carried out in Iberia to identify their role in other areas apart from the Viseu region has revealed numerous cases and it can now be stated that painting was a widespread technique in megalithic monuments in the Iberian Peninsula. Our current understanding of the paintings is directly related to the work carried out in developing documentation methods.

The Research Project being undertaken since 2011 in Atlantic Europe has succeeded in confirming the hypothesis of the presence of paintings on megaliths in this region (BUENO/BALBÍN 2002, 614). The positive results obtained in these four years have encouraged other teams to apply protocols in the same line to document a new series of sites within the study of symbolic interactions in megalithism (BUENO et al. 2012a; 2015a; 2016b).

These contributions imply many consequences (new interpretations of the symbolic realm, relationship between the techniques used, position of paintings and engravings in connection with the reworking of the monuments). One of the most innovative is undoubtedly connected with the possibility of applying new archaeometric dating systems to the megaliths (BUENO et al. 2007). Both the dates obtained for paintings made with organic pigments (CARRERA/FÁBREGAS 2002; 2006; STEELMAN et al. 2005) and those that are now being obtained with the plasma oxidation technique, will provide new points of reference to situate the different events involved in the construction, reformation and maintenance of the megaliths (BUENO et al. 2014a; b; c).

BIOGRAPHIES OF THE STONES: INDIVIDUAL AND COLLECTIVE HISTORIES

The close relationship of the symbology of human groups with the material world, which is often the principal subject of archaeology, justifies the intensive study of the depictions. However, they have been studied within a separate field, underestimating the contributions they can make to the symbolic background to the rites of death (BUENO et al. 2015b). Rejection of over-descriptive studies is probably one reason why the study of Prehistoric Art still has to undergo a major methodological development. It is normal to associate this kind of study with intricate analyses of techniques or themes, which in most cases do not put forward any arguments that go beyond a certain degree of subjectivity.

Fortunately, in both Palaeolithic Art (BALBÍN/ALCOLEA 2009; BALBÍN et. al. 2012; PIKE et al. 2012)

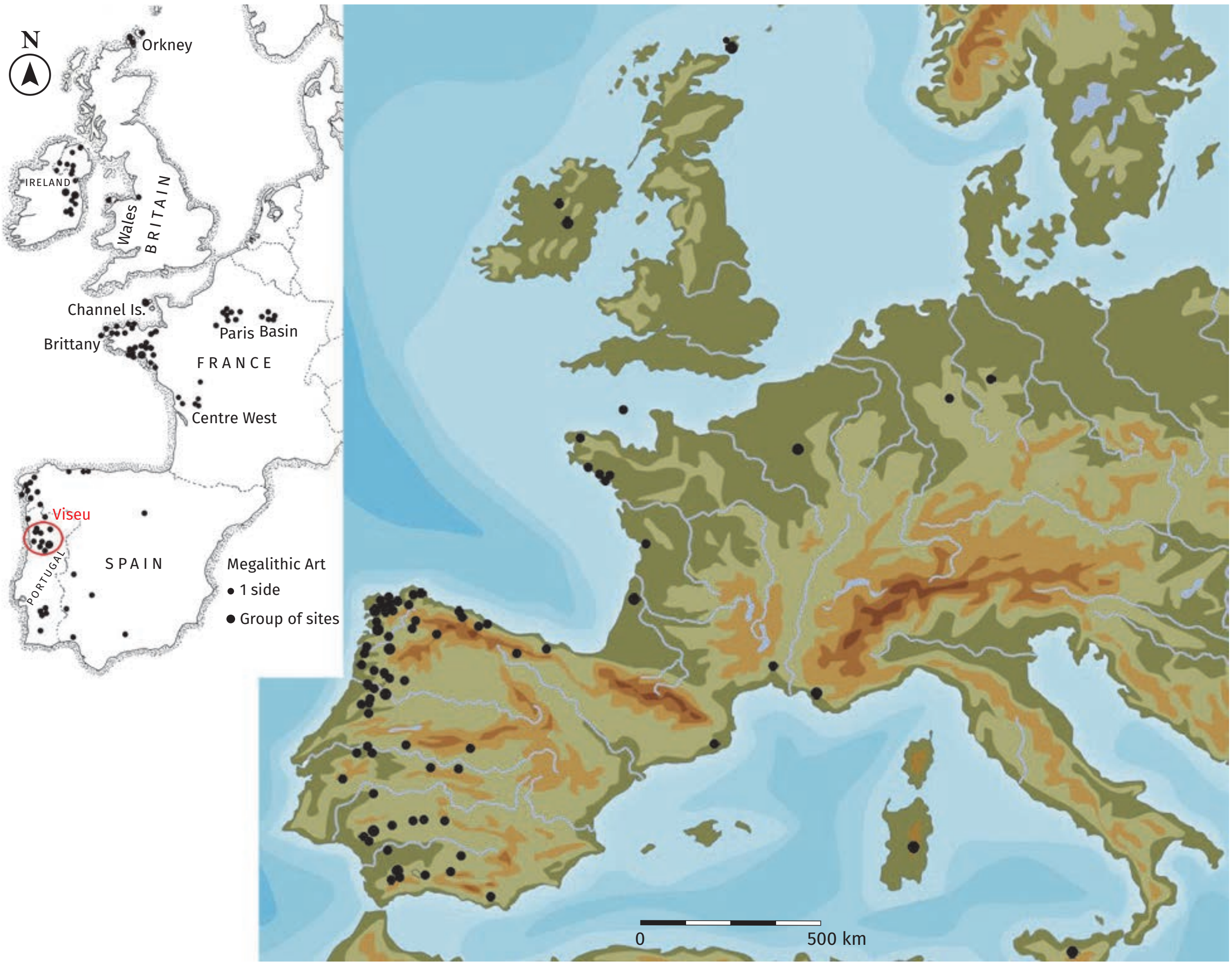

Fig.1. Plan of the Painted megaliths in Europe. On the top left Shee-Twohig's plan of decorated megaliths in Europe: Viseu at the North of the Portugal was the only region with painted megaliths (marqued by a red circle).

and Post-Palaeolithic Art (BUENO et al. 2012a; 2013a; 2015a; CORTÓN et al. 2015; HERNANZ et al. 2006; 2014; ROGERIO et al. 2013; ROLDÁN et al. 2007; RUIZ/PEREIRA 2014), Iberian teams enjoy considerable experience in fieldwork, in addition to the search for analytical arguments to explain some of the cultural, social and ideological patterns in the graphic formulae that accompanied the evolution of prehistoric societies (BRADLEY 2009, 24).

Our research is framed in this context. Dolmens are a convincing setting for the study of post-Pleistocene art (BUENO et al. 2004; BUENO et al.2013a) as they are the materialisation of a plan conceived by the builders of the monuments. Each of the components of a dolmen is totally artificial, from the choice of its position to the sourcing, transportation and shaping of each of the stones that form part of its architecture (SCARRE 2004). This plan not only followed architectonic objectives but also included a programme for the position, form and technique of the decorations (BUENO et al. 2015b, 52). The correct documentation of the full project of the monument ineludibly includes strategies for the study of its depictions.

This must begin with a meticulous study, panel by panel, as it has been shown that the biography of each monument is deduced through the biography of each of its stones. To reconstruct it, Megalithic Art study methods provide irrefutable points of reference, through the use of artificial lighting and specialised photography (BUENO et al. 2012b, 125–126; 2015 a, 57–58). In many cases, this programme includes recovering old stones in the origin of the construction of many European megalithic monuments (BUENO et al. 2014a; 2015c). These re-used stones, previously unsuspected in such large numbers, are detected through the fragmentation of the engraved decorations, the study of the carving techniques that reveals the presence of free-standing statues, stelae and menhirs, and the superimposition of paintings (BUENO et al. 2007; 2012a; 2013b; 2015a; CARRERA/FÁBREGAS 2002;

CASSEN et al. 2009; L'HELGOUACH 1983; HENSEY/ROBIN 2011; WILLIAMS/SHEE TWOHIG 2015).

Despite the evidence of similar practices with wooden objects (JONES 2013), the most outstanding examples of megalithic art are found in funerary and other types of structures, made from stone. These comprise a record of enormous interest for the application of protocols aimed at locating decorations that are poorly preserved, such as paintings, or scarcely visible (superficially pecked engravings and fine incisions), in order to document the individual history of each stone and its role in the collective construction of which it forms part.

THE IBERIAN PENINSULA AS A LABORATORY FOR MEGALITHIC ART TECHNIQUES

E. SHEE TWOHIG (1981) recognised the presence of paintings in the north of Portugal (Viseu) and described an archaic core area that would have been the origin of Iberian megalithic art. This hypothesis combined the reality of several cases of painted dolmens in the northwest (BREUIL 1935; COELHO 1931; VASCONCELLOS 1907) with the ideological »Atlantism« proposed by a generation of Portuguese and Galician prehistorians who aimed to separate Mediterranean prehistory (which would have developed in the rest of the Iberian Peninsula) from an Atlantic prehistory (PINTO 1929).

The low level of intensity in research into Iberian megalithic art meant that until the late 1980s nothing changed in this perspective (BUENO/BALBÍN 1992). In the rest of Europe, most effort was concentrated on the archaeological contextualisation of engraved megaliths (CASSEN 2000; L'HELGOUACH 1996; LE ROUX 1984; EOGAN 1997). This did not consider the hypothesis of the existence of paintings, with few exceptions (DEVIGNES 1996; 1998 a/b). Therefore, the idea grew that painting would be more characteristic of the southern area, owing to a supposed Mediterranean link, which strengthened the hypotheses proposed in the early part of the century and supported the idea of an Atlantic art, which is still valid today (BUENO et al. 2012b, 144).

The abundant schematic paintings and depictions on decorated objects in Iberian recent prehistory did not square with the supposed absences of this technique in such plenteous regions as Andalusia (BUENO et al. 2009a). Consequently, our team planned to carry out fieldwork and it was found that, as well as in northern Portugal, Galicia, the whole northern coast, the two Plateaus and Andalusia all revealed a larger number of painted dolmens when the specific methodologies for their documentation were applied (BELLO 1994; BLAS 1997; BUENO/BALBÍN 2006a; BUENO et al. 2004; 2005; 2006; 2009b; 2013a; 2013b; CARRERA 2011, CARRERA et al. 2005). Paintings were seen in decorated megalithic monuments of different typologies, with long chronologies and irrespective of their geographical location (BUENO et al. 2006b; 2007). The close symbolic and, naturally, technical relationships amongst the Atlantic megaliths suggested reasonable expectations of positive results in a research programme of the same kind applied to other parts of the Atlantic seaboard of Europe (BUENO/BALBÍN 2002; BUENO et al. 2016b).

Long experience in fieldwork in Iberian dolmens provided a firm basis on which to determine the elements to be studied and develop a working protocol that had become very familiar. We were able to predict which engraving techniques would be more likely to be compatible with painting: superficial pecking, fine incisions, and channelling. Equally, the raw materials that display greatest propensity for the conservation of the paintings, and which types of analysis are able to obtain the best results in a reasonable length of time and with an acceptable cost. In sum, tried and tested strategies were established, which explains the rapid success in their application.

At the same time, a series of results in the analysis of pigments both of Palaeolithic and Post-Palaeolithic Art is available (HERNANZ 2015), while a team of experienced chemists is able to contribute basic tools to acquire a practically unimagined level of information about the decoration of megaliths. These analyses aim to characterise the pigments. Most of the studies carried out in the 1980s and 1990s used Scanning Electron Microscopy and Energy Dispersive X-Ray Microanalysis (SEM/EDX), while some data were acquired with X-Ray Fluorescence (XRF). In fact, the work performed in the Menga Dolmen was the first to be undertaken in a systematic way in a European dolmen (BUENO et al. 2009c).

The experience accumulated in the direct dating of Palaeolithic Art (PETTITT/PIKE 2007) has shown the importance of prior characterisation of the pigments in order to define what exactly is being dated. We are now aware that the analysis of pigment should not be limited to its characterisation and composition. It should be able to discriminate recent contamination, document the mixtures used and help the direct dating. We therefore consider that Raman microscopy (HERNANZ et al. 2015) is of proven utility and is also a non-intrusive technique. Like other techniques, it has to be combined and complemented by other forms of analysis. We are currently working on applications that are capable of discriminating amounts of organic components that will facilitate practically non-invasive direct dating. At the moment, the results obtained with the plasma oxidation techniques, which counts carbon molecules and prepares for radiocarbon dating, is raising very positive expectations. Other applications, such as gas chromatography to identify agglutinants, usually animal fatty acids, are beginning to bear fruit (BUENO et al. 2008, 48; MAS et al. 2013; OLIVEIRA et al. 2017; RAMPAZZI et al.2002).

As the old discussions about whether the paintings on the walls above Palaeolithic or Post-Palaeolithic deposits are contemporaneous with the remains (CARTAILHAC 1902) are no longer relevant, the objective must now be to obtain data about the graphic sequences on the walls (BUENO et al. 2013b). Some of these data will come from systematic studies of superimpositions of techniques or of closed contexts for these decorations (BUENO/BALBÍN 1992). Another part will come from the direct dating of pigments and this is a source of information for the chronology of European megalithism of undoubted interest (BUENO et al. 2007; CARRERA/FÁBREGAS 2002; 2006; STEELMAN et al. 2005).

CHANGING THE GEOGRAPHY OF PAINTED MEGALITHS IN EUROPE

Dolmens in the north and south of Europe have traditionally been thought to possess different personalities, although there are currently arguments to nuance this view (LAPORTE/BUENO 2016; SCARRE/DEHN 2016). One of these arguments may lie in the symbolic realm. For this reason, it seems appropriate to group the places selected for the study within those two large regions in order to contribute data that can be used to assess their symbolic connections or disconnections.

Northern Brittany has been and is an ineludible point of reference for the study of the origin of the symbolic system of European megaliths (SHEE TWOHIG 1981), as well as the place where some of the most interesting hypotheses about the beginnings of Atlantic megalithism have been developed (CASSEN et al. 2012), including its relationship with the Britain and Ireland (LE ROUX 1994; ROBIN 2010; SCARRE 2007) and the rest of France and southern Europe (BUENO et al. 2012a; CALADO 2002). The Orkney Islands have been regarded as the spearhead of megalithism towards northern Europe, because of their close relationship with the situation in Danish megalithism and, beyond the coast, with megalithism on the inland plains of Europe (CROCHANE et al. 2015). However, its connections with Britain and Ireland megalithism are becoming increasingly clear (SHERIDAN 2004; 2010), which means that contacts with the megalithism of Brittany must also be considered.

References to paintings on French megaliths were collated by Devignes (1996, 138; 1998a/b), focusing on the potential of this technique in southern France, in relation to the decorations in Iberian schematic and megalithic art. The composition of pigments was not analysed, although ochre pencils were noted in the passage of d'Aquitaine de Barbehère, in Gironde (BEYNEIX 2007, 523; COFFYN 1996, 48). Most of the pigment analyses in southern France come from the documentation of schematic paintings in rock-shelters. Hematite, ochre and bauxite, as well as such components as clay and burnt bone reveal that the depictions were usually produced with mixtures, just as deduced from the compositions obtained from megaliths (HAMEAU et al. 2001).

Red, associated with stelae, is relatively abundant also in the south, as in the case of the stelae of Ubac (SAUZADE et al. 2003). It has been identified as bauxite on the stelae of Château Blanc (HASLER 1998), ochre on the Puagère stelae, and cinnabar on the Bastidonne (WALTER et al. 1997) and Beysan stelae (BOSANSKY/D'ANNA 2015).

Black is used most in the decoration in Marne, where it has been associated with charcoal. Although the paintings had never been analysed, the fieldwork carried out with R. Martineau was able to differentiate the presence of pieces of charcoal through the use of microphotography, which is the only confirmation about the pigment composition. The difficult access to the sites has not allowed the application of Raman microscopy, and hopefully this will be solved in the near future.

No evidence of paintings had been recorded in the concentration of decorated dolmens in the north-west of France. However, the close technical and thematic relationship with Iberian megalithic art, together with direct knowledge of the sites, suggested that paintings would have played a role in such interesting monuments (BUENO/BALBÍN 2002; BUENO et al. 2012a). We are now able to confirm that paintings have been analysed in the dolmens of Barnenez, Chambers A and H, Tumulus Mont-Saint-Michel (dolmen 3), dolmen de Gavres, Mané Retual, Mané Kerioné B and Dissignac. Other analyses are underway, but the results are not yet available (HERNANZ et al. 2015). Portable Raman microscopy was used in all these monuments.

In addition, data has been obtained from two stelae; one in the open air, L'Hirondelle Stela, and the other in a megalithic context, the Bury Stela, both with pigments.

Red is used in the oldest Breton monuments, such as Dolmen 3 at TMSM and Orthostat C in Chamber H at Barnenez (BUENO et al. 2015a). Hematite ground up very finely (essential for mineral pigments to mix successfully with the agglutinant) and mixed with charcoal was identified at Mané Rutual and Mané Kerioné B. This means

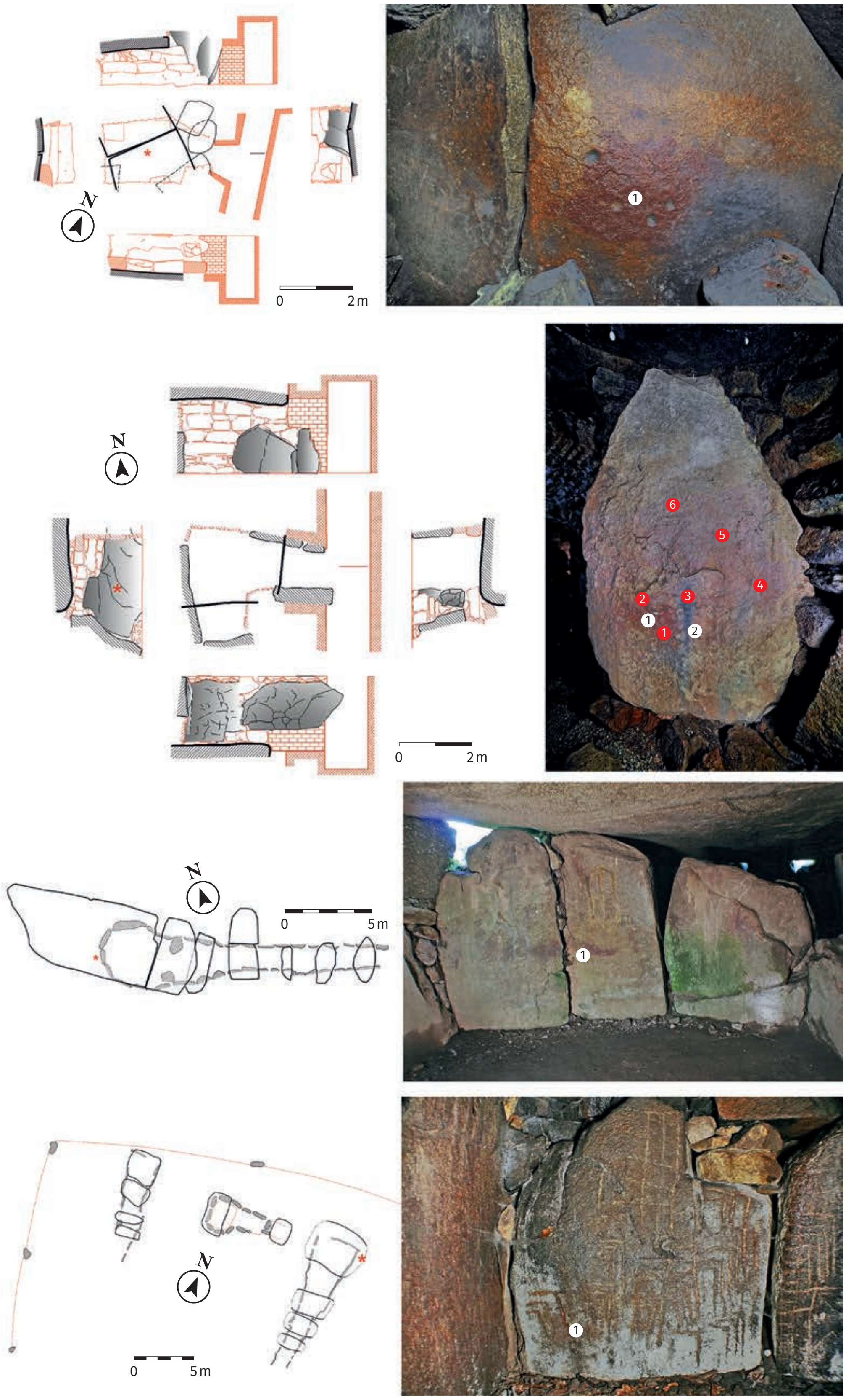

Fig. 2. Red samples analysed pigments at the Brittany dolmens: dolmen 1 of Tumulus Mont-Saint-Michel, dolmen 3 of Tumulus Mont-Saint-Michel, Mané Retual chamber, Mané Kerioné B chamber. Plans designed by Ph. Gouezin, photos: R. de Balbín (modified from Hernanz *et al. 2015).*

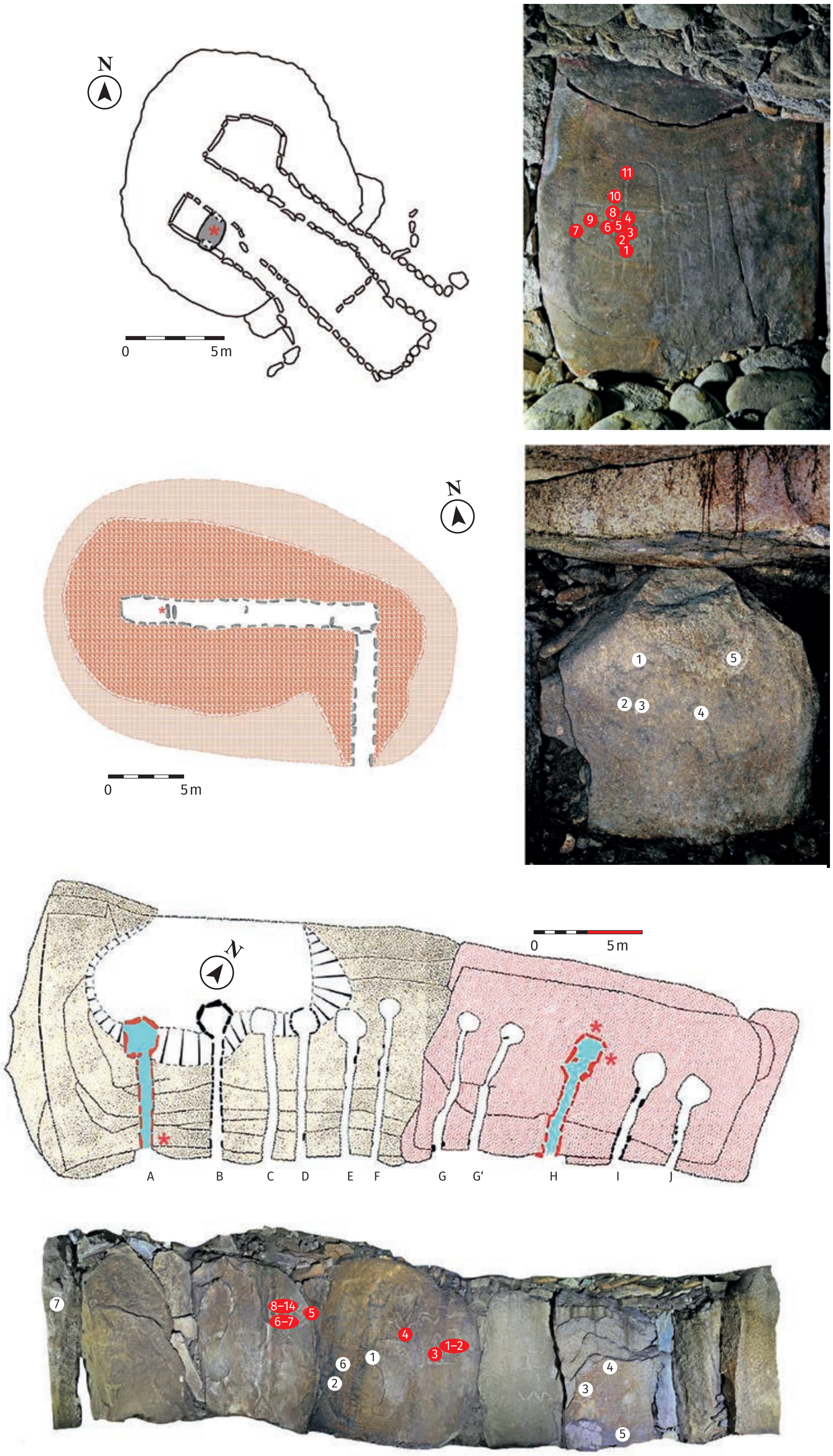

Fig. 3. Black samples analysed pigments at the Brittany dolmens: Dissignac, dolmen of Goërem, tumulus of Barnenez with chamber A and H: detail of samples of Chamber H. Plans designed by Ph. Gouezin, photos: R. de Balbín-Behrmann (modified from Hernanz *et al.2015).*

that it may be possible to obtain direct dates. In Barnenez Chamber A, and also in the L'Hirondelle Stela, in the open air in a group of menhirs (BENETEAU-DOUILLARD 2012), goethite was used to make a red pigment. The range of red pigments used in Breton megalithism is noticeably similar to that identified in the open-air paintings in southern France mentioned above (Fig. 2).

The black pigment in Chambers H and A at Barnenez, Gavres, Dissignac and Bury comes from two sources: manganese oxides and charcoal. As regards the former, manganese oxides, the data obtained in Barnenez Chamber H indicates a phase of paintings with pyrocroite, which has been detected with the same composition and mixture on several orthostats in the chamber, suggesting their technical unity (BUENO et al. 2015a; HERNANZ et al. 2015). Charcoal has also been identified, with the advantage that the microstratigraphy recorded through the use of Raman microscopy identified this as part of the composition and not as a consequence of the presence of microorganisms on the surface of some of the stones. In the same way, the precision of the Raman documentation showed how in one point contamination had been caused by the use of plastic and a pen to draw a tracing (Fig. 3). This is another advantage of this analytical technique; it is capable of identifying recent intrusions in the ancient compositions (HERNANZ et al. 2015).

Charcoal is the most classic organic pigment and was used for the black painting accompanying the red pigment on the Bury Stela. This object comes from an unquestionable archaeological context (Fig. 4) to situate the first painted stela known in northern France (SALANOVA 2007). The efficacious custody of the stela, which was stored without being washed as it was suspected that it might hold paintings, has allowed the analysis of the pigments and even enough material has been obtained for a radiocarbon determination. This direct date provides not only a unique opportunity to understand the role of stelae inside monuments but also archaeometric data about the early chronology of paintings at megalithic sites in northern France: 466 ± 30BP (Beta – 406946).

Other researchers are beginning to use the same work protocols. For example, analyses have been performed at Gavrinis using XRF. As far as we currently know, hematite was used for the bright red colour seen in the fill in the channelling at this site (BUENO et al. 2012a, 125). A very similar type of fill has been recognised for us at Mané Kerioné B (HERNANZ et al. 2015). It will be necessary to await the publication of the analyses to know which protocols were established to discriminate recent contaminations or the different degrees of grinding of the pigment.

Recent research in the Orkney Islands has relaunched some of the issues that were raised in the

Fig. 4. Red and black samples analysed at the Hirondelle stele (top), and the Bury stele (down). Overse and reverse. Photos: R. de Balbín-Behrmann (modified from HERNANZ et al. 2015).

middle of the twentieth century, such as the *in situ* evolution in the architecture (RENFREW 1985). Equally, technical and chronological relationships have been determined between the decoration of funerary monuments and that of dwellings or cultural places (BRADLEY et al. 2000; BRADLEY 2009, 15; SHEE TWOHIG 1997). Together with a very notable effort in obtaining radiocarbon dates, it has been proposed that the recent prehistory of the islands should be integrated within the framework of the prehistory of the Britain and Ireland Isles (SCHULTING et al. 2010).

These premises have made the Orkney Islands a key part of our project. It was important to verify Bradley's observation about evidence of painting in the megalithic monument of Maes Howe and the often-cited paintings in such contemporary sites as Skara Brae (CHILDE 1931; SHEE TWOHIG 1997) or, more recently, Ness of Brodgar (CARD/THOMAS 2012). The latter two sites offer outstanding potential for a detailed study of *chaîne opératoire* of the pigments, owing to

Fig. 5. Left: Painted pot of Isle of Man after Darvill/Andrews *2014. Right: Ochre pots from Skara Brae (Museum of Stromness and National Museum of Scotland). Photos: R. de Balbín-Behrmann.*

the excellent preservation of the »ochre pots« at Skara Brae, as well as similar remains at Ness of Brodgar (Card/Thomas 2012, 118).

Our documentation strategy followed two approaches: to obtain data about the composition of the pigments on the walls of Ness of Brodgar and in the Skara Brae ochre pots in order to assess whether similar recipes were used in these sites; and to explore the possibilities of sampling paintings in the megalithic monuments. In both cases, methodological protocols were applied to obtain direct chronologies. In the present state of our project, the preliminary results in both approaches are positive. In dwellings and ceremonial buildings, red paintings (in various shades and hues, yellow and orangeish) are the most common. Their basic composition is iron oxide but it is mixed with charcoal and therefore samples can be taken for radiocarbon dating using the plasma oxidation technique (Steelman et al. 2015). Because of the problems in obtaining very small charcoal samples for dating, it is advantageous to choose sites within a clear archaeological context, such as Ness of Brodgar, as it adds greater reliability to the determinations. At the moment, two results have been obtained for red and black pigments on the same object: NoB Small Find 7485. M5 red: 3810 ± 140 BP; NoB Small Find 7485. M6 black: 3580 ± 240 BP.

These come from Structure 11 (Context 2126), for which no other radiocarbon results are available. So far, the information is too limited to reach conclusions, but the dates are clearly within the expected range. Their interpretation might consider the average date of the two samples, whose standard deviations can be explained by the tiny amount of organic matter. This hypothesis would propose that the stone was painted in the second half of the third millennium cal BC (2600–1800 cal BC at 2σ). However, in an alternative interpretation, the stone may have been decorated first in red and later in black, within the hypothesis of the maintenance of constructions in a similar way to the maintenance and repainting on some Iberian megaliths (Bueno et al. 2007, 598; Carrera/Fábregas 2002).

The work on the ochre pots is still in process, and similarly it is thought that the walls were covered with a layer of ochre to smooth their surfaces and obtain a continuous red colour, as is clear on some of the stones in the structures at Ness of Brodgar. The consistence of this type of application is striking. In the National Museum of Scotland, a stone from Skara Brae with a similar coating has been sampled, and in this way both sites can be compared. The results and those obtained for the mixtures in the ochre pots will provide practical information about the forms of application of colour at those sites. The study of the painted pottery from the Isle of Man (DARVILL/ANDREWS 2014) can be added to other citations of paint on Grooved Ware (CARD/THOMAS 2012, 116), and other known examples (MERCER et al. 1981, 170; COLES/ORME 1984, 44). Our observations of paint on decorated maceheads support the role of paint at recent prehistoric sites on the northern islands (Fig. 5).

The relationship between decorations in dwellings or ceremonial sites and those in chambered tombs on the Orkney Islands has been documented in Bradley's research in Maes Howe and other megaliths, as well as in the possible presence of painting associated with the characteristic fine incisions at such sites (BRADLEY et al. 2000). Therefore, the possibility of verifying this hypothesis was another of our objectives. Photographic documentation was obtained with artificial lighting in Maes Howe, Cuween Hill and Wideford Cairn. The photographs have not been passed through any colour filter. They clearly indicate the presence of the use of colour, which will have to be tested with analyses in a future phase of research. Red in zigzags at Maes Howe and black in horizontal and parallel series of small black triangles in the other monuments, combined with similar patterns in red (Cuween Hill), the paintings open a line of research in the Orkneys certain to obtain positive results (Fig. 6).

A further two regions should be added to the present state of our knowledge as regards the documentation and analysis of megalithic paintings: the north European plains and the Mediterranean.

Evidence of painted megaliths in Germany was compiled by MÜLLER (1996), highlighting the use of white bases on which red and black decoration was painted. More recently, the documentation of the complete painted megalith at Halle, with wide white brush strokes and possibly a large mass of colour can be added to other examples of painted megaliths. The gallery grave at Züschen is a good instance (ANATI GOMES 2013). Samples from these monuments, in addition to the well-known painted decoration at Dölauer, Halle (SCHUNKE 2013), are expected to yield valuable points of reference. In the first place, it may be noted that the decoration of Göhtlizsch (TREBESZ 2013, 245) is easily comparable with some of the best known examples in the Orkney Islands, especially on stones at Ness of Brodgar. Similarly, the geometric decoration on the Halle orthostats reproduce very similar stelae to those recorded on the wall of one of the houses at Bodman-Ludwigshafen. The relationship between these formulas and anthropomorphic representations in southern Europe is apparent and indicative of the multiple interactions that took place on the plains of Central Europe.

References to paintings on third millennium dolmens and stelae on the Russian plains may be added to the citations of painted megaliths in Croatia, increasing the potential for this type of interpretations (KOVALEV 2012; TRIFFONOV this volume i).

The western Mediterranean has been excluded from the expressions of European megalithism as much of its monumental architecture is in hypogea. These were built at a similar time to the monuments on the Atlantic seaboard, reproduce common rituals and display elaborate decorations inside them. Equally, it should not be forgotten that many European megaliths are also hypogea (GUILAINE et al. 2015, 20). Decorations painted on a light-coloured base (sometimes on coloured clays) (RAMPAZZI et al. 2002), on which red and occasionally black motifs were created should be assessed in connection with a wider perspective in which the exact differences and similarities between different cases need to be determined with archaeometric methods as well as symbolic arguments. It is not in vain that ideas about the relationship between Malta and Atlantic cultures are sporadically aired, while the reality of a large ancient record of hypogea with collective burials in the Iberian Peninsula should not be ignored.

BUILDING COLOURED SCENARIOS FOR DEATH IN MEGALITHIC EUROPE

By recomposing an image of engraved and painted scenarios in which the mythology of death was expressed in totally artificial constructions, these burial sites become the first in the history of humankind to generate elaborate funerary discourses. They formed part of the collective imagination with its setting in everyday life (engravings and paintings in the open air) and which was known and shared over wide geographical areas. Indeed, schematic paintings are known in the north of Europe, which justifies their probable presence in megalithic monuments (LAELMA 2008; GOLDHAHN 2010; SOGGNES 1983). The literature on open-air sites in the Iberian Peninsula has grown through surveying in areas with large numbers of megaliths, and spectacular results have been achieved (BUENO et al. 2008; 2009d). The application of systematic methodologies of this kind in other parts of the Atlantic seaboard would make sense if, as proposed here, paintings are widely represented in megalithic contexts (BUENO et al. 2014a, 5).

Fig.6. Top: Cuween Hill, red above the door, black triangles in surfaces of wall. Middle: Maes Howe, red zig-zag above the door and a detail of this painting. Down: Wideford Cairn, red above the door, black triangles in surfaces of wall (photos: R. de Balbín-Berhmann).

The comparison of the geographic scales in use for European megalithic art and another older expression, Palaeolithic art, shows that they are quite similar, which suggests a component with ancient roots in the technical and ideological systems supporting the graphic expressions of the megalithic funerary discourses (BUENO/BALBÍN 2002; BUENO et al. 2015b, 69).

The documentation of recipes shows the insistent mixtures of hematite and charcoal in Iberian megaliths, in Brittany, on stelae and decorated stones in the Orkney Islands and even in open-air paintings in Iberian and French schematic art (GOMES et al. 2015; HAMEAU et al. 2001).

Mixtures of pigments with clay found on some stelae (Antequera) or dolmens (Dombate, Soto) were probably quite widespread in all Europe, as occurred in Palaeolithic Art (BALBÍN/ALCOLEA 2009). This is thought to be the case in Barnenez Chamber A. It should be borne in mind that the presence of clay in the pigments causes fluorescence in analysis with XRF and Raman microscopy, and this may mask some sampling and hide the depictions. The use of burnt bone (schematic art in the south of France) repeats methods documented in Palaeolithic art (BALBÍN/ALCOLEA 2009), indicating the value of mixtures known of old, which were also applied as fill on pottery (JONES et al. 2011; ODRIOZOLA/HURTADO 2007) and early figurines (ODRIOZOLA 2008) (Tables 1–3).

The white colour of some of this fill should make us reflect on their major role in graphic expressions in the north-eastern area. Some analyses of white pigments in Iberia have revealed another origin for this colour, as well as kaolin clay (CARRERA 2011). This is calcite, in the form of slaked lime. This evidence is still being studied, but lime is the white base in the Soto Dolmen and the Viera Dolmen (BUENO et al. 2013b). Lime has been identified at Neolithic sites (VILAPLANA et al. 2011) and even more so at Chalcolithic sites. Therefore the data obtained for the decoration on the walls of the house of de Bodman-Ludwigshafen and the Halle Dolmen, currently being studied, will be of great interest.

The role of cinnabar, a bright red copper oxide, has become important in recent years. It had been seen in Iberian monuments that when it is found, it is not on the walls but over the human remains or some of the grave goods. Indeed, the analysis of pottery and adornments impregnated with cinnabar enjoys a long tradition in the Iberian Peninsula, with clear evidence of the use of the mineral from at least the early Neolithic (DOMINGO et al. 2012). The recent interpretation of cinnabar as poison, because of the high concentration of mercury, for the individuals who used it in their body decoration or clothes is a new line of research (EMSLIE et al. 2015). In this respect, the relationship of cinnabar red with anthropomorphic representations at megalithic sites in the South of France (BOSANSKY/D'ANNA 2015) and the Iberian Peninsula (BUENO et al. 2015b, 61) is very suggestive, as this type of colouring matter was deliberately chosen for items that were intended to possess a clear anthropomorphic significance (BUENO et al. 2016c).

We now know that the monuments as we see them today are the final result of a series of constructions of ritual and funerary places in the same site. Which sites display a prolonged use and which are the product of shorter events are only some of the questions that megalithic art studies may be able to help answer. Data from archaeological contexts should be contrasted with direct dates that may be obtained from the paintings or from the objects or pottery that still preserve remains of paint (BUENO et al. 2007; BUENO et al. 2008 fig. 5.12).

The idea of the constant re-working of the funerary places will not be very different from what happened in other types of places (ditched enclosures, henges, walls, etc.), which were managed through collective labour. In this respect, dolmens are simply one of the monument types that characterise European recent prehistory and they should be explained jointly within the framework of the ideological, social and cultural background of the first farmers (BUENO et al. 2016a).

It is very likely that, as in the Iberian Peninsula, the time of these depictions was linked to the period of time of megalithism as a whole (BUENO et al. 2007). In the North of France, especially in the main core area of Atlantic megalithism, Brittany, paintings were probably produced over a longer time in a diachronicity that began with the oldest constructions. The paintings in Dolmen 3 in the Mont Saint Michel Tumulus, in Chambers H and A in the Barnenez Tumulus, the chronology of the open-air site of L'Hirondelle, with the stela of the same name, and the direct date for the Bury Stela form a compact set of early evidence that can be expected to increase with future research.

We now know that the pigments in the Orkney Islands confirm that decoration was widespread in the third millennium cal BC (CARD/THOMAS 2012). The painted pottery from the Isle of Man, the evidence Breuil found in Loughcrew or what we have suspected at Knowth and Barclodiad (BUENO et al. 2015a), the evidence of painted architecture further north in Germany, Russia and Croatia, and houses with painted panels all support this *floruit* of painted decoration.

This increase in the number of places with symbolic importance in the third millennium BC is very noticeable in the Iberian Peninsula (BUENO et al. 2013a). Its relationship with greater intensity of interactions aimed to acquire objects for the funerary ritual shows that the exhibition of death attained a significant social projection.

Tab. 1. Painted analysed dolmens in Spain and Portugal and C14 results of carbon samples.

	SITE	SAMPLES	ANALYSES	RESULT	DATA / BP	REFERENCE
PORTUGAL	Fontão	Red pigment	SEM-EDS	Mixture of iron oxides & silicates(C, P, S) with little organic matter		Carrera 2011
	Fojo	Whiteplaster	SEM-EDS	Mixture of illite-muscovite (Si, Al, K, Fe),quartz (Si), and little kaolinite (Si,Al).		Carrera 2011
	Eireira	Red	DRX	Mixture of haematite and goethite		Oliveira et al. in press
			GC	Cooked algae or aquatic plants and egg		
	Antelas	Black pigment		amorphous carbon	OxA-5433:4655±65	Cruz 1995
	Mota Grande	Red pigment	EAIr	Iron oxides		Carrera 2011
SPAIN	Pedra Moura	Black pigment		amorphous carbon	CAMS-77761: 4980±70	Carrera/Fábregas 2002
		Red pigment	SEM-EDS	Mixture of kaolinite, quartz and hydroxide of Al with organic matter remains		Carrera 2011
		White plaster	DRX	Quartz, kaolinite		
			SEM-EDS	Kaolinite and quartz Mixture of oxides and aluminum silicates, maybe illite-muscovite (not detected with DRX).Organic matter (C, P, S)		
	Pedra Cuberta	Black pigment		amorphous carbon	CAMS-77923: 5010 ±60	Carrera/Fábregas 2002
		Red pigment	SEM-EDS	Mixture of iron oxides and silicates with organic matter (C, P, S)		Carrera 2011
		White plaster	DRX	Quartz, kaolinite		
			SEM-EDS	Homogeneaus mixture of kaolinite and quartz. Same organic matter		
	Casota do Páramo	Black pigment		amorphous carbon	CAMS-77427:4740±120	Carrera/Fábregas 2002
		Red pigment	SEM-EDS	Mixture of oxide of Al (gibbsite)and iron oxide (Al»Si,K), with scarce organic matter		Carrera2011
			DRX	Quartz, microcline, gibbsite, albite, illite, calcite		
		White plaster	SEM-EDS	Mixture of quartz, kaolinite and maybe illite-muscovite. Same organic matter. Al>Si, C, (K), (Fe). Al2Si3 and kaolinite		
	Forno dos Mouros	Black pigment		amorphous carbon	CAMS-80501:4900±60	
		Red pigment	SEM-EDS	Mixture of silicates & iron oxide (haematite) Mixture of pigment and plastering		Carrera 2011
			DRX	Quartz, illite, hematite, kaolinite		
	Castiñeiras 1	Red pigment	SEM-EDS	Homogeneaus mixture of iron oxides and kaolinite		Carrera 2011
			DRX	Quartz, haematite, muscovite, kaolinite		

SPAIN	*Dombate*	*Red pigment*	*SEM-EDS*	*Mixture of muscovite (Si, Al, K) and biotite (Si, Al, K, Fe, Mg) in indistinguishable matrix (<10 mm) of Si, Al, K, Fe (illite-muscovite?) and Si, Al (kaolinite)*		CARRERA 2011
	Dombate	*Black pigment*	*DRX*	*Quartz, kaolinite, microcline, anhydrite, illite, ankerite*		CARRERA 2011
			SEM-EDS	*Mixture of Si-Al-K-Fe-Cl (illite?). C Presece of C without P or S. vegetable charcoal*		
	Anta do Serramo	*Black pigment*		*amorphous carbon*	*CAMS-88195:6050±110*	CARRERA 2011
	Castiñeiras 1	*Whiteplaster*	*DRX*	*Quartz, muscovite, kaolinite*		CARRERA 2011
			SEM-EDS	*Mixture of quartz, illite-muscovite (Si, Al, K, Fe), kaolinite (Si, Al) and plentiful organic matter (C,S,P)*		
	Os Muiños	*Red*	*SEM-EDS*	*Maghemite*		CARRERA 2008
		Black		*Charcoal*	*Ua33808:4710±20*	
		White		*Kaolinie*		
	Monte dos Marxos	*Black pigment*		*amorphous carbon*	*CAMS-77924:5330±80*	CARRERA/FÁBREGAS 2002
		Black pigment		*amorphous carbon*	*CAMS-77925:4920±60*	
	Coto dos Mouros	*Black pigment*		*amorphous carbon*	*CAMS-83116:3830±60*	CARRERA 2011
		Black pigment		*amorphous carbon*	*CAMS-83631:5540±70*	
	Soto	*Red orth.*	*SEM-EDS*	*Mixture of silicates & iron oxides*		CARRERA 2011
		Red	*Raman*	*Mixture of haematite and charcoal*		*unpublished*
		Black		*Manganese oxide and charcoal*		
		White		*Calcium carbonate*		
SPAIN	*Alberite*	*Red*	*DRX*	*Calcite, quartz, iron oxides, cinnabar*		DOMINGUEZ BELLA 1996
		Red *Black* *White*	*Raman*			*unpublished*
		Grinder	*DRX*			
		Red pigment	*SEM-EDS*			
		Red pigment	*SEM-EDS*	*Red and brown colours: High content of Fe.* *Red part: Si, Al, Ca, K, a lot of Fe, C, 0 (Iron oxide).* *Brown-grey part: Si, Al, Ca, (Mg), Fe, (Mn), C, 0.* *Rose part: Si, Mg, Al, Fe y Ca (majority)*		CARRERA 2011
		White pigment		*White and rase colour: High content of Ca.* *Ca, (Si), (Al), (Fe), (Mg), C, 0.*		
			DRX	*Calcite, quartz, haematite, muscovite, kaolinite*		
	Viera	*White*		*Lime*		BUENO *et al.* 2013
	Menga	*Red* *Black*	*EDXRF*	*Ironoxide*		BUENO *et al.* 2009a
				Manganese oxide		

Tab. 2. Painted analysed dolmens in France and Orkney Islands, and C14 results of carbon samples.

	SITE	SAMPLES	ANALYSES	RESULT	DATE/BP	REFERENCE
FRANCE	Barnenez-Chamber H	Black	Raman SEM/EDX	Mixture of different manganese oxides (pyrocroite and bixbyite). Haematite and amorphous carbon.		BUENO et al. 2012a; 2015a. HERNANZ et al. 2015
		Black		Mixture of different manganese oxides (pyrocroite and bixbyite). Haematite and amorphous carbon.		HERNANZ et al. 2015
		Red		Haematite, amorphous carbon, gypsum and calcite		HERNANZ et al. 2015
	Barnenez-Chamber A	Orthostat entrance	Raman SEM/EDX	Geothite and haematite		HERNANZ et al. 2015
	Goërem	Stele	Raman SEM/EDX	amorphous carbon		HERNANZ et al. 2015
	T. Mont-Saint Michel	Dolmen 1	Raman SEM/EDX	Haematite		HERNANZ et al. 2015
		Dolmen 2		amorphous carbon		
		Dolmen 3 – Orth 1		amorphous carbon. Mixture of haematite and carbon		
	Dissignac	Cover reused	Raman SEM/EDX	amorphous carbon?		HERNANZ et al. 2015
	Mané Kerioné B	Engraving filling	Raman SEM/EDX	Haematite, amorphous carbon		HERNANZ et al. 2015
	Mané Rutual	Head	Raman SEM/EDX	Haematite		HERNANZ et al. 2015
UK	Ness of Brodgar-11	Red Black	Raman	Iron oxide and charcoal Manganese oxide and charcoal	NOB7485 red: 3810±140 NOB7485 black: 3580±240	unpublished
		Red		Haematites		

Tab. 3. Painted analyses steles and vessels in France, Spain and UK.

STELE	SAMPLES	ANALYSES	RESULT	REFERENCE
Château Blanc	Red	SEM	Bauxite	WALTER et. al. 1997
Trets 1–4	Red	SEM	Cinnaber, Ochre	WALTER et al. 1997
La Puagère 1–4	Red	SEM	Ochre	D'ANNA et al. 2004
Beysan 1–2	Red	Raman	Cinnaber	D'ANNA et al. 2015
Beaucet 1	Red		Cinnaber	SAUZADE/CERCLIER 2014
L'Hirondelle	Red	Raman	Haematite and amorphous charbon	HERNANZ et al. 2015 separate et al
	Yellow		Goethite and amorphous charbon	
Bury	Black	Raman	Amorphous charbon	HERNANZ et al. 2015
	Red		Haematite Well crystallised haematite	
Trincones	Red		Cinnaber	BUENO et al. 2008
VESSEL	**SAMPLES**	**ANALYSES**	**RESULT**	**REFERENCE**
Isle of Man	Red	SEM	Clay and carbon	DARVILL/ANDREWS 2014
Lagunita III	Red	EDX, CG	Haematites and animal fat	BUENO et al. 2008

In the current state of our knowledge on the movement and access to prestigious raw materials in European megalithism, relevant information might be provided about the capacity and intensity of exchange networks by comparing the data on the symbology and decorative techniques in the megaliths with information about the provenance of the raw materials. The symbols were created in the materialisation of the social patterns that supported that level of interaction, as they defined a specific context in which this exhibition occupied a prominent position: the funerary sites. The ideology they transmit was apparently shared over large parts of continental Europe and the islands. Variscite in Brittany with a provenance in the Iberian Peninsula (HERBAUT/QUERRE 2004), jadeite axes that circulated in Europe (PETREQUIN et al. 2012), Sicilian amber found in monuments in Andalusia (MURILLO-BARROSO et al.2018) and the African or Asian ivory documented in south-west Iberia are some of the materials confirming this interaction. The management of many of these objects across the Iberian Peninsula can be added to the presence of paintings in Atlantic funerary decoration to assess a more active role of southern Europe in shaping the symbolic parameters of recent prehistoric funerary sites. This interpretation should not forget the transcendence of a technical and thematic background deeply rooted in the hunter-gatherer societies who maintained the first symbolic networks in the continent during millennia.

ACKNOWLEDGEMENTS

This project is founded by Spanish *Ministerio de Economia y Competitividad* HAR2012–34709, HAR68595-P. We are grateful to Torsten Schunke at Museum of Halle, to Janette Park at Stromness Museum and to Felicitas Schmitt and Jadranka Verdonkschot, of the University of Tübingen, and Antonia Thomas of the University of Highlands and Islands, for their help in the field surveys in Germany and in Orkney Islands.

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→ 6 SOCIAL DIVERSITY AND DIFFERENTIATION

The enigma of the Neolithic cult houses – Graves, shrines or social statement?

Anne Birgitte Gebauer

ABSTRACT

An analysis of the twelve cult houses in northern Jutland, Denmark has been made in relation to a new study of the Tustrup site, a cluster of three megalithic tombs and a cult house. In comparison with the votive pottery found at the three tombs, the pottery depositions at the cult house at Tustrup show a more elaborate workmanship, a higher proportion of ritual devices like pedestal bowls and clay ladles, and they were deposited in a more complete form. A special relationship is seen between the cult house and the passage grave at Tustrup where the ritual activities appear to be coordinated.

The cult houses are seen as special structures that were incorporated in the Funnel Beaker ancestor cult in relation to social and religious changes away from the collective burial rites at the megaliths towards invidual burials manifested in the stone heap graves. In general, the cult houses show a close spatially affiliation both locally and regionally to the stone heap graves. Due to their location next to megalithic tombs and their ceramic inventory, some of the houses appear to be related to the ancestor cult at the megalithic tombs, while other aspects of the ideology might be addressed in houses with little or no pottery and no megalithic tombs in the vicinity. Two cult houses with substantial corner posts probably dates from the Battle Axe culture.

INTRODUCTION

The function of a small group of enigmatic structures in northern Jutland, Denmark has been discussed for about half a century. These buildings have variously been labelled cult houses or mortuary houses, but at the same time being interpreted as death houses keeping the dead person or as a kind of temples (Becker 1969; 1973; 1993; 1996, 340; Kjærum 1955, 24, Kjærum 1966, 323; Kjærum 1967, 194; Mattes 2008, 272–275; Midgley 1992, 441–443; Midgley 2008, 167–169). A thorough study of these buildings was presented in 1996 (Becker 1996). The present study is based on a new analysis of the Tustrup site, especially the cult house, including an evaluation of the other houses in northern Jutland, Denmark as well as related ritual structures in neighbouring regions.

THE TUSTRUP SITE

The Tustrup site is located at a small plateau near the Hevring stream and has the appearance of a preconceived necropolis including three megalithic tombs placed in a semi-circle with a radius of about 50 meters around a house-like structure (Fig. 1). The three tombs are of different types: a round dolmen surrounded by a line large kerb stones, a large dolmen with a passage and possibly a line of kerb stones as well as a large passage grave with a side chamber, a short façade of orthostats at the entrance, but no line of kerb stones. The house faces away from the tombs with the open front end facing northeast towards a small bog nearby (Fig. 2).

RELATIONSHIP BETWEEN THE MORTUARY HOUSE AND THE MEGALITHIC TOMBS AT TUSTRUP

None of the tombs are radiocarbon dated, although based on the pottery styles all four monuments were used contemporaneously during period MNA Ib and II. However, it is impossible to state whether the monuments were built at the exact same time (see discussion of the house structure below). Based on the

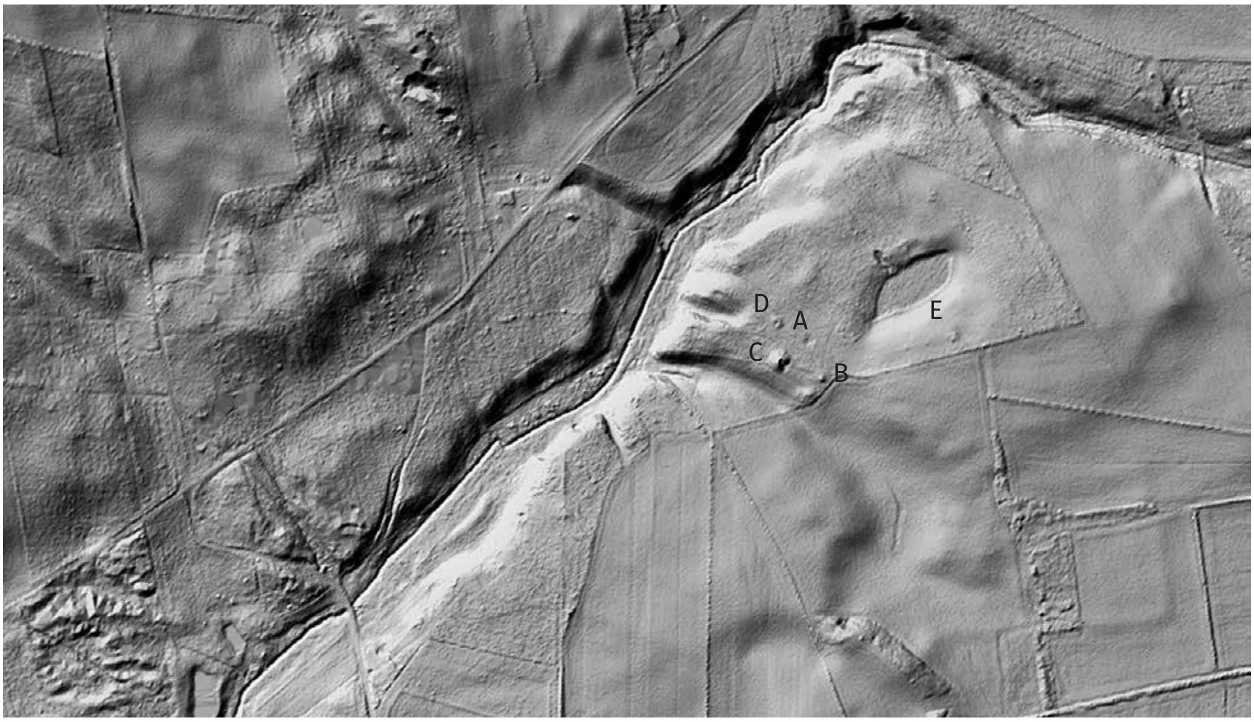

*Fig. 1. Lidar map of the Tustrup site showing A. cult house, B. round dolmen, C. passage grave, D. dolmen with a passage, E. bog. Exploration for a causewayed enclosure was made without result at the sharp bend of the Hevring stream (*Klassen *2014, 119).*

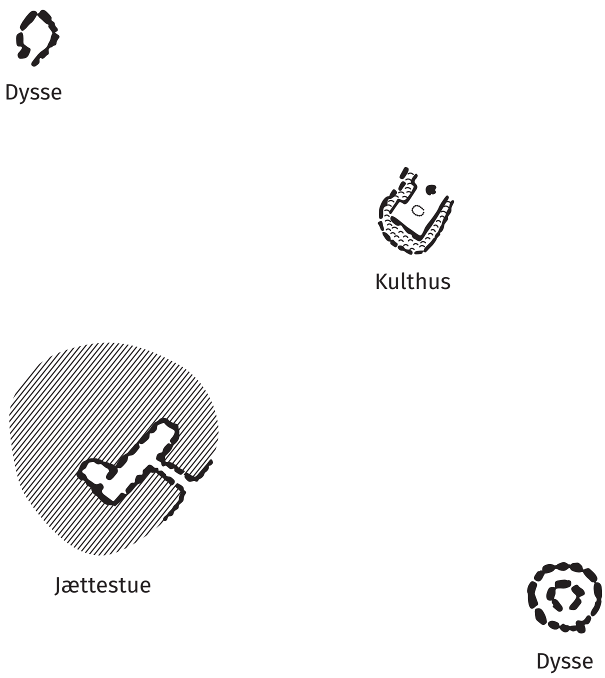

Fig. 2. Map of the Tustrup site showing the affiliation of the pottery among the cult house, the passage grave and the round dolmen (based on Nielsen *1981, 90).*

date of eight funnel neck beakers, the first use of the round dolmen may belong to an early part of period MNA I (Eriksen/Gebauer in prep.). The high percentage of funnel neck beakers found here may in itself indicate depositions from an early part of MNA I (Kaul 1998, 52).

The latest pottery deposited at all four monuments was decorated in early Ferslev style dating from the late part of MNA II. In terms of calendar years, the deposits span a minimum of 100 years similar to 3–4 generations or up to about 200 years and 6–8 generations.

Some of the vessels found at the cult house, the passage grave and the round dolmen were almost identical and likely produced by the same person. Only the size of the vessels and details of the utensils used in the decoration indicate differences. Nine vessels found at the mortuary house and the passage grave, three pedestal bowls and six carinated vessels are almost identical. Likewise, two pedestal bowls found at the mortuary house and the round dolmen are almost identical. All of these vessels date from MNA II. In addition, a clay ladle from the round dolmen shares the rim design typical of the pottery at the mortuary house: a triple line of rhombi made with spatula stamps (Fig. 3).

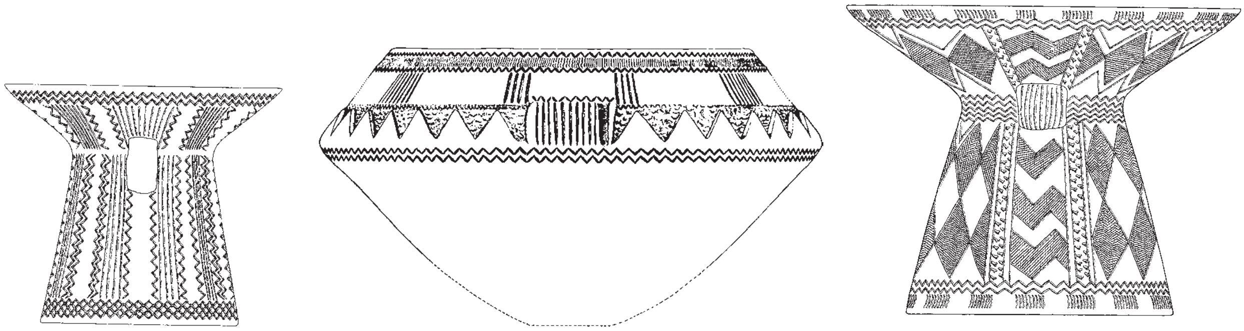

Fig. 3. Identical vessels found at the mortuary house and the passage grave, the pedestal bowl to the left and the carinated vessel, and at the house and the round dolmen, the pedestal bowl to the right.

A certain degree of coordination appears to be in place regarding the depositions of certain types of vessels at the mortuary house, the passage grave and the round dolmen. The number of pedestal bowls and ladles is extraordinarily high at the mortuary house, while the number at the passage grave is very low compared with the two dolmens as well as other megalithic tombs (Fig. 4). These ritual vessels were possibly placed in the mortuary house rather than at the passage grave. Furthermore, small, nicely decorated funnel neck beakers may be deposited at the round dolmen rather than at the passage grave where only one such beaker was found.

In general, the pottery from the mortuary house, the passage grave and the round dolmen is very similar stylistically. Ritual activities at these three monuments were likely coordinated and perhaps performed simultaneously considering the apparent coordination in the use of vessels made by the same potter and the placement of certain types of vessels at certain monuments.

Interestingly, the pottery styles found at the dolmen with a passage deviate in various aspects, such as the decoration of the pedestal bowls, the selection of rim designs and decoration techniques. While the location of the tomb suggests a close social affiliation with users of the other Tustrup monuments, the persons making the pottery deposited at the passage dolmen may derive from another social group.

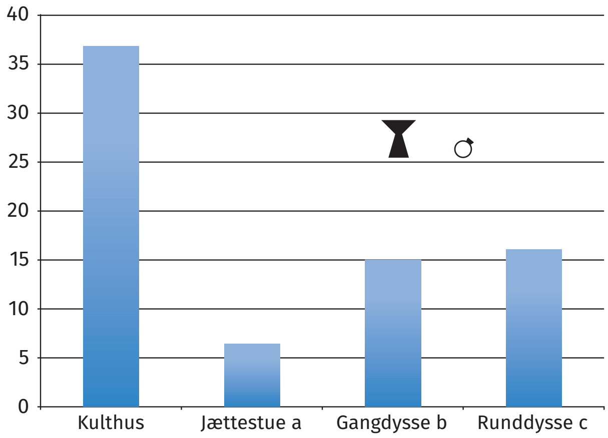

Fig. 4. The percentage of pedestal bowls and clay ladles of the ceramics found at the cult house, the passage grave, the dolmen with a passage and the round dolmen.

PRESERVATION AND FRAGMENTATION OF THE POTTERY AT THE FOUR TUSTRUP SITE

The assumption by Poul Kjærum – who excavated the four monuments at Tustrup in the 1950s – was that the pottery was deposited as whole vessels (Kjærum 1955, 25; Kjærum 1967, 195). Missing parts of the vessels were ascribed to decay and erosion: in case of the cult house, the damage caused by the collapse of the building and the fire. However, in most cases, only a minor part of the vessels were deposited. Among the pottery from all four monuments, a total of 48 % of the vessels are represented by only 1–2 sherds each, while 70 % of the vessels are represented by fewer than ten sherds. The degree of preservation varies between the different monuments. Vessels from the three megalithic tombs are represented by only 7–9 sherds on average, while vessels from the mortuary house are represented by 36 sherds on average.

The pottery from the cult house was deposited in a much more complete form than the pottery at the megalithic tombs; in fact, a number of vessels may have been deposited as complete vessels. An assessment was made about the degree of preservation of each pot based upon the percentage of the preserved diameter of each rim and an overall evaluation based on the number of sherds included in the reconstructed vessels as well as the number of loose sherds belonging to each vessel (Fig. 5). The preservation of the individual vessels varies from a few

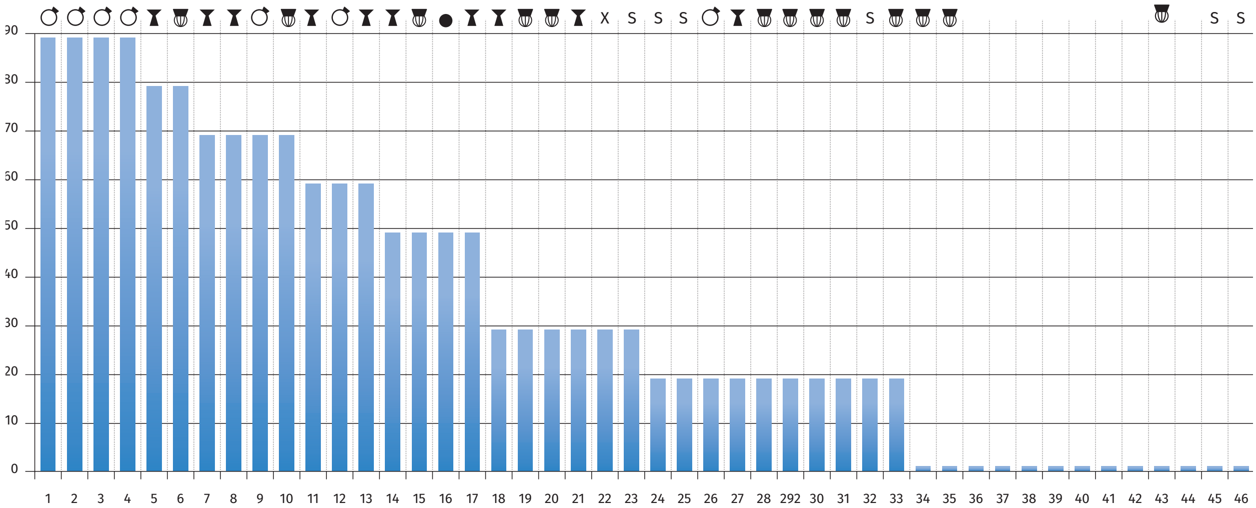

Fig. 5. Degree of preservation of the 46 vessels found at the Tustrup cult house. The icons above the columns mark the different vessel shapes: ladles, pedestal bowls, funnel neck beakers, and a clay disc. »S« marks carinated vessels and »X« marks a large dish with funnel neck. The shape of a number of fragments could not be determined.

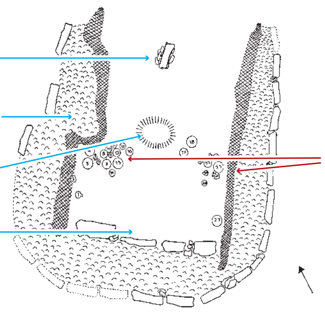

Fig. 6. Ground plan showing the different features of the cult house at Tustrup.

almost complete vessels at one end of the spectrum to thirteen vessels only represented by a few sherds at the other end. Evidently, different methods of deposition were used regarding the various vessel shapes. Ritual types of pottery like clay ladles and pedestal bowls are among the best-preserved vessels, funnel neck beakers vary from one sherd to almost complete vessels, whereas carinated vessels are generally poorly preserved.

Fragmentation of the pottery was clearly the rule rather than the exception at the Tustrup monuments. Similar high degrees of fragmentation have been demonstrated at other megalithic tombs (Holten 2000, 291; Madsen this volume). At Tustrup, fragmentation was practised differently depending on the type of monument and the type of pottery involved. A large part of the pottery found at the cult house was most likely brought to the site as whole vessels, most pots were broken to some degree and parts of the vessels were removed. Like at the Herrup 26 cult house, a pattern of sequential breakage of previously deposited vessels appears to be part of the ritual (Becker 1996, 340). The thirteen vessels represented by only a few sherds were probably brought in from elsewhere as loose sherds. The opposite scenario is seen at the three tombs where the majority of the pottery most likely was brought in as loose sherds and only a few vessels as complete pots. As suggested by Andersen (2000, 30) and Chapman (2000), deliberate breakage and circulation of ceramic fragments may have served a need to maintain ties between the living, the dead and certain places.

CONSTRUCTIONAL FEATURES OF THE TUSTRUP CULT HOUSE

The unusual construction of the Tustrup cult house combines four large orthostats used as the rear wall and two sidewalls built of vertical wooden planks made of split tree trunks and set in stone-lined foundation trenches (Fig. 6). The structure measured about 5 × 6 m and was open towards the northeast. The floor plan of the house was divided in two along the central axis by a monolith placed at the front end of the house, a large central pit with a flat bottom (1.4–1.8 m in diameter and about 1 m deep), and perhaps a small recess in the back wall (Kjærum 1955, 18, 25, 20 fig. 14).

The floor of pure subsoil sand was graded stepwise with a sunken floor next to the rear wall about 0.2 m lower than at the floor at the entrance. The only artefacts found in the house were 46 vessels placed in two compact groups, including 25 and 15 vessels, respectively, whereby six vessels were distributed in both groups (Eriksen/Gebauer in prep). Otherwise, the floor was clean and no cultural horizon was detected (Kjærum 1955, 25).

A horseshoe-shaped line of small kerbstones – 0.8–1.0 m high – framed the outside of house (Becker 1996, 322; Kjærum 1955, 13; Kjærum 1967, 190) (Fig. 5). According to the excavator, the roof was carried by the wooden walls supported on the outside by drywall of flag stones and a stone wall flanked by the kerb stones (Kjærum 1955, 18 fig. 12). The presence of the stone-built wall is debated (Becker 1996, 341; Eriksen/Gebauer 2015, 106). Regardless of their origin, these stones were used as a pavement covering the site after the house was burned down (Becker 1966; Eriksen/Gebauer 2015, 106).

No sign of a roof structure was detected at Kjærum's excavation. The absence of roof-carrying posts was confirmed by a later re-excavation in 2015. According to Eriksen, the Tustrup house was in reality an open enclosure or a court yard without a roof cover reminiscent of enclosures related to facades at long barrows such as Højens vej, Rude, Bygholm Nørremark and British long barrows (Beck 2013, 63; Eriksen/Gebauer 2015, 106; Madsen 1979; Rønne 1979).

Another aspect of the analysis by Eriksen (this volume) suggests that the mortuary house was a multiphase construction. An additional large stone was originally placed in a deep foundation pit at each end of the line of orthostats: this line of six orthostats was combined with the wooden sidewalls. However, the space taken up by the two extra stones conflicts with the presence of a surrounding stonewall or pavement as well as the outer line of kerb stones, whereby these features must have been added later (Eriksen this volume). In my opinion, the presence of the two extra stones also precluded the wooden sidewalls, implying that the line of six orthostats was originally freestanding and the wooden sidewalls as well as the outer stone structures were added later.

Freestanding lines of stones have not previously been recorded in the Danish Neolithic, although short rows of orthostats have been found at the contemporary site of Dösjebro, Scania in Sweden (Andersson/Wallebom 2011, 35 fig. 11, 105–108).

The line of six large stones most of all resembles facades at the end of long barrows and at the entrance of passage graves like the one at Tustrup (Kjærum 1957, fig. 4; Madsen 1979, 311; Rudebeck 2010, 141–148). The façade could be an older structure possibly functioning in relation to the central pit and the monolith. At the long barrow at Højens vej, Svendborg, half of a funnel neck beaker was deposited in a pit in front of a wooden façade (Beck 2013, 62–63.). No pottery was found in the central pit in the Tustrup house: a brownish sticky substance – perhaps stored in an organic container – was found within a small area near the bottom of the pit, but was never investigated. Four small sherds of a carinated vessel (T18 from MNA II) found at the top of the pit indicate that the central pit had been filled up and no longer functioned at the time of the final ceramic deposition. According to this scenario, where the façade might be the oldest structure at Tustrup, the megalithic tombs seem to be arranged in a semi-circle around it. However, given the absence of a long barrow, the presence of an older façade is difficult to explain.

Another possibility is that the wall of six stones was built later as a second, freestanding façade to the passage grave (Madsen, personal communication). Despite being one of the largest passage graves in Jutland, the Tustrup passage grave only has a short façade of six modest size orthostats and no circle of kerb stones. The presence of dry wall may be explained if the stonewall is an emulation of the façade at the entrance of the tomb. An affiliation with the passage grave is also suggested by the possible opening above the modest-sized orthostat standing in the recess in the middle of the stonewall (Kjærum 1955, fig. 4 (sten S)). This opening would have provided a view of the entrance of the passage grave (Fig. 2). Following this scenario, the stone façade would be the primary structure built in relation to the passage grave, only later being transformed into a cult house framed by kerb stones. The inclusion of the reduced line of four orthostats as the rear wall of the final house structure supports the symbolic significance of these stone. Regardless of the building sequence, the extension of the wooden walls beyond the stone-built end wall is difficult to explain.

The question is whether pottery depositions took place at the freestanding stone façade, only in the finished house structure or both. The immediate impression is that the pottery was placed in relation to the wooden sidewalls as well as the central pit (Fig. 7). Several clay ladles and most of the pedestalled bowls were placed along the wooden walls (Fig. 7). However, the pottery closest to the western wall dates from MNA II and might have only been placed there after the sidewalls had been added. Both depositions from MNA Ib and II were placed close to the east wall, although the exact location in relation to sidewall is partly obscured by the initial amateur excavation. Given the closeness of the sidewalls and the pottery, great care would be required to construct the wooden sidewalls without damaging already-deposited vessels. Perhaps it was only possible if the pottery from MNA Ib was deposited at the stone façade and the transformation of the structure into a house or a courtyard took place prior to the placement of pottery dating from MNA II. In this case, the pottery placed at the stone façade during period MNA Ib was a double deposition made in relation to activities at the passage grave. The cult house would only relate to the later pottery.

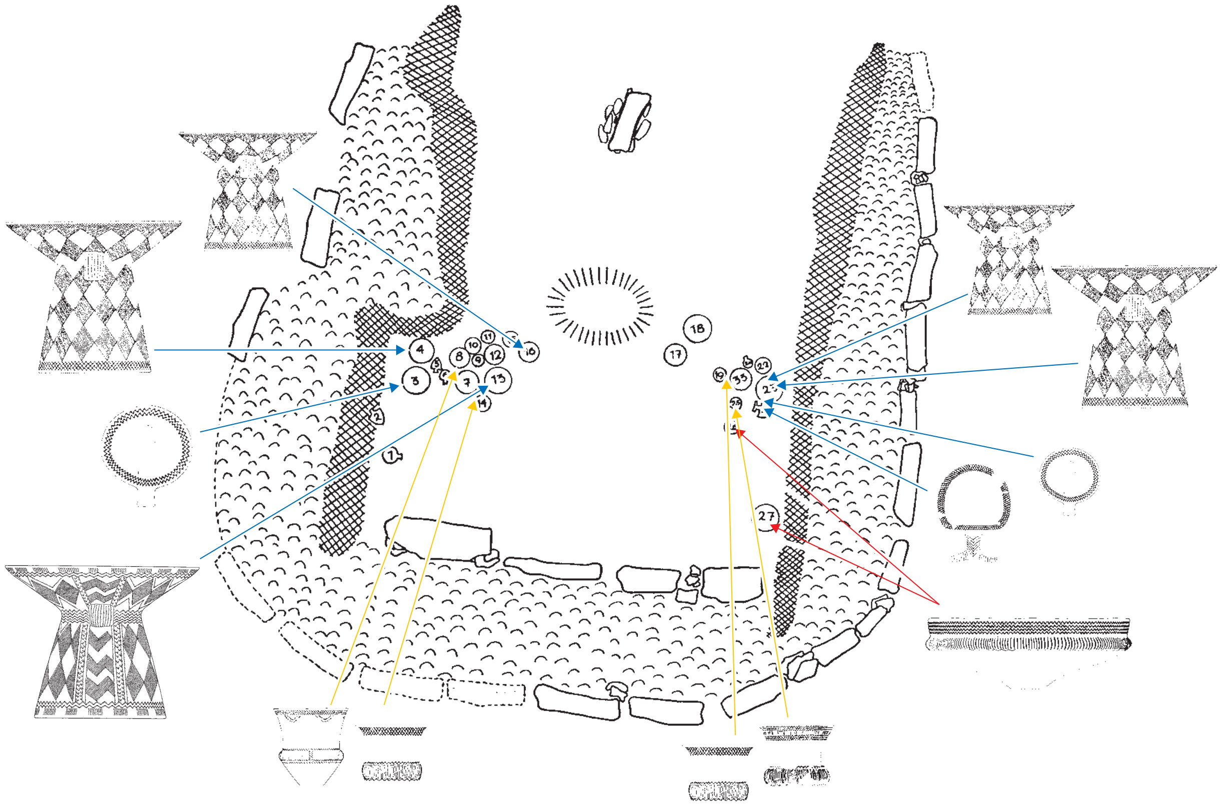

Fig. 7. Symmetrical placement of certain vessel types in the two pottery groups during period MNA IB.

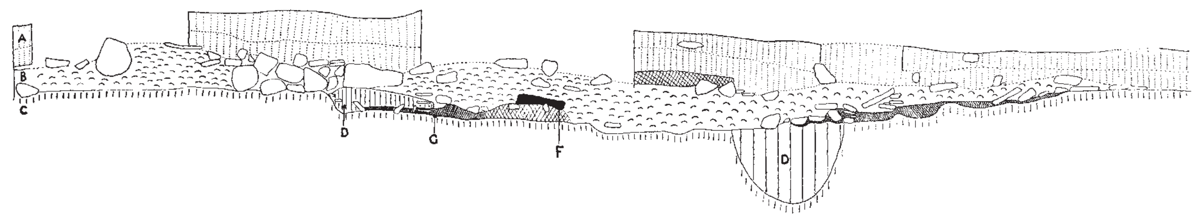

Fig. 10. Profil A–B i husets længderetning. A: Flyvesand, B: Sten, opblandet m. sand, C: Undergrundssand, D: Blandet fyldjord, E: Stolpespor, F: Trækul, G: Trækulblandet sand.

Section A–B on longitudinal axis of house. A: Windblown sand, B: Stones, mixed with sand, C: Subsoil sand, D: Mixed fill, E: Traces of posts, F: Charcoal, G: Mixed sand and charcoal.

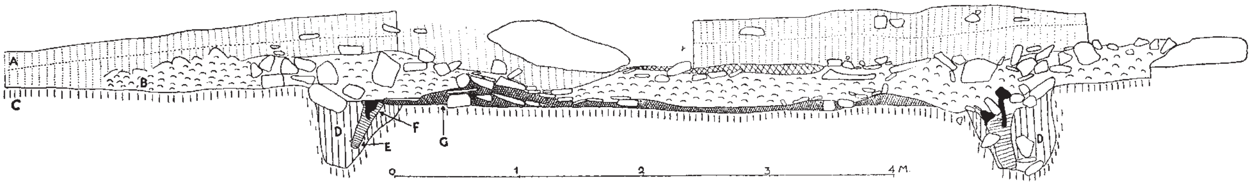

Fig. 11. Snit C–D på tværs af huset. Signaturer som fig. 10.

Section C–D across house. Lettering as Fig. 10.

Fig. 8. Longitudinal and cross section of the Tustrup house (KJÆRUM 1955, fig. 11).

Several arguments can be made that soon after deposition the pottery was protected by a layer of sand. The excellent preservation of the pottery with the original surface still shiny from burnishing indicates that the pottery must have somehow been protected. An immediate coverage of the vessels was most likely needed to maintain the pristine condition of the pottery over extended periods of time and through different seasons of the year. Furthermore, coverage with sand at least prior to the burning down of the house is suggested by the fact that the majority of the pottery showed only limited or no damage from the fire (see below). Two clay ladles (R1 and Q2) placed next to northwest wooden sidewall showed the most heat damage from the house fire with tiny fractures all over the surface, although the decoration was still recognisable. Only few other sherds showed heat damage. Coverage with sand immediately after deposition would have also protected the pottery in case no roof was built, as suggested by Eriksen (ERIKSEN/GEBAUER 2015, 106) and possibly also in case the wooden sidewalls were added during the time of the pottery depositions. The thickness of the burned layer containing the ceramics in the back half of the house as opposed to the entrance area supports the notion that additional sand was added here (Fig. 8).

Some manipulation of the burned layer apparently took place at the central part of the house in the area between the two groups of pottery and the central pit. The longitudinal section shows the final stone pavement extending all the way down to the top of the subsoil and the central pit in this area (Fig. 8). However, the pottery depositions do not appear to be manipulated after the fire, in contrast to what seems to be the case at the site of Herrup 26 (BECKER 1996, 293, 324).

According to the excavator, the oblong pit filled with stones at the northwest wall was part of the house structure and possibly a grave (KJÆRUM 1955, 24; KJÆRUM 1967, 194), but it was considered a secondary feature by Becker (1996, 321 fig. B46). The line of wooden planks in the northwest wall makes a bend as if to accommodate the oblong pit with one wall plank being positioned at a 90 degree angle to the sidewall. The following pieces of wood are shown lying horizontally and two sections in this area confirm that the wood was broken in larger segments. The aberrant position of this section of the wooden wall might possibly be explained by disturbances created in relation to the oblong pit. No other traces of a wall were found between the house floor and the pit.

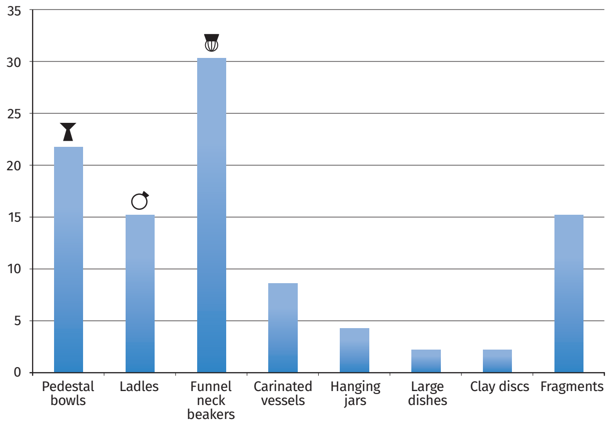

Fig. 9. The percentage distribution of vessel types at the Tustrup house.

The pedestal bowl closest to the oblong pit was found scattered in more places than the other vessels on the floor next to end of the oblong pit, down along the side of the pit together with burned wood as well as a few sherds among the stones in the fill of the pit (Fig. 3, pedestal bowl to the left). During the re-excavation in 2015, the only artefact found was a sherd of this pedestal bowl in the area in front of the end of the northwest wall. Most likely, the spread of sherds of this pedestal bowl was a result of a later disturbance, suggesting that the oblong pit was a secondary feature.

The purpose of the oblong pit and the chronological relation to the stone pavement covering the house is unknown. Interestingly, secondary oblong pits placed in a similar location in relation to one of the sidewalls have been found at the Herrup 26 and Foulum houses and interpreted as a stone heap grave at Herrup 26 (BECKER 1966; FABRICIUS 1996, 92; ERIKSEN this volume). At Engedal, a later stone heap grave with two oblong pits for cattle and »wagon grave« was placed on top of the site the older house structure (FABER 1977, 41). The secondary oblong pits at the house structures at Herrup 26, Foulum and Tustrup were possibly individual cattle burials placed here as a way to reclaim ownership of an important older structure.

POTTERY AT THE TUSTRUP HOUSE

Seven different types of vessels are used in the depositions at the Tustrup house, with funnel neck beakers being the most common, accounting for 30 % of the total (Fig. 9).

However, ritual vessel shapes like pedestal bowls and clay ladles constitute a very high percentage, with 37 % overall. The pottery is characterised by a high class of workmanship and the use of special vessel shapes, several of which are among the largest known from this time period in Jutland. The surface of the vessel walls is polished and glossy. The decoration is elaborate and uniform in terms of both design and

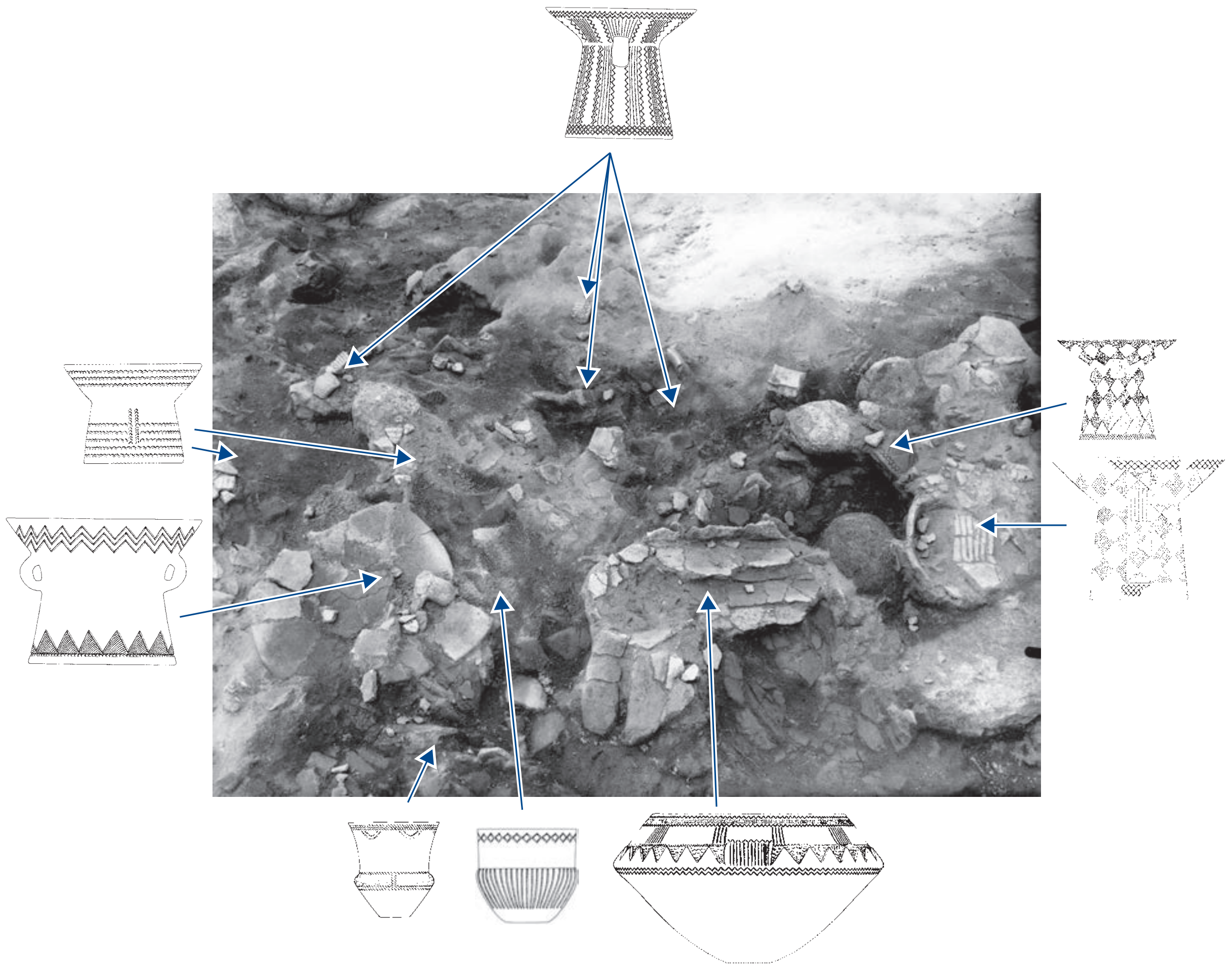

Fig. 10. Excavation photo showing the location of some of the vessels in the western pottery group in the Tustrup house.

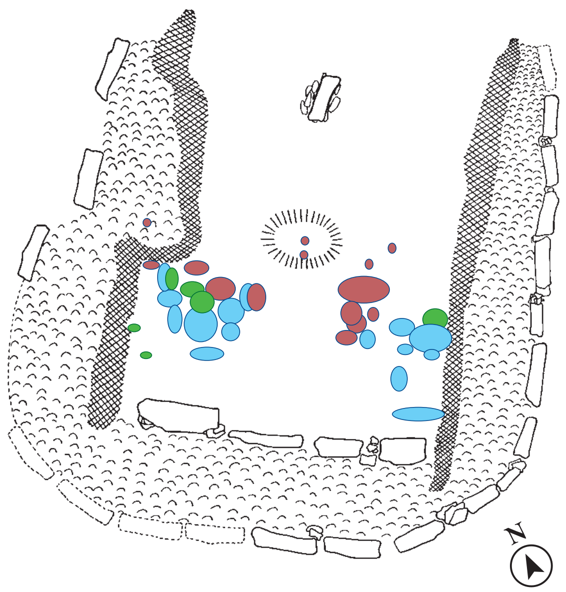

Fig. 11. Horizontal stratigraphy of the vessels deposited in the two pottery groups. Blue: MNA Ib, Green: MNA Ib/II, red: MNA II pottery.

techniques. The most common rim design is lines of rhombi, especially triple lines of rhombi, made with spatula impressions found at 22 vessels. Six out of ten pedestalled bowls are decorated with crosshatched diamonds (ERIKSEN/GEBAUER in prep.). In some cases, the individual vessel had retained the original shape, while in other cases large fragments or piles of crushed sherds made it possible to determine the original location with a high degree of accuracy (Fig. 10).

Depositions at the Tustrup house belong to period MNA Ib and II, defined by the Klintebakke, Blandebjerg and early Ferslev style pottery styles (BECKER 1973, 78; BECKER 1996, 339; DAVIDSEN 1973, footnote 34; EBBESEN 1975, 12 footnote 21; KJÆRUM 1955, 27; KJÆRUM 1966, 324; KJÆRUM 1967, 192). Contrary to the expectations of Kjærum (1955, 25), the use of the Tustrup building was not a one-time event but rather spanned a surprisingly long period of at least 100 years or 3–4 generations, perhaps even 200 years. Some of the other cult houses may likewise have had an extended period of use (see below and Tab. 1) (BECKER 1996, 323).

At least three episodes of deposition took place, as indicated by the range of stylistic variation of the ceramics as well as the horizontal and vertical stratigraphy of the two pottery groups (ERIKSEN/GEBAUER in prep.) (Fig. 11). Simultaneous depositions started at the back end of both pottery groups closest to the stone-wall during period MNA Ib, whereas later depositions moved forward and towards the middle of the house. A degree of symmetrical order is apparent in the placement of vessels like funnel neck beakers, pedestal bowls and clay ladles in the two pottery groups (Fig. 7).

DEPOSITIONS AT THE TUSTRUP HOUSE

The use of space in the Tustrup house appears to be highly proscribed. A bi-partition of the house along a central axis – defined by the monolith at the entrance, the central pit and the niche demarcated by a small flat orthostat at the back wall – seems to be important. Perhaps it is an emulation of the depositions at either side of the entrance to the passage grave. The same phenomenon is repeated at other cult houses (BECKER 1996, 337) (Fig. 12). The pottery offerings were contained within two limited areas, while the remaining floor area was empty of finds. Space for other purposes was left available against the back wall of the house and at the entrance.

Similar strategies appear to guide the depositions in both pottery groups in terms of vessel types, their location in the group and the use of space over time.

From start to end of the activities in the cult house, parallel depositions took place at both pottery groups on each side of the central pit. More pots were placed in the western group and later depositions were often stacked on top of previous depositions. On the other hand, some of the vessels placed in the eastern group are among the largest known examples of vessels of their type (pedestal bowl A33, ladle L24, dish V27, hanging vessel U17 and carinated vessel T18). Containing the pottery within these two areas of the floor seems to be important. The individual pots were placed in each group. Occasionally, one or two sherds were broken off and placed in the opposite pottery group. A few of the vessels represented only by a few sherds were spread out in both pottery groups.

The house fire would have destroyed any decorations or objects made of organic material. The lack of daub suggests that decorative clay sculptures or panelling as seen elsewhere was not used (NIELSEN et al. 2014, fig. 16, fig. 18; SCHLICHTHERLE 2006, 128–129, fig. 6–9). Fragments of birch bark – compressed of several layers of fresh bark – were found on the house floor and interpreted as roofing material (unpublished analysis by B. Brorson-Christensen, the National Museum Copenhagen; Becker 1996, 338; Kjærum 1967, 192). Elsewhere, birch bark was used between the dry wall in megalithic tombs and as flooring in ditches at causewayed enclosures. The bark may have held a symbolic significance due to the white colour (DEHN/HANSEN 2006, 37; SØRENSEN 1995, 19; TILLEY 1996, 315–317, 321–322). However, it is possible that these bark pieces were not part of the construction, but instead remnants of ritual paraphernalia made of bark cloth, which is produced by beating together of several layers of bark. The same interpretation may apply to the birch bark found at other mortuary houses (BECKER 1996, 295).

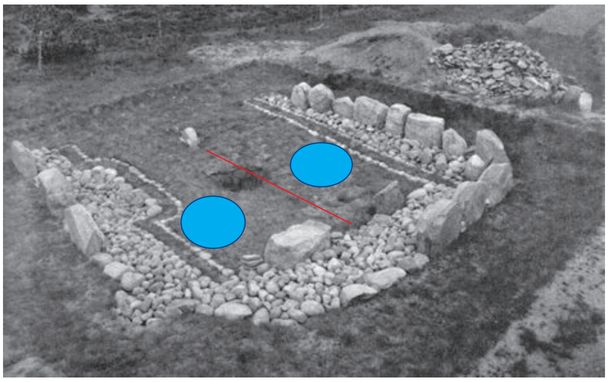

Fig. 12. The reconstructed site of the Tustrup house showing the central axis through the niche in the rear wall, the central pit and the monolith in front (red line). Note the empty space behind and in front of the two pottery groups (blue circles).

PEDESTAL BOWLS AND CLAY LADLES

An iconic picture from the depositions at the Tustrup mortuary house is a group of pedestalled bowls each with a ladle placed in the bowl, suggesting that the clay ladles were indeed used as spoons or ladles (KJÆRUM 1955, fig. 16). However, the location of the clay ladles indicates that they were most likely lying on the floor rather than in the pedestal bowls. Some ladles were placed in association with a certain pedestal bowl (Fig. 13), but other ladles were lying by themselves along the wall. Several pedestal bowls were not associated with a ladle.

The shape of the so-called ladles – including the placement of the sockets – suggests a different function than as serving utensils. The clay ladles were possibly carried as standards or idols mounted on wooden handles similar to the battle axe hafted on a 120 cm long shaft at Cham-Eslen, Switzerland (HAFNER 2013, 106 fig. 3). A fragment of a hazel stick found in the socket of one of the ladles (M20) shows that the ladles were mounted on wooden sticks. Some burned wooden sticks mentioned in the excavation report as coming from the same layer as the pottery may have served as handles for the ladles, although the number and dimensions of these sticks are unknown.

The pedestal bowls are flashy and unusual vessels associated with ritual activities at the megalithic tombs. These vessels must have served as cultic

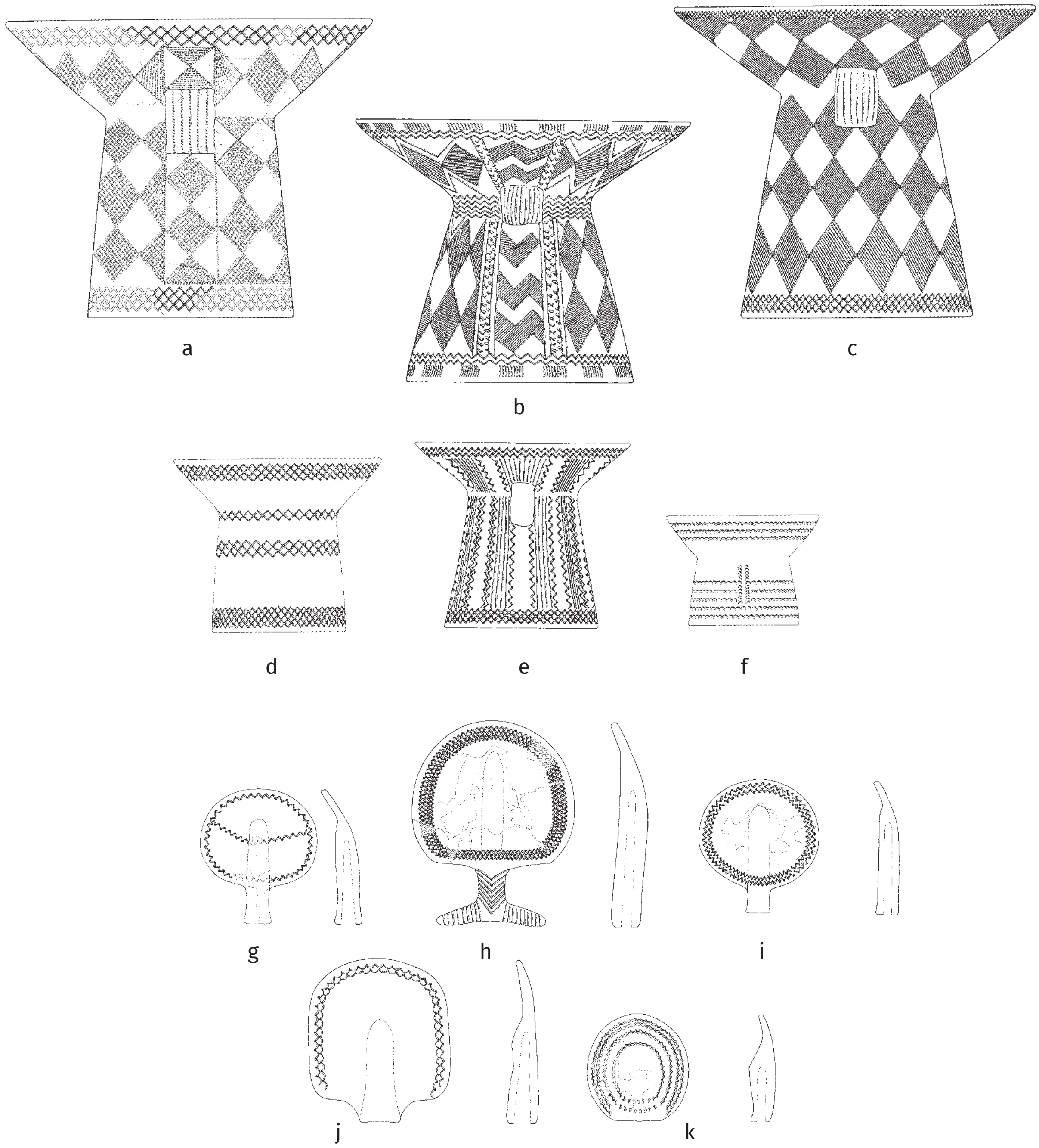

Fig. 13. Selection of pedestal bowls and clay ladles from the Tustrup house. Six out ten pedestal bowls were decorated with hatched diamonds. Pedestal bowl f and ladle k were decorated with a similar scalloped stamp, pedestal bowl c and ladle h were found next to each other as were pedestal bowl d and ladle g.

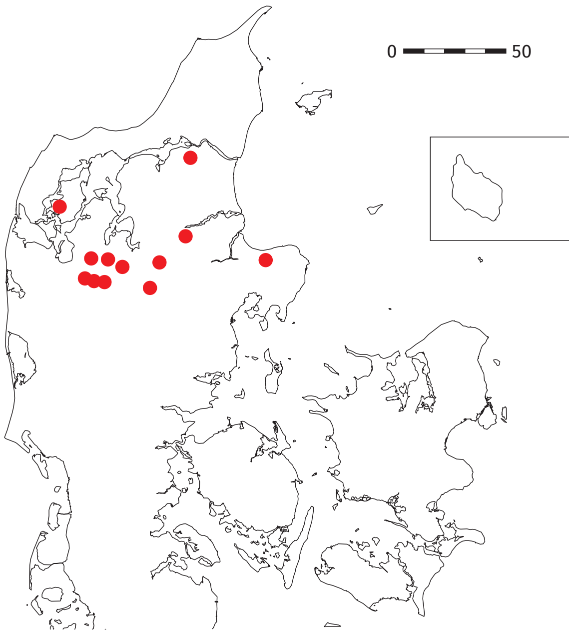

Fig. 14. Distribution map of 12 cult houses in northern Jutland, Denmark.

stands used in highly visible presentations of probably dry goods, hence explaining the German term »Fruchtschalen« (Schwabedissen 1953, 14). The high-powered significance of the content is perhaps revealed by the way in whihch some of the bowls from the pededestal bowls were left intact on top of piles of crushed pottery at the Tustrup and the Engedal mortuary houses (Faber 1977, 39 fig. 6–7; Eriksen/Gebauer in prep.). A suggestion of what the content may have been is perhaps seen in a late chalcolithic burial cave, Pequi'in in Galilee, Israel, where some of the pedestal bowls were used as cultic stands holding a human skull (Shalem et al. 2013, 439, 60 fig. 3.11, 62 fig. 3.18, 246 fig. 5.3.3, 249 fig. 5.6.1).

ARCHITECTURE AND ACTIVITIES AT THE DANISH CULT HOUSES

At present, twelve cult houses are known from a limited region in northern Jutland, Denmark (Becker 1993, 110–111; Becker 1996, 277–363; Eriksen/

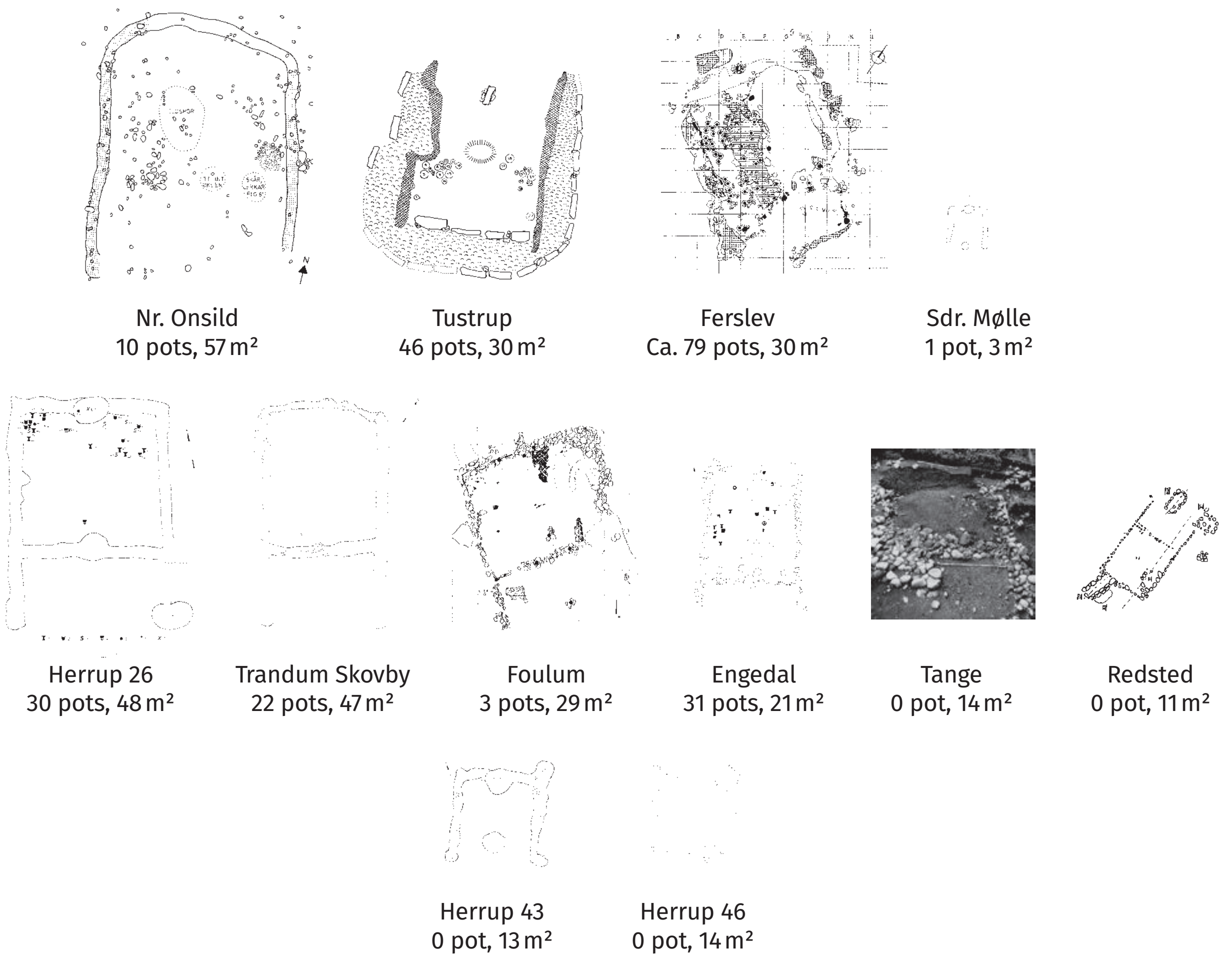

Fig. 15. Ground plans of the cult houses: four open houses above, six megaron-shaped houses in the middle and two houses with large corner posts at the bottom (based on Becker 1996 fig. B 46).

Gebauer in prep.) (Fig. 14). A common architectural feature of these rectangular structures is walls built of wooden planks and set in stone-lined foundation trenches. No entrance to the main room is detected at any of the four-sided structures and daub has not been found anywhere (Becker 1996, 338).

Three different kinds of construction are observed (Fig. 15, Tab. 1):

- Open rectangular or U-shaped structures (four houses)
- Megaron-shaped structures with sidewalls set in deep foundation trenches and less substantial end walls (six houses)
- Almost square houses with external corner posts (two houses)

Interestingly, the four U-shaped structures are all unusual in terms of size, construction materials or pottery deposits. Megalithic elements are included in the architecture of both the Tustrup and the Ferslev house, although aside from being open at one end these two houses are similar to the megaron-shaped houses regarding size, ceramic inventory, destruction by fire and sealing by a stone pavement. The structure at Nørre Onsild deviates from the other houses in terms of the large size, low number of pots and evidence of fire inside the house, but no final destruction by fire or stone pavement. The pottery includes pedestal bowls and carinated vessels like at the other houses, although early Neolithic pottery possibly from a settlement is also present. The fourth of the open houses – Sønder Mølle – is the smallest of all the houses and only held one pedestal bowl. Apparently the structure was dismantled, but not burned and only the outline of the walls was covered by stones. The house is probably related to a nearby megalithic structure of unknown kind with a small pottery deposition.

The architecture of the six megaron-shaped houses is more uniform, although the size is quite variable. Three of these house have a rich ceramic inventory similar to the Tustrup and Ferslev houses, while only three domestic type vessels were deposited at Foulum and none at the two smallest houses at Tange and Redsted.

Finally, the two houses Herrup 43 and 46 with external corner posts deviate from the remaining structures in terms of architecture and they are generally smaller in size. Unlike most of the other houses, they were empty and neither burned down nor covered by a stone pavement.

Tab. 1. Twelve mortuary houses from northern Jutland, Denmark. The secondary grave-like pits at Tustrup and Foulum are marked as possible stone heap graves with a question mark. The Tange house is only dated by a funnel beaker found in the stone pavement covering the house site.

CULT HOUSES	NR. ONSILD	HERRUP 26	TRANDUM	TUSTRUP	FERSLEV
Size	57 m^2	36 m^2	31 m^2	30 m^2	30 m^2
Orientation	S	SW	SSE	NE	NW
Shape	rectangular	rectangular	rectangular	rectangular	rectangular
Vestibule		x	x		
Destruction method	unknown	fire	dismantled	fire	fire
Megalith distance	unknown	600 m	50 m	50 m	60–80 m
Stonepacking graves		x		?	
Date	I	I	I–II	I–II	I–III
Ceramic inventory					
Vessel total number	10	30	22	46	ca. 79
pedestal bowl	2	8	5	10	6
Ladle		2	3	7	3
Aceramic inventory			None	None	None

ROOF CONSTRUCTION

Traditionally, the houses were thought to be covered by a saddleroof supported by central posts placed in large pits at the front and back of the houses (FERSLEV, HERRUP 26, TRANDUM SKOVBY and ENGEDAL; BECKER 1996, 338). Most likely, different types of roof construction were used with the roof being at least partly supported by the substantial sidewalls, especially at houses with no roof-supporting posts such as Tustrup and Redsted. At some houses, two larger posts placed as part of the end walls may be part of the roof-carrying construction (FOULUM, HERRUP 46). Most probably, the external corner posts at Herrup 43 and 46 supported the roof at these structures. The roof construction and even the presence of a roof is thus a matter of debate (se above, ERIKSEN/GEBAUER 2015, 106). Clean-up activities at the sites may also limit our understanding of the roof construction (see below).

The large pits interpreted as foundations of roof-carrying posts often seem larger than necessary considering the size of the structure (HERRUP 26 and 43, SØNDER MØLLE and ENGEDAL) and may instead have supported religious images or served other ritual purposes; indeed, a large bowl was placed below floor level in front of such a pit at Herrup 26 (BECKER 1996, 290 fig. B 17, 339).

PRE-FIRE ACTIVITIES

One or more events of pottery depositions took place at most houses. Depositions at the empty houses may have only included items made of organic material or different kinds of actions took place here. A large part of the pottery appears to be primary deposits of almost complete vessels or partial deposits of vessels. However, the pottery seem to be crushed and in secondary position in several places (northwest corner of Herrup 26, Sdr. Mølle, Trandum Skovby, perhaps the early pottery at Ferslev) (BECKER 1996, 296, 310, 325, 323). Furthermore, sprinkles of one or two sherds of pottery unrelated to the other vessels are seen at Tustrup and at Herrup 26 (BECKER 1996, 292).

A-ceramic objects are usually not found at the houses. At Herrup 26, the deposition of a group of thirteen transverse arrow heads may be related to activities at the house rather than the remains of an earlier inhumation grave (BECKER 1996, 290–291). The arrow heads were placed only 4–7 cm below the floor level at the top of the subsoil, a very shallow and exposed position for

FOULUM	ENGEDAL	HERRUP 46	HERRUP 43	TANGE	RESTED	SDR. MØLLE3
20,7 m²	*15,8 m²*	*14.4 m²*	*13,0 m²*	*9,6–12,8 m²*	*7,5 m²*	*2,7 m²*
SSW	*SSW*	*NNE*	*SSW*	*E*	*NE*	*E*
rectangular	*rectangular*	*square*	*square*	*rectangular*	*rectangular*	*square*
x	*x*	*x*		*x*	*x*	
fire	*fire*	*unfinished*	*dismantled*	*fire*	*unknown*	*dismantled*
unknown	*70–140 m*	*600 m*	*600 m*	*unknown*	*unknown*	*kenotaf close*
?	*x*	*x*	*x*			
I	*I*			*I**		*I*
3 pots	*31*	*0*	*0*	*0*	*0*	*1*
	5					*1*
	4					
	None	*None*	*None*	*None*	*None*	*None*

a possible grave (BECKER 1996, 286). Other flint objects found at or near the Herrup 26 house are not considered part of the inventory (BECKER 1996, 290). A few flint artefacts found at Nr. Onsild may belong to an earlier settlement (BECKER 1996, 331).

In some cases, floor material appears to be used to seal the interior of some of the vessels at the time of deposition. Two vessels at Herrup 26 were filled with sand and deposited upside down. Three vessels at Ferslev contained burned flint. A lugged jar filled mostly with burned flint at the Klokkehøj dolmen is another example of this tradition (THORSEN 1980, 125 fig.10).

The pottery depositions in general may have been covered to some degree with sand prior to the destruction of the houses. Surprisingly, the pottery deposited in the burned-down houses show only little damage from the fire. Severe heat damage to the pottery is seen only at the deposits in the northwest corner of the Herrup 26 house where the vessels must have been exposed to a temperature of about 1200 degrees celsius (BECKER 1996, 287–288, 295–296). The remaining pottery at Herrup 26 and elsewhere may be lightly damaged due to a secondary burning at about 700 degrees celsius, probably from the house fire (BECKER 1996, 296). However, a significant part of the pottery shows no sign of heat damage; indeed, even the original shiny surface was preserved at a large part of the pottery from the Tustrup house (see above). A similar situation is seen at the other houses (BECKER 1996, 323, 325; GEBAUER unpublished). Even though the temperature of the fires may have varied in different areas of the houses, it seems that the pottery must have been protected from the heat. Some of the vessels at Herrup 26 were partially covered by sand (BECKER 1996, 289, 294) and most likely a similar coverage was applied at the other houses. The presence of an added sand layer would also explain why it is difficult to establish the exact level of the floor in several houses (BECKER 1996, 286, 293, 302, 309, 326, 330). Aside from heat damage, it is difficult to understand how the pottery could be as well preserved as it generally is, unless it was somehow protected from the collapsing timber. It seems unlikely that turfs falling from the collapsing roof during the fire would have provided such protection (BECKER 1996, 324).

DESTRUCTION AND SEALING

Most houses were deliberately destroyed and sealed by a stone pavement. Two U-shaped and four megaron-shaped houses were burned down, one U-shaped and a megaron-shaped house as well as a house with external corner post were dismantled, while the demise of three houses remains unknown. At both Tustrup and Herrup 26, efforts were made to contain the burned materials within the walls of the structure (BECKER 1996, 286; KJÆRUM 1955, fig. 11 section C–D) and a degree of clean-up may have taken place at Herrup 26, Foulum, Tange (BECKER 1996, 296, 328, 330) and Engedal (FABER 1977, 40).

Sealing pavements were found at eight out of ten U- or megaron-shaped houses. At the houses with external corner posts, nearby piles of stones may suggest that a pavement was intended (HERRUP 43 and 46) (Tab. 1). A similar sealing by stone pavements is commonly found at a number of Funnel Beaker burial sites and pottery depositions at the megalithic tombs (BECKER 1996, 340–341; FABRICIUS 1996, 134; GEBAUER 2015, 140; HOLTEN 2000, 293; ANDERSEN 2000, 21).

POST-FIRE ACTIVITIES

A number of post-fire activities show that the site of the destroyed houses continued to be important, in both the immediate aftermath of the destruction and the longer term.

A secondary manipulation of the ceramic deposits and/or the stone pavement has been observed at several places (Tustrup (see above), Herrup 26 (BECKER 1996, 296, 324), Sdr. Mølle (BECKER 1996, 310), Trandum Skovby (BECKER 1996, 320) and possibly Foulum (BECKER 1996, 328)). At Herrup 26, a carinated cup and funnel neck beaker were placed in front of the central posts in the north and south wall, respectively (BECKER 1996, 281, 288–289, 290). A funnel neck beaker dating from MNA I was deposited on top of the sealing pavement at the Tange, while finally a beaker from MNA was found 1.5 m from Sønder Mølle (BECKER 1996, 330, 310). At Foulum, a burned flint chissel and axe from MNA V post-date the house, while the context of seven amber beads found 2–3 m from this house is uncertain (BECKER 1996, 326; LANGBALLE 1985, 21). As mentioned above, secondary grave-like pits were placed across the left side wall looking out of three houses (Tustrup, Herrup 26, Foulum).

DATING

The cult houses date from the Funnel Beaker period MNA I–III (3300–3000 cal BC) (Fig. 16). The oldest pottery related to the houses date from MNA I, which is perhaps reflected in the fairly homogeneous radiocarbon datings. Deposits at several houses appear to be an agglomeration of several actions: at Herrup 26, all within period MNA I; at Tustrup, Trandum Skovby and Nørre Onsild, during period MNA I and II; and at the Ferslev house, an extended period including MNA Ib, II and III. As mentioned above, the use period of the Tustrup house would be at least 100 years and possibly up to 200 years according to the date of the pottery stiles, reflecting the unlikely longevity of a wooden structure. Recent chronological analyses of long cairns and long barrows in Britain suggest a short use period of a few decades rather than the prolonged use of wooden structures such as Haddenham long barrow (Evans/Hodder 2006, 188; Thomas 2015). Unfortunately, new high-precision radiocarbon dates are not available for the Danish cult houses.

The differential treatment of the pottery and the suggestions that some of the pottery had been broken and re-deposited raise the question of whether the house structures are necessarily contemporary with all of the pottery placed here. Perhaps some of the pottery could have been brought in from elsewhere like the crushed and heavily burned pottery in the northwest corner of the Herrup 26 house or belong to an earlier structure in case of the MNA Ib pottery at Ferslev (Becker 1996, 323). At Tustrup, the wooden structure may be a later addition built in MNA II. Despite such speculation, the apparent longevity of the cult houses remains a conundrum.

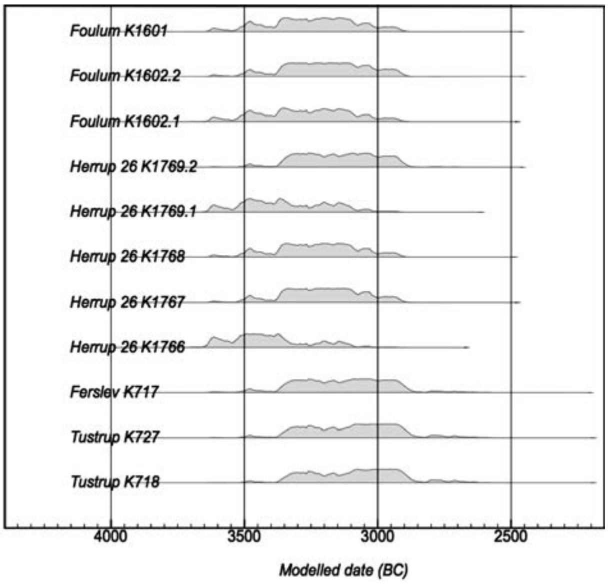

Fig. 16. Radiocarbon dates of the mortuary houses recalibrated using OxCal 4.2.

CONTEXT OF THE CULT HOUSES FROM NORTHERN JUTLAND

It is difficult to ascertain whether the use of cult houses during MNA I–III in northern Jutland, Denmark represents the continuation of an earlier tradition, or whether it was a short-lived regional phenomena (Midgley 2008, 168). The origin of the cult houses has been linked to various U-shaped wooden structures from the early Neolithic period, graves of Troelstrup type found in earthen long barrows, some individual structures and some structures found at settlements (Andersson 2004, 83–85; Becker 1996, 332–333; Klassen 2014, 323; Madsen 1979, 309; Klassen 2014, 322–324; Midgley 1992, 443, 455).

In addition, a tradition of building huts of various shapes – round-oval, D-, U- or horseshoe-shaped as well as rectangular – is found in the Funnel Beaker period from the beginning of the early Neolithic through MNA I. A few primarily four-sided huts were built during MNA II–III, while both round-oval and four-sided huts are found throughout MNA B (Artursson et al. 2003, 118–119). A common feature of these buildings is a lack of roof-supporting posts (Artursson et al. 2003, 116).

Aside from the group of twelve cult houses from northern Jutland, Denmark, a small number of purported cult buildings have been found in eastern Denmark, Sweden and northwest Germany.

At Hesselbjerg on southwest Zealand near Halskov, Denmark, a small house of 3 × 3 m was built of seven posts. The house is dated by a large amount of pottery dating from MNA Ib found in two pits immediately west of the house. In one pit, three whole vessels were stacked on top of each other together with an axe preform (Hesselbjerg unpublished excavation report 2010).

At Nordkildebakke in northeast Zealand near Græsted, Denmark, two pits contained large amounts of burned daub, 30 flint scrapers and sherds of 29 mainly highly decorated vessels including pedestal bowls dating from period MNA Ia. No house structures were found (Nordkildebakke unpublished excavation report 2001).

Four Swedish hut structures have been interpreted as possible ritual buildings from the early and middle part of the Funnel Beaker period (Andersson 2004, 159).

A grave or death house at Fågelbacken, Västmannland had walls of individual posts, a rich cultural layer and a pit in the interior, with finds of sherds representing 65 early Neolithic vessels, a thin-butted axe and a chisel in stone and a grinding stone. High values of phosphate suggest the internment of several individuals (APEL et al. 1995, 82–83; HALLGREN 2008, 107–109). Two sites were found about 3 km apart in the same valley in Scania, Sweden. At Särslöv, two structures were found 40 m apart, a U-shaped house with sherds from a pedestal bowl dating from period MNA I–II and a bit flint debitage and a square house without finds. The nearest megalithic tomb was 800 m away (ANDERSSON 2004, 84–85 fig. 32, 159). At the other Scanian site – the settlement Dagstorp 11 – a narrow U-shape feature with a partly stone-lined foundation trench of 3 × 1.4 m was the remains of a burned wooden structure dating from EN II–MNA II, C14 3550–3120 cal. BC. No pottery was found (ANDERSSON 2004, 83–84 fig. 31, 159).

Two structures found 12 km apart in Lower Saxony – not far from the coast of the North Sea – have been interpreted as cult houses (BAKKER 1979, 59). At Hainmühlen, Kr. Wesermünde, a structure (I) with a right-angle foundation trench measuring 4 × 1.2 m was preserved at the edge of a gravel pit (AUST 1966, 96). Among the stones of an interior pavement were sherds of seven vessels including a pedestal bowl dating from period MNA II, charcoal and five flint flakes (BAKKER 1979, 59 fig. 25). Another four stone-covered features – possibly graves – with contemporay pottery, burned bones, charcoal, a few flint tools and debitage were found in the vicinity (AUST 1966, 100–103; BAKKER 1992, 44).

At Flögeln, Kr. Cuxhaven, three houses, a megalithic tomb and some inhumation graves were investigated between 1977 and 1985 (BAKKER unpublished). The two long houses were dwellings, although one room containing a grave may be a ritual area (BEHRE/SCHMIDT 1998, 51). A third building with a sunken floor appears to be a ritual building related to the Danish cult houses based on the ground plan and special finds of a disc-shaped mace head, a stone axe and a pedestal bowl (ZIMMERMANN 1995, 256; ZIMMERMANN 2000, 114). The structure – measuring 6.3 × 4.4 m – was defined by two parallel foundation trenches and a rectangular sunken area framed by post holes, 3.7 × 3.9 × 0.35 m (MENNENGA unpublished). The depth of the postholes throughout the structure was highly variable, as a possible indication of more than one structure at this site (MENNENGA unpublished, 131). An area with elevated phosphate levels across the sunken area and in one of the foundation trenches indicates concentrations of organic materials (MENNENGA unpublished, 132). The structure was not burned down (MENNENGA unpublished, 129).

The Flögeln house contained 27 vessels, including a collared flask, a pedestal bowl, open bowls, carinated vessels, funnel neck beakers, storage vessels and miscellaneous fragments dating from the early Neolithic to MNA II–III (BAKKER unpublished). Only a small proportion of each vessel was found. Contrary to the building, several sherds were damaged by fire, some severely. Pieces of daub also occurred. The extended period of use suggested by the pottery is explained by an intrusion of older settlement material and a long duration of the house structure (BAKKER unpublished, 134).

At Warburg, Hessen, the wooden structure II has a ground plan similar to the Danish megaron-shaped structures with an anteroom. A wall of flagstones set in clay covered the outside of the wooden walls. Warburg II is located in a group of megalithic tombs, although unfortunately the purpose of this structure is uncertain as the floor was destroyed (GÜNTHER 1997, 141–155). At Völlinghausen, one end of the structure was a chamber built of flagstones, while the other end was built of two rows of posts set in deep, stone-lined foundation pits. A pavement and human bones were found in the chamber (SCHIERHOLD 2012, 67).

From the late Funnel Beaker period, a series of very different cult buildings in the form of circular timber structures are known from Scania, Sweden and the island of Bornholm, Denmark. At Vasagård, one of these structures had clay panels with a decoration including small pieces of burned bones (NIELSEN et al. 2014, 97–103).

A couple of Swedish cult houses from later periods of the Neolithic are close comparisons with the two houses with external corner posts, Herrup 43 and 46. Both houses are rounded rectangular, built of vertical posts set a continuous foundation trench and four external corner posts, while neither one had a visible entrance. At Bollbacken, Västmanland from the Pitted Ware Culture (2580–2450 cal BC), depositions of burned animal and human bones were found in pits inside and just outside of the house (ARTURSSON 2006, 55). The Gläntan house Östra Södermanland is likewise interpreted as a death house and held the cremated remains of at least seventeen humans, animal bones as well as stone tools (LINDSTRÖM 2006, 81). This house is dated to the late Battle Axe culture with calibrated ^{14}C-dates around 2500 BC (LINDSTRÖM 2006, 66, 81).

The examples of possible cult houses from eastern Denmark, Sweden and northwest Germany show that small buildings were built for ritual purposes in different areas at different times depending on local needs and beliefs. The cult houses from northern Jutland are not a unique phenomenon, although they stand out from the rest by their number and relatively uniform architecture.

In general, the other examples of cult houses appear to be related to funerary rites. A number of the early structures were either actual graves or funerary structures related to long barrows. Among the Danish examples, only the house at Strynø and perhaps Sejrø appear to be independent structures, albeit possibly related to nearby graves. Several of the U-shaped structures in Sweden were part of settlements, but some appear to have a ritual purpose, like Särslöv and Dagstorp 11. The Flögeln structure was placed in the vicinity of both a settlement and a megalithic tomb: the Hainmühlen structure as well as Herrup 26 and Redsted near inhumation graves. Elevated levels of phosphate suggest that Fågelbacken and Flögeln were used for funerary purposes, just like Bollbacken and Gläntan with cremated human remains. If pedestal bowls can serve as an argument for an association with the ancestor cult, both of the uncertain features at Zealand – Hesselbjerg and Nordkildebakke – as well as the houses at Flögeln and Hainmühlen, Germany and Särslöv, Sweden were possibly associated with funerary rites. Interestingly, the distinction between timber-built graves/death houses and other ritual house-like structures appears to be fluid.

An early Neolithic tradition of building U-shaped, hut-like structures is clearly present in both a mundane and a funerary context. If these structures are the predecessors of the open cult houses in northern Jutland, the houses at Nr. Onsild and Sønder Mølle are the most obvious continuation of this building tradition. On the other hand, the heterogenous construction of the open cult houses with the rectangular houses at Tustrup and Ferslev resembling the megaron-shaped houses suggests that the open houses were local adaptations of the main megaron-shaped structures rather than a continuation of an earlier building tradition. In this case, the cult houses were a short-lived regional phenomenon in northern Jutland during period MNA I–III.

No obvious parallels between the megaron-shaped houses and other huts and houses built during the Funnel Beaker period in southern Scandinavia are found in terms of shape and construction. Four-sided huts with rectangular, square or more trapezoidal shape have been uncovered in Danish long barrows (Becker 1996, 333; Kristensen 1989, 74; Rønne 1979, 3–8) as well as in Sweden, but none with the characteristic foundation trenches or a forecourt (Artursson et al. 2003, 114). The German structures might suggest connections to the south, although they are unique examples that may in fact be inspired from northern Jutland. Mundane long houses with foundation trenches do not appear before in the late Funnel Beaker culture (Artursson et al. 2003, 98–100; Nielsen/Nielsen 1985, 105–107). Thus, the origin of the megaron-shape cult houses in northern Jutland remains unknown.

The two empty and undated houses at Herrup 43 and 46 are very similar to the houses at Bollbackan and Gläntan, Sweden, dating from the Pitted Ware and Battle Axe cultures, respectively. Likewise, the constructional feature of substantial corner posts is found at wooden burial chambers and death houses in the Battle Axe Culture in northern Jutland (Hübner 2005, 555, 558, 561, 564). Furthermore, the two houses stand out due to the lack of ritual destruction and they may well belong to a younger group of cult houses associated with the Battle Axe culture.

DISCUSSION OF THE FUNCTION OF THE DANISH CULT HOUSES

The ten U-shaped and megaron-shaped houses apparently served similar purposes. However, five of both the U-shaped and megaron-shaped houses have a rich inventory of pottery, while the other five houses contain little or no pottery. The houses rich in ceramics are located within 100 m of a megalithic tomb, except the Herrup 26 house, where the distance is 600 m. These houses seem to be closely related to the megalithic ancestor cult. Of the other five houses poor in pottery, only one is located next to a megalithic structure of an unknown kind (Sdr. Mølle), while no contemporary Funnel Beaker funerary sites are found in connection with the other four houses. Three of the poor houses are relatively small (Sdr. Mølle, Tange, Redsted), but the Foulum house has the same size as the rich houses and Nr. Onsild is larger. While the rich houses date from the entire period MNA I–III, the datable poor houses date from MNA I. The different ways of using the cult houses seem to be contemporary, although the number and scope of individual events taking place at houses vary depending on the affiliation with a neighbouring megalithic tomb.

Activities in most of the houses appear to meet a number of criteria for ritual acts: repetition, formalism and durability (Berggren 2010, 379). At most of the houses, similar ritual proscriptions appear to guide the ceremonies with a bi-partition of the offerings and the possibly presence of religious images such as idols or totem poles marked by the large pits at the back and front of the houses (Becker 1996, 339). Only a ceramic inventory is found at most of the houses: the pottery is generally highly decorated pots of ritual type similar to the ceramic depositions at the megalithic tombs. Pottery of domestic type found at some of the houses is also used at megalithic tombs (DEHN et al. 1995, 100; GEBAUER 1979, 143).

The purpose of these buildings has been discussed for more than half a century: were the houses a kind of timber-built grave used once and then destroyed as proposed by Kjærum (1966, 323, 329; 1967, 194), were they a sacrificial ritual related to burials at the megaliths (KJÆRUM 1955, 24) or did the houses serve as places visited repeatedly for worship, i.e. as a kind of temple (BECKER 1969; 1973; 1993; 1996, 340)? Aside from the grave-temple issue, the interpretation of the houses as ritual structures has rarely been discussed (MATTES 2008, 272–275) and their function remains unclear (SJÖGREN 2015, 1015).

The interpretation of the Tustrup house and by extension the cult houses in general as burial sites was based on the grave-like features in the Tustrup and Ferslev houses (the niche in the northwest wall at Tustrup and a stone-framed area covered by burned flint at Ferslev), the use of pottery similar to the offerings at the megalithic tombs and an understanding of the deposits in the houses as one-time events (KJÆRUM 1967, 194f.; MARSEEN 1960a; 1960b). In favour of the interpretation as temples was the lack of grave-like features at the other cult houses, the lack of human remains everywhere, the lack of a-ceramic finds and indications of several depositions over a period of time (ANDERSEN 2000, 23f.; BECKER 1969, 28; BECKER 1973, 79; BECKER 1996, 340; DAVIDSEN 1973, 10, footnote 34; EBBESEN 1978, 160, footnote 9).

The new analysis of the architecture and the depositions of the Tustrup house shows that multiple events took place here, most likely in relation to activities at the passage grave. Evidence from Herrup 26 – the only other cult house where the deposits have been thoroughly analysed – likewise demonstrates an extended sequence of depositions, albeit without linkage to a megalithic tomb (ANDERSEN 2000, 24; BECKER 1993, 111; BECKER 1996, 339).

Features like burial pits or deposits of human remains are absent. However, the interpretation of some of the Swedish houses as death houses is not based on the presence of grave-like features, but rather on elevated phosfate levels and depositions of burned bones in the foundations' trenches (Fågelbacken:

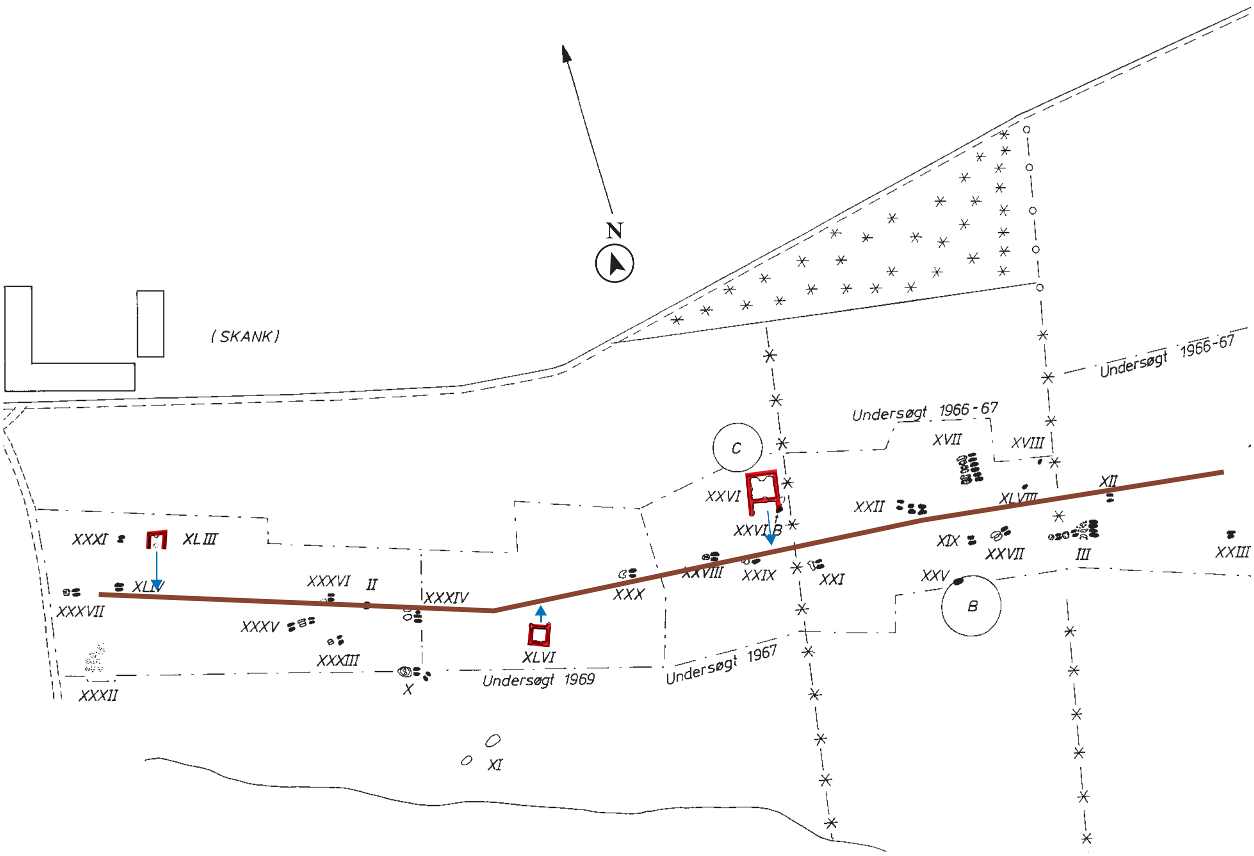

Fig. 17. Map of the Herrup site. The three cult houses are marked in red with the orientation of the entrance marked by a blue arrow. A possible road following the line of stone heap graves is marked with brown (Based on BECKER *1996, 292).*

APEL et al. 1995, 82–83. Bollbacken: ARTURSSON 2006, 55. Gläntan: LINDSTRÖM 2006, 81). Evidence of burials was possibly overlooked at the houses in northern Jutland: bone preservation is poor in these areas, no phosphate analyses have been made and a lack of water sieving may have prevented the discovery of burned bone fragments. The most likely evidence of a grave is the group of tranverse arrowheads found just below the floor of the Herrup 26 house (BECKER 1996, 340). However, based on the available evidence, nothing indicates that the houses served as graves. The so-called cult houses may have served as auxillary facilities in relation to burials elsewhere. They were possibly used as death houses where the dead were kept temporarely for lit de parade ceremonies, excarnation or other purposes, but apparently not as the final burial site.

A clear association with the ancestor cult related to the megalithic tombs is found at the five rich houses (Herrup 26, Trandum Skovby, Tustrup, Ferslev, Engedal) (Fig. 2 and Tab. 1). These houses are situated within 100 m from a megalithic tomb and/or include in their ceramic inventory pedestal bowls, often also clay ladles, typical of depositions at the megalithic tombs. Materials such as large stones and burned flint known from the tombs were used at some of the houses (BECKER 1996, 337–338, 340). In fact, it could be argued that the line of kerb stones framing the Tustrup house, part of the Ferslev house and perhaps the »poor« Foulum house transforms these structures to a kind of megalithic monuments in their own right. Furthermore, fires on the floor like in some megalithic chambers have been observed at a couple of houses. At Tustrup, depositions at the cult house and acticitivies at the passage grave appear to be coordinated, possibly also at the round dolmen. The purpose of the houses poor in pottery is less clear.

A connection to the stone heap graves is suggested by the close spatial association found between cult houses and stone heap graves at the regional level as well as at some individual sites (Nr. Onsild, Engedal and the three houses at Herrup). In addition, secondary, bathtub-shaped pits reminiscent of the stone heap graves for oxen are found at the sidewall of three houses (Tustrup, Herrup 26 and Foulum) (BECKER 1996, 292; Eriksen this volume; Johannsen/Laursen 2010, 21–25). The deposition of a funnel neck beaker on top of the sealing stone pavement at the Tange house is a tradition later repeated at some of the stone heap graves (FABRICIUS 1996, 206, 218). Finally, a number of mortuary houses appear to be situated along roads in the same manner as the stone heap graves (JOHANNSEN/LAURSEN 2010, 39, 41, 47; ROSTHOLM 1978, 202) (Fig. 17). A track road of unknown date runs across the Herrup 26 house (BECKER 1996, 278 fig. B 1). Even at Tustrup, a modern track road connecting to a crossing of the nearby Hevring stream runs in front of the mortuary house. The early stone heap graves date from MNA II and are contemporary with some of the mortuary houses (FABRICIUS 1996, 228; BECKER 1996, 337). The two small houses – Herrup 43 and 46 – are only dated by their architecture (BECKER 1996, 302) and may – as mentioned above – relate to the later Battle Axe culture.

Thus, the cult houses appear to be a kind of ritual structure often related to the ancestor cult, but how do these structures compare with mundane houses? A recent study of so-called cult buildings in the Neolithic and Copper Age in southeast Europe suggests that these structures were in fact dwellings specially decorated and equipped for ritual occasions. Accordingly, the term cult building should only be used in relation to structures that mainly or exclusively serve religious purposes and clearly differ from profane buildings in terms of their size, ground plan, construction as well as interior furnishing (LICHTER 2014, 122).

Although a distinction between religious practices and the mundane is difficult in archaeological remains (RENFREW/BAHN 2008, 412), a comparison between domestic houses and the cult houses appears to confirm the special character of the latter on all accounts regarding the architectur and inventory. The dwellings were long houses with an oval ground plan and/or rounded gables and rectangular long houses: walls were made of wattle and daub and the saddle roof supported by a central row of posts (ARTURSSON et al. 2003, 116; NIELSEN 1999, 150–153, fig. 3). Foundations' trenches are not seen at the domestic houses before period MNA V (NIELSEN 1999, 154). The absence of a cultural layer at the cult houses, the general lack of stone artefacts and the use of specific devices like pedestal bowls underline a non-domestic function of these structures.

Compared with other contemporary ritual sites such as bog offerings or causewayed enclosures, the cult houses likewise stand out by the absence of a-ceramic objects as well as depositions of food or human remains and by the selection of pottery (KOCH 1996; Andersen 1997). Spatially, no connection is observed between cult houses and these kinds of sites, with the possible exception of a U-shaped structure recently discovered by geo-magnetics next to a possible enclosure (KLASSEN 2014, 316).

To sum up, the so-called cult houses in northern Jutland apparently served as a kind of shrine where repeated offerings took place (BECKER 1969; 1973; 1993; 1996, 340; RENFREW/BAHN 2008, 412). Several structures showed a clear ideological connection to the ancestor cult in terms of location and/or the pottery depositions. However, the two terms often used in relation to these structures seem inappropiate. The term

»temple« is usually related to more established religions and a function as graves in the sense of being final repositories of dead persons is not documented at the cult houses, with the possible exception of Herrup 26 based upon the tranverse arrow heads below the floor. The cult houses may have played a role in the funerary rites as death houses meaning temporary resting places for the dead, excarnation or lit de parade, although this is unknown. The Tustrup houses appear to be a special kind of cult house, a so-called mortuary house built in relation to funerary activities at the passage grave and a place of ritual activities related to funerary rites, but not the place of the actual burial. If the structure at Tustrup had no roof, terms like shrine or holy place may be more appropiate. A similar close association with specific funerary activities may be found at the other houses located in close proximity of megalithic tombs (Engedal, Ferslev). The other cult houses with little or no pottery probably had an ideological connection to the ancestor cult as two of them contained pedestal bowls, but other social and religious aspects of the contemporary society may also be important.

WHY CULT HOUSES?

To understand why such structures became a fashion within a limited area and period of time, it is useful to look at similar phenomena in other periods of prehistory, as well as recent examples from other areas of the world. In the Bronze Age, mortuary houses were commonly used as auxiliary structures in relation to burials in Denmark and Sweden (KAUL 2006, 100; VICTOR 2002). Features such as the absence of a proper entrance at the four-sided houses and the orientation of the house entrance away from the associated tombs are shared phenomena with several of the Neolithic cult houses in northern Jutland (KAUL 2006, 100, fig. 6). Interpretations of the Bronze Age mortuary houses often focus on the house as a metaphor of the family (RUDEBECK 2006, 19). Building a mortuary house and the related ceremonies involve a considerable invest of wealth and may be an expression of social competition among lineages or family groups (ARTURSSON 2006, 430; LINDSTRÖM 2006, 72; SVANBERG 2006, 128; VICTOR 2006, 114). Performances of rites of passage in addition to the teaching of special skills and ritual knowledge may also have taken place at these special structures (KAUL 2006, 109).

An ethnographic study of the Enga at New Guinea describes how ancestral cults were imported and refitted to local needs, just like the Danish cult houses in the Neolithic seem to be an addition to the existing ancestor cult (WIESSNER 2002, 242). Over a period of 5–10 years, a cult among the Enga people involved constructing a cult house, rites in the house concerning fertility as well as the ancestors and finally burning of the cult house (WIESSNER 2002, 245 tab. 2). At each step of the ritual cycle, the tribe gathered and feasting at different levels took place. The rituals associated with the cult house were not only geared towards restoring communication with the ancestors, but also served to evoke prosperity through fertility rites, articulate relations between clans and promote secular exchange networks.

In the Middle Neolithic Funnel Beaker culture in northern Jutland, the use of cult houses appears to be a new institution adopted to allow people to pursue opportunities that they did not previously have while keeping up the traditional obligations related to the ancestral cult at the megalithic tombs. These opportunities may have included expressions of social rivalry. The considerable investment of wealth in building and destroying a cult house suggests that being a social statement about status of the builder(s) was an important aspect of the purpose of these houses. Changing ideas related to cosmology – perhaps with a focus on prosperity and fertility – may also be expressed. In fact, a focus on sexual reproduction and cosmic renewal may be reflected in the central features of the Tustrup house, the monolith and the central pit.

Like the stone heap graves, the cult houses may be evidence that new institutions and new ideological ideas were introduced (DAMM 1993, 200; JOHANNSEN/LAURSEN 2010, 49; JOHANNSEN et al. 2016, 46–49). Both the cult houses and the stone heap graves represent a change in venue away from the megalithic tombs and probably also a change in values celebrated in the rituals. The cult houses may be precursors of the social and religious changes away from the collective burial rites at the megaliths towards invidual burials manifested in the stone heap graves at the end of the 4th millenium in northern Jutland, Denmark.

CONCLUSIONS

An analysis of the cult houses in northern Jutland, Denmark has been made in relation to a new study of the Tustrup site. The pottery depositions from the Tustrup house are characterised by vessels of supreme workmanship and a limited range of vessel types, but a high proportion of pedestal bowls and clay ladles typical of the votive offerings in front of the megalithic tombs. The pottery is treated differently than ceramics deposited at the three neighbouring megalithic tombs, being deposited in a more complete form. A high degree of stylistic similarity is found between the pottery from the cult house, the passage grave and the round dolmen, while the pottery styles found at the dolmen with a passage deviate in various aspects. Ritual activities at these three monuments were likely coordinated and perhaps performed simultaneously considering the apparent coordination in the use of vessels made by the same potter and the placement of certain types of vessels at certain monuments.

Three different types of construction are observed among the twelve Danish cult houses. The U-shaped and megaron-shaped houses were contemporary and appear to fulfil similar purposes. Five cult houses rich in pottery were affiliated with the megalithic ancestor cult, while five houses with little or no pottery may have been used to celebrate other social or ideological causes. Two houses with external corner posts are probably associated with the later Battle Axe culture. No Scandinavian parallels were found to the megaron-shaped houses that may reflect ideas from further afield, like the few contemporary cult buildings found in other areas. The construction of the U-shaped houses may be inspired by early Neolithic structures or more likely local adaptations of the megaron-shaped houses. The Tustrup house appears to be a unique multi-stage wood-and-stone construction.

The cult houses are interpreted as shrines built exclusively for ritual purposes, several of them being related to the ancestor cult at the megalithic tombs, and with a close spatially affiliation to the stone heap graves. No connections are found to domestic houses or other ritual types of sites like bog sacrifices and causewayed enclosures. Compared with the few structures found elsewhere, the cult houses in northern Jutland, Denmark seem to form a special uniform group. The use of cult houses in this region at the end of the 4th millenium may be related to social and religious changes away from the collective burial rites at the megaliths towards invidual burials manifested in the stone heap graves.

ACKNOWLEDGEMENTS

I would like to thank Palle Eriksen and Torsten Madsen for insightful discussions and access to unpublished analyses, Jan Albert Bakker and Moritz Mennenga for providing access to their unpublished studies of the Flögeln-Eekhöltjen site, The National Museum, Copenhagen for providing work space for the Tustrup project, Moesgård Museum for support in bringing the finds to Copenhagen, and Douglas Price for help with the illustrations.

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Pots for the ancestors. The structure and meaning of pottery depositions at passage graves

Torsten Madsen

ABSTRACT

Despite the total destruction of the passage grave at Nørremarksgård, part of the pottery deposited in front of the tomb was exceptionally well preserved. This has made it possible to reconstruct the sequence of depositions in front of the tomb in detail, adding valuable information to our knowledge of this type of events. The first part of the paper describes and analyse the depositions at Nørremarksgård. Based on vertical and horizontal stratigraphic evidence and stylistic differences, I separate eight depositions and place them in a chronological sequence. Further, the paper demonstrates the deliberate destruction of pots and the deposition of incomplete pots. The second part of the paper draws the lines from the depositions at Nørremarksgård to other megalithic tombs and to causewayed enclosures. The development in burial practices is discussed and it is shown that a shift in depositions from causewayed enclosures to megalithic tombs may occur at the turn from EN II to MN A I. Finally, the paper discusses the implications for the social structure of society in the TBR culture.

INTRODUCTION

A remarkable feature associated with megalithic tombs in northern Europe and especially in South Scandinavia is the extraordinary amount of exquisite pottery found along the kerbstone lines, centring on the entrance area to the chambers (MIDGLEY 2008, 148 ff.).

From the outset, the pottery found in front of megalithic tombs was considered offerings in connection with burials in the chambers (MADSEN 1896; MÜLLER 1923) or from initiation ceremonies of the tombs (ALMGREN 1910, 77; NORDMAN 1917b). Later an interpretation of the pottery as the result of clearances of the chamber to make room for new burials was added (ROSENBERG 1929, 1933; FORSANDER 1936; BRØNDSTED 1938, 205–6).

It was Knud Thorvildsen's excavation at the Grønhøj passage grave in 1940 that finally settled the question (THORVILDSEN 1946). Six pots stood undisturbed on the chamber floor and shards from a seventh lay in the chamber, the passage and outside. These pots can be dated from early in MN A I to the beginning of MN A II, while the pottery placed in front of the kerbstones dates from early in MN A I to the end of MN A II. Thorvildsen (1946, 91–92) convincingly concludes that the pottery in front of the kerbstones had been placed there through time in connection with activities inside the tomb. This does not mean that clearances of chambers did not take place, but in well-documented cases, it appear to happen at a later stage, after the depositions of pottery in front of the tombs ceased (KJÆRUM 1970, 55).

Discussions following the publication of Grønhøj mostly focussed on the frequency of the depositions in front of the tombs ranging from suggestions that pots were added continuously with only one or two pots at a time (EBBESEN 1979, 32) to suggestions that they reflect one or a few depositions in connection with burials (GEBAUER 1979, 142). One publication, however, stood out. Poul Kjærum's paper on his investigations of the passage grave Jordhøj was a dedicated attempt to elucidate the nature of the deposits. A careful analysis of the position of individual pots and their dates based on stylistic evidence suggested a total of four to seven deposits (KJÆRUM 1970, 52).

THE PASSAGE GRAVE AT NØRREMARKSGÅRD

The Nørremarksgård passage grave, located 4 km west of Horsens in Eastern Jutland, Denmark (Fig. 1), was excavated by the author in 1985 (Horsens Museum j. no. 102). The tomb lies in an area with many

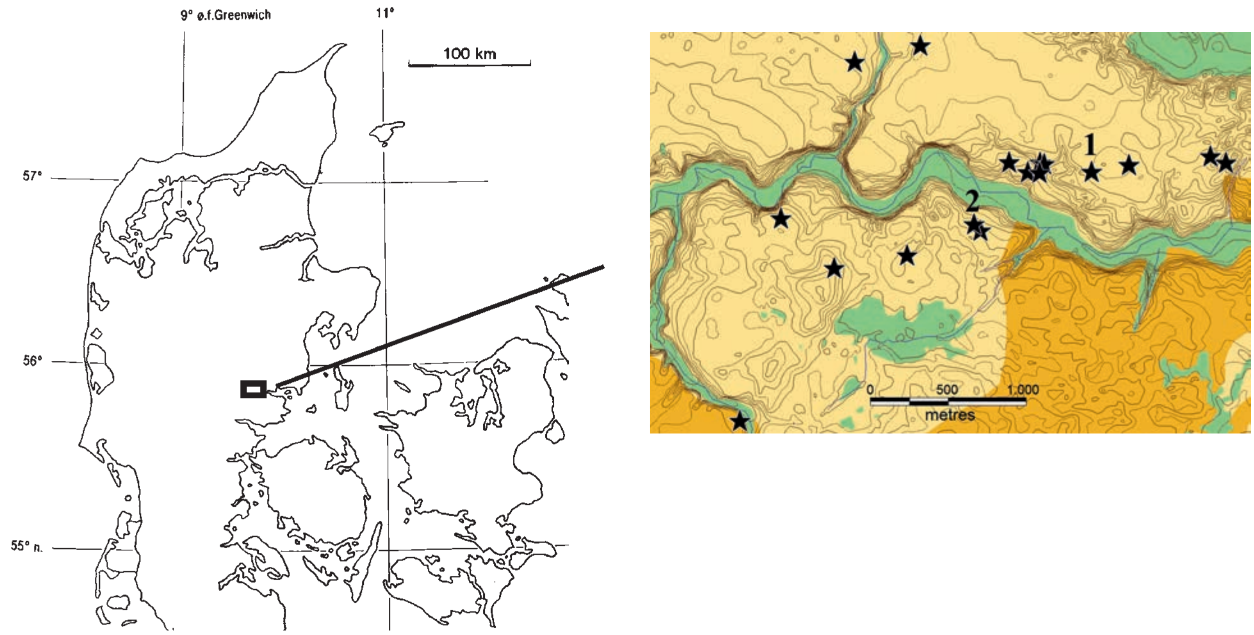

Fig. 1. Map showing the position of the Nørremarksgård passage grave (1) together with a number of other megalithic tombs west of Horsens town in eastern Jutland. The Grønhøj passage grave (2) mentioned in the text is one of these.

megalithic tombs, most of which are ruined to various degrees. A number of these tombs have been excavated, including the well-known and well-preserved Grønhøj passage grave (THORVILDSEN 1946).

In 1905, G. Sarauw described the Nørremarksgård site (Sb 18 of Hatting parish, Hatting District, Vejle County) as a »Ploughed over barrow, 1.6 m high and 30 m in diameter. In the southern half, the remnants of a demolished passage grave with a passage to the south are visible. Four large uprights in the chamber and two in the passage; one stone overturned. The other stones removed. Under a large stone in the chamber, a collection of potshards occurred. These were handed over to the museum as a gift« (NM A22440; Fig. 4).

Fig. 2. The passage grave seen from the south after removal of the top soil and all disturbed layers (photo: T. Madsen).

The excavation in 1985 revealed a chamber in the southern half of a round barrow encircled by a row of 65–70 kerbstones – now all gone (Fig. 2 and 3). The barrow had a diameter of approximately 19 m with a fill preserved to a height of 0.5 m. Due to disturbances in the south-west part of the barrow only 46 kerbstones could be traced through their imprints in the ground. The barrow consisted of sand and gravel with embedded layers of brown humus. Below the barrow, traces after ard ploughing were noted.

All uprights from the chamber and passage had disappeared, but the excavation revealed clear marks after the stones. The chamber had a round to oval floor plan measuring 3.3 m by 3.2 m with the longest axis perpendicular to the passage (Fig. 3). It had nine uprights – four on each side in an arched setting and one huge stone at the rear. Between the uprights, slabs forming the lower part of drywall stacks stood in situ. Behind the uprights lay a massive packing of clay mixed with both crushed and burned flint. In a limited area, a floor paved with flat stone slabs and covered with a layer of white burned, crushed flint mixed with charcoal was preserved.

The passage was 2.5 m long and 0.8 m wide. It had three sets of upright of which the central pair had been of a fair size, while both the inner and outer pairs were small (Fig. 3). Between the inner pair a large flat stone slab, set on edge into the ground, filled the space between the two uprights, constituting a threshold stone for a door arrangement. The outer pair of uprights had probably not carried a capstone. Towards the entrance, the kerbstones bend inwards, forming a funnel to the passage.

From the disturbed soil of the chamber came a few shards, fragments of amber beads and the front part of a flint chisel. Among the shards is one from a ledged vessel decorated below the rim with a horizontal row of stick stabs followed by vertical rows of stick stabs reaching down to the ledge. The vessel that must come from a burial in the chamber dates to a late part of MN A.

The pottery shards donated to the National Museum in 1905 must also come from burials in the chamber. They are from six different vessels – five shouldered vessels and a funnel-neck beaker (Fig. 4). Stylistically this pottery dates to MN A I–II.

A dense layer of stones, partly destroyed by ploughing lay outside the kerbstone line, east of the passage. Below the stones, up to 7 m east of the passage, deposits of broken pots were found. The stones continued, though not so densely, along the east side of the barrow, but without pottery finds.

The area west of the passage and partly in front of it was heavily disturbed. A few potshards in the disturbed layers are probably the leftovers of deposits like those found east of the passage.

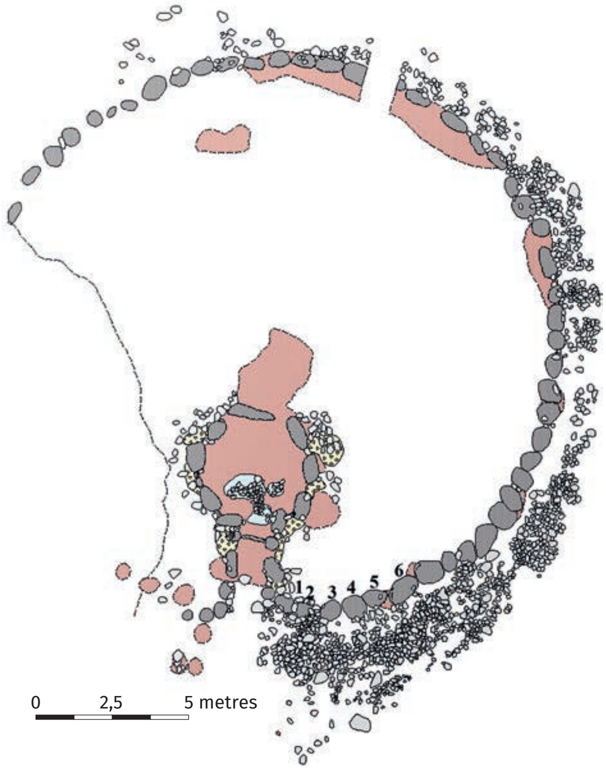

Fig. 3. Plan of the passage grave. Stone marks are shown in dark grey, clay and flint packing around the chamber in yellow and disturbances in red. The first six kerbstones east of the passage are numbered for comparisons with figures 21–24.

POTTERY DEPOSITIONS AT NØRREMARKSGÅRD

In front of the kerbstone line, the excavation revealed around 15.000 shards with a weight of app. 75 kg. The condition of the shards is generally good, and as the degree of decoration is high, it was possible for me to sort most of the shards (around 13.000) into 85 individual pots. Some of these pots are more or less complete, but in most cases, parts of the pots are missing.

The pots have been restored to varying degrees, but even where all or most of the shards from individual pots are preserved, complete pots have not been assembled. In some cases, this is due to the crumbling of shard edges, but mainly the reason is a decision not to use plaster to reconstruct the pots. Thus, just looking at the illustrations of the pots does not provide an idea of how well they are preserved. To obtain a preservation index, I have measured how much of the circumferences at characteristic points as the rim, the neck-belly transition and the transition between upper and lower bellies are preserved. Combining these measures with the respective diameters, I have calculated a preservation index in percentage for each pot. You can find the preservation indexes in the captions to the illustrations of the pots.

Anne Bjerrekær (BJERREKÆR 1992) studied the pots and the details of their deposition as part of her MA theses. Using stratigraphic evidence as well as horizontal and vertical plots of shards from individual pots, she separated seven major depositions and some possible single depositions of pots. I have reanalysed the material and separated eight major depositions,

Fig. 4. Shards from pots found in the chamber and donated to the National Museum in 1905 – M 1:3 (photo: T. Madsen).

Fig. 5. Seven of the nine pots found in deposition I – M 1:3. The preservation indexes for the pots are 25: 60 %; 27: 40 %; 57: 90 %; 58: 30 %; 61: < 20 %; 62: > 90 %; 63: 80 %; 80: < 20 % and 83: < 20 % (photo: T. Madsen).

seven of which are the same as those separated by Bjerrekær. There are, however, differences with respect to which pots belongs to what depositions.

Deposition I. This deposition consisted of nine pots (Fig. 5). The pots were placed in front of and between the third and fourth kerbstone east of the passage within an area of no more than 0.8 by 0.6 m, although some of the shards had been spread a little wider than this (Fig. 20). The deposition contains five funnel-neck beakers, three funnel-neck bowls and a pedestal bowl. The funnel-neck bowl 27 and the funnel-neck beakers 57, 62 and 63 were placed together in a low depression directly in front of a kerbstone. Later, activities in connection with an adjacent pit containing pottery depositions (VI–VIII) had disturbed Pot 27 with the result that many minor shards lay dispersed to the south and west. The same is partly true with pot 63. The funnel-neck bowls 25 and 83 lay on the slope of a small heap of burned flint and sand between two kerbstones (Fig. 7). They had obviously been disturbed during stone removal along the kerbstone line. The few shards from the pedestal bowl 80 lay adjacent to a kerbstone and slightly deeper than shards from the other pots. It was probably disturbed in connection with the removal of the kerbstone. The few shards from the funnel-neck beakers 58 and 61 lay on

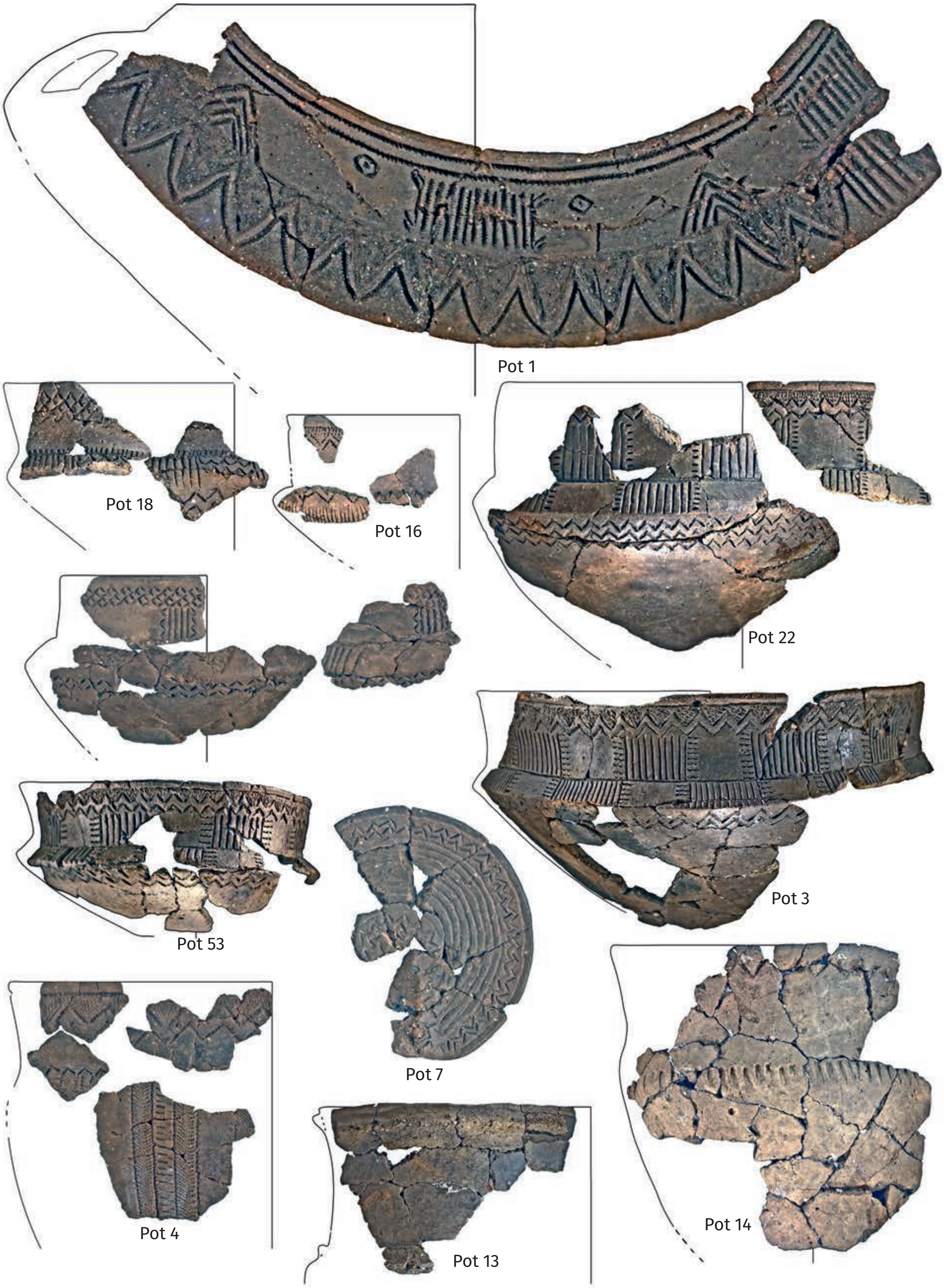

Fig. 6. Sixteen of the eighteen pots found in deposition II – M 1:3. The preservation indexes for the pots are 1: > 90 %; 2: 70 %; 3: > 90 %; 4: 20 %; 5: 70 %; 6: 40 %; 7: 60 %; 13: 60 %; 14: 30 %; 15: < 20 %; 16: 20 %; 18: 40 %; 19: 50 %; 21: 60 %; 22: 70 %; 23: ?; 26: 40 % and 53: > 90 % (photo: T. Madsen).

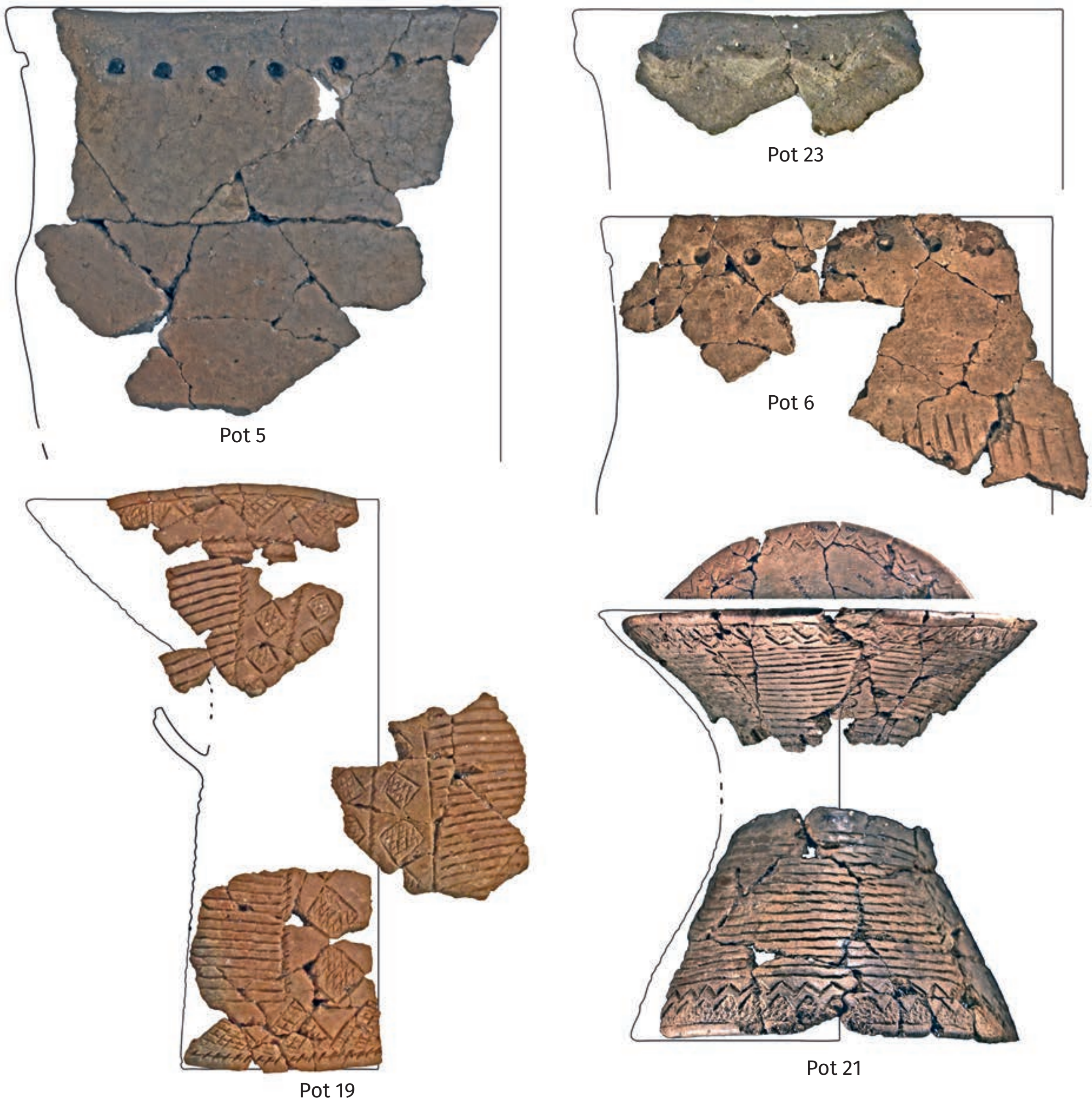

Fig. 6. Continued.

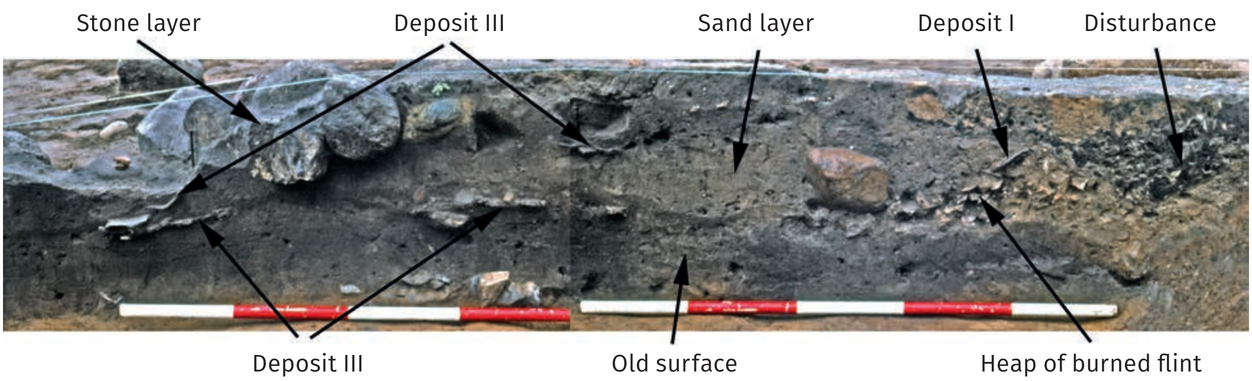

Fig. 7. Section through deposited layers in front of the kerbstone line seen from the east. The disturbance to the right marks the position of a kerbstone (photo: T. Madsen).

a slightly higher level than the shards from the other pots. Recent disturbances had clearly affected them.

Deposition II. This deposition consisted of eighteen pots (Fig. 6). The pots lay in front of the kerbstone line in an area measuring 2 by 1.7 m with most of them less than a metre from the kerbstones (Fig. 21). The shards lay on a humus-filled layer of sand that probably represents the original surface, and a layer of yellow-brown sand that sealed them off from the higher lying deposition III (Fig. 7) covered them. The sand was thickest close to the kerbstones, where it partly covered deposition I as well. It thinned down outwards where it disappeared after 1.8 m. and it thus only covered part of the shards from pots 13, 22, 23 and 26. The deposit contained seven shouldered vessels, five funnel-neck beakers, two funnel-neck bowls, two pedestal bowls, a clay ladle and a clay disk. The preservation of the individual pots is of special interest due to the covering layer of sand.

Three of the shouldered vessels are fully preserved. Pot 1 lay bottom up with three stones covering its centre (Fig. 8). The stones lay in such a way that they must have been thrown onto the pot, crushing it. The shards all lay concentrated within a small area and, apart from the crushing, apparently undisturbed. Most of Pot 53 lay almost undisturbed in a slanting position against a stone on which it may originally have been placed or more likely smashed against (Fig. 9). The position of the pot is above the general shard layer of deposit II visible below the pot and the stone. Pot 53 must have been one of the last pots added to the deposit before this was covered and engulfed in sand leaving us a snapshot from the past as seen on Figure 9. Yet a few of its shards lay a couple of metres from where it stood. Pot 3 lay broken with the shards concentrated within a limited area all covered by the layer of sand.

Seven pots (2, 5, 7, 13, 19, 21 and 22) had a preservation index between 50% and 70%. Characteristic for these pots are that major parts are present and often well preserved, while other parts of the pots are missing completely. An illuminating example is the clay ladle pot 7. All shards from one-half of the ladle lay together, while not a single shard from the other half was present. The shards from pots 2, 5, 7, 19 and 22 lay concentrated within limited areas, and there was no indication for a spread of the missing parts. Most of the shards from pots 13 and 21 also lay within limited areas, but 5–10% of the shards lay up to 3 m from their respective distribution centres continuing outside the layer of covering sand. Thus, missing parts from these pots may partly have been removed by disturbances from the plough zone.

Of the remaining eight pots, seven (4, 6, 14, 15, 16, 18 and 26) had a preservation index of less than 50% while for Pot 23 the index could not be established. For some of these pots all shards lay concentrated (pots 18, 23 and 26), for others (pot 4 and 6) most of the shards lay concentrated with a few spread out, while for the rest (pots 14, 15 and 16) the pattern is unclear. For all pots, however, the missing parts were definitely not to be found within the excavation area, and the covering layer of sterile sand preclude that they should have been removed through modern disturbances.

Fig. 8. Pot 1 from deposition II. The pot had been placed upside down and deliberately smashed with three stones. The stones lay directly on the rim of the pot, while bottom shards had collapsed around the stones, partly leaning against them. The hole to the right is the emptied stone mark from kerbstone 4. (photo: T. Madsen).

Fig. 9. Pot 53 from deposition II. The pot was one of the last to be added to deposition II before this was covered with sand. It had either been placed on the adjacent stone or smashed against it (photo: T. Madsen).

Deposition III. This deposition consisted of three pots (Fig. 10). They rested upon the layer of sand that covered deposition II. A layer of stones covered the shards (Fig. 7 and 22). The deposition consisted of two shouldered vessels and a pedestal bowl.

Fig. 10. The three pots found in deposition III – M 1:3. The preservation indexes for the pots are 8: 50 %; 17: 30 % and 20; 60 % (photo: T. Madsen).

All three pots had a main concentration of shards extending no more than a metre from their respective distribution centres, but for pot 8 and 20, 10 % of the shards had a wider distribution with up to 3 m from the centre point. There is no indication of how much time passed between the depositing of the pots and the coverage with stones, and hence arguing the reason for the missing parts of the pots is difficult. To the degree, that the distribution of shards had continued further than the current limit of the covering layer of stones, shards may have been lost to the plough zone.

Deposition IV. Four pots formed an easterly isolated group (Fig. 11 and 22). The pots lay on the old surface, and all shards from individual pots lay concentrated. The deposition contained two clay disks, a funnel-neck beaker and a shouldered vessel. As undisturbed deposits did not seal off the pots, we cannot argue the reason for the missing parts. Further, we cannot establish a relationship with the other depositions.

Deposition V. Seven pots that lay in front of the entrance close to each other and relatively deep may represent a separate deposition (Fig. 12 and 20). The deposition contained three funnel necked beakers, two shouldered vessels, one pedestal bowl and one clay ladle. The shards from the individual pots formed clear clusters, but some shards from pots 46, 52 and 69 lay between 1 and 2 m from their distribution centres. As undisturbed deposits did not seal off the pots, we cannot argue the reason for the missing parts. Further, we cannot establish a relationship with the other depositions. You may note that the position of this deposition is classical for clearances from the chamber. However, the high preservation index for each pot as well as the distinct distribution pattern of shards from individual pots speaks against a clearance from the chamber.

Deposition VI. Between the second and third kerbstone east of the passage a 0.9 by 0.9 m wide and 0.3–0.4 m deep pit had been dug partly undermining the kerbstones (Fig. 13 and 22). Stones filled the western part of the pit, while potshards filled the eastern part and continued under the stones as well. The deposit contained nine pots (Fig. 14), six of which were funnel necked beakers, one a shouldered vessel, one a pedestal bowl and one a clay ladle. The shards formed a solid mass in the pit, where it was not possible to identify individual pots during the excavation. As seen from Figure 21, the distribution centre for all pots lie within 50 cm of each other, but a few shards lay outside the pit as the result of a later recut into the pit with a new deposition (VII).

Deposition VII. This deposition consisted of nine pots – three funnel-neck beakers, three pedestal bowls, two shouldered vessels and one bowl (Fig. 15). They lay in a recut into the pit that contained deposition VI. The new pit was slightly larger than the previous (1.2 by 0.9 m), but shallower although still undermining the kerbstones. Only part of the shards lay inside the recut. A good deal lay outside to the west and some to the east where they intermingled with shards from pot 13 in deposition II (Fig. 22). The layer of sand that covered deposition II did not cover all shards from pot 13, so it is a uncertain whether the mixing with shards from deposition VII happened before or after the layer of sand had been added. Nor have we any evidence that the layer of sand had covered the pit at any point in time. The preservation indexes for the pots vary considerably, but on average, half of the pots are preserved.

Deposition VIII. A final deposition of seven pots(-Fig. 16) took place in and partly outside a 1.3 by 0.8 m wide, low depression that hardly can be called a recut

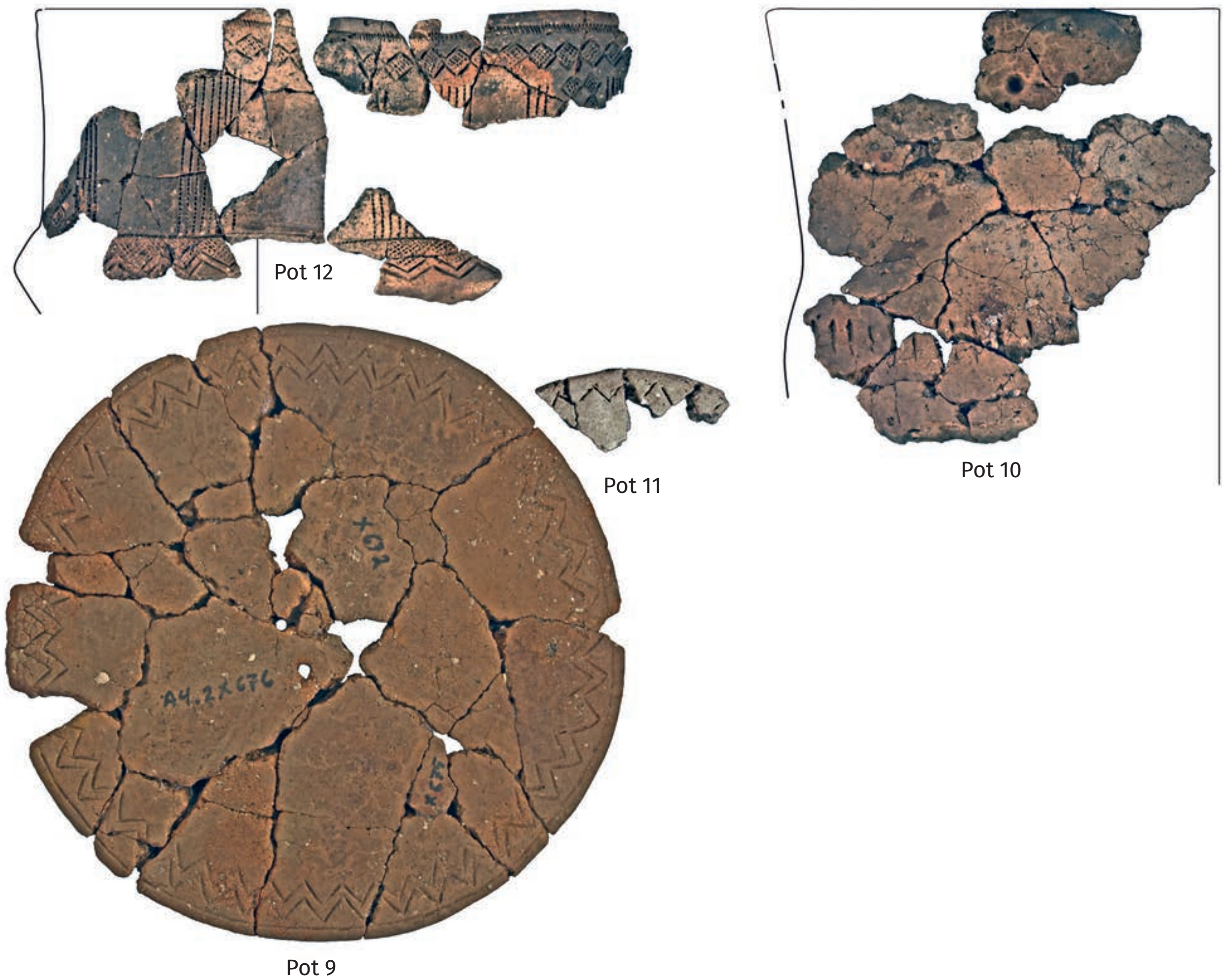

Fig. 11. The four pots found in deposition IV – M 1:3. The preservation indexes for the pots are 9: > 90 %; 10: 30 %; 11: 40 % and 12: 40 % (photo: T. Madsen).

into the pit (Fig. 17 and 23). The deposition consisted of three funnel-neck bowls, three bi-conical vessels, and one pedestal bowl. The pots lay in well-defined concentrations indicating individual depositing, but their preservation indexes are low. A layer of stones partly covered the shards. These stones lay in direct contact with the shards making depressions into the shard layer. When we removed a stone, the shards formed a perfect lining of the stone mark (Fig. 18). Obviously, the layer of stones had been laid down directly on the newly formed layer of shards partly being responsible for crushing them. This indicates that the missing parts of the pots were removed either before the stones covered the shards, or were never part of the deposition. If shards during the destructions had been dispersed further to the southwest than indicated on figure 23 some may have been lost to the plough zone, but in general the likelihood of modern disturbances appear low.

Additional pots. Seventeen pots cannot be attributed to any particular deposition (not depicted). Especially this is true with pots coming from the disturbed areas in front and west of the entrance. These pots include four funnel-neck beakers (pot 54, 66, 67 and 74), three shouldered vessels (pot 30, 76 and 84), three clay ladles (pot 39, 51 and 81), two clay disks (pot 43 and 65), two open bowls (pot 60, 78), a ledged vessel (pot 75), a pedestal bowl (pot 24) and a pot of uncertain type (pot 79).

Criteria for separating the depositions. As described above, I have separated eight depositions. The criteria for some of these separations are straightforward others are not. Depositions IV and V separated themselves by forming isolated groups with no overlaps to other depositions (Fig. 20 and 22) and a layer of sand separated depositions II and III (Fig. 7). The separation between deposition I and II on the other hand is not entirely clear, as there is no stratigraphic evidence. The two depositions lie adjacent to each other and some shards from deposition II crosscut with deposition I. Further, the sand that covered deposition II also covered deposition I. The main reason to see the two as separate depositions is partly the position of deposition I on a sloping »mound« of sand and fire cracked flint and partly that there appear to be a slight interruption between the tight group of pots in deposition I and the wider distribution pattern of pots in deposition II (Figs. 20 and 21).

The pit that contained deposition VI, VII and VIII was clearly visible throughout the excavation of the shard layers. Thus, stratigraphic observation separates these three depositions from the other depositions. Separating the three depositions from each other, however, proved to be a much more difficult task. During the excavation, it was clear that the outline and position of the pit changed as digging progressed, indicating that recuts had taken place, but there was no notable bottom lines of the cuts (the pit was not sectioned), and with each recut disturbances to the underlying shard layers obviously occurred. The only possible neutral criterion to separate the three deposits is the level of the shards in the pit. Consequently, I sorted the pots in a sequence using as a first criterion the depth of the lowest lying shard from each pot and next the lowest lying median depth of the shards from a pot. This gave a continuous distribution with no clear plateaus and therefore I had to make a judgement of where to place the borderlines for the three groups. Deliberately, I here considered stylistic elements. The figures for the primary criterion are deposition VI – depth 146–135 cm; deposition VII – depth 135–124 cm; deposition VIII – depth 123–109 cm. The measures are depth below an arbitrary datum line.

Depositional history. To reconstruct the depositional history we have the following stratigraphic observations: deposition II is older than deposition III; deposition VI is older than deposition VII; deposition VII is older than deposition VIII.

To gain additional information we have to look at the decorative elements on the pots from the depositions. This I did as follows: The presence of stylistic elements in the various decoration zones of the pots (rim, neck, shoulder, belly bowl-side, pedestal etc.) were counted separately and then added together to one set of counts for each pot. Next the counts for the pots were added together to form representative counts for the individual depositions. These counts were analysed through a correspondence analysis, where a criteria was that a variable had to have at least five occurrences to enter the analysis. This led to a simplification of the original recording as related stylistic elements were lumped together (for example I reduced straight cuts, arched cuts and flint edge cuts to cuts) and a few elements were left out (for example a rosette with only two occurrences). Originally, I recorded fifty-two elements that subsequently were reduced to twenty-one elements (Tab. 1).

The analysis shows a clear result (Fig. 19). If we apply the stratigraphic information outlined above we can see that there is a temporal sequence from left to right, and a differentiation on the left hand side between deposition I and V on the one hand and deposition II and VI on the other. I interpret the result as follows:

- The oldest depositions are deposition I and deposition V (Fig. 20). They are characterised by cuts, roundish stabs, simple rows, cross fills, chevron stack fills and to a lesser degree linear bands. Stylistically, the pottery dates to MN A I. Deposition I (Fig. 5) is clearly the older of the two, but deposition V (Fig. 12) on the other hand is just as clearly older than the depositions in the next group.
- The second set of depositions consists of deposition II and deposition VI (Fig. 21). It is characterised by chisel/spatula stabs, chevron rows, chisel-stab-lines, groove-lines, groupings (of rows and lines), triangle bands and scrape off fills. The content of the chamber attach to this group. Stylistically, the pottery from deposition II (Fig. 6) and deposition VI (Fig. 14) dates to a late part of MN A I or an early part of MN A II depending on which particular pots you favour to base your date on. Deposition VI appears to be the older of the two.
- The third set of depositions consists of deposition III, deposition IV and deposition VII (Fig. 22). It is characterised by cardium imprints, cross-stab-lines, chevron stacks, and as an intermediate between older and younger depositions, by chisel/spatula stabs, chevron rows and rhomb bands. Stylistically, the pottery from these three depositions dates to MN A II where deposition VII (Fig. 15) is the older and deposition IV (Fig. 11) and especially deposition III (Fig. 10) are the youngest of the three.
- The youngest deposition is deposition VIII (Fig. 23). It is characterised by dent-stabs, dent-stab-lines, chevron bands, linear bands, rhomb bands, oblique fills and transverse fills. Stylistically, the pottery in deposition VIII (Fig. 16) belongs to the Ferslev style dating to early MN A III.

The result of the analysis shows that the minimum number of depositional events cannot be less than four based on the stylistic differences in the material, but the number of events must be higher even though all eight depositions are not necessarily separate events in time. We should not overlook the possibility of parallel depositions. For the time being, however, I view all eight deposits as separate events in the following order:

1. Deposition I consisted of nine pots placed individually in a tight group in front of and very close to two kerbstones situated in part on a small heap of burned flint and sand (Fig. 20). The pots had a highly variable preservation (between < 20 % and > 90 %) partly due to modern disturbances.

Fig. 12. Six of the seven pots found in deposition V – M 1:3. The preservation indexes for the pots are 46: < 20 %; 52: 70 %; 68: 70 %; 69: 70 %; 70: 90 %; 71: ? and 73: 40 % (photo: T. Madsen).

2. Deposition V consisted of seven pots placed individually in front of the entrance (Fig. 20). Even if modern disturbances are fully possible for this deposition, preservation indexes are generally high. Stylistically the deposition belongs here in the sequence.
3. Deposition VI took place associated with stones in a 40 cm deep pit dug adjacent to a kerbstone partly undermining this (Fig. 21). The deposition consisted of nine pots with between 20 and 80 % of the individual pots accounted for.
4. Deposition II consisted of eighteen pots placed individually over a 4-m^2 area in front of the kerbstone line (Fig. 21). Subsequently a layer of sand sealed off the deposit. This created a favorable condition for observation: Pots were deliberately destroyed after they had been deposited; Pots were still being deposited after previously placed pots had been destroyed; Missing parts of some of the pots were either not deposited or were removed from the site as part of the destruction process. Preservation indexes varies widely between < 20 % and > 90 % emphasizing the effect of these activities.
5. Deposition VII took place in a recut into the pit that contained deposition VI (Fig. 22). It consisted of nine pots that mainly lay in the pit but with a fair amount of shards found outside it as well. The preservation indexes vary between 20 % and 80 %. Disturbance occurred in connection with the following deposition (VIII) and missing parts of the pots may have been removed on this occasion, but more likely, they either were removed in connection with the deposition itself or were not part of it.
6. Deposition IV consisted of four pots placed individually in a group in front of the kerbstones to the east of the other deposits (Fig. 22). One pot was completely preserved while the three others had indexes of 30 – 40 % only. It is uncertain to what degree this is due to modern disturbances.
7. Deposition III consisted of three pots placed individually on the layer of sand that covered deposition II (Fig. 22). The pots with preservation indexes that vary from 30 % to 60 % were destroyed and the shards spread out before a layer of stones covered the deposit. It is uncertain when this happened and what happened to the missing parts.
8. Deposition VIII consisted of seven pots placed individually, partly in and partly outside a shallow depression in the top of the pit that contained deposition VI and VII (Fig. 23). With preservation indexes between < 20 % and 40 % only, the pots are notably incomplete. Despite the possibility of modern disturbances if the shards had been dispersed further than recorded during the excavation, I find it likely that the missing parts either were removed before the coverage with stones, or were never part of the deposition.

Table 2 summarize the content of the depositions. We find that funnel-neck beakers including storage vessels, shoulder vessels and pedestal bowls make up the majority of the pots with funnel-neck beakers dominating in the beginning, gradually superseded by shoulder vessels, and with pedestal bowls as a stable component throughout the sequence. If we look at the average preservation index for the depositions, we may find that there is a tendency for the late depositions to contain fewer parts of the individual pots than the early ones. Deposition I breaks this pattern, but this is probably the result of the disturbances caused by the removal of kerbstones. As noted above in the summary of the individual depositions, post-depositional activities may have affected some of the depositions. These activities have happened over the last one-hundred years following the total destruction of the tomb and with the advent of heavy farming machinery. The layer of stones that covered most of the area where the depositions took place, however, formed a shield against this hazard. Only to the degree that parts of the depositions are located outside this stone layer, modern disturbances are a possibility.

Fig. 13. The pit in front of the kerbstone line containing deposition VI (photo T. Madsen).

In addition to the eight depositions recognised and defined there must have existed more, as indicated by the seventeen pots that mainly come from disturbed areas. If there has been some kind of symmetry in the depositions around the entrance, then we should expect the existence of a number of depositions in the

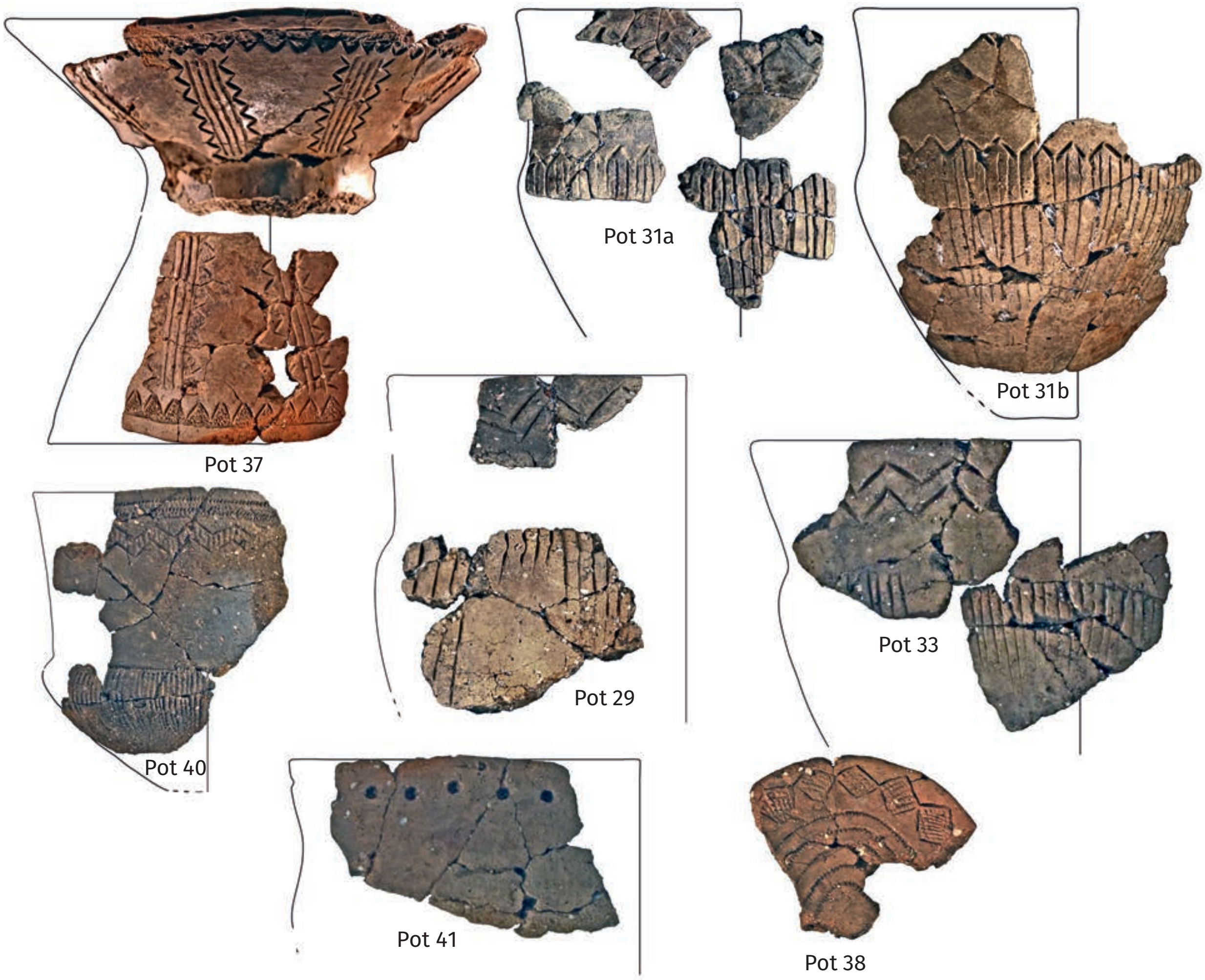

Fig. 14. Eight of nine pots found in deposition VI – M 1:3. The preservation indexes for the pots are 29: 40 %; 31 a & b: 80 %; 33: 50 %; 37: 80 %; 38: 60 %; 40: 80 %; 41: 50 % and 48: 50 % (photo: T. Madsen).

completely destroyed area west of the entrance. How many is pure guesswork of course, but we cannot neglect them if we want to evaluate the deposition activity in front of the tomb.

The depositions represent a time interval from somewhere in the middle of MN A I to somewhere in MN A III, which equals a period of 150–200 years. This would mean a deposition every 20–25 years on average. If

Fig. 15. The nine pots found in deposition VII – M 1:3. The preservation indexes for the pots are 34: 80 %; 35: 60 %; 36: 80 %; 49: 40 %; 50: 50 %; 55: 40 %; 56: 20 %; 59: 30 % and 64: 20 % (photo: T. Madsen).

there was about the same number of depositions west of the entrance, the average could come down to around 10–15 years, unless of course the depositions west of the entrance started earlier, which they may well have done.

Without committing ourselves too much to exact numbers, we can conclude that depositions occurred in front of the Nørremarksgård passage grave with an average interval of 10–20 years.

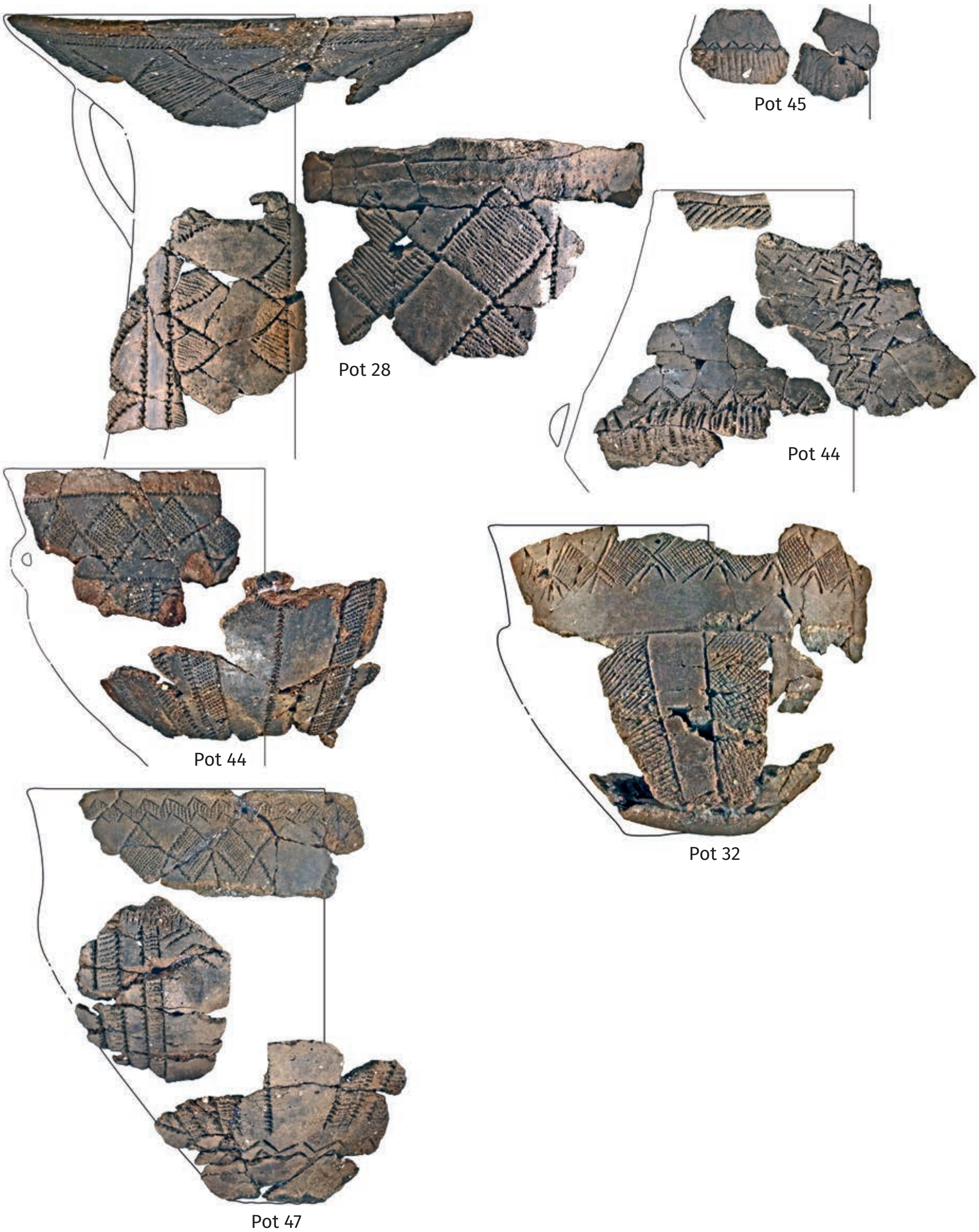

Fig. 16. Six of the seven pots found in deposition VIII – M 1:3. The preservation indexes for the pots are 28: 40 %; 32: ?; 42: 30 %; 44: 40 %; 45: 20 %; 47: 30 % and 85: < 20 % (photo: T. Madsen).

THE POTTERY DEPOSITIONS IN A WIDER CONTEXT

Coverage of depositions. Soil and/or stones always cover pottery deposited in front of megalithic tombs. Otherwise, we would not find the shards today. The nature of the coverage has drawn little attention, however. We may tend to see it as the result of an erosion from the barrow, but it is a view that we should challenge. At Nørremarksgård, a layer of sand covered deposition II immediately after the event. A new deposition (III) was added, and subsequently a dense layer of stones covered the whole area in front of the tomb. We can explain neither the layer of sand nor the heap of stones by erosion from the barrow. A number of observations at other passage graves points in the same direction.

Fig. 17. Deposition VIII in front of the kerbstones on the left and deposition II on the right (photo: T. Madsen).

Fig. 18. Shards from pot 44 in deposition VIII found immediately below a covering layer of stones. The stones lay in direct contact with the shards (a). When removed a depression from the stones in the shard layer could be seen (b) (photo: T. Madsen).

At the nearby Grønhøj, an up to 30 cm thick tightly packed layer of coarse yellow sand that had virtually cemented around the shards covered the pottery in front of the tomb, followed by a dense layer of stones (THORVILDSEN 1946, 80–81). Thorvildsen does not discuss the origin of the layers of sand and stones, but his choice of words indicate that he considered both as the result of deliberate acts: The sand »was placed« and the stones »were heaped up«.

At Jordhøj, a 10–15 cm thick layer of grey sand followed by 10–15 cm of grey-black greasy sand covered the pottery. The latter contained artefacts from the first clearance of the chamber, which probably took place in MN A V or slightly later (KJÆRUM 1970, 26, 52–54). A covering layer of stones was thus not present. Kjærum does not comment on the origin of the layer of grey sand, but as the surface of the barrow behind the kerbstones were covered with a layer of white, fire cracked flint, and as no such flint was found in the sand, it cannot have been created by erosion from the barrow.

At Hagebrogård, a »mound of earth«, 2–3 m wide and up to 50 cm thick covered the pottery, followed by a layer of stones (JØRGENSEN 1977, 14–15). At Vroue Hede I, a low yellow-grey heap of sand followed by a layer of stones covered the pottery (JØRGENSEN 1977, 42–43), and at Vroue Hede III, a crescent-shaped 4 m wide 11 m long and up to 60 cm high heap of sand followed by a layer of stones covered the pottery (JØRGENSEN 1977; 107, 110).

At Egeløkke, a 2 m wide and 5 m long heap of stones covered the pottery. Four thick-butted flint axes lay on top of the stones (SKAARUP 1985, 98). At Skovtofte, the pottery were »mostly« embedded in grey sand and covered by a large heap of stones, upon which several thick-butted flint axes, two thick-butted flint adzes, a pointed-butted flint adze, and a couple of flint chisels were found (Skaarup 1985, 103). At Tvede Skov, the pottery lay embedded in sand, and covered by a 3 m wide, 7.5 m long and up to 40 cm thick crescent shaped heap of stones, upon which lay eleven thick-butted, thick- and thin-bladed flint axes (SKAARUP 1985,106, 108). At Hjulbjerg, a 2.5 m wide, 7–8 m long and up to 40 cm high crescent shaped heap of stones covered the pottery, and at Kragnæs, the pottery lay below and partly embedded in a 3 m wide stone heap. Directly in

Tab. 1. Table showing counts of stylistic elements on pots from the depositions and in the chamber.

	TECHNIQUE					ROWS		LINES				BANDS				BAND FILLS					
Deposit	Cuts	Roundish Stabs	Chisel/spatula stabs	Dent stabs	Cardium imprints	Simple rows	Chevron rows	Groove-lines	Dent-stab-lines	Chisel-stab-lines	Cross-stab-lines	Linear bands	Triangle bands	Chevron bands	Rhomb bands	Transverse fills	Oblique fills	Cross fills	Chevron stack fills	Scrape off fills	Groupings
I	7	3	15	2		6	6	7		1	3	3	2		1			6	1		2
II	7	5	31	9	9	11	23	9	1	6	13	1	14		2		2	4	1	7	9
III		1	7	5		1	4		2		2		2		2		3			1	1
IV	1	1	6	3		2	3	2	2		1		1		2		2	1			2
V	5		6			1	4	2		1	4	1	2		1		1	2	1		1
VI	2	1	14			1	7	5		5	3		4	1	1	1		1		4	3
VII	3		17	7	4	2	13	8	2	2	6	1	2	2	4		6	1	1	1	3
VIII	2		9	24	4		11	3	3	2	13	7	1	3	6	3	12	2	1		
Chamber			4	2	1		6	8			1	1			1					1	2

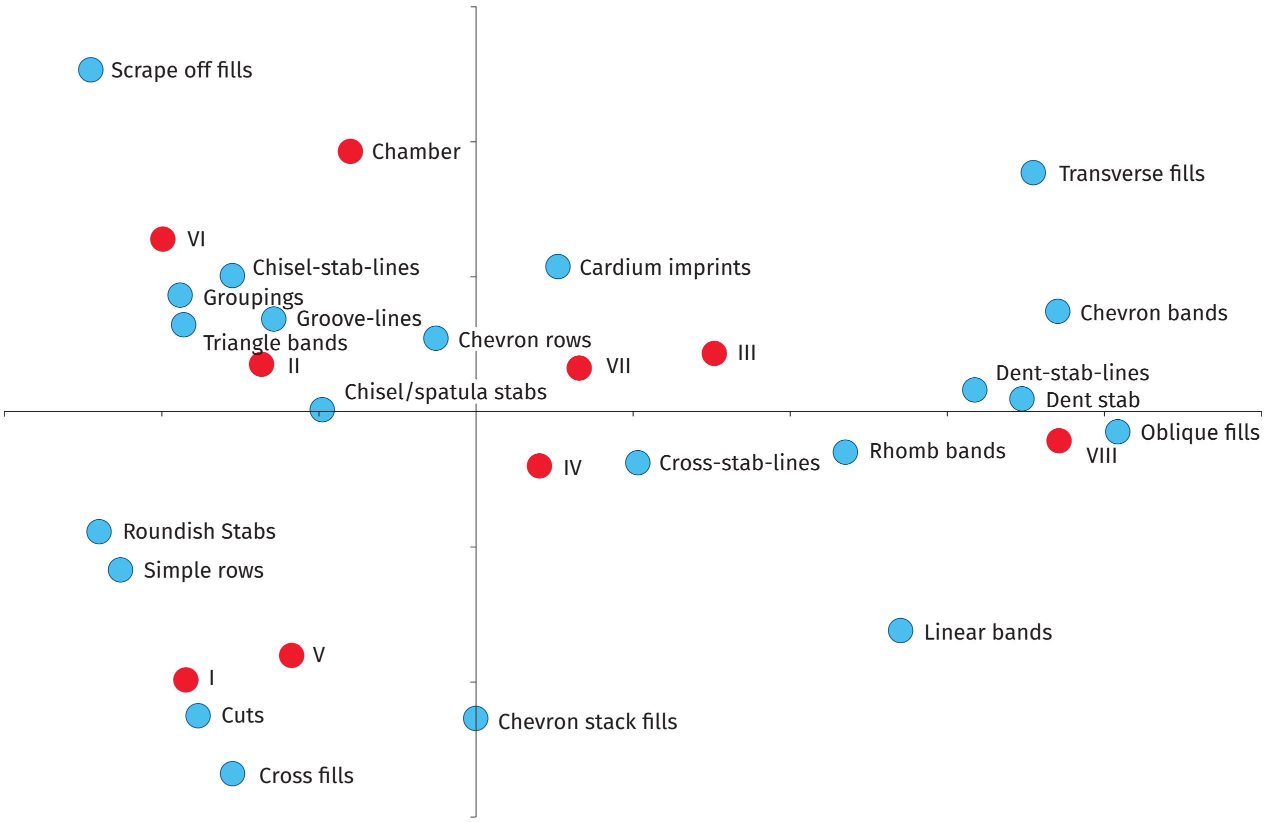

Fig. 19. Correspondence analysis of the counts in table 1. A combined plot of depositions and stylistic elements on the two first principal axes are shown.

front of the entrance, also covered by the stone heap, a layer of brown greasy sand containing many shards from MN A in general constituted a clearance layer (SKAARUP 1985, 253–54).

At Knarregård, the pottery lay embedded in a 15–40 cm thick layer of sand covered by a heap of stones (ROSENBERG 1929, 234), and at Nordre Stensebygaard, the pottery lay embedded in a 20 cm thick

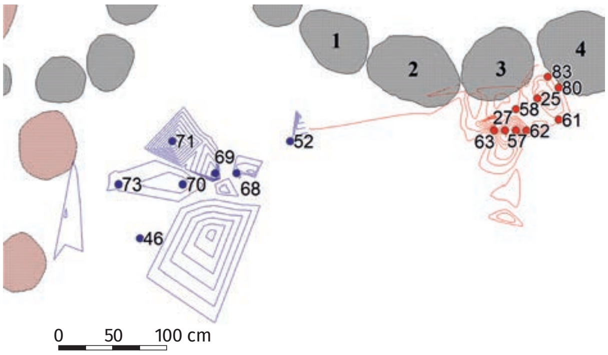

Fig. 20. Map showing the position of deposition I (red) and V (blue). Dots with pot numbers show the centre points of shard distributions for individual pots, and contour-lines show the overall distribution of shards in the depositions.

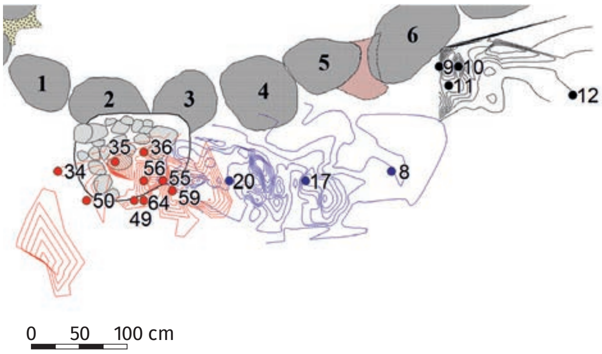

Fig. 22. Map showing the position of deposition III (blue), IV (black) and VII (red). Dots with pot numbers show the centre points of shard distributions for individual pots, and contour-lines show the overall distribution of shards in the depositions.

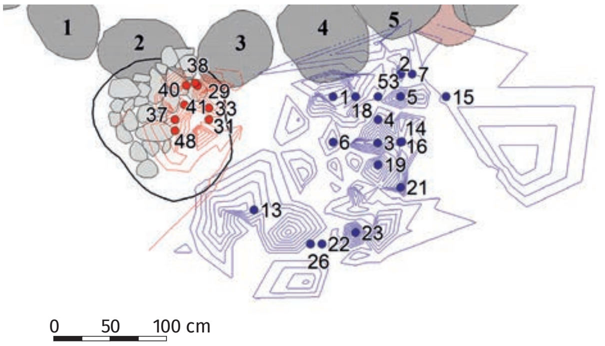

Fig. 21. Map showing the position of deposition II (blue) and VI (red). Dots with pot numbers show the centre points of shard distributions for individual pots, and contour-lines show the overall distribution of shards in the depositions.

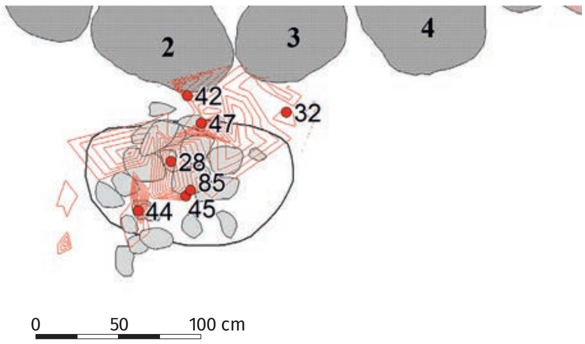

Fig. 23. Map showing the position of deposition VIII. Dots with pot numbers show the centre points of shard distributions for individual pots, and contour-lines show the overall distribution of shards in the deposition. Note that the stones covered the shards, and not the other way around as you might believe from the graphics.

layer of »former agricultural« soil covered by three separate heaps of stones (ROSENBERG 1929, 238). At Fjälkinge 9, the pottery lay compressed in a 5 cm thick layer of black, burned soil covered by a layer of stones (BAGGE & KAELAS 1950, 68). Finally, at Kong Svends Høj, a layer of crushed white burned flint covered the pottery (DEHN et al. 1995, 86 ff.).

These examples from northern Jutland, the Danish isles and Scania clearly shows that there was a wide spread practise of covering the pottery with heaps or layers of stone. The available dating evidence shows that in many cases, this occurred around the turn from MN A to MN B but of course, some may also be earlier. In most cases, if not always, the pots below the stones lie embedded in a layer of sand. At Grønhøj, the coarse yellow sand that had cemented around the shards included both early and late pottery. The best-preserved pots, lying close to the kerbstones, where the layer of sand was thickest, all belonged to the oldest depositions. The sand must have piled up around these pots shortly after their deposition, and before the deposition of the late pottery. The late shard material was very fragmented and difficult to reconstruct into pots, but we have no information as to the reason for this condition.

At Nørremarksgård, it was clearly demonstrated that deposition II was covered by sand after its deposition. The shards from depositions IV and V also lay in sand when found. The only difference to layer II was that we could not make any inference about the origin of this sand. The circumstances for deposition III is less clear. A layer of stones covered the shards, but there is no evidence of when the coverage happened.

Depositions in pits. At first glance, the pit containing depositions VI, VII and VIII is a unique feature. However, pits in front of megalithic tombs containing pottery are not an entirely unknown phenomenon. At a long dolmen at Tolne, a pit immediately in front and partly below a kerbstone contained a shard from a pedestal bowl. The excavator assumed that the pit antedated the dolmen (STERUM 1975, 159–60). At a passage grave at Vedsted, a pit east of the passage contained a shard layer. Klaus Ebbesen, who published the site, assumed it was old fox burrow (EBBESEN 1979, 24 fig. 32). Judging from the photo of the pit, I find this unlikely.

At Nørballe, two pits outside the kerbstone line contained shards from at least seventy pots dating to MN A I–II. Because the presence of a thick-butted flint axe and a tongued arrowhead of type D, the excavator considered the content of the two pits to be the result of a »cleaning operation« in the chamber, passage and in front of the passage (SKAARUP 1985: 165–66). At Kragnæs, a pit close to the kerbstone line contained shards from eight different funnel-neck beakers, a clay disk and eighteen flake scrapers of flint (SKAARUP 1985, 254). At Ramshög, pits outside the kerbstone line contained shards from a number of different pots. As the pots date to more stylistic periods and shards from the pits matched with shards found outside the pits, the pits were considered to represent a secondary deposition (STRÖMBERG 1971, 364).

At first glance, none of these examples matches the pit at Nørremarksgård, and yet they may. If we had excavated the pit at Nørremarksgård with less rigour and focus on stratigraphic control, then it would have looked a lot like the pits from Ramshög with pottery from different periods and with shards outside the pit that fitted with shards inside it. The same might be true with the pit at Nørballe. Here it all hinges on where the flint in the pit comes from. Still the pit at Nørremarksgård presents us with some new intriguing problems and questions. Foremost of these, how exactly did the deposition take place?

If the pots of deposition VI had been deposited individually in the pit, we would have been able to identify them during the excavation, even if they had been smashed and shards had been (re)moved by the later recut. All we could see, however, was a solid mass of shards from where I could separate pots only later. The conclusion must be that the pots were already broken up before deposition.

The find circumstances of deposition VII were somewhat different and more complex as shards from the pots lay not only in the pit but also outside it to the west and to the east, where they intermingled with shards from deposition II. It is not possible to decide whether the pots originally lay in the pit and later were disturbed, or if shards from the pots were deposited both inside and outside the pit, in which case the pots must have been broken up before deposition.

The pots of deposition VIII were deposited individually, but subsequently smashed thoroughly with a layer of stones that was part of the deposition.

The pit leaves us with the clear impression that a deliberate reduction of the pots to a shard layer was an integrated part of the rituals. The pots had to be destroyed, and as part of the destruction, parts of the pots were removed from or never introduced into the material deposited. Are these observations unique to this pit or do they apply on a wider scale? Is deliberate destruction of pots in depositions the rule rather than the exception, and was it common that only part of the pots ended up in the deposits?

Destruction of pots. The shouldered vessel (pot 1) placed upside down with three stones through its bottom is indisputable evidence of deliberate destruction of a pot placed in front of a megalithic tomb (Fig. 8). I know of only one direct parallel. In front of the passage grave at Vroue Hede I, a pot lay upside down with a stone pressed through its bottom (JØRGENSEN 1977, 42).

Tab. 2. Showing the distribution of pottery types across depositions arranged in a chronological order. Numbers in brackets show how many of the funnel-neck beakers in a deposition are of storage vessel types. The last row of the table shows the average preservation index for the pots in each deposition.

	DEPOSITIONS							
	I	V	VI	II	VII	IV	III	VIII
Funnel-neck beaker	5	3	6(1)	5(4)	3	1		
Bowl	3			2	1			3
Shoulder vessel		2	1	7	2	1	2	
Pedestal bowl	1	1	1	2	3		1	1
Clay ladle		1	1	1				
Bi-conical vessel								3
Clay disk				1		2		
Preservation index	48	57	59	55	47	53	43	28

Fig. 24. Three pots placed upside down in front of kerbstones at the Grønhøj passage grave. Photo from excavation report.

Pots placed upside down in front of the kerbstones are also known from Grønhøj, where it was suggested that they had been placed on top of the kerbstones, from where they had fallen down, ending upside down right in front of the kerbstones. Four such pots occurred, and shards from one of them came from behind the kerbstones proving to the excavator, their original position on the barrow (THORVILDSEN 1946, 82–83).

A picture from the excavation report shows three of the pots standing in front of the kerbstones (Fig. 24). Two of them lie squeezed in very close to the kerbstones, standing in a perfect upside down position. I find it impossible that they should have fallen there by themselves. Indeed, it is doubtful whether large pots tumbling down from a barrow would ever land in an upside down position. They are much more likely to end up lying on their sides. Further, the shards found behind the kerbstones lay 2 m from the pot to which they belonged.

The deposition of pots on top of the kerbstones or the barrow surface is a standard assumption in the literature (MIDGLEY 2008, 150–51). It originated at Grønhøj with the four pots standing upside down, but exactly those four pots do not prove the assumption. They were beyond doubt deliberately placed upside down where they stood. However, pots were in some cases placed on top of the kerbstones as well-documented cases show (KJÆRUM 1970, 49; EBBESEN 1979, 30–32; DEHN et al 1995, 91). I do not believe, however, that pots were left there to disintegrate and for shards to be dispersed by chance. Rather, they may have been displayed there and subsequently broken before the shards were deposited. Whatever happened during the different stages of the rituals performed, the pots were meant to be left broken in front of the kerbstones.

At Nørremarksgård, deposit II is the well-documented example of this. As at numerous other megalithic tombs, we can decide the position of the individual pots from the distribution of the shards (Fig. 21), but in contrast to other tombs, we can also say something about what happened to the pots before sand covered them. Apart from the evidence from pot 1, pot 53 shows us that other pots of the deposit were already reduced to a layer of shards, when it was added to the deposition (Fig. 9). One conclusion from this is that pots in a deposition had to be broken. It was part of the rituals to break up the pots. Another inference we can make from the situation in Figure 9 is that deposition II was not a mass deposition of pots with a subsequent coverage. Probably, pots were added and destroyed individually or in small batches until the rituals were completed and the deposited material covered.

There is discordance here with the more or less contemporary deposition VI in the pit. The nine pots here were broken up and deposited as one. The result was the same, but the procedures must have been different. One possible reason could be that only the final part of the rituals had taken place at the tomb, and that the shard material came from rituals somewhere else.

Depositing incomplete pots. The amount of shards from individual pots in depositions is often such that we may assume that they had been complete or almost complete, when they were deposited. However, were they? We can reconstruct many pots, but not reassemble them completely because parts of the pots are missing. Normally, we consider this irrelevant, as disturbances may have removed part of the pots. This is even more the case, where large parts of pots are missing. Can we be sure, however, that it is always later disturbances that are responsible, or could it be due to cultural formation processes in the past? Obviously, we have to focus on instances where sand covers the deposits. At Grønhøj Thorvildsen could point to the spot of deposition for more than 20 pots (1946, fig. 1), but only few of these were »complete«. The excavation, however, was not of a nature where we can claim beyond doubt that the missing parts are not missing due to disturbances. The same is true with most excavations. If we do not recognize and address the problem during the excavation, then subsequently we are left in doubt.

Already Nordman (1917a, 89) mentioned the possibility of the deposition of incomplete, fragmented pots in front of passage graves in connection with Mejls, and in a major, unfortunately unpublished work, Lars Holten (1997) focused on the presence of incomplete fragmented pots in front of the megalithic tombs as opposed to more complete pots inside the tombs.

At Nørremarksgård, we can address the problem in connection with deposition II and deposition VI. For deposition II the covering layer of sand provided with a *terminus ante quem* by deposition III, precludes any ideas of modern disturbances. Thus, we must explain missing parts of the pots in terms of formation processes in contemporary society.

The preservation indexes for the pots varies from over 90 % to less than 20 % (se caption to Fig. 6), and on average, 59 % of all pots is present. Pot 1 that we know was broken in situ is one of the pots with a preservation index above 90 %, and the same is true with Pot 53 that was smashed against or placed on a neighbouring stone (Fig. 9), although some of the bottom shards are in fact missing from this pot.

If pots with a lower preservation index belonging to deposition II were treated in the same way as pot 1 and 53, we must assume that a removal of parts of the pots occurred. Logically, we can explain these missing parts in two ways: they were removed after the pots were broken but before the sand cover was added, or the pots were broken elsewhere and only part of them were deposited. We do not know which of these options are correct.

For deposition VI between 20 % and 60 % of the pots were missing. As the shards from the pots entered the pit as one batch the missing parts must have been removed before deposition took place.

BURIALS AND DEPOSITS

A variety of tombs was in use during the millennium that the TRB culture lasted in South Scandinavia. They include: Simple inhumation graves; Earthen long barrows and elongated enclosures with wooden built chambers or wooden and stone built cists; Dolmens of various forms; Passage graves; Mortuary houses; Flat grave cemeteries.

Most notable in EN I is the earthen long barrows and enclosures (Madsen 1979, 1993). They were probably introduced around 3800 BC (Sørensen 2014, 112), and recent research show that they may be even more versatile than they appeared originally (Andersen 2015). Parallel to these we also have simple inhumation graves as the well-known Dragsholm grave now firmly dated around 3700 BC (Price et al. 2007, 212). Graves with preserved skeletons are very few, but in addition to the grave from Dragsholm and a few others with one individual (Ebbesen 1992, 88 ff. numbers 13, 15 and 50), we have graves with four and five articulated individuals (Madsen 1993). In some cases, the graves are richly furnished including copper ornaments (Becker 1947, 249–254; Stürup 1966; Liversage 1992, 25; Kristiansen 2000; Andersen 2015, 124). Pottery occurs in the graves (Ebbesen 1992, fig. 10) as well as in association with the barrows. Mostly we find it in connection with the timber facades that terminate the barrows in one end (f. ex. Madsen 1980, 88–96; Kristensen 1991, 75–76, Liversage 1992, 31), although pots along the sides of the barrows are known also (Kjærum 1977, 23; AUD 1995, 176). The pots appear complete and in many cases unbroken, when deposited, not only in the graves, but also at the terminal facades.

In EN II, dolmens become dominant, although the use of both earthen long barrows with wooden chambers and simple inhumation graves continue. Already in 1947, C. J. Becker (1947, 264–269) advocated that the dolmens were locally developed from cists of wood and stone, something that today has been substantiated (ERIKSEN/ANDERSEN 2014, 97 ff.). The dolmen chambers datable to EN II covers a range of forms from closed to more or less open types (ERIKSEN/ANDERSEN 2014, 39 ff.). Skeletal material with an unquestionable date to the period is not abundant, but exists. Traditionally, we view the burials as articulated, but some of the finds do not support this view. In a recent survey, Eriksen and Andersen (2014, 273 ff.) suggests that all burials in dolmens in fact were disarticulated. I am not fully prepared to follow this view. Some of the dolmens contain fully articulated but disturbed burials, I believe, as do the contemporary simple inhumation grave from Lohals (SKAARUP 1985, 324). However, things were changing, and some form of disarticulation did occur in EN II. The grave goods also change and become less lavish. We see a shift away from axes and amber beads and towards a standard inventory of a collard flask and/or a lugged flask, previously known as a dolmen flask. Pottery deposited outside the tombs is virtually unknown, but may turn up more frequently as excavations of monuments become more complete (see f. ex. ERIKSEN/ANDERSEN 2014, 261).

In MN A I we end up with evolved dolmens and passage graves. There are plenty of old excavation photos of Danish passage grave chambers with stacks of bones, illustrating the use of the chambers for mass burials. Unfortunately, most of the bones in these pictures are with high probability from MN B and LN. A good example is the passage grave Hjulbjerg on Langeland (SKAARUP 1985, 190 ff.). Here bones from a large number of people in more layers occurred. The upper layer clearly dated to MN B and LN, but the lower was expected to date to MN A. ^{14}C dates, however, of seven femurs from different persons all fell in LN (RAHBEK/RASMUSSEN 1996, 303–304). I should add, though, that it is unclear from which layers the dated specimens came.

When it comes to the use of the chambers in MN A, we know very little. From Denmark, our best knowledge comes from a burial layer in the Trekroner polygonal dolmen on Zealand ^{14}C dated between 3360–3020 BC cal., which clearly points to MN A and possibly to an early part of this period (KAUL 1994, 7–11). The burial layer that held no datable artefacts contained bones from at least five adults and five children. The preservation of the bones was good, but still a large number of bones were missing from the individuals, especially the larger long bones and the skulls (but not the jaws). Another example comes from the passage grave at Sarup Gamle Skole on the Island of Fyn. On the primary floor were some badly preserved bones together with a couple of un-datable flint tools. A lower jaw among the bones was from a 16–20 year old, presumably a girl. On a secondary floor that sealed off the original floor, badly preserved bones from several persons were found together with artefacts. The oldest datable artefacts on this floor were pottery from MN A II (ANDERSEN 1997, 97–8, 116–17; ANDERSEN 2000, 21; Niels H. Andersen personal communication).

In the double passage grave Aldersro on Zealand (HOLTEN 2000), sealed off burial layers contained bones from several individuals without anatomical order and with many parts of the bodies missing (no anatomical report is available). ^{14}C dates of bones from both chambers resulted in dates between 3100–2500 cal BC, equalling the second half of MN A and the first half of MN B approximately. Artefacts were present in both burial layers datable to MN A II–V (HEINEMEIER/RUD 2001, 317–318). From Scania it is worth mentioning a pit below the floor of the Carlshögen passage grave with selected bones from a number of individuals including a skull ^{14}C dated to between 3100–2700 cal BC equalling the last half of MN A and the beginning of MN B (STRÖMBERG 1971, 59). To this comes a pit below the floor of the Ramshög passage grave with selected bones from two individuals ^{14}C dated to between 3350–3000 cal BC equalling the first half of MN A.

The most detailed information from South Scandinavia, however, comes from the passage grave Frälsegården in Falbygden (SJÖGREN 2015). The bone material stems from at least 51 individuals that roughly represented two groups of interments. The younger group, characterised by persons interred in articulated conditions, dates around 3000–2900 cal BC equalling the first half of MN A V. The older group showing signs of disarticulation dates around 3100–3000 cal BC equalling MN A II-IV. It has not been possible to determine the precise nature or cause of the disarticulation.

Passage graves with large amounts of grave goods are common. Good examples are the double passage grave from Gundsølille on Zealand (EBBESEN 1975,346 ff.) and the passage grave Hjulbjerg on Langeland (SKAARUP 1985, 190 ff.). When it comes to dolmens or passage graves with undisturbed inventories from the beginning of MN A, however, there are only few to mention.

Most notable is Grønhøj. In a 25 cm thick layer of yellow sand lay four unbroken pots (Fig. 25), one broken but completely preserved pot, and one broken pot, where part of the shards were missing. In addition to this, the layer contained a thick-butted flint axe, six flint flakes, two amber beads and a few loose shards only. Above the layer came artefacts from LN

Fig. 25. Two of six pots preserved unbroken on the floor of the Grønhøj passage grave. Photo from excavation report.

burials (THORVILDSEN 1946, 77–79 fig. 3, fig. 12). The stylistic date of the pots in the chamber match the stylistic development in the deposits outside the chamber, and the immediate impression is one of a limited number of interments in the chamber, where on each occasion great care was taken not to disturb the artefacts associated with earlier burials. There were no traces of bone in the acid sand, but neither was there any dark discolorations indicating a major burial layer.

Also notable is Mogenstrup on Djursland (NORDMAN 1917a, 94–98). The chamber contained two complete pots and shards from a third incomplete pot standing on the floor. A small amber bead and a thin-butted, thin-bladed flint axe lay in a pit dug into the floor. The pots and the flint axe dates to MN A I, and one of the pots – an open bowl – to its very beginning. We know nothing about pottery offerings outside the tomb, as excavations were never carried out there.

At Hagebrogård, two complete pots stood on the floor, while shards from a third lay loose in the fill. Three thin-butted, thin-bladed flint axes also lay on the floor, as well as a large part of some fifty amber beads. On a higher level in the chamber, burial remains from the single grave culture occurred (NORMAN 1917a, 102–106; JØRGENSEN 1977, 15–17). The pots and the flint axes dates to MN A I. Depositions of pots were found outside the chamber on both sides of the entrance (JØRGENSEN 1977, 14–15. From the descriptions and illustrations of the pots, at least fifty different pots were present, all datable to MN A I.

Two complete pots come from a megalithic tomb at Lønt near Haderslev (JØRGENSEN 1983, 32), and we may also note that the famous Skarpsalling funnel-neck bowl (NM A11073 – depicted on Danish fifty kroner bills) come from a megalithic tomb in Himmerland. A comparable, though not quite as splendid funnel-neck bowl, come from a megalithic tomb at Odder in eastern Jutland (NM A1233). Further, from Klaus Ebbesen's survey of pots from megalithic tombs in Jutland (EBBESEN 1978, 77 ff.) we learn of more complete or almost complete pots dating to an early part of MN A.

However few these examples may be, they hold some important implications. Firstly, complete pots were deposited in the chambers and they remained unbroken there, at least during the early phase of burials in the chambers. Apparently, this is exactly as with burials in EN II, where funnel-neck beakers and collared- and lugged flasks often have survived intact. Secondly, the evidence from Hagebrogård and especially Grønhøj suggests that there is a clear synchronism between what happens inside and outside the chamber, but also a behavioural difference. We can state this as follows: When a complete pot was placed inside the chamber, a number of broken pots were placed outside the chamber.

All examples cited above with one exception come from Jutland. I have not been able to find any from Zealand and southern Sweden, and the evidence for burials from Trekroner and Aldersro on Zealand does not appear congruous with the situations at Grønhøj and Hagebrogård. It could be because burial customs were different, but it could also be due to a temporal difference. The Aldersro date is clearly younger than the complete pots from the passage graves mentioned above, and the one date from Trekroner with a range from the middle of MN A I to the beginning of MN A V may also be younger. The explanation for the lack of complete pots from the beginning of MN A in Zealand could instead be that here burial activities in the chambers were much more intense in the late part of MN A and throughout the younger Neolithic with clearances and disturbances as the result. It is not helpful either that all our knowledge about buried persons in megalithic tombs comes from the eastern parts of South Scandinavia, while preserved bones are rare in the acid soils of Jutland.

DEPOSITS AT CAUSEWAYED ENCLOSURES

Depositions of pottery are also notable at causewayed enclosures and in water. Here I will focus at the causewayed enclosures exclusively, but I should stress that the depositions in water are also of relevance.

A couple of broken pots, one of them complete, were found at the bottom of ditch segments at the Sarup I enclosure (ANDERSEN 1997, 49). Further, shards from one pot were found distributed in three ditch segments and four adjacent pits of the Sarup II enclosure (ANDERSEN 1997, 74). In the nearby row of enclosure ditches at Sarup Gamle Skole shards from a broken incomplete pot lay in association with a miniature dolmen chamber at the bottom of one of the ditch segments (ANDERSEN 2009, 32)

At Toftum, shards that could be assembled to complete pots were found in recuts in the ditches. In four cases, the shards lay scattered around stones in the otherwise stone free sand indicating a deliberate breakage of the pots (MADSEN 1988, 314). At Bjerggård, we find three cases of broken but complete pots on the bottom of ditch segments or recuts (MADSEN 1988, 310). In one case, a pot lay on a stone pavement in association with a fire, in another a pot was found on a stone pavement in association with dog skeletons.

In two ditch segments at Store Brokhøj, large amounts of pottery occurred in association with stone pavements and fireplaces (TORFING 2013, 70). At Kildevang broken pots were found deposited partly in pits forming a row and partly in what can best be considered a ditch segment (SKOUSEN 2008, 162–176). At Ellerødgård, both complete and incomplete broken pots lay in recuts into what must have been a ditch segment of a causewayed enclosure (NIELSEN 1988). At Markildegård, pots were placed in the ditch segments, some of them apparently on birch bark mats (SØRENSEN 1995, 19).

Pots were also placed at the foot of the palisades of the Sarup I enclosure. 81 m of the palisade trench was excavated and here shards from several hundred pots were found, some of them forming clear clusters (ANDERSEN 1997, 34).

Pits containing whole, unbroken objects – especially pots, have been found on the inner surface of both Sarup I and Sarup II (ANDERSEN 1997, 56, 77). Due to the lack of excavations of inner surfaces on other sites, we do not know if this feature occurs elsewhere, but two unbroken pots and the copper hoard in a lugged jar from Aarupgård, may constitute another example (MADSEN 1988, 309).

Causewayed enclosures in South Scandinavia as elsewhere in Europe contain human bones even if the condition of preservation in general is bad. Andersen (1997, 273) mentions seven sites where the ditch segments contain human bones. Especially at Bundsø and Hygind, the finds are impressive. Burnt human bones are also found at the palisade of Sarup I and from pits on the inner surface of Sarup II (ANDERSEN 1997, 62, 86).

In my opinion the causewayed enclosures played a role in the relationship between the living and the dead (MADSEN 2009, 129 ff.), and find the term ›villages for the souls of the dead‹ very much to the point (ANDERSEN 1997, 309). There is an obvious parallelism between what happened at the megalithic tombs and what happened at the causewayed enclosures (ANDERSEN 1997, 315; MADSEN 2009, 131). Let me just make the following points

- Pots are deliberately broken and deposited along the margins of both tombs and enclosures.
- Pots may be complete, or incomplete when deposited.
- The depositions happen as part of delimited events.
- The depositions are subsequently buried with sand or stone. At enclosures and now in the pit at Nørremarksgård, it happened »below« ground, while at megalithic tombs and at the palisade at Sarup, it happened »above« ground by piling up dirt.
- Pots deposited inside the tombs and inside the enclosures are not deliberately broken.
- Chronologically the events at the enclosures and at the tombs are not contemporary, although they overlap.

The conclusion as I see it is that we are dealing with similar events at the causewayed enclosures and the megalithic tombs.

FEASTING, ENCHAINMENT AND KINSHIP ORGANISATION

The causewayed enclosures date back to around 3800 cal BC, probably with a background in the Michelsberg area (KLASSEN 2014, 232). At the same time, the earthen long barrows were introduced, probably with a more westerly background (RASSMANN 2011). A few were buried in the monumental tombs, but probably their souls lived elsewhere together with the souls of all those whose bodies were disposed of differently. They may have lived below ground and it may have been possible to communicate with them at the causewayed enclosures.

With time, both tombs and causewayed enclosures became more and more monumental. As noted previously, there is a clear developmental line from the early wooden built tombs to the imposing dolmens at the end of EN II and the beginning of MN A. Many of the late dolmens were true monumental structures with enormous freestanding chambers that for all practical purposes stood open. We do not have evidence for the nature of the burials in these late chambers following the erection. The nearest we come is the extended dolmen Klokkehøj, where we find a regular burial of a man and a child, but also evidence of disarticulation in relation to the man and a third person (THORSEN 1981, 117–120; ERIKSEN/ANDERSEN 2014, 275). I do not think, though, that there is reason to believe that these open chambers were used differently from the rest of the tombs.

There can be little doubt that the building of increasingly monumental tombs in EN was part of a social competition in society. It may be tempting to see this as competition between males for a dominating position in society, but the burial of men, women and children alike clearly contradict this. It seems much more likely to be a case of group-based competition. Various kinship groups were competing for dominance and rights. Building a monumental tomb was one way to impress, and the inducement to build one was not necessarily the death of a powerful person. It could be the death of one or more persons of internal significance to the group.

At the beginning of MN A, a profound change to the megalithic tombs occurred. The monumental chambers that hitherto had been fully visible became hidden in barrows with access through a narrow passage, only. Although, it is fully possible to see this change as a typological development from the older dolmens (ERIKSEN/ANDERSEN 2014, 39 ff.) it is probably not as simple as that. The concepts attached to this architectural change in the megalithic tombs were certainly not local. It was part of a general trend in North and Northwest Europe towards a secluded burial and/or ritual space. How and where it evolved is immaterial here.

The architectural change, whether inherent to the ideas that followed or not, broke the tradition of building new monumental tombs. Instead, the new passage graves were reused with regular intervals. As outlined above, concrete evidence for the nature of burials in the chambers during the early part of MN A are missing, but looking at Grønhøj it can be argued that the complete pots in the chamber shows a continuing tradition. Now burial sessions occurred at intervals where earlier new tombs were built at intervals. At the same time, the lack of a dark greasy layer at the bottom of the tomb speaks against a steady accumulation of bodies.

The burial sessions were associated with depositions of pots outside the tombs. There may be a background for this in the depositions at the terminal facades of the long barrows in EN I, but also in the depositions of pots in the ditch segments of the causewayed enclosures. The latter prevailed in EN II, where deposits of pots outside the tombs were scanty at best, and then disappeared as the custom gained momentum in front of the tombs.

In addition to broken pots in the ditch segments of causewayed enclosures, we also find deposits of more ordinary rubbish often combined with traces of burning. This type of deposits seldom if ever occur in the primary ditch segments. They are found in later recuts into the ditches (MADSEN 1988, 315; ANDERSEN 1997, 51), and cannot be considered as ordinary dumping of settlement debris. A good example can be seen in a section through a ditch at Toftum (MADSEN 1978, 165 fig. 2; KLASSEN/KNOCHE this volume). Here a sequence of deposits can be seen, including two thin layers of rubbish separated by a sterile layer of sand and followed by a red burned layer of clay. Clearly, this is a case of careful deposition of rubbish, and not one of dumping. The layer of shells in the section should also be noted (KLASSEN/KNOCHE this volume). Shells are found in many of the recuts in ditch segments at Toftum that lies more than a kilometre from the coast, but not in the nearby contemporary settlement.

In relation to the Aalstrup enclosure, I suggested that ditch segments, or here perhaps more correctly pits, were cut as part of *rites of passage*, to create openings for the souls to pass (MADSEN 2009, 131). The recuts with cultural debris, however, clearly differ and is best explained, I believe, as evidence of feasting for the dead. We find them in EN I at around 3700–3600 cal BC (SKOUSEN 2008, 172 ff.). They are abundant in EN II and continue into early MN A. At Sarup recuts containing cultural debris continues into the later periods of MN A as well (ANDERSEN 1997, 51, 73–74), beyond the primary usage of the enclosures. It is tempting to see this as a continuing tradition of feasting for the dead on the former causewayed enclosures, but it is difficult to prove, as Sarup now increasingly became a regular settlement site.

How then shall we understand the depositions of pots? The only reasonable answer is that they were meant for the ancestors. To be able to transfer them to the ancestors they were systematically broken (›killed‹) and then covered up whether in the ditch segments or in front of the tombs as shown at Nørremarksgård. However, that would be only half of the explanation. If pots were broken in order to reach the souls of the dead, then why were only parts of the pots deposited? Why for instance do deposition II at Nørremarksgård include only half of a clay ladle (pot 7, Fig. 6), and not all of it. John Chapman has discussed this phenomenon in detail (2000, 23 ff.) and convincingly argued that by offering only part of an object and keeping the other part for yourself; you were actively building up links with the deceased. You were enchaining yourself to the ancestors.

If those standing outside of enclosures and tombs could connect to the souls inside by depositing incomplete pots, then how should we view the complete pots inside the tombs and enclosures? An immediate answer to this would be that they were there for the convenience of the dead souls. As the living needed pots that were functional, so did the dead.

The displacement of pottery depositions from causewayed enclosures to megalithic tombs around the turn from EN to MN raises the question if this indicates a change in beliefs. Were the souls no longer living below ground? Had they instead taken residence in the secluded space of the passage graves? This may be what happened, as we may note that at the same time the primary functions of the causewayed enclosures obviously crumbled. Possibly, the feast for the dead continued at the ditch segments, but the depositions of broken pots followed the souls.

How often and on what occasions did these events take place? The answer to the frequency lies with the depositions – between 10 and 20 years on average at Nørremarksgård for instance. The occasion for feasting and depositing pottery is another matter, however. The immediate answer would be that it was caused by the death of a person, but I believe this to be too simple an answer.

Probably, the events were regulated partly by norms in the society and partly by needs and possibilities arising within the group, very much like the Huron's ›feast of the death‹ (HEIDENREICH 1978, 374 – without any further analogy). We should not overlook, that even though the feasting was for the dead, the participants were the living, who were actively engaged in social relationships. Each megalithic tomb probably belonged to a kinship group that were in social competition with other kinship groups, and who at the same time regularly needed to reinstall their ties with the ancestors as a mean of legitimization. This could certainly influence the decisions that triggered an event.

However, what about those who actually died on a daily basis so to speak? What happened to them if they were not automatically buried in the tombs, as they died – which I am certain they were not. Where were they buried, and were they articulated, disarticulated or cremated? Did they remain where they were interred first or were they moved around? Yes, probably all of this and possibly more! If we add the information we have on skeletal material from EN and MN A together, we find a very complicated and versatile picture, where there appear to be no rhyme and reason.

Few people, in fact very few, were buried in the monumental tombs including the passage graves in the period immediately after they had been built. Those interred there were probably articulated, when they were buried, and in the wooden chambers, they stayed articulated for good reasons. In the stone chambers, on the other hand all sorts of things could happen, including removal of bones and contamination with bones from other contexts. Those that were not buried in the monumental tombs may have been buried in pits, in water, left to disarticulate or were cremated. Their bones may have vanished, or people could have kept them at their houses as souvenirs or used them in connection with rituals at causewayed enclosures. We should not put too much stress on what happened to the bones, I believe. The souls mattered, and the bones, so to speak, were more or less discarded containers that could be used in various ways.

Throughout EN and the first part of MN A, society was controlled by norms of group affiliation. Kinship was everything and the competition between kinship groups was the driving factor behind social organization and development. Monumental tombs were the tangible evidence in the landscape that legitimized the rights of groups. They were also tombs, but not in the sense that they were communal burial grounds for those who died. If you ended up being buried in a monumental tomb, it was not because of you as a person, but rather as an emblem of your kinship group.

During MN A, these norms began to change, and gradually, ideas of the individual were (re)instated. The role of the megalithic tombs, now no longer built, changed. They became the focus for multiple burials of articulated individuals. Often chambers were thoroughly cleaned out in advance, or new floors were laid down. Further, the evidence for the rituals that had been practiced outside were covered up and defused by heaps of stones. By MN B, these new ideas were fully implemented, but it may have started earlier than this.

ACKNOWLEDGEMENTS

I would like to thank the two reviewers for useful comments on the first drafts of this paper. In particular, I would like to thank Anne Birgitte Gebauer for long and intense discussions of the paper and issues related to it. These discussions triggered significant changes to the paper.

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The phasing of megalithic construction activities and its implications for the development of social formations in Northern-Central Germany

Martin Furholt, Doris Mischka

ABSTRACT

Based on the study of radiocarbon dating of burial monuments in Northern-Central Europe, the authors propose that megalithic long barrows and small single dolmen were built between 3650–3400 cal BC. Since 3350 cal BC, passage graves, gallery graves and large dolmens constitute the preferred burial architecture. These three latter types represent three regionally-distinct variants of the same principle, namely the concentration and collectivisation of burial activities. This »collectivisation«, a processes of social stabilisation and concentration can be observed both in burials and settlement patterns.

INTRODUCTION

Until recently, the phasing of the Funnel Beaker period in Southern Scandinavia and Northern Germany rested mainly upon typological considerations, resulting in a periodisation comprising several typological phases (Hoika 1987; Midgley 1992, 201–232; 205–221 in particular), which can only partly be confirmed by radiocarbon dates (Madsen 1994; Midgley 1992; Meurers-Balke/Weninger 1994; Hoika 1990, 86; Persson/Sjögren 1995, 70; Sjögren 2011). This has been partly due to unfavourable preservation conditions of materials (e.g. bones) and an unfavourable structure of the archaeological features. Settlement sites mostly comprise thin cultural layers with scarce material remains. Burial rites are dominated by collective megalithic graves, where a connection between construction activities and grave goods is difficult to establish, as these chambers are usually being more or less continuously used for centuries.

One task of the Priority Program »Early Monumentality and Social Differentiation« was to improve the absolute dating of the Funnel Beaker period in Northern Germany through an increase in radiocarbon dates and the excavation of new sites to establish stratified contexts that allowed the application of Bayesian modelling, or at least to date contexts with a more explicit sample-artefact connection. Since 2009, it has been possible to date 973 new samples and thus enlarge the number of radiocarbon dates available connected to the North Group of the Funnel Beaker complex. Compared to the 281 identified in a survey in 2007, this is a significant increase, which is instructive for our knowledge on several aspects of the early Neolithic period in Northern Germany and Southern Scandinavia.

This paper concentrates on the new picture of a phasing of monumental grave structures, including megaliths, and compares our findings to the development of settlement structures and social organisation. We will approach this topic discussing the data on three spatial scales, namely the local level – concentrating on the megalithic burial ground of Flintbek, south of Kiel (Mischka 2011a; 2011b; 2012; 2013; 2014) – the regional level – Northern Germany – and the transregional level of the Funnel Beaker North Group. We present the data while pursuing the following research questions: Is the overall trend of burial architecture a uniform one observable in the whole Funnel Beaker area, or is there a regional variability? Are the developments of burial architecture connected to changes in settlement, social organisation and land use?

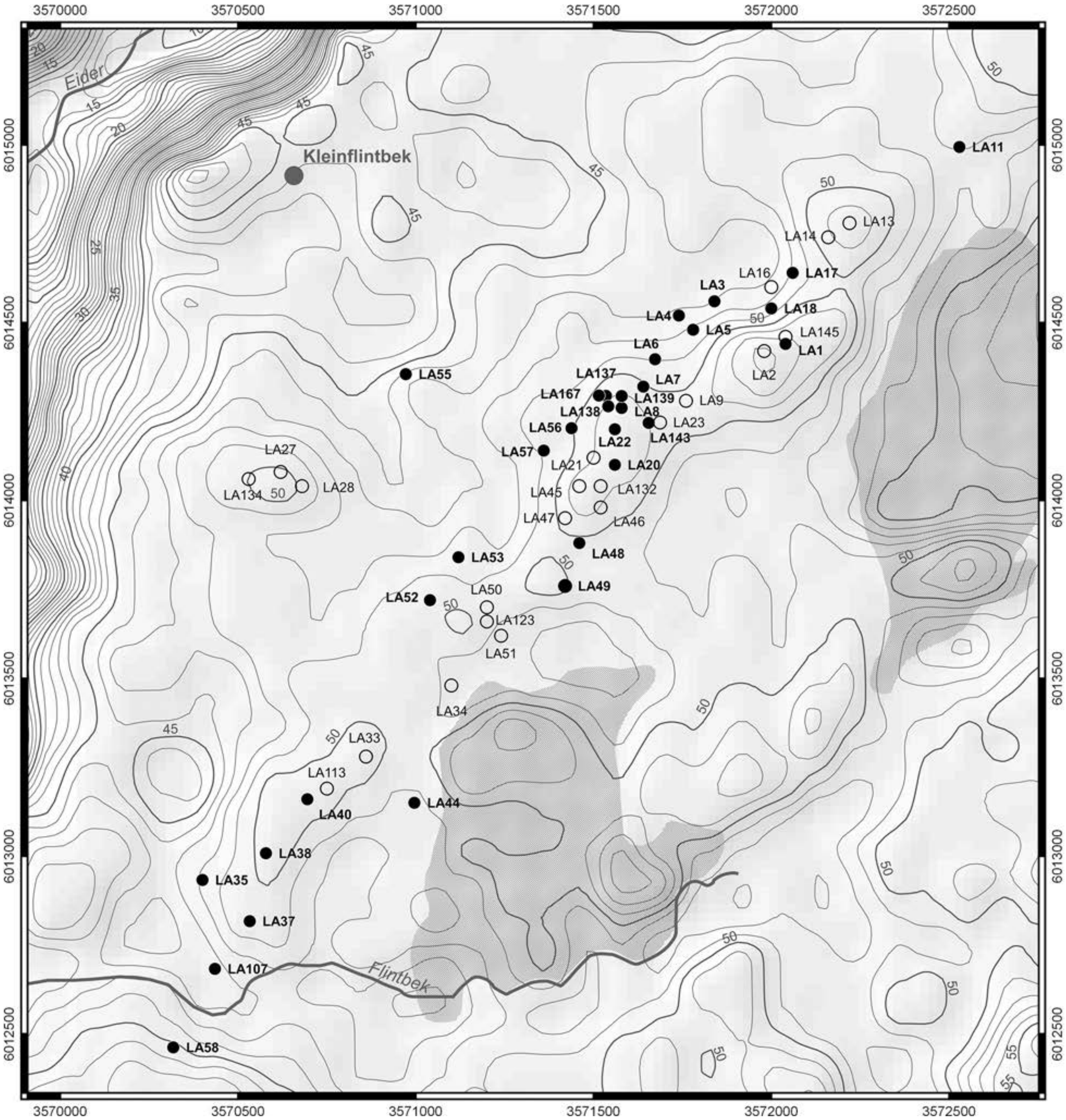

Fig. 1. Flintbek. Map of the excavated sites (according to Zich *2005, changed by Carsten Mischka and Nicole Bößl).*

THE LOCAL LEVEL: FLINTBEK

The case study of Flintbek – next to Kiel – was instructive for our understanding of the development of burial architecture at the local level (Mischka 2011a; b; 2012; 2013; 2014). The graveyard comprises 29 megalithic burial monuments (Fig. 1): 6, possibly 7, long barrows with 14 dolmens and 15 non-megalithic burials (Flintbek LA 3, 4, 17/171, 37, 137 and 167), 4, possibly 6, passage graves with 4–5 or 7–8 non-megalithic burials (Flintbek LA 5, 40, 52, 57, possibly LA 7, 11) and 7, possibly 9, single dolmen with 1 or 4 non-megalithic burials (Flintbek LA 6, 17/171 next to the long barrow, Flintbek LA 18, 38, 53, 56, 58 and possibly LA 7, 11) and probably two totally-destroyed further megaliths (Flintbek LA 16 and 49). Despite being almost completely erased by modern agriculture, their remains were excavated entirely by the State Heritage Management Organisation of Schleswig-Holstein from 1976 to 1996 in a strictly standardised way. Bayesian

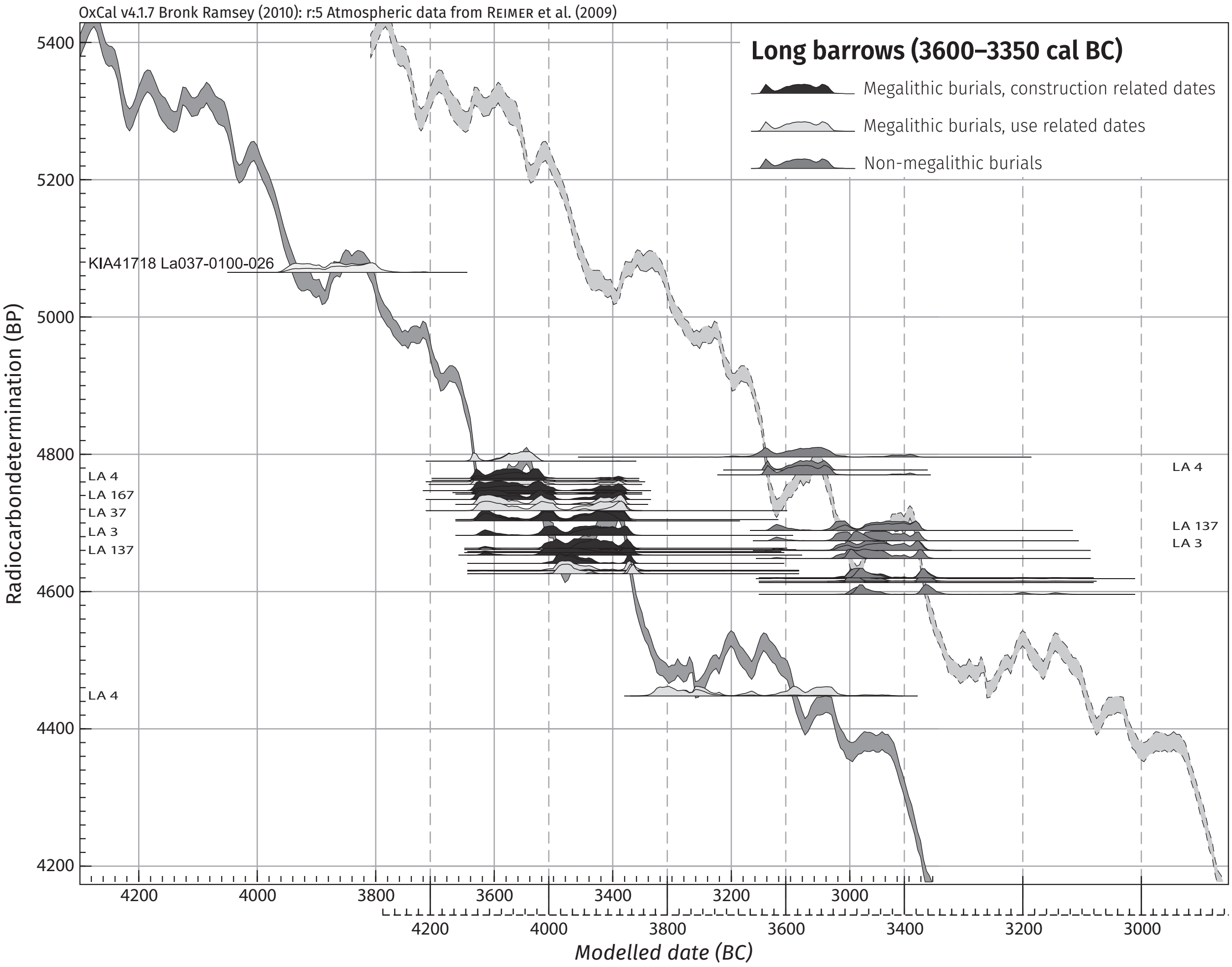

Fig. 2. Flintbek. Age-modelled, calibrated AMS-measurements of charcoal and skeletal remains of megalithic and non-megalithic burials within long barrows. For better comparison, the two data series are plotted on two calibration curves shifted along the x-axis.

models were built up using the *a priori* information of the well-reported stratigraphical or constructional sequences, linking 150 new AMS datings. They enabled understanding the temporal frame of the burial construction activities connected to a settlement area in detail. Several observations are striking:

1. Results for the long barrows (Fig. 2)
- The long barrows in Flintbek were constructed between 3630–3350 cal BC [1].
- There are no non-megalithic long barrows preserved in Flintbek; all of them were transformed into megalithic tombs within their biography.
- The long barrows commence by either non-megalithic burials like in Flintbek LA 3 or they begin with megalithic burial chambers of the dolmen type like Flintbek LA 4 or LA 167.
- The long barrows initiated by megalithic burial chambers are – in Flintbek – older than the others.
- The non-megalithic burials within the long barrows belong mainly to the second half of this time span, namely starting around 3500 cal BC. Only the dates of Flintbek LA 4 can be interpreted as being as old as the earliest megalithic dates, although this is less secure due to the building sequence, which unfortunately shows no clear stratigraphical order.
- The use-related dates – dates of artefacts or charcoal in particular from the burials themselves – indicate a main use time between 3600–3350 cal BC.

1 Be aware that within this and the next figures, there are two curves plotted one upon another. One is shifted along the x-axis to allow a better comparison of the data.

Fig. 3. Flintbek. Age-modelled, calibrated AMS-measurements of charcoal from dolmen not from long barrows. For better comparison, the two data series are plotted on two calibration curves shifted along the x-axis.

2. Results for the dolmen chambers that were not integrated into long barrows (Fig. 3)
— There are several dolmen in Flintbek that were not integrated into long barrows within their lifetime. For some of them, it can be discussed whether they were covered by round mounds instead.
— AMS dates prove a construction between 3600 and 3350 cal BC.
— They confirm re-uses in one or several secondary use phases up to around 2400 cal BC, as for example in Flintbek LA 6. They were probably easier to access for a longer time than the dolmens incorporated into long barrows.
— Regarding dolmen within long barrows and in the discrete positions, we cannot state a succession from non-megalithic to megalithic burials but a contemporaneous use of different kinds of burials within one and in between several monuments.

3. Results for the passage graves (Fig. 4)
— The time and area of origin of the passage graves is not yet clearly known, but in Flintbek they are constructed in a later period than the long barrows.
— The sequences of the Bayesian models created for the AMS dates of the charcoal samples from the sites are too short to overcome the plateau of about 350 years between 3350–3000 cal BC.
— Therefore, it is not yet possible to determine whether the passage graves were erected – for example – at a short time span at the beginning of this time range or if they were erected and used within the entire period.
— The two older dates of Flintbek LA 57 have to be evaluated sceptically; the first very old date was re-measured by the Kiel AMS laboratory due to laboratory difficulties (discussion in Lull et al. 2015; contra: Meadows et al. 2015), while the new result also seems much older than all of the other passage

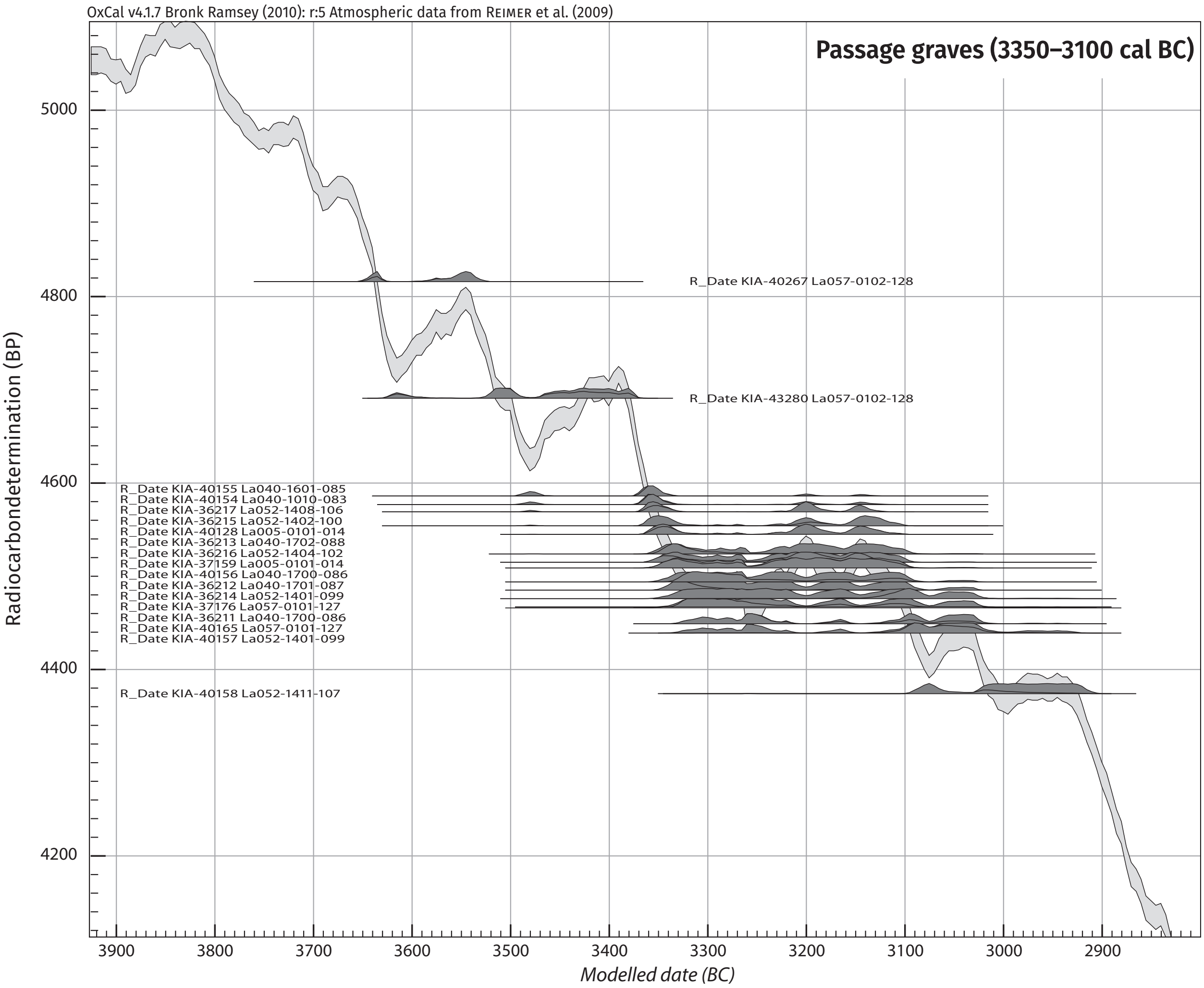

Fig. 4. Flintbek. Age-modelled, calibrated AMS-measurements of charcoal from passage graves.

graves in Flintbek. The first passage graves in Sweden were built in earlier times than 3300 cal BC according to SCHULZ PAULSSON (2010), so the Flintbek date cannot be totally excluded as too old, although it should currently be treated as an outlier, until perhaps more dates increase the probability of such old passage graves in Northern Germany.

Even if the above-ground parts of the megaliths were destroyed, it was possible for most of the Flintbek sites to describe the dolmen types according to the German typology (MISCHKA 2011a, 884 fig. 20.48). *Urdolmen* without an entrance do not exist in Flintbek. We were able to distinguish *small dolmen* (*Kleindolmen*) and the *larger extended dolmen* (*erweiterte Dolmen*, alias *Großdolmen* or in Danish *stordysse*), as well as *polygonal dolmen* with a polygonal instead of a rectangular chamber layout, and the *passage graves*, with oval or rectangular chambers. Using the aforementioned temporal development of the Flintbek monuments, the micro-region offers a closer look at the typological development of the tomb types. While the overall time span in which dolmen were built in Flintbek ranges from 3630 to 3350 cal BC (see above), it is possible to order the types mentioned along the time axis:

4. Results concerning the chronologically-preferred architecture (Fig. 5[2])
— The oldest feature in Flintbek is a *polygonal dolmen* – so far supported only by one date – followed by *extended dolmens*, which are older than *small dolmens,* while the passage graves evolved the last.

2 In figure 5, each grey line symbolises the range of the ^{14}C date of the building of one megalith burial monument in the Flintbek area. The rectangular boxes give us the idea about the time range in between one or more of the different types of megalithic tombs that were built.

Our hypothesis resulting from this case study on the local scale is:

- Dolmens are only built in the Early Neolithic.
- Some were integrated into long barrows, while others were not and especially those free-standing dolmens were re-used more often in the following centuries.
- The passage graves are built only after 3350 cal BC.

The demonstrated *new* quality of analysis is only possible within an entirely-excavated and well-dated settlement region, of which Flintbek is the first one in Northern Germany. We are now in a position to compare the results with the Scandinavian evidence. Furthermore, below we will compare the Flintbek sequence to the regional level by discussing the regional SPP data of burials as well as settlements and enclosures. Finally, we will discuss our results concerning the phasing of burial architecture, settlement and enclosure construction in the light of changes in land use and in relation to population estimations proposed for the working area.

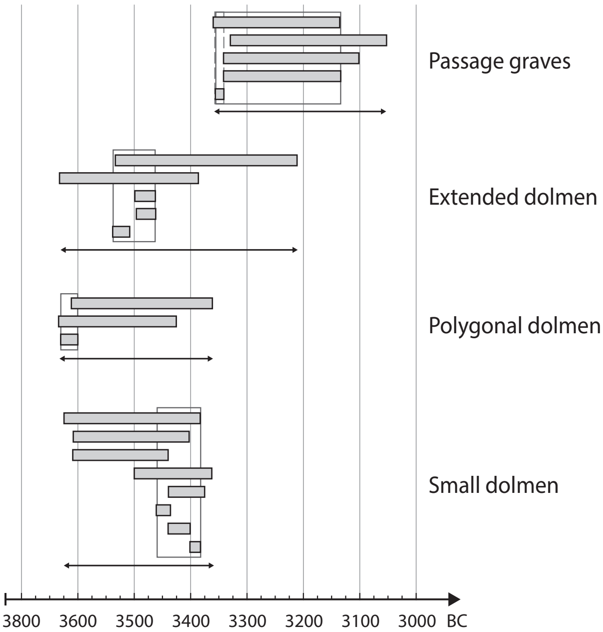

Fig. 5. Flintbek. Summary of the dated types of monuments on the Flintbek burial field.

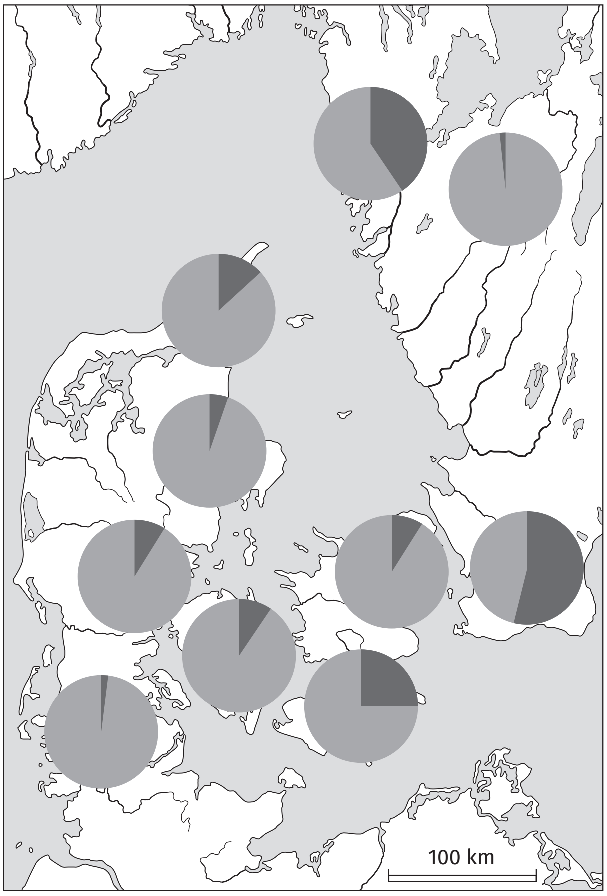

*Fig. 6. Map of Scandinavian burial monuments indicating the regional quantity of dolmens (**light grey**) and passage graves (**dark grey**) (according to Persson/Sjögren 1995, 79 fig. 15).*

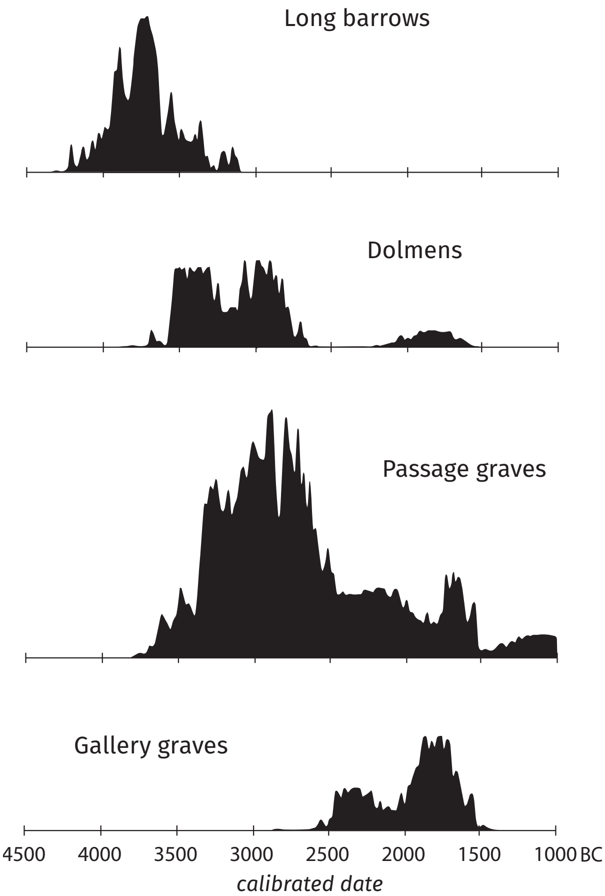

Fig. 7. Summary graph of radiocarbon dates grouped by grave type (according to Persson/Sjögren 1995, 73 fig. 12).

THE TRANSREGIONAL SCALE: SOUTHERN SCANDINAVIA

The absolute dates of Scandinavian megaliths are discussed by Persson and Sjögren (1995), Schulz Paulsson (2010), Sjögren (2011) and Mischka (2014). A possible deviation from the situation in Flintbek is the earlier start of passage graves in Sweden, where the earliest dates are as old as 3500 cal BC. In this context, it is important to point to specific patterns of distribution (see fig. 6): In Sweden, passage graves dominate over dolmens, while in Denmark we have many more dolmens than passage graves. The summed probability graphs for Scandinavia as a whole indicate that long barrows and dolmens start a little earlier than the passage graves but are used contemporaneously over a long period (Fig. 7).

However, the dates mainly derive from human bones from the burials and thus indicate a phase of use rather than construction. Moreover, quite a large number of dates are not reliable, as re-dating has shown[3]. A re-evaluation makes clear that there are only few dates connected directly to the construction of the monuments. However, in Denmark samples of birch bark from the dry-stone walling (*Zwickelmauerwerk*) of passage graves delivered very reliable dates, pointing towards a start of the passage graves at or even before 3350 cal BC.

Altogether, the Scandinavian evidence is not as clear as we hoped (Fig. 8). For the dolmens, we do not have many dates related to the actual construction, although Denmark and Norway are quite similar to the Flintbek situation overall. Most dates deriving from passage graves are use-related dates, between 3300–3100 cal BC. However, in Denmark there are two and in Sweden three dates showing a slightly earlier construction of passage graves than the beginning of the plateau in the calibration curve around 3350 cal BC.

	NO. OF SITES	NO. OF DATES	STD < 75 YEARS	CONSTRUCTION RELATED	USE RELATED DATES	BEST (1S) CONSTRUCTION DATE		OLDEST SITE
DK-Dolmen	*11*	*17*	*3*	*3*	*7*	*3630–3350 BC*	*> 3350 BC*	*Vroue Hede IV*
S-Dolmen	*8*	*20*	*9*	*.*	*10*	*3490–3120 BC*	*not clear*	*Kinneved 21*
N-Dolmen	*2*	*2*	*.*	*.*	*1*	*3625–3360 BC*	*not clear*	*Holtenes III*
Flintbek	*9*	*25*	*25*	*16*	*9*	*3440–3374 BC*	*> 3374 BC*	*LA 37*
Flintbek	*.*	*.*	*.*	*.*	*.*	*3628–3599 BC*	*> 3599 BC*	*LA 167*
DK-PG	*10*	*14*	*9*	*10*	*1*	*3515–3345 BC*	*> 3345 BC*	*Hvalshøje*
DK-PG	*.*	*.*	*.*	*.*	*.*	*3365–3115 BC*	*> 3115 BC*	*Raevehoj*
S-PG (with sequence models)	*18* *3*	*105* *46*	*69* *37*	*.* *.*	*91* *46*		*> 3360 BC*	*Mysinge 2//* *Gökhem 17*
Flintbek	*4*	*24*	*24*	*6*	*18*	*3365–3345 BC*	*> 3350 BC*	*LA 57?, LA 40*
DK-ELB (without Facade)	*10*	*27*	*7*	*6*	*.*	*3910–3540 BC*	*> 3540 BC*	*Rustrup II*
S-ELB (without Facade) *Flintbek*	*4* *.*	*8*	*2*	*3*	*.*	*3943–3705 BC*	*> 3705 BC*	*Kristineberg A*
Sum	*79*	*288*	*185*	*44*	*183*			
Prozent Flintbek	*16,5*	*17,0*	*26,5*	*50,0*	*14,8*			

Fig. 8. Evaluation of the quality of dated samples of Scandinavian megalithic tombs related to the building of the monument. In some cases, an early and a late construction date are shown, indicating the time spans in between these grave types were built. DK-Denmark, S-Sweden, N-Norway, PG-Passage grave, ELB-Earthen long barrow. The sample material of the Danish passage graves is birch bark from the dry-walling between the orthostats.

3 Personal communication P. Persson 2011, EAA Oslo.

THE REGIONAL SCALE: NORTHERN GERMANY

The data from Flintbek and Southern Scandinavia can be compared with the dated structures at the regional level of Northern Germany. In addition to long barrows, dolmens and passage graves in Flintbek, we have dated 13 burial structures containing dolmens with 65 dates, two burial monuments containing passage graves with 49 dates and two burial monuments containing gallery graves with 79 radiocarbon dates. These dates indicate a phasing that is to a large extent quite similar to that of the Flintbek cemetery. Fig. 9 shows that dolmens in long barrows are constructed between 3650–3400 cal BC, while the use-related dates indicate a start of burial activities in these structures around 3650 cal BC, with several re-uses in later periods. A difference compared with the Flintbek example is the fact that we have a distinct phase of non-megalithic long barrows (in Borgstedt LA 22, Albersdorf LA 56, see HAGE 2016, 161–198), which

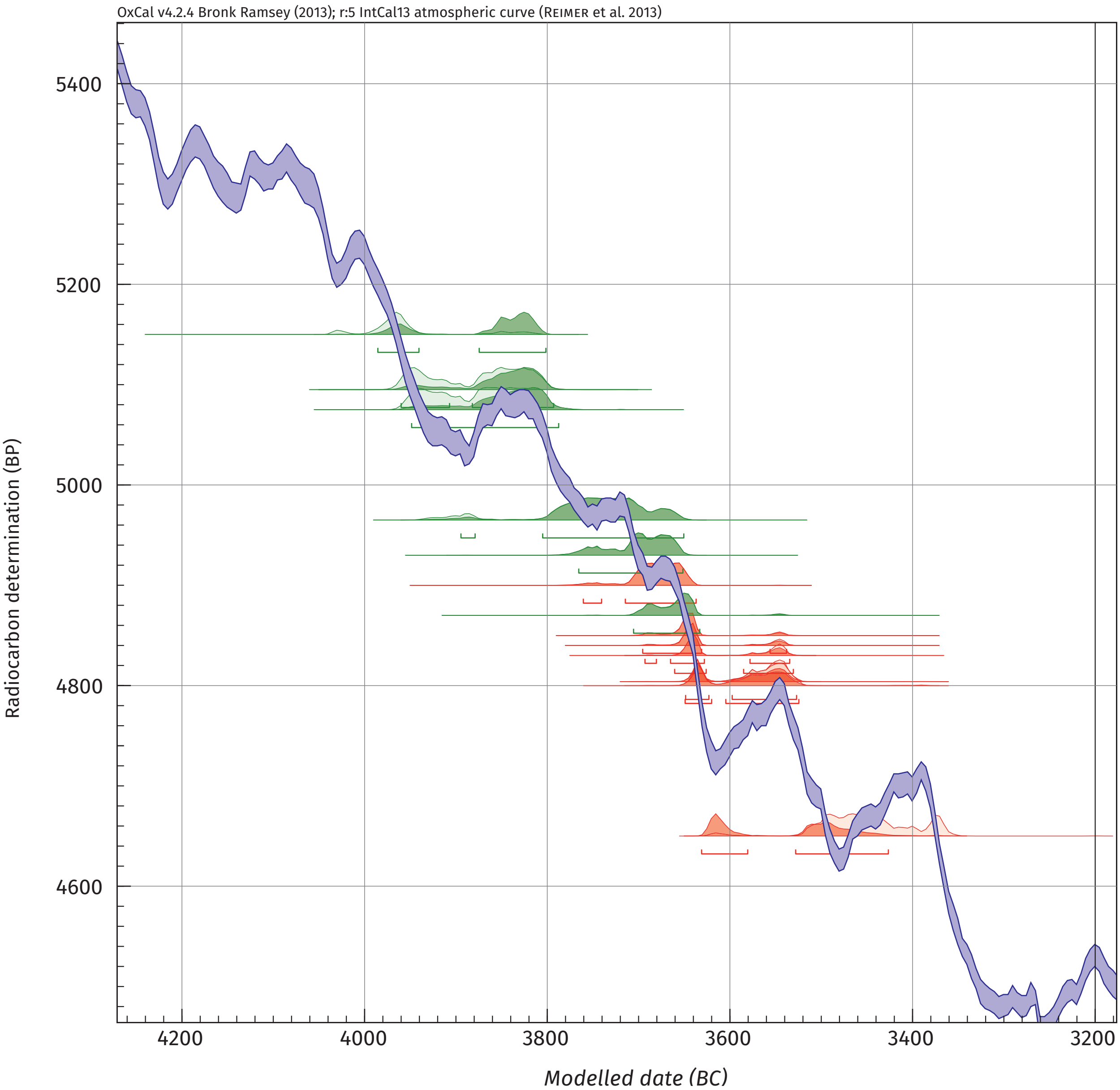

Fig. 9. [14]C dates related to dolmen chambers in long barrows in Northern Germany (outside of Flintbek), differentiated between dates associated with the barrow only (green colour coding), with the construction of the dolmen chambers (red colour code).

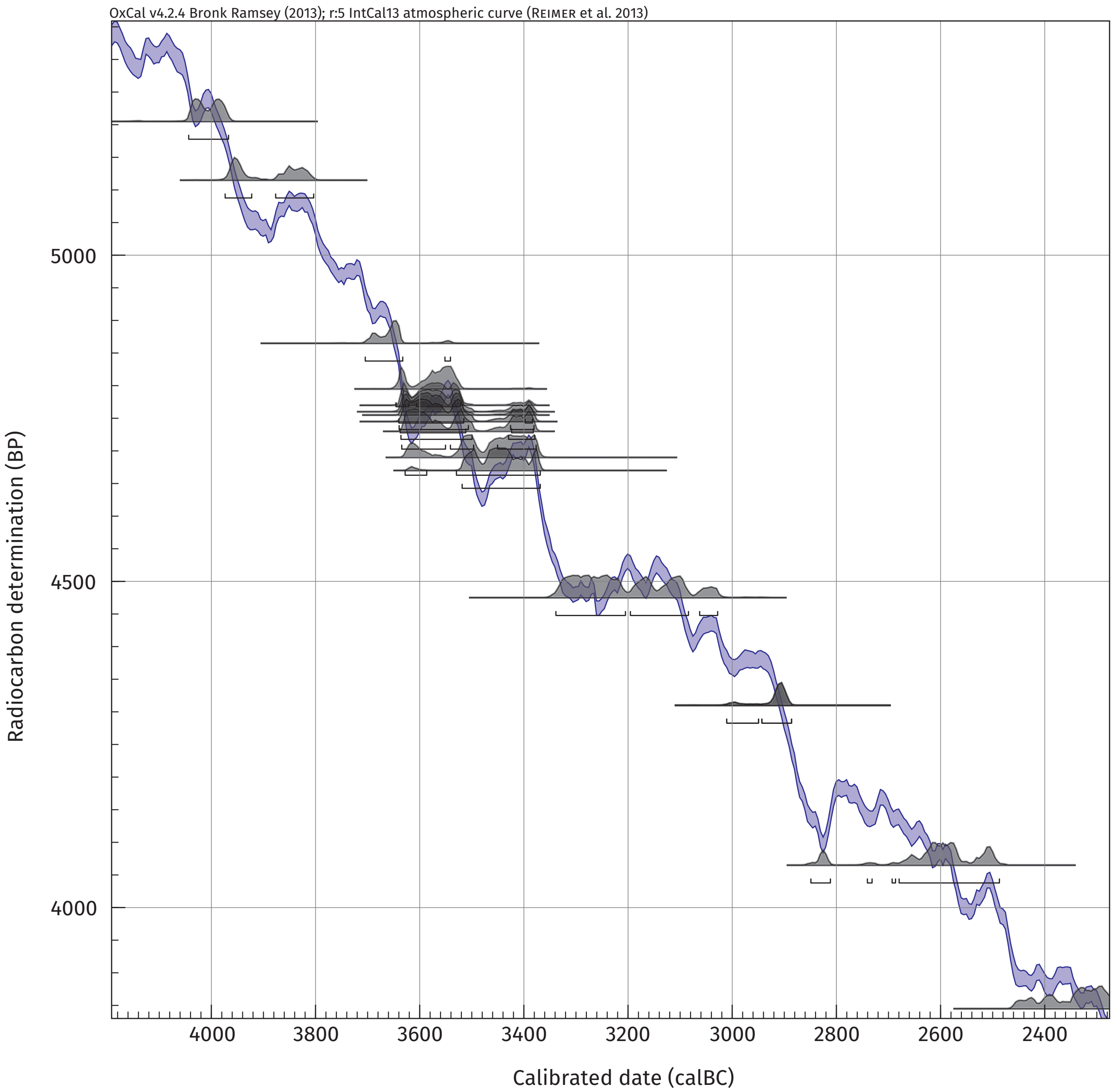

Fig.10. [14]C Dates related to dolmen chambers in round barrows in Northern Germany (outside of Flintbek).

start at least 3820 cal BC [4], even if megalithic chambers are included in a later phase. Dolmens in round barrows (Fig. 10) show – regarding the majority of dated complexes – the same chronological position as dolmens in long barrows, namely 3650 cal BC. However, there is one notable exception that needs to be addressed: the large dolmen of Borgstedt LA 28 is ambiguously dated (see HAGE 2012; HAGE 2016, 196). An old conventional date from the Leibniz laboratory in Kiel placed the use of the chamber in the period of 3650 to 3400 cal BC, but two newer accelerator measurements from the same laboratory date between 3950 and 3800 cal BC, which makes this grave the oldest megalithic monument in Northern Germany and Southern Scandinavia combined. Both samples were measured on charcoal, albeit a relatively short-lived species (*Rosaceae*). Moreover, such an old date is supported by a vessel of the Early Neolithic I that

4 A *bounded phase* in Oxcal 4.2 for long barrow construction-related activities calculated a *boundary* for the start of activities between 4050–3818 BC (95.1 %) and a *boundary* for the end of activities between 3622–3362 BC.

was found inside the dolmen. On the other hand, the two dates were measured in a period of reported difficulties and inaccuracies within the Leibniz laboratory (see above; LULL et al. 2015 and contra MEADOWS et al. 2015). Unfortunately, there is no organic material left to reproduce this early position of a dolmen, and we thus remain sceptical and refrain from accepting the claims for such early megalithic architecture until it is backed by other, equally-old structures.

Concerning passage graves, we were only able to date one structure outside of Flintbek. However, with Wangels LA 69 in eastern Holstein, we have a newly-excavated structure with a well-documented stratigraphy, which allowed a Bayesian approach (BROZIO 2016, 155–162). Leaving all details aside (see BROZIO 2016; BROZIO, this volume), the Bayesian model shows that the construction of the grave took place around 3360 cal BC, and its use – and some additional constructional activities – continued at least until 3000 cal BC. This supports the idea that passage graves – outside of Sweden – are mainly built at a later stage within the megalithic sequence, with some starting in the 34th century cal BC, as indicated in Flintbek and by the Danish evidence (see above).

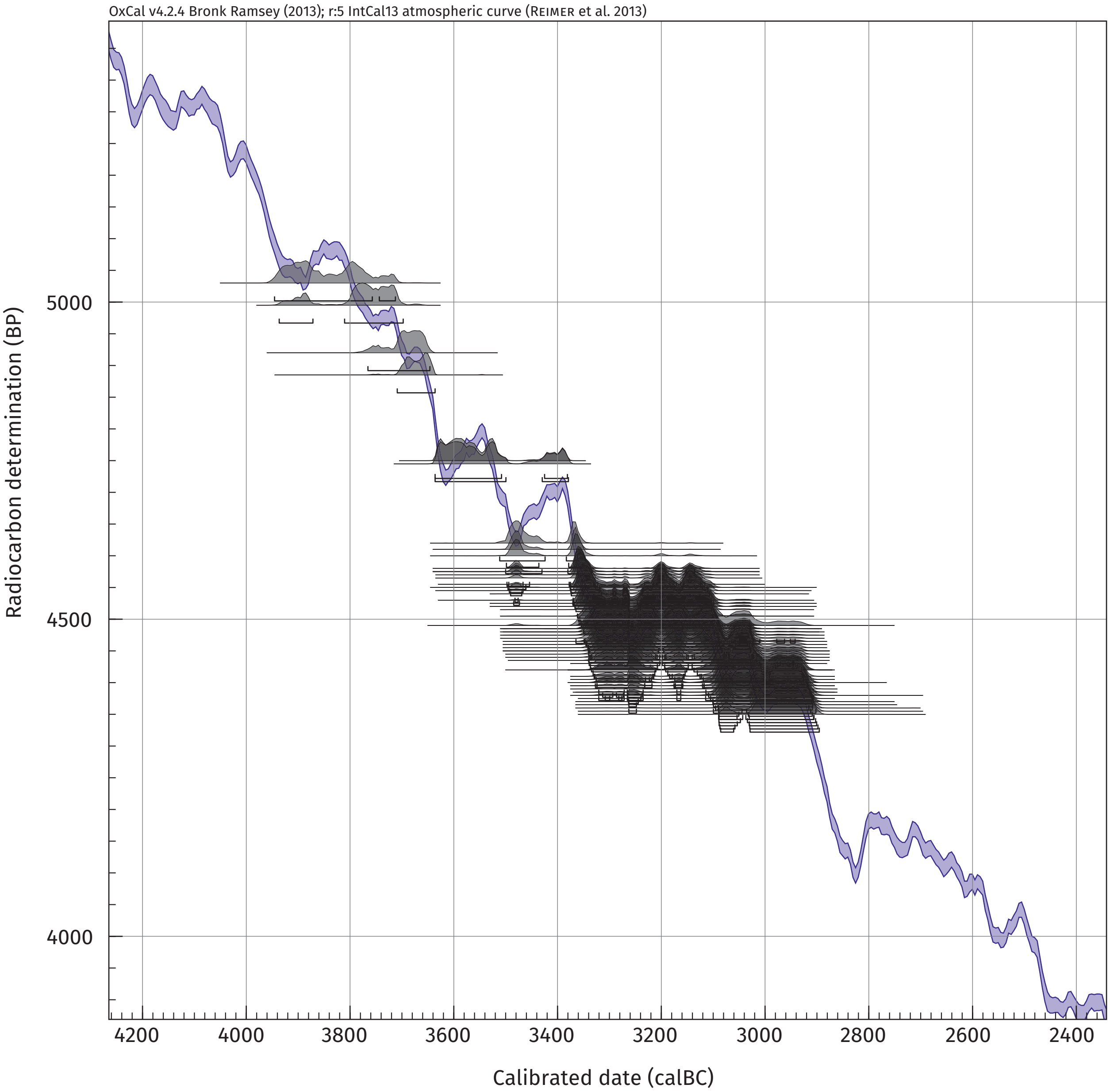

Fig. 11. ^{14}C Dates related to Gallery Graves in north-western Germany (see SCHIERHOLD in press; this volume).

Another supposedly late megalithic type is the gallery grave. Within the SPP, two structures in Schmerlecke were intensively dated by Kerstin Schierhold (SCHIERHOLD; this volume). The vast majority of dates fall into the time period between 3350–2900 cal BC (Fig. 11). Two dates lie between 3600–3400 cal BC and four dates between 4000–3600 cal BC. As the contexts are still unpublished, we will have to refer to Schierholds publications, although we can conclude that the data indicates that the majority of activities in these two gallery graves took place between 3400–2900 cal BC.

ENCLOSURES AND VILLAGES

In Northern Germany, only a few enclosures are known. In the south of our working area, we dated the circular enclosures of Belleben I (RÜCK 2012) and Hundisburg-Olbetal (RINNE/MÜLLER 2012; BOCK et al., this volume; SCHMÜTZ 2017). The latter is used from about 4350 cal BC until 3850 cal BC, while Belleben is consistently dated by more than 50 radiocarbon dates between 3650–3400 cal BC (for details: RÜCK in prep.).

We were able to establish Bayesian models for two enclosures in the north of our working area, Albersdorf-Dieksknöll (DIBBERN 2016; this volume) and Büdelsdorf (HAGE 2016; this volume). In both cases, there is peculiar a combination of long-lasting traditions and short-term events, as is also known from other regions (Sarup, ANDERSEN 1997). In Albersdorf (DIBBERN 2016; this volume), the first trenches were dug around 3750 cal BC and from then until 2550 cal BC several short-term activities took place, including several re-cuttings of the exact same trenches. The majority of these short-term events date between 3630 and 3370 cal BC, after which there is break for around 200 years, until a new re-cutting occurs (DIBBERN 2012; 2016, 50 fig. 6.12). The enclosures of Büdelsdorf (HAGE 2016; this volume) were also first dug around 3750 cal BC at the latest (boundary at 1 Sigma: 3750–3650 cal BC). The last re-cutting took place some time before 3350 cal BC. Between 3340 and 3200 cal BC, the trenches were filled and the village of Büdelsdorf was erected in the former interior of the enclosure, which lasted for about 100 years[5]. After the end of the settlement phase, the place was again used as an enclosure, with several new re-cuttings until 3020 cal BC. This example demonstrates how enclosures and villages are clearly connected phenomena (see also KLASSEN, this volume). The phenomenon of villages is much less common in the Funnel Beaker area than in other Neolithic contexts. The usual Funnel Beaker settlement site comprises small, thin cultural layers, sometimes containing postholes and shallow pits. These are difficult to identify and mostly found during the excavation of other structures, when they are – for example – preserved below a barrow (e.g. STEFFENS 2009). It seems that the dominating settlement form in the context of the Funnel Beaker North Group is that of single farmsteads or small hamlets of four or five houses. There are a few settlement sites that show a different scale, where we find larger pits, often also a substantial cultural layer and indications of a larger number of houses. Naturally, archaeological research is biased towards these settlements, as it is them that provide more favourable preservation conditions for data concerning subsistence and economy. Within the SPP, we excavated the sites of Büdelsdorf and Oldenburg LA 77. In Büdelsdorf – as already mentioned – excavations uncovered eight post-built long-houses regularly arranged in a NE-SW orientation, forming a densely-built village structure (HAGE 2016). Hage argues that this dense village structure extends at least over a 2.6 ha core area, which would result in an original house number of 40 houses, and it is surrounded by a less densely-built area, 4.2 ha in total (HAGE 2016). Here, we deal with a community of several hundreds of people, living in a village with rather strictly standardised house forms, positions and orientations. This settlement dates between 3340–3200 cal BC (see above).

In Oldenburg LA 77, excavations uncovered five long-houses and several huts in a similarly densely-built structure (BROZIO 2016). Again, it is argued that as the village extends over 1.35 ha, whereby several dozens of houses and huts should have existed per generation, resulting in a population of some hundred people. This settlement is dated by 12 ^{14}C dates between 3270 cal BC–2920 cal BC (BROZIO 2016). These two villages from Northern Germany confirm the Danish evidence, where larger settlement sites are seen as a phenomenon of the Middle Neolithic (ANDERSEN 1997; JENSEN 2006).

5 Boundary for the start of settlement activities: 3340 und 3300 BC (95.1 %), boundary for the end of settlement: 3300–3210 BC (95.1 %), see HAGE (2016).

Fig. 12. The Burial Monument of Flintbek LA3 highlighting the successive stages of construction in a period between 3500 and 3400 cal BC.

BACK TO FLINTBEK FOR AN INTERPRETATION

The cemetery of Flintbek provides a fine opportunity to study structural developments at a local scale. As is visible from the ^{14}C dates presented above, there is a marked change of practices at around 3350 cal BC. In the prior centuries, most monumental structures show simple building plans but a variation of forms and construction details, as well as successive events of monument building and altering of structures. As is best documented in the long barrow Flintbek LA 3 (Fig. 12, see Mischka 2011a; b; Furholt et al. in press), a sequence of small-scale non-megalithic graves are built over the course of 100 years, adding up to a linear structure, which is only later surrounded by a stone frame and turned into a megalithic structure by adding several dolmen chambers and a secondary, megalithic frame. Different but structurally similar histories can be shown for other long or round barrows. There is probably no »general plan« for the final shape of these monuments. The activities take place within at least four clusters [6] along the ridge on which the Flintbek cemetery is placed (Fig. 13). After 3350 cal BC, the structure of activities changes in all four of these clusters towards a »collectivisation in death«: in each cluster, instead of the larger number of structures constructed and constantly re-built in the earlier phase by supposedly several »communities of practice«, now only one passage grave »bundles« all the ritual activities within one megalithic monument.

6 If Flintbek LA 7 and LA 11 are also passage graves, we have six clusters.

The building plan is more complex and the chamber is enlarged and from the beginning, where tumulus, grave, passage and frame form one well-defined design. This pre-defined building plan is only changed by taking up additional non-megalithic burials. When we compare the early graves (3650–3350 cal BC) with the later ones, we also find a gradual shift of emphasis from collective activities during the building and the successive enlargement of the monuments – for example, long barrows – and from the successive integration of newly-deceased individuals as *individuals* or very small groups of individuals into smaller chambers within the shared monument towards an initial construction of one chamber and the successive integration of the individuals into this single, collectively-used larger chamber after 3350 cal BC.

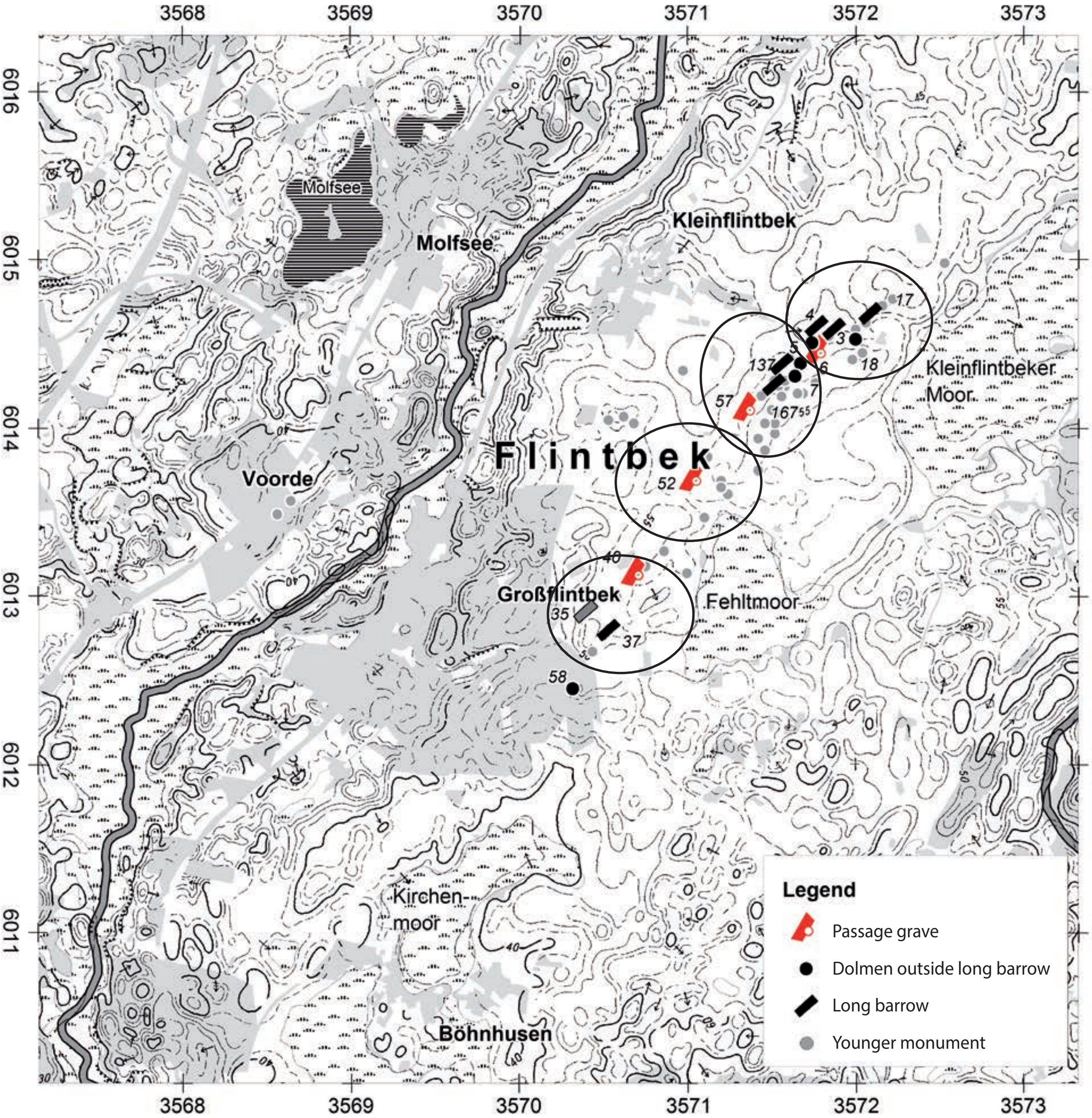

Fig. 13. The Neolithic cemetery of Flintbek, Northern Germany (after Mischka 2011a), highlighting the presence of four clusters of graves connected to passage grave constructions in the phase after 3350 cal BC.

REGIONAL STRUCTURAL DEVELOPMENTS

The structural development that can be pointed to in Flintbek is also visible at the regional scale. Here, it is possible to connect ritual practices connected to monument construction and use with the development of settlement and social structure. Since 3800 cal BC – perhaps even earlier – we see the first monuments, mainly non-megalithic long barrows, within which since 3650 cal BC megalithic dolmen chambers are integrated. At a comparable time starting around 3750 cal BC, the earliest TRB enclosures are dug.

Around 3400/3350 cal BC, passage graves and gallery graves constitute a new form of megalithic monuments. Both monument types share a fundamental structural difference compared with the monuments erected earlier. They are built according to a preplanned overall design, which is realised in one initial building event, much in contrast to the successive building steps and alterations in the earlier phase. In cases where alterations are made, this mostly does not constitute a real change in the overall structure. For example, in Flintbek LA 40, only the diameter of the tumulus visible in the stone frames at the feet of the barrow is enlarged (see MISCHKA 2011a). A second characteristic of passage graves and gallery graves is that the accessibility of these structures is mostly clearly marked by architectural features like the megalithic passage, or the »Seelenloch« of the gallery graves. Thus, when we see these monuments as places of ritual practices, the focus has changed from continuous construction activities including a constant alteration of the design and shape before 3350 cal BC towards a more fixed shape and stronger emphasis on depositional practices of dead bodies and material culture connected to these structures (see FURHOLT 2012). Generally, this new emphasis on the depositional practices is associated with an enlargement of the chamber size. This strengthens the collective nature of these burials. The individual body is less highlighted than in the smaller chambers of the early period. In many cases, it could be shown that older interments are more or less pushed aside to make space for the next bodies (JENSEN 2001). These characteristics – namely a preconceived and stable shape of structures, the enlargement of the chamber sizes and a new emphasis on collective burials – are present in three different types of megalithic monuments: the passage grave, the gallery grave and the large dolmens. Fig. 14 shows that these types are largely regionally distinct. Gallery graves are found in the south-west of our working area, Westfalia and Hesse. Passage graves are mainly found in the centre, in Lower Saxony (and they extend into the Netherlands, BAKKER 1992), Schleswig-Holstein and western Mecklenburg. Large dolmens are found mostly in Mecklenburg and on the Isle of Rügen. Looking into Southern Scandinavia, there is a corresponding picture, in the sense that passage graves are essentially the only variant of a large chamber, and large dolmen chambers as known from Mecklenburg are widely unknown (EBBESEN 2009)

We have shown that both gallery graves and passage graves date after 3400/3350 cal BC, with the possible exception that the passage grave might be older in Southern Sweden, which is thus a candidate for its area of origin (SCHULZ PAULSSON 2010). In the same way, the large dolmens seem to be generally younger, although there might be exceptions like Burtevitz 1 on Rügen (see BEHRENS/REICHLER 2012), where two charcoal dates indicate a construction already around 3500 cal BC. However, here the main phase of usage also lies after 3400 cal BC and extends into the 3rd millennium cal BC.

It is thus fair to conclude that the three types of large-chambered megalithic graves represent three distinct, regionally-determined cultural variants of the same principle, namely a more stable architecture and a more collective burial rite.

This trend in the burial architecture and rituals correspond well with the developments in settlement and social organisation. As we have seen above, the settlement pattern in the early Neolithic period from 4100 to 3350 cal BC seems to comprise small hamlets or individual farmsteads. It is only after 3350 cal BC that the institution of the village appears in Northern Germany and south Scandinavia. Despite having a millennia-long tradition in the European Neolithic south of our working region, this institution does not reach the Funnel Beaker area for more than 700 years. The switch from a social system organised in single farmsteads or small hamlets to villages with several hundred inhabitants reflects a major change in social relations. Structurally, a connection can be made between the small, dispersed settlement sites and the small-scale building activities on early monuments. It is conceivable that the building activities documented – for example – in each phase of Flintbek LA 3 could be carried out by the inhabitants of one or two farmsteads, or a hamlet, and that a cemetery like Flintbek – where several of those small-scale building projects formed spatial clusters – could well function as a meeting place and an arena for interaction between these small autonomous units.

Additionally, regional centres are probably represented by the enclosures, periodical places of gathering and collective rituals. After 3400 cal BC, a process of collectivisation is seen in the switch to one communal burial monument in each of the Flintbek grave clusters (see FURHOLT et al. in press), a trend that can be seen in the whole region through the rising

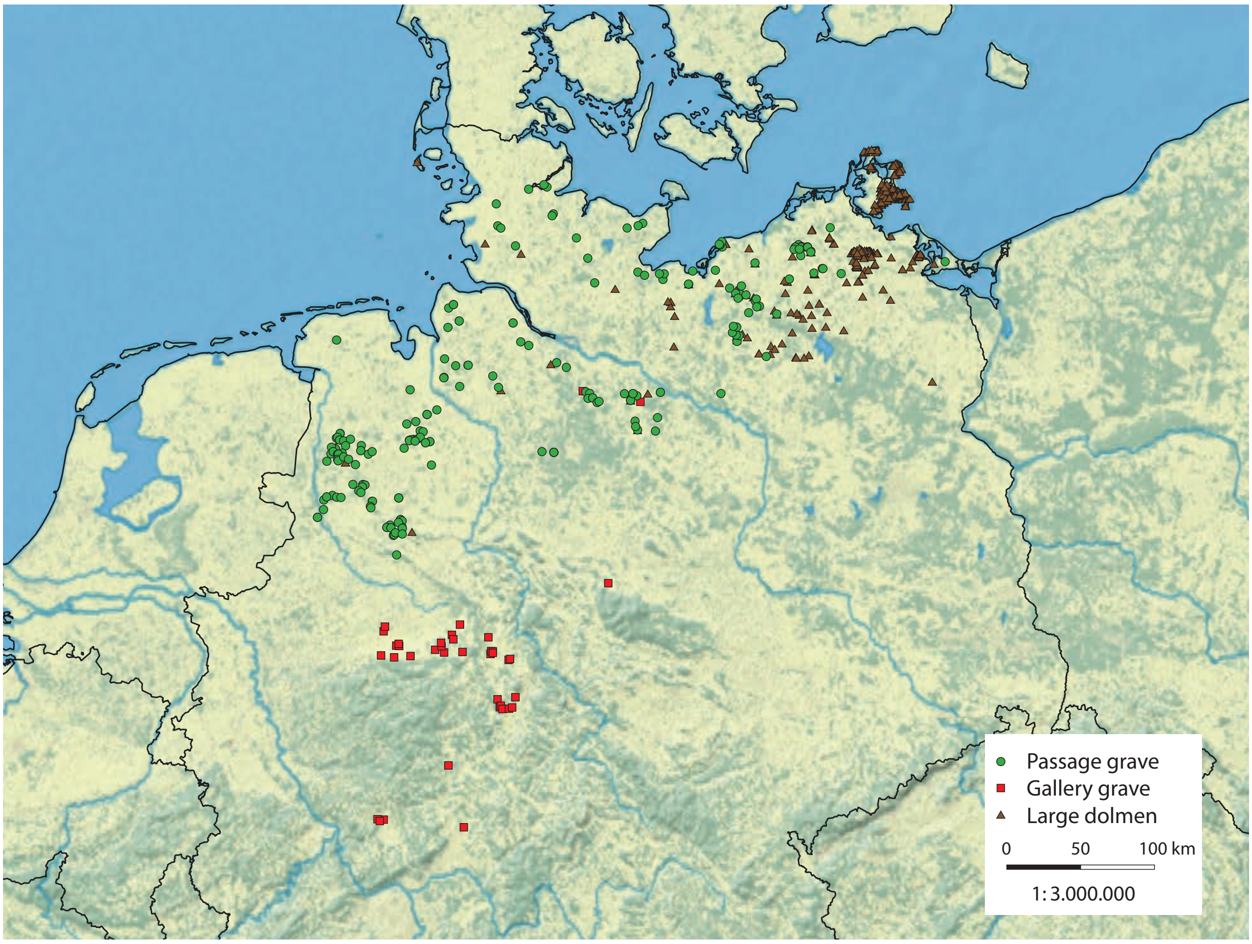

Fig. 14. Regional patterns of the three variants of large chambered megalithic grave monuments in Northern Germany (after SCHAFFERER *in press,* SCHIERHOLD *2012).*

importance of large collective burial chambers, whether passage graves, gallery graves or large dolmens. At roughly the same time – potentially later than visible in the burial monuments – a collectivisation is also visible in the settlement structure. Although the concept of the village is surely known among the farmers in the Funnel Beaker period (see also KLASSEN/KNOCHE, this volume, who argue for the enclosure as a ritual representation of the village idea), the practical construction of uniform and well-structured houses, densely packed within a village represents a major social transformation, which will inevitably involve a significant increase in collectivity. Settlement-wide decision-making and (collective or centralised) cooperation will take over most of what must have been autonomously-organised decisions and practices in the earlier system. Thus, it makes sense to connect the collectivisation of burial rituals and the collectivisation visible in the settlements as effects of the same social process, namely a strengthening of larger social groups, extending the reach of single farms or small agglomerations of farms (cp. also MÜLLER 2010).

LAND-USE AND POPULATION ESTIMATIONS

As a consequence of our argumentation, the data for human impact on the vegetation and the reading of summed radiocarbon dates as indicators for human activities might be viewed in a different light. Within the SPP, Ingo Feeser (FEESER/DÖRFLER 2014; 2015; FEESER et al. 2016) used a principal component analysis to identify landscape openings. He describes an increase of human impact around 3600 cal BC and a decrease at 3300/3200 cal BC. This discrepancy of a less visible human impact in phases of the constructions of passage grave and the emergence of larger villages particularly leads to an important question: Does the pollen data reflect not so much an overall decrease in human activity but rather a spatial re-arrangement of activities or a spatial concentration of activities, caused by the changes in the settlement pattern from dispersed single farmsteads to concentrated villages (and fewer but more frequently used passage graves)? The »settlement and enclosure islands« in the forested areas could be too small for the locally-produced pollen to reach the off-site drilling sites providing the data sets. Feeser worked out that especially Schleswig-Holstein is only characterised by high uncertainties in the second half of the 4^{th} millennium, whereas for western Mecklenburg the trend is stable.

Martin Hinz and colleagues estimated the population numbers by using sum calibrations of ^{14}C dates for more than 1,300 sites form western Sweden, Skane, Northern Jutland and Northern Germany (HINZ et al. 2012). For each site, they integrated a sum calibrated value in the calculation to avoid a bias from a differential intensive research activity. The general assumption is that the numbers of ^{14}C dates or the number of dated sites per period reflects human activity and thus relates to population density.

In accordance with the palynological data, these curves suggest a decrease of human activity and thus population density during the time of the passage graves and the large villages. Could it be that the concentration of settlement activity at the local scale reduces the human impact at a regional scale? Moreover, would this settlement concentration reduce the total site number and thus affect the ^{14}C dates' potential to be taken as a proxy for the estimation of population size? Alternatively, do we have to consider a social interpretation for the »discrepancy« of the different data? Perhaps the re-organisation of the society that we witness around 3300 cal BC – this collectivisation of both settlement and burials – affected the agricultural productivity in a negative way, leading the way to the marked social changes visible in the centuries after 3000 cal BC with the emergence of corded ware/single graves.

CONCLUSIONS

Based on the study of the dating of burial monuments at both the local level at the Flintbek cemetery and the regional level of Northern Germany (the SPP data), we can state that the megalithic long barrows and small single dolmen were built in the time between 3650–3400 cal BC. After 3350 cal BC, the passage graves, gallery graves and large dolmens constitute the preferred burial architecture. These three types of graves represent three regionally-distinct variants of the same principle, namely the concentration and collectivisation of burial activities. Parallel to this process, settlement patterns change towards the establishment of more concentrated and collective organisation, namely villages fall into this period. In settlements and burials, we observe what we describe as »collectivisation«, processes of stabilisation, concentration and enlargement. We interpret this phenomenon as a strengthening of larger social groups acting in a more coordinated, collective or centralised cooperation and less as autonomous small-scale social units.

We argue that this archaeological evidence could change the current interpretations of the archaeobotanical data and the population estimations based on the number of ^{14}C dates. The latter could reflect larger and thus less scattered social units instead of a decreasing absolute population number or a decrease of human pressure on the environment after 3400 cal BC. The concentration of activities possibly prohibits the pollen from entering the sediment traps of our pollen data archives. On the other hand, more concentrated settlement activities would also result in fewer sites and thus the number of sites – often taken as a proxy for population estimations – would not be the appropriate method. However, as an alternative option, we could also think of a decrease of agricultural activity associated with this re-organisation of the society around 3350 cal BC, leading to the marked social changes visible in the centuries after 3000 cal BC.

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Enclosures, structured deposits and selective innovations: Riedling and the role of the South Bavarian Münchshöfen Culture in the new networks of the Late Neolithic

Daniela Hofmann, Ludwig Husty

ABSTRACT

In this paper, we briefly discuss the role played by the southern Bavarian Münchshöfen culture (c. 4500–3900 cal BC) in the wider European networks of material, social and ritual innovations which characterise the later Neolithic. Two key aspects are the construction of monumental enclosures – many of them causewayed – and the structured deposition of objects, animals and humans. This is also attested for the Münchshöfen culture and the paper begins by briefly summarising the current state of research. However, prestige goods (copper, Alpine jade axes) are strikingly absent in the study area. In the final part of the paper, we briefly outline the possible ways in which this selective pattern of the adoption, adaptation and rejection of innovations could be further investigated, using the enclosure site of Riedling as an example. This site is currently the focus of a newly-established research project but holds the potential to contribute to these broader questions in the future.

THE LATE NEOLITHIC BACKGROUND

The late Neolithic is a time of change across central and north-western Europe. To name the most obvious examples, there is an expansion of the Neolithic way of life, which is now extended to cover the north European plain, Great Britain, Ireland and the Alpine foreland, as well as pushing onto less favourable soils within the settlement areas occupied since the early Neolithic (e.g. GLESER 1995, 331–335; LICHARDUS 1991). The architecture associated with this horizon often comprises ephemeral and rather small houses (as for instance in the Alpine foreland, Ireland and southern areas of the Michelsberg culture: EBERSBACH 2013; HOFMANN 2013; SMYTH 2006; HÖHN 2002, 29–60; RICHTER 2011), although considerable diversity remains in detail[1]. Perhaps most striking is the emergence of new vocabularies of structured deposition and forms of personal representation (CHAPMAN 2013; HANSEN 2011; MÜLLER 1996), alongside the widespread building of enclosures – many of them causewayed – in a range of shapes and sizes (ANDERSEN 1997, 133–280; 2015; PETRASCH 2015, 766–768; MEYER/RAETZEL-FABIAN 2006).

For central Europe at least, many of the economic and social changes that could have been driving these processes remain to be pinned down. For instance, it has been suggested that an increased reliance on cattle herding could have fuelled the building of many of the enclosure sites of the Michelsberg culture (GESCHWINDE/RAETZEL-FABIAN 2009) as well as facilitating inter-regional contact (SCHIER 1993, 39), while others have argued that a general cycle of over-population – possibly coupled with climatic downturns – could have driven the expansion into previously unsettled regions and the need for both defensive earthworks and monuments fostering social cohesion (e.g. GRONENBORN 2006). For others still, enclosures above all fulfilled a social and ritual function as gathering places at which late Neolithic communities reinforced their social relationships through various kinds of exchanges and/or through ritual activities, often exemplified by the deposition of artefacts, animals and human remains in the enclosure ditches or pits inside (e.g. ANDERSEN 1997, 285–287; RAETZEL-FABIAN 1999; MATUSCHICK 1991). These models are not necessarily mutually exclusive (SCHIER 1993, 30) and they explain why enclosures have been so prominent in the study of this period.

In this paper, we will review the role of enclosures, prestige goods and structured deposits specifically in

1 For example, the longhouses of several Michelsberg sites in France and Belgium (MAROLLE 1998; MARCHAL et al. 2004).

the late Neolithic in south-east Germany, focusing on the so-called Münchshöfen culture. The constellation of practices present (and absent) there raises a series of questions regarding how wider trends and innovations articulate with local developments. Subsequently, we present the enclosure site of Riedling as a case study that – upon the completion of our current research project – will hopefully allow new perspectives on these issues.

Enclosures and hierarchies

One guiding idea in the study of the monuments of this period is undoubtedly the notion of increasing hierarchisation. This can take the form of constructing settlement hierarchies between sites without, with small and with large enclosures (e.g. GRONENBORN 2010); however, although this kind of hierarchy works at an inter-site level, the idea of exceptional personages such as ›chiefs‹ sponsoring the building of monuments is sometimes implied. The existence of increasing hierarchies between individuals is also bound up in the notion of prestige goods. Indeed, in the late Neolithic two distinct long-distance networks are established and in both cases the materials concerned come from restricted sources and require skill and time to produce. One is the network through which jade axes from the Italian Alps were spread across western and western central Europe, arriving in the Paris Basin from about 4700 cal BC and probably reaching the north European plain via the Michelsberg culture (PÉTREQUIN et al. 2012, 696–699). The other concerns the early appearance of metal in central Europe and the Alpine area from the mid 5th millennium cal BC onwards (e.g. TURCK 2010; STRAHM 1994; DOLFINI 2013; HEYD/WALKER 2015; ROBERTS 2009, 130–132; BARTELHEIM 2007, 190–195). Due to their exclusive origin, material properties of shininess and lustre as well as the long distances that these objects travel, they have been seen as inherently desirable and thus – almost by default – as tokens of a new social (and sometimes explicitly male) elite who sought to distinguish themselves from others through the possession of such items (e.g. MÜLLER 2001, 415–418; HEYD/WALKER 2015; STRAHM 1994; PÉTREQUIN et al. 2013)[2]. The classic case study remains the cemetery of Varna, where individuals are buried with large quantities of copper and gold objects.

However, the general validity of a narrative stressing status competition between individuals as the main driver of social change has been questioned in recent years (e.g. KIENLIN 2008; TURCK 2010, 1–9; MILLE/CAROZZA 2009, 165–168). In particular, the expectation that the alleged prestige goods would have caused the same social transformations everywhere has been met with scepticism. For instance, Chapman (2013) has traced the extent to which the ›Varna effect‹ – the new constellation of exchange networks, settlement form and lavish consumption of metalwork in the funerary domain – influenced other contemporary communities. He found that while many societies up to 1,000 km from Varna indeed exhibited changes at the same time, in general only some aspects of the package were taken up. Especially the extent to which metal was introduced and the extent to which it was consumed in the mortuary sphere differed (CHAPMAN 2013, 328–331).

Varna certainly remains an isolated phenomenon at present, while in much of central Europe we neither find a large horizon of lavishly provisioned individual burials nor particularly large domestic buildings which could have bolstered the elite claims of their inhabitants (although there are rich hoards: HEYD/WALKER 2015, 681). Others have highlighted how varied the uptake of metal was, in terms of both the items involved (trinkets and ornaments, axes, copper discs, etc.) and the contexts in which they were deposited (with human remains, at prominent points in the landscape, in association with smelting debris, on settlement sites) (e.g. TURCK 2010, 21–35, 103; KRAUSS/HUIJSMANS 1996; DE MARINIS/PEDROTTI 1997). The copper disc recovered from the burning horizon of Hornstaad on Lake Constance, dating to 3910 BC, may serve as a case in point for the multiple connections active at this time. Although its shape recalls gold finds from south-east Europe – notably the Stollhof hoard – the metal most likely came from northern Italy (KLASSEN 2010). This shows the creative cultural fusions that could be active in this early phase of metal use. They could have extended to the social uses of metal, alongside the shapes that it took and where it was buried. By the same token, the size of social group drawn upon to build enclosure sites – and thus the extent to which they could fuel processes of hierarchisation (and if so, on what scale) – was most likely very varied.

Remaining research questions

This focus on regional differences in the uptake of what seem to be shared innovations and trends finds

2 Although large-scale social changes are often said to coincide with the onset of the Bronze Age proper, Copper Age societies frequently serve as a convenient evolutionary starting point.

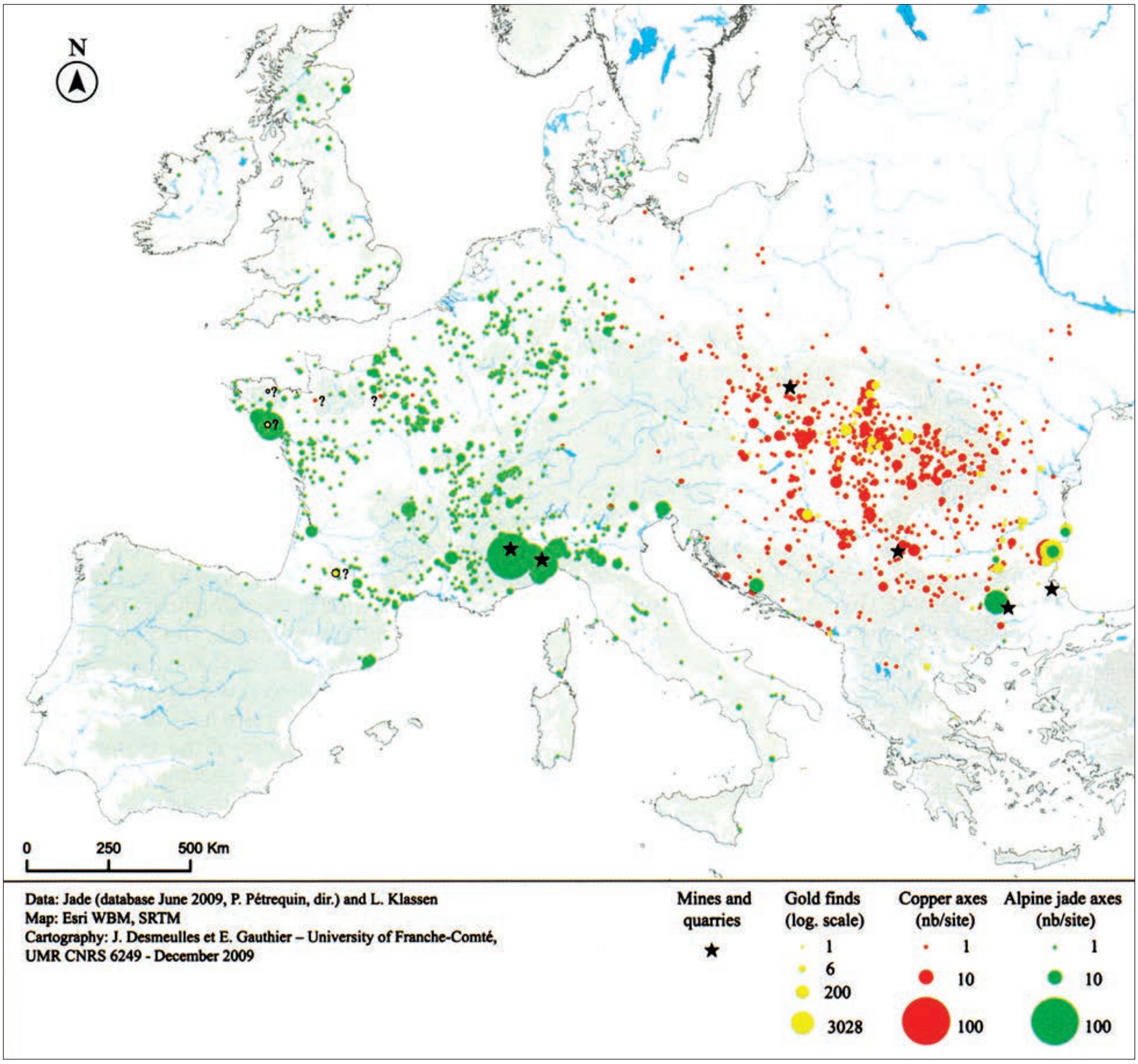

Fig. 1. Distribution of Alpine jade axes and copper objects in Europe (from Klassen et al. 2012, 1281; reproduced with kind permission of P. Pétrequin).

its echo in the profusion of regional culture groupings, mostly defined based on pottery, which also characterise the later Neolithic. The interplay between such local and regional distinctions on the one hand and the shared changes manifested over large geographical areas on the other is a key problem for further study. This is especially the case since the distributions of different kinds of evidence – such as types of enclosure, structured deposits, personal ornaments, pottery, stone tools and other items – only overlap partially at best, with rigid boundaries conspicuously absent (Doppler/Ebersbach 2011; Schier 1993, 34; Suter 2011). Nonetheless, progress in this area remains difficult as the state of research in different regions is highly uneven.

One main problem is the lack of a firm dating framework for large parts of central Europe, certainly away from the waterlogged conditions of the Alpine foreland. For instance, in his recent review, Gleser (2012, 38–41) distinguished between a short-, long- and medium-term chronological model, all based on typological arguments and more or less critical views of existing ^{14}C dates. Depending on which model is adhered to, dates for various culture groups can shift by well over a century, which has a major impact on our view of cultural change and the spread of various items of material culture, as well as the synchronisation of the central European sequence with areas further to the east and west. All of this means that for large areas we still lack a well-substantiated idea of how quickly innovations were transmitted across Europe, the longevity or episodic nature of key sites and their relationship with wider social, demographic or environmental trends (although this is changing, see e.g. SEIDEL et al. 2016; RACZKY/SIKLÓSI 2013). All of this can only be tackled by increasing the number of detailed and well-contextualised site narratives.

As one case in point that will help us to address at least some of these issues, we have chosen the southern Bavarian Münchshöfen culture. Its position in the late Neolithic network is crucial for two reasons: on the one hand, it is geographically central between the two large culture blocks of the Lengyel and post-Lengyel cultures in the east and the Schulterbandgruppen, Michelsberg and related cultural phenomena in the west; and on the other hand, the distribution pattern of prestige goods reveals a striking lack of such items in the Münchshöfen culture area (Fig. 1). Only one well-contexted copper object – an ear stud – has ever been recovered (BÖHM/PIELMEYER 1994).[3] This is despite the fact that Münchshöfen culture pottery outside its core area of distribution, for instance in the Alps, is often associated with smelting crucibles and other signs of metallurgical activity (e.g. at Mariahilfsbergl, KRAUSS/HUIJSMANS 1996; Kiechlberg, TÖCHTERLE 2012; and Isera La Torretta, DE MARINIS/PEDROTTI 1997). The Münchshöfen culture is thus an ideal test case for investigating how, and how quickly, innovations and ideas spread across vast geographic distances. The pattern of selective adoption of key innovations also means that we can track a range of responses with which these innovations – including prestige goods and enclosures – were actually met on the ground and investigate whether the resulting constellations of traits (›cultures‹) actually relate to social groups of some kind.

THE MÜNCHSHÖFEN CULTURE

First identified by Joseph Rabl and Joseph Dahlem in 1876 (BÖHM 2002, 227–229; for a summary of research history see GLESER 1995, 289–290; BÖHM 2002), the Münchshöfen culture (Fig. 2) is generally characterised based on its pottery. An initial assessment was provided by Süß in the 1950s (published as SÜSS 1976). Given what was then believed to be a short overall duration for the Münchshöfen culture, he was also concerned with identifying regional differences, an aspect that is now once again being pursued in more detail (e.g. MEIXNER 2013a; Meixner in press). Much initial discussion (summarised in GLESER 1995, 290–298) also focused on whether Münchshöfen pottery should be classified as *either* like Lengyel *or* like Aichbühl and more western traditions, causing various problems of cross-dating.

The best-known attempt at phasing was undertaken by Böhm (1994; 2002). He distinguished an early phase with angular bands executed in a stab-and-drag technique from an elaborately decorated middle or classic phase with a wide variety of ceramic forms. While early on there are similarities with (Epi) Lengyel groups and even Rössen imports (RIND 1994), contacts with Goldberg I and Aichbühl come to the fore over time (NADLER/ZEEB 1994, 183; MEIXNER 2013a). Finally, the late phase is characterised by fewer decorations, now executed as incised motifs delimiting angular bands, as well as vessel types with handles, arcade rims and a rough barbotine surface finish. Closer parallels here are Jordanów/Jordansmühl, Altheim and Michelsberg (BÖHM 1994; 2002; BÜRGER 2004). These reflections already made clear the multiple roots of the Münchshöfen pottery tradition, to which a local Middle Neolithic substrate must also be added (HUSTY 2011, 144).

Unfortunately, these studies could not be completed before Böhm's untimely death in 2005 and distinguishing regional from chronological developments remains disputed (BÜRGER 2004; MEIXNER 2008). Publications of smaller assemblages (e.g. Pilsting-Wiesen, BLAICH 1995; Galeriehöhle, NADLER 1994; Frauenberg, RIND 1994; Blankenburg, MEIXNER 2013b) have generally tended to confirm the overall rough outline, as well as succeeding in further smoothening the seemingly abrupt transition from the Middle Neolithic to the Münchshöfen (MEIXNER/RIEDHAMMER 2009; GLESER 1995, 296). A more detailed analysis and re-phasing of the known sites is imminent (Meixner in press).

Nonetheless, while the overall sequence is now clear, the duration of the individual phases is not. The 43 radiocarbon dates currently in existence (see list of 35 dates in Meixner in press; to this must be added the eight dates from Riedling) cover a span between roughly 4450 and 3900 cal BC, although this is

3 There are a few other possible instances, although their contexts remain doubtful (MATUSCHIK 1997, 103).

based on informal visual inspection and has not yet been formally modelled. How long the different pottery phases last within this overall time span remains to be established.

In sum, the detailed typological study of the pottery has provided a considerable amount of information regarding the changing connections and stylistic affiliations of the Münchshöfen culture, which indeed seems to be situated at a crossroads of several styles and traditions. It may even influence ceramic production as far afield as northern Italy (MOTTES et al. 2002, 120). Therefore, despite seemingly not participating in ›prestige goods networks‹, these communities were not isolated from wider developments. The role of pottery itself is also important in this context. As Süß (1976, 91) already recognised, the wide spectrum of vessel shapes, the quality of manufacture and the sometimes highly elaborate decoration set Münchshöfen culture pottery apart from the preceding Middle Neolithic traditions (as well as from the styles that were to follow) and suggest that the social function and valuation of these vessels also changed. New forms such as serving spoons imply new roles in the presentation and serving of food (RIEDMEIER-FISCHER 1998), there are instances of painted vessels (e. g. Gammelsdorf; WILD/ZACH 2015) and different vessel forms could also be connected to new ways of food preparation. In addition, pottery is often part

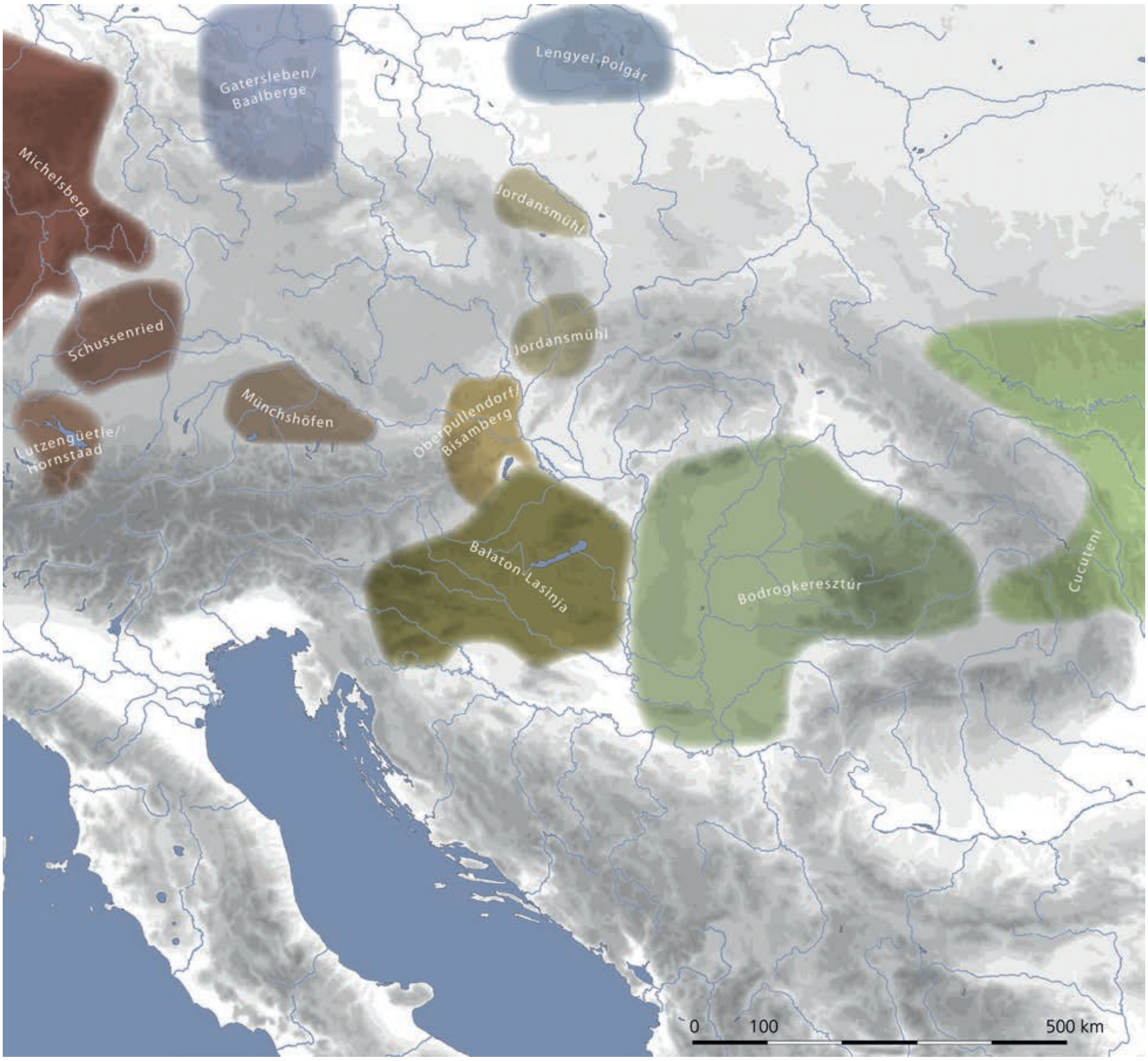

Fig. 2. Map showing the extent of the Münchshöfen culture and its relation with surrounding groups (© RGZM, reproduced with kind permission of Detlef Gronenborn).

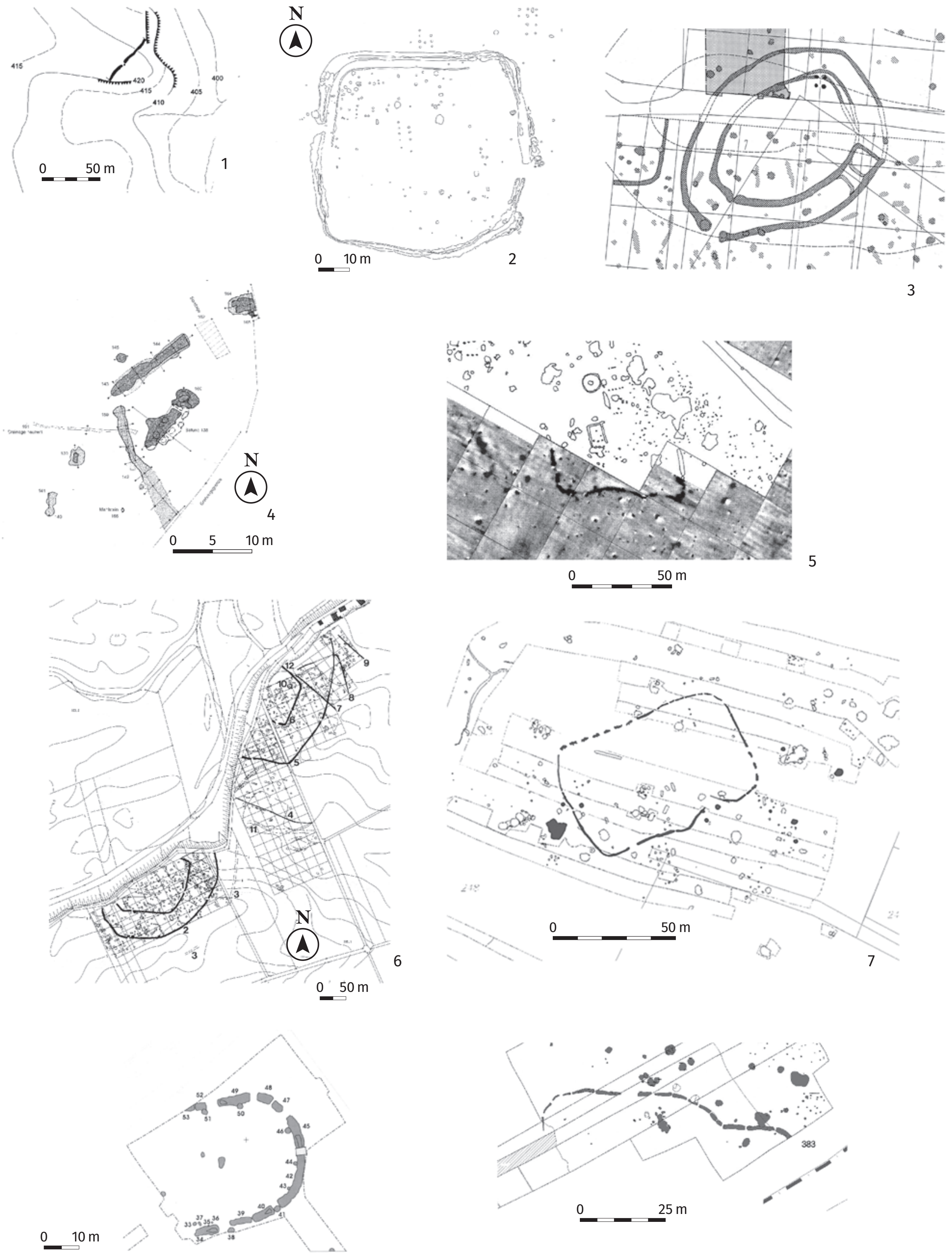

Fig. 3. Münchshöfen enclosures in south-east Bavaria. North at the top. 1 Landau a.d.Isar (Kreiner 2009); 2 Buxheim (Rieder 1998); 3 Riekofen (Becker/Tillmann 1996); 4 Langenreichen (Mahnkopf/Meixner 2007); 5 Murr (Neumair 2010); 6 Tabertshausen (Fassbinder/Irlinger 1997); 7 Salching (Husty 2016); 8 Oberhinkofen (Engelhardt 2007); 9 Feldkirchen (Husty 2009).

of structured deposits (see below). Seen in this light, richly decorated and finely-made pottery could be considered a prestige good in its own right and could have been integrated in a wide range of social interactions (BÜRGER 2004, 187). Hence, pottery remains key in terms of investigating how wider trends visible in the multiple regional connections of the corpus are combined in locally specific ways and mediate relations at several social scales.

Other aspects of material culture are less well studied but similarly stress multiple lines of influence. While we know little about domestic architecture (see GANSLMEIER 2009 for a recent summary and possible connections to the Alpine area), burial customs conform to a broadly European trend of small numbers of individuals being interred, a fact often interpreted as reflecting a low status for these ›anomalous‹ graves (e. g. HAUNSCHMIDT 2001). However, as Meixner (2009) has shown, there are recurrent patterns in the orientation and position of many of the deceased, variously reflecting the preferences more common in the Rössen or Lengyel cultural areas or – in the case of secondary burial – the Michelsberg tradition. By contrast, the deposition of multiple burials, often in grain storage pits, is still seen as anomalous (MEIXNER 2009). While the preferred interpretation for these latter cases is one of excluded dead, sacrificial victims, etc. it is worth highlighting that they are also part of a widespread phenomenon that can be observed across culture groupings (JEUNESSE 2010). The same is true for two other key components, namely enclosures and the existence of structured deposits, which warrant being introduced in greater detail.

MÜNCHSHÖFEN ENCLOSURES IN SOUTH-EAST BAVARIA

Just like many other contemporary groupings across Europe, the Münchshöfen culture built enclosures and in south-east Bavaria work in recent years has brought to light a large number of new sites (HUSTY 2011, 136–140). Although many could not be completely excavated, several key points already stand out. For example, it is clear that the shapes and sizes of these sites were extremely varied. Although research remains in its infancy, it seems that there was also some diversity regarding the lengths of time in which these sites were in use, the ways in which they related to earlier monuments and the kinds of activity that were carried out.

In the 1990s, several almost linear ditches with deep, v-shaped profiles were uncovered south of Landau a. d. Isar (Fig. 3.1), where they cut off a promontory or hilltop (KREINER 2009, 131–133). This reference to natural features is also found in some of the more rectangular examples. For instance, recent excavations at Niederpöring in the district of Deggendorf completed the plan of an enclosure discovered in the early 1980s, revealing three parts of a rectangle. The fourth, open side lies towards the edge of the high terrace of the Isar, which is very steep at this point and forms a natural access barrier (unpublished; pers. comm. S. Hanöffner, Kreisarchäologie Deggendorf). The same kind of enclosure is visible in a magnetometer survey carried out at Tabertshausen, just a few kilometres further downstream (FASSBINDER/IRLINGER 1997; fig. 3.6). In 2014, a sub-rectangular enclosure of c. 73 m × 47 m (i. e. surrounding an area of about 3400 m²) was almost completely excavated on the high plateau of a hill (Fig. 3.7) near Salching, Straubing-Bogen district (HUSTY 2016). Several segments of a further, evidently late Münchshöfen enclosure were uncovered between 2012 and 2015 at Oberschneiding, also near Straubing-Bogen. Together with contemporary ditch segments excavated just to the south in the early 1980s, it can be reconstructed as an exceptionally large rectangular site of 170 m × 90 m, which encloses the top of a hill. Both of these hills were settled at the time.

Nonetheless, Münchshöfen culture enclosures do not always occur in potentially defensible positions and there are indications that they also fulfilled other functions in any case. At the large Münchshöfen settlement at Murr (NEUMAIR 2010, 71–77), what looks like half of a rectangular enclosure (Fig. 3.5) was uncovered. Its south-eastern arm is around 50 m long, although it is unclear whether the circuit was ever completed. Instead, the ditch seems to have acted as a focus for the deposition of whole pottery vessels (NEUMAIR 1996, 33–36). At Langenreichen (MAHNKOPF 2005; MAHNKOPF/MEIXNER 2006), only a small section of the ditch was excavated, but the skeleton of a child was recovered from it, comparable to many such instances in enclosure 1 at Riedling (see below). Similarly, the presence of sometimes quite substantial causeways and gaps, for instance at Bergheim (MEIXNER 2002; fig. 3.4), seems to speak against a simply defensive function, although of course local erosion processes must be taken into account. Several smaller, round or semi-circular enclosures exist and some at least have segmented ditches, a phenomenon first observed at Oberhinkofen near Regensburg (ENGELHARDT 2007; fig. 3.8). The two Riedling enclosures also fall into this category, as do the rather irregular ditch at Feldkirchen near Straubing-Bogen (HUSTY 2009, 48f.; fig. 3.9) and the rectangular Salching enclosure described above.

Finally, a strong historical component can be attested at some sites. Several have multiple episodes of occupation, while some make striking reference to earlier monuments. At Buxheim near Eichstätt, a subsquare enclosure with causeways in the west and east was completely excavated in the mid-1990s (Fig. 3.2). It encircles an area of around 65 m × 70 m and saw three phases of occupation. The enclosure at Riekofen in Regensburg district (Fig. 3.3) is only known from aerial photographs and magnetometer surveys. Its shape strongly recalls Middle Neolithic rondels, although the mass of collected surface finds definitely place it in a Münchshöfen context (BECKER/TILLMANN 1996). The doubled ditch system, enclosing an area of about 72 m × 53 m, was interrupted in the south-west, while the internal palisade had a gap in the north and an almost square entrance construction, behind which another palisade trench was dug. It seems that there are at least two phases of activity here. It is difficult to interpret the Riekofen rondel as anything other than a repetition and emulation of the earlier tradition, complete with astronomical orientation, and this may not be the only example. A few metres south-east of Oberschneiding, two parallel, strongly curved stretches of ditch dating to the Münchshöfen culture were excavated in 2005 and 2006. The adjacent areas to the east were surveyed by magnetometer in 2015, showing that these ditches belong to a round double-ditched enclosure with a diameter of around 80 m (unpublished reports by ProArch/ArchDienst and Archaios). Finally, at the Middle Neolithic rondel of Meisternthal, a shallow Münchshöfen recut was recorded in parts of the ditch, following its course (BECKER/KREINER 1994)[4]. It thus seems that Münchshöfen people deliberately made reference to past enclosures, by either re-excavating parts of them – perhaps where they were still visible as slight dips in the landscape – or imitating their architectural features, as at Riekofen.

While this is by no means a complete representation of Münchshöfen enclosures in Bavaria, the examples described above open several questions for further research. For example, it would be interesting to investigate whether the different shapes – such as short linear stretches of ditch, rectangular or oval enclosures and regular or irregular shapes – are due to chronological change or simply local topographic conditions. This is also related to the question of the role that these sites played in Münchshöfen society. Given their variability in appearance, use and duration, it seems probable that the search for a single function explaining all of these enclosures will not be successful. In very general terms, a hierarchy of some kind has been proposed between sites with and those without an enclosure, as the former could have functioned as central places (MATUSCHIK 1991, 44, 48). Others prefer to argue in more neutral terms that enclosures could have served to demarcate a community (ENGELHARDT 2007) or functioned as a meeting place (HUSTY 2011), without suggesting further hierarchical divisions. To even begin to address these questions, more detailed site biographies will have to be created and compared to recognise emergent patterns.

MÜNCHSHÖFEN STRUCTURED DEPOSITS

In conjunction with enclosures, another pan-European factor also reflected in Münchshöfen material is the increase in instances of so-called structured deposition. Although the term has attracted some criticism, particularly for encompassing an overly-wide range of practices to be analytically useful in its present form (most recently GARROW 2012; CHADWICK 2012), most authors agree that there remains a category of carefully placed deposits in both enclosure ditches and pits which were buried complete or smashed in situ and stand out by virtue of their assemblage composition, arrangement and treatment. In the Münchshöfen culture, these can involve objects, animals and people.

Beginning with depositions of objects, pottery is once again a crucial item of material culture. At Murr, alongside the pots placed in the enclosure ditch (see above), large settlement pits saw the deposition of staggering quantities of sherds, as well as placed deposits of animal bone and pots (NEUMAIR 1996, 33–36, 50–59). At Tiefenbach, five complete vessels and seven arrowheads were arranged in a pit (EIBL/KOCH 2010) and whole vessels in connection with flint tools and an adze were also recovered from Singenbach (STOIA/WEINING 2012). At Pilsting-Wiesen, a pit with traces of burning at its base contained a complete vessel, placed upside down next to the skull of a young boar (BLAICH 1995, 86). In addition, this and a similar adjacent pit contained a particularly rich assemblage of sherds, with an unusual number of bowls (BLAICH 1995, 86). Further instances could be mentioned, including the large-scale destruction of pottery from Riedling itself (see below), but it is clear that the consumption of pottery was a key aspect at depositional events.

4 Interestingly, the rondel of Svodín also experienced later Jordansmühl recuts (TUREK 2012, 191).

Alongside pottery, animals are another focus for deposition, as already shown by the boar skull from Pilsting-Wiesen. For instance, a deer was buried with a decorated bottle at Alteglofsheim-Köfering (MATUSCHIK 1992) and a male deer was deposited in a pit at Straubing-Kreuzbreite (VON DEN DRIESCH/GERSTNER 1993). Perhaps the most striking examples come from Mamming in the Dingolfing-Landau district. Here, an hourglass-shaped storage pit (pit 21) contained the complete skeletons of two female pigs, placed cross-wise on top of each other and covered with further animal bones and sherds (Fig. 4). In the immediate vicinity, another pit contained one complete and two partial pig skeletons, a sheep/goat foetus and a hare (pit 50), while a complete female roe deer was recovered from the very narrow pit 108 (von den DRIESCH/GERSTNER 1993; KREINER 1993). One interesting aspect at Mamming is the spatial arrangement of these pits, which form part of a loose circle enclosing an empty area (Fig. 4). Regardless of whether a house stood here – as suggested by Kreiner (1993, 39–40) – this concentration of deposits in a pit cluster of this kind can be read as an attempt to demarcate a space, creating a kind of symbolic boundary.

Some of the deposits of human remains can potentially be understood in a similar way. For example,

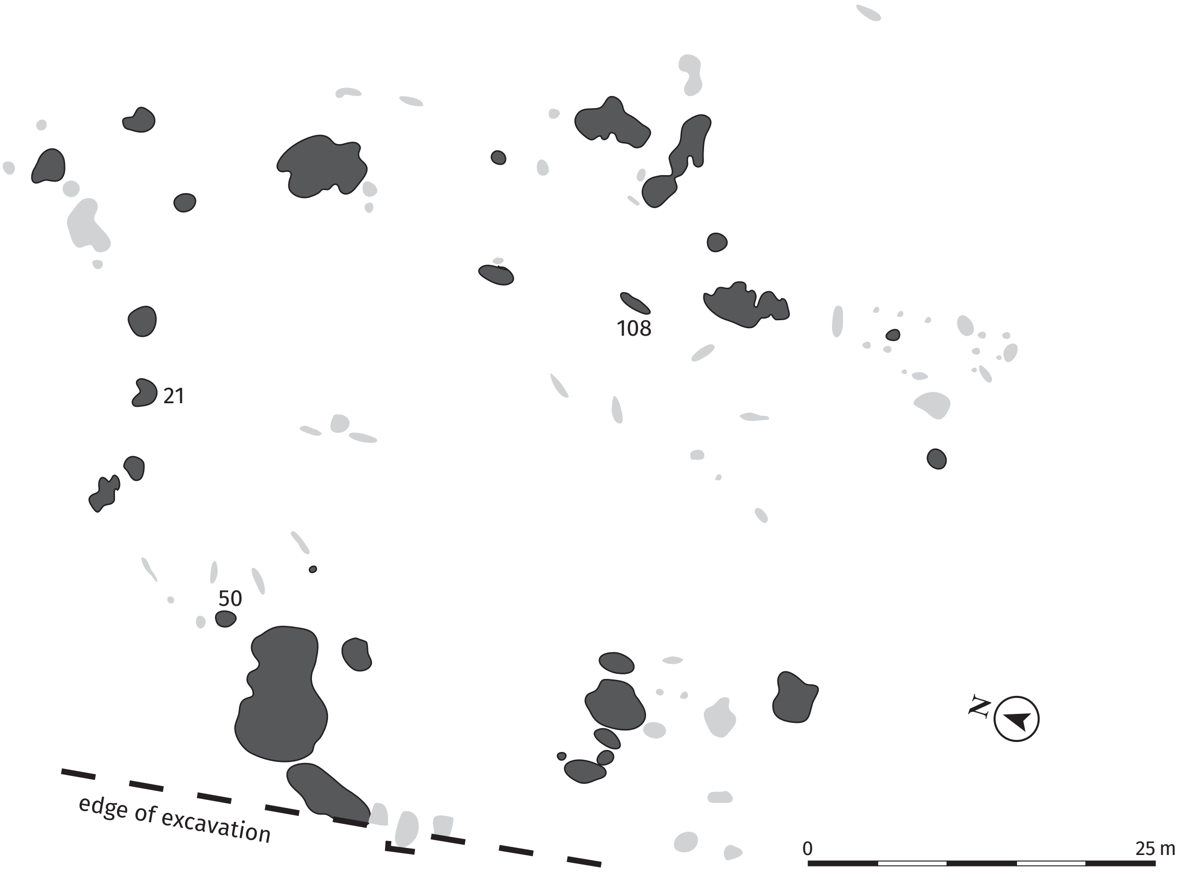

Fig. 4. Mamming: layout of Neolithic features in the western part of the site and close-up of pig deposition (after KREINER 1993, 38). Dark grey features are dated to the Münchshöfen culture, light grey ones are undated. Early Neolithic (LBK) features are not shown.

the cross-wise deposition of human individuals in a grain storage pit from Straubing-Wasserwerk (Böhm/Pielmeyer 1993) very strongly recalls the arrangement of pigs at Mamming, creating a parallel choreography between human and animal. Other parallel treatments can be suggested based on partial human remains. For instance, a human skull from Aufhausen, surrounded by thirteen flint tools and two almost identical late Münchshöfen beakers (Kreiner 1998), is very reminiscent of the Pilsting-Wiesen boar skull. In another pit at the same site, a roe deer mandible and the frontal bone of an adult human skull were deposited on a gravel layer and covered by multiple dumps of burning debris (Kreiner 2004, 24).

Hence, structured deposits of various kinds played an important role in the Münchshöfen culture and there are suggestive hints at repeated patterns, such as a parallel treatment of human and animal remains. It is also possible that deposits may have functioned to demarcate spaces, and this could also apply to similar instances in enclosure ditches. In addition, this aspect of Münchshöfen behaviour could once again be fruitfully compared to other regions where similar phenomena have been observed (e.g. for animal deposits see Auxiette/Méniel 2013; Lefranc et al. 2010). However, with the current state of knowledge, it is difficult to draw further conclusions. To begin with, a definite corpus of Münchshöfen structured deposits remains to be drawn up and in many individual instances it is difficult to decide whether one is dealing with a disturbed grave (as e.g. suggested by Stoia/Weining 2012), a chance breakage (rather than the ritual destruction of pottery, for instance) or a behaviour that could be described as a purposeful, ritually motivated deposition. Thus, this aspect remains to be treated on a firm statistical foundation, in which the first task must be to identify recurrent combinations of objects in definite placed deposits (including human and animal burials), before investigating possible parallels in less secure instances. Accordingly, one could start to frame the cornerstones of a Münchshöfen depositional logic (or the lack thereof), which can then be placed in the wider European context of similar practices.

Although the details remain to be worked out, depositional practices are sufficiently common to have been key activities, perhaps connected to negotiating group identities at various scales. Alongside pits on settlement sites, enclosures where larger audiences came together also witnessed such events. The potential importance of enclosures and structured deposits for the self-definition of Münchshöfen communities and boundary creation (see also Chadwick 2012, 300) was our rationale for choosing one enclosure site – Riedling – to investigate the interplay between far-flung connections on the one hand and strategies of community definition on the other, as it is played out through monumental architecture and depositional events. The project is generously funded by the Deutsche Forschungsgemeinschaft[5].

THE ENCLOSURE AT RIEDLING

The site of Riedling near Straubing in Lower Bavaria is situated on a small rise between the fertile, loess-covered Gäuboden and the Tertiary Hills (Husty/Meixner 2009; Husty 2011). It was almost completely excavated in advance of loam extraction between 2007 and 2012 under the direction of Gerhard Meixner for the companies ArcTron and ArcTeam. This revealed two intercutting ditches, both dating to the Münchshöfen culture, as well as numerous pits within and outside the enclosures, most of which are also of late Neolithic date (Fig. 5). The outer and stratigraphically older ditch forms an irregular oval of around 180 m × 110 m: not a giant by European standards, but unusually large for the Münchshöfen culture. Despite being causewayed in appearance, once recent erosion is taken into account the ditch was probably almost continuous at the top, with only the larger gaps surviving as entrances. This ditch is particularly notable for its extensive structured deposits, as discussed below. The second, younger ditch is sub-rectangular in outline and encloses an area of around 150 m × 160 m. Its southern end could not be completely excavated, but nonetheless a change in use is apparent as it is not associated with any structured deposition events.

Overall, the amount of material recovered at Riedling is staggering, although metal artefacts are once again conspicuous by their absence. Pottery is by far the best represented finds category, making up about 1500kg in weight, of which 80 % is estimated to belong to the Münchshöfen culture (mostly its classic and later phases; Husty/Meixner 2009)[6]. There is also a rich stone

5 Chronologie, Vernetzungen, Sozialstrukturen – Studien zur Münchshöfener Kultur am Erdwerk von Riedling, Niederbayern. The project has begun in May 2016.

6 Middle Neolithic, Altheim, Cham, Baden, Bronze Age and Iron Age pottery is also represented but mostly comes from discrete features rather than being admixed with Münchshöfen material.

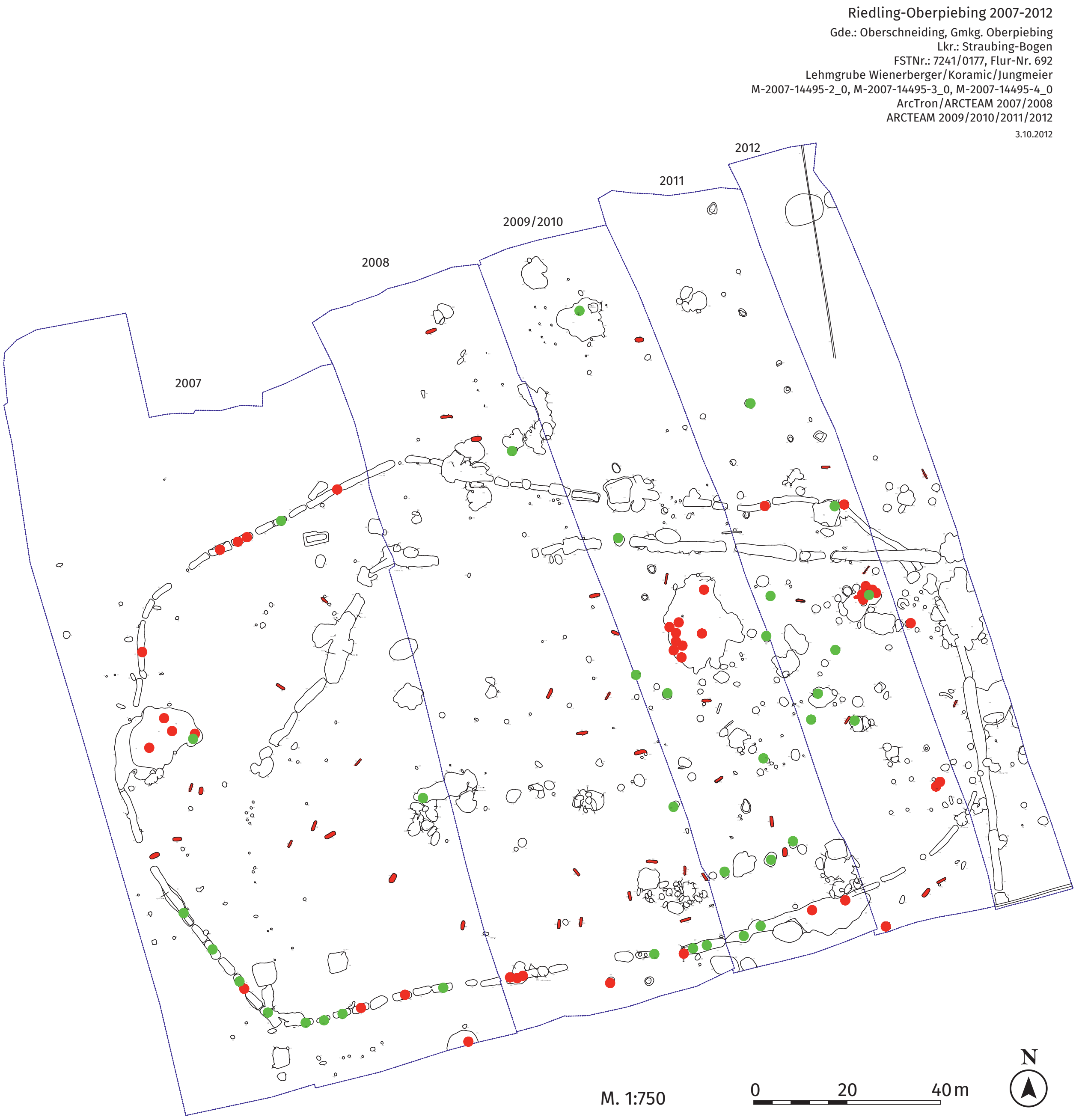

Fig. 5. Riedling: Plan of the site, showing location of human remains (red dots), structured deposits (green dots) and slit-shaped pits (elongated red features) (ArcTeam 2012).

tool inventory of both chipped and polished pieces (around 750 chipped stone artefacts and 700 other lithics; investigated by Nicole Kegler-Graiewski), a selection of loom weights and spindle whorls (around 150 items) and a hitherto unquantified amount of daub. Samples for flotation have been taken and are currently being processed (they are studied by Claudia Sarkady). Riedling is also important for having provided the largest Münchshöfen animal bone assemblage to date, comprising over 10,000 pieces (being analysed by Jörg Ewersen). Even though the remains are very fragmented, this far exceeds the contemporary complexes summarised by von den Driesch (2004, 333–334), which yielded at most about 700 and generally less than 100 bones. In addition, at least 40 human skeletons and partial skeletons were recovered, generally from the older of the two ditches and from various pits in the interior (HUSTY/MEIXNER 2009; these are being studied by Gisela Grupe).

One of the most striking features of Riedling are the structured deposits in the older ditch and several

Fig. 6: Riedling: Examples of depositional events.
A: Sherd paving covering human remains;
B: Colletion of vessels in pit 144;
C: Pit 521 during excavation, showing cattle horn core and largely complete vessels around the edges of the feature and an axe of green stone near the bottom of the image;
D: Burial in pit 277, later covered by a paving of sherds and large portions of vessels (all photographs by ArcTeam).

pits in its vicinity. These can comprise extensive scatters of whole pottery vessels smashed in situ, creating thick sherd pavings several metres long (HUSTY/MEIXNER 2009, 43–44; fig. 6A). Sometimes, (partly) articulated and disarticulated human remains are associated with these deposits. In addition, there are many pits in which smaller but evidently carefully arranged complete items and collections of items have been placed. For instance, a stack of nine pig mandibles was recovered from feature 469 (ARCTEAM 2012, 24), three complete vessels were deposited at the edge of the large pit complex 144 (Fig. 6B) – which also contained the remains of several human individuals (HUSTY/MEIXNER 2009, 37–38) – and a dense layer of sherds, grinding stone fragments and animal bone in pit 521 was framed by the deposition of two almost complete vessels and a complete axe of green stone (Fig. 6C, ARCTEAM 2012, 29–30). Finally, human skeletal remains can also appear as single and double inhumations in discrete features (Fig. 6D; HUSTY/MEIXNER 2009; ARCTEAM 2012). Thus, we are faced with a range of depositional activities carried out on a large scale and/or over a longer period and in which considerable material resources were invested. This makes the complete absence of these activities from the later enclosure all the more notable.

Given these general characteristics, the main aims of our project are threefold. First, this site provides an unparalleled opportunity for further developing the existing chronological systems for the Münchshöfen culture. Especially the deposition of complete vessels and large collections of reconstructable vessels provides closed assemblages which can form the basic building blocks for typochronologies. Together with the stratigraphic relationship between the two ditches, these can subsequently be used to inform Bayesian modelling of radiocarbon dates (to be carried out by Seren Griffiths) in an effort to estimate the overall duration of the site and its individual phases (for existing applications, see e.g. WHITTLE et al. 2011; TASIĆ et al. 2015; SEIDEL et al. 2016). In particular, we hope to estimate how quickly the change in the function of the enclosure – from a site appropriate for the repeated deposition of material culture and human remains to a site in which these conspicuous events were no longer a focus – actually happened, as well as whether this entailed a hiatus.

Second, based on a robust chronological framework, we aim to investigate the various connections that the inhabitants of Riedling entertained with other late Neolithic communities. The pottery will once again be central here. Several non-Münchshöfen vessels and forms have already been identified, including influences and/or imports from Schulterband areas to the west and from the Moravian – East Austrian Group (Mährisch-Ostösterreichische Gruppe; HUSTY/MEIXNER 2009). Pilot portable XRF analysis (to be carried out by Markus Helfert) will be employed to assess whether vessels with these ›foreign‹ shapes and decorations at Riedling also stand out in terms of their clay composition[7], while lipid analysis (under the auspices of Richard Evershed) can show whether particular foodstuffs were prepared in them. The links and networks established on this basis will subsequently be compared with the provenance of the stone materials from the site. However, we not only want to trace the origins of the objects themselves, but also the wider currency of the practices in which they were embedded. For this purpose, we will specifically focus on the structured deposits and compare their composition and arrangement in the ground with examples from neighbouring regions. Are specific kinds of objects, animals and people selected that stand apart from the less obviously structured depositional activities on this site? Are these the same kinds of objects, animals and people that are also involved in depositions in other cultural contexts, suggesting the adoption of shared principles? Alternatively, can we identify a specifically Münchshöfen depositional grammar?

Third, we want to investigate whether and how these networks change between the two phases of the site. Does the end of structured deposits at Riedling coincide with a change in its position in wider networks – for instance, a drop in imported pottery or a change in the lithics procurement network? Are economic changes visible in animal or plant exploitation? Moreover, how do these patterns of change articulate with our ideas of Münchshöfen social structure? This last question will need further reflection on the role that enclosures like Riedling played in the Münchshöfen settlement system. Evidently, whatever function the site fulfilled at first did not last. This suggests that a site's position could have been fluid and negotiable, depending on the economic successes or other activities of its builders and users. In this context, it may be worthwhile to explore alternatives to models of aggrandising individual elites, for which we currently have little direct evidence in the Münchshöfen culture.

Over the last few years, models of transegalitarian or broadly heterarchical systems have increasingly

7 Expanding on pioneering studies by BÖHM and HAGN (1988) and BLAICH (1995) on smaller assemblages from other sites.

gained currency. In such societies, an individual or group's ability to gain pre-eminence would have been founded on their capacity to accumulate surplus and followers, who had to be offered some sort of benefit in return. Communal gatherings and feasts have a major role to play in such cases, as they promote group solidarity at the same time as forming a vehicle for competition, between both individuals and larger groups (e.g. Dietler/Hayden 2001; Siklósi 2013, 423). With such a strategy of ›persuasive politics‹ (Beck 2008), people's contributions to the common cause needed to be seen to be rewarded. These obligations could function as a counter-balance to aggrandising individuals (e.g. also Flannery/Marcus 2012, 153–183). To further investigate this, we must try to trace in more detail whether institutional bottlenecks limiting access to resources, knowledge, production processes, etc. could have existed in this particular case (see Earle/Spriggs 2015) We hope that our work at Riedling will provide useful new pointers regarding the applicability of such alternative scenarios.

OUTLOOK

In sum, the Münchshöfen culture occupies a nodal position in the late Neolithic network. Its pottery – based on which it has largely been defined – is indeed very recognisable but blends decorations, techniques and shapes from various adjacent regions. This kind of creative fusion is also visible in the construction of enclosures and the placement of structured deposits, to name but two obvious examples. Like other ›cultures‹ of this period, the Münchshöfen culture is thus a tantalising blend of innovation (e.g. in pottery design) and local roots (for instance in the reference to Middle Neolithic enclosure sites), regional peculiarities (such as an absence of prestige goods) and shared trends. It seems quite likely that complex social processes were taking place, in which attempts to increase hierarchies were counter-balanced by the need to engage in persuasive politics of various kinds. These internal dynamics would have resonated with processes of admixture, innovation and selective adoption. We will need to produce more well-dated, well-contextualised site narratives to disentangle these aspects, which is something that we hope to achieve for the site of Riedling.

ACKNOWLEDGEMENTS

We would like to thank the organisers for the opportunity to present our paper at their conference and for their patience in waiting for the written contribution. For the Riedling project, our main thanks are due to the DFG for their generous funding of our investigations and all who helped with the project application. DH would also like to thank Daniel Meixner for sending his forthcoming manuscript ahead of time and in general for always being happy to discuss Münchshöfen material. We would also like to thank Pierre Pétrequin for his permission to reproduce figure 1, Ludwig Kreiner for letting us reproduce the image of the pig deposit from Mamming and Detlef Gronenborn for his help in obtaining figure 2 and for allowing us to use it. Finally, thanks to the anonymous peer reviewers for helping to improve the first version of this paper and to Richard Forsythe for his careful editing.

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From graves to society: Monuments and forms of differentiation in death (Northern France, 4th millennium BC)

Laure Salanova

ABSTRACT

The best-documented collective graves excavated in Northern France are used for discussing the structure of the past societies and the causes of change in their history. Analysed since the 1960s with different types of approaches, the investigations have concluded the existence of a great diversity of burial practices, as proven by the various architectures, the ranges of the grave goods and the different treatments of the body during and after the funerals. Through a comparison between gallery graves concentrated in the north-west part of the Paris Basin and hypogea located eastwards from the Seine valley, the different ways of differentiating dead within and between graves are analysed. The interpretation of these differences is clearly the main problem, as they obviously depend on various factors, which makes it necessary to adopt an interdisciplinary perspective to avoid a distorted reading of the past. At a structural level, the regional patterns highlighted for the 4th millennium BC are detected in a long-term sequence, pointing to the question of their time and causes.

INTRODUCTION

Research on the monumental graves in Europe has essentially been focused on the causes and consequences of their appearance on the global history of the past population (FURHOLT/MÜLLER 2011; GALLAY 2011). Beyond this general trend, the archaeological remains often show evidence of differences in the treatments of the dead, within the monument and between graves (SALANOVA 1998; KRISTIANSEN 2011). These differences inevitably question the causes of the variability and the structure of the societies who built and used these monuments. They obviously demonstrate that different expressions of identity have coexisted within the same period, each of them having their particular idea of their society. What has finally left the most visible part of the human history and how can one detect through the archaeological remains the various categories of people who compose a society? These methodological problems are still discussed nowadays (SALANOVA 2016).

The collective graves perfectly illustrate this gap between the general trend of the macro-history and what should have been the reality of the past societies. In Northern France, these graves are particularly well preserved. This region yielded hundreds of collective monuments, built during the second half of the 4th millennium BC (CHAMBON/SALANOVA 1996). They form an interesting assemblage for discussing the structure of the past societies, so that many methods have been developed on this material. Further consideration of the excavating methods first began to emerge in the 1960s, emphasising rituals, and shortly afterwards the composition of the population buried through physical anthropology (DUDAY/MASSET 1987; LEROI-GOURHAN et al. 1962). Despite the common rule of collective grouping, these investigations have concluded the existence of a great diversity of burial practices, as proven by the various architectures, the ranges of the grave goods, as well as the different treatments of the body during and after the funerals (BILLOIN et al. 1999; CHAMBON 2003; DONAT et al. 2014; SALANOVA/SOHN 2007). Few have been excavated recently, but the dozen best-documented cases allow discussing the structural and geographical variability. A redefined chronology and the large-scale comparisons have demonstrated in parallel the heterogeneity of the cultural components, with different regional backgrounds and distinct evolutions (SALANOVA et al. 2011; SALANOVA/HEYD 2007; VANDER LINDEN/SALANOVA 2004).

This contribution aims to compare different regional cases, pointing to some problems that hold importance for the interpretation of the heterogeneity observed.

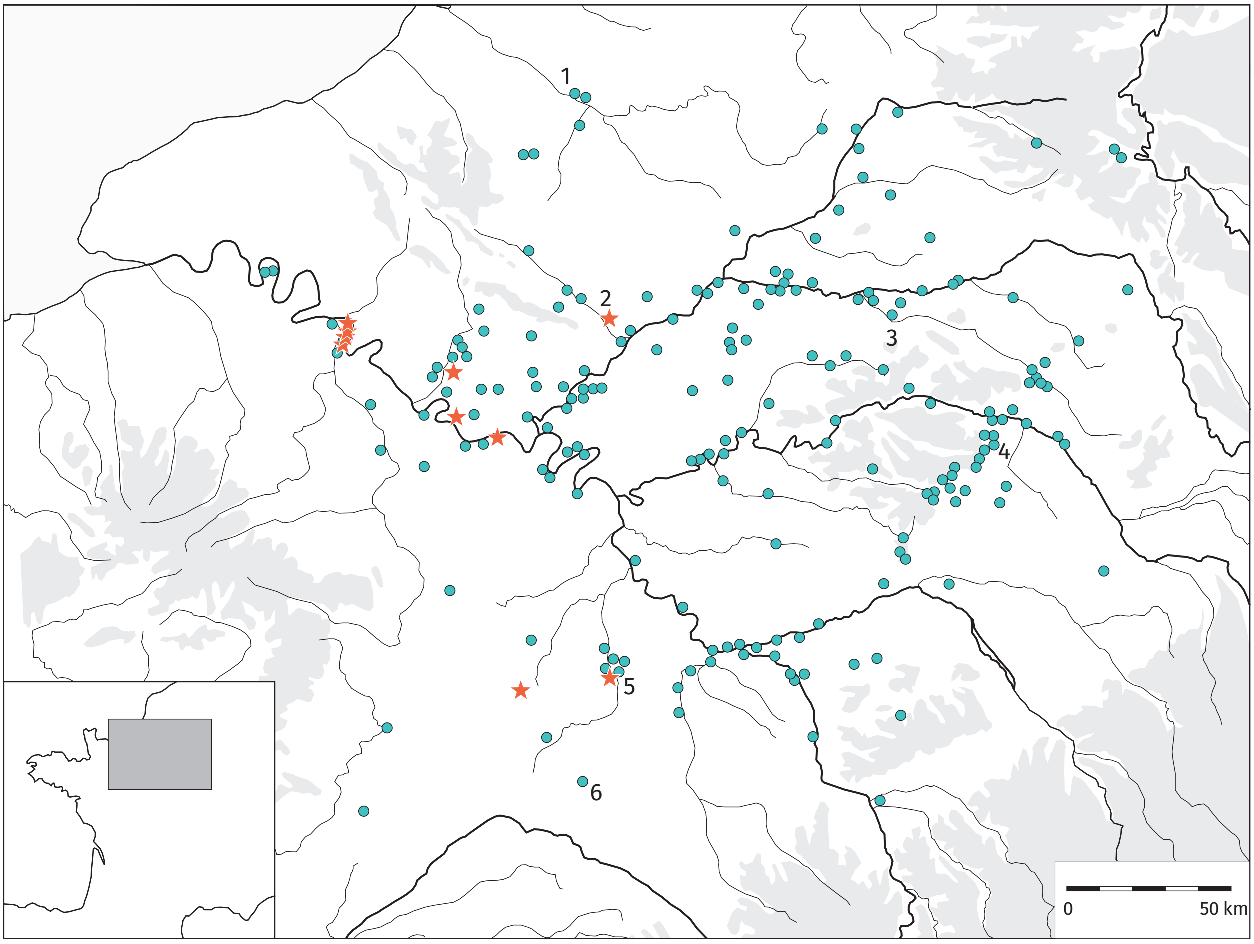

Fig. 1. Distribution of the collective graves from Northern France (after Chambon/Salanova *1996 and* Salanova *2011). Red stars: collective graves with Bell Beakers. 1. La Cense du Bois, La Chaussée-Tirancourt, Somme, 2. Saint-Claude, Bury, Oise, 3. Le Bois de Muisemont, Bazoches-sur-Vesles, Aisne, 4. Les Mournouards, Le Mesnil-sur-Oger, Marne, 5. La Pente de Courcelles, Nanteau-sur-Essonne, Seine-et-Marne, 6. Les Canas, Varennes-Changy, Loiret.*

MATERIAL AND METHODS

Among the collective graves from Northern France, the architecture of the monument, its location in the past landscape, the time and effort involved in its building, in addition to the number of dead as well as the quality and quantity of grave goods deposited with them allow distinguishing between different groups (Salanova/Sohn 2007; Sohn 2012). The interpretation of the differences is clearly the main problem, as they could refer to individual behaviours, collective norms specific to one group (age groups, kinship links, corporation, etc.) or even more universal emotional reactions (Binford 2004; Díaz-Andreu/Lucy 2005; Fowler 2010; Roberts/Vander Linden 2011).

Despite the contemporaneity and the homogeneity of the inner plan, the techniques of building the collective graves vary from one monument to the other (Fig. 1). Three main categories can be distinguished. The gallery graves are the most typical and the best-known architectures, due to the number of sites recently excavated. This category is defined by the distinctive longitudinal axis of their plan, composed by a rectangular chamber and specific features at both extremities, not necessarily practical, like vertical slabs and entrance with portholes. They were all erected in a large underground pit dug into natural hillsides, more or less deep according to the cases. The walls were built with an assemblage of megaliths or a mix of techniques (wood, earth and dry stones). The size of the grave, the duration of its use for burial deposits and the number of individuals buried vary considerably from one grave to another (Chambon 2003; Salanova/Sohn 2007). The average size is between 8 m and 10 m, while gallery graves larger than 15 m are rare. The largest monuments are located in the north-west of the Paris Basin, around the Seine and the Oise valleys. All were built during the second half of the 4th millennium BC, although only 30 of the 400 monuments recorded were still in use during the 3rd millennium BC, with only ten containing Bell Beakers (CHAMBON/SALANOVA 1996). The duration and the number of individuals buried seem to be correlated, as the largest ones have also delivered the highest number of individuals, which varies from one dozen to hundreds.

Artificial caves (hypogea) – which define the second type – have also been dug to receive collective burials. When considering the rare examples excavated recently, they are wider than the gallery graves and can only be reached by a sloping corridor (DONAT et al. 2014, 390). This feature indicates the real underground characteristic of the hypogea. The burial chamber is globally rectangular, organised in one or several cells. The population buried – less than 100 individuals – is correlated with the short duration of their use, which is restricted to the second half of the 4th millennium BC and the onset of the 3rd millennium BC. This architectural type is mainly known in the north-east, gathered in the limestone area of Champagne in the Marne region.

Finally, the third category is composed by graves that do not fit in the two prior broad categories. This category was long represented by partly destroyed or inadequately preserved structures to be precisely defined (BAILLOUD 1964; PEEK 1975). However, recent excavations have added some other real types of burials, built during the second half of the 4th millennium BC. This diversity of architectures has been mainly recognised in the southern part of the Paris Basin. For example, this is the case with the burial shelter at Nanteau-sur-Essonne (CHAMBON/SALANOVA 1993; CHAMBON 2003; SALANOVA/MARTINEAU 2014). This collective grave – dated from the second half of the 4th millennium BC – was established below a natural sandstone slab, where a burial chamber was organised, partly disturbed by modern hunting activities. The stratigraphy of the sixteen remaining skeletons shows a low intensity of the burial use, which occurred in several phases. In the same area, the cremation cemetery of »Les Canas« defines another type (BILLOIN et al. 1999). The cemetery is composed by thirteen burial pits, organised in three distinct bands of the same length, orientation and spacing, which has been interpreted as a monument in perishable raw materials. Each pit contained the rest of one adult or one adult associated with one child. Two ^{14}C dates place this cemetery between 3380 and 3000 BC.

Aside from the regional distribution and the chronology, the factors of variability have been investigated since a long time, with a wide range of approaches, questioning the different forms of differentiation in death. The position and location of each dead within the monument as well as the grave goods constitute a first – and classic – level, referring to differentiations among the individuals of a community. However, the collective graves were not isolated in the landscape. Despite the fact that the settlements and the environment are badly known for this period, groups of graves were recorded and they have been used simultaneously (CHAMBON/SALANOVA 1996; BILLARD et al. 1998). Consequently, the grave itself represents a second level of choice. The coexistence of different architectures with various sizes and durations in the same area implies a network of burial structures at a local scale. This point remains unclear and it is still difficult to explain this coexistence, due to the rarity of micro-regional and interdisciplinary analyses. However, the organisation of these networks defines a third level, related to structural and regional patterns. This was the main subject of a collective programme, which is currently developed on a longer time scale (COTTIAUX/SALANOVA 2014; SALANOVA et al. 2015).

RESULTS

The grave population

The position and location of the dead within the collective monuments always differentiate groups, rarely one individual. The pregnant woman deposited during the final use of Les Mournouards hypogeum II belongs among such exceptions (CHAMBON 2003, 286). If the architecture of the hypogea – with different cells – implies separated groups of dead inside the monument, this was not the case in the gallery graves from the north-west, where the burial chamber did not contain division. In the earliest periods of deposits, dead were buried in extended position, without or few spatial distinctions (MARÇAIS et al. 2016; SALANOVA et al. 2017). In fact, the most obvious grouping of dead – often cited for La Chaussée-Tirancourt, for instance – refer to the late use of the gallery grave during the 3rd millennium BC (SCARRE 1984; LECLERC/MASSET 2006).

By contrast, the number of grave goods and their distribution demonstrate the most visible level of differentiation among individuals, albeit buried according to the same collective practices. The quantity and range of the grave goods were very limited during the

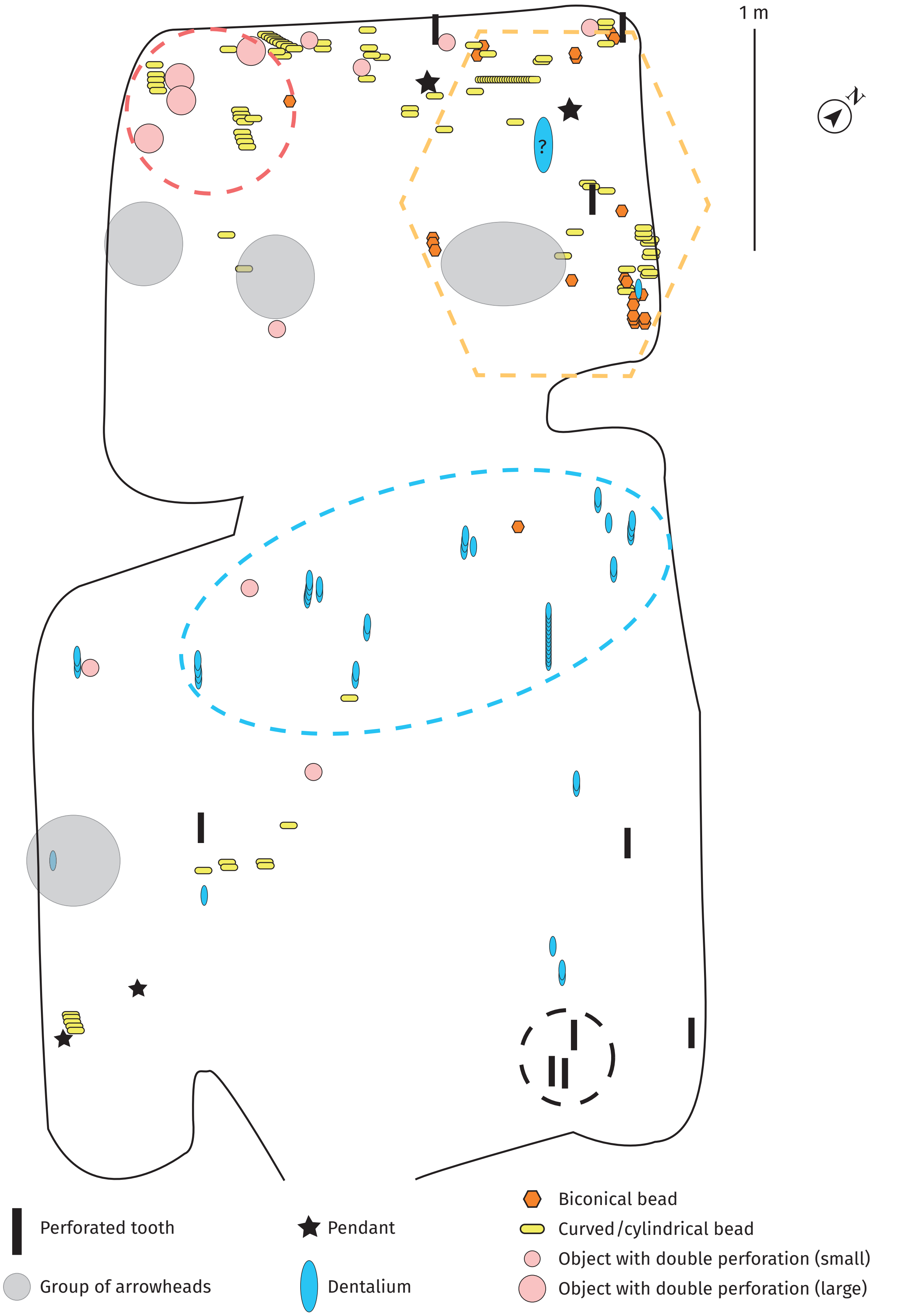

Fig. 2. Distribution of the ornaments in Les Mournouards hypogeum II (data from Leroi-Gourhan et al. 1962).

4th millennium BC and their typology does not really differ from the previous period (SALANOVA/HEYD 2007, 13; SALANOVA/SOHN 2007, 82–83; SALANOVA et al. 2011, 80–81). This means that despite the development of new burial practices, there was no gap in the material culture. As demonstrated by M. SOHN (2006), the range of the grave goods is not so different than the objects found in settlements and despite being used in a burial context, they generally present signs of wear. It is particularly obvious for the ornaments, mainly composed by beads and pendants in shell, bone and rock, very rarely in copper (POLLONI 2008, 77–82). Some others refer to ancestral objects, like the schist pendants manufactured from recycling bracelets dated from the Early Neolithic. In most cases (89% of the whole ornaments), perforations have been repaired and surfaces present signs of erosion. These objects had thus been worn before they were deposited in graves. Is it sufficient to conclude that they were personal items of the dead in one's lifetime? Certainly not, as proven by some sets whose erosion does not fit with the young age of the dead with whom they were associated, thus questioning the role of the ornaments for the expression of affiliations (POLLONI 2008, 85).

Collective gifts for the grave or the community have to be distinguished from individual marks. These were not symbolised by the same items. Like elsewhere in Northern Europe, pottery and axes are associated with the building phase of the grave and the first deposits (SOHN 2012). Flint tools (arrowheads and blades) and ornaments – the most frequent objects – are associated with some dead, but it is not systematic. According to the best-documented graves studied by A. Polloni (2008, 84–85), the number of individuals (men, women as well as children) wearing ornaments varies from 2% to 20%. How should these differences be interpreted?

The hypogeum of Les Mournouards II is one of the best examples to analyse the various functions of the grave goods in burial contexts. The distribution of the ornaments and the arrowheads – the most frequent objects – could indicate both individual and group specificities. Many arrowheads – 95 precisely – were found across the whole area of the chamber (LEROI-GOURHAN et al. 1962, 132). However, it is always difficult to distinguish the pieces deposited as quivers from those that arrived with wounded bodies. Independent of technological purposes, this second situation could explain the wide typological diversity often observed from flint assemblages found in each grave (LEROI-GOURHAN et al. 1962, 35; RENARD et al. 2014, 336). Indeed, only four concentrations of arrowheads with similar orientation could prove the deposits of quivers, three located in the rear end of the chamber, near the legs of individuals, and one smaller one in the south-west cell, along the wall (Fig. 2). Concerning ornaments, necklaces composed by limestone beads or dentalium and objects with double perforation (pendants or button?) are the most frequent. The best-preserved necklaces of limestone beads are concentrated in the rear end of the hypogeum, close to concentrations of skulls, but also at the level of arms. Some rests of identical necklaces have also been found in the south-west cell. If the majority of the 145 beads were described as curved or cylindrical, 35 biconical beads located along the eastern wall at the rear end of the grave show the existence of an ornamental set slightly different from what appears to be the norm of the burial costume in this grave. Dentalium shells – sometimes found threaded in situ – are mostly located in the front part of the grave, with still-preserved pieces of necklaces. Some objects with double perforation – represented by fourteen pieces – were also found, concentrated in the rear end of the hypogeum, along the wall and close to skulls. Two categories were distinguished according to the size of the objects: large, from 47 to 68 mm long; and small, from 14 to 27 mm long (LEROI-GOURHAN et al. 1962, 44). The larger pieces are concentrated in the western corner of the rear end. Few other types of ornaments were listed, like various pendants and nine perforated teeth scattered in the grave, except for three of them found in the eastern corner of the chamber, near immature bones.

When compared with the disposition of the dead, it is obvious that the preservation of complete bodies is much better in the rear end, prompting the suspicion that some moving occurred from one cell to the other (LEROI-GOURHAN et al. 1962, 86), a hypothesis refuted by the most recent bone study (BLIN 2012, 44). The distribution of ornaments is rather in agreement with some moving inside the grave. Indeed, it shows common assemblages between the western cell and the rear end of the grave, unlike the eastern part where dentalium and perforated teeth are preferentially located. The composition of the buried population is correlated with these observations. The rear end and the western cell show similar composition of the population buried, with a high rate of adults (more than 50%) and fewer children (Fig. 3). However, the eastern cell contained a different kind of composition, with a well-balanced profile between adults and children.

The example of Les Mournouards II shows the complexity in detecting the numerous identities within collective graves, mixed together and only reflecting how the living population have considered and expressed their differences. Upon first glance, the initial organisation of the hypogeum in two cells could express the choice to separate the population buried in distinct areas. However, the final organisation of all the remains shows a much more complex organisation. Biological analyses – which remain scarce in this region – could improve the comprehension between these mental representations and the reality of grouping. However, the first results of the analyses led in the Bury gallery grave show that – as expected – the arrangement of the dead inside the monument is sometimes correlated with kinship relationships, but in other parts they are also linked with other criteria, invisible neither on human bones nor on objects associated with dead (SALANOVA 2016).

The grave in a local context

The situation becomes more complex when considering groups of graves that could have functioned during the same period at a local scale. For example, this was the case with the hypogea from the Marne region, gathered in small cemeteries. The content of the graves – most of which were excavated at the end of the 19th century AD – remains unclear and all of the collections were unfortunately grouped without distinction

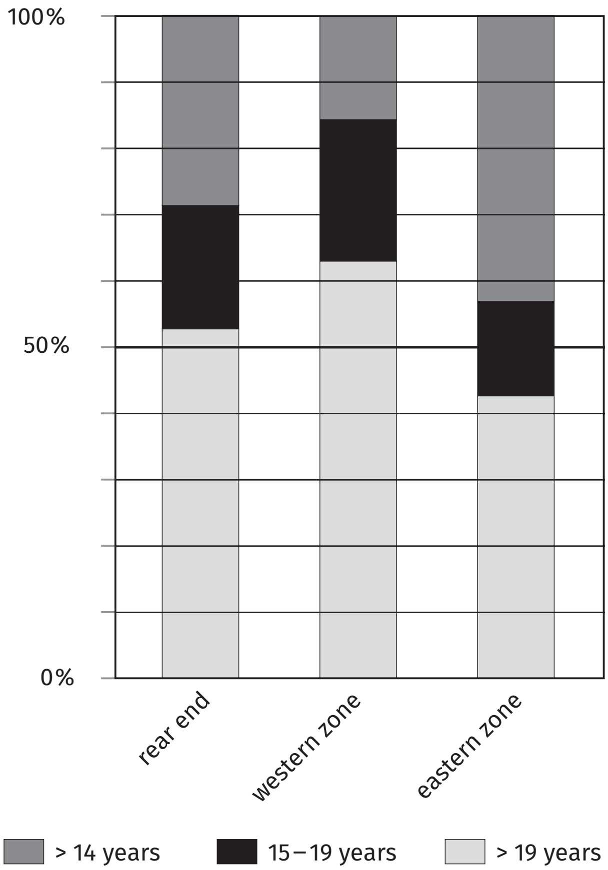

Fig. 3. Composition of the population buried in the different cells of Les Mournouards hypogeum II (data from BLIN 2012, 45–46).

Tab. 1. Comparison of the main categories of graves goods deposited in Les Mournouards hypogeum I and hypogeum II (after COUTIER and BRISSON 1959 and LEROI-GOURHAN et al. 1962).

	HYPOGEUM I	HYPOGEUM II
limestone beads	68	180
double perforated objects	6	18
copper beads	1	0
axes	2	2
blades	14	45
arrowheads	73	95
bone tools	9	12

of origin (RENARD et al. 2014). The only comparison available once again concerns Les Mournouards, where the hypogeum I – 6 m away from the hypogeum II – was discovered during the same period, although it was not excavated with the same precision. The architecture is different, presenting only one cell, square and 3 m long (COUTIER/BRISSON 1959). The description of the burials is very imprecise, although the organisation of the grave seems to be very similar to the hypogeum II, with concentrations of bones along the wall and in the rear end of the chamber. Aside from the presence of one copper bead in the hypogeum I, the grave goods are also similar, with the same categories and more or less in the same proportions (Tab. 1).

Such homogeneity was observed in a group of five gallery graves excavated in Normandy (BILLARD et al. 2010, 266, 325–326). These five monuments were built in an area 1,300 m long, close to the Seine valley. Despite the diversity of the raw materials and the building techniques, the plans of these gallery graves are identical, 10–15 m long and 2–3 m wide. They were used from the 4th to the 3rd millennia BC, some of them longer until the end of the 3rd millennium BC. The graves yielded the same categories of goods, albeit whose quantity varies in concordance with the duration of the grave. Biological analyses have demonstrated the homogeneity of the population buried, without distinction by monument.

Some interdisciplinary studies were led on other grave from the Paris Basin, where several monuments were compared to correlate the characteristics of the architectures with physical characteristics of the population buried. The first question concerned the architecture and more precisely the raw materials, considering the wooden architectures less prestigious than the megalithic ones (DESCHAMPS et al. 1996). The results of the analyses were not very conclusive, as the regional and chronological backgrounds were not taken into account.

Consequently, the duration of the monuments seems to be the keystone of the differences observed between the gallery graves. Was the duration planned by the first builders of the monuments? This question was asked regarding the Bury gallery grave, which represents one of the largest architectures, containing 300 individuals buried in a long-term sequence (Salanova 2007). The first phase of deposits – dated from the end of the 4th millennium BC – uses the whole length of the burial chamber (Salanova et al. 2017). In Northern France, the few collective graves that remained in use during the first half of the 3rd millennium BC are all located in the north-west of the Paris Basin, while the hypogea from the eastern part of the region have visibly been left.

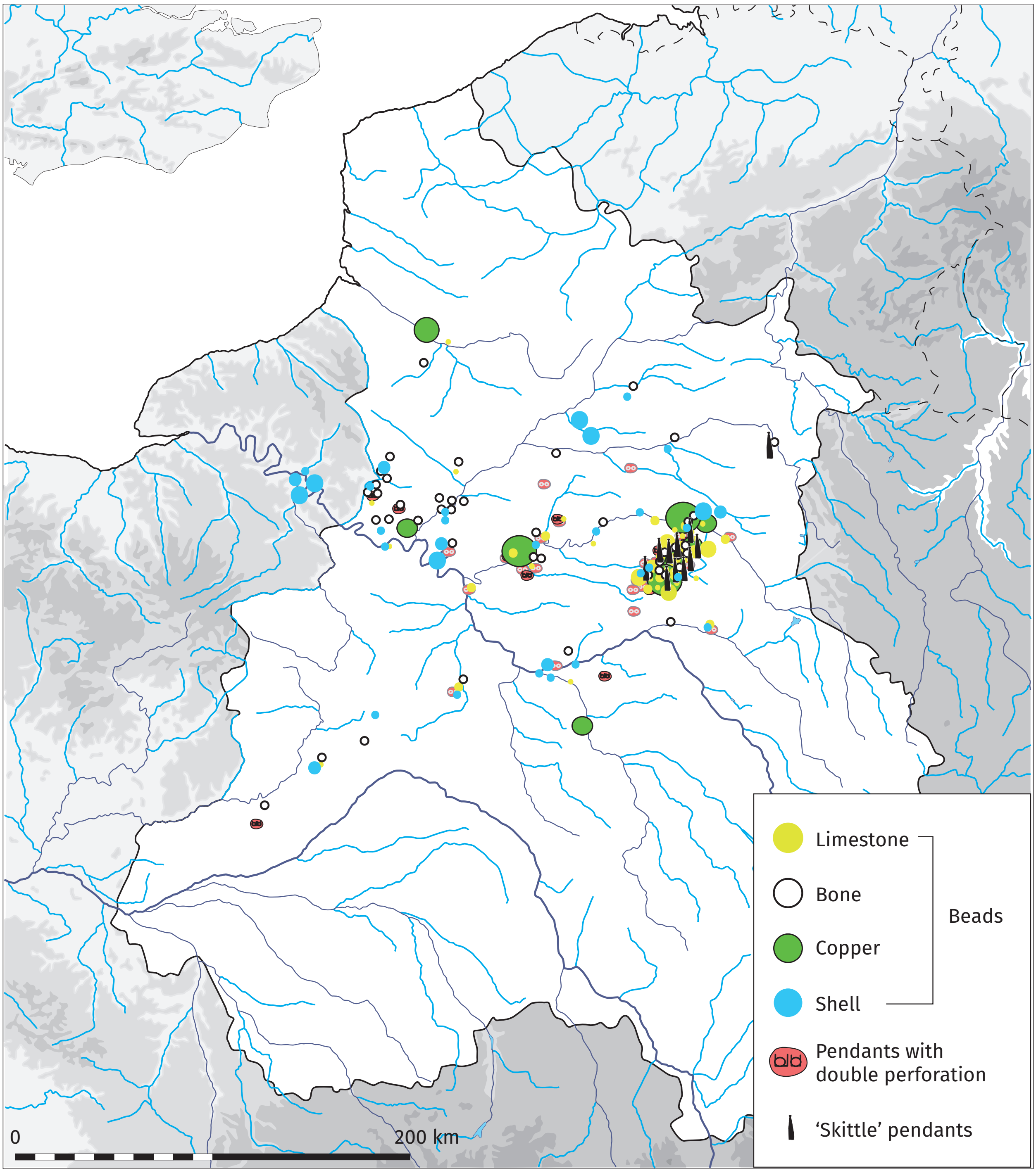

Fig. 4. Distribution of the main categories of ornaments deposited in collective graves from Northern France (data from Polloni 2014, 489–496).

Regional patterns

For the 4th millennium BC, the settlements are badly preserved and only few have been excavated. This means that it is very difficult to define the way of life of the population through the domestic contexts. However, burial costumes are highly indicative of structural differences. There were obvious regional preferences, as shown by the distribution of ornaments in collective graves from Northern France (Fig. 4). They were mostly found eastwards of the Seine valley, with a dense concentration in the hypogea of the Marne region. This distribution is not artificial, as recent excavations with systematic sieving westwards from this concentration did not provide such ornamental sets (Salanova/ Martineau 2014; Salanova et al. 2017).

Fig. 4 presents the distribution of the main categories of ornaments found in collective graves. It is clear that the raw materials vary according to the geological context of each area. Nevertheless, this is not the only one factor, as beads made from limestone could have had a greater repartition in the Paris Basin. The homogeneity of the ornaments – and more generally of the grave goods – is more obvious in the Marne hypogea. The fact that these ornaments were deposited in a state of advanced erosion and that they were associated with the first metal objects from this region – the copper beads – prompts another kind of question. It means that these objects were definitively removed from the living world, taken out from the normal cycle of transmission, which indicates a particular event in the evolution of this population (Godelier 2002).

The continuous use of collective graves in the north-west – even restricted to some monuments – does not show the same evolution. However, like in the Marne region, the scarcity of graves for the 3rd millennium BC clearly questions the existence of other burial practices and ultimately the representativeness of the burials structures currently known for this period (Salanova 2011, 142).

DISCUSSION

Through analysing some regional cases, the questions posed by the collective graves have been transformed. While the social aspects of the burials have long been emphasised, without real extensive anthropological analyses the simplest facts have often been ignored.

For instance, the analysis of the data from the archaeological excavations of Les Mournouards II highlights the complexity of interpreting the organisation of a grave. The differences in both grave goods and burial population show an unbalanced situation between the western and the eastern part of the grave.

Tab. 2. Comparison of the main burial characteristics in gallery graves and in hypogea.

	NORTHWEST	SOUTHEAST
contexts	*loose grouping of graves*	*cemeteries*
visibility	*semi-underground*	*underground*
architectures	*no clear space division*	*cells*
dead	*rare trace of violoence*	*many isolated arrowheads*
grave goods	*low differentiation*	*high differentiation*

While the eastern cell contains a burial population close to what we could expect for a normal mortality in this period (Ledermann 1969), the western cell and the rear end of the grave present another assemblage. The high percentage of adults in these two areas – more than the half of the numbers – is rather in accordance with demographic profiles observed in contexts of epidemic crisis during more recent periods (Castex 2008, 32). There is no evidence of such mortality anomaly, as the anthropological analysis of Les Mournouards II was not led in this direction. Whether the population of this grave was the expression of a manipulated representation of the society or the real composition of the persons buried, these differences are especially significant when adding the number of arrowheads found in the grave and the characteristics of the ornaments. The reading of the burial data is currently clearer in the eastern part of the Paris Basin, in the context of hypogea. In the gallery graves from the west, the scarcity of material indicators proving a deliberate choice of differentiation, as well as the characteristics of the grave goods – whose assemblages are distinct from those found in the hypogea – indicate another ideological system. Does it concern the whole organisation of the society?

The comparison between the north-west and the south-east areas of the Paris Basin is not limited to the material expressions detected inside the grave, although it reveals the existence of obvious separated patterns (Tab. 2). In the north-west part of the region, the groups of graves are known, but unlike hypogea – which have formed real cemeteries – the network was looser. The hypogea were obviously conceived as underground structures, hidden in the landscape, while gallery graves were semi-underground. The high number of arrowheads found in the Marne region – among which many should have come with bounded persons – indicates another difference between the two regions: the grave goods associated with the dead, and especially the abundance of ornaments in an advanced state of erosion, have mostly been interpreted as reflection of the social organisation, but they could also be indicative of the context of the death (BINFORD 2004, 5).

In the long-term sequence represented by the 4th and 3rd millennia BC, there is more to say about these differentiations. While the first half of the 3rd millennium BC remains poorly understood in Northern France, the second half of the same millennium shows the same regional divisions. Once again, the grave goods express important structural differences. Whereas the categories of grave goods from the 4th millennium BC are more or less identical with the objects found in domestic contexts, the Bell Beaker assemblages deposited in burial contexts during the second half of the 3rd millennium BC mark a new representation of the grave goods. First, the pottery that disappeared from the burial deposits during the first half of the 3rd millennium BC appeared again (CHAMBON/SALANOVA 1996). Second, for one part of the population the pots represent their affiliation to biological and corporative groups (SALANOVA 2016). This is particularly visible for the most widespread style of the Bell Beakers, whose typology and techniques sharply contrast with the objects found in domestic contexts (SALANOVA 2000). Finally, these specificities and the existence of twin beakers in many Bell Beaker graves show the increased role of pottery in rituals and the existence of part-time specialists linked to this production (SALANOVA 2002 and 2012). This organisation of the production and the rural communities should be analysed for comparison in the following pre-industrial periods.

CONCLUSIONS

The structural differences observed from the burials and the objects manufactured and used during the 4th millennium BC continue into the 3rd millennium. These differences between the western zone of France and the area eastwards from the Seine are now well demonstrated based on the economic and symbolic patterns expressed by the Bell Beaker materials (SALANOVA 2011; SALANOVA et al. 2015).

This example – which started with the collective graves in Northern France – ultimately has two conclusions for the material studies, which could appear in contradiction. The first one is that the archaeological remains – and above all the visible part of the objects that allow a diagnosis upon first glance – are the best raw materials for defining the identity expressions of the past populations. However, as the second conclusion, decoding these identities requires more than a first glance, and interdisciplinary research is obviously necessary for understanding and interpreting these remains.

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How routine life was made sacred: Settlement and monumentality in Later Neolithic Britain

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ABSTRACT

This paper seeks to dissolve some of the critical distinctions we regularly make between Neolithic settlement and monument making by highlighting the ways in which both domains of practice intersect, and even merge. Three strands are pursued in the context of the British later Neolithic (c. 3000–2400 cal BC). The first looks at the connected dynamics of occupation and monument building within locations frequently referred to as ›ritual‹ or ›ceremonial landscapes‹. The second part explores the architectural connections between dwellings and monumental architecture; while the final section deals with ontological transformations, or how places of the living became monumentalised.

INTRODUCTION: MONUMENTS AND THE QUOTIDIAN – AN UNEASY RELATIONSHIP

Neolithic monumentality and settlement are often subject to separate lines of inquiry, undertaken by groups of scholars with different theoretical agendas. This is in part a product of the affordances seen to reside in aspects of the archaeological record, and a perception of the divergent kinds of activities thought to have taken place within each kind of setting. Certainly in the Anglo-American tradition, since the New or Processual Archaeology of the 1970s monuments have provided a productive resource around which theory building could be pursued. Their scale has been taken as an index of emerging social complexity (RENFREW 1973); their distribution used to model territoriality (RENFREW 1976); their architecture conceptualised as a device to structure and reproduce social distinction (THOMAS 1993; BARRETT 1994); their setting an index of the enculturation of the landscape (TILLEY 1994; SCARRE 2002; CUMMINGS 2009); their physical form, relationship to other constructions/places and engagement as evidence of their role as repositories of memory and history (GILLINGS et al. 2008); and so on. Monuments are conceived as active, as lying at the heart of corporate social action, and so able to offer insight into the worlds of prehistoric social relations, agency, history, belief, cosmology and materiality. Since they often provide rich and stratified deposits of artefactual and faunal material, they can also provide the dominant contexts through which chronologies and sequences are constructed (BAYLISS/WHITTLE 2007; WHITTLE et al. 2011). In consequence, in those areas of Europe where traditions of monument building were strongest and where settlement evidence is hard-fought (e. g. the Atlantic seaboard and the British Isles) they have come to dominate accounts of the period.

While we know through experience and ethnographic instance that much of the social action that comprises the structure, dynamics and politics of life occurs within quotidian settings (the house, the compound, settlement and surrounding landscape), there has been a tendency to see Neolithic settlement evidence through largely functional perspectives; that is as economic or environmentally-driven. There are notable exceptions (WHITTLE 2003), but a focus on issues relating to demography, economy, productive tasks, resource catchments and so forth are common in engagements with the settlement record (e. g. SCHOFIELD 1991; KOOIJMANS/JONGSTE 2006). Settlement can become glossed as routine, rather flat, ahistorical and asocial, more in the realm of nature – the slowly unfolding counterpoint to exciting events at monuments. This has been especially so in studies of the British Neolithic, in part because of the intractable nature of the record. Outside regions like Orkney, there are few houses post-3650 cal BC, and for the most part we struggle with ephemeral traces (artefact scatters, pits, occasional hearths and stake-holes). When left without the physical structure of houses, it becomes difficult to find resolution and comprehend how social life was played out in routine spaces (structures give structure: BOURDIEU 1990; WATERSON 1990).

Here, I would like to attempt to bridge the interpretive gap between these two dimensions of the record and suggest that connections between monuments and settlement are much greater than first seem. The central message is that we have become caught in the logic of categories of our own making, seeking a false distinction between spaces of ceremony and the quotidian or everyday, and have perhaps not been as open to interpretive linkages as we should. The record itself has not been silent in altering us to the false

Fig. 1. Map of key sites referred to in text.

distinctions we might make. Across the European Neolithic there are instances where settlements were monumental (e.g. Balkan tells), or where monuments performed as settlements of sorts (e.g. causewayed enclosures). For some time we have acknowledged that structures of the living might provide the template for monuments for the dead, as with the transformation of the LBK longhouse into earthen long barrows (CHILDE 1949; BRADLEY 1998; MIDGLEY 2005). In other instances we simply struggle to determine whether a structure might be categorised as a house, monumental hall or tomb (BRADLEY 2005), locking ourselves into seeking resolution to a categorical problem that is ours and not one of the past.

In what follows, three strands are pursued in the context of the British later Neolithic (c. 3000–2400 cal BC). The first looks at the connected dynamics of occupation and monument building within locations referred to as ›ritual‹ or ›ceremonial landscapes‹ (e.g. THORPE/RICHARDS 1984). The second part explores the architectural connections between dwellings and monumental architecture; while the final section deals with ontological transformations, or how places of the living became monumentalised.

SETTLEMENT AND CEREMONIAL LANDSCAPE

Across parts of Britain and Ireland there are locations where major concentrations of Neolithic monuments are found. These include such iconic landscapes as those of Stonehenge and Avebury in Wiltshire, Stenness/Brodgar in Orkney, Dorchester and Knowlton in Dorset, Thornborough in North Yorkshire, Forteviot in Perth and Kinross, and the Walton Basin in Powys (Fig. 1). All of these locations witnessed earlier Neolithic (4th millennium BC) activity, even the building of tombs and enclosures, but it was during the 3rd millennium BC that we see a considerable up-scaling in monument building, marking out these locations as especially potent, sacred landscapes. Because of the obvious visibility of many monuments (as earthworks, megalithic settings or cropmarks) and the relative invisibility of areas of contemporary settlement (generally only evident as lithic scatters within ploughsoils) it is inevitable that archaeological attention has focussed on understanding the monumental. A perception that these might be reserved spaces from which settlement was excluded has been one inevitable consequence (hence the misleading accolade of ›ritual landscape‹). The matter has been redressed through dedicated programmes of surface collection, undertaken with the explicit aim of searching for contemporary settlement (e.g. HOLGATE 1987; RICHARDS 1990; HARDING 2013). These have revealed large lithic scatters within relatively close proximity to many monuments; and it is reasonable to read those scatters as durable traces of erstwhile surface refuse spreads and middens that mark the location of settlement areas. Excavation within such scatters regularly reveals pits and stake-holes (e.g. RICHARDS 1990, 109–123), which are now acknowledged as occupation-related features (ANDERSON-WHYMARK/THOMAS 2012). Houses as such are rare, or at least difficult to detect when of light stake-built construction and affected by later agricultural attrition, and we should not expect it will be easy to find them.

It must now be acknowledged that these regions carried at least small resident populations throughout the Neolithic, even if semi-sedentary or engaged in tethered mobility (WHITTLE 1997a; POLLARD 1999); however histories of residence, participation, affiliation and tension all ensured that living in these landscapes was rarely characterised by stability. There existed a complex and imbricated relationship between occupation and monument building. As will be argued below, it was often the process of living in these landscapes which afforded places with the history and special qualities that led to monument building. But on a more general level, there needs to be consideration of the ›pull‹ and ›push‹ that such regions could exert through the process of monument building and periodic ceremony. Resident populations were on occasions considerably augmented by large numbers of people coming into these regions to take part in monument-related activities, especially construction. Certainly at the top of the scale, the building of the three Thornborough henges, the phase 2 stone settings at Stonehenge, or the earthworks at Avebury and Silbury Hill, would have required participation from at least several hundred, likely low thousands, of people; numbers well excess of the normal ›carrying capacity‹ of these landscapes. For Thornborough, Jan Harding interprets the larger yet low density late Neolithic scatters that occupy the higher ground around the henges there as evidence of people ›only visiting this landscape for very short periods‹ (HARDING 2013, 192). In this instance, it is not just construction, but special journeys, even pilgrimage, that are invoked as pull factors. Direct evidence for mass aggregation associated with construction, in this case linked to the stones of Stonehenge 2 (DARVILL et al. 2012), comes from recent excavations at the nearby site of Durrington Walls (PARKER PEARSON 2007, 2012). In the decades around 2500 cal BC, and immediately prior to this location becoming a massive henge enclosure, it provided the setting for a very extensive settlement of houses and middens (Fig. 2). Its scale suggests a residential population in excess of 1000. Evidence points to its seasonal use around midwinter, and abundant feasting – it was by no means typical of the sorts of settlement that would normally be encountered in late Neolithic Britain. Proxy evidence for the geographic range from which people were drawn is provided by strontium and oxygen isotope data from domesticated cattle and pig teeth. These highlight a strong non-local origin for the animals and their herders, extending to older geology 30–50 km to the west and possibly as far north as Scotland (Viner et al. 2010).

While the process of bringing large numbers of people together to engage in corporate construction projects fostered senses of community, it still provided a setting in which social distinctions could be highlighted, even generated. With people coming from

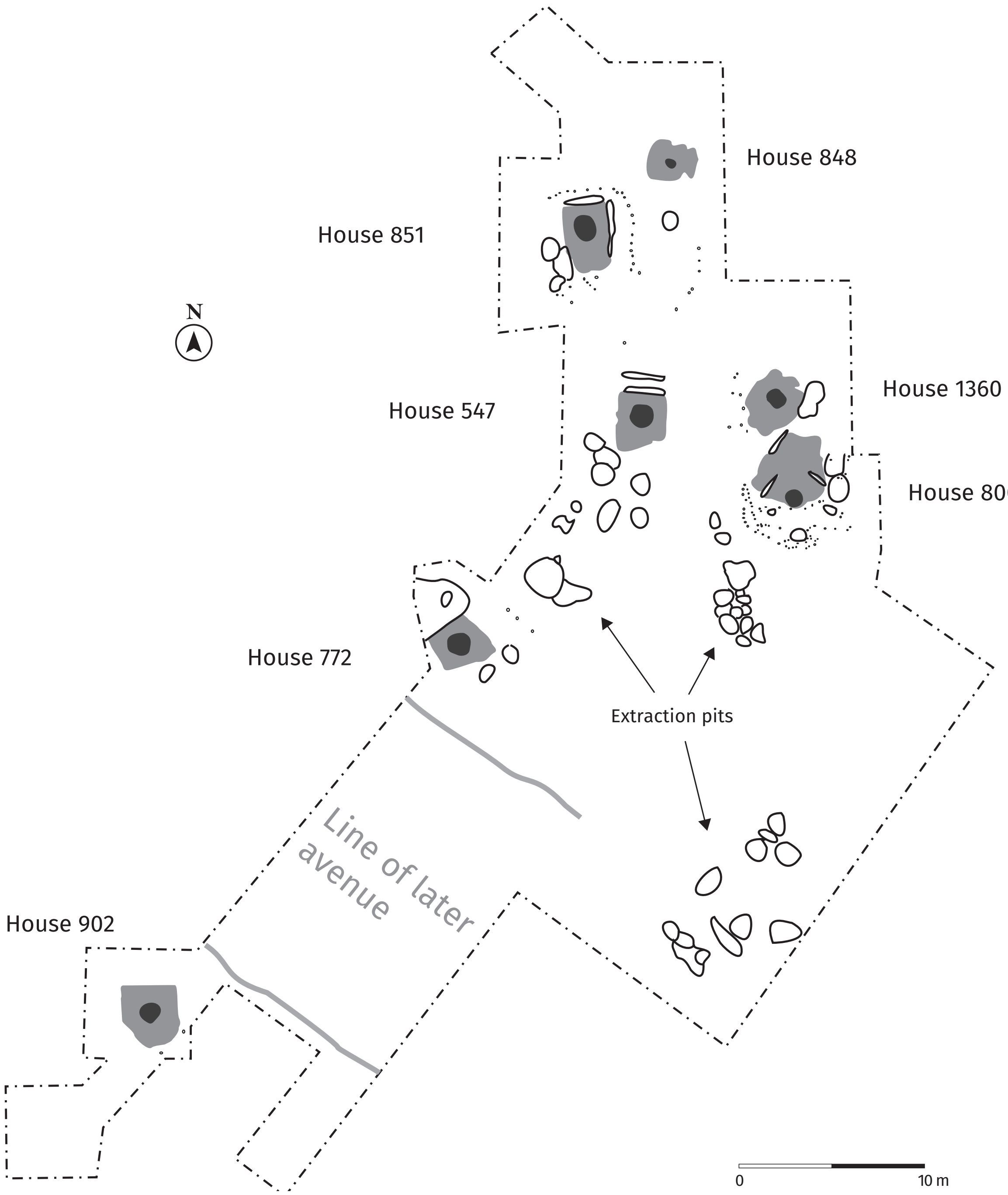

Fig. 2. Excavated section of the Durrington Walls pre-henge settlement (after Parker Pearson 2012).

wide catchments, not everyone would be bound by common kinship or shared origins. Perhaps this explains the presence of spatially discrete yet seemingly contemporary scatters around some major monuments; each representing an area occupied by a separate group, held together in loose confederation through common cause. With aggregation periodic, rights to reside in particular places were presumably historically sanctioned. This can be seen in the Avebury region, where surface collection in the early 1980s located at least four major scatters in a 3 km radius of the henge, each on higher ground and to a degree intervisible (HOLGATE 1987). Perhaps that element of intervisibility is telling of the need to maintain sight of one's neighbours, and the potential for competition, even tension and conflict. The presence of large numbers of arrowheads from some of these scatters may therefore speak more of inter-group violence than sustained hunting (CLEAL 2012). Living together in great numbers offered an exceptional circumstance and could incur both social benefit, and risk and cost.

There is a further dimension to the spatial organisation of contemporary settlement and monuments that deserves comment, and that is the positioning of major artefact scatters at a respectful distance around rather within the zones occupied by later Neolithic monuments. This is not absolute, and may be true more of major monument complexes than minor groups or individual monuments (see below). It is seen in the Thornborough, Stonehenge and Avebury landscapes (HOLGATE 1987; RICHARDS 1990; HARDING 2013). Separation may only be in the order of a few hundred metres, though accentuated by topographic variation. It likely reflects the perceived potency or sacrality that attached to some constructions or the places they occupied, resulting in the generation of spaces around which human presence and activity were closely circumscribed. Mike Parker Pearson has related this to the existence of different domains for the living and the dead/ancestors, which were materialised through the deployment of different media (stone versus wood: PARKER PEARSON/RAMILISONINA 1998). The absence from megalithic monuments especially of the kinds of artefacts and deposits commonly associated with routine life is certainly telling.

The point here is to stress that the conditions under which these landscapes were lived in and those in which monuments were created were deeply imbricated and are not well served by viewing respective evidence traces as categorically different in kind. Settlement traces should be seen in the same historical, political and phenomenological terms as any monumental construction.

DWELLINGS AND MONUMENTAL ARCHITECTURE

Although later Neolithic domestic buildings remain rare across much of the British Isles (Orkney and Shetland excepted), a sufficient number have been identified to provide an insight into their form. Generally sub-circular and of stake wall construction, around 5 m in diameter, with central square or rectangular hearths (BRITNELL 1982; NOBLE et al. 2012), they are distinctly different by virtue of form and diminished dimensions to known early Neolithic houses. Yet despite their ephemerality they provided a powerful and much drawn-upon template for monumental architecture during the very late 4th and first half of the 3rd millennia BC (BRADLEY 2003; 2005; 2013; POLLARD 2009; THOMAS 2010; RICHARDS/JONES 2016). Within two regions, Orkney and Stonehenge, it is possible to identify an architectural continuum from simple dwellings to elaborate timber and stone monuments, Stonehenge included.

The use of local sandstone for both domestic and monumental building in Neolithic Orkney has provided a record of building forms that is unsurpassed in western Europe, and allows direct architectural comparison between houses, halls, passage graves and henges (Fig. 3). Colin Richards has cogently argued that iconic monuments of the Orcadian later Neolithic such as the Stones of Stenness and Maes Howe can be conceived as symbolic elaborations of contemporary houses (RICHARDS 2005). In the case of Maes Howe, the elements of the passage grave's plan, notably the ›enclosure‹ of the four tall pillars defining the corners of the central chamber (a primary structural setting) within the circular mound directly recalls the ›square in circle‹/cruciform layout of contemporary houses; while at Stenness there is compelling evidence to suggest the circle of standing stones and henge ditch ›wrapped‹ the remains of a large house, analogous to the inner building of Structure 8 in the adjacent settlement of Barnhouse (RICHARDS 2013, 70–74). But the clearest evidence for the monumentalisation of the house comes from the on-going excavation of the remarkable series of large halls within a massive walled enclosure at the Ness of Brodgar, located on the narrow isthmus between the Lochs of Harray and Stenness. At least eight major buildings are represented, and each shares features in common with both local houses and tombs. Their scale and the elaboration of construction (including the use of dressed and decorated stones), their setting in a liminal part of this landscape, their enclosure, evidence of feasting, and the presence of unusual artefacts and a diverse range of building forms, shows this was no ordinary settlement. Such a ›gathering of big houses‹ might be read as an attempt to project a state of island(s)-wide unity within an increasingly competitive social environment (RICHARDS/JONES 2016, 41–43).

Timber provided the dominant building material within the Stonehenge landscape, yet the greatest of all constructions there, Stonehenge itself, utilised types of stone transported from outside the region (north Wiltshire sarsen and Welsh bluestone). The colossal effort involved in the movement and working of those stones, effected in two major stages around 3000 cal BC and 2500 cal BC (PARKER PEARSON et al. 2012), surely sets Stonehenge apart from other constructions within this landscape, both quotidian and ceremonial, but yet again there is good reason to envisage the house as the template for this preeminent monument. In the mid 3rd millennium BC Stonehenge occupied a reserved ancestral space at the heart of this landscape, while to the east traces of settlement and ceremonial activity structured around large gatherings and feasting are quite abundant. One zone, extending along King Barrow Ridge and onto Coneybury Hill overlooks Stonehenge (RICHARDS 1990); the other is situated along the Avon riverside to the south of Durrington. It is within the latter zone that a range of buildings are found. Increasing in scale and complexity, these include the seasonally-occupied houses of the massive pre-henge settlement at Durrington Walls, other structures on higher ground in the western part of the area later enclosed by the henge that appear as more elaborate versions of the settlement

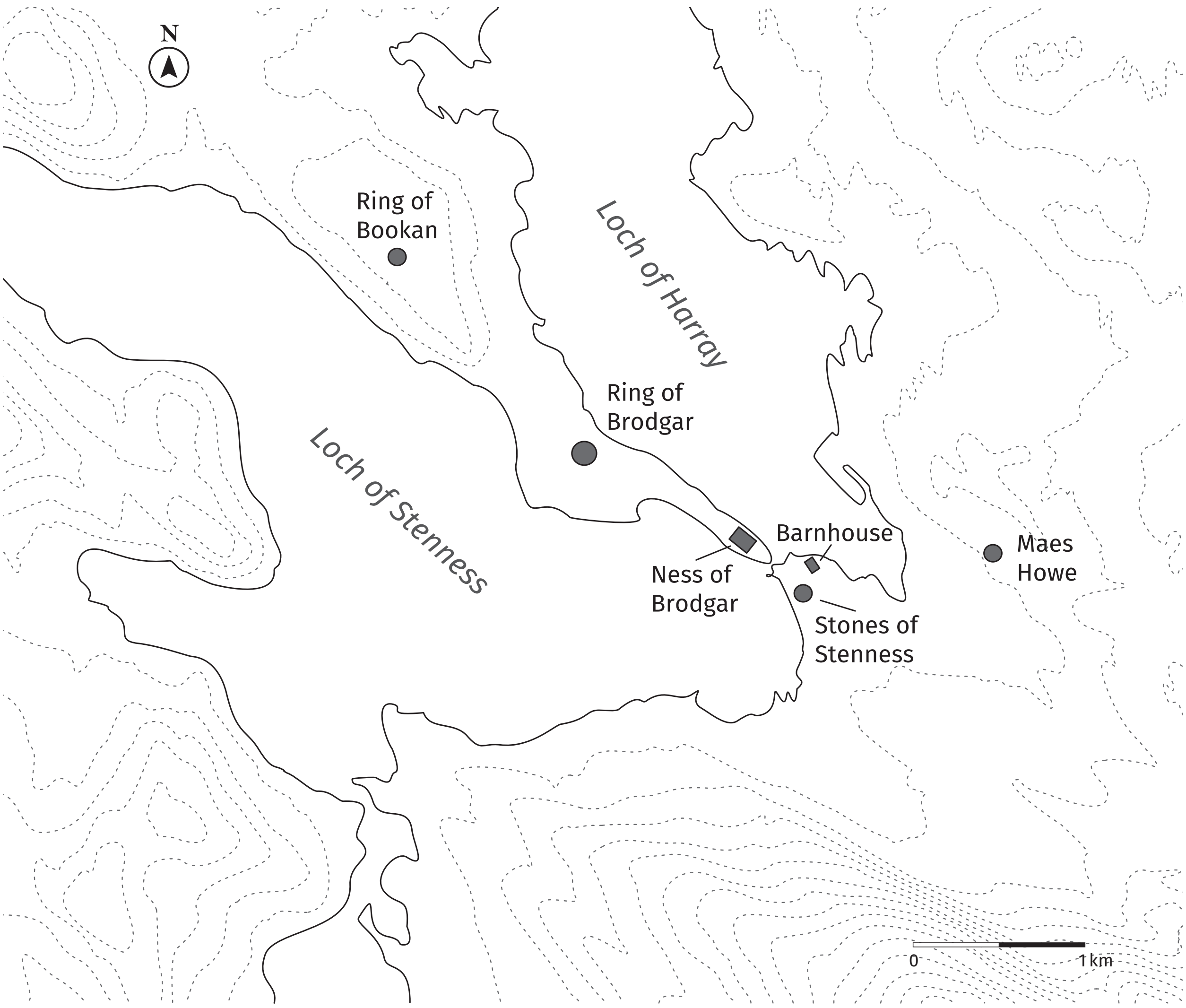

Fig. 3. Key late Neolithic sites in the Lochs of Harray and Stenness region, Orkney.

houses, more monumental square-in-circle structures, and the multiple timber circles at Woodhenge and the Southern Circle at Durrington Walls (Fig. 4). Each ›stage‹, from house to multiple circle, can be seen as an elaboration of the previous (POLLARD 2009; THOMAS 2010). Sharing close plan resemblance to both Woodhenge and the Southern Circle, the form of Stonehenge 2 may therefore be linked through this

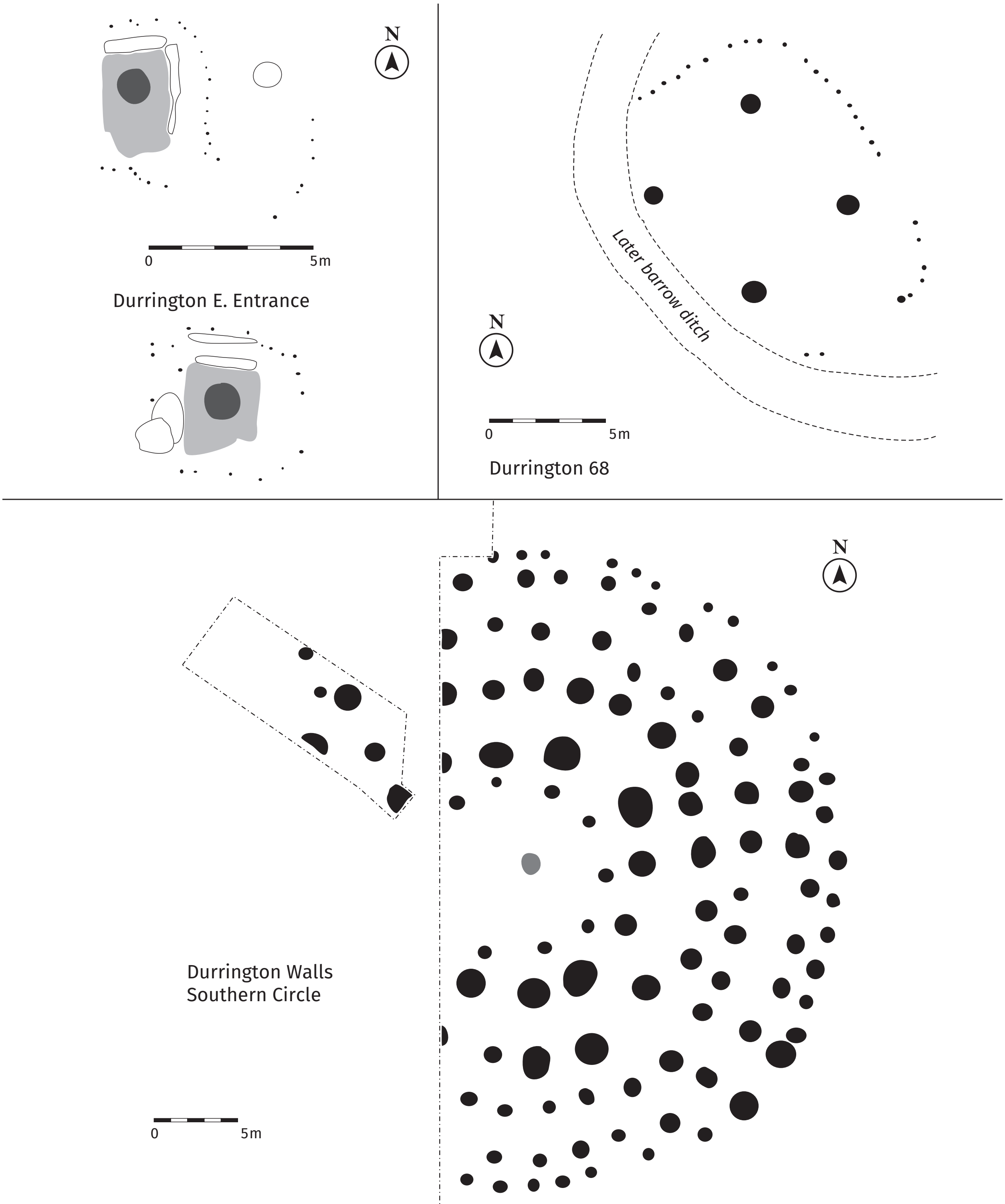

Fig. 4. Late Neolithic, Grooved Ware associated houses, square-in-circle structures, and multiple timber circles in the Woodhenge/Durrington Walls zone, near Stonehenge.

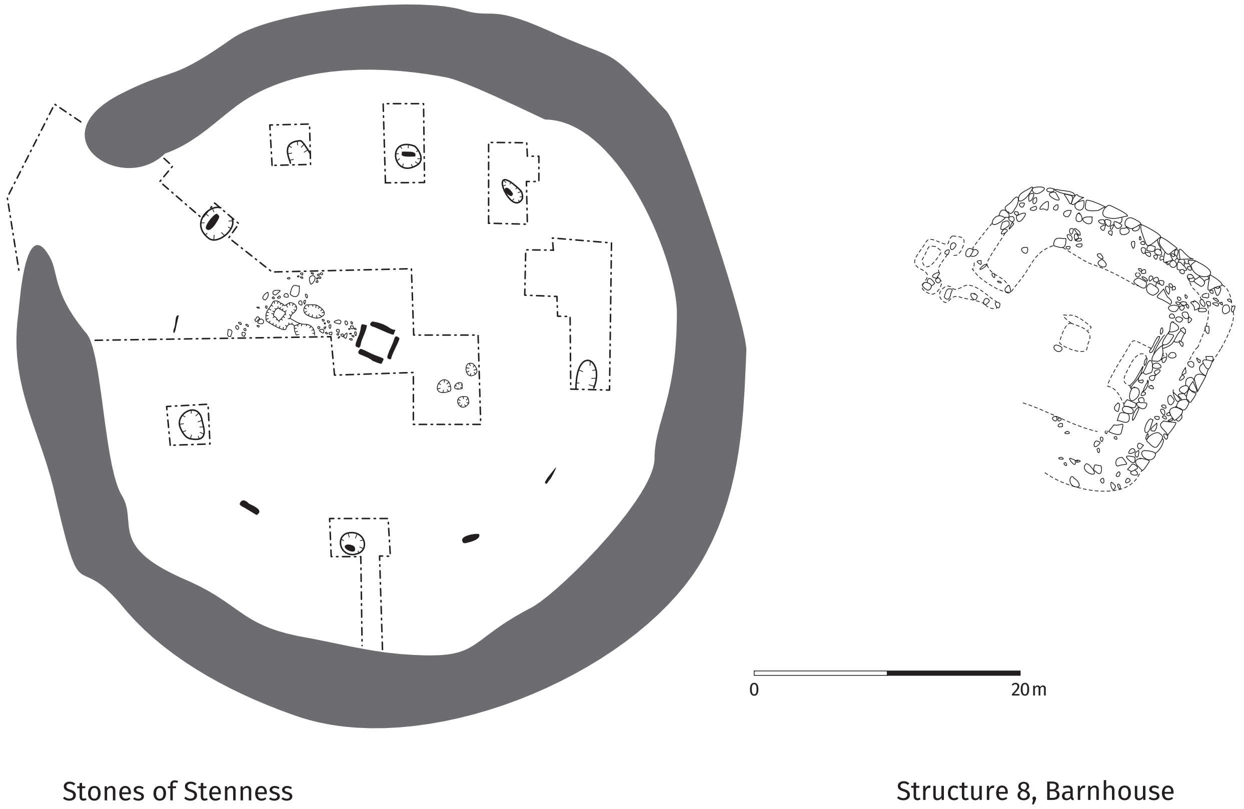

Fig. 5. The Stones of Stenness henge and Structure 8, Barnhouse (after Richards *2013).*

chain of architectural elaboration back to houses of living, though its creation in stone asserts its ancestral connections.

The origin of both multiple timber circles and Stonehenge 2 may lie with the Southern Circle (Pollard 2009). A sequence of development can be discerned with this particular monument in which a square-in-circle structure much like those known to the south of Woodhenge and with the Durrington Northern Circle became progressively ringed by additional circles of posts (Wainwright/Longworth 1971; Thomas 2007), a processing of ›wrapping‹ that likely resulted from its increasing sacrality – architectural depth shielding the innermost space from the profane world outside. While we do not know enough about the micro-detail of its development, it is possible that the stone settings of Stonehenge 2 unfold in a very short dynamic sequence in much the same way. This would see the inner sarsen Trilithon Horseshoe and double Bluestone Circle (Q and R Holes) as a lithic version of a square-in-circle structure; both then wrapped by the outer Sarsen Circle and eventually Y and Z Holes in much the same way as we see with the middle and outer rings at the Southern Circle (Cleal et al. 1995; Darvill et al. 2012).

Interpretive ambiguity has always surrounded some of the more elaborate later Neolithic timber structures within the Stonehenge landscape, such as Woodhenge, the Southern Circle and Western Circles (Piggott 1940; Wainwright/Longworth 1971; Thomas 2007). It has not always been clear whether they functioned as roofed structures or not; and even if roofed, whether they should be regarded as high status or communal houses, ancestor or origin houses, shrines or temples. Yet this interpretive tension is telling in itself, in that it acknowledges the ›houseness‹ of these constructions – their potential to be read as houses/halls of sorts. This is because we are witnessing an architectural tradition that operated at different scales across different domains of practice, but within which the house was the model. Richard Bradley has described this as a ›ritualization of the domestic sphere‹, in which the form of everyday structures was drawn upon and took on special qualities in certain contexts (Bradley 2003). Ethnographically, it is a not uncommon phenomenon (Waterson 1990; Hardy 2007), though it may appear striking in the case of the British late Neolithic when we consider just how ephemeral such houses could be (it is rare that we detect their presence).

Power may lie in the house because its form can serve as a dominant symbol (Thomas 2010, 8; Bradley 2013), embodying potent ideas about sociality, kinship, the cosmos and order (Waterson 1990;

PARKER PEARSON/RICHARDS 1994; RICHARDS 1996). There is also the potential of the house (whether conceived in physical form or as a corporate institution) to act as the medium via which resources and rights are transmitted inter-generationally, offering a mode of social organisation outside ›classic‹ forms of kinship structure (LÉVI STRAUSS's *sociétés à maisons*: 1982). House society models have gained a certain popularity in Neolithic studies in recent years (e.g. THOMAS 2013; RICHARDS/JONES 2016), and there is a danger of their becoming a default explanation for a wide range of circumstances within which different social and material conditions operated. Nonetheless, if not a good way of conceptualising society, they do provide a good way of conceptualising *sociality* (RICHARDS/JONES 2016), and highlight the potency of the house, or that of the idea of the house, as resource around which critical relations might be structured.

ONTOLOGICAL TRANSFORMATION

This final section will consider the connections between settlement and monumentality through a focus on process and ontological transformation. It will examine how places and traces of lived life could be transformed from quotidian to sanctified spaces, and how that transformation could be mediated or materialised through the building of monuments. The starting point lies in an acknowledgement of the socially constructed nature of place, its fluidity, heterogeneity and multi-dimensional nature (RELPH 1976). Places are created through human engagement and carry with them connections and associations to people, events, materials, practices, other places and non-human agents (including the supernatural). Their identities are affected by those associations and practices so long as attempts are made to retain and work upon memory. In the process of dwelling and memory work there exists potential for the qualities of places to be fundamentally transformed – they can become spaces for different kinds of being or reality to those that went before (hence ontological transformation). This may happen through direct association (e.g. connection to singular and notable events or people), through the accrual of sacrality (e.g. a recognition of emergent holiness), or a desire to control the perceived potency of features or traces (e.g. pollution or contamination). A house might, for example, go from an unremarked dwelling to a place of significance by virtue of the standing or fame of its occupant(s), to a focus for pilgrimage or even veneration following the death of such a remarkable person. It could be described as the ›Graceland principle‹.

Such ontological transformation of place is well attested in the European Neolithic, if somewhat neglected as a specific focus for inquiry. It is evident at the beginnings of monument building in the transformation of Villeneuve-Saint-Germain houses into Cerny long barrows at Balloy in the Paris Basin (MORDANT 1997), for instance. Similar sequences are seen with many long barrows and chambered tombs in the British early Neolithic, which were frequently and deliberately constructed over settlement structures, middens and cultivation plots (e.g. SAVILLE 1990; WHITTLE/BENSON 2006). Building monuments did not simply mark, memorialise or appropriate earlier events, but effected a transformation of the meaning of places.

This process of ontological transformation – from settlement to monument – is again evident in the later Neolithic, with houses/halls being reworked into henges and with settlement traces being sealed by barrow-like mounds. The sequence at the Stones of Stenness henge, Orkney, has been referred to briefly above, but is worth considering in more detail. Excavations within the interior of this monument, whose outward appearance is of a single-entrance henge enclosing a stone circle, revealed a small box-like stone setting and a series of other ephemeral features (RITCHIE 1976). It was Colin Richards's work on the adjacent settlement of Barnhouse that elucidated the significance of the latter. Based on the presence of similar structural arrangements within the entrance area of the 'big house‹ Structure 8 at Barnhouse, he has made a convincing case for there being a free-standing building of similar size within the area that would subsequently become enclosed by the henge (Fig. 5). The domed topography of the henge interior may even suggest the remains of that building were sealed by a capping of clay (RICHARDS 2013, 68–74). While the building itself had likely been dismantled by the time the henge ditch and stone circle were created in the early 3rd millennium BC, for Richards the idea of the big house lived on, the Stones of Stenness becoming ›an extension of Barnhouse village and a material objectification of a *sociétés à maisons*‹ (RICHARDS/JONES 2016, 241).

Returning to the Stonehenge landscape, a very similar sequence can be postulated for the Coneybury henge, located 1 km to the south-east of the eponymous monument (RICHARDS 1990). Here the henge also encloses a series of structural features which are likely to pre-date the earthwork. These look to belong to a large square-in-circle building c. 10 m in diameter – another ›big house‹ or hall – set within an oval fenced area c. 25 m across surrounded by surface midden deposits (Fig. 6). A dense but largely unintelligible

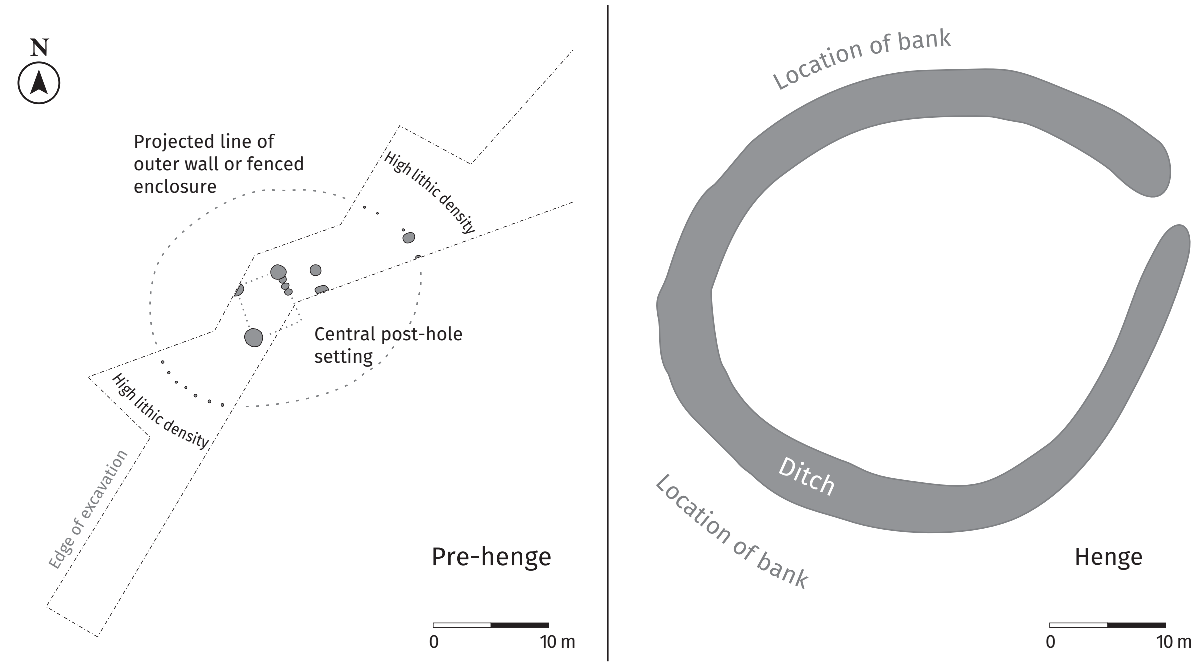

Fig. 6. Suggested sequence at Coneybury, near Stonehenge (after Richards *1990).*

scatter of stake-holes within and around this could reflect the presence of smaller houses such as those found at the Durrington settlement. Perhaps the ›big house‹ developed out of one of these. Extensive surface collection has shown the henge to lie within a large and particularly rich artefact scatter at least 28 ha in extent (Richards 1990, fig. 10). Distinctive middle/late Neolithic tool types have been recovered from this, such as rods/fabricators, chisel and oblique arrowheads (Richards 1990, fig. 158), suggesting the settlement related activity that generated the scatter is broadly contemporary with the pre-henge structure and henge. There remains interpretive latitude, but here it is suggested the sequence runs from a largely undifferentiated settlement area to one where spatial and status distinctions began to emerge, materialised through the development of substantial fence-enclosed house/hall on the hilltop. Potentially its occupants were regarded as possessing through real or fictive lineage a preeminent connection to founding or senior ancestors; conceivably those of Stonehenge, over which the site looks. Once that building went out of use its location was regarded as sufficiently potent or sacred to ensure its separation from the rest of the settlement area through the creation of the henge earthwork – a dramatic and permanent act of distinction that restricted future access to this space.

Accrued sacrality leading to the monumentalisation of spaces that previously witnessed settlement of an undifferentiated or differentiated kind may be a more common process than currently acknowledged. Versions of the sequence outlined for Coneybury (and Stenness) could apply to the locations of other major late Neolithic monuments, for example the Sanctuary near Avebury. The latter was created in a location that had witnessed quite intense prior activity during the late 4th and early 3rd millennia BC, to judge by the quantities of lithics and to a lesser degree ceramics recovered from excavation (Cunnington 1931; Pitts 2001). Its ridgetop setting and intervisibility with the Avebury henge recalls the situation seen with Coneybury and Stonehenge.

Enclosing spaces within henge earthworks served not just to define them as special, but also acted as a form of memory work, drawing attention to those spaces and their prior status. This was also enhanced by other practices such as converting erstwhile timber settings into stone, as at the Sanctuary; a process that perpetuated something of the form of what had gone before yet also effecting another kind of ontological transformation given the different associations wood and stone held (Parker Pearson/Ramilisonina 1998). In other instances, it could be argued that an active process of control and *forgetting* was in operation. This may explain striking cases where later Neolithic settlement traces were buried under barrow-like mounds. Several instances are known from Wales to the south-east, including Upper Ninepence in Powys (Gibson 1999), Ringlemere in Kent (Parfitt/Needham 2012) and Tye Field in Essex (Shennan et al. 1982). Each was the location of quite intensive though spatially constrained settlement and/or settlement refuse accumulation. A series of stake-built houses were present at Upper Ninepence, associated with both Peterborough and Grooved Wares. Pre-mound activity at both Ringlemere and Tye Field was exclusively of Grooved Ware association; in the case of the former defined not just by large quantities of artefacts, but also pits, hearths and at least one structure (Fig. 7). Round mounds were built over these traces in each instances; the sequence at Ringlemere being somewhat more complicated since an intervening stage involved the construction of a pit/post horseshoe setting and small henge a little under 50 m in

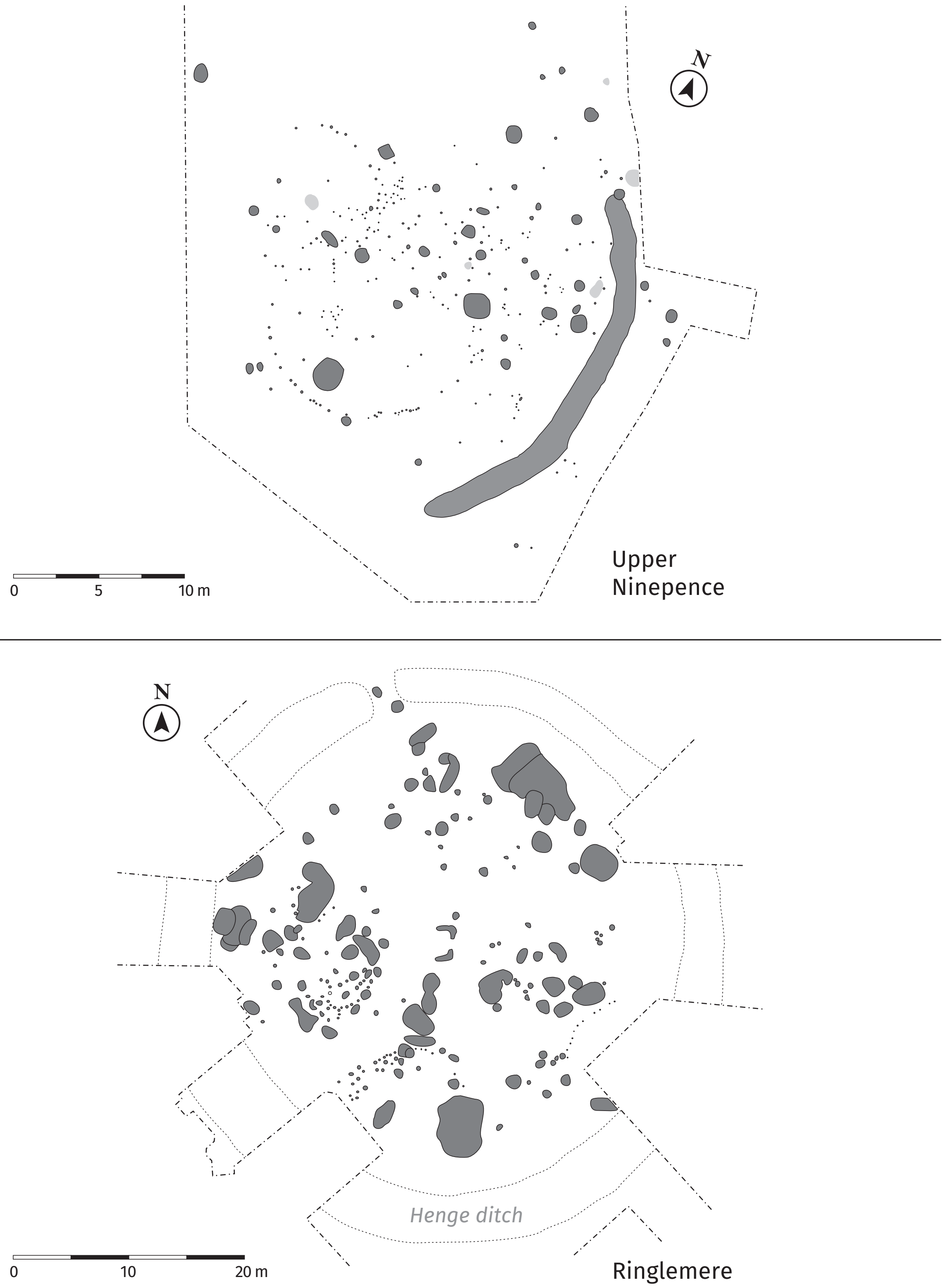

Fig. 7. Pre-mound features at Upper Ninepence, Powys (after Gibson 1999) and Ringlemere, Kent (after Parfitt/Needham 2012).

diameter (PARFITT/NEEDHAM 2012). The chronology of the mounds themselves remains vague, though it is likely that each was created during the second half of the 3rd millennium BC (Chalcolithic to Early Bronze Age), and so sometime after occupation had ceased. While instances of Bronze Age barrows being constructed over traces of earlier settlement, or of old settlement refuse being incidentally incorporated within barrow mounds through turf stripping are not uncommon (e. g. CLEAL/ALLEN 1994), in each case of the sites referred to here there is no indication of the mounds having served a funerary purpose.

As a concealing technology mounding was also employed to bury monuments (BROPHY/NOBLE 2012). The final chalk mound phases at Silbury Hill engulfed a henge earthwork (LEARY et al. 2013), and the same sequence is seen at Forteviot (BROPHY/NOBLE 2012) and at Dyffryn Lane, Powys, where a round mound constructed in the centre of a small henge buried a stone circle (GIBSON 2010). These constructional practices recall the laying of clay platforms and midden over truncated structural remains on a number of Orcadian sites (RICHARDS 2013, 74). It is likely that mounding was undertaken with the express intention of burying, and so containing, what went before. Further, it is not unreasonable to infer that the residues and structures being buried were conceived as sufficiently potent, powerful or dangerous that such an extreme form of control was required. Ethnographic instance provides potential illumination. In discussing the creation of Silbury Hill, Alasdair Whittle cited the case of Dengkur/Ngundeng's mound in South Sudan (WHITTLE 1997b; CAMPBELL 2013). Ngundeng Bong was a Nuer prophet of great power. In response to epidemics of smallpox and rinderpest during 1888–9 he initiated the building of a great mound to contain evil agencies, magic and the diseases themselves. The mound was created in the context of tension between the Nuer and British colonial authorities and was eventually partially levelled by the British (CAMPBELL 2013). Could it be that logic of 3rd millennium BC mound building was not that different, and even that the tensions of a culture contact situation were shared? If the Upper Ninepence, Ringlemere and Tye Field mounds were constructed during the currency of Beakers and yet sealed the remains of significant materially-rich Grooved Ware settlements or places of gathering, their role could be bound up in strategies to negate ›old‹ power in the face of an increasingly confident new social order.

CONCLUSIONS

The intention of this paper was to start to dissolve some of the critical distinctions we make between Neolithic settlement and monumentality by highlighting the ways in which both domains of practice intersect, and even merge as houses and settlement areas become monuments themselves, or the templates for such. There is power in the everyday. It offers the conditions around which people come to understand the world in all its myriad dimensions, variously relations with kin and others, spiritual agencies, places, history and identity. It therefore follows that accounts of settlement and routine should be just as dynamic and historically-centred as those we create when seeking to make sense of monumentality. For Neolithic scholars the task is to more firmly integrate these different strands of evidence, and to not treat settlement as a ›flat‹ background to dynamic goings on at monuments. The evidence is rich, and offers potential for new narratives that can reshape our understanding of the period.

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The North Munster atypical court tombs of Western Ireland – Social dynamics, regional trajectories and responses to distant events over the course of the Neolithic

Carleton Jones

ABSTRACT

A distinct group of megaliths in western Ireland is defined and described. These north Munster atypical court tombs are related to the more common Irish megaliths known as court tombs and also to monuments even farther afield, but the north Munster megaliths are architecturally distinct and geographically isolated. These north Munster atypical court tombs are associated, at least in part, with the widespread Carinated Bowl tradition of the Early Neolithic but north Munster societies followed a trajectory distinct from other regions as the Neolithic progressed. Compared to areas farther to the north and east in Ireland where there is evidence for dynamic social structures and consequent efforts to legitimate and demonstrate social statuses, Neolithic north Munster societies appear to have been smaller, more stable and less open to innovations. The geography of Ireland appears to have helped separate north Munster Neolithic societies from regions with more dynamic demographic, social and ritual milieus, but north Munster was not completely isolated. The evidence from the excavated north Munster atypical court tomb at Parknabinnia shows that some distant events may well have influenced practices in the far west of Ireland.

INTRODUCTION

In the northern part of the province of Munster in western Ireland, mainly in the county of Clare but with one example in County Tipperary, there is a group of at least four megaliths that belong to a distinct regional tradition and are referred to here as ›north Munster atypical court tombs‹ (Fig. 1 and Fig. 2). These north Munster megaliths are far removed from the main concentrations of contemporary Neolithic monuments and while they show affinities with court tombs, they are sufficiently different that they are best understood as a regional group of atypical court tombs. Various interesting questions related to forms of early monumentality, social differentiation, social dynamics and the construction of identities are raised by this relatively isolated group of megaliths. This paper explores issues of regional practices and identities, inter-regional contacts, and differing trajectories of social development through these megaliths and in particular through the evidence from one of these megaliths, the Parknabinnia atypical court tomb, which was excavated by the author between 1998 and 2001 (Jones 2003; 2004; Jones/Gilmer 1999; Jones/Walsh 1996).

Radiocarbon dates on unburnt human bone from the Parknabinnia atypical court tomb indicate that, in common with other court tombs, it was initially used

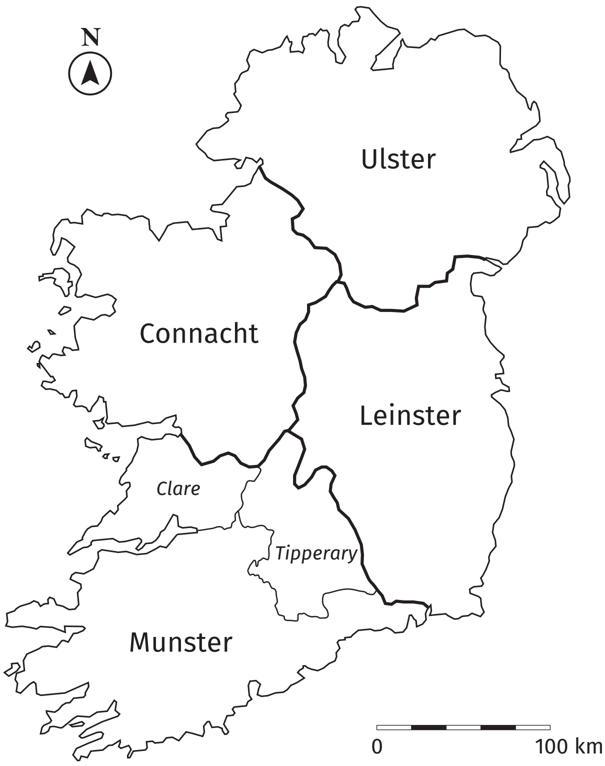

Fig. 1. Ireland, showing the four provinces and Counties Clare and Tipperary in north Munster.

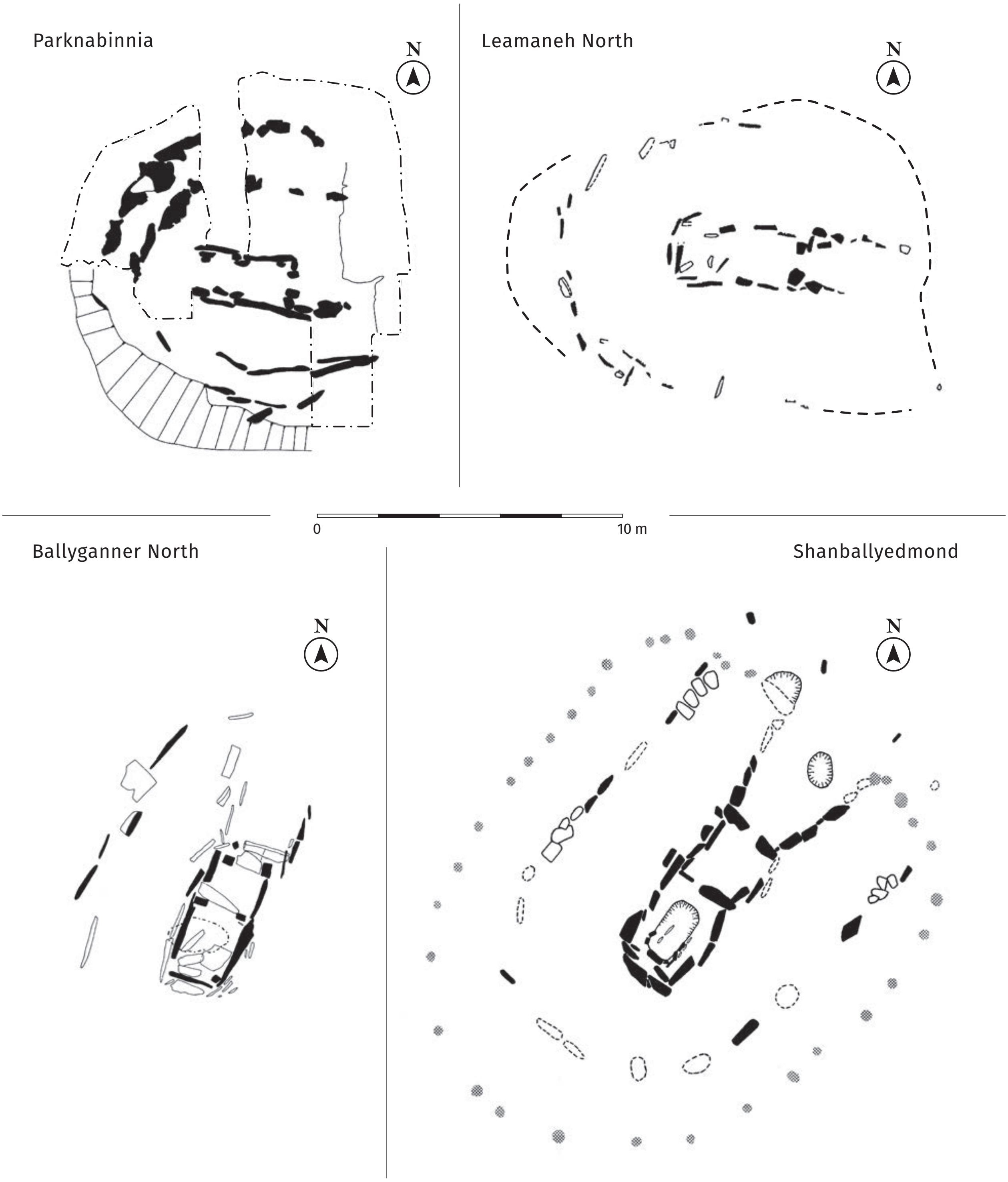

Fig. 2. Well-preserved examples of north Munster atypical court tombs. Top left – Parknabinnia (Cl. 153); top right – Leamaneh North (Cl. 135); bottom left – Ballyganner North (Cl. 34); bottom right – Shanballyedmond (Ti. 7). Adapted from De Valera/Ó Nualláin (1961), Megalithic Survey – National Monuments Service, and O'Kelly (1958).

c. 3700–3570 cal BC (the earliest date is GU-10578: 3693–3376 cal BC at 95.4 % confidence) and then continued to be used, possibly intermittently, up into the first half of the third millennium BC (the latest date is GU-10575: 2905–2620 cal BC at 95.4 % confidence) (Schulting et al. 2012). Over the centuries that Parknabinnia was in use, identities, ritual practices and social dynamics all show variation across the island of Ireland. In this paper, the north Munster megaliths are examined in the wider context of significant social processes and events farther afield in order to shed light on the social significance of some of the apparent variation between north Munster and other parts of Ireland in the Early (c. 3800–3600 BC), Middle (c. 3600–3100 BC) and Late Neolithic (c. 3100–2500 BC).

ARCHITECTURE OF PARKNABINNIA & RELATED NORTH MUNSTER MEGALITHS

The Parknabinnia megalith (Cl. 153) possesses some architectural features that can be paralleled in court tombs, but it and the other definite north Munster atypical court tombs (Ballyganner North [Cl. 34], Leamaneh North [Cl. 135] and Shanballyedmond [Ti. 7]), also possess features that set them apart from more ›typical‹ court tombs (Fig. 2 and Fig. 3). In common with other court tombs, the north Munster megaliths have galleries of multiple chambers aligned in a sequence. At Parknabinnia and the other north Munster atypical court tombs, there are two chambers. This is also a common arrangement in more typical court tombs, with approximately 70 % of court tombs with a known number of chambers having two chambers (WADDELL 2010). At Parknabinnia, Ballyganner North, Leamaneh North and Shanballyedmond, the chamber galleries are aligned either east-west with the entrance to the east or northeast-southwest with the entrance to the northeast, again reflecting common layouts among more typical court tombs (cf. DE VALERA 1960, Plate XXXV).

Court tombs typically have a wide crescent-shaped or closed oval forecourt. However, instead of these more typical forecourts, the north Munster atypical court tombs have narrow straight-sided forecourts. At Shanballyedmond, the forecourt is in the shape of a ›V‹, but at the others it is a narrow forecourt with parallel sides no wider than the gallery of chambers. There are currently around 400 court tombs recorded in Ireland (CLARKE 2006; WADDELL 2010). Many of these are very ruined and without excavation, morphology can be uncertain. Nevertheless, some idea of how common particular features may have been can be seen in De Valera's (1960) publication of the plans and descriptions of 141 examples which includes the best-preserved examples in the country. In this sample, 63 % have crescent or oval forecourts, 35 % are too ruined to determine forecourt shape, and only 2 % have narrow, straight-sided forecourts.

The north Munster atypical court tombs are also smaller than many other court tombs (measured by cairn length and chamber gallery length). Cairns on court tombs are generally long, and sometimes trapezoidal (Fig. 3). At Parknabinnia, Leamaneh North and Shanballyedmond, the cairns are definitely short and heel-shaped and this is probably also the case at Ballyganner North. At Parknabinnia, there is evidence that the cairn may have originally been even smaller and more circular (see below). As best as can be measured in their current state, the average overall length of the cairns on the north Munster atypical court tombs is c. 13 m and the average length of their chamber galleries is c. 4.5 m.

Small court tombs do certainly exist elsewhere, but court tombs in other regions typically have cairns measuring between 25–35 m in length (under 20 m is rare) with the longest recorded being the Farranmacbride central court tomb in County Donegal in the north of the island which has an overall length of 57 m (DE VALERA 1960). In the De Valera sample, just under 52 % definitely have long cairns, just under 48 % are too ruined to determine cairn morphology, and just one site – located in south Munster – has a definite short cairn (Ballyganner North is the only north Munster example recorded in DE VALERA 1960 and its cairn is of uncertain length).

The entrance to the first chamber at Parknabinnia is also distinct in that the jamb stones are set parallel to the chamber sides and the gaps between the outsides of the jamb stones and the insides of the chamber sides are filled with two ›façade‹ stones set perpendicularly between the jamb stones and the chamber sides. A more typical arrangement is simpler with just a stone either side of the entrance set perpendicular to the chamber sides and fulfilling the function of both jamb stone and ›façade‹ stone. The arrangement of the entrance at Parknabinnia is not replicated at the other north Munster atypical court tombs. There is a similar but not identical doubling of stones on the north side of the entrance at Leamaneh North, but Ballyganner North and Shanballyedmond have more typical entrances formed by a single stone either side of the entrance (Fig. 2). At Shanballyedmond the stones are set perpendicularly to the chamber sides while at Ballyganner North the orientation of the stones is not a distinctive feature as they are square in plan. Entrance

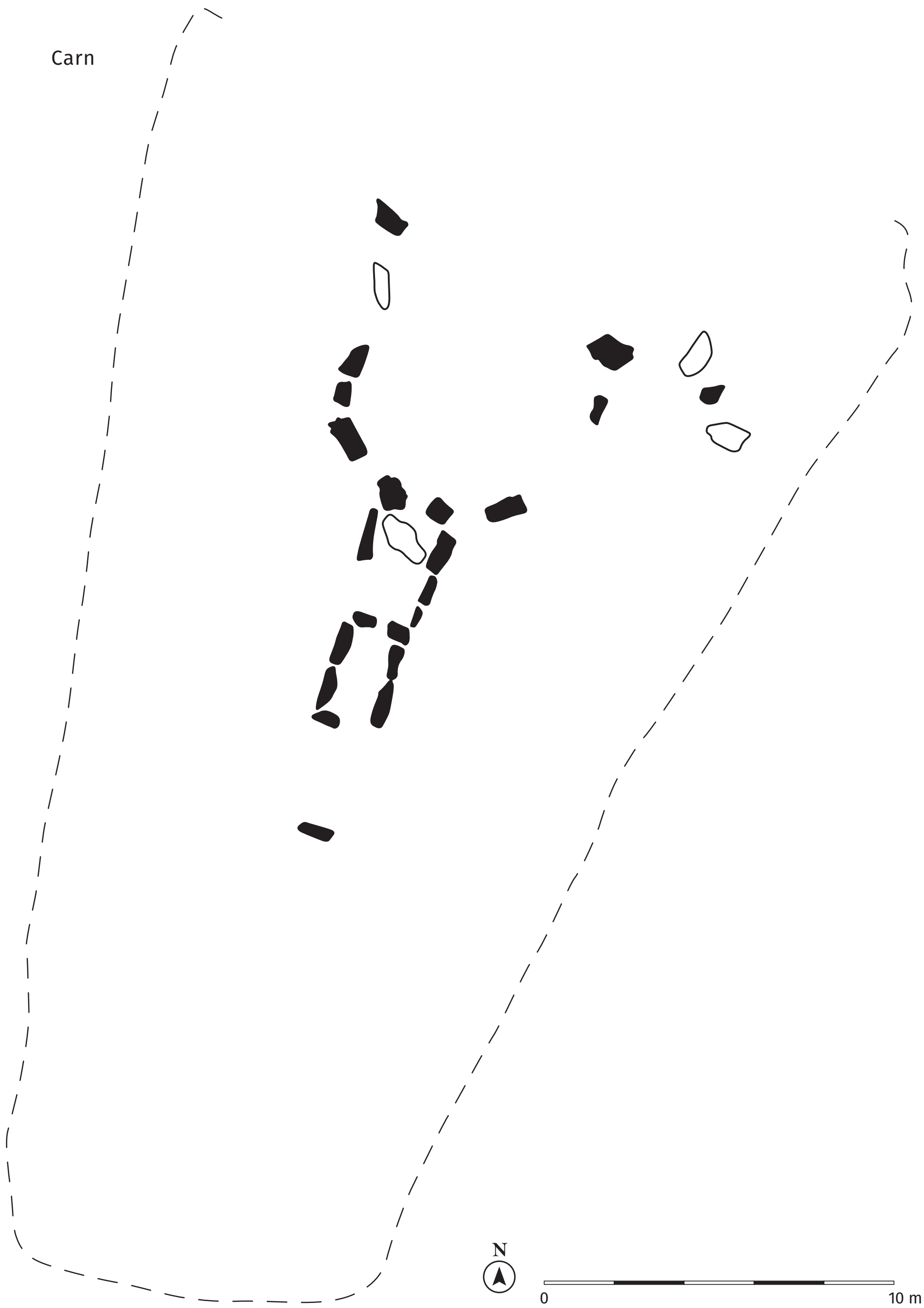

Fig. 3. A more ›typical‹ court tomb farther north (Carn, Co. Monaghan) (adapted from De Valera *1960).*

jambs set parallel to the chamber sides are not a common feature on court tombs. In the DE VALERA (1960) sample, 42.5 % have perpendicular entrance jambs, 54 % are too ruined for their orientation to be determined, and only 3.5 % have entrance jambs set parallel to the chamber sides.

When excavated, no formal back to the second chamber was found at Parknabinnia but many court tombs that do have in-situ backstones have gable-shaped slabs in this position. Ballyganner North has a gable-shaped slab (but with a flat top) at the back of its rear chamber while Leamaneh North and Shanballyedmond have arrangements of multiple slabs. Gable-shaped backstones in court tombs are often taken to be indicative of the former presence of a corbelled stone roof but the form of the roofs covering the chambers on the north Munster atypical court tombs is uncertain. At Ballyganner North, two large slabs leaning against the outside of the rear chamber and tilted slightly into the chamber were interpreted as ›high-pitched slab corbels‹ by DE VALERA/Ó NUALLÁIN (1961, 30), while another large slab lying tilted within the rear chamber with one end resting on the ›slab corbels‹ was interpreted as likely to be part of the roof. However, as the bases of these stones are not visible without excavation, a possible alternate interpretation would be that all three large slabs formed part of the roof of the rear chamber and that when the roof collapsed, two of the slabs slid to the outside of the chamber and one landed within the chamber. At the excavated atypical court tomb of Shanballyedmond, however, O'Kelly found a similarly positioned earth-fast stone and interpreted it as a 'roof-corbel slab springing from the ground‹ (O'KELLY 1958, 43) and DE VALERA/Ó NUALLÁIN (1961, 106) state that high-pitched corbels are common on court tombs.

Parknabinnia had no such large slabs but it does share another interesting feature with Ballyganner North and Shanballyedmond that may well be related to the roof structure. At all three sites there are pseudo-jambs at the back of the rear chambers (i.e. jamb stones that do not lead onto another chamber). These pseudo-jambs are certainly helping to support the chamber sides at Parknabinnia, although they may also have served as roof supports as they project into the chamber with their tops well positioned to help support a roof. At Parknabinnia, there are also additional stone uprights in chamber corners and in one instance on the side of a chamber that may also have served as roof supports. Three of these remain in-situ in corners along the north side of the gallery. These could not have been intended as side supports as they were only held upright by loose stones at the base of the chambers and had to be stabilised as excavation proceeded to keep them from toppling into the chambers. On the south side, one remains in-situ in the middle of the south wall of Chamber 2 along with one definite and two possible fallen uprights in the corners that correspond to the in-situ uprights on the north (Figure 2 shows the in-situ uprights but not the fallen uprights). The pseudo-jambs and the additional uprights are not typical features of court tombs.

The chamber walls of Parknabinnia are constructed with four large thin slabs (two for each chamber) that are held in place by the jamb stones and pseudo-jambs on the inside, and the cairn on the outside. An important element in keeping the uprights from falling inwards under the pressure from the surrounding cairn is the sill stone between the chambers which spans the width of the gallery and is tightly wedged between the middle jamb stones (visible in Figure 9 but not shown on Figure 2). A basal layer of smaller stones in both chambers may also have been part of the original construction, helping to stabilise all of the upright stones as the soil was too shallow for sockets. In terms of structural engineering, the gallery of chambers is made stable by the opposing forces of the cairn pressing in from the outside and the jambs and pseudo-jambs pressing in the opposite direction (especially where the sill stone between the chambers is holding the two middle jambs apart). At Shanballyedmond, smaller orthostats were used for the walls of the chambers and these were set into well-defined sockets cut into the sub-soil (O'KELLY 1958).

The small size, the narrow straight-sided courts, the short cairns, the sometimes doubled stones at the entrances with jamb stones sometimes parallel to the chamber sides (at Parknabinnia at least) and the pseudo-jambs seem to set the north Munster atypical court tombs apart from other court tombs, while the gallery of sequential chambers and the eastern or north-eastern orientations are features that the north Munster megaliths share with other court tombs. In addition, the three monuments of Parknabinnia, Ballyganner North and Leameneh North are all very close together geographically, all being within 5 km of each other, while Shanballyedmond is located approximately 70 km to the southeast (Fig. 4).

Three more nearby megaliths may also belong to this type, but they are too ruined to be certain without excavation. These more ruined megaliths are another example in Parknabinnia townland (Cl. 154), one at Calluragh South (Cl. 50) 17 km to the southwest and one at Tyredagh Upper (Cl. 97) 24 km to the southeast. Parknabinnia Cl. 154 is very ruined and low but visible orthostats seem to define a two-chambered gallery divided by jamb stones and opening to the east. The gallery is set in a short cairn but no forecourt is visible (JONES/WALSH 1996). Calluragh South appears to be a two-chambered gallery divided by jamb stones

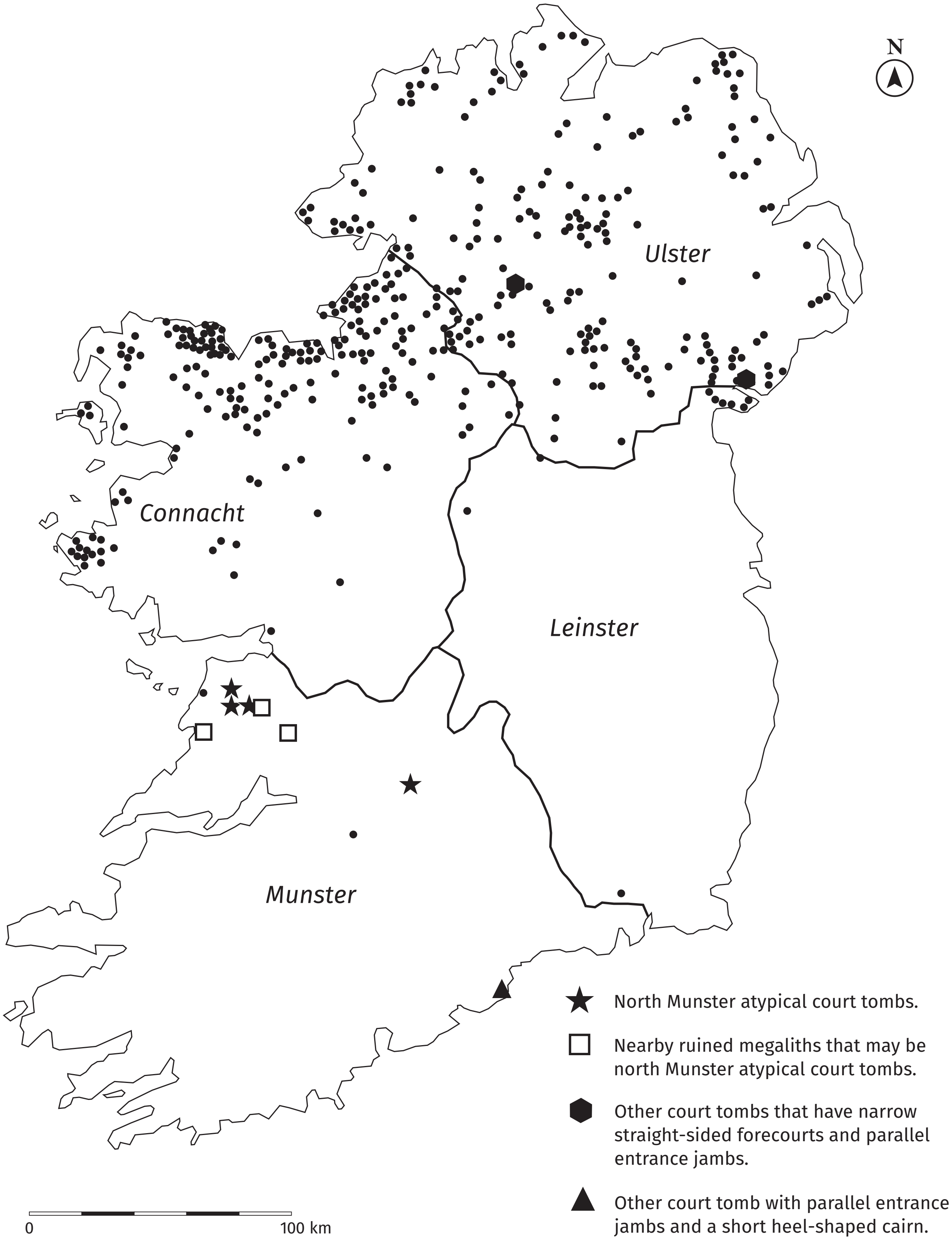

Fig. 4. Distribution of all court tombs with north Munster atypical court tombs, nearby ruined megaliths that may be north Munster atypical-type court tombs and other court tombs that have similar features highlighted (adapted from Ó Nualláin 1989 with additions).

and opening to the east but no trace of the forecourt or the cairn are visible (DE VALERA/Ó NUALLÁIN 1961). Tyredagh Upper consists of a very ruined gallery that may be divided by jambs into two or more chambers. It is aligned north-south but it is unclear which end is the front. The cairn appears to have been short but no trace of a forecourt is visible (DE VALERA/Ó NUALLÁIN 1961; Westropp 1902).

While Parknabinnia Cl. 154, Calluragh South and Tyredagh Upper all seem to have segmented galleries of multiple chambers and may therefore be further examples of north Munster atypical court tombs, critically diagnostic features are not visible at these monuments. In their present condition – and without excavation – they could be equally plausibly grouped with more typical court tombs and it should be noted that not far away on the Atlantic coast of north Munster is the court tomb of Teergonean (Cl. 134) which appears to have a crescent-shaped forecourt and a normal arrangement of jamb stones at its entrance (it is too ruined to determine the shape and size of its cairn or if it had pseudo-jambs at the back of its rear chamber). Teergonean may have more in common with more typical court tombs in distant regions than to its neighbours in north Munster and this of course also opens up the possibility that the more ruined megaliths at Parknabinnia Cl. 154, Calluragh South and Tyredagh may also be of a more typical form.

Three court tombs outside of north Munster have combinations of architectural features that might suggest links with the north Munster atypical court tombs, but possible links are far from certain (Fig. 4). On the south Munster coast, the court tomb at Ballynamona Lower in County Waterford has entrance jambs set parallel to the chamber sides and excavation showed it to have a short, heel-shaped cairn (POWELL 1938). Far to the north, the court tombs at Ballyedmond in County Down and at Ballyreagh in County Fermanagh both have narrow straight-sided forecourts (Ballyedmond more so than Ballyreagh) and parallel entrance jambs (DE VALERA 1960). Excavation at Ballyedmond, on the north shore of Carlingford Lough, also demonstrated that it was set within a short oval cairn but as the cairn was found to extend right around the front of the monument encasing the forecourt, it is unclear from this old excavation (EVANS 1938) what the chronological relationship is between the gallery and forecourt, and the surrounding cairn.

AFFILIATIONS & WIDER CONTEXT IN THE EARLY NEOLITHIC (C. 3800 – 3600 BC)

Chronology

Recent Bayesian modelling of radiocarbon dates from court tombs across Ireland (but primarily in the north) places the initial use of court tombs in the Early Neolithic c. 3700–3570 cal BC (95.4 %) (SCHULTING et al. 2012). Given the distinctive architecture of the north Munster atypical court tombs and their geographical clustering, the possibility arises that the differences between this group of megaliths and other court tombs may be related to chronology. A series of twelve radiocarbon dates from human bone is available for the Parknabinnia megalith and Bayesian modelling of these dates indicates that Parknabinnia was initially used c. 3715–3530 cal BC (68.2 %) (COONEY et al. 2011), a date range perfectly in line with a modelled timeframe for the initial Early Neolithic use of court tombs throughout Ireland of c. 3700–3570 cal BC (95.4 %) (SCHULTING et al. 2012). However, it must be noted that the Parknabinnia dates were included in the all-Ireland model and have therefore influenced it.

The only other north Munster atypical court tomb to have radiocarbon dates is Shanballyedmond. Here, a charcoal date from a posthole near the entrance of the monument gave a date of c. 3938–3542 cal BC (95.4 %) (GrN-11431) which is not particularly tight nor is it from a particularly informative context regarding the construction or definitive initial use of this monument but a date in the first half of the 4th millennium would be expected (SCHULTING et al. 2012). In addition, leaf-shaped arrowheads and a small number of potsherds that appear to be from Carinated Bowls recovered in the excavation (O'KELLY 1958) support an Early Neolithic date in line with the initial use of Parknabinnia, and with court tombs in general. A second radiocarbon date from charcoal at the base of the cairn spread of c. 1893–1691 cal BC (95.4 %) (GrN-11432) is related to post-Neolithic activity at the site.

The dates from Parknabinnia and the much more limited evidence from Shanballyedmond suggest that there is no chronological difference between the initial use of the north Munster atypical court tombs and other court tombs further to the north. In addition, the initial use of all of these monuments appears to fall in a fairly tight horizon of Early Neolithic activity that includes the construction of large numbers of rectangular timber structures in Ireland (many of which appear to have been houses), the construction and use of many long barrows and chambered tombs in southern Britain, and perhaps slightly later, but overlapping with the use of causewayed enclosures in southern Britain (COONEY et al. 2011; MC SPARRON 2008; SMYTH 2014; WHITEHOUSE et al. 2014). This horizon of Early Neolithic activity probably occurred 50–150 years after the start of the Neolithic in Ireland as modelled by COONEY et al. (2011) at c. 3850–3740 cal BC (95.4 %).

Burial rite

Males, females, adults and sub-adults were all interred in the Parknabinnia megalith (total MNI=20). These can be divided into 75 % adults, 10 % adolescents, 5 % children, 5 % infants and 5 % neonates. The adults were split between 10 % adult male, 25 % adult female and the remaining 40 % un-sexed adults. The majority of the bones (n=6084) were inhumed rather than cremated but there were some cremated remains (1.6 %) (BECKETT 2011). All radiocarbon analyses performed on inhumed bone from Parknabinnia (n=12) have produced Neolithic dates, but radiocarbon analyses performed on cremated remains indicate that some – and possibly all – the cremated bone at Parknabinnia is post-Neolithic and therefore the result of a different burial tradition (SNOECK et al. forthcoming). The inhumed remains were highly fragmented and most were disarticulated but some partial articulations (0.4 %) were present and there was also evidence of the re-arrangement of bones in some instances. This pattern suggests that the most common burial practice at Parknabinnia was the successive inhumation of complete bodies which subsequently decomposed inside the monument. When the next inhumation was interred in the monument, the remains of earlier burials were re-arranged. The re-arrangement of the bones does not seem to have been done according to age or sex. Instead, the resultant pattern of major concentrations of bones at the edges of the chambers, and sometimes in the corners, appears to be the result of successive clearing episodes to make room for new interments (BECKETT 2011).

How this burial rite compares with the burial rite in other court tombs is not completely clear. This is not due to any aspect of the Parknabinnia deposits, but instead to the fact that many excavated court tombs are located on acidic soils where bone preservation was not good. However, based on the limited evidence available, it does seem that inhumation was the predominate burial rite in court tombs (SCHULTING et al. 2012). Looking at Neolithic funerary practices more widely, it is also apparent that the pattern seen at Parknabinnia of primary inhumation in a collective tomb with subsequent disturbance and re-arrangement during later burials is the most common burial rite in Neolithic Ireland and Britain (BECKETT/ROBB 2006). Similarly, the lack of any striking age or sex bias amongst the individuals interred in Parknabinnia is also a common pattern (BECKETT/ROBB 2006). Human remains were not abundant at Shanballyedmond, consisting of six separate groups of cremated bone of which only the cremated remains of a youth placed in a pit in the rear chamber and a few fragments of unburnt bone found outside of the first chamber were likely to have been in-situ. The other groups of cremated bone were found in positions that the excavator felt were secondary: in the end chamber, the front chamber, the forecourt and in the cairn to the south of the chamber gallery (O'KELLY 1958). It is possible that these are post-Neolithic deposits.

Artefact assemblage

Finds other than human and animal bone from Parknabinnia consisted of pottery, lithics and some bone artefacts. The pottery is very fragmentary and only incomplete vessels are represented although the position of one concentration of sherds under a small lip in the bedrock in front of the monument does suggest that a complete bowl was placed here originally. This bowl may be the earliest on the site (c. 3700–3600 BC) and appears to have been a large, thin-walled Carinated Bowl. Most of the potsherds on site were recovered from the chambers and the entrance area and altogether, the sherds from the site probably represent 5–10 vessels. In addition to the Carinated Bowl found in front of the monument, there were sherds from another undecorated Carinated Bowl, at least two simple bowls and a decorated bowl (BRINDLEY 2010). The decorated bowl most likely dates to the Middle Neolithic and is therefore discussed below rather than here. The lithics recovered included four leaf-shaped arrowheads, a plano-convex knife and a bifacial knife, two flat stone beads, various cutting and scraping tools and debitage. The leaf-shaped arrowheads, plano-convex knife and flat stone beads and pottery other than the decorated bowl all fit comfortably in an Early Neolithic, ›Carinated Bowl Neolithic‹ context (SHERIDAN 2007). The bone artefacts included what appear to be two halves of the same toggle with expanded ›golf-tee‹ shaped heads and a portion of a long, tubular bead with an expanded head. It is uncertain whether these two bone artefacts relate to Neolithic use of the monument or perhaps to later use (JONES 2003).

At Shanballyedmond, pottery finds consisted of small and poorly preserved sherds identified as ›western Neolithic‹ by the excavator (O'KELLY 1958) which are probably Early Neolithic undecorated Carinated

Bowls in more current terminology (cf. GROGAN/ROCHE 2010; SHERIDAN 1995). Lithic finds from Shanballyedmond consisted of five leaf-shaped arrowheads, one scraper and a few other worked flakes and pieces of debitage (O'KELLY 1958).

Wider affiliations

The architecture, radiocarbon dates, burial rite and artefact assemblage from Parknabinnia (and the less abundant evidence from Shanballyedmond) show that Parknabinnia and the other north Munster atypical court tombs are certainly related to court tombs farther north in Ireland. The radiocarbon dates and artefact assemblage from Parknabinnia also place the initial use of Parknabinnia within the Early Neolithic ›Carinated Bowl Neolithic‹ as defined by SHERIDAN (2010; 2007). At Shanballyedmond, the pottery identification is less certain and the radiocarbon dates are not from particularly informative contexts, but the evidence does not contradict an Early Neolithic construction date associated with the Carinated Bowl Neolithic. SHERIDAN (2010) sees the Carinated Bowl Neolithic as deriving ultimately from Neolithic communities in northernmost France on the northwest edge of the continent and then spreading across the English Channel, up the east coast of Britain, into Scotland, and from there crossing the north Irish Sea to Ireland and spreading southwards along both the east and the west coasts of Ireland. This may well have been the route along which the ideas and people behind the building of these megaliths reached north Munster, but the geographical isolation of the north Munster atypical court tombs from northern Irish court tombs and their divergent architecture may suggest that influences and/or routes other than this northern route also played a role.

Only 7 km from the Parknabinnia megalith is the Poulnabrone portal tomb. This has also been excavated and Bayesian modelling on radiocarbon dates from Poulnabrone indicates that it was first used (and presumably constructed) c. 3815–3745 cal BC (68.2 %) (SCHULTING 2014). This suggests that there was an Early Neolithic population in north Munster possibly a century or two prior to the construction of the Parknabinnia atypical court tomb. Like the north Munster atypical court tombs, portal tombs in north Munster (including Poulnabrone) are also geographically isolated from a much denser concentration in the north (Fig. 5). However, it may be significant that the distribution of north Munster portal tombs stretches to the east and may be more closely related to a spread of portal tombs in southeast Ireland (Leinster) rather than those in the north. As discussed below, connections between north Munster

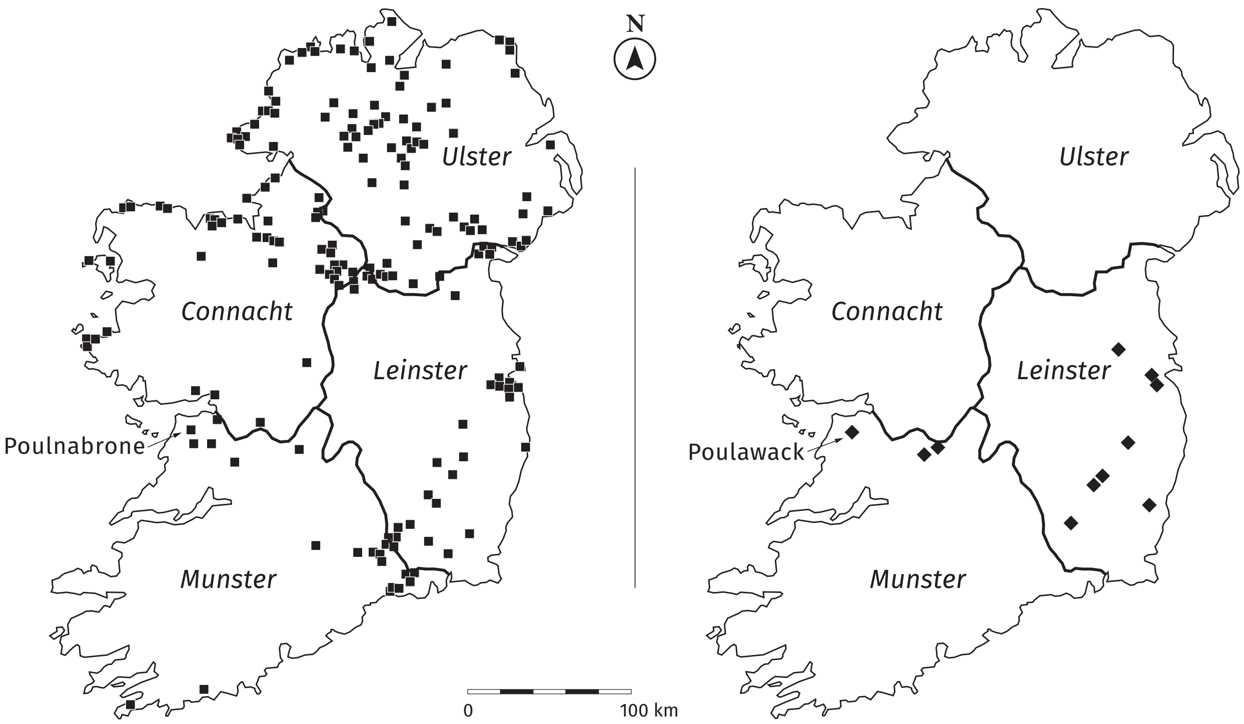

Fig. 5. Left: Distribution of Early Neolithic portal tombs in Ireland with Poulnabrone highlighted. Right: Distribution of Middle Neolithic Linkardstown cists with Poulawack highlighted (adapted from Ó NUALLÁIN 1989 and RYAN 1981 with additions).

and Leinster are definitely apparent later on, in the Middle Neolithic.

Court tomb architecture and social dynamics

The ›typical‹ court tomb shown in Figure 3 is a fairly simple structure, but there are various types of more complex court tombs. These more complex court tombs are sometimes ›dual‹ court tombs which have the appearance of two simple court tombs placed back-to-back, ›central‹ court tombs which have the appearance of two simple court tombs placed front-to-front and ›full-court‹ court tombs where the arms of the forecourt wrap completely around the forecourt enclosing it (Jones 1997).

Most – and possibly all – of these complex court tombs are multi-phase monuments (Fig. 6). Evidence of this can be seen in changes in the alignments of chamber galleries and other architectural elements, changes

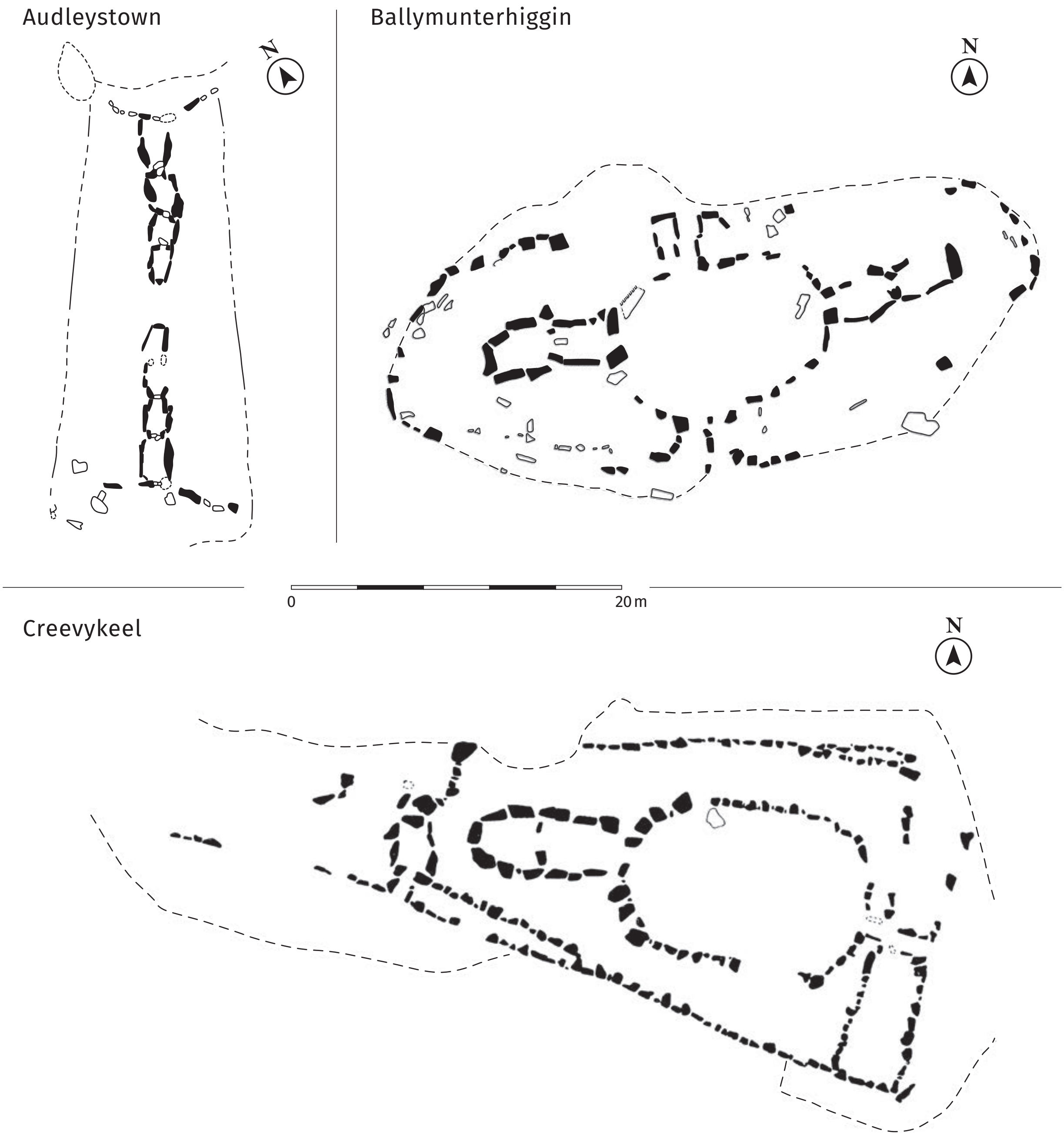

Fig. 6. Complex court tombs with evidence for elaboration over time (adapted from De Valera 1960 and Cody 2002).

in construction techniques (often at a change in alignment), mis-matches between the two halves of a monument, and lines of earlier kerbs and revetments left embedded in expanded cairns (CLARKE 2006; CORCORAN 1972). Examples of central court tombs (i.e. with the form of two simple court tombs placed front-to-front) with mis-matches between the two halves of the monument and ›joins‹ where the forecourts come together can be seen at Deerpark in Co. Sligo and at Ballyglass in Co. Mayo (CORCORAN 1972). A clear example of a full-court court tomb that was built in stages can be seen at Creevykeel in Co. Sligo (Fig. 6). Although the excavator equivocated on whether it was a single or multi-phase monument (HENCKEN 1939), various mis-alignments, differences in construction techniques and – most tellingly – earlier revetments left embedded in the cairn as it was expanded all point to a multi-phase monument (CORCORAN 1972) which has been interpreted as the sequential aggrandisement of the monument (JONES 1997).

Evidence for the sequential building of dual court tombs (i.e. with the form of two simple court tombs placed back-to-back) can be seen at Aghanaglack in Co. Fermanagh and at Audleystown in Co. Down. At Aghanaglack the construction techniques and quality differ in the two halves suggesting that one half of the monument was a later addition to the other half (JONES 1997). At Audleystown, CORCORAN (1972) argued for a two-phase monument based on a change in alignment halfway along the four-chambered north-east gallery and the fact that all of the monument except the north-east end shares a common alignment (Fig. 6). CORCORAN (1972) suggested that an original round monument may have been converted into a long mound (based on similar findings in Britain). The Audleystown cairn was not excavated in full (COLLINS 1954), but no trace of an earlier round monument was uncovered and therefore a more likely scenario is that an original two-chambered simple court tomb opening to the north-east was converted into the present monument with a slightly different alignment by adding two chambers to the rear of the north-east gallery and also the entire south-west half of the monument. Whether this was accomplished in one or more alteration phases is uncertain.

There are also some court tombs that have additional chambers positioned laterally in their cairns such as Annaghmare Co. Armagh, Creevykeel Co. Sligo, Letter Co. Donegal and Ally Co. Tyrone (CLARKE 2006; DE VALERA 1960). Similar arrangements in Scottish Clyde Cairns have been shown in some cases to be the result of earlier circular monuments being encased in later long mounds as at Mid Gleniron and Blasthill (CUMMINGS/ROBINSON 2015; NOBLE 2006) and similar sequences are also evident elsewhere in Britain (CORCORAN 1972). In the Cotswold-Severn long barrows in England, lateral chambers may sometimes be the result of multi-phase monuments but in other cases were part of the original design scheme (DARVILL 2004). It is not always clear if lateral chambers in Irish court tombs are the result of multi-phase constructions, but the lateral chambers at Annaghmare definitely belong to a phase distinct from the main gallery and forecourt (WATERMAN 1965), and the lateral chambers at the rear of Creevykeel are another likely example (CORCORAN 1972; JONES 1997).

Complexity of form and sequential alterations to monuments are not necessarily always the result of social dynamics; they can for instance, result from changes in ritual practices or be the result of reconciling different design requirements (cf. FLEMING 1972). The segmented character of the compartments within many megalithic tombs (including court tombs), however, has often been interpreted as being related to the dynamics of segmentary societies. FLEMING (1972) argued that the development of segmented chambers may have resulted from the ›fusion‹ of social units that remained internally differentiated and going further, he suggested that the basic module of a two-chambered simple court tomb first recognised by DE VALERA (1960), and the frequency of two and four-chambered galleries in court tombs, might be the result of societies organised into moieties. DARVILL (1979, 326) built on Fleming's ideas by looking beyond the structure of court tombs to their spatial distribution and arguing that the 'small, repetitive territories‹ postulated in his model were also suggestive of segmentary societies. More recently, POWELL (2005, 12) has suggested that the various complex architectural configurations of court tombs might be part of a ›discourse‹ promoting different sets of social relationships, with arrangements such as dual court tombs and central court tombs possibly being related to different descent groups being incorporated into larger, internally-segmented societies.

FLEMING'S (1972) ideas were based ultimately on the pioneering anthropological work of Marshall SAHLINS (1961) on social dynamics in small-scale societies. More recent studies of a wide variety of anthropologically and archaeologically known societies around the world have served to reinforce and expand upon this work by demonstrating correlations between episodes of impressive mortuary monument construction and periods when social statuses needed to be achieved, legitimated, or demonstrated to others, often at times of societal change (KOLB et al. 1994, 156; PARKER PEARSON 1999, 86–7; EARLE 2004; WASON 1994). The construction of megalithic wedge tombs in the Irish Chalcolithic has been explained in these terms (JONES et al. 2015), and it seems quite possible that the construction – and sometimes subsequent elaboration – of court tombs in the Neolithic might also be correlated with a period of social flux when the ancestors were called upon to legitimise social statuses. What these two widely separated periods have in common is that both are likely to have been periods of unstable or challenged social statuses. In the Chalcolithic, the challenge to social statuses may have been brought about by the expansion of Beaker exchange networks and the advent of metallurgy (cf. JONES et al.

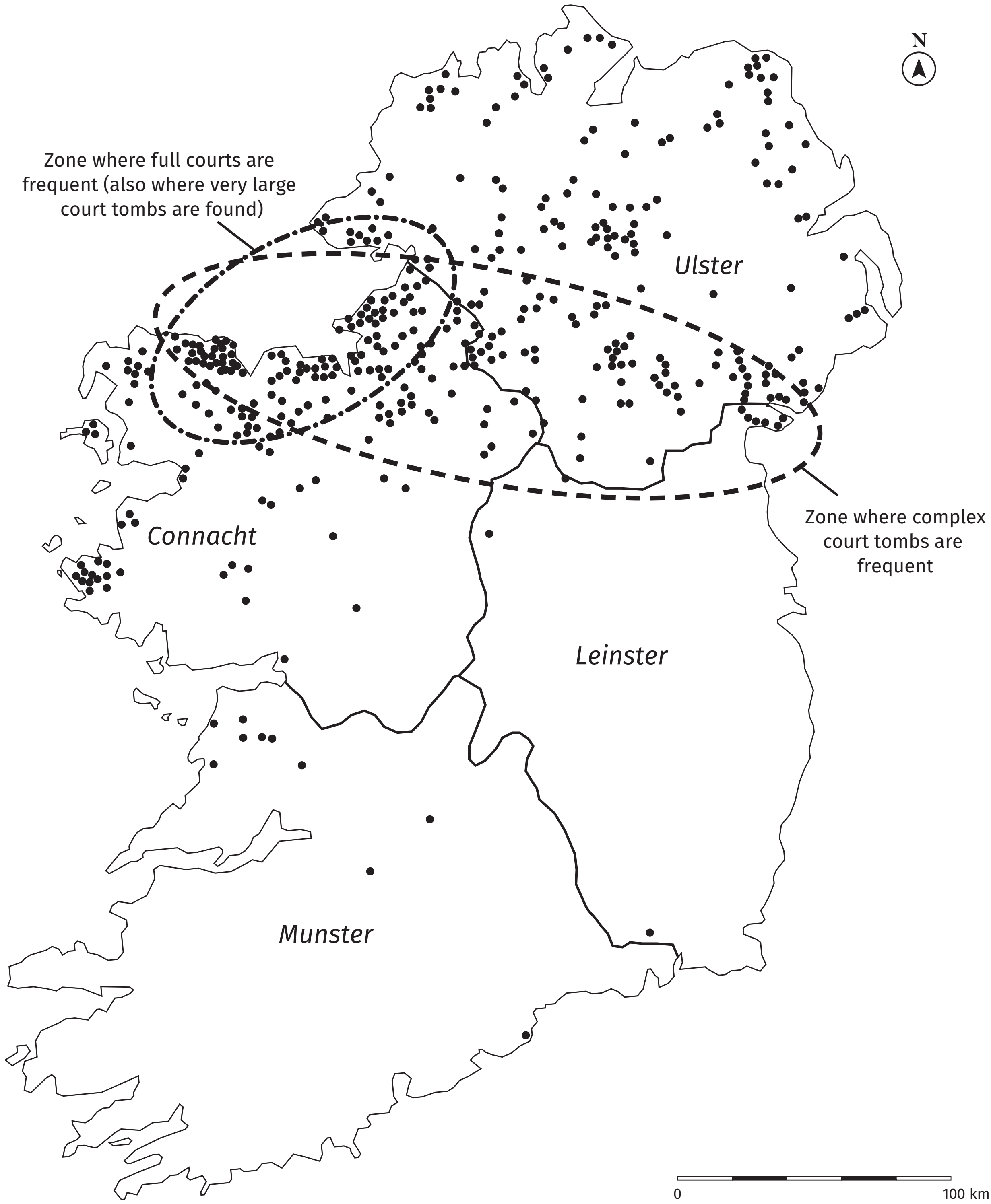

Fig. 7. Zones of court tomb architectural complexity (adapted from Ó NUALLÁIN 1989 with additions).

2015), in the Early Neolithic the challenge to established social statuses is likely to have arisen in a context of significant immigrant populations (cf. Cassidy et al. 2016; McLaughlin et al. 2016; Sheridan 2010) and the subsequent need to forge new social structures.

Interestingly, the complex court tombs are concentrated in north Connaught – south Ulster, namely in those areas that have the densest concentrations of court tombs. If this concentration of complex and probably multi-phase court tombs is the result of a period when social statuses needed to be established and/or demonstrated, this suggests a dynamic social context in this region, possibly related to rising populations. This social context is also suggested by the sequential aggrandisement of some court tombs in an overlapping region in the northwest (Fig. 7). The massive, c. 50 m long, court tomb of Creevykeel which was modified and enlarged at least twice is a good example (Jones 2007).

The finds and radiocarbon dates available from excavated court tombs show that they were often used in both the Early and Middle Neolithic periods (Herity 1987; Schulting et al. 2012) but no precise dating evidence for phases of alteration at complex court tombs is available at present. This is due to a combination of old excavations, prolonged or repeated use-episodes, site disturbance, and in some cases acidic soils that destroy bones. Therefore, we cannot be certain when these alterations took place. However, there are some hints from old excavations of dual court tombs. At Aghanaglack in County Fermanagh (south-west Ulster), a site where differences in construction techniques between the east and west galleries as well as the overlapping of stones where the two galleries meet at the middle of the monument strongly suggests a constructional sequence (Jones 1997), sherds of undecorated Carinated Bowls were found in both the eastern and the western galleries (Davies 1939; Herity 1987). This suggests that both halves of this dual court tomb were constructed prior to c. 3500 BC, the period when undecorated Carinated Bowls and simple bowls were the only pots in use (cf. Grogan/Roche 2010; Sheridan 1995), but it must be borne in mind that there seems to have been some continued use of undecorated Carinated Bowls alongside Middle Neolithic decorated bowls after c. 3500 BC (cf. Sheridan 1995). Similar to Aghanaglack, in the dual court tombs at Audleystown in County Down (south-east Ulster) and Ballyreagh in County Fermanagh (south-west Ulster), undecorated Carinated Bowls were found in both the eastern and western galleries of chambers (Collins 1954, 1959; Davies 1942; Herity 1987).

If alterations to court tombs were related to rising population levels and social dynamics, the ceramic evidence pointing to at least some of these occurring in the Early Neolithic is also supported by recent palaeoenvironmental and settlement evidence which is painting a picture of a dynamic and widespread Early Neolithic in Ireland contrasting with a Middle Neolithic characterised by declining human activity and reforestation. Although demographics are notoriously difficult to elucidate from the archaeological record, the widespread and varied Early Neolithic evidence of settlement sites (including the ›house horizon‹ of substantial timber houses), significant tree clearances and monument building taken together suggest large populations where these types of evidence are present. Contrasting with this, the same lines of evidence for the Middle Neolithic show declining levels of activity between 3500–3300 BC, with evidence for most activities remaining at low levels until c. 3000 BC (although burial activity is evidenced) (Cooney 2016; McLaughlin et al. 2016; Whitehouse et al. 2014; Schulting et al. 2012).

Elevated levels of Early Neolithic activity followed by a slackening of activity in the Middle Neolithic both seem to be widespread patterns in Ireland, but particularly relevant to the current study are palaeoenvironmental studies from County Sligo in north Connaught, the area where the zones of court tomb alterations and aggrandisements overlap (Fig. 7). Here, multiple studies indicate that Neolithic farming made its greatest impact on the landscape in the Early Neolithic, followed by a decline in farming starting prior to c. 3500 BC, and then a cessation of farming at some locations between c. 3000–2700 BC (O'Connell et al. 2014; Stolze et al. 2013; Taylor et al. 2013). If the elaboration of the court tombs in this region is related to growing populations, it would seem that this is most likely to have occurred prior to c. 3500 BC.

The question then arises, was anything similar happening in north Munster? Excavation at Parknabinnia did reveal evidence that the front of the cairn had been flattened and possibly slightly extended (less than a metre) at some point after the initial construction of the monument, but this was a very modest modification, nothing on the scale of what is evidenced at some of the court tombs farther north. Shanballyedmond and the two un-excavated north Munster atypical court tombs are also modest-sized structures and none show any evidence of elaboration or aggrandisement. In north Munster, the lack of complex court tombs and the paucity of evidence for significant sequential aggrandisement suggest that north Munster may not have been as dynamic demographically or socially as the north Connaught – Ulster region.

Supporting evidence for lower population levels in the region surrounding Parknabinnia at this time comes from correlations between soil types, palynological evidence of Neolithic farming, and the locations of Early Neolithic megalithic tombs which indicate that the megalithic tombs in this area are a good proxy for areas of Neolithic farming. Pollen cores on, or at the edge of, the karstic limestone region known as the Burren (the northwest portion of County Clare) where Parknabinnia and two of the other north Munster atypical court tombs are clustered along with several other definite and possible Early Neolithic megalithic tombs (Fig. 4 and Fig. 5) show a ›strong‹ or ›medium‹ farming impact in the earlier Neolithic, declining to a ›weak‹ impact or ›none‹ by the later Neolithic (c. 3200–2500 BC) (O'CONNELL/MOLLOY 2001). In contrast to the Burren which was evidently attractive to Neolithic farmers (and is today characterised by thin Rendzina soils and outcropping rock), 30 km to the south in central County Clare the low-lying landscape of rolling hills and small valleys is covered in a mosaic of different soil types dominated by Grey Brown Podzolics and here both the pollen and archaeological records show no significant human presence until the Bronze Age (GROGAN 2005; MOLLOY 2005; O'CONNELL/MOLLOY 2001). Here, there are no Neolithic megalithic tombs and the pollen cores show only a ›weak‹ farming impact or ›none‹ in the earlier Neolithic and no farming impact in the later Neolithic (O'CONNELL/MOLLOY 2001). In County Clare, megalithic tombs appear to be good proxies for the location and intensity of Neolithic farming.

In both the County Clare portion of the north Munster region and in the north Connaught – south Ulster region, there appear to be close spatial correlations between Early Neolithic farming activity and Early Neolithic megalithic tombs, and in both regions farming intensity seems to have been greater in the Early Neolithic and then declined later in the Neolithic. Therefore, it seems that we can read the contrasts in the number, scale and elaboration of the court tombs of the two regions as related to contrasts in contemporary population levels and demographics. In the north Connaught – south Ulster region, the greater number, larger scale and instances of sequential elaboration and aggrandisements of court tombs all suggest greater population levels and more dynamic demographics when compared to the contemporary situation in north Munster where the atypical court tombs are fewer in number, smaller in scale and for the most part do not show signs of sequential elaboration or aggrandisement.

It should be noted that while in some other regions of Ireland the locations of Early Neolithic megalithic tombs have also been found to correlate well not only with palaeoenvironmental evidence of farming but also with the locations of Early Neolithic settlement sites, in other regions settlement sites have been found without any nearby megalithic tombs (MCLAUGHLIN et al. 2016; SMYTH 2014). In County Clare, as we have seen, the locations of Early Neolithic megalithic tombs correlate well with palaeoenvironmental evidence for contemporary farming, but settlement sites have not been located. These disparities (some of which are probably due to the vagaries of pre-development discoveries) certainly merit further study, but the palaeoenvironmental and megalithic monument evidence from the north Munster (County Clare) region and the north Connaught – south Ulster region can be compared without recourse to additional settlement site evidence for the time being.

WIDER CONTEXT IN THE MIDDLE NEOLITHIC (C. 3600 – 3100 BC)

North Munster and Leinster

Parknabinnia continued to be used in the Middle Neolithic and the burial rite appears to have been unchanged. Individuals continued to be interred in the chambers and artefacts were also placed in the chambers. Sherds of a decorated bowl were found in the entrance to Chamber 1 and immediately inside the entrance. This decorated bowl is later than the undecorated Carinated Bowls that were found and may date to c. 3650–3500 BC (BRINDLEY 2010). Interestingly, the decoration of parallel closely spaced lines overlain by lighter lines running perpendicular to those underneath is a decorative pattern that may be restricted to the southern portion of the island (BRINDLEY 2010), and like the portal tombs in the Early Neolithic, it seems to show connections stretching east from north Munster into Leinster.

The decorative pattern on the Parknabinnia bowl is best known from bowls found in a distinctive type of Neolithic burial known as a Linkardstown cist (BRINDLEY 2010; BRINDLEY/LANTING 1990). These monuments consist of a central cist sealed in a covering cairn or mound (RYAN 1981; WADDELL 2010). Linkardstown cists are a Middle Neolithic phenomenon with Bayesian modelling of radiocarbon dates from them suggesting a start date for their use c. 3710–3560 cal BC (68.2 %) and an end date c. 3355–3180 cal BC (68.2 %) (COONEY et al. 2011). These Linkardstown cists are another phenomenon that demonstrates a link between north Munster and Leinster. The distribution of known sites suggests that they were most common in southeast Ireland (Leinster), but their distribution stretches as far west as the monument at Poulawack, which is less than 6 km

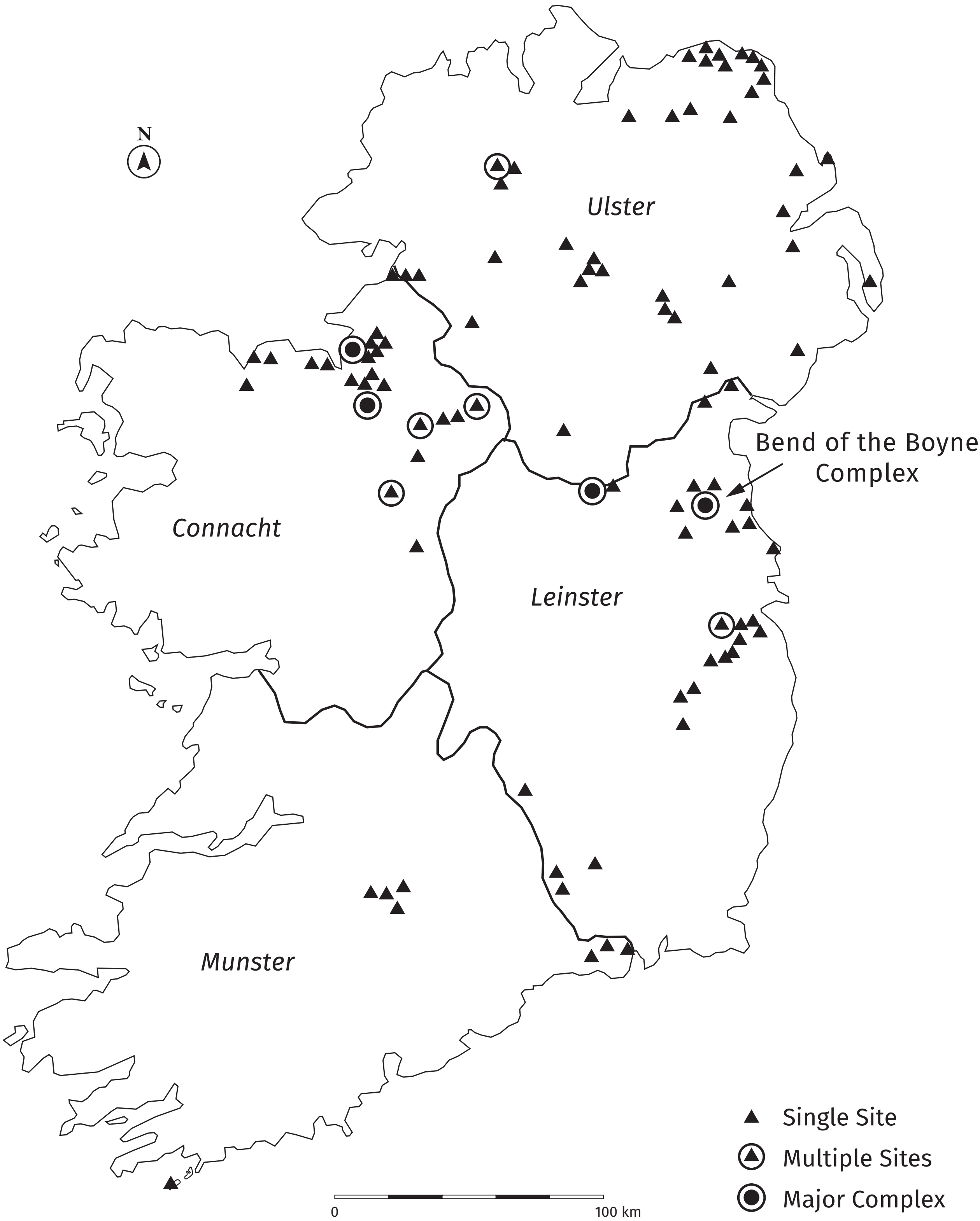

Fig. 8. Distribution of passage tombs in Ireland with Bend of the Boyne complex highlighted (adapted from Ó Nualláin 1989 with additions).

from Parknabinnia. Interestingly, Linkardstown cists in the southeast typically contain the inhumed remains of a single adult male, but moving away from the ›core‹ area of Linkardstown cists, more diverse burial rites are encountered. At the north end of the distribution, a Linkardstown cist contained the remains of three adult men, while to the west and into north Munster, Linkardstown cists have also been found to contain the remains of multiple individuals, including the Linkardstown cist at Poulawack which contained the remains of an adult man, two adult women and an infant (HENCKEN 1935; RYAN 1981) (Fig. 5). Therefore, it seems that while north Munster was influenced by a funerary architectural style that appears most commonly in Leinster, the burial rite (and perhaps social structure) of north Munster was distinct. The fact that the construction of Linkardstown cists in north Munster did not herald the abandonment of the earlier megaliths is also significant. Both the Parknabinnia atypical court tomb and the Poulnabrone portal tomb continued to be used concurrently with the Poulawack Linkardstown cist (BECKETT 2011; SCHULTING et al. 2012).

Fig. 9. Looking east along the gallery of chambers in the Parknabinnia atypical court tomb showing in-situ blocking stones between the chambers (at the centre of the photo). Chamber 2 is in the foreground with the ranging rod at the back of the chamber; Chamber 1 is in the distance. Figure is standing in front of the megalith.

Distant events

Another very important feature of the Middle Neolithic in Ireland is the passage tomb phenomenon. While some have argued for a very early start for passages tombs at the end of the 5th millennium (BURENHULT 2003), it now seems more likely that their construction began sometime in the second or third quarter of the 4th millennium (BAYLISS/O'SULLIVAN 2013; BERGH/HENSEY 2013; COONEY et al. 2011). The end of the passage tomb tradition seems to have occurred around the turn of the 4th – 3rd millennia, or in the early 3rd millennium (COONEY et al. 2011; SCHULTING 2015). Over this span of time some dramatically larger and more complex passage tombs were built, and very large-scale ceremonial complexes incorporating these mega-passage tombs emerged in a zone stretching across north Leinster and north Connaught, far to the north of north Munster. The most spectacular of these massive ceremonial complexes is that of the Bend of the Boyne in eastern Ireland where the main passage tombs have diametres up to 85 m across. Dates from two of the main components of the Boyne complex, the passage tombs of Newgrange and Knowth, show that it was in the final two centuries of the 4th millennium BC that these large and elaborate passage tombs were built (SCHULTING 2015).

There is one monument (Cl. 151) on the same hill as the Parknabinnia atypical court tomb that may be a passage tomb but without excavation its affinities remain uncertain. This is a circular mound with a diameter of about 12 meters and a central, circular chamber (JONES/WALSH 1996). Whether or not it is a passage tomb, it is clear from looking at the distribution of passage tombs throughout Ireland that north Munster was far from the core areas of passage tomb activity (Fig. 8).

What is important to the present discussion is that the scale of the Bend of the Boyne ceremonial complex and the other mega-passage tomb complexes at the end of the 4th millennium BC suggests that they are not just local monuments, and of course there is good evidence of interactions between the builders and users of the Bend of the Boyne complex and related developments beyond Ireland (EOGAN 1992; SHERIDAN 2004). The question arises: were the inhabitants of north Munster affected by the very significant ritual – and probably social – developments happening elsewhere on the island around the end of the 4th millennium BC?

Insight into the potential scale of a sphere of influence around a large Late Neolithic ceremonial complex is provided by the somewhat later, mid-third millennium BC, animal bone deposits at the massive henge at Durrington Walls, part of the extensive Stonehenge ceremonial complex in southern Britain (PARKER PEARSON et. al. 2013; PARKER PEARSON/RAMILISONINA 1998). Here, recent strontium isotope analysis of cattle teeth has demonstrated that the cattle which were feasted upon at Durrington Walls were brought to the site from a variety of regions, in some cases from at least 100 km away and possibly even further (VINER et al. 2010). Similar strontium isotope analyses have not yet been carried out on animal remains from the Bend of the Boyne, but a similar pattern can be seen in the distinctive stones that were used in the Boyne passage tombs which were most likely brought long distances to the site from various locations: rounded granite, granodiorite and siltstone cobbles from Dundalk Bay 35 km to the northeast and white quartz from the Wicklow Mountains 40 km to the south (COONEY 2000; MITCHELL 1992).

It seems likely, therefore, that people beyond the immediate region surrounding the Bend of the Boyne, including the inhabitants of north Munster in the late 4th millennium, were aware of the major ceremonial complex at the Bend of the Boyne and of the other large passage tomb groups to their north. They may have even travelled to the Bend of the Boyne or the other passage tomb complexes and participated in rituals there, and although there are no major passage tombs in north Munster (and possibly no passage tombs at all), some things did change in north Munster around this time or perhaps shortly after (see below).

WIDER CONTEXT IN THE LATE NEOLITHIC (C. 3100–2500 BC)

Local responses

Sometime around the time that the mega-passage tombs of Knowth and Newgrange were built alongside the Boyne or shortly after, the rear chamber (Chamber 2) at Parknabinnia was blocked off by wedging four large slabs along with several smaller slabs in front of the jamb stones and sill stone that divide the two chambers (Fig. 9). This event is probably fairly closely dated by radiocarbon date GU-10579 which gives a calibrated date of c. 3095–2765 cal BC (95.4 %) for a femur that was wedged between the sill stone and the blocking stones and which appears to have been articulated with a pelvis lying on top of the sill stone at the time of the blocking. Whether or not this blocking event was a response to the elaboration and increase in scale of passage tomb rituals in areas to the north and east, it does seem to have been a significant ritual event in the history of use of the Parknabinnia monument and the timing of this event is interesting in light of the major passage tomb construction projects taking place farther afield.

This was not, however, the end of depositions in Parknabinnia. Bodies continued to be interred in the front chamber (Chamber 1), with the deposits building up against the blocking stones between the chambers. Bayesian modelling places the end of these depositions in the front chamber c. 2900–2640 cal BC (95.4 %) (COONEY et al. 2011). This Late Neolithic use of Parknabinnia does not seem to be typical for court tombs. SCHULTING et al. (2012) found little evidence of the use of court tombs in the Late Neolithic with the exception of three court tombs in the west (Parknabinnia and two others in Co. Mayo). In the east, the Late Neolithic is characterised in particular by the related phenomena of Grooved Ware and henges, both of which are linked to the passage tomb tradition. Grooved Ware and henges do occur in the west, but the late use of Parknabinnia and some other western court tombs may indicate that some parts of western Ireland held on to traditional practices and identities longer.

DISCUSSION – GROUP DIFFERENTIATION AND IDENTITY IN NORTH MUNSTER

The architecture of the north Munster atypical court tombs is related, but not identical to, other monument traditions such as the more typical court tombs found predominately in the north of Ireland, the Clyde cairns in Scotland and the Cotswold-Severn tombs in England. Additionally, the pottery, lithics and dating of the initial use of Parknabinnia indicate that it was part of the Carinated Bowl Early Neolithic. As such, the Early Neolithic inhabitants of north Munster must have had links with other Carinated Bowl groups. Links not only to other groups in Ireland, but also at least historical links to groups in Britain and ultimately to northernmost France on the Continent.

The north Munster atypical court tombs are geographically isolated from the north Connaught-Ulster region where court tombs are distributed most densely. This geographic isolation certainly may have contributed to the development of a distinct north

Munster identity from early on and there is also evidence of different trajectories of social development in the two regions as the Neolithic progressed. In the north Connaught-Ulster region, the densely distributed court tombs combined with the occurrence of sequentially elaborated and enlarged court tombs suggests a high population density and a dynamic social milieu. The timing of the elaboration and enlargement of the northern court times is uncertain, but palaeoenvironmental and wider contextual evidence suggests that sometime prior to 3500 BC is likely (i.e. in the Early Neolithic or very early Middle Neolithic). In contrast, the relatively few monuments in north Munster along with their relatively small size and minor elaborations suggest a scenario of lower population densities and probably a less dynamic social milieu, and this is corroborated by the palaeoenvironmental evidence for the region.

The continued distinct trajectory of north Munster societies in the Middle Neolithic is evidenced in the burial ritual associated with a Middle Neolithic innovation, Linkardstown cists. Where these monuments occur in Leinster (southeast Ireland), the emphasis is typically on the inhumation of single adult men. The contrast of this pattern with the north Munster burials in the central cist of the Poulawack Linkardstown cist where two adult females and an infant were inhumed along with the more conventional inhumation of an adult male, suggests that social structures may have been significantly different in north Munster. Linkardstown cists seem to be primarily a Leinster phenomenon and although the burial ritual at Poulawack differs from the norm, the fact that there are Linkardstown cists in north Munster does indicate links stretching eastwards into Leinster, a pattern that was evident with portal tombs in the Early Neolithic. Munster to Leinster links in the Middle Neolithic are also evidenced by the sherds of the decorated bowl found at Parknabinnia. The decorative motif on these sherds can be paralleled elsewhere in Munster and in Leinster and may well be restricted to these provinces. While there are no definite passage tombs in north Munster (bearing in mind the one possible example close to the Parknabinnia megalith), there are passage tombs in central and southeast Munster (Fig. 8). Like the decorated pottery and the Linkardstown cists – and the portal tombs before them – these passage tombs appear to indicate links eastwards into Leinster where there are other passage tombs far south of the main passage tomb complexes in north Leinster and north Connaught.

All of these lines of evidence suggest that while north Munster was developing along a distinct trajectory, it was not completely isolated. Differences between the atypical court tombs of north Munster and court tombs farther north in the north Connaught – south Ulster region are evident while to the south, the paucity of court tombs and portal tombs throughout much of the rest of Munster is also a significant contrast. From the Early Neolithic through the Middle Neolithic, however, important connections stretched to the east into Leinster. While eastwards connections to Leinster are evident, north Munster may have been more conservative: the Middle Neolithic innovations of Linkardstown cists and more developed passage tombs are more common in Leinster than they are in Munster, and when the Poulawack Linkardstown cist was constructed and used in north Munster, both the nearby Poulnabrone portal tomb and the nearby Parknabinnia atypical court tomb continued in use (Beckett 2011).

From the evidence discussed above, it seems that these eastward links from north Munster into Leinster were long-lived and influenced the character of Neolithic society throughout the Neolithic. One of the reasons for the direction of these links certainly seems to be geography. As argued elsewhere (Jones 2009), the combination of the exposed and rugged western coastline, along with a predominate south-west to north-east ›grain‹ in the topography of Ireland, an extensive low-lying and often boggy region in the centre of the island, and a difficult-to-cross drumlin belt which separates the northern third of the island from the southern two-thirds, all combine to make potential east-west routeways more common than potential north-south routeways. Further facilitating east-west travel (but not north-south travel) are the eskers that cross the low-lying middle of the island. These are long, high ridges of well-drained sand and gravel left by the last glaciation that traverse the midlands in a predominately east to west direction. The most important of these is the *Eiscir Riada* along which the *Slí Mhór*, the ›Great Road‹ of ancient Ireland, ran from the vicinity of Dublin in the east to Galway Bay in the west (O'Lochlainn 1940). At the dawn of the historic period in Ireland (mid 1st millennium AD), written sources mention the *Slí Mhó*r and four other ›great roads‹ in Ireland. These five ›great roads‹ of the early historic era follow routes determined by the geography of Ireland and therefore it is very likely that their use stretches right back into earliest prehistory. Importantly for the present study, two of these roads (the *Slí Mhór* and the *Slí Dhála*) connect north Munster to points to the east while no ›great roads‹ run either north or south from north Munster, although the south-flowing River Shannon does (Jones 2009, fig. 10.2).

The construction of mega-passage tombs in large ceremonial complexes far to the north and east of north Munster at the end of the 4th millennium is also of crucial importance to the discussion of social differentiation and identities in Neolithic Ireland. These massive complexes were most likely renowned across the island and probably reflect changing social structures and a strengthening of regional identities in those regions where they were constructed. How far the ramifications of those changes were felt is uncertain. The Boyne ceremonial complex was certainly connected to other ceremonial complexes on the Orkney Islands to the north and in Brittany and Iberia to the south (cf. CUNLIFFE 2012; WADDELL 2010), areas far beyond the shores of Ireland, so an island-wide awareness of the great passage tomb ceremonial complexes is likely as is some degree of island-wide participation in rituals at the complexes. North Munster seems to have remained at the edges of these developments, geographically removed from the great passage tomb ceremonial complexes, and with the Parknabinnia atypical court tomb continuing in use into the Late Neolithic when most court tombs were probably no longer used. However, the blocking of the rear chamber at Parknabinnia around the turn of the 4th/3rd millennia may well indicate a shift in ritual practices related in some way to the major shifts taking place elsewhere.

CONCLUSIONS

The origin of at least a significant element of the Neolithic population in north Munster seems to be the widespread Carinated Bowl Neolithic, and links are also apparent with early monument traditions elsewhere in Ireland, Scotland and England. Despite apparently sharing some common origins with Neolithic populations elsewhere in Ireland and Britain, from an early stage north Munster societies seem to have followed a different trajectory of development. The small scale, low numbers and minimal elaboration or enlargement over time of the north Munster atypical court tombs is significant in this regard as this is in such contrast to the north Connaught – south Ulster region which not only has the densest concentration of court tombs, but is also the focus of sequentially elaborated and enlarged court tombs. This contrast in ritual monuments is good evidence for a contrast in social dynamics in these two regions. While we know that not all Neolithic societies in Ireland built megaliths, the contrast in the density, scale and elaboration of the monuments in these two regions certainly suggests that north Munster had smaller-scale societies and that lower and probably more stable demographics in north Munster may have resulted in more stable and conservative societies throughout the Neolithic. Outside of north Munster, the inhumation of single adult men in Linkardstown cists in Leinster in the Middle Neolithic and the impressively large amounts of collective labour needed to build the mega-passage tombs in north Leinster and north Connaught are both phenomena suggestive of the development of more ranked societies, and in some cases possibly larger polities in these other regions. North Munster, on the other hand, appears to have been inhabited by groups organised into small polities with low levels of ranking throughout the Neolithic.

ACKNOWLEDGEMENTS

Many thanks to Angela Gallagher for her skilled draughtsmanship on all of the figures. Thanks also to the two anonymous reviewers whose comments were very helpful. And finally, sincere thanks to the organizers of the ›Megaliths, Societies, Landscapes – Early Monumentality and Social Differentiation in Neolithic Europe‹ conference for inviting me to participate, and to all those whose efforts after the conference went into the production of this publication.

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Burial practices and social hierarchisation in Copper Age Iberia: Analysing tomb 10.042–10.049 at Valencina de la Concepción (Seville, Spain)

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ABSTRACT

Social complexity, social inequality and social hierarchisation are among the most frequently discussed topics in the study of the Iberian Copper Age (c. 3200–2200 cal BCE). Since the impact of processual archaeology on Iberian Late Prehistory during the early-1980s, a large number of studies have been dedicated to these issues[1]. Establishing a single theory (or a unanimously accepted one) of Chalcolithic social complexity is especially difficult due to the geographical and ecological diversity of Iberia, with the subsequent variability of social and cultural responses, as well as due to the limitations of the available empirical record.

This paper aims to contribute to the debate concerning the nature of social inequality and hierarchisation in Copper Age Iberia by presenting and discussing new data obtained at the site of Valencina de la Concepción (Seville, Spain). Valencina[2] – located in the lower Guadalquivir River valley (Figures 1 and 2) – is perhaps the largest Iberian settlement from the 3rd millennium cal BCE and it certainly has great potential to help advance the debate on the evolution of social complexity during the Iberian Copper Age (García Sanjuán et al. 2017). Recent contributions to the ample literature on this site have made it possible to move forward in the systematisation of the available empirical evidence (García Sanjuán et al. 2013a), especially in terms of chronology (García Sanjuán et al. 2018), demography (Díaz-Zorita Bonilla 2017) and resources (García Sanjuán 2017). Specifically, we will proceed by presenting the existing data on grave 10.042–10.049, which is located in the PP4-Montelirio sector of Valencina. We will subsequently continue by evaluating this grave within the context of the social organisation of the communities that occupied and/or frequented this Chalcolithic settlement.

THE PP4-MONTELIRIO SECTOR

The PP4-Montelirio sector is located in the southern half of Valencina, adjacent to the Montelirio *tholos* and just 500 m south of the La Pastora *tholos* (which was discovered in 1860) (Fig. 3). A rescue excavation carried out between 2007 and 2008 at PP4-Montelirio revealed 134 Chalcolithic structures, as well as 40 stratigraphic units of uncertain chronology (as the information obtained from them was unclear and/or insufficient) and another ten likely Chalcolithic structures that were not excavated (Fig. 4 and 5).

In January 2011 the Research Group ATLAS from the University of Seville began extensive research on the collections resulting from this excavation. To this end, and as presented in a previous study (Mora Molina et al. 2013), the 134 excavated structures were divided into two main functional and three morphological categories. From a functional perspective, 60 structures (plus a doubtful one) have been considered burial features, as they contained human remains, while 73 have been considered non-burial structures as they did not present any formal deposition of human remains. The basis for adopting this criterion is that any structure that contains a formal deposition of human remains (regardless of its nature) is considered to have served – at least at some point during its biography – as a space for burial practices, or to have had some connection with

1 See Gilman 1987; 2002; Chapman 1990; 2008; Micó Pérez 1995; Kunst 1995; Díaz-del-Río 2004; 2011; García Sanjuán 2006; Garrido-Pena 2006; Ramos Millán 2013; García Sanjuán/Murillo-Barroso 2013, to cite but a handful of those that have been published in English.

2 The official name of this site in the records of the Junta de Andalucía (regional government) is ›Valencina de la Concepción-Castilleja de Guzmán Archaeological Area‹, but for the sake of brevity it will be referred to as ›Valencina‹ in this paper.

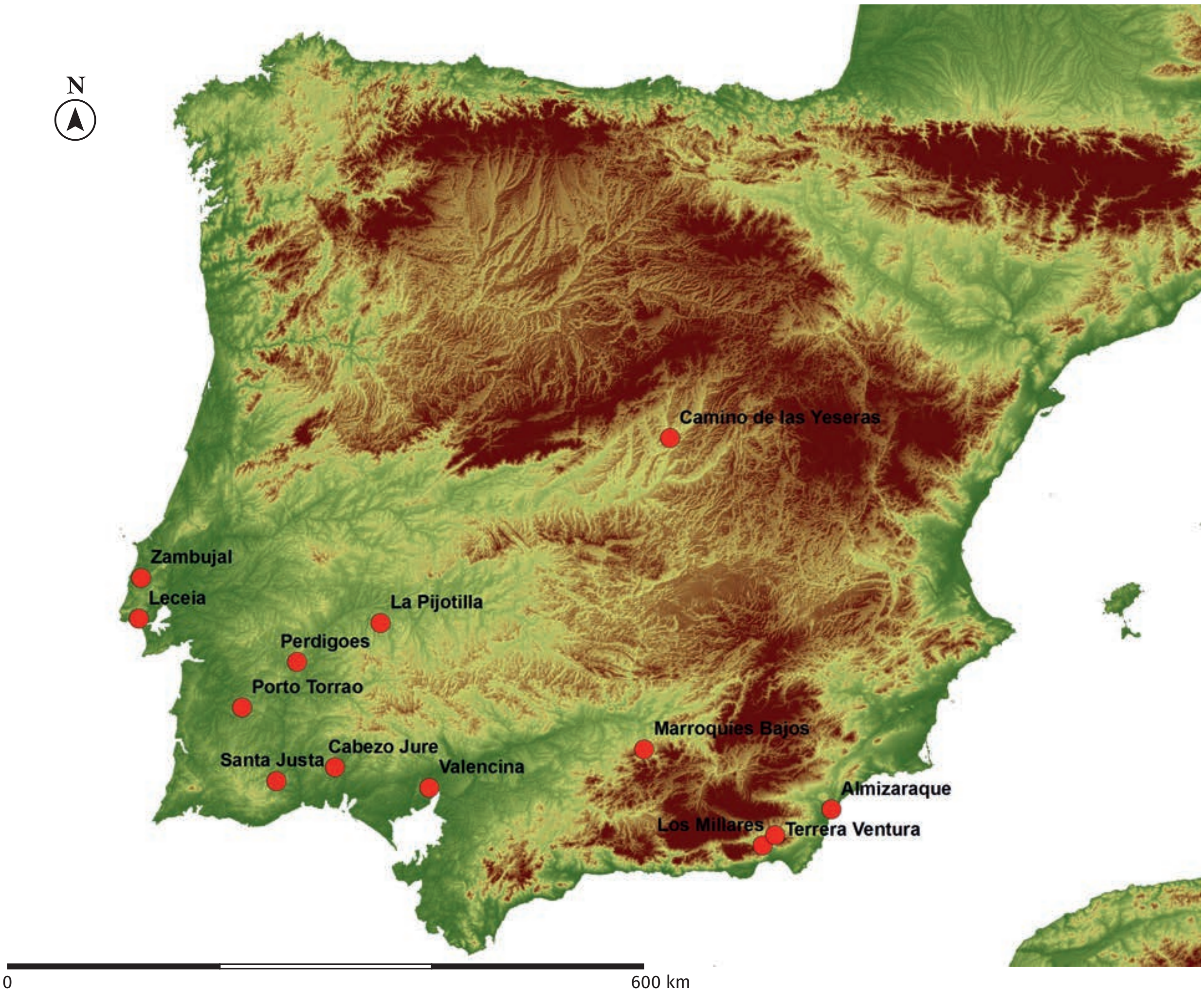

Fig. 1. Location of Valencina and other major Copper Age sites in southern Iberia (design: Manuel E. Costa Caramé).

funerary ideology and/or ancestor cult. The concept ›non-burial‹ is generic and synonymous with an ›absence of a formal deposition of human remains‹ and it does not imply any particular functional interpretation (residential, domestic, votive, etc.) of the structure.

From a morphological or architectural perspective, both burial and non-burial structures have been divided into three groups: megalithic structures, negative structures with stone elements and negative structures without stone elements. The burial structures include:

- Megalithic structures (of which five are counted) are defined as those that present medium-sized (approximate maximum length of up to 1.5) slabs (made from slate for the most part)[3] forming the boundaries of some of the spaces that make up the structure (normally the chamber and the corridor), with an evident aesthetic and visual importance, although normally lacking a clear supporting function.
- Negative burial structures with stone elements (a total of 20) are those constructed by cutting into the ground a cavity of varying shape and size, which occasionally contains one or more isolated stone elements (normally inside the chamber or at the beginning of the corridor). These are not structures where stone has an obvious importance as building material and cannot be described as *megaliths*.
- Negative burial structures without stone elements (a total of 35) are those that entail only a cavity of varying shape and size cut into the ground.

3 At the PP4-Montelirio sector none of the megalithic structures were constructed with orthostatic blocks. It is also worthwhile noting that at Valencina slate slabs are almost invariably associated with mortuary deposits.

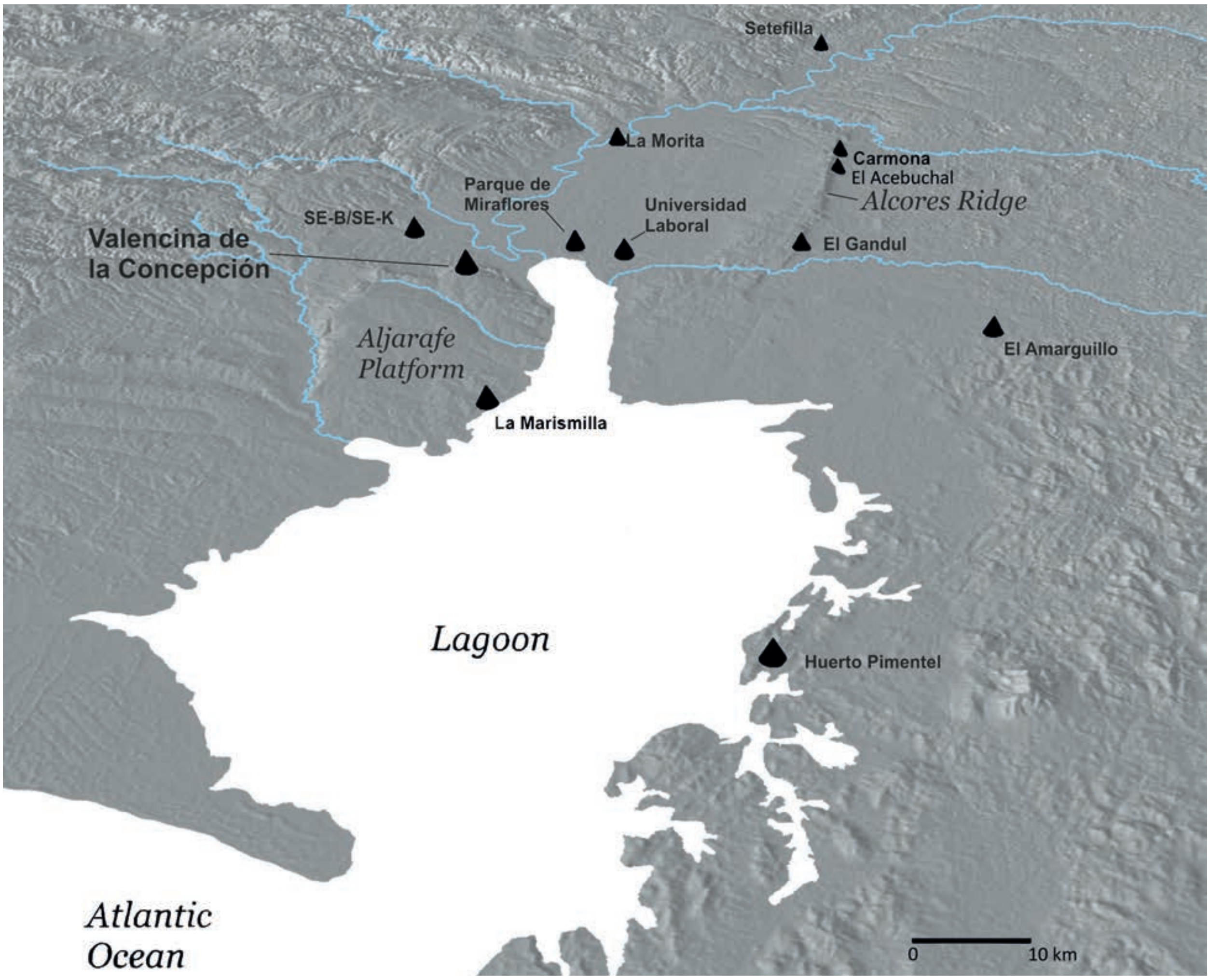

Fig. 2. Location of Valencina and other excavated 3rd and 2nd millennium BCE sites in the lower Guadalquivir valley (design: David W. Wheatley).

Overall, the 134 structures at PP4-Montelirio yielded several hundred objects (plus faunal remains), as well as a great amount of human remains, which take up about 100 crates held in the Archaeological Museum of Seville (approximately half of them contains human remains while the other half contains material culture). The systematic study of this set of evidence undertaken since January 2011 has resulted in a number of publications to date. These address several issues concerning various aspects of the material culture (ROGERIO-CANDELERA et al. 2013; GARCÍA SANJUÁN et al. 2013a; LUCIAÑEZ TRIVIÑO et al. 2014; MURILLO-BARROSO et al. 2015; MORGADO RODRÍGUEZ et al. 2016), faunal (LIESAU VON LETTOW VORBECK et al. 2014), and human remains (DÍAZ-ZORITA BONILLA 2013; 2017; ROBLES CARRASCO/DÍAZ-ZORITA BONILLA 2013; ROBLES CARRASCO et al. 2017) as well as radiocarbon chronology (GARCÍA SANJUÁN et al. 2018). The anthropological laboratory study, which has already covered approximately half of the burial structures at the time of finishing this manuscript (September 2017), will allow us to confidently test the preliminary population estimate made by the excavator (minimum number of individuals = 150).

Given the vast amount of information to be processed, the study of the PP4-Montelirio excavation will surely continue for several more years. In order to provide some insight into the volume of information involved in this study, it will suffice to say that aside from the strictly megalithic constructions that are comparatively lower in number, the PP4-Montelirio sector presents an amount of structures and material remains not unlike that of the Los Millares necropolis, which includes over 80 graves, the majority of which are of the *tholos* type.

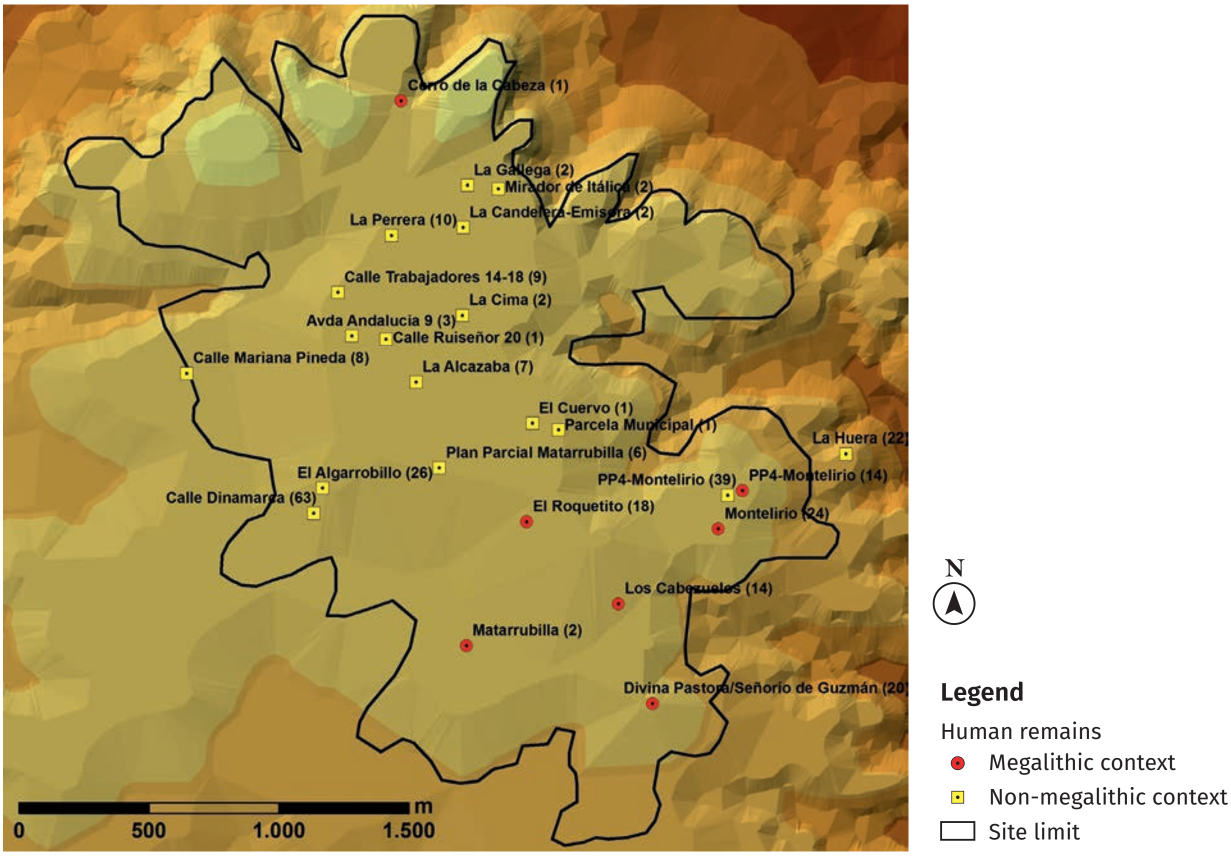

Fig. 3. Distribution of burial deposits with known MNI at Valencina (design: L. García Sanjuán/Manuel E. Costa Caramé).

Fig. 4. Air photograph of the PP4-Montelirio sector from the North. Structure 10.042-10.049 is in the foreground while the Montelirio tholos is at the background (photo: José Peinado Cucarella).

Fig. 5. Plan of Copper Age structures at the PP4-Montelirio sector: Structures with human remains in red, without human remains in yellow (design: Coronada Mora Molina).

STRUCTURE 10.042 – 10.049

To date, a great deal of research has been focused on Structure 10.042–10.049, which is megalithic in form and funerary in nature. The spatial location of this structure suggests its importance as it is situated in a ›central‹ position in relation to the rest of the structures which surround it, albeit with an empty ›transition‹ space in between (Fig. 5). Furthermore, this tomb stands out for both its architectural importance (it is the largest and most architecturally complex structure in the sector), as well as for the intrinsic characteristics of the great number of artefacts deposited therein. According to the excavator, José Peinado Cucarella, it is a ›double‹ monument that presents two corridor and chamber structures (named 10.042 and 10.049 respectively) that are connected to each other (Fig. 6 and 7). The area where the two structures joined was almost entirely destroyed at the time the excavation was carried out. No evidence of a tumulus was found, although the empty space that surrounds this monument and separates it from the structures that encircle it seems to suggest that it could have been formally delimited by some means.

Structure 10.042–10.049 also holds interest given its proximity to the Montelirio tholos, excavated between

Fig. 6. Air photograph of Structure 10.042-10.049 (photo: José Peinado Cucarella).

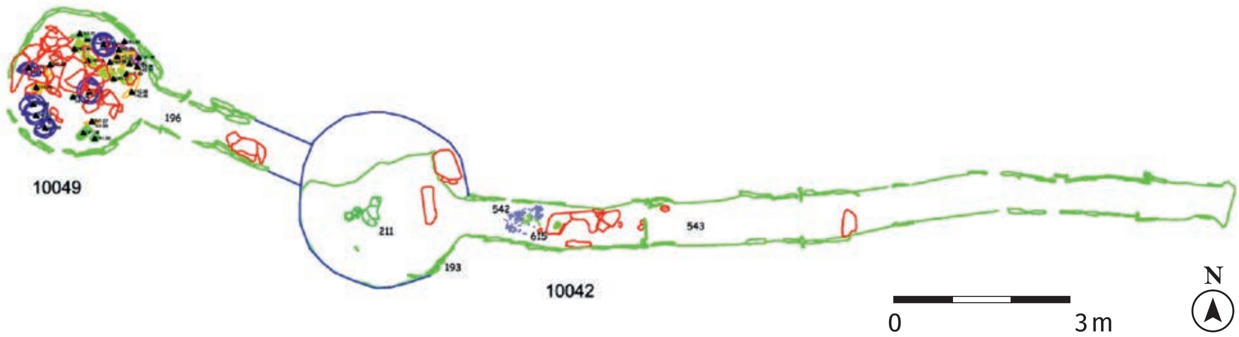

Fig. 7. Plan of Structure 10.042-10.049 (design: José Peinado Cucarella).

Fig. 8. Structure 10.042 (photo: José Peinado Cucarella).

2007 and 2010, and for which a major monograph has been recently published (Fernández Flores et al., 2016). Together with the Montelirio *tholos*, the PP4-Montelirio sector represents the largest area of formal burial ever excavated at Valencina.

STRUCTURE 10.042

Structure 10.042 presents an access corridor measuring 13 metres long and a maximum of 0.7 metres wide, delimited on both sides by 57 carefully worked slate slabs (29 on the north side and 28 on the south side) and a circular chamber, also delimited by slate slabs and with an estimated diameter of 2.57 metres, which was almost completely destroyed by activities that may have a chronology dating back to Antiquity or the Middle Ages (Fig. 8).

Human remains

An assemblage of disarticulated mixed human bone remains was found in the corridor and in the chamber. According to the excavator, the scattering of these human bones would be explained by Ancient and/or Medieval activity, which was also reflected in material culture elements such as wheel-thrown ceramics and fragments of iron objects[4]. These remains presented a heterogeneous state of preservation, with very fragmented bones –some unidentified– alongside complete ones, such as three tali bones (two of them right and one left) in addition to some carpal bones and vertebrae, some of which presented stains of red pigment, especially those belonging to UE 615. Their study suggested a minimum number of individuals (MNI) of four based on four permanent teeth (11, 23 and 33), including two female, one male and one unsexed individual, with an estimated age between 17 and 45 years (Robles Carrasco/Díaz-Zorita Bonilla 2013, 379).

These individuals present oral pathologies such as hypoplasia and periodontal diseases, calculus and severely worn teeth as well, all possibly related to inadequate oral hygiene, the type of diet and stress. An interesting descriptive feature observed on certain teeth is a horizontal groove on the enamel of the crown in the medial region (on a 13 and a 34 tooth), similar to two grooves or horizontal indents in the distal and mesial regions, at the same height, on a 33 and an orifice at the height of the cingulum, on this same tooth. These artificial interproximal grooves, free of tooth decay, could have been caused by different factors, such as oral hygiene care using a sharp object, carrying out some type of continued activity or the use of some tool capable of eroding the enamel (Robles Carrasco/Díaz-Zorita Bonilla 2013, 380).

In addition to oral pathologies, a possible case of osteoarthritis was identified on two proximal epiphysis of right ulnae, presenting a wearing away of the radial notch, perhaps due to a degenerative process of the elbow owing to a continued activity. A musculoskeletal stress marker is also confirmed on a right clavicle, presented by a small bone regeneration. The fact that these indicators are found on right ulnae and a right clavicle, just as the opening of the septal cavity in the right humerus, could indicate a pattern of physical activity that led to the repeated use of the right arm, suggesting that this side was dominant over the left. However, given the fragmentation of these remains and the size of the sample, this diagnosis has been considered as pending confirmation. Finally, we also observed a vastus notch on a right patella in addition to a squatting facet on the distal epiphysis of a right tibia, a marker related to a continued activity and attributable to the habit of remaining in a squatting position for a long time (Robles Carrasco/Díaz-Zorita Bonilla 2013, 379).

Therefore, overall the available evidence shows that three adults and one young adult were buried in Structure 10.042. They presented several clear indications of intense physical activity in the upper and (perhaps) the lower extremities as well as poor oral health (with severe dental erosion, calculus and periodontal diseases) and hypoplasia of the enamel that – as is well known – is related to periods of stress or inadequate nutrition during childhood[5].

Samples taken from these human remains yielded radiocarbon determinations to between the 30th and 27th centuries cal BCE (Tab. 1). This is an early period of activity at Valencina, albeit well after the earliest burials activity, which have been dated to the 32nd century cal BCE (García Sanjuán et al. 2018).

4 Activity dated to the Iron Age and Antiquity was also recorded at the neighbouring Montelirio tholos (Fernández Flores/García Sanjuán 2016, 127–133).

5 It can also be associated with generalised stress, metabolic stress, genetic factors, ingestion of toxic products, infections, traumas and childhood diseases.

Tab. 1. Radiocarbon dates obtained for Structure 10.042-10.049.

STRUCTURE	SAMPLE	LAB. REF.	DATE BP	CALIBRATED DATE 2σ	COMMENTS
10.042	Human bone (Left ulna of young adult of undetermined sex)	CNA-1303	4277 ± 31	3007–2780 cal BCE	Valid
10.042	Human bone (Left ulna of adult of undetermined sex)	CNA-1291	4161 ± 34	2880–2630 cal BCE	Valid
10.049. Lower Level (UE 664-1)	Ivory vessel	Erl-17297	2299 ± 68	540–178 cal BCE	Disregarded
10.049. Upper Level (UE 535)	Ivory dagger sheath	Erl-17298	2439 ± 58	759–403 cal BCE	Disregarded
10.049. Upper Level (UE 535)	Dagger hilt	Erl-17299	3905 ± 74	2575–2197 cal BCE	Disregarded
10.049. Upper Level (UE 535)	Decorated tusk	Erl-17300	1930 ± 57	43–221 cal AD	Disregarded
10.049. Lower Level (UE 664-1)	Unworked tusk	Erl-17588	2180 ± 55	384–92 cal BC	Disregarded

Fig. 9. Perforated beads impregnated with cinnabar pigment in the corridor of Structure 10.042 (photo: José Peinado Cucarella).

Finds: Corridor

Regarding the grave goods of Structure 10.042 (Tab. 2), in the access corridor (stratigraphic units 542 and 615) eighteen fragments of pottery (some wheel-thrown) were found, in addition to six apparently unworked stones (they have not yet been systematically studied) and, what is most noteworthy, over 2000 perforated discoid beads (amounting to a total weight of 454 g). These beads, which fluctuate between a maximum diameter of approximately 5.4 and 3.8 mm, appeared mixed with human bones and were impregnated with an intense red pigment (Fig. 9). Neither the photographs nor the notes taken during the excavation make it possible to determine whether they were strung together forming part of one or more necklaces, as they are presented in Fig. 10, or whether they formed some type of complex textile, such as the personal garments identified at the neighbouring Montelirio *tholos* (Díaz-Guardamino et al. 2016).

The intense red substance present in the corridor of Structure 10.042 (and in the lower level of the chamber 10.049 as we will immediately see), was identified as cinnabar (Rogerio-Candelera et al. 2013). This cinnabar would have probably come from the region of Almadén (province of Ciudad Real) in central Spain, as has been suggested for the thick coating of intense red colour and plastic texture that covered the slabs of the Large Chamber at the neighbouring *tholos* of Montelirio (Hunt Ortiz/Hurtado Pérez 2010; Bueno Ramírez et al. 2016). The study of pigment samples from Structure 10.042–10.049 revealed that the particles of this cinnabar are nanometre-sized, thus implying that they were carefully ground. In addition, the pigment was deliberately mixed with iron oxides, most likely with the aim of »cutting« it to thus increase the availability of this costly raw material (Rogerio-Candelera et al. 2013, 286).

The use of this substance as part of the burial ritual carried out in the corridor of Structure 10.042 (and in the chamber of Structure 10.049) may have had both a practical as well as a symbolic meaning. In this respect, in the study of the grave of La Velilla (province of Palencia, north of Spain) it was noted that cinnabar was possibly used for the preservation of cadavers, a characteristic that would have been determined owing to the mercury compounds that form cinnabar (Martín-Gil et al. 2005). However, the presence of iron oxides mixed with the cinnabar in several finds would suggest that the preservative properties of this

Tab. 2. Full inventory of finds in Structure 10.042 (source: after Mora Molina 2011).

STRATIGRAPHIC UNIT NUMBER	STRATIGRAPHIC UNIT DESCRIPTION	DESCRIPTION OF FINDS
UE 543	*Access corridor*	*NO ATTACHED FINDS*
UE 615	*Access corridor: human remains*	• *4 perforated beads* • *1 small fragment of apparently unworked stone*
UE 542	*Access corridor: grave goods associated to individuals inhumed.*	• *18 fragments of pottery (some wheel-thrown)* • *More than 2,000 perforated beads.* • *5 small-size apparently unworked stones*
UE 193	*Chamber*	*NO ATTACHED FINDS*
UE 640	*Chamber: human remains*	• *More than 200 fragments of pottery (some wheel-thrown)* • *3 arrow heads* • *7 pieces of knapped flint* • *2 small-size apparently unworked stones* • *3 fragments of ivory objects* • *Various fragments of deer antler* • *3 perforated beads* • *5 fragments of iron objects (intrusive)*
UE 211/648	*Chamber: grave goods associated to individuals inhumed*	• *2 or 3 anthropomorphic figurines (head, body and legs)* • *More than 1,100 fragments of pottery (some wheel-thrown)* • *8 stone arrow heads and 1 fragment* • *6 pieces of knapped flint* • *12 small-size apparently unworked stones* • *1 rare stone* • *4 fragments of ivory needle* • *2 fragmented decorated ivory objects* • *1 marine malacofauna shell* • *1 fragment of marine malacofauna shell* • *21 perforated beads*
UE 683	*Chamber: Possible floor*	*NO ATTACHED FINDS*

Fig. 10. Perforated beads of Structure 10.042 (photo: Miguel Ángel Blanco de la Rubia).

mineral would have been of secondary interest, in the event that Chalcolithic users were aware of them (Rogerio-Candelera et al. 2013, 289). Based on ethnographic similarities, other studies have underlined the possible symbolism of cinnabar (as well as other red pigments) as »blood« (Bradley 1998, 24; Tilley 1996, 63), an idea suggested for the Iberian Neolithic as well (Rubio de Miguel 1989, 28). Other authors have highlighted the probable polysemic nature of these substances (Jones/McGregor 2002, 8). In Iberia it has also been noted that during the Chalcolithic the association of cinnabar with exotic raw materials such as ivory and gold in some graves (Blasco Bosqued/Ríos Mendoza 2010), could have constituted an ›assemblage‹ of exotic raw materials linked to the exhibition of prestige by the elite[6]. The use of cinnabar pigments in the Iberian Chalcolithic seems to have been rather intensive in some cases. Studies conducted on samples of human bone from the Portuguese site of Perdigões and from the Montelirio tholos at Valencina have demonstrated that some of the individuals deposited in those graves presented highly toxic levels of mercury which would have seriously impaired their health. This has been linked to a repeated use of cinnabar for body paint or tattoos or even for consumption through inhalation or ingestion (Emslie et al. 2015, 5; 2016).

Finds: Chamber

Inside the chamber (stratigraphic units 211, 640 and 648), an important series of artefacts was identified. The available excavation records do not allow us to determine the spatial location of the objects. However, given that this chamber was found almost completely destroyed and its Chalcolithic deposits heavily disrupted, and even mixed with objects of historical chronology, it is likely that the spatial distribution of such objects would not have been very significant. They will thus be generically described by category.

About 1,300 **ceramic** fragments were found, of which a small amount (about 25) are wheel-thrown fragments that correspond to activity from the aforementioned historical periods. Given that this assemblage of ceramic objects has not yet been the subject of a systematic study, at present it is not possible to make a full techno-morphological characterisation of it. However, assessment of the preserved fragments suggests that the original grave goods from the chamber would have included several plates such as those found in good condition in the chamber of Structure 10.049 (see below).

Twenty-four **knapped lithic artefacts** were also identified, including eleven arrowheads (plus one fragment) and thirteen tools. Regarding the arrowheads, despite the fact that all of them are broken it is possible to verify that nine of them (and the fragment), are very unique on account of their morphology, characterised by their fine, slender main body, finished off with a long tip and extremely long barbs at the base. This type of arrowhead, reaching lengths of up to 9 cm, has been found in large quantities (173 units) at the neighbouring Montelirio tholos. Their remarkable delicateness and fragility clearly sets them as aesthetic-artistic artefacts rather than utilitarian objects (García Sanjuán et al. 2016). The fact that this very unique type of arrowhead has not been found at any other sector in

6 The reddish pigmentation could have been a marker of gender in some cases: in some graves from the Argaric Bronze Age it appears unevenly in the graves of men and women, or it appears on different parts of the body according to sex (López Padilla et al. 2012, 287, figure 3 and 288).

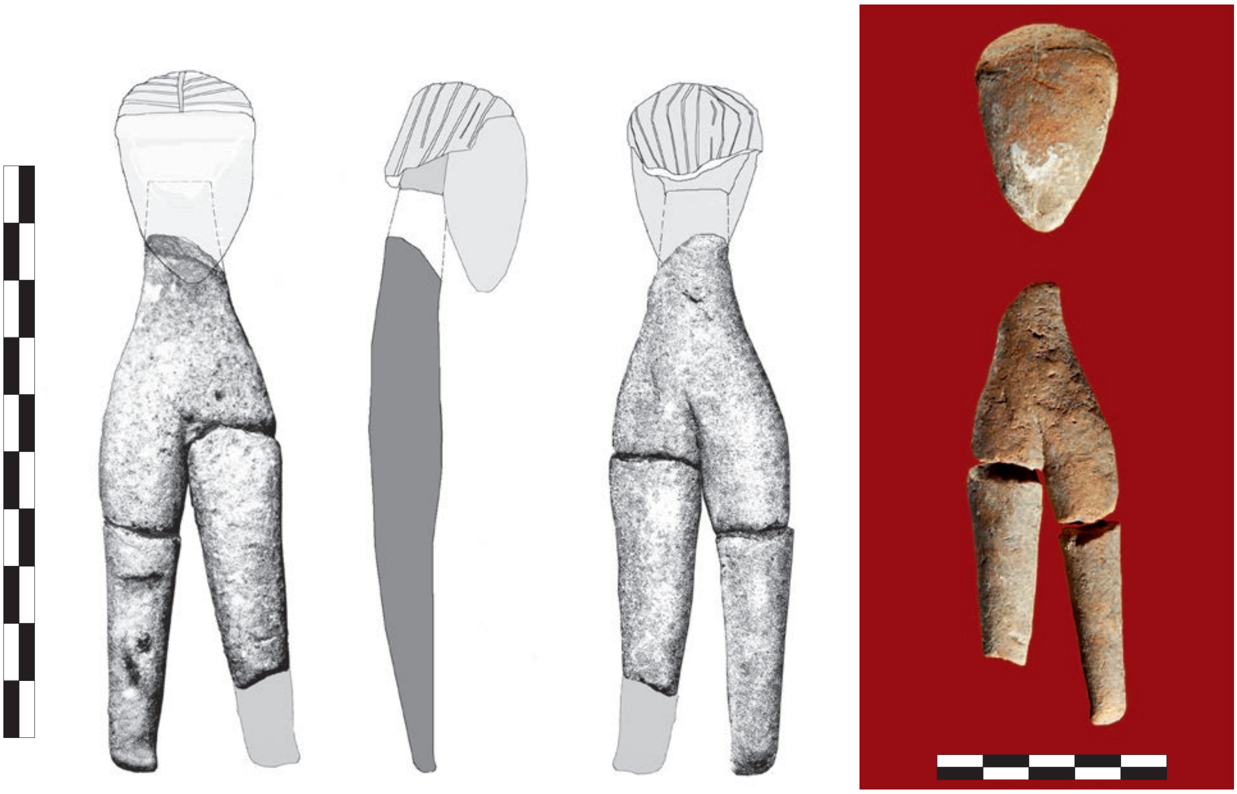

Fig. 11. Anthropomorphic figurine found in the chamber of Structure 10.042 (photo: Miguel Ángel Blanco de la Rubia; drawing: Víctor Hurtado Pérez).

Valencina[7] suggests that their presence in the chamber of Structure 10.042 indicate some kind of chronological, social and/or cultural relationship between this grave and the Montelirio *tholos*, a possibility that is further discussed later on. Regarding the other two arrowheads, one (made from white limestone) is much rougher, while the other (made from flint) has a triangular shape and a flat base.

Apart from the arrowheads, thirteen knapped lithic tools were identified in the chamber of Structure 10.042, including 6 blades, two pieces of debris from non-cortical cores (one uncertain), one fragment of a flake or debris, one internal flake also with simple retouching and 3 semicortical flakes.

Several fragments of **ivory** were also found in this chamber. After the conservation treatment carried out by one of the authors (M. Luciañez Triviño) it was possible to identify a rectangular box with diamond-like decoration in low relief and an indeterminate object with perforations. A total of 24 perforated discoid beads made from calcite and shell were also identified.

The material culture from this chamber also includes the remains of a hand-made ceramic **anthropomorphic figurine**, with smoothened surfaces and a reddish-orange colour. According to the already-published description of this item (Hurtado Pérez 2013, 314–315), despite its fragmentation it is possible to recognise a head, as well as the trunk and the legs, which would correspond to one schematic human figure (Fig. 11). The head displays a totally smooth face, without any facial features (it is possible that these features were originally painted on, although no evidence of this has been preserved). The hair, with incisions to indicate the lines of the hairstyle, stands out from the forehead as if it were independent, sticking out towards the back but without making contact with it. The torso shows a very narrow waistline that widens in the hips; the legs take the shape of a cylinder that thins out towards the feet, barely noticeable. In its morphology, this figurines is unlike any other of the 36 plastic representations or ›idols‹ that have been identified to date at Valencina, mainly on its northern sector: a comparatively small series in which

7 Similar arrowheads, although with shorter barbs, were found in Ontiveros, a megalithic monument located some 700 m west of Montelirio (Carriazo y Arroquia 1962, 220–221).

Fig. 12. Fragments of deer antler found in the chamber of Structure 10.042 (source: modified from Liesau Von Lettow Vorbeck *et al., 2014, fig. 4).*

anthropomorphic figurines are very scarce (there are only three more apart from the one described here).

Interesting **faunal remains** were also found in the chamber of Structure 10.042. In terms of terrestrial fauna, seventeen fragments of deer antler (*Cervus elaphus*) were identified; it was not possible to determine whether they correspond to one single antler or more, nor whether they correspond to – as it seems – the shedding of the antler or pieces attached to the cranium (liesau von lettow vorbeck et al. 2014, 83–84). At least two of these fragments present marks from carving or manipulation, so they could have perhaps formed part of the handle of a tool (Fig. 12). In addition, two remains of rabbit (*Oryctolagus cuniculus*) and sheep were found, probably intrusive in both cases, although at the moment there are no radiocarbon dates to corroborate this.

Furthermore, two very interesting specimens of marine mollusc were found: one triton shell (*Charonia lampas*) and one scallop valve (*Pecten sp.*). The rather well-preserved triton shell, measuring about 7 cm long, is a unique find in Valencina. Scallop valves were used as grave goods in thirteen other structures at PP4-Montelirio, with a total of seventeen specimens (liesau von lettow vorbeck et al. 2014, 82 table 7), which suggests they were important objects. Scallop shells have been recorded in other Copper Age and Early Bronze Age locations across the lower Guadalquivir valley. All things considered, the presence of these two shells of *Charonia lampas* and *Pecten sp.*, evidently selected on account of their special physical, aesthetic and possibly symbolic properties, seems to suggest that the sea played an important role in the life of the communities that occupied and/or frequented the site of Valencina and, accordingly, in their world view (and, indirectly, in the funerary ideology). The geological study of the neighbouring *tholoi* of La Pastora and Montelirio revealed, precisely owing to the presence of various species of marine *Lithophaga* molluscs, that some capstones were quarried from the neighbouring coastline and specifically from an inter-tidal area (cáceres puro et al. 2013; 2014; borja barrera/borja barrera 2016). This implies a very specific choice for the supply of this construction material, again pointing to the sea as an important ideological element. However, the only available results of carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) stable isotopes in bone collagen for Valencina suggest a diet based mainly on C3 land resources, rich in proteins and low in marine components, with proteins being mainly obtained from C3 consumer herbivores (fontanals-coll et al. 2015, 7).

No copper **metal** was identified in this chamber, but in the UE 640 five fragments of iron plates (with a maximum diameter of 3 cm) were discovered which can be linked to the alterations caused in the chamber of this grave during historical periods.

Altogether, the material culture assemblage of Chalcolithic chronology from Structure 10.042 amounts to an estimated 33 objects, including 24 knapped lithic artefacts (eleven arrowheads and thirteen knapped tools), two ivory objects (estimation), one ceramic human figurine, the remains of a deer antler (or perhaps more than one) and two marine mollusc shells (triton and scallop), in addition to several hundred ceramic fragments and over 2000 perforated beads. Given the extensive damage to the chamber of this structure, this count must seriously underestimate what may have been the grave goods originally deposited in it.

Structure 10.049

Structure 10.049 presents a much shorter access corridor, measuring 2.52 metres long and a maximum of 0.51 metres wide, delimited by fifteen slate slabs (seven on the north side and eight on the south side), which leads to a second chamber (with a diameter of 2.1 metres and delimited by seventeen slate slabs) that was found in much better condition. The excavation of this chamber allowed for the identification of two discrete stratigraphic deposits separated by a set of horizontally arranged slabs that could be interpreted as a type of ›seal‹ between them.

Chamber: Lower level

The lower level of the chamber contained the articulated skeleton of one single individual, located in the north-east quadrant of the chamber right up against its delimitation slabs, lying in right lateral decubitus position with its head pointing towards the corridor, i.e. aligned with the monument's axis of symmetry[8] (Figures 13 and 14).

The anthropological study revealed that the subject was between the ages of 17 and 25 and probably male, although due to the skeleton's high degree of fragmentation the sex was assessed using qualitative indicators, meaning that it must be taken cautiously (Robles Carrasco/Díaz-Zorita Bonilla 2013, 377). The poor condition of the bones rather limited the study of the morphological characteristics and the pathologies present in this subject. In any case, it could be confirmed that the individual presented mild or moderate dental calculus on practically all of its dental pieces which can be associated with the periodontal alteration verified on the maxillary and mandibular alveolar bones. This alteration suggests that this individual may have suffered from periodontitis or pyorrhea, an infection not only of the alveolar bone but also of the soft tissue in the mouth; this would have triggered recession of the bone tissue and regeneration on the edge of the alveolar bone, probably causing a hyperostosis (Robles Carrasco/Díaz-Zorita Bonilla 2013, 377–378) (Fig. 15). Additionally, at least three maxillary teeth (13, 24 and 25) presented clear signs of hypoplasia of the tooth enamel. It was estimated that these episodes of hypoplasia on each of the teeth mentioned occurred when the subject was between the ages of three and five years old, approximately (Robles Carrasco/Díaz-Zorita Bonilla 2013, 378). Moreover, osteophytes were observed on at least two of the subject's vertebrae, thus suggesting the presence of osteoarthritis.

The anthropological characterisation of this individual revealed the presence of an interesting epigenetic feature such as the foramen on the distal side of the crown at tooth element 46 (Fig. 16).

The analysis of stable isotopes $^{87}Sr/^{86}Sr$ (Díaz-Zorita Bonilla 2017, 89–90), suggests that this person was local (came from Valencina itself or from the surrounding area). This is especially interesting since, in that study, out of a total of 33 Valencina individuals that were analysed, eleven proved to be non-local (namely a third of those sampled, which appears to be a rather high proportion). It is worth adding that speaking in terms of diet, the results of carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) stable isotopes in bone collagen put this individual in line with what was confirmed for the sample set studied from Valencina, in the sense that proteins were mainly obtained from C3 consumer herbivores (Díaz-Zorita Bonilla 2017, 84). This also fits in quite well with the importance of livestock among these communities (García Sanjuán 2017) and coincides with the results from the already mentioned isotopic study of the Montelirio *tholos* (Fontanals-Coll et al. 2015).

The anthropological and demographic data are – in general terms – equally consistent with the mtDNA study, which has revealed this individual's classification into matrilineal haplogroup HV, the most characteristic of all of Europe, and into sub-clade H1, the

8 The exact astronomical orientation of Structure 10.042–10.049 was not recorded during the excavation process, although it is eastern-facing, almost certainly towards sunrise.

Fig. 13. Lower level of the chamber of Structure 10.049 (photo: José Peinado Cucarella).

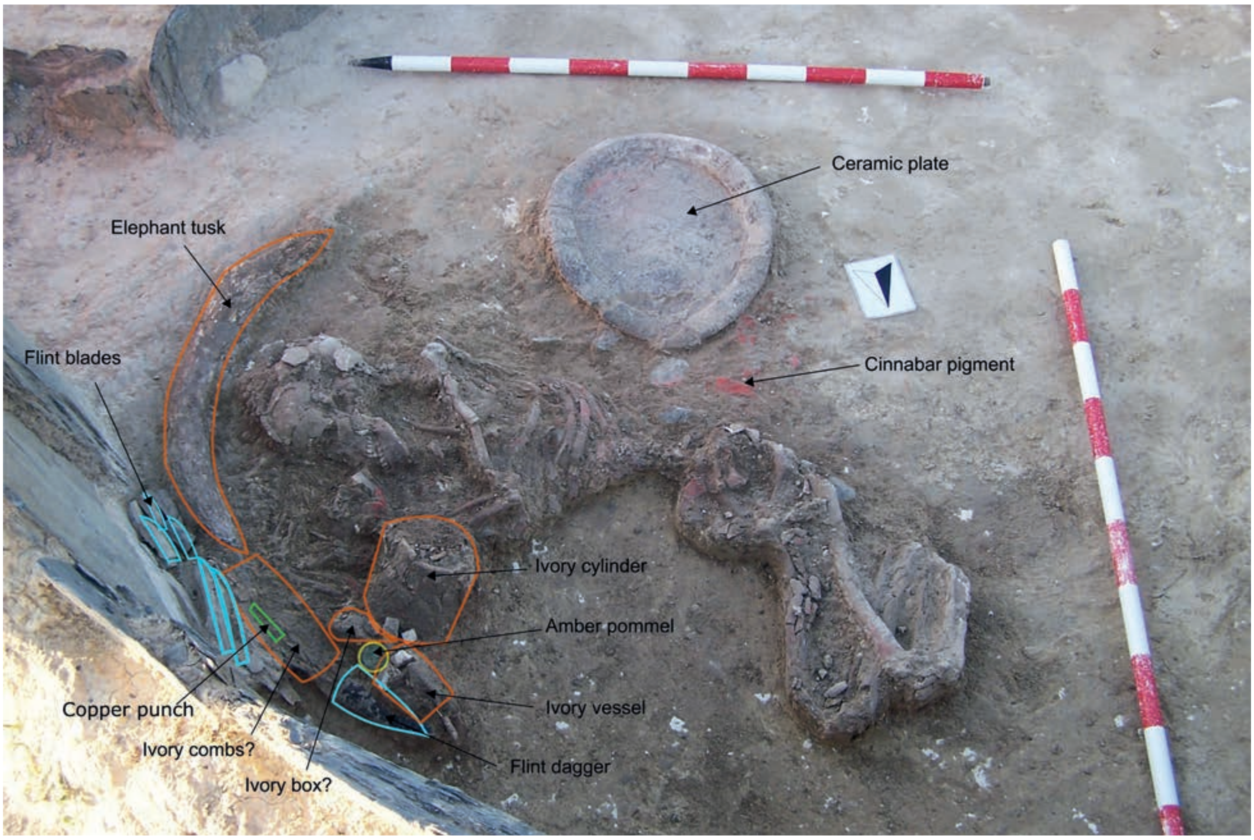

Fig. 14. Human remains and grave goods of inhumed adult male individual found at the lower level of the chamber of Structure 10.049 (photo: José Peinado Cucarella; drawing: Miriam Luciañez Triviño).

Fig. 15. Human remains of inhumed adult male individual found at the lower level of the chamber of Structure 10.049 showing evidence of periodontal disease in maxilar bone (above) and mandible (below) – details of maxila on the right (source: Robles Carrasco/Díaz-Zorita Bonilla 2013, 378).

most important and widely extended at the present time in Europe, North Africa and Western Asia (Palomo Díaz/Arroyo Pardo 2015).

Numerous artefacts were found around this individual. They are described below in a clockwise order, starting at his head (Table 3 and Fig. 14). An undecorated elephant tusk was placed above the individual's head, with the concave side facing towards the buried individual's head, as if framing or delimiting the body against the threshold between the chamber and the corridor. This tusk, which was broken into three pieces of similar size and weight measures approximately 59–60 cm and weighs 1,170.5 g (Fig. 17) and represents a unique piece in the whole of the Iberian Chalcolithic[9]. This tusk has been attributed to an African elephant (*Loxodonta a. africana*) (García Sanjuán et al. 2013b, 622). Although serrated pieces (segments) of elephant tusks have been discovered in the great megalithic tombs of Montelirio and Matarrubilla – also at Valencina – this piece is the only complete or semi-complete specimen ever found (García Sanjuán et al. 2013b, 614).

Near the individual's back, waist-high, there was a ceramic plate of the variety known as the ›almond-shaped rim‹, very characteristic of Copper Age pottery in the lower Guadalquivir valley, and specifically at Valencina. Both on and around it, this ceramic plate presented various intense red stains which were also characterised as cinnabar pigment (Rogerio-Candelera et al. 2013).

9 As it is known, weight estimates for prehistoric ivory or bone must take into account the loss of bone density caused by taphonomic factors, which may account for up to 30 % reduction of original weight (Simpson 2011).

Fig. 16. Human tooth of inhumed adult male individual found at the lower level of the chamber of Structure 10.049, showing epigenetic trait in right-side mandibular M2 (source: Robles Carrasco/Díaz-Zorita Bonilla 2013, 378).

Tab. 3. Full inventory of finds in Structure 10.049 (source: after Mora Molina 2011).

LEVEL	STRATIGRAPHIC UNIT NUMBER	STRATIGRAPHIC UNIT DESCRIPTION	DESCRIPTION OF FINDS
	UE 196	*Structure of corridor and chamber and slate slabs on UE 535*	• *3 fragments of at least three ceramic vessels*
UPPER LEVEL	*UE 535*	*Grave goods in upper level of the chamber*	• *5 ›almond rim‹ ceramic plates, four of them complete, and one half, one of them covered with red pigment* • *38 flint blades and 13 flint tools* • *1 limestone arrowhead* • *1 rock crystal dagger blade* • *1 ivory handle of the rock crystal dagger blade* • *1 ivory palette of the rock crystal dagger sheath* • *1 decorated ivory tusk (possibly a drinking horn or cornucopia)* • *1 rectangular ivory item with rounded edges and decoration* • *1 needle* • *34 fragments of ivory, some of them with red pigment, possibly belonging to a single bracelet* • *Various fragments of three decorated ivory objects* • *1 small ivory fragment with zigzag decoration* • *1 ostrich egg shell* • *90 perforated beads*
	UE 660	*or sealing slate slabs*	*NO ATTACHED FINDS*
LOWER LEVEL	*UE 667*	*Human remains of single individual inhumed in the lower level of the chamber*	*NO ATTACHED FINDS*
	UE 664	*Grave goods associated to individual inhumed in the lower level of the chamber (UE 667)*	• *1 complete ceramic plate with red pigment* • *1 flint dagger blade* • *21 flint blades* • *1 undecorated elephant tusk cut in three segments* • *1 cylindrical and hollow undecorated ivory object with red pigments* • *Various fragments of one small ivory object with reticulate decoration* • *Various fragments of one small ivory object with red pigment* • *1 ivory needle (broken in two fragments)* • *1 ivory object (broken in 18 fragments) decorated with linear motifs* • *1 ivory object (broken in 12 fragments) decorated with linear motifs* • *1 unidentifiable ivory object with red pigment* • *1 small copper object (perhaps a punch)* • *12 fragments of iron (intrusive)* • *1 amber pommel (for the handle of the flint dagger blade).*
	UE 686	*Possible floor in chamber*	*NO ATTACHED FINDS*

Fig. 17. Unworked elephant tusk found at the lower level of the chamber of Structure 10.049 (photo: Miguel Ángel Blanco de la Rubia).

Fig. 18. Carved vessel found at the lower level of the chamber of Structure 10.049 (photo: Miguel Ángel Blanco de la Rubia).

Fig. 19. Flint dagger blade found at the lower level of the chamber of Structure 10.049 (photo: Miguel Ángel Blanco de la Rubia).

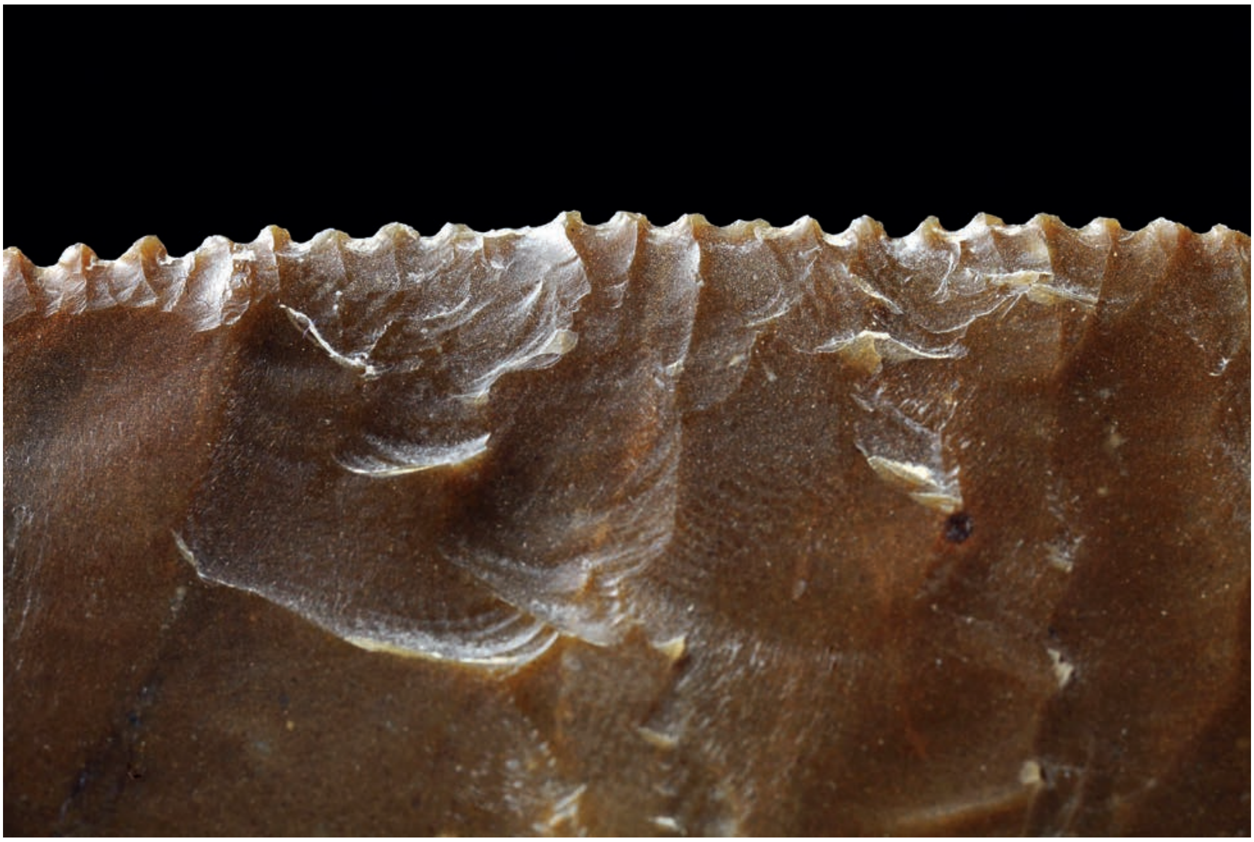

Fig. 20. Detail of the edge of the flint dagger blade found at the lower level of the chamber of Structure 10.049 (photo: Miguel Ángel Blanco de la Rubia).

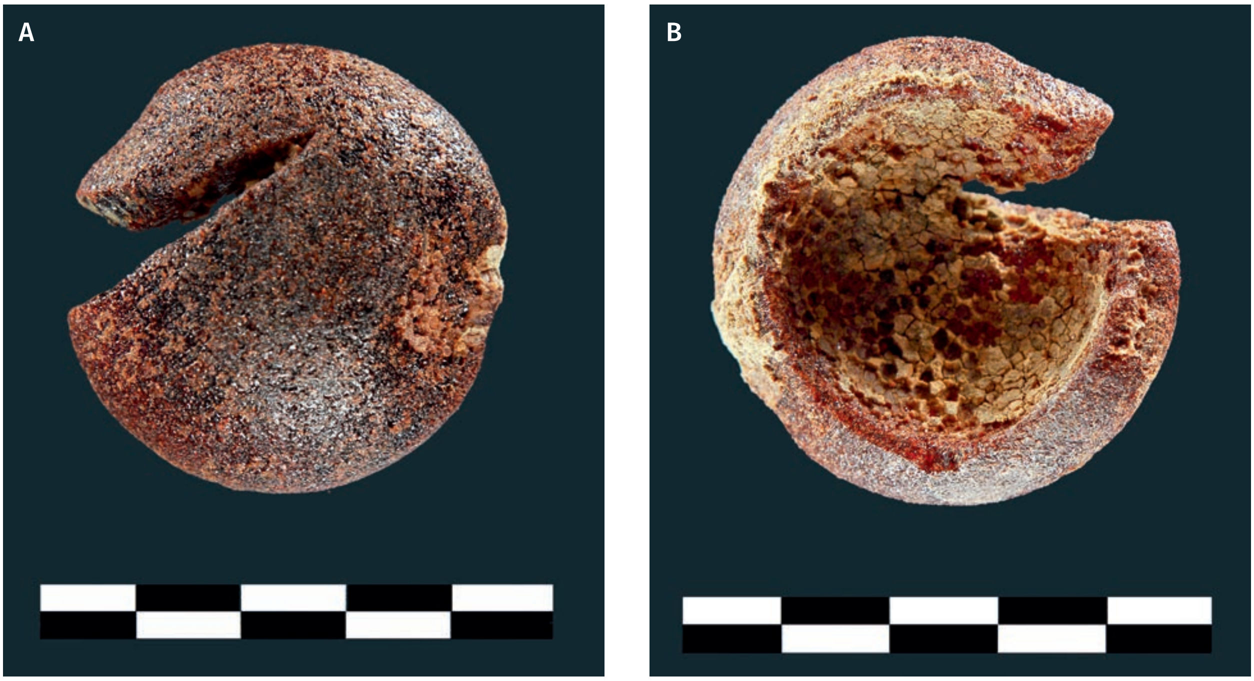

Fig. 21. Amber pommel belonging to the flint dagger blade found at the lower level of the chamber of Structure 10.049: a) obverse; b) reverse (photo: Miguel Ángel Blanco de la Rubia).

Further grave goods were located at chest level, in front of the folded forearms, forming a remarkable and varied assemblage of artefacts made from exotic raw materials that, in some cases, are also exceptional owing to their morphology, design and craft. They include twelve **ivory** objects: two vessel-like containers, two combs, a possible box (or container), a fragment of a cylindrical object with a maximum diameter of 15–20 cm (Fig. 18) and two or three other objects that remain unidentified owing to their high degree of fragmentation. Together with the previously described unworked tusk, these items amount to 1.8 kg[10] of ivory, only second to the Montelirio *tholos* as the largest ivory collection ever recorded in Copper Age Iberia.

In front (to the north) of the cylindrical ivory object, always at the approximate height of the buried individual's chest, a bifacially knapped foliaceous flint **dagger blade** was found. This blade has a length of 15.7 cm, a maximum width of 5.1 cm, a maximum thickness of 0.9 cm, a weight of 86 g and presents two notches on the proximal end, undoubtedly meant to attach the hilt (Figures 19 and 20). The geological study of this piece, which is currently being undertaken[11], has revealed that the raw material does not come from southern Iberia. This is an important breakthrough since, as recent studies have suggested, Andalusia had an important economy of flint exploitation (mainly from the geological formations of the Baetic System) and distribution during the Copper Age, and up until now no cases of flint originating outside Iberia have been identified in Valencina[12].

A piece of amber found just 5 cm from the proximal end of this flint dagger blade has been interpreted as a pommel of the hilt of the dagger, which would have been made of wood and has not been preserved. This amber item has the approximate shape and size of half a plum, with a dark red, translucent colour, an internal diameter of 30.32 mm, an external diameter of 42.57 mm and a maximum height of 17.42 mm (Fig. 21). It is an exceptional find seeing as, to date, the only pieces of amber documented for Iberian Late Prehistory are necklace beads (Murillo-Barroso/Martinón-Torres 2012; Murillo-Barroso/García Sanjuán 2013, 514; Murillo-Barroso 2016). The only prehistoric parallels for this piece are thus extra-peninsular and are found in the British Isles, specifically the two amber pommels of the handles of two daggers discovered at the Early Bronze Age burials of Hammeldon (Devon) and Manton Barrow (Preshute, Wilts) (Murillo-Barroso/García Sanjuán 2013, 514). The analysis of this piece using Fourier Transform Infrared Spectroscopy (FTIR) ruled out a Baltic origin, suggesting instead that the raw material may have originated in Sicily (Murillo-Barroso/García Sanjuán 2013, 516), which is consistent with the characterisation of the large amber collection found in the neighbouring Montelirio *tholos* (Murillo-Barroso 2016). The combination of exotic raw materials in the form of foreign flint and possibly Sicilian amber in the manufacture of this dagger is completely unprecedented in the Iberian Copper Age and naturally suggests that this piece was highly valuable.

About 20 cm to the north of the dagger, right up against the slate slabs that delimit the burial chamber, 21 flint blades were found. These blades, together with the dagger blade, represent a total weight of 417.8 g of flint. Some of these blades present a length of almost 20 cm. These pieces include eight internal blades, one with flat retouch, five with abrupt retouch, one with abrupt retouch and a retouched notch, three with simple retouch, one denticulated piece, one with a retouched notch and one with very marginal simple retouch. These blades were all found together in a bundle, which suggests that they were held together inside a leather or fabric bag or perhaps a container made of organic material which has disappeared. Geological characterisation demonstrates that these blades were made from flint and rhyolite from different locations in southern Iberia including the provinces of Huelva, Málaga and Granada.

Among the ivory objects and flint blades located in front of the buried subject's face, an elongated, sharp **copper** object about 5 cm long was found. Although it is almost unrecognisable, based on the excavation pictures it could have been a punch. It is the only copper object found in Structure 10.042–10.049, and one of six found in the entire PP4-Montelirio sector.

Very thick red stains of plastic texture were detected both on top of the buried subject's skeleton and on top of some of the grave goods, also identified as **cinnabar**.

Overall, 35 objects have been identified at the lower level of Structure 10.049, including a great ceramic plate, an estimated twelve ivory objects (with a total weight

10 It is difficult to determine a reliable figure regarding the number of objects and their original weight given the high degree of fragmentation and the fact that some of them – which are currently being studied – still have soil adhered to them and need to be cleaned.

11 We thank José Antonio Lozano Rodríguez (Institute of Earth Sciences of the Spanish National Research Council, Granada, Spain), for this information.

12 However, near the site of La Orden-El Seminario (located some 80 km to the West of Valencina), a polished hand axe made with Scandinavian flint has recently been published (Morgado Rodríguez et al. 2014). This hand axe is a surface find and no details are available regarding its context.

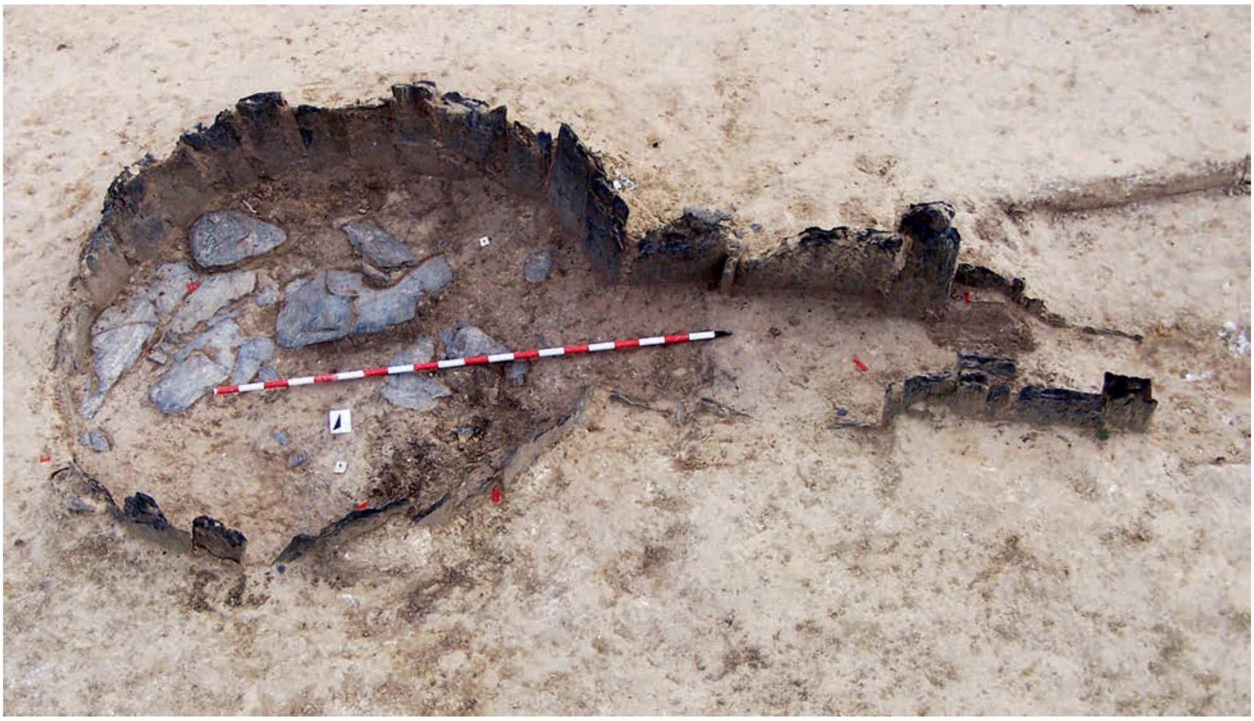

Fig. 22. Seal of slate slabs separating the lower and upper levels of the chamber of Structure 10.049 (photo: José Peinado Cucarella).

Fig. 23. Artefacts deposited in the upper level of the chamber of Structure 10.049 (photo: José Peinado Cucarella).

Fig. 24. Ostrich egg-shell in the upper level of the chamber of Structure 10.049 (photo: José Peinado Cucarella).

between 1.8 kg), 22 flint objects (0.4 kg in total), one small copper object and the amber pommel of the flint dagger. Apart from the sheer number of objects, this assemblage stands out due to the foreign nature of almost all of them, including some likely extra-Iberian ones (ivory, flint dagger blade and amber pommel). It should be noted that this entire assemblage of objects was found surrounding the skeleton of the buried subject in the lower level of the chamber of Structure 10.049, while neither elements of material culture[13] nor human remains were discovered in the rest of the chamber. This suggests that all of the objects truly made up the grave goods of this one person. As will be discussed later on, this has interesting implications for the assessment of this individual's social status and, by extension, the issue of social hierarchisation in Copper Age Iberia.

Chamber: Upper level

There was a second level of artefact deposition between 15 and 20 cm above the lower level of the chamber of Structure 10.049. This upper level seems to have been formally separated from the lower level by means of several slate slabs placed horizontally that, in the words of the excavator, could have acted as a »seal« (Fig. 22). Given the complete absence of human and faunal remains in this upper level, radiocarbon dating was attempted on the ivory objects. However, as was already explained in a previous study (García Sanjuán et al. 2013b, 625), these dates yielded results that are totally inconsistent with the material culture and the context, presumably due to the low levels of collagen. Therefore, in short, the amount of time that elapsed between the deposition of the individual and the grave goods in the lower level and the deposition of the objects in the upper level is unknown. For this reason it is not possible to ascertain whether the numerous and exceptional objects in the upper level were also intended as grave goods for the individual in the lower level, or whether they were a later offering understood in a more general sense. This issue will be revisited in the discussion section of this article.

The finds from the upper level of Structure 10.049 include four complete or almost complete **ceramic** plates with an ›almond-shaped edge‹, and a one half of a fifth plate. Of these plates, three of the complete plates and the half plate were found at the back of the chamber, right next to the wall-lining slabs, between the centre and the south-western quadrant of the chamber, while the fifth plate was discovered right next to the northern edge of the chamber (Fig. 23). These five plates with ›almond-shaped edges‹, identical in shape to the plate which was found in the lower level of this grave, just next to the buried subject's back, stand out due to their size: two of them have diameters of almost 50 cm, while the others' diameters range between 30 and 40 cm.

Surrounding the half ceramic plate as well as between this plate and two other overlapping plates a little further south, 51 **knapped flint** objects with a total weight of 865.4 g were discovered. Among these objects there are 38 blades (21 internal blades, one semicortical blade, five with simple retouch, three denticulated blades, one with simple-abrupt retouch, one with flat retouch and six with abrupt retouch) and thirteen different tools (two notches,

13 The excavator indicates the presence of twelve small iron plaques (all with a maximum diameter of less than 3 cm), which are undoubtedly an intrusive element in this chamber, perhaps associated with the Ancient funerary activity identified at the PP4-Montelirio sector.

two scrapers on blades, eight retouched notches and one notch with simple retouch). A flint-crafted arrowhead was also found, presenting a morphology similar to those found in Structure 10.042 and the 173 arrowheads found at the neighbouring Montelirio tholos, characterised, as has already been mentioned, by their remarkable thinness and long barbs.

An **ostrich eggshell** was discovered to the east of the main assemblage of plates and the collection of lithic objects, approximately in the middle of the chamber. This eggshell has a maximum diameter of 8.5 cm and was found very well preserved in the vertical position. One of its ends is cut, possibly to convert it into a vessel[14] (Fig. 24). This piece is exceptional due to its origins (probably in Africa) and the fact that it is complete[15].

However, perhaps the most remarkable finds from the upper level of Structure 10.049 are the **ivories**. An outstanding carved tusk of Asian elephant (*Elephas maximus*) was found right next to the northern edge of the chamber, approximately 1.3 m from its entrance (Fig. 25). Hollowed on the inside and carefully worked on the outside, this tusk currently presents a length of 30 cm, although from the excavation photographs it is deduced that it originally could have been up to 36–37 cm long. This item has been described in two previous publications dedicated to the ivories from this grave (GARCÍA SANJUÁN et al. 2013b, 615–617; LUCIAÑEZ TRIVIÑO et al. 2014, 80). Given its shape, the spherical top on its distal end and the fact that its entire length is hollowed out, this piece has been interpreted as a possible container for liquids: a vessel or drinking horn (as a kind of cornucopia). Some objects with approximately similar shapes and sizes as this piece are known of in the southern Iberian Chalcolithic, although these known objects are made from stone rather than ivory, they have traditionally been interpreted as ›idols‹ (ALMAGRO GORBEA 1973, 63)[16].

A further set of objects from the upper level of this grave was found in the south-eastern quadrant of the chamber, approximately half a metre from the threshold between the chamber and the corridor. This included a **dagger with a rock crystal blade** and ivory hilt and sheath that we have already described, separately, in two previous publications (GARCÍA SANJUÁN et al. 2013b, 617–622; MORGADO RODRÍGUEZ et al. 2016) (Fig. 26). Essentially, the hilt comprises two parts (both from the Asian elephant) elaborated separately and then assembled; a handle measuring about 8.4 cm long and 4.5 cm wide, and a pommel or ornamental top measuring 13 cm long and 4.5 cm wide. The hilt was lavishly decorated with engraved vertical zigzag motifs in addition to eight (preserved) conical-shaped motifs across the handle. The fourteen perforations on the back side of the pommel are an interesting feature of the decoration of this piece. The excavation photographs show that next to this ivory hilt, very close to the pommel perforations, 90 very small perforated discoid beads were found clustered together (in a bunch), which suggests that they formed part of the showy decoration of this object. The beads would have probably been strung together along strings made from some type of perishable material; in turn, the strings would have been tied to the perforations, thus forming a hanging, ornamental motif.

The rock crystal dagger blade has a length of 21.4 cm, a maximum width of 5.9 cm, a maximum thickness of 13 mm and a weight of 196 g. It is morphologically similar to the flint dagger blade found in the lower level of this grave owing to its foliaceous morphology and bifacial knapping in addition to the presence of lateral notches on the proximal end to fit the hilt, in this case made of ivory. From a technical perspective, of course, it is nevertheless a very distinct piece given the rarity of the raw material and how difficult it is to knap. In this respect, the study of the knapped rock crystal found in the form of micro-blades, arrowheads and this dagger blade suggest that there was a community of stone knappers in Chalcolithic Valencina with no parallel in southern Iberia. These craftspeople were able to transfer to rock crystal the accomplished experience they had gained in working with siliceous rocks. The geochemical analysis using Raman Spectroscopy suggested that the source of supply of this raw material must be a region with an abundance of hyaline quartz mineralisation from slate based, lutaceous or greywacke-like materials. This mainly refers to two Iberian regions: the Nevado-Filabride domain of the Baetic System and the Central Iberian Zone of the Iberian Massif. Although at the moment it is not possible

14 This piece has not been studied to date as it still has not been found in the Archaeological Museum of Seville.

15 As far as we know, the only other fragments of ostrich eggshell found in Valencina are those from the Montelirio *tholos* (FERNÁNDEZ FLORES/AYCART LUENGO 2013, 250) and those from the excavation undertaken at Avenida de Andalucía at the corner of C/Clara Campoamor.

16 However, a very similar object made from ivory – although smaller in size and with a rougher finish – was recently found in the artificial cave of La Molina (Lora de Estepa, Seville), about 120 km east of Valencina (JUÁREZ MARTÍN 2010, 91).

to determine the specific place of origin of the raw material, it is very likely that it travelled several hundred kilometres before reaching Valencina, probably from within the Iberian Peninsula itself.

The ivory hilt and the rock crystal blade would have been complemented by an ivory plaque, approximately 25 cm long (it probably would have been considerably longer) with a maximum width of 12.5 cm and a thickness of between 0.4 and 0.6 cm – which we have already described elsewhere (García Sanjuán et al. 2013b, 620–622) – and that according to our interpretation, would have served as the rigid base for a sheath made from leather or fabric. This piece was lavishly decorated with engravings on its back side, but it was smooth on its front side where the edges present two stops that almost exactly line up with the arch that forms the pommel of the dagger handle in the shape of a crescent moon.

On account of its morphology and material characteristics this dagger is an exceptional object. No similar artefacts has ever been documented in Valencina, although a knife handle and an object that seems like the handle of a razor were found at the Matarrubilla *tholos* (Collantes de Terán 1969, 58). In the aforementioned artificial cave of La Molina, a slightly tapered hilt with a flint blade connected to its narrowest end was discovered (Juárez Martín 2010, 91). A blade handle made from ivory (but with a much simpler morphology and undecorated) has been recorded at La Molina, an artificial cave located 120 km east of Valencina.

In addition, the morphology of this piece reminds the representations of ›anchor-like‹ objects known in the Bronze Age stelae of the Alentejo region, in southern Portugal, which tend to appear suspended from the ›shoulders‹ or ›neck‹ of the stone/stela/anthropomorph. In some of the ›anchor-like‹ representations on the Alentejo, the object has even been observed to comprise two pieces, just like the hilt from PP4-Montelirio. Therefore, it is possible that the ›anchor-like‹ elements symbolised on the stelae are the representation of objects similar to the one found in the upper level of grave 10.049. Daggers of a similar morphology also appear in large numbers in the Valcamonica rock art, in Italy. However, save for the rock art representations, no artefact showing an analogous combination of rock crystal and ivory exists in the archaeological records of Iberian (or indeed European) Late Prehistory to date.

In addition to the three aforementioned ivory objects which have been restored and published in previous papers, other very fragmented ivory remains were found in the upper level of Structure 10.049; they appear to correspond to 1 rectangular object decorated with rounded edges, several fragments of one or two D-section rings or bracelets and 3 more indeterminate objects.

Fig. 25. Carved elephant tusk found in the upper level of the chamber of Structure 10.049 (photo: Miguel Ángel Blanco de la Rubia).

Therefore, **to summarise**, the upper level of Structure 10.049 yielded 65 objects, which are classified as follows: five large ceramic plates, up to six ivory objects with a total weight of 650 g, 53 knapped stone objects (including 38 blades, thirteen tools, one arrowhead and one dagger blade), with a total weight of

865.4 g of flint (in addition to the almost 200 g from the rock crystal blade), an ostrich egg and 90 perforated discoid beads. It is worth noting the absence of copper objects and polished stone tools, as is (save for the small copper punch) also the case with the lower level of this same grave.

Fig. 26. Dagger with ivory hilt and sheath and rock crystal blade found in the upper level of the chamber of Structure 10.049 (photo: Miguel Ángel Blanco de la Rubia).

DISCUSSION

As has been shown throughout the pages above, Structure 10.042–10.049 stands out for its architectural magnitude and for the quantity and quality of the artefacts that were deposited in it (Tab. 4). Furthermore, the individual inhumation carried out in the lower level of the chamber of Structure 10.049 provides the opportunity to evaluate the grave goods of this subject from the perspective of his social status.

From an architectural perspective, spanning approximately 20 m in total, Structure 10.042–10.049 is the largest megalithic construction found at the PP4-Montelirio sector and the sixth largest in Valencina, after the *tholoi* of La Pastora, Matarrubilla, Montelirio and Cerro de la Cabeza, and after the megalithic construction of Ontiveros, whose exact characteristics are unknown[17]. In this respect, it is especially interesting to assess the chronological position of Structure 10.042–10.049 regarding the other great megaliths of Valencina, especially Montelirio. As previously noted, the two dates obtained on human bone from Structure 10.042 (Table 1) have given results of 3007–2780 and 2880–2630 cal BCE (2σ). These dates have recently been assessed using a Bayesian model along with dates obtained on samples of human bone from structures 10.031 (another two) and 10.071 (another four) from the PP4-Montelirio[18] sector and from other sectors of the settlement of Valencina (García Sanjuán et al. 2018).

The result of this study suggests that the oldest megaliths (*tholoi*) of Valencina would be Structure 10.042–10.049 (3180–2880 cal BCE, 68 % probability), the *tholos* of Cerro de la Cabeza (3035–2865 cal BCE, 61 % probability) and the *tholos* of Montelirio (2875–2805 cal BCE, 68 % probability). According to the models obtained, there is a 68 % probability that the start of Structure 10.042–10.049 occurred before that of Cerro de la Cabeza, and a 94 % probability that this happened before the Montelirio tholos (García Sanjuán et al. 2018).

Therefore, Structure 10.042–10.049 seems to have formed part of the first phase of development of megalithic monumentality in Chalcolithic Valencina, between the 31st and 29th centuries cal BC. The main known monuments from this phase share a series of basic, formal characteristics, such as the use of large slate slabs to delimit corridors and chambers, the probable use of domes made from perishable material or (as has been confirmed in Montelirio) sun-dried clay, and the prevailing, ›canonical‹ sunrise orientation. Hypothetically, these early monuments would have been followed by a second phase of megalithic monumentality, characterised by *tholos*-type monuments that, like La Pastora or Matarrubilla, present masonry architecture using small stones held together with clay and corbelled domes, as well as ›unusual‹ astronomical orientations (García Sanjuán et al. 2018). In addition, the high probability that the chronology of Structure 10.042–10.049 began somewhat before the grand Montelirio *tholos* has some interesting implications that will be discussed below.

In addition to its architectural magnitude and the fact that it was constructed early on in the

Tab. 4. Summary of count and weight data for all finds in Structure 10.042-10.049. Given that it is difficult to estimate the number of ivory artefacts due to their highly fragmented state, the figures shown here differ slightly from those provided in García Sanjuán et al., 2013 b, 613.

STRUCTURE	OBJECTS (COUNT)	OBJECTS (WEIGHT)
10.042	*35 (plus > 2000 perforated beads)*	*Beads: 0.45 kg*
10.049, Lower Level	*65*	*Ivory: 1.5–2 kg Flint: 0.41 kg*
10.049, Upper Level	*30 (+ 90 perforated beads)*	*Ivory: 0.64 kg Flint: 0.86 kg*
TOTAL	*130 (plus > 2090 perforated beads)*	*Ivory: 2.1–2.6 kg Flint: 1.27 kg Beads: 0.46 kg*

17 Apart from the exploration of the atrium and the first few metres of the corridor conducted in 1949 by J. de Mata Carriazo y Arroquia (1962), this megalithic monument has never been fully studied given it is located under a house that is in use.

18 The human and faunal bone remains and the ivory from the PP4-Montelirio sector have proved unsuitable for radiocarbon dating given the low levels of collagen they present. At the time of drafting these lines, of a total of 25 samples that were sent to different laboratories for dating, only eight dates have been obtained, with the remaining seventeen having failed (specifically, none of the samples from Structure 10.049 have been dated). The study of the faunal remains has confirmed the frequent presence of carbonate and silicate deposits that cover the surfaces of the bones; this suggests that, regardless of other pedo-chemical conditions, the infills of the structures could have been subjected to recurring and prolonged flooding, an issue that accelerated the deterioration of the collagen (Liesau von Lettow Vorbeck et al. 2014, 73).

social development of the site of Valencina, Structure 10.042–10.049 stands out because of its grave goods. There are several reasons:

a. Scale. First, these grave goods stand out in number, which we estimate to be approximately 130 artefacts, including about 2.5 kg of ivory, 1.27 kg of flint and almost 0.5 kg of perforated beads. Given the high degree of destruction to the chamber of Structure 10.042, we can assume that, originally, this tomb would have contained a considerably greater number of objects.
b. Provenance. Second, it is necessary to highlight the diversity of the origins of the raw materials (both Iberian as well as extra-Iberian), represented in this assemblage. The presence of rhyolite from Huelva, flint from eastern Andalusia (Málaga and Granada), and cinnabar from Almadén (Ciudad Real) have been confirmed. In addition, rock crystal likely to have come from central Spain and copper from the Huelva pyritic belt must be counted. Raw materials from outside Iberia include ivory and an ostrich egg shell probably from North Africa, ivory from Asian elephant and probably Sicilian amber.
c. Ivory. Third, ivory notably stands out among the foreign raw materials; with between about 2.5 kg of ivory, this grave represents the greatest deposit of this raw material in the settlement of Valencina and, by extension, one of the largest in Chalcolithic Iberia, only surpassed by Montelirio itself, a fact that we already pointed in a previous article (García Sanjuán et al., 2013 b 613).
d. Craftsmanship. Fourth, the exceptional craftmanship and artistic quality of some of the manufactured objects must be noted. These objects are among the most sophisticated of Copper Age Iberia, perhaps rivalled only by the finds from the Montelirio tholos. The manufacturing of arrowheads with long barbs, the rock crystal dagger blade or the large pieces of ivory required a skill and technical knowledge that were unknown during the Neolithic period and are not seen in many places during the Copper Age.

All of this suggests that the family unit or factional group that constructed and used grave 10.042–10.049 must have had a strong capacity for mobilising resources, as well as access to a wide range of exotic raw materials and a first-class technical know-how, particularly regarding the work with ivory, rock crystal, flint and, perhaps, with textiles (in the event that the beads had not formed part of necklaces, but personal clothing or linens). When Structure 10.042–10.049 began to be used, access to these exotic raw materials had experienced a relatively sudden flourishing in Valencina seeing as such materials do not appear in the site's oldest burial structures, as is the case with the artificial caves of La Huera and Calle Dinamarca, whose construction and use has been dated to the 32nd century cal BCE.

All of this is particularly true for the individual buried in the lower level of the chamber of Structure 10.049. This individual is a rare find that gives us an idea of the socio-economic and ideological profile of a member of Copper Age elite. It is well known that a collective pattern prevails in the burial practices of the 4th and 3rd millennia BCE in southern Iberia. This means that assigning grave goods to specific individuals is generally quite problematic (often impossible). The repeated manipulations and alterations that burials places underwent over long periods of time contributed to human remains becoming commingled, thus creating a complex palimpsest of bones, offerings and artefacts where individuality was made indistinguishable. Of course, the fact that the dead were originally deliberately deposited and treated with little difference could have contributed to this. In addition very few individuals who would have been deposited with outstanding grave goods, based on an ideology that placed more emphasis on the collective and communal than on the individual (García Sanjuán/Costa Caramé 2009, 207).

However, the male buried in the base level of Structure 10.049 gives us the opportunity to carry out a detailed assessment of the grave goods of a specific person. With his 35 grave good objects, including unique artefacts such as an entire elephant tusk, a dagger with a flint blade with an amber pommel (both of probable extra-Iberian origin and formally unparalleled in Iberia), in addition to an important assemblage of ivory and flint objects, this subject was accompanied by a set of material culture that is unrivalled in Copper Age Iberia.

In this respect, there seems to be little doubt that the adult male buried in Structure 10.049 would have formed part of the emerging elite within the Chalcolithic society of the lower Guadalquivir valley. This individual (and/or the collective that he formed part of), was capable of mobilising resources for the construction of a great megalithic grave that enjoys both spatial and visual prominence owing to its location and that housed a considerable amount of exotic paraphernalia. Something very similar can be said of the great Montelirio tholos, although in this case it was not possible to identify such a clear association between the grave goods and the buried individuals. The social group buried in graves 10.042–10.049 and Montelirio define what was probably the highest social level within the processes of social hierarchisation characteristic of Late Neolithic and Copper Age Iberia. In Valencina, these dynamics were likely characterised by the same factional competition defined for Los Millares (Chapman 1990) and other settlements (Díaz-del-Río 2004).

But, what was the nature of this elite? And what economic, social and ideological foundation did its social position have? First of all, we must explain that, regrettably, there is no sound data that allows us to interpret the objects deposited in the upper level of Structure 10.049 as the grave goods of the individual deposited below. Several attempts made to obtain radiocarbon dates on human bone or ivory from this structure were not successful due to the limited amount of collagen in the samples. Therefore, the time elapsed between the deposition of the individual at the lower level, the sealing off of this level with slate slabs and the deposition of the objects in the upper level is unknown. Theoretically, the objects in the upper level may have been part of a votive act: the absence of human bones suggests that it was not a funerary act, or if it was, it would have been an *indirect* one, perhaps separately or independently from the individual buried in the lower level, especially if a long time had elapsed between the lower and upper depositions.

However, in this regard, it may be interesting to take a closer look at the chronology of the Montelirio *tholos* which – as was previously noted – was very likely built after grave 10.042–10.049. The available radiocarbon model shows that tomb 10.042–10.049 was erected between 3515–2875 cal BCE (86 % probability), its activity ending between 2885–2155 cal BCE (86 % probability). The Montelirio *tholos*, on the other hand, was constructed in 2875–2700 cal BCE (95 % probability), its use ending between 2805–2635 cal BCE (95 % probability) (Bayliss et al. 2016). The Bayesian models show that the Montelirio *tholos* was very probably built and used slightly later (99 % probability) than Structure 10.042–10.049. This is very interesting as there are subtle hints that suggest that additional offerings were made to grave 10.042–10.049 perhaps as a result of the construction of Montelirio. This seems to be suggested by the arrowheads with exceptionally long barbs in the upper level of the chamber (10.049) and in the ante-chamber (10.042) as well as by the more than two thousand perforated beads, perhaps forming a mantle or clothing, also in the ante-chamber. Neither the long-barbed arrowheads nor the perforated beads are present at the lower (earlier) level on Structure 10.049, which is particularly intriguing.

Although we do not know exactly how much time elapsed between the construction of one grave and another, if the span of time had not been very long (for instance, two or three generations at most), then it is possible that the existence of grave 10.042–10.049 would still be known about when Montelirio was constructed. It is even possible that the *tholos* of Montelirio was built where it was built *precisely* because grave 10.042–10.049 and the formal deposition area that had emerged around the grave (a constellation of over a hundred burial and non-burial structures) were located nearby. It is thus important that the extraordinary arrowheads with long barbs which were found in large numbers in Montelirio only appear in the corridor of the Structure 10.042 and in the upper level of the chamber of Structure 10.049, but not in the lower level of this chamber in connection with the individual buried with lavish grave goods. The same could be said about the large number of beads found in the corridor of Structure 10.042 that are absent from the base level of Structure 10.049. Given how exceptional the arrowheads and clusters of beads are (the latter probably sewn forming mantles or clothing), both of which are unknown objects in any other sector of Valencina, and given that there are no human remains in the upper level of Structure 10.049, it appears rather tempting to think that the deposits in the upper level of Structure 10.049 and in the corridor of Structure 10.042 were reuses of this grave that were carried out when the majestic *tholos* of Montelirio was erected. These reuses would have perhaps served to pay tribute to a great figure, the founder of a clan or a kinship unit from a few generations back that the people executing the funerals at Montelirio wanted to honour.

In any case, although we cannot be certain that the assemblage of objects in the upper level of Structure 10.049 forms part of the personal grave goods of the individual buried a few centimetres below, there are several indications in the configuration of these grave goods that may help to try and give an approximate answer to the question asking what nature and what economic, social and ideological foundation this elite group had. First, as we have suggested elsewhere (García Sanjuán et al., 2013b 629), the emphasis on ivory – including both unworked raw material (tusk) and sophisticated, finished objects (dagger hilt, combs, vessels, etc.) – suggests that this subject (and/or his kin unit) could have been particularly connected to the transformation and/or trade of this raw material, and that he could have been a merchant or craftsperson specialised in ivory. The presence of ivory knapping debris in the IES sector indicate that the transformation of this raw material took place at Valencina (Vargas Jiménez et al. 2012; Nocete Calvo et al. 2013). Second, the limited presence of metal stands out for the exact opposite reason; no pieces of gold were found in this tomb, while the only piece of copper is a punch, a tool that is perhaps linked to ivory working. The absence of sumptuous copper objects (personal ornaments, weapons) in the grave goods of this subject suggest the meagre role that copper played in the expression of social status and hierarchy during the first half of the 3rd millennium, something that has already been highlighted in previous studies (GARCÍA SANJUÁN/COSTA CARAMÉ 2009; MURILLO-BARROSO/MONTERO-RUIZ 2012). Third, the presence of flint likely from outside Andalusia in the form of a dagger blade is highly significant since – unlike ivory – flint is an abundant raw material in southern Iberia (in fact, other objects in this same grave are made from flint from eastern Andalusia). This suggests that in the Copper Age the exotic value of a resource was not only related to its availability at the local level or its intrinsic physical properties, but to its foreign origin *per se*. In this regard, we can reasonably infer that simply for being foreign, some raw materials were granted special value, in either a social sense (if they were part of agreements or bonds between individuals or groups from different regions linked by family ties, marriage or economic interests) or even a symbolic sense (for the mystical or perhaps magical properties they were invested with).

Generally speaking, the global configuration of the assemblage of artefacts described in this paper strongly suggests that – to a large extent – the expression of social status of the individual found in Structure 10.049 relied on (and/or was expressed by) the possession of raw materials that had ›special‹ properties. The elephant tusk (or the ostrich egg in the upper level), evoke animals that did not exist in Chalcolithic Iberia, and that the Valencina community in general (and the individual buried in Structure 10.049 in particular) could only have known about from oral narrations or graphic descriptions. This is also the case with the rock crystal dagger (in the upper level deposit), a raw material with very special mechanical and visual properties that, like quartz, has always been invested with ›mystical‹ properties cross-culturally (FORTEZA GONZÁLEZ et al. 2008, 148–149), and with the marine scallop shells, again with a strong symbolism throughout Prehistory, Antiquity and even throughout more recent historical periods.

This, generally speaking, can be extrapolated to the Chalcolithic period in all of southern Iberia: exotic elements gained prominence with the affirmation of mechanisms for social competition, ivory being particularly used as an element of value for the differentiation and social affirmation of the elite (VALERA 2010, 31–32). Thus, it would appear that access to far-off, foreign and mysterious objects would have been an essential component in the definition of the social position of the individual inhumed in Structure 10.049, something that fits very well with the ethnographic evidence that show that, in societies of intermediate complexity, the power of distant and exotic objects can be a very effective means for strengthening the social position and charisma of self-aggrandising individuals (HELMS 1988; 1998).

Other indications suggest that the power of the elite thus characterised must have been rather unstable and limited by important social, ideological and cultural factors. The individual from Structure 10.049 suffered from episodes of malnutrition during childhood and, despite his young age, presented osteoarthritis in the spinal column, which suggests demanding physical activity. His oral and dental health conditions were far from optimal since he had suffered from an infection in the soft tissue of the mouth. In addition, these traits match well with what is observed in the overall Valencina population, suggesting the absence of significant differences as far as living conditions went. The individuals identified in Structure 10.042 also presented several clear indications of intense physical activity in his arms and perhaps in his legs as well, poor oral health and hypoplasia of the enamel: in other words, similar conditions as those of the individual from the chamber of Structure 10.049. Altogether, this does not suggest particularly easy or comfortable living conditions for the elite of early Chalcolithic Valencia, which goes against what would be expected in the aristocracy of an early state system. Instead, it rather suggests that this individual had to work hard to gain his social position. This also matches the conclusion of a recent study showing that no children's burials with prestige grave goods were ever made in Valencina, something that would have suggested the presence of social statuses ascribed at birth (CINTAS-PEÑA et al. 2018) as – again – one would expect from the aristocracies of early states.

Furthermore, the apparent hierarchisation in the burial practices at Valencina, which the individual from Structure 10.049 seems to represent best, does not have any correlation whatsoever with the residential evidence, which in reality is rather difficult to identify since there are no traces of civil or domestic architecture that could suggest institutionalised and stable forms of power (GARCÍA SANJUÁN/MURILLO-BARROSO 2013).

Additionally, the fact that a carved elephant tusk similar to that of the upper level of Structure 10.049 was found in the artificial cave of La Molina (Lora de Estepa, Seville) about 120 km east of Valencina (JUÁREZ MARTÍN et al. 2010, 91) suggests that the local elite from other, smaller communities in the lower Guadalquivir and the surrounding area also had access to similar objects of prestige, although not the same amount or with the same workmanship.

Finally, from a gender perspective, it is worth noting that the individual from the lower level of Structure 10.049 is probably a male, while in Structure 10.042 two female individuals, one male and one unsexed individual were discovered. The anthropological study of the Montelirio tholos suggests the presence of a high number of females (PECERO ESPÍN 2016). The interpretation of the balance (10.042–10.049) or imbalance (Montelirio) of males and females in these high-ranking tombs is impaired by the limitations of the empirical evidence, although the proposed interpretation for Montelirio is that a ›special‹ group of women – perhaps religious specialists – were buried there. However, with the data available at present, it is difficult to assess the role of gender relations within the Valencina Chalcolithic society. The anthropological study of the entire PP4-Montelirio sector will certainly be able to contribute some data on the subject, although further studies like the one presented here will be required in the future.

CONCLUSIONS

The data described and commented above suggest that a process of increased social differentiation began around the 29th century cal BCE in the communities that occupied and/or frequented Valencina. Some individuals or groups (kinship or corporate) started to have access to exotic raw materials which were likely financed by the local exploitation of salt or specialised, high-yield livestock breeding, especially cattle and *dehesa* pigs (García Sanjuán 2017). The goods made with those exotic materials were then used in practices of social competition and showy funerals, where they ended up their use lives as grave goods. The exotic raw materials could have provided their bearers and users with a symbolic or ideological means to strengthen or represent their incipient social influence, perhaps based on greater wealth in terms of livestock or the mere size of their families and clans. It does not seem unreasonable to think that these groups or individuals managed to generate social capital by promoting conspicuous consumption, feasts and the construction of megalithic monuments and ditches, as part of larger gatherings of people.

These elements correspond almost exactly to the concept of ›communalist ranked society‹ that was proposed almost two decades ago as a frame of reference for analysing southern Iberian Copper Age societies (García Sanjuán 1999, 20–22). This concept integrates elements present in several Marxist proposals for the analysis of complex, non-state societies, as is the case with the primitive communist mode of production in its complex redistribution variant (Hindess/Hirst 1979), the communal mode of production (Gailey/Patterson 1988), the intensive domestic mode of production (Sahlins 1983), the rank society (Fried 1967; Friedman 1977; Wason 1994), the societies with great intensifier-redistributor men (Godelier 1971; 1986; Harris 1982), or the notions of ›cacicazgo‹ (Sanoja/Vargas 1987; Toledo/Molina 1987; etc.) and hierarchical tribal society (Sarmiento 1992) proposed in American prehistoric archaeology.

In the sphere of productive forces, a key component to the communal hierarchical society is a strong capacity for agricultural intensification and animal husbandry, which enables the production and accumulation of surplus. The increase in production and the creation of surplus results from the interaction of multiple factors, such as especially favourable ecological conditions, greater labour productivity resulting from improved technology and increased quantity and effectiveness of the workforce, in addition to the activity of specialised intensifier institutions. The societies settled in the lower Guadalquivir at the end of the 4th millennium BCE presented all of these conditions: privileged ecological configuration, great availability of resources, demographic growth (and hence an increase in the work force) and the likely presence of intensifier institutions, mainly in the form of inter-group competition dynamics.

At the same time, the availability of surpluses generates the rise in specialists in the management, administration and redistribution of the collective product, in the secondary processing of biotic (livestock and forestry) and abiotic products (stone, metal), as well as ideological activities not directly linked to the primary production of basic goods for subsistence (García Sanjuán 1999, 20–22). While in Valencina there is not (yet) any compelling evidence of the existence of a specialised management or administration of agricultural and livestock resources, there is indeed very clear evidence of the presence of a community of craftspeople with a high degree of technological expertise – although at the moment it is not possible to know whether they were full-time artisans or if they combined their commitment to craftsmanship with farming.

The specific pattern of social relations of production is mainly based on descent and kinship rules, following the conical clan model wherein each individual establishes their position relative to society according to their proximity to or distance from the founding ancestor depending on factors of descent and primogeniture (Fried 1967, 126; Wason 1994, 49). By its very nature, this system of social relations stimulates the development of explicit descent principles such as the hierarchisation of kinship units based on their proximity to the reference bloodline. The south-eastern sector of Valencina demonstrates a sequence of events and burial practices that seems to highlight those explicit descent principles.

First, the artificial cave of La Huera was constructed and utilised during the oldest period of activity at the site: its earliest burial took place in 3260–3100 cal BCE (95% probability), the latest one occurring between 2920 and 2860 cal BCE (88% probability). Later, a short distance from La Huera, grave 10.042–10.049 was erected, followed or accompanied by the formation of a formal deposition area that surrounds the grave with several dozen additional burial and non-burial structures. Later on, the magnificent Montelirio *tholos* was built. As we have noted elsewhere (GARCÍA SANJUÁN et al. 2018) it does not seem coincidence that the last body was introduced into the artificial cave of La Huera, on top of the oldest deposits, precisely between c. 2920 and 2860 cal BCE (88% probability), just as the activity at the PP4-Montelirio sector and the *tholos* of Montelirio was at its peak.

In the Valencina of the early 3rd millennium cal BCE, the expanding internal hierarchisation resulting from differential accumulations of economic (livestock, abiotic resources) and social capital (prestige) meant that the upper echelons of society started to associate themselves with showy material elements of prestige and status (symbols) mostly of foreign origin. Undoubtedly, grave 10.042–10.049 and the Montelirio *tholos* offer excellent examples of the appearance of such elements of prestige. However, the nature of these objects indicates the likely limits of the (unstable) social position acquired by these elite individuals: they are objects that were granted ›exotic‹ or ›magical‹ properties that suggest a power which was more symbolic than material. The absence of copper objects that could be construed as weapons (daggers, axes or arrowheads) highlights the lack of a military, violent or coercive nature in the definition of the power (perhaps simply the *influence*) achieved by these elite individuals. An inherent feature of the communal hierarchical society is precisely that the coercive power of leaders is severely restricted and limited by the prevailing, communal social framework and the representation that they hold of the collective interests of the entire community (FRIED 1967, 137; HINDESS/HIRST 1979, 80; SAHLINS 1983, 152; ZAGARELL 1986, 157). This represents a basic distinction between a hierarchical society and a stratified or state society. Other indicators that support the strong limitation, likely instability and lack of institutionalised power of the Chalcolithic elite present in Valencina include the absence of children's burials with valuable objects as well as lack of civil or residential buildings. Despite growing social differences, communal ideology would have preserved a strong association between lineages, probably materialised in a communalism in the possession and usufruct of natural and material resources. To put it another way, self-regulatory mechanisms characteristic of communal hierarchical society aimed as means of resistance against stratifying tendencies that, under certain circumstances, can threaten its reproduction (ZAGARELL 1986, 160–161), seem to be present in the Chalcolithic society of Valencina

Recently obtained chronological data suggest that the social system which gave rise to the great megalithic graves of Valencina, and certainly to the site of Valencina itself, experienced a severe crisis between 2400 and 2300 cal BCE. A strong social and cultural discontinuity occurred during that time which would put an end to the longstanding Late Neolithic tradition of the ditched enclosures and megalithic monuments and would lead to a different type of society.

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Landscapes of complexity in Southern Portugal during the 4th and 3rd millennium BC

António Carlos Valera

ABSTRACT

This paper addresses the development of monumental landscapes in Southern Portugal in the context of increasing social complexity, understood as a long-term non-linear process (and not as a state or condition). Starting by addressing the first movements towards the construction of monumental landscapes during the first stages of the Neolithic, the essay will focus on the period between the Late Middle Neolithic and the transition to the Bronze Age, which roughly corresponds to time span between 3500 and 2000 BC. Spatially, the analysis will be restricted to the inland Alentejo, in the areas of the middle Guadiana basin and eastern Sado basin, where the archaeological data has considerably changed in the last two decades, showing complex and monumental landscapes unsuspected some decades ago. Based on the available information, the nature of the dimensions of large ditched enclosures will be discussed and the importance of social practices of emulation to the »inflation of monumentality« observable in the 3rd millennium BC will be underlined.

INTRODUCTION

Monumentality can be described as a form of communication using qualities such as magnitude and endurance that are deeply relational and operates at different scales. The approach to the first forms of communicating through monumentality therefore need to take into consideration variability in scale and time, as well as the concepts of monument and monumentality.

The monument is what physically exists, while monumentality is the abstract category that is inherent to the monument but goes behind it. In short, monumentality is the message and the effect of the monument, reflecting its social role. The Latin word *monumentum* refers to the Indo – European root *men*, which expresses one of the main functions of the spirit: the memory (Rodrigues 2001). Accordingly, etymologically monument is what evokes the past and perpetuates its meanings. It is a form of what is called – in cognitive sciences – an external memory and it is associated with physical durability and magnitude.

In this sense, monuments assume the condition of documents, which that is why there are series of historical documents with the word *Monumenta* in their names in many countries. They communicate world views, ideological principals, rules and memories, helping to organise the human life in space, time and social terms. In a way, monuments and their ability to communicate specific messages – their monumentality – are inherent to human symbolic thinking. Therefore, they are a universal that – despite being expressed in different versions and scales and serving different purposes according to time and place – is expected to be found in all human societies. Moreover, the ways in which societies use monumentality say a lot about their social organisation.

The first forms of monumentality in the western Iberian peninsula – as in other parts of the world – can be ascribed to the hunter gatherer communities of the Upper Paleolithic and are deeply related to the arising of what we usually call art. The Escoural cave in Southern Portugal – like others in Europe – can be considered an underground monument of relatively small scale, while its contemporary open-air sanctuaries in important river valleys are of large-scale magnitude, like the Côa/Águeda, Tagus and Guadiana rivers.

However, in both situations, monumentality is achieved not by architecture (in the restrict sense of the term, human building) but rather by adding iconographic elements to natural settings. Through this additive strategy, the natural elements are progressively transformed into monuments, organising time and space with messages that seem to have been of cosmological order expressing the first attempts to domesticate the world. In this sense, the first forms of domestication were not of material nature but rather a symbolic one (Valera 2012a), through the monumentalisation of natural places.

During the Mesolithic, forms of monumental expression seem to be strangely missing, most probably due to an orientation of research almost exclusively to economic and territorial issues. However, while arguing in favour of a clear tendency for sedentary occupations, sometimes year-around camping, as well as a development of incipient social complexity based on interspatial site and burial organisation, it has been claimed that some shellmiddens with human burials could represent early forms of funerary monumentality of mound type. This is the case with the Cabeço da Amoreira, one of the Muge shellmiddens located in the lower Tagus valley, which presents a 2.5 m-high accumulation of shells and a series of burials that were covered by a layer of 120,000 small stones, forming a sort of a cairn (BICHO 2011).

However, it is with the advent of the first Neolithic communities that man-built monuments are clearly present. The monumentalisation of natural elements will continue during all Neolithic and Chalcolithic, through the painting and carving of sub-naturalistic and schematic art. The old Paleolithic river valley sanctuaries will receive new artistic cycles that also reach plateaus, the top of mountains, shelters in prominent rock formations and caves. However, since the second half of the 6th and the beginning of the 5th millennium BC, the monumentality expressed by these rock art sanctuaries is followed by unambiguous architectonic investments of monumental nature, which seem to reach their zenith in the Late Neolithic and Chalcolithic and suffer a subsequent collapse (VALERA 2015a).

In this global context, the Alentejo's hinterland (Southern Portugal) shows a significant development of monumental landscapes during the second half of the 4th and 3rd millennium BC. Internationally displayed by the work of the Leisner couple in 1950s, this region came to be known as a landscape dominated by megalithic passage graves, open settlements and some few hill forts, with a well-established separation between domestic areas and funerary ones (LEISNER/LEISNER 1943). It was a land of farmers – and later also metallurgists – that organised their territory in a simple and dichotomist way, where monumentality was essentially expressed by megalithic architectures, at least until the advent of the few walled fortified sites.

This perception has suffered profound theoretical and empirical transformations in recent decades. The discovery of the real expression of enclosures in the region (VALERA 2012b; 2013a) (Fig. 1), the role that they have proven to play as main architectures in the organisation of cosmological landscapes and social life (VALERA 2013b), the proliferation of different forms of burial and body manipulations (VALERA 2012c), the new observable scales of interaction, the questioning of a clear demarcation between the profane and the sacred or between the economic and the ideological and the chronological revisions of the megalithic phenomena (CALADO 2004; BOAVENTURA/MATALOTO 2013) have drastically changed our perception of the regional landscapes during this period.

New »landscapes of complexity« emerged with the new data and diversity can be perceived underneath a certain regional cultural unity. The clear frontier between domestic and funerary spaces is now more blurred (VALERA 2016), showing us an integrated world where social dimensions are not easily isolated. Highly-codified landscapes go side by side with others, apparently more ambiguous and perceptions of monumentality changed scale. Geological and topographical diversities seem to have more interference than was previously considered and peripheries (such as the Beja area) have revealed themselves important core zones. A social trajectory with levels of complexity comparable to other regions of southern Iberia – like the entire Andalusia region – is now visible in the archaeological record. Despite participating of a general social trend, the region presents its own particularities and forms of expression that can already be detected in the first movements towards architected monumental landscapes.

However, this trend is not only historical, but also historiographic. It starts with the recognition that the characterisation of the Neolithic is far from being exhausted by economic and technological approaches. Since the 1990s (HODDER 1990; WHITTLE 1996; BRADLEY 1998), the importance of the ideological dimension has been underlined, emphasizing the emergence of a new world view and the agency that it recursively induced played structural roles in the process. In this trend, monuments and monumentality are not seen as simple by-products of a structural change in the productive system; rather, they are considered as a decisive element of the Neolithic social organisation that – in some cases – may be in the very origin and configuring of the changes (as has been advocated for the origins of the Neolithic in Anatolia following the discoveries of Göbekli Tepe – CAUVIN 2000). This does not mean that ideology or – in this particular instance – monumentality may be presented as a substitute of economy or technology for a leading role in the explanation and interpretation of the Neolithic. In fact, in Portugal as in many European regions (BRADLEY 1998), there are areas where Neolithic monumentality is rather faint, showing that its social role was played in a heterogeneous way. However, trying to understand the Neolithic keeping the ideology and cosmology in a secondary plan is something that reminds of the answer that the young Albert Jacquard received to the question »Who am I?«: they said that he was a soul and a body, to which he replied that this way of dividing him in two was very unpleasant.

TOWARDS THE FIRST ARCHITECTED MONUMENTAL LANDSCAPES (5500 (?) – 3500 BC)

As in many other regions, the process of monumentalising landscapes through human constructions in Alentejo is associated with the emergence of megalithic monuments (the use of outstanding natural features in the construction meaningful landscapes was most certainly an earlier procedure, as some of the rock art in the Guadiana river indicates). Nonetheless, the moment of that emergence remains blurred and subject to debate.

The several models that deal with the emergence of the Neolithic in western Iberia have been criticised for ignoring the symbolic dimensions of the process (VALERA 2003; CALADO 2004), namely those related to the construction of monuments, traditionally considered to be from later periods of the Neolithic (CALADO 2004, 244). This criticism goes along with the proposal that the first menhirs and cromlechs of Alentejo region can be ascribed to the early stages of the Neolithic (second half of the 6th, transition to the 5th millennium BC). It was suggested that they were part of the process of colonisation of the hinterland by groups originated in the last hunter gatherers of the littoral, who carried with them elements of the Neolithic economy and ideology obtained through previous maritime contacts with northern Atlantic and Mediterranean areas (CALADO 2004; 2015). These first megalithic monuments would be socially active in a context of the occupation and control of new territories. We could say that they were part of a »territorial project« that change the landscape in a systematic, non-accidental way (BENEVOLO/ALBRECHT 2003).

However, the attribution of these first monuments to the Early Neolithic is not without problems. There is a significant lack of credible absolute dates for standing stones (the few ones that exist have problems related to context and dated materials – charcoals). On the other hand, the associations of large menhirs and cromlechs to materials assemblages that can be ascribed to the Early Neolithic are not unquestionably demonstrated. Nevertheless, as has been shown for Britany (CASSEN et al. 2000) and some areas of central and south Iberia (BUENO et al. 2007b; BUENO et al. 2013) – where early menhirs and stelae are later reused in megalithic tombs – the antiquity of these monuments is viable. The fact that some small menhirs seem to be present in habitat areas dated from the Early Neolithic, such as Caramujeira in Algarve (GOMES 1997), Vale Pincel 1 (Tavares da Silva, personal communication) or Malhada da Ourada (FERREIRA et al. 2009) and that some seem to be reused integrated in early funerary megalithic monuments, such as Torrão (LAGO/ALBERGARIA 2001), Monte da Cabeça (LEISNER/LEISNER 1959) or Pedra Escorregadia (GOMES 1994), are arguments in favour of the antiquity of some of these monuments.

If menhirs and cromlechs continue to be used/reused in the following millennia, possibly with different or additional meanings and social roles, a second impulse towards monumentality is related precisely to the emergence of the funerary megalithic monuments. Again, given the lack of absolute chronologies it is difficult to establish with adequate precision the emergence of the funerary megalithic phenomena in the region. There is general agreement that the first megalithic tombs were small in size (almost of cist type) and mainly for individual use. The beginning of their building was thought to be in the second half of the 5th millennium BC (SOARES/SILVA 2000), but recent revisions of the available data tend to establish the emergence of these funerary architectures in the beginning of the 4th millennium BC (BOAVENTURA/MATALOTO 2013), although in the centre of Portugal and the centre of Iberia there are monuments dated from the 5th millennium BC (BUENO et al. 2007a). For the Alentejo region, it is possible that the first passage graves with clear collective use would have appeared in the second quarter of the 4th millennium BC, not yet with the monumental appearance that would be achieved in the second half of that millennium. However, were these first monuments clearly related to agrarian landscapes, as was traditionally assumed?

Apart from the lack of direct empirical evidence of a strong agricultural dependence in the first Neolithic times, it is not easy to establish a straight connection of the first built monuments to a plain agrarian system, although isotopic studies on diets patterns suggest that the importance of agriculture might have increased during the Middle Neolithic in the coastal regions of Central and Southern Portugal (CARVALHO/PETCHEY 2013; CARVALHO 2014). The settlement patterns seem to present a general continuity along the Early and Middle Neolithic, characterised by open-air habitats with highly-perishable structures in granitic areas with large outcrops or sandy soils near rivers (NEVES/DINIZ 2014), presenting no signs of significant agricultural intensification. Additionally, the direct association of the first burial monuments with a consolidated agrarian economic system has been submitted to criticism since the 1990s (BARRETT 1991; BRADLEY 1993; 1998; JORGE 1999). By differentiating closed tombs from opened ones, it was argued that these monuments responded to different notions of time, played different social roles and corresponded to different forms of economic organisation.

In fact, in Alentejo and other regions of western Iberia, the funerary megalithic phenomenon is characterised in its first stages by a tendency for small tombs that were frequently closed after the first depositions that corresponded to just one or few individuals. Their low monumentality and short and restricted use indicates they are not yet strongly engaged with group identity management, social aggregation and rituals of ancestors (BRADLEY 1998). If this small-scale architectonic monumentality is used for the first time regarding the dead, it remains far from the investment and use that megaliths would assume during the middle and late 4th millennium and the following 3rd millennium BC, when the economy of production seems to have higher levels of consolidation.

The same general idea that we are dealing with social practices not yet strongly connected to an agrarian system is also suggested by the characteristics of the sub-naturalist and schematic art, traditionally associated with the early stages of the Neolithic. The carved and painted rocks and shelters are still being organised in ways that monumentalise landscapes or transform natural features into conceptual monuments. The thematic is considered to express landscapes that are still essentially tied to a hunter-gatherer-herding symbolism and a still significant territorial mobility (JORGE 1999, 26), presenting graphic codes not far from those present in the Paleolithic Art (BUENO/DE BALBÍN 2002; BUENO et al. 2007c). For instance, this mobility has been shown by isotopic studies for some of the communities that used the Bom Santo necropolis, a natural cave in the Montejunto cave located north of Lisbon in Estremadura (CARVALHO 2014). The funerary depositions occurred in a period between 3800–3400 BC, corresponding to the use of the so-called »proto-megalithic« tombs (the small, closed chambers used for individual or small number of individuals) and the construction of the first plainly collective megalithic monuments in Alentejo region. Moreover, another aspect that tends to reflect a weaker dependence of a well-established agrarian economy is the absent production of iconographic objects that might be relaying in ideologies related to agriculture. In fact, all of western Iberia seems to be iconoclastic until the Late Neolithic (second half of the 4th millennium BC).

Therefore, it seems that the first forms of monumentalised landscapes through human architecture in Alentejo – if they are related to the emergence and developed of the productive system and therefore to new forms of territoriality, namely with the development of the notion of projects of long duration that is inherent to agriculture, do not yet express consolidated agrarian societies. They integrate a long period of transition before an historical acceleration that we may call »takeoff«. More than substantially changing the natural base, these first monuments mark it with an intellectual imprint, trying to be in consonance with it (BENEVOLO/ALBRECHT 2003). Nonetheless, some of the ideological principles that would be relevant for the monumental projects that would follow were already there. The first architectures of enclosed categorised spaces appear with the first cromlechs, even if with great visible and physical permeability between the inside and outside areas. The location and orientation of some of these megalithic enclosures already respond to a concern with astronomic events, as seems to happen in the cromlechs of Almendres, Vale Maria do Meio, Portela dos Mogos, Cuncos ou Vale de Rei (CALADO 2000; SILVA/CALADO 2003; ALVIM 2006). Finally, the expression of collectiveness in funerary practices started to develop with the first passage graves, revealing the increasing social role of ancestors and the role of memory and tradition in monument building (as the incorporation of previous menhirs in megalithic tombs well expresses). However, the following centuries witnessed dramatic developments in monumental landscapes, which – more than a progressive development of the previous phase – seem to correspond to an abrupt expansion of the previous set of conditions.

»TAKEOFF«: A SOCIAL TRAJECTORY EXPRESSED BY TERRITORIAL PROJECTS OF LONG DURATION (3500 – 2200 BC)

From the second half of the 4th millennium BC onwards, the region reveals a generalised increment of architectonic monumentality expressed in diversified ways through a plurality of scenarios that can be related to growing social complexity. During the second half of the 4th millennium BC, the »takeoff« of this trajectory can be appreciated in several domains of the social life:

a. In the central and north Alentejo, larger and monumental megalithic passage graves – involving higher levels of communitarian work – started to be built, while in the southern part necropolis of rock cut tombs appeared (in one case, Outeiro Alto 2, associated to a timber circle – VALERA/FILIPE 2012) possible due to geologic limitations (lack of adequate rocks in a significant part of Beja District). Nonetheless, both solutions reflected a growing tendency for intensive collective funerary use. The temporalities constructed by the necropolis of progressively-added tombs and the collective use now seem to correspond to the notion of monument as a construction for controlling, reproducing and preserve memories related to ancestors and to be used as elements of power, identity and territorial management. They were integrated in strategies of monumentalisation that make use of the dead and occurred at different scales: at the level of a landscape, as we may see in the concentration of funerary megalithic monuments in the Ribeira do Álamo valley (LEISNER/LEISNER 1985); at the scale of a particular natural feature, like the hill of Sobreira de Cima, where several hypogea were excavated providing the natural feature with the appearance of a large mound with several chambers (VALERA 2013c); and at the scale of the monuments, when later – during the 3rd millennium – tholoi tombs were added to previous megalithic passage graves in Reguengos de Monsaraz area (LEISNER/LEISNER 1985; GONÇALVES 2014).

b. Furthermore, during the late 4th millennium BC the symbolic iconographic expressions in material culture emerge with an impulse and diversity with no previous parallel. Schematic anthropomorphic idols (like the »Almeriense Idols« – Valera 2012d), geometric decorated schist plaques and staffs (GONÇALVES 1989), zoomorphic figurines (namely rabbits – THOMAS/WATERMAN 2013; VALERA et al. 2014c), the so-called »Horn Idols« (SOARES/SILVA 2013; VALERA 2015b) and the first representations of the iconographic elements as part of the »symbolic decoration« that would flourish during the 3rd millennium BC talk about a new ideological frame.

c. According to present available absolute chronologies, it is also around 3500 BC that ditched enclosing structures started to be built in continuity in western Iberia and this region. In Senhora da Alegria (Coimbra, Central Portugal), after a first small trench dated from Early Neolithic (5500–5300BC), several small ditches are present in a phase of occupation dated between 3600–3400 BC (VALERA 2013d). In Central Alentejo, the first occupation of Perdigões associated with three small ditches is dated from 3500–3300 BC. This seems to be the moment of initial dissemination of ditched enclosures construction in the region and between 3400–2900BC the number increases (at the present, there are seventeen ditched enclosures known in Alentejo for this chronological gap). In the cases with information about more general plans, some already present large enclosed areas that surmount 10 ha (like Perdigões or Monte da Contenda), show relative complex designs (Moreiros 2; Águas Frias; Perdigões) and in one case (Perdigões) the location and orientation of the enclosure show a clear connection to the sun annual cycle (VALERA 2013a), following principals present in some megalithic cromlechs and dolmens.

d. Evidence of long-distance circulation of exotic and valued materials – like ivory items, cinnabar and large blades of oolithic flint (for instance at Sobreira de Cima necropolis – VALERA 2013c) – announces the large interaction networks of exotic items that would developed through the 3rd millennium BC.

This path was intensified during the 3rd millennium BC. The number and complexity of ditched enclosures considerably increased, large collective megalithic passage graves continue to be used and *tholoi* type monuments appear, while walled enclosures also started to be built and inter-regional interaction is intensified. During this long-term trajectory, we observe a development of monumental architectures impregnated of symbolic meanings, more marked and symbolically-organised landscapes and a densification of territorial occupation expressing a demographic growth. This is associated with a significant investment in funerary activities and practices of manipulation of human remains, progressively more diversified and with more expressive ideological use of the human remains. An intensification of large-scale circulation of exotic materials, an increase of domestic species in the faunal record and agriculture or the development of new technologies (namely metallurgy and weaving techniques) are also visible. Finally, a complex and diversified ideological display generating an intense iconographic production – which also seems to indicate some signs of craft specialisation – and the development of aggregation centres reveal a more multifaceted social organisation.

This can be seen with the emphasis in some of the ditched enclosures that become quite large and complex. They show a significant concentration of labour, expressed by the number and size of the structures built: when data is available, we can observe ditches 3 to 8.5 m deep, some 9 to 14 m wide and with perimeters longer than a kilometre, enclosing areas of 10 to 20 or more ha. Inside and outside, hundreds of pit features of various sizes and concentrations of *tholoi* type tombs or hypogea increase this image of the significant aggregation of people and investment in collective labour in places that tend to present long periods of utilisation, during which they participate in the organisation of meaningful landscapes.

The best example comes from Perdigões enclosure, in Reguengos de Monsaraz (VALERA 2010; VALERA et al. 2014a). The site emerged in the Late Middle Neolithic in the mid-4th millennium BC when the monumental megalithic landscape of Riberia do Álamo was being formed (Fig. 2), and by the last quarter of that millennium it was already a large enclosure. Located in the western extremity of that megalithic territory, in a natural theatre open to the east, it was facing a highly symbolically-marked landscape, with innumerous monuments (tens of megalithic tombs, isolated menhirs, cromlechs). The limits of visibility within the natural theatre are roughly coincident with both solstices at sun-rise and the hill of Monsaraz – at 90° in the horizon – marked the equinoxes. The horizon was then an annual solar calendar and one of the Late Neolithic enclosures had its gate aligned precisely with the equinoxes. Where the natural theatre opened to the valley, there was a cromlech not yet dated, so we do not know if it was the first enclosure there or if it was built in relation to the Neolithic ditched ones. The monumental landscape built in this way seems to express a cosmology related to the sun's annual cycle. The ditched enclosure located in the western extremity of the valley faces and captures all of this landscape as a mega chamber opening to a large and vast passage until the sun-rising horizon, as if the organisation of the landscape reproduced the architecture of a passage grave monument. Established in the second

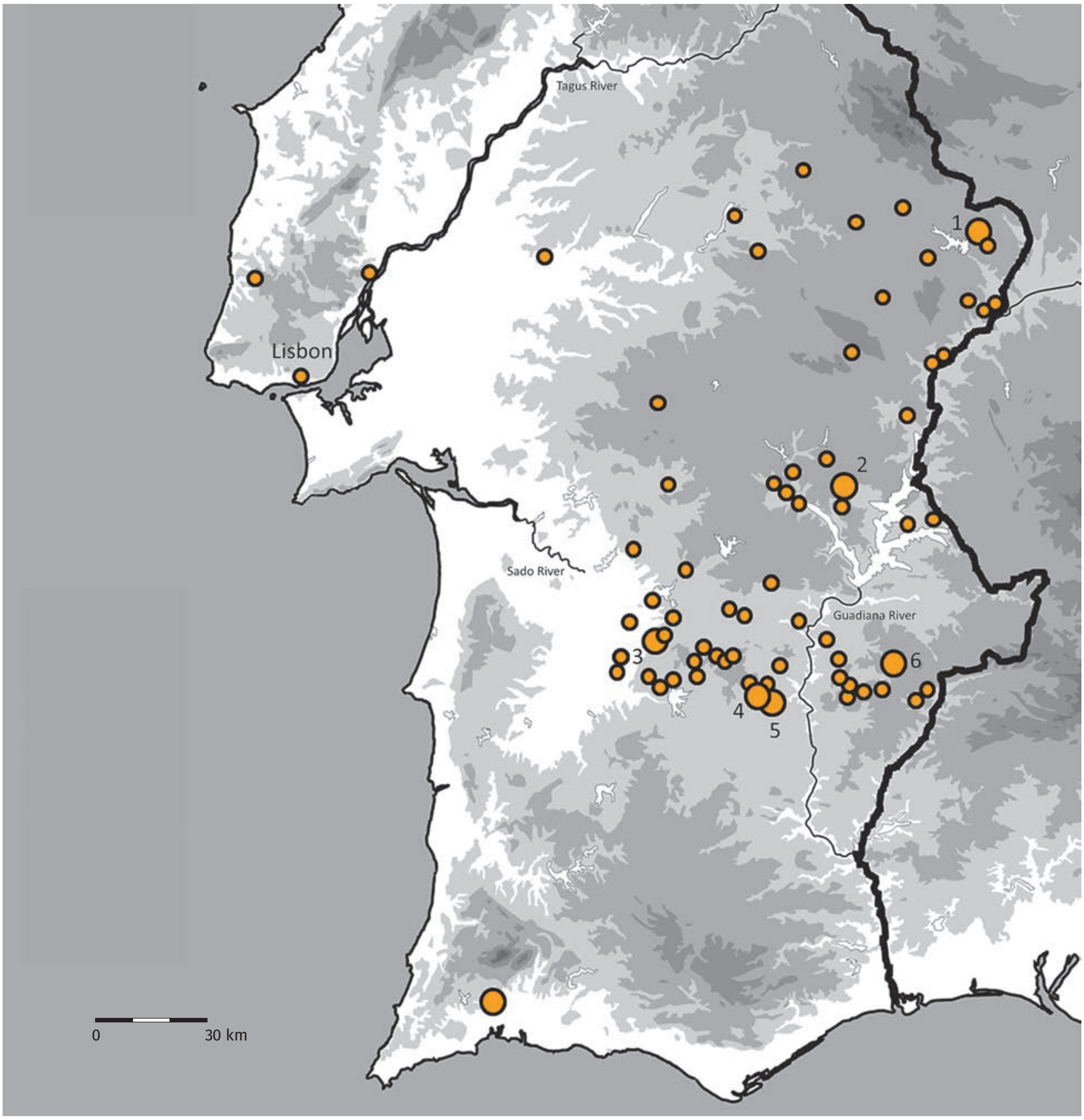

Fig. 1. Ditched enclosures in Southern Portugal, with indication of the large enclosures mentioned in the text: 1 – Monte da Contenda; 2 – Perdigões; 3 – Porto Torrão; 4 – Monte das Cabeceiras 2; 5 – Salvada; 6 – Herdade da Corte.

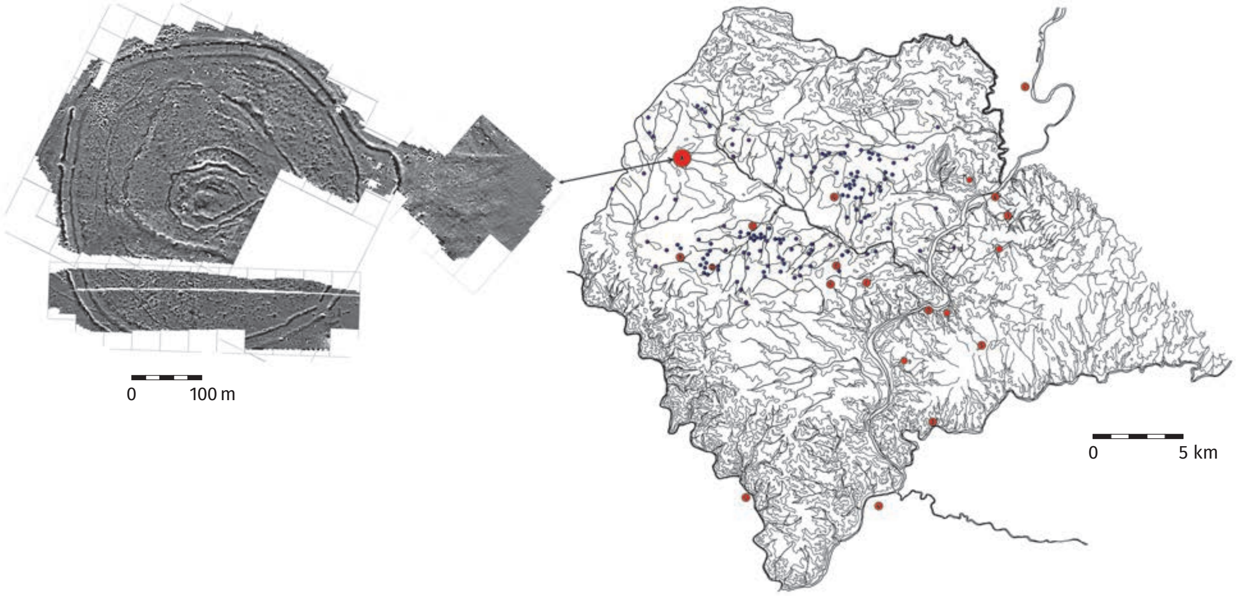

Fig. 2. Magnetograme of Perdigões (after Marquéz et al. 2011; Valera et al. 2014a) and location of the enclosure in the monumental landscape of Ribeira do Álamo valley (Reguengos de Monsaraz, Évora). The blue dots correspond to megalithic monuments and the orange dots to settlements.

half of the 4th millennium BC, this landscape would maintain its coherence during the 3rd millennium BC. Several of the previous monuments suffer processes of monumentalisation (*tholoi* added to megalithic tombs), while others were kept in use/reuse. In the enclosure of Perdigões, the activity increases, with the construction of several other small or large ditches (the later also with the gates astronomically aligned), filled intentionally with depositions compatible with the results of feasting, sometimes recut and refilled and with intense and diversified funerary practices and body manipulations (Valera et al. 2014a). Other large ditched enclosures were certainly integrated in meaningfully-organised landscapes corresponding to territorial projects of long duration, although our knowledge of them is much more incomplete.

This large aggregation of people and the investment in labour that can be seen in other large enclosures such as Porto Torrão, Monte da Contenda, Salvada, Monte das Cabeceiras 2 or Herdade da Corte (Fig. 1) has undeniable social implications. Nonetheless, it is difficult to estimate the number of involved people in the construction and use of each of these enclosures. Being aggregation sites, probably with seasonal concentrations, the number of individuals would be quite floating, as it was the size of the enclosed areas during the lifetime of each set of enclosures. Therefore, a direct relation between area and persons is problematic. However, if we take in consideration that 43,000 tonnes of extracted bedrock are estimated just for ditch 1 of Perdigões, we gain an idea of the amount of labour concentration that might be involved in these constructions and the need guidance.

In fact, applying complex systems theory to social developments shows us that the greater the scale of the task and the number of persons involved, the more difficult the consensual decision and the management of the enterprise, implicating the emergence of leading persons or groups. Accordingly, we might agree that enterprises requiring significant amounts of work and investment inherently require specific forms of leadership in the decision and implementation processes. As Johnson (1982) argued, hierarchy is inherent to scale. The archaeological data available for the second half of the 4th and 3rd millennium BC in this region would have implicated the development of stronger leaderships that would have initiated processes of social competition and created needs for differential forms of consumption and social display that fed the increased circulation of the exotic materials obtained through long-distance exchange networks. In other words, these large sites of social aggregation seem to have implied the development of some sort of social segregation, as the large menhirs and cromlechs and the large collective passage tombs would have already implied in smaller scales. Indeed if – as Churchill once argued – we shape our buildings and our buildings shape us, the development of a monumental architectures during this period in the region was not simply a response to ongoing social changes, but rather it actively contributed to conform and induce them in a trajectory towards social competition and inequality.

However, to what extent did this social path develop in the region during the 3rd millennium BC in the region?

LANDSCAPES OF COMPLEXITY, LANDSCAPES OF EMULATION

If – according to the theory of complex systems – social hierarchy is an indispensable request for the design and implementation of large enterprises, it is not necessarily an irreversible circumstance. Johnson (1982) considers two types of hierarchies: hierarchies that are persistent and become institutionalised; and hierarchies that are temporary and sequential in time, considering the latter to be proper of small-scale societies. In these cases, a hierarchy is formed when smaller groups or communities are reunited to accomplish a particular enterprise, such as the shaping, transportation and erection of a menhir or the building of

Fig. 3. Ditched enclosures at Porto Torrão (Ferreira do Alentejo, Beja). First estimated area of the site (A); projection of the double Chalcolithic ditches at south of the stream (B) ; projection of the ditches (one Chalcolithic and the other Late Neolithic) in the north bank of the stream (C). Projections based in the data collected in rescue excavations (Valera/Filipe 2004; Santos et al. 2014; Filipa Rodrigues, personal information).

places of ceremonial purposes, and after this is accomplished hierarchy is dissolved into the previous social order. However, the persistence and institutionalisation of hierarchies would generate persistent and progressively large centres and an unambiguous archaeological record – namely funerary – of the institutionalised social inequalities. Thus, what does the archaeological available data for the 3rd millennium BC in the inland Alentejo tell us regarding these issues? Again, I will focus on information from the large ditched enclosures.

First, the large ditched enclosures are in fact quite large, although perhaps not as large and permanent as has been suggested.

For instance, Porto Torrão has been considered to have about 100 ha of enclosed area based on the surface distribution of archaeological materials (ARNAUD 1993). However, no global plan of the enclosure is available at present. Recent surveys have revealed a presence of several ditches on both sides of the stream that crosses the site apparently in the middle (VALERA/FILIPE 2004; SANTOS et al. 2014). The distribution of the surveyed sections suggests that there are circular parallel ditches on each side of the stream, but they develop in divergent trajectories (Fig. 3), thus indicating that they correspond to different enclosed areas. The fact that both ditches of the South bank of the stream are apparently of Chalcolithic chronology and the ditches of the north bank are one from the Chalcolithic and the other from Late Neolithic reinforces the idea that we are in the presence of at least two sets of enclosures, perhaps overlapping each other or using the stream as a border, and not a unique mega enclosure.

Other enclosures with archaeological remains spread across vast areas (between 10 to 20 ha) are known in the region, although recent evidence shows that those vast areas do not correspond to a single site progressively growing over time, but rather to sequences of different enclosures, overlapping each other, generating an erroneous perception of size and permanence when we do not have significant parts of their layouts.

At Monte da Contenda – a Late Neolithic and Chalcolithic site (VALERA et al. 2015a) – the results of the geophysical survey revealed and extraordinary complex situation, where at least seventeen ditches (the larger number known so far in one single site in Portugal) define several enclosures that partially overlap (Fig. 4). This indicates that in a large area there was an intense building activity over time, with clear distinctive phases of construction, featuring overlaps and lateral displacements, corresponding to periods of construction and abandonment. The same circumstances occur at the large Chalcolithic site of Herdade da Corte (VALERA et al. 2015a), where a set of at least three parallel ditches presenting an ellipsoidal plan with a major axis of 500 m is overlapped (or is overlapping) by a second set of linear and sinuous ditches of circular plans in the south-west (Fig. 5). This fluctuation and lateralisation of building activity is also observable in smaller sites, like at Moreiros 2 (VALERA et al. 2013), Murteira 6 (PORFÍRIO et al. 2012) and Coelheira 2 (VALERA et al. 2015b).

These archaeological circumstances are more consistent with sequences of projects and periodic aggregation with intervals of abandonment, showing what – in

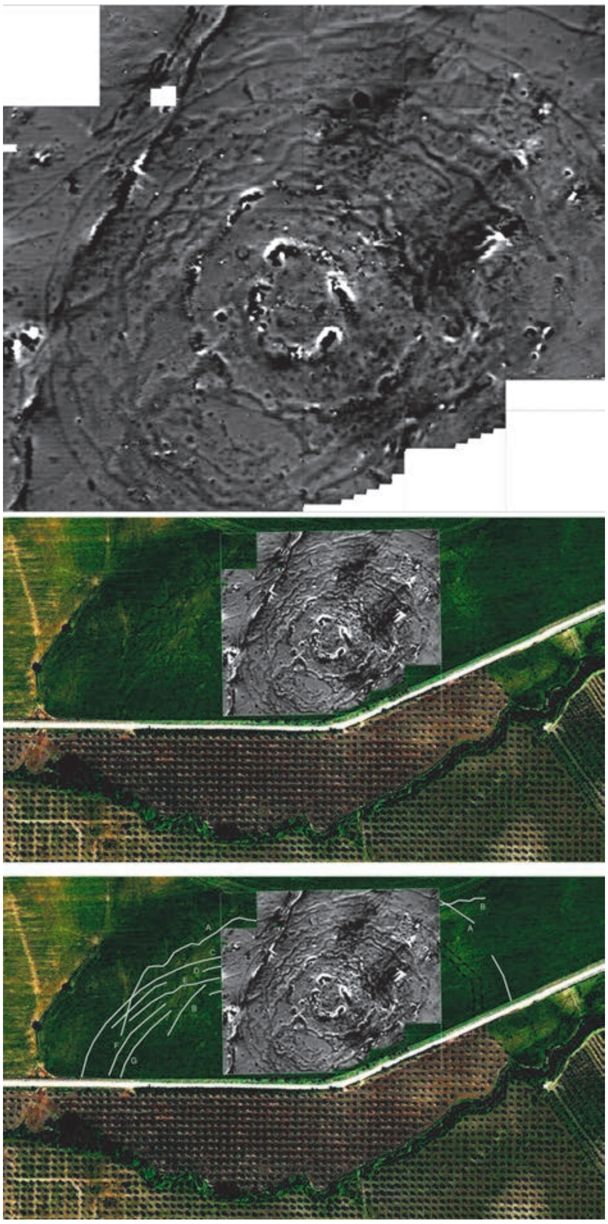

Fig. 4. Monte da Contenda (Arronches, Portalegre). Magnetograme (after VALERA et al. 2015a) and location over a satellite image (Bing Maps) where the trajectory of the early ditches is visible.

Fig. 5. Herdade da Corte ditched enclosures (Serpa, Beja). Elliptical linear ditches (Wight arrows); circular sinuous and linear ditches (black arrows).

some cases – might be disguised by a tendency for concentricity that induces perceptions of linear occupations and evolutions, emphasising the importance of understanding the rhythms and temporalities of these complex sites (WHITTLE 2006; 2014; MÁRQUEZ/JIMÉNEZ 2010; VALERA et al. 2014d; VALERA et al. 2014a). Even when we have situations of concentricity, as it happens in Perdigões, the available data does not show a continuity of growing and absolute permanence of occupations, but rather an alternation of the sizes of enclosed areas and the intermittent filling of the ditches with intentional and selective depositions and recuttings, indicating periodic activity rather than a continuous one.

On the other hand, we have a significant concentration of ditched enclosures in the inland Alentejo, and even if we do not yet have good chronological sequences for the great majority of them, we can roughly establish periods of contemporaneity or sequences based on material culture, showing that diversity characterises the trajectory of enclosures. Many that were built in the Late Neolithic did not reach the 3rd millennium BC, while others continued throughout that millennium. Some suggest very short periods of use, almost corresponding to event-like horizons or unsuccessful social achievements, while others grew to develop long and complex biographies. Building, abandoning and reoccupying enclosures was therefore inherent to their social role and the dynamics of the societies that built and used them, probably in a context of achievement competition. The long-term permanence and development of some of them became quite large, even if marked by some sort of periodicity, seemingly responding to a free scale network (Johnson 1982) that functions by the principal of »big get bigger«, where small initial differences may turn some more attractive than others, and for each new adherence the attractive ability is reinforced, generating larger asymmetries. For instance, this would help to explain why Perdigões – which emerged in the mid-4th millennium BC – developed throughout the 3rd millennium BC, while Ponte da Azambuja – which appeared soon after just 15 km away – did not survive the transition between the millennia. Alternatively, it could explain the furious periodic construction of overlapping enclosures at Monte da Contenda in face of the moderation of building activity (just two ditches) presented by Santa Vitória just 4.4 km away. The problem is that there is no necessary proportionality between what generates change and the direction that change takes (Bernabeu et al. 2013). Large things can have small beginnings and astonishing starts can result in small achievements. The actual data talks about non-linear causality in the construction of these monumental landscapes, creating difficulties in terms of prediction and explanation.

In fact, making use of the traditional models of hierarchic settlement networks, based on the site size it would not be very predictable that two large ditched enclosures both chronologically situated in the Chalcolithic (although their temporalities are not yet conveniently established) would be just 3.5 km. However, this is the situation observable south of Beja, between the enclosures of Salvada and Monte das Cabeceiras 2 (Fig. 6).

Salvada has an enclosed area of about 17 ha, with a plan with a circular and concentric tendency (445 m by 512 m of maximum diameters) that is divided north-south at two-thirds by a stream. It has an outside double ditch (one of the ditches has a sinuous patterned design) and at least two circular ditches inside. Monte das Cabeceiras 2 has the same general plan and size (five ditches have been recognised so far) and it is also crossed at two-thirds by a stream. The available material shows that both sites were occupied during the 3rd millennium BC in the plain Chalcolithic (Valera/Pereiro 2015). This situation raises interesting problems: if we assume that they are not contemporaneous, then we would have to accept that these large enclosures had a relatively short life (which would implicate a concentrated building activity) and we would have to explain why one large set of ditched enclosures would be abandoned to build a new one just 3.5 km away. On the contrary, if we assume that they are contemporaneous (as everything indicates), then we have to question what social mechanisms would explain the proximity between such large enclosures. This situation seems to conform with a competitive interaction between neighbours developing mimetic behaviours, generating a scenario that is in opposition to the one presented by Perdigões and the small peripheral enclosures: here, an eventual situation of social emulation did not generate a dissymmetry between the long-lasting large enclosure and the short life of the smaller peripheral ones, but rather a symmetry of sizes and possibly times that inclusively seems to be expressed by their particular spatial location and plans. In this case, social emulation processes could help to explain the intensive building activity, the concentration of labour and the dimension and monumentality achieved by both projects.

On the other hand, the available funerary data does not show clear and deeply-marked social differentiations. Although individual burials are known (namely in pits), it is the collectiveness of the funerary ritual that dominates the ideologies of the late-4th and the first two-thirds of the 3rd millennium BC. No prominent burial of an individual is known thus far in this region during this period. On the contrary, if funerary practices differentiated, they did so between large groups of people and not between individuals or small groups of individuals.

In the Perdigões record for the middle and third quarter of the 3rd millennium BC, funerary practices are quite suggestive of this (Valera et al. 2014a; Valera et al. 2015c). The collective use and reuse with secondary depositions of two *tholoi* type tombs in the eastern part of the enclosure was contemporary of the secondary deposition of human cremated remains in pit graves located in the centre of the enclosure. Presenting different architectonic solutions and different treatments of the bodies of hundreds of individuals (cremations vs secondary depositions), both set of contexts present rich but quite different funerary assemblages. No individual status can be identified in the collectiveness of each tomb, suggesting processes of group competition and identity differentiation within the enclosure, which was probably an arena for this kind of emulative interaction between communities periodically aggregated there. At Porto Torrão, there are pit graves with individual depositions with no particularly expressive votive assemblages (Santos et al. 2014). However, what dominates are the collective depositions in surrounding *tholoi* and *hypogea* of tens of individuals by tomb (Valera et al. 2014b) and – as in Perdigões – the depositions of scattered human remains in ditches, mixed with faunal remains, pottery shards and other materials (Valera/Godinho 2010; Rodrigues 2014). The emulative behaviour in the funerary practices that might have occurred associated with these large ditched enclosures is also reinforced

Fig. 6. Identification of the ditched enclosures of Salvada (A) and Monte das Cabeceiras 2 (B) in Google Earth images.

at Perdigões by the fact that the numerous and diversified exotic materials present at the site were almost totally recovered in the funerary contexts, suggesting that we are in the presence of social practices of squander as forms of competition between groups (VALERA 2015b).

SUMMARISING

In inland Alentejo, the first architected monumental landscapes appear with the occupation of the territory in the Early and Middle Neolithic, associated with megalithic monuments built and used in contexts of ideological and economic transition, but where the main traits of the Neolithic ideologies and their monumental expression were being forged.

From the second half of the 4th mellinnium BC onwards, there was an abrupt acceleration in building up monumental landscapes that would reach scales previously unknown, incorporating and potentiating the tradition and memory in the central aspects of the discourse expressed by monumentality. More than each monument are the assemblages of monuments and the relations established between them (conceptual, visual, temporal, travelled, etc.) that built the identity of each monumental landscape, which may share the same general cosmological principals but express them in diversified ways and different scales.

In this context, many ditched enclosures clearly assume a monumental status due to the size they reached, the earthwork that they involved, the highly-symbolic activities that they enclosed or the ideological principals displayed by their architectonic designs, mainly during the 3rd millennium BC. Some of these complexes of enclosures became quite large (with tens of ha) and present very complex biographies, with long temporalities (more than a millennium) during which the enclosing structures were built and repeatedly rebuilt. Aggregations of great numbers of people were involved in large-scale earthworks and ceremonial practices, with particular focus in funerary ones. Indeed, it was also during the 3rd millennium BC that walled enclosures started being built. Independent of their specific function (the majority are usually assumed as fortified settlements), the walls of these sites are clearly monumental, communicating power, no longer through the evocation of ancestors, but rather through an architecture of endurance and referring to present social status.

This social need for monumental forms of expression that we can appreciate in the region since the second half of the 4th millennium BC – and which had a significant increment during the 3rd millennium – was followed by an equally rapid increment of the consumption of exotic raw materials and prestige goods, supporting a growing interaction network that fed this need for social exhibition. Ivory from North African bush elephant, cinnabar, gold, variscite, crystals of quartz, large blades of flint, objects made of marble, limestone or amber were circulating with growing intensity. They were used for adornment and prestige items, but also to produce and extended list of iconographic items associated with cosmologies and the sacred or social order, being related more to ideas, social roles or mythical characters than concrete persons (VALERA et al. 2015c; VALERA 2015b).

This increasing of architectonic monumentality and – we might say – »object monumentality« during the 3rd millennium BC traduces a social path where emerging social differentiation, the interaction and the negotiation of power are highly staged. Although there is no evidence of stratified social orders, it seems that monumentality as a way of controlling the natural and the cosmos, managing identities and organising territories was now also extended to a way of exalting the social.

In this context, social emulation – characterised by mimetic behaviours leading to making larger, better and more expensive and generating a greater appetite for materials obtained through inter-regional exchanges – might have had an important contribution to the process. If monumental landscapes emerge and developed in the region as one more structural and inherent element of the process of »becoming Neolithic«, at a certain moment of that social trajectory behaviours of emulation could be responsible for an inflation of monumentality and associated labour, which in many cases extends far beyond any functional needs (even ideological ones) and for the increasing presence of exotic items, which seem to be submitted to squander practices in funerary contexts, where no individuality emerges.

This great investment in leaded collective work generates complex social images: if it in some way induces the development of emergent forms of social inequality, it also reinforces group identity through the value of that collective work in the arenas of interaction that many of these enclosures appear to have been involved. Moreover, through interaction, it also generates images of similarity and conformity in wider regions, something that could be easily confused with large-scale political integration. Undoubtedly, this social path presented higher levels of social complexity during the 3rd millennium BC than previously, although it does not seem to have reached the stages of more formal and institutionalised social inequality, as has been suggested by some. Although processes of social differentiation – possibly of transegalitarian nature (HAYDEN 1995) – can be tracked through the archaeological record, the data suggests that we are still in the presence of what Gilman recently called a collective society ceasing to be so (GILMAN 2013, 15): societies that generated inflated monumental landscapes at once expressing world views, group identities and collective ambitions and framed the daily life. Territories full of diverse monuments, places and pathways between them, which – in a web of relations – built the active monumentality of these landscapes.

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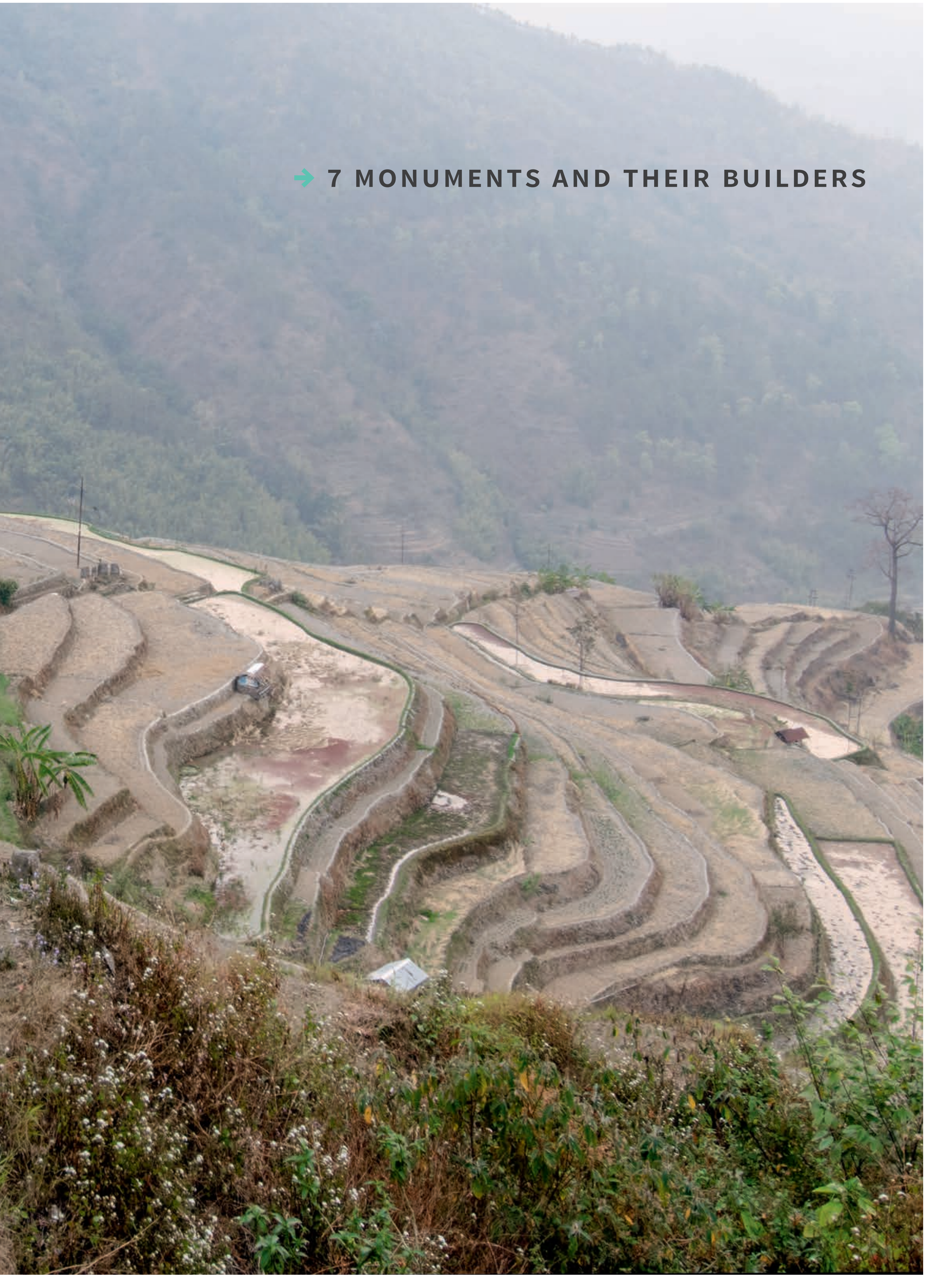
7 MONUMENTS AND THEIR BUILDERS



Danish passage graves and their builders

Torben Dehn

ABSTRACT

The investigation and restoration of around 70 well-preserved, scheduled passage graves in Denmark has provided detailed insight into their construction and architecture and revealed traces of both the construction process and the actual construction site. Moreover, the restoration process constitutes a form of experimental archaeology that furthers an understanding of the principles of megalithic construction. In turn, this provides an opportunity to gain an impression of the methods and mentality of the megalith builders. In this article, examples are presented of the observations and experiences that demonstrate the complexity of passage grave construction, which required detailed planning of the work and the organisation of both materials and labour. It is suggested that the graphic representation of – for example – structural features may have been employed in the construction process. In an appendix, an account is given of the preliminary results of climate monitoring – temperature and humidity – in a chamber of the passage grave Maglehøj. This was carried out to ensure optimal preservation conditions for the birch bark found in the dry-walling here.

INTRODUCTION

The title of the ›Monuments and their Builders‹ session at the *Early Monumentality and Social Differentiation in Neolithic Europe* conference provided a precise headline for the thoughts that the author has held for many years in connection with the investigation and restoration of passage graves in Denmark. What were the thoughts and actions of the people who designed and built passage graves and – in particular – were responsible for the construction behind the walls and above the chambers that was essential for preservation and which was exposed during investigations around 5,000 years late? Therefore, the session title represented a challenge for the author to attempt to organise and structure his thoughts on the subject, whereby this article is the result.

Megaliths as a focus for a cult of the dead and ancestor worship has been the subject of research for almost as long as archaeology has existed as an academic discipline. On the other hand, interest in megalith construction and architecture has first intensified in recent decades. Both the use of megalithic monuments and their actual construction are able to provide information on the people and the society responsible for this Neolithic construction boom. It was a phenomenon that resulted in monuments within which we can still share space with the people who built and used them, after more than five millennia. However, these same monuments also reflect their function and the people who reused and changed them in tune with their own ideas and rituals throughout the subsequent millennia. Archaeology can only gather information about the people and the ideas behind the construction of these monuments by – in a figurative sense – peeling back the later layers and penetrating the original core of the monument and the construction process that produced it.

The greatest potential for this lies in the best-preserved monuments, in which the stone chambers remain covered and sealed within the mounds that – in the same construction process – were built of earth and stone. Denmark has quite a number of these monuments and for more than a century it has been the practice that the general public have had access to some of them. Consequently, they have been regularly maintained and restored, thereby providing the opportunity for archaeological investigations of their construction and observations of their architecture (Dehn/Hansen/Westphal 2013). The combination of these two aspects has facilitated an insight into the construction process and with it the organisation of the work and its participants. For example, by deciphering the individual steps in the construction process it is possible to gain an insight into the stages at which decisions with respect to the design of the various details of the construction were taken, i.e. including in the planning of the construction work (Dehn 2015). In turn, this also provides an opportunity to begin to understand the builders' mindset and motives that led to the creation of monuments that still stand after more than 5,000 years.

Combined restoration/investigation

The method employed in the restoration work has been – as far as possible – to make use of the same principles as those employed by the megalith builders of the Stone Age; for example, ensuring that the chamber and passage remain intact and dry by thorough sealing of the gaps between the orthostats and the capstones and that rainwater percolating down through the earthen mound is led around the chamber and passage by the construction of internal roofing and drainage systems. These measures were undertaken in all cases, although different materials were used from monument to monument and with various degrees of diligence, presumably dependent on the local choice of building materials and the resources available for the construction process. The observations made during investigations and restoration work have provided some practical experience of megalith construction that can be equated with a form of experimental archaeology. Details of the construction that have given rise to speculation in the investigative phase can sometimes be explained in the restoration phase via the rebuilding process. Accordingly, it is possible to gain some perception of the thought processes of the megalith builders.

Furthermore, practical experience of positioning orthostats and capstones in the form of irregular moraine boulders weighing several tonnes gives a much better understanding of the challenges involved in finding an arrangement whereby the morphology of the stones fits best with each other, with a minimum of gaps, while securing the stability of the construction. When moraine boulders are seen positioned in a different and illogical way in the original construction, the explanation is presumably that the megalith builders had a specific purpose in mind in relation to this and thereby with the monument's expression. Consequently, the construction also becomes architecture. Examples include the positioning of a set of twin stones as cornerstones in the passage grave Ørnhøj. In constructional terms, they fit badly with both capstones and the other orthostats, although they presumably reflect a wish that these particular stones should be included as elements in this monument (Dehn/Hansen 2000, 220). It is partly in the light of this situation that investigation and restoration can take on the character of experimental archaeology.

In this respect, it is important to remember that the monuments subjected to modern archaeological investigations are not identical with those as they were originally designed and built. It is the author's view that Danish passage graves were built in one continuous process without any breaks of longer duration. However, it seems likely that both the megalith builders themselves and the immediately subsequent generations during the Funnel Beaker culture also carried out maintenance and modifications (Dehn 2015, 66–67). Further to these operations were the changes made in particular in the Late Neolithic and Bronze Age, which in some cases involved radical alterations. Therefore, in the investigations it is important to ignore these later changes made to the original construction. Moreover, more recent changes in the form of the effects of plundering, excavation and consequent decay can contribute to blurring the original picture.

Of course, there is no evidence that it is possible – as a modern archaeologist – to understand the mindset of the megalith builders, although this is nevertheless the impression gained when involved practically in restoration work. For example, in the rebuilding of a section of dry-walling, it is possible to recognise aspects of a behaviour pattern that are also apparent from the intact, original dry-walling. This arises through the recognition of some of the tricks and pragmatic technical solutions that have to be employed, in the process of which a perception emerges of only a small mental gap between the past and present. Accordingly, a proximity is felt to Neolithic people when finding traces of everyday and more universal human activities. Despite the fact that this is of course a form of self-deception, it can – with some reservation – be used as a trail leading to increased realisation and theorisation.

This perception of a small mental gap between past and present often appears during work actually inside a megalithic construction, when an insight is gained into traces of the original prehistoric building site. For Neolithic people, both the monument and the construction process encompassed social and religious manifestations and declarations. However, during the actual building work, the place was also a simple building site, with stones, timber and earth, as well as a clear requirement for planning and engineering and provisions for the maintenance of the participants.

Observations during investigations of the many technical details give cause for wonder and raise many questions. Of course, prominent among these is the handling of the huge stones and their relation to one another, as well as the technical details involved.

Case studies

An example of the latter is the use of birch bark between the individual flat flagstones in the sections of dry-walling, which is laid double in each course with the fold facing in towards the interior of the chamber (DEHN/HANSEN 2006a). Its effect as an ornament and a means of keeping the construction intact and dry is obvious, although a modern attempt to build dry-walling using fresh birch bark demonstrated the difficulty of the operation. After a few courses, the walling became springy and unstable. However, with practice, it proved possible to construct the dry-walling, while at the same time revealing a feasible solution to another problem: when placing capstones on top of newly-constructed dry-walling, several of the flagstones in the dry-walling sometimes cracked under the huge pressure. This situation is not encountered in the original dry-walling and it may be due to the cushioning effect of the birch bark when it is completely fresh.

A further detail also relates to the dry-walling: when an orthostat is in danger of toppling, it may be necessary to dismantle all or part of an original section of dry-walling to straighten up the stone and restore it to its original position. Given actual practical building experience, when dismantling an original piece of dry-walling, one begins to recognise the various tricks and stratagems that seem obvious to use today. The megalith builders employed the same procedures for placing and fitting the individual flagstones, whereby the resulting dry-walling is regular, sealed, stable and solid. While this does not perhaps actually represent a universal approach to the work, there is nevertheless a common way of thinking in an identical process that appears independent of time and space.

The presence of the megalithic builders is also felt when trampling layers emerge; for example, behind the orthostats or in other places where there has been intense building work. ›Building-site layers‹ such as these arise through mixing of *in-situ* trampled topsoil and subsoil and material that was dropped during transport to the monument; for example, crushed flint, which was sometimes used in large quantities. Layers such as these are completely comparable with the recent layers that are formed in connection with excavation and restoration work. The structure of the

Fig. 1. An experiment with the rebuilding of dry-walling using fresh birch bark. The lower part of the dry-walling is original, while the upper two courses of sandstone flags are modern additions (photo: T. Dehn).

Fig. 2. Section of the rebuilt dry-walling shown on figure a. Folded, fresh birch bark has been laid between five recently-added sandstone flags (photo: T. Dehn).

Fig. 3. Flagstones in three sections of dry-walling in the passage grave Kong Svends Høj had to be dismantled. They are seen here after removal, laid out to enable investigations of their working and fitting together (photo: T. Dehn).

Fig. 4. Four courses of sandstone flags from the same section of dry-walling, refitted to the two original stone flags. The fitting together of the flagstones bears witness to a high utilisation ratio for the material and very little waste (photo: T. Dehn).

earthen mound behind the walls of the stone chamber is otherwise characterised by well-defined, regular layers of earth fill, gravel, clay, stone and flint in a construction reflecting great precision and care. Against this background, it is intriguing to observe these unintentional traces of the building process, which bear witness to traces of human activity that should not have been visible in the completed monument.

Similar examples of the more universally human approach to the construction work are provided by evidence of the accidents and errors that took place during the building work. One example is seen in the passage grave Flintinge Byskov, where a capstone cracked off a large corner from the inner side of an orthostat as it was being put into place, causing the already-built dry-walling to fall out. As a makeshift solution, the dry-walling was subsequently rebuilt from the inside. It has been fitted as closely as possible to the damaged edge of the orthostat and has consequently become twisted. (Dehn 2009, 23), which is otherwise never the case. A similar situation is seen in the passage grave Birkehøj, where an orthostat has toppled forwards into the chamber after completion of the construction. The capstone has remained in place because it was supported by other stones. The toppled orthostat has been re-erected, albeit in an advanced position relative to the line of the wall such that here it was also necessary to carry out a makeshift repair. Closure of the gap between the standing and the re-erected orthostat was carried out from inside the chamber and not using the conventional dry-walling (Dehn/Hansen/Westphal 2004, 23). In both cases, these repairs do not

Fig. 5. The northeast corner of the chamber in the Birkehøj passage grave can be seen to the lower right. Behind the orthostat on the left – which leans secondarily inwards – the packing material of small pebbles has been removed from the space between the orthostat and the sloping stone bank that forms part of the mound construction around the chamber. The packing is broadest at the top and narrowest at the base. Behind the orthostat on the right, the pebble packing material is still intact between the orthostat and the stone bank, hidden in the section. Construction of this may have been carried out in a single continuous process, independent of the orthostats and dry-walling. The narrow stone between the two orthostats is a closing stone, which – in the final phase of the building – sealed this alternative entrance that gave access to the chamber during construction of the passage and the mound (photo: T. Dehn).

show the care and regularity that otherwise characterise this kind of megalith construction.

The passage grave Birkehøj is unusual in several ways and it is the only Danish passage grave in which crushed flint was not used as the packing material in the construction behind the chamber walls. Small pebbles from a nearby lake shore were used instead and crushed flint is only used to a very limited extent in critical places in the roof construction. As a building material, these round stones do not have the same locking effect as crushed flint with its sharp edges, which was perhaps a contributory factor to the collapse of parts of the passage grave when it was opened by amateur archaeologists in 1909. The structures behind the orthostats also significantly differ from those in other monuments, where there was a gradual build-up of a core around the chamber in step with the laying of the dry-walling. In Birkehøj, a stone bank or rampart was built behind the orthostats and the dry-walling, albeit without coming into contact with the rear surfaces of these. The funnel-shaped space between the rear of the chamber wall and the stone bank was filled with a packing material comprising small stones, thereby forming double wall or coffer-work, which provided a solid foundation for the large intermediary stones fitted between the orthostats and capstones (Dehn/Hansen/Westphal 2013, fig. 3). One advantage of these small stones is that they constitute a building material that does not settle with time but is immediately stable. However, it does lead percolating rainwater from the roof construction down behind the chamber to the subsoil in the same way as flint packing.

In the light of its construction and the packing material employed, Birkehøj has always been considered unique. However, a passage grave in Sweden has now been found to have the same construction principle. This is the Örenäs passage grave in Scania, which is located a few metres from the Oresund coast. The packing material used here also comprises small pebbles and an investigation in conjunction with a restoration carried out in November 2015 (http://www.lansstyrelsen.se/skane/Sv/nyheter/2015/Pages/restaurering-av-ganggrift-i-orenas.aspx) shows that the construction principle

Fig. 6. Reverse of the chamber wall in the Maglehøj passage grave, where the flint packing between the orthostats and the mound construction of stone and earth is broadest at the base, becoming narrower upwards. The mound was constructed in a continuous process, with building of the dry-walling following erection of the orthostats (photo: T. Dehn).

employed is identical to that in Birkehøj. Both passage graves are characterised by a solid intermediary layer between orthostats and capstone: the very situation where a double wall or coffer-work is useful. Moreover, both monuments are located in the immediate vicinity of the shore – of a lake and the sea, respectively – where the small pebbles occur naturally.

It is difficult to understand why this alternative material – and with it such an unusual building technique – was employed in these cases. The two passage graves are both located among other megalithic graves – constructed using crushed flint – in their respective areas, so the explanation does not lie in a lack of available building material.

Crushed unburnt flint was normally employed as building material hidden within the megalithic construction, while white-burnt flint was commonly used in places where it was visible; for example, on floors, on the surface of the mound or in the area in front of the entrance and façade. The white-burnt flint was not used consistently as an element in the construction, but was probably added later during use of the monument.

Fig. 7. Crushed flint from the flint packing behind dry-walling in the Ejby passage grave. This flint has a coarser character than normal (photo: T. Dehn).

However, burnt stone – including flint – has been observed behind the dry-walling and orthostats of a few passage graves. Nonetheless, due to the modest quantities present, it apparently does not represent part of the construction – rather a symbolic or ritual element – although this observation has not been explored in detail.

The use of crushed flint as a constructional element with a sealing or draining function is generally common in areas where flint is accessible. On the island of Bornholm, where flint only occurs in very limited quantities, this material is not used at all behind the dry-walling and there are no indications of the use of other materials in its place. On the other hand, both the quantity and character of the flint used in constructions in the rest of the country varies. For example, in Maglehøj (Fig. 6), the walls of the chamber are completely surrounded by a compact, soil-free flint packing and in the Ejby passage grave there was around 800 kg of flint behind one single section of dry-walling (Fig. 7). In other cases, the use of flint is restricted to a small occurrence of soil-mixed material immediately associated with the dry-walling. The flint may be more or less coarsely crushed, although this could be due to both the particular properties of the flint employed and the efforts invested. The various occurrences of worked flint in the monuments appear not to be dependent on geographic area or distance from the coast, but must be a result of the builders' different intentions and the labour resources available for each individual construction project.

An insight can also be gained into the mentality of the megalithic builders by analysing the planning that was necessary for the monument to be unified and impeccable in its construction and fully in agreement with the builders' intentions. This analysis has been attempted based on the observations made over the last 25 years in relation to the construction and architecture of about 70 megalithic monuments (DEHN 2015). For example, it was necessary to take account of the width of the roof in the completed monument when marking out the ground plan, as the maximum span is determined by the length of the capstones. The latter lie across the longitudinal axis of the chamber and the inclination of the orthostats must similarly be included in these first considerations.

An example illustrating this general planning is the approach to dualism evident in the architecture. This occurs at several levels, partly in the form of twin stones: two pieces of the same moraine boulder that are always placed opposite or beside one another, partly in the form of two chambers within the same mound. There is also the example of two passage graves, each contained within their own mound, although with ground plans that are identical mirror images (DEHN/HANSEN 2006b, 59–60 fig. 9). If special stones such as these are to be accommodated in the construction, it is necessary at the planning stage to have an overall idea of the dimensions of

Fig. 8. Examples of hammerstones from the Ejby passage grave. The stones lay in the flint packing behind sections of dry-walling and were probably lost or discarded in connection with crushing of the flint nodules (photo: T. Dehn).

the monument and particularly the height and width of the chamber, the latter at both floor and roof level. The orientation of the passage must apparently also be determined in the initial phase of the construction. Sight lines (optical axes) have been observed lowermost in the mound fill behind the chamber in two cases; for example, in Kong Svends Høj (DEHN/HANSEN/KAUL 1995, 28–30 figs. 25–26). Moreover, in a remarkably large proportion of passage graves an extension of the passage's sides coincides with a gap between two orthostats in the long side of the chamber opposite the passage, which also suggests the requirement for a sight line at an early stage in the construction process (DEHN/HANSEN 2006b, 53–54 figs. 7–8).

These are just two examples illustrating that the construction of a passage grave was a process that required the planning and organisation of both materials and work force. It is debated whether megalithic monuments are the product of an unbroken process that concluded with a monument that – in a certain sense – was considered as finished, or whether there was a conscious stepwise process over the course of several seasons or even generations. The latter appears to be the case in Early Neolithic monuments such as Højensvej Høj 7 (BECK 2013). However, when later alterations to the investigated passage graves are ignored, these monuments appear to constitute complex entities with a core that has no evident traces of hiatuses or breaks in the form of vegetation horizons or wash layers. If passage graves were built in one continuous process, this means that a large workforce must have been in action at same time. In turn, this would have required comprehensive and detailed organisation of the work, including internal communication and lines of command. This also applies although the process has been more complex. This is suggested by the internal structures below the mound at the megalithic structure A1 Damsbo Mark, Funen (ANDERSEN 2011, 152 fig. 5).

Fig. 9. Pieces of presumed clay daub from the building shown in figure j at Vasagård. A piece of calcined bone forms the centre of a rosette pressed into the clay. The diameter of the rosette is 3.5–4 cm (photo: P. O. Nielsen).

Organisation and communication in the megalithic construction process

Clear traces of the organisation behind the construction work have not been observed in the investigated passage graves, although some indications are present; for example, in the aforementioned Højensvej Høj 7 (BECK 2013, 44 fig. 6) and two long dolmens at Iberg (DEHN 2015, fig. 10; JUEL/HANSEN/ANDERSEN 2016). In both cases, these monuments have longitudinal or transverse divisions in the mound fill that could suggest a form of cell structure and – associated with this – different work teams. In the long dolmens at Iberg, differences in the mound fill could be observed in the various sections and it seems likely that something similar could have been the case in the passage graves.

The simultaneous application of a large workforce would have required clear communication to inform all of the participants of the overall idea of the project and the specific tasks of the individual groups and the cooperation between them. It is impossible to discover how this was achieved, although recent observations during the investigation of the causewayed enclosure at Vasagård on the island of Bornholm can perhaps shed some light on this aspect. Vasagård is a place of assembly and a multi-period megalithic monument at the site is partly coeval with its use (NIELSEN/ANDRESEN/THORSEN 2015; NIELSEN/NIELSEN/THORSEN 2014). A characteristic feature of the site is numerous so-called sun stones. These are small, round stone discs with inscribed motifs, one of which is a ray-like pattern, with radial lines departing from the centre of the disc. The same site has also yielded ornamented pieces of clay, interpreted as fragments of daub from the wall panels in a round building. Rays also feature as a motif here, with lines radiating out from a central point, which – in a few cases – is marked with a small piece of calcined bone and which form a rosette with a diameter of 3.5–4 cm (NIELSEN/NIELSEN/THORSEN 2014, 97–102 figs. 17–18). For example, these daub fragments have been found in eight postholes associated with a circular structure with a diameter of about 8 m and with a flat, white sandstone block at its centre. The coincidence between this round building with a white stone at its centre and the ray motif on the clay with a central piece of white bone is striking. It is also possible that the eight posts in the building represent a radiating construction, although this cannot be confirmed.

The rosettes with a piece of calcined bone at their centre can be equated with the circular sun motif inscribed into small stone discs of approximately the same size. However, no examples of the latter have been found with a marked white centre. Nonetheless, it does seem likely that parallels can be drawn between the circular ground plan of the building and its architecture and these rosettes, as the pieces of white bone corre-

Fig. 10. Eight postholes associated with a round building with a diameter of c. 8 m. The clay daub shown in figure i was found in two of the postholes. At the centre of the building lies a piece of white sandstone (photo: M. Thorsen).

spond to the white sandstone. The building can be interpreted as an architectonic expression of the same motif as the rosette decoration impressed in the clay fragments and inscribed on the sun stones. The pieces of clay formed part of the building's construction, although the extent to which the building reflects the ray motif, or *vice versa,* cannot be ascertained. However, it is remarkable that people were apparently able to reproduce and recognise the same motif or symbol on both a two-dimensional surface the size of a large coin and in the form of a three-dimensional building.

Conclusions

This observation sheds some light on the level of abstraction that people were able to employ at that time. Therefore, it is conceivable that graphic representations of technical details and complex constructions were also a possibility in connection with the construction of megalithic monuments. This could have been very important with respect to decisions relating to the design of passage graves and in subsequent planning, but would have been particularly useful in the practical execution of the construction project. Graphic explanations such as these could have constituted an important supplement to oral communication relative to the acquisition of building materials and between construction foremen and the other participants. The ability to produce graphic representations of three-dimensional structures could also have been involved in the reports on the construction work and about details of the layout and organisation of the passage graves that were hidden within the monument. Some of these would have been visible in the chamber and passage, when there was access to these, while others were completely concealed within the monument construction. Graphical depictions of important elements such as those hidden within the monument could have reinforced the memory of the monument and the stories about it that only the participants in its construction work could tell.

While these thoughts and ideas about the megalithic construction process that the author has had over the years cannot be demonstrated scientifically, they have emerged in extension of the interpretation of the megalithic architecture – combined with archaeological observations – and can hopefully provide inspiration relative to the interpretation and understanding of new sites and observations in the future.

APPENDIX ON CLIMATE MONITORING IN THE CHAMBER OF A PASSAGE GRAVE

As an important element in megalithic constructions, birch bark was rediscovered in Maglehøj in 1993 and investigated in 1996 (DEHN/HANSEN 2006a, 24–26; 2007, 18–20). This passage grave is covered with earth and has been accessible to the public since it was opened in 1823. Prior to that, the chamber had been free of earth since the Neolithic. Since 1996, the birch bark has been kept under observation and has appeared to be undergoing decay. Therefore, passage grave was closed with a gate for a period to exclude visitors and in 2012 a programme of monitoring of the temperature and humidity in the chamber and its surroundings was initiated in cooperation with the Danish National Museum's Department of Environmental Archaeology and Materials Science (JENSEN/LARSEN 2015).

Sensors were installed in the walls and roof of the chamber, in the earthen mound over the capstones and in the earth beneath the floor. Further to this, a weather station outside the passage grave mound records the precipitation and temperature.

The monitoring is still in progress and aims to establish optimal conditions for the preservation of the birch bark. However, already at present – in November 2015 – preliminary results are available in relation to the bark and the climatic conditions in the earth-covered stone chamber.

The degradation of the birch bark is a natural process of decay caused by air and water, which has been in progress since the bark was placed in the passage grave. The important point is that this decay is not due to bacterial or fungal attack but presumably results from the effect of repeated wetting and drying bringing about physical degradation. Consequently, the humidity conditions in the chamber are an important factor with respect to preservation of the bark.

The monitoring data show that the climatic conditions within the chamber follow the external climate to some degree when there is free access via the passage, i.e. 2–17°C during the course of the year with a fluctuation of up to 3°C from day to day. The humidity varies from 50–100 % RH, resulting in the regular formation of condensation on the roof and walls. If the passage is sealed, the temperature fluctuations stabilise at less than 1°C from day to day, while the annual variation remains unchanged. The humidity also becomes more constant at 90–95 % RH throughout the year and condensation can still form.

This means that the closure of the passage leads to better conditions for preservation of the bark, as desiccation does not take place to the same extent. However, despite the apparently effective exclusion of rainwater over the capstones, the humidity remains relatively high. There

Fig. 11. The chamber in the passage grave Maglehøj with the climate monitoring equipment. Sensors for measuring temperature and humidity can be seen mounted on the surface of the stones and have been installed in the floor and in the earthen mound. Weather conditions – including precipitation – are also monitored outside the mound (photo: T. Dehn).

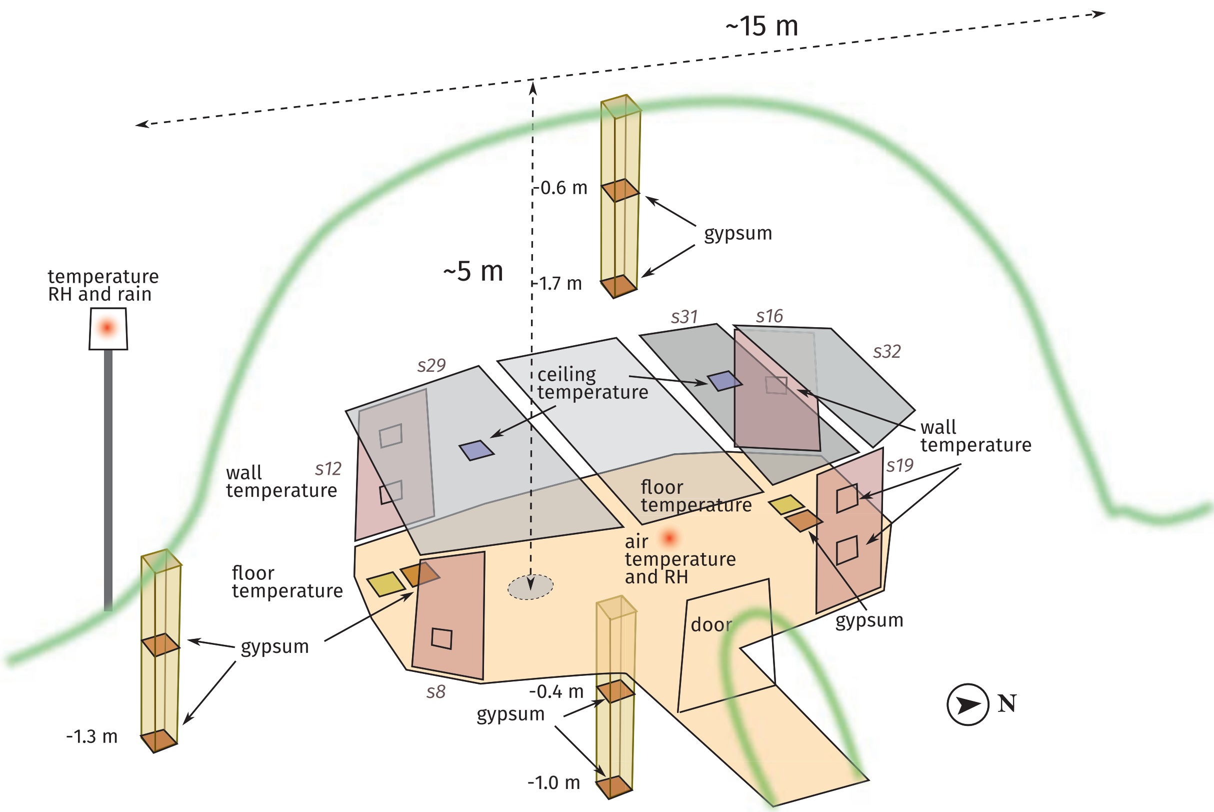


Fig. 12. Sketch diagram of the Maglehøj passage grave showing the sensors for monitoring the climate inside and outside the chamber (T. Padfield after Jensen/Larsen *2015, fig. 4.1).*

is a suspicion that one significant factor involved in the level of humidity in the chamber could be moisture that originates from precipitation outside the mound, but which travels horizontally through the layers of earth into the floor of the chamber. Consequently, in the subsequent period, a membrane was laid out over the floor of the chamber to hinder evaporation from it. Preliminary results suggest that this membrane could make a significant contribution to reducing the humidity within the chamber and thereby lead to improved conditions for preservation of the birch bark. The question is whether the megalith builders were aware of this effect. In the construction, many measures have been taken to keep the chamber sealed and dry, whereby the floor construction could have been one of these. The original chamber floors of these monuments have often been disturbed or broken up, either in prehistory or during early archaeological investigations. However, where information is available, there is usually mention of some form of close-fitting flagstone covering. In the Birkehøj passage grave, at least, the floor does appear to have been made with this effect in mind. A dense clay layer had been carefully laid over a capillary interrupting layer of shingle, which can prevent moisture from rising up from the subsoil (Dehn/Hansen/Westphal 2013, fig. 3).

The aim of monitoring the climatic conditions in Maglehøj is to improve the preservation conditions for the folded birch bark between the slabs of the dry-walling. However, the data can also be used in other contexts where conservation measures are desired, with respect to either the actual monument construction or the preserved burial layer.

ACKNOWLEDGEMENTS

The fieldwork on which these thoughts about the people responsible for building megalith monuments are based was carried out in fruitful collaboration with Svend Illum Hansen and Jørgen Westphal. However, they cannot be held responsible for any of my thoughts and interpretations arising from our joint work.

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Niedertiefenbach reloaded. The builders of the Wartberg gallery grave

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ABSTRACT

The gallery grave from Niedertiefenbach is an extraordinary find for the late Wartberg Group in the Neolithic of the German Lower Mountain Range. In this case alone, a stratified sequence of at least 177 individuals is documented. A new extensive series of radiocarbon dates documents a greater age of the grave than previously published and allows the modelling of a funeral sequence between 3350 and 2900 cal BC. A new palaeopathological analysis – preliminary based on the skulls – shows a high disease burden. First analyses of ancient DNA using high-throughput sequencing (HTS)testify a good preservation and confirm the presence of mitochondrial DNA with haplogroups U5 and X2. The first use of a CAD-CAM computer system (CEREC) provides a detailed assessment of morphological and pathological characteristics of the teeth and jaws providing data for subsequent metric statistical analysis.

INTRODUCTION

The early development of the Wartberg group is correlated with an impressive monumentalisation in the landscape of the central German mountain range between the early 4th and early 3rd millennium BC, starting with vast enclosures. From around 3500 BC, collective burials are constructed of large stone slabs and used until the early 3rd millennium BC (SCHIERHOLD 2014; GESCHWINDE/RAETZEL-FABIAN 2009; MEYER/RAETZEL-FABIAN 2006; RAETZEL-FABIAN 2002a; RAETZEL-FABIAN 2000, 220 ff.; GÜNTHER 1997). The size of these burials ranges between 3 m and 4 m in width and up to 35 m of length. Depending on the preservation, the minimum number of buried individuals ranges from two up to 235 persons, providing a sustainable basis for studies in cultural as well as physical anthropology. This has been conducted on many traditional aspects shifting to a special focus on demography and ancient DNA (aDNA) analyses in recent years (HINZ 2007; HINZ/DEMNICK 2012, 67–70, 72–75; SCHIESBERG 2012; LEE et al. 2014; S. MÜLLER 2012).

In the case of Niedertiefenbach, these studies rely on the old preliminary publication and an early palaeopathological study after the excavation in 1961 (WURM et al. 1963; CZARNETZKI 1966). In the context of an extensive study on early metallurgy, the copper spirals have been analysed, showing a high arsenic proportion and thus forming a part of the SAM Group E01 (WURM et al. 1963, 72; SANGMEISTER et al. 1960, 151; 1974, 208–209, nr. 16481). Nowadays, this group of metals is known as »Mondsee copper«, showing a widespread distribution over Europe from the early 4th to the early 3rd millennium BC (PERNICKA 1995, 99, fig. 43; MATUSCHIK 1998, 240–242; S. KLASSEN 2000; KLASSEN/STÜRUP 2001). The absolute dating of the grave has been based on three traditional radiocarbon dates modelled by means of wiggle-matching in the time span from 2900 to 2750/2700 cal BC, thus pointing to a late use in Wartberg and continuity into the final Neolithic (BREUNIG 1987, 187; MÜLLER 1998, 85 fig.13, 96; RAETZEL-FABIAN 2002b, 3, 5 f. fig.4). A first more detailed analysis including contextualisation of the artefacts and a listing of the orientation of the bones in the differentiated strata of the excavation has been recently published (SCHIERHOLD 2012, 109, 111 f., 296–298.). Many details concerning the dating remain under debate and especially issues regarding the development of the burying community have still not even been asked.

ARCHAEOLOGICAL EVIDENCE AND DATING

The gallery grave had an original length of at least 10 m, although only 4 m with the outer width of 3.2 m was in good condition, with the surrounding stone slabs in the original position. Thus, only 7 m² of the original 18 m² of space for inhumations was preserved with an infill of approximate 70 cm revealing a dense agglomeration of about 1,600 bones from 177 individuals (Fig. 1). This area was excavated and documented in ten artificial strata counted from the top to the final pavement. Natural layers could only be observed in three cases: between strata 3 and 4 several chalk stones indicate an intentional separation, meanwhile strata 5 and 6 were separated by a layer of earth. Several chalk stones above stratum seven might be interpreted as the third artificial division of the inhumation sequence. Only one profile was documented on the southern outside of the undisturbed area, thus showing several disturbances in relation with the missing stone slabs of the long side.

The digitisation of all documented plana, the additional preliminary diagnostic and the recording of

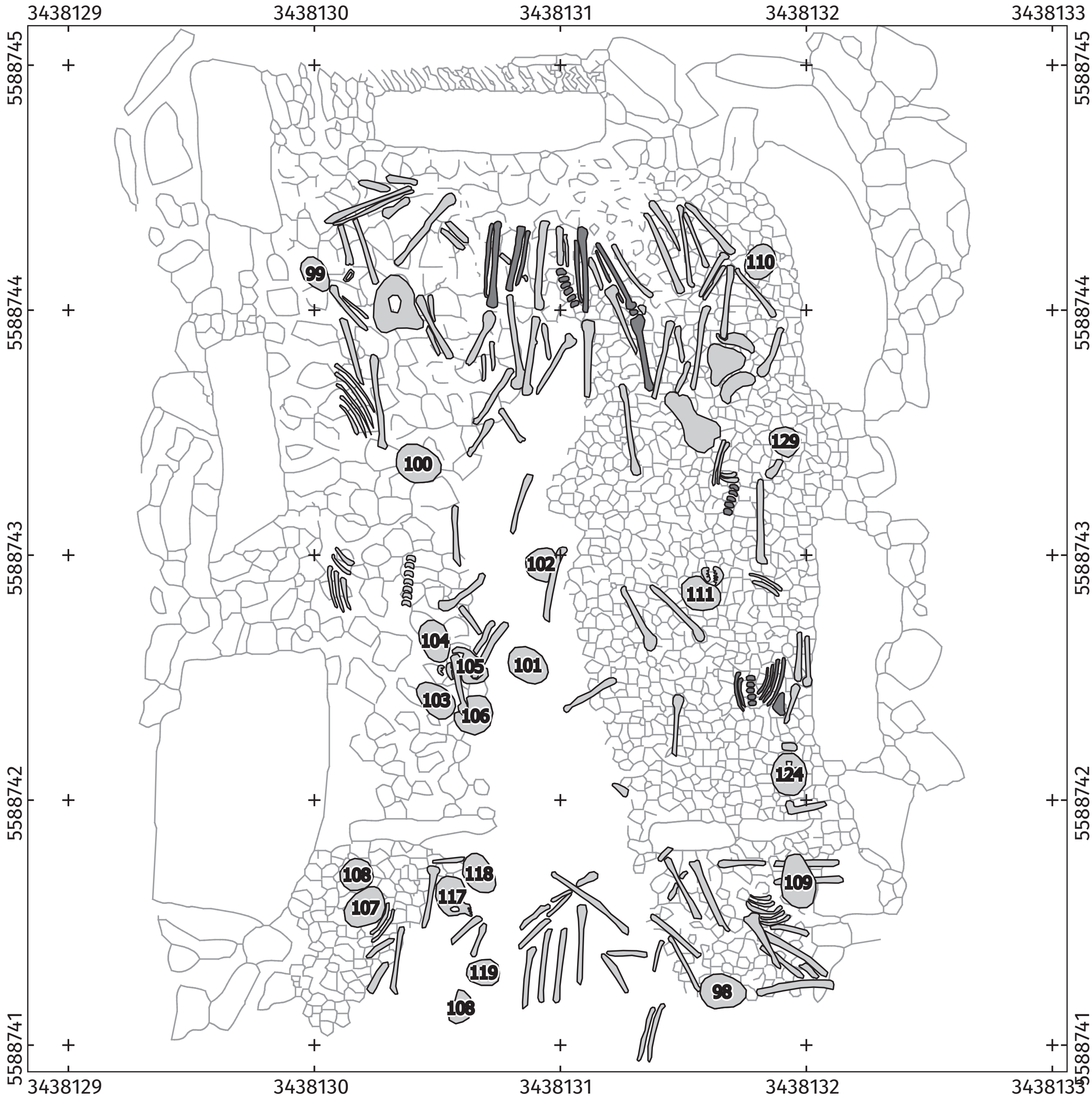

Fig. 1. Plan of the base pavement and surrounding stone slabs with the bones of stratum 6.

articulated parts and their orientation facilitates a first rough presentation without the still needed palaeopathological review of all the bones. The known MNI of 177 has to be put into relation with the 7 m² excavated, thus indicating the highest density of buried persons in the Wartberg context (Tab. 1). Overall, 76 articulated groups with 541 bones were documented, albeit only comprising a high proportion of few bones (25 %: 3, 50 % 5 and 75 % up to ten bones). The articulated parts are dominated by vertebra (173), metacarpalia or metatarsalia (78) and ribs (85). Parts of legs could be documented more often than parts of arms (femur 34, tibia 40, fibula 20, humerus 6, ulna 6, radius 7). The orientation could be detected in 69 cases and shows a clear dominance with the head to the entrance (Fig. 2).

A series of fifteen new radiocarbon dates enables us to establish a well-fitting model of the inhumation sequence (Fig. 3). On the forehand, the old dating into the first centuries of the 3rd millennium has to be rejected, Niedertiefenbach can be dated between 3350 and 2900 cal BC and thus corresponds to the general dating of Wartberg gallery graves (RAETZEL-FABIAN 2000). Only two dates do not fit well into the model:

1. Poz-62870 belongs to individual 142 represented only by its cranium and originated from the base stratum 10. The un-modelled date is 3321–2915 cal BC (95.4 %), which has a very pure coincidence (27 %) with the required preceding position in relation to stratum eight. This might be explained by the very low proportion of collagen (0.7 %) and the date could thus be discarded.
2. Poz-62869 belongs to the individual 2, a single skull in the top-most stratum. With a probability of A=2.6 %, the date cannot belong to the stratigrafic position; therefore, the skull must belong to a previous inhumation and has been transferred into the new position. The strata of the excavation do not correspond to natural layers in general should be referred to as parts of a continuous deposition rate; therefore, boundaries have not been calculated. The stratigrafic separation between strata 5 and 6 coincides with a short decline in the calibration curve and separates well the numerous data even without a modelled boundary. To model the possible stratigrafic separation between strata 6 and 7, the one date from stratum 8 is devoid of archaeological substance.

Suggesting a continuous deposition rate over the 450 years represented by the radiocarbon dating, each stratum resembles a time span of 45 years or approximately one generation. Taking the number of crania per stratum as an approximation for the diseased, a high and probably cyclical variation with maxima in strata 1, 5 and 10 can be detected (Fig. 4). Although stratum 5 is over-represented by five radiocarbon dates and the underlying calibration curve shows two smaller plateaus (3300–3100, 3100–2900 cal BC), the dates do not spread into the preceding stratum. This underlines the closed time span of the deposition and ensures the interpretation of the high number of skulls as an effect of an increase in the population or mortality rate. As stratum 5 starts with an artificial pavement of earth, this development seems to be expected in the living community. Consequently, a demographic variation – e. g. by migration or fertility – seems to be more likely.

Tab. 1. Density of deceased for selected gallery graves of the Wartberg group (MNI: minimal number of individuals, D/m², deceased per m²).

GRAVE SITE	MNI	AREA (M²)	D/M²
Niedertiefenbach (7 m²)	177	7	25
Niedertiefenbach (18 m²)	177	18	10
Altendorf	235	29	8
Bredelem	51	8	6
Sorsum	105	18	6
Rimbeck	125	23	5
Calden II	84	20	4

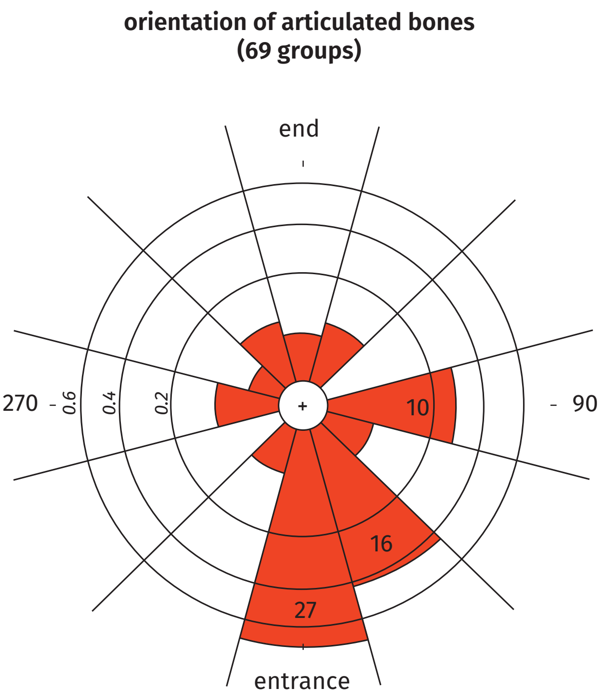

Fig. 2. Orientation of articulates bones (cranial – caudal) in relation to the chamber entrance.

HUMAN OSTEOLOGY AND PALAEOPATHOLOGY

The teeth have been scanned with today's new method in restoration dentistry with a CAD/CAM system that produces a 3D image of the teeth on the fly. The method has existed since 2005 and can deal with reflecting dentine at the current state. As a result of the widespread use in today's dental prosthetics, there is a huge database of at least 400 samples for each modern tooth. For the data of Niedertiefenbach, two aspects of method evolution are now underway: first, we want to quantify variation to modern teeth and check individual variation; and second, we hope to establish a new method to quantify abrasion, although this is still on paper. At least 100 jaw fragments and 150 molars have been scanned, whereby the database of modern teeth will be expanded by prehistoric evidence.

The recent investigation of the human remains of the Niedertiefenbach grave focused on the examination of crania, including the mandible. With an assemblage of 1,600 bones minimum, cranial and mandible fragments were easily identifiable body parts and good

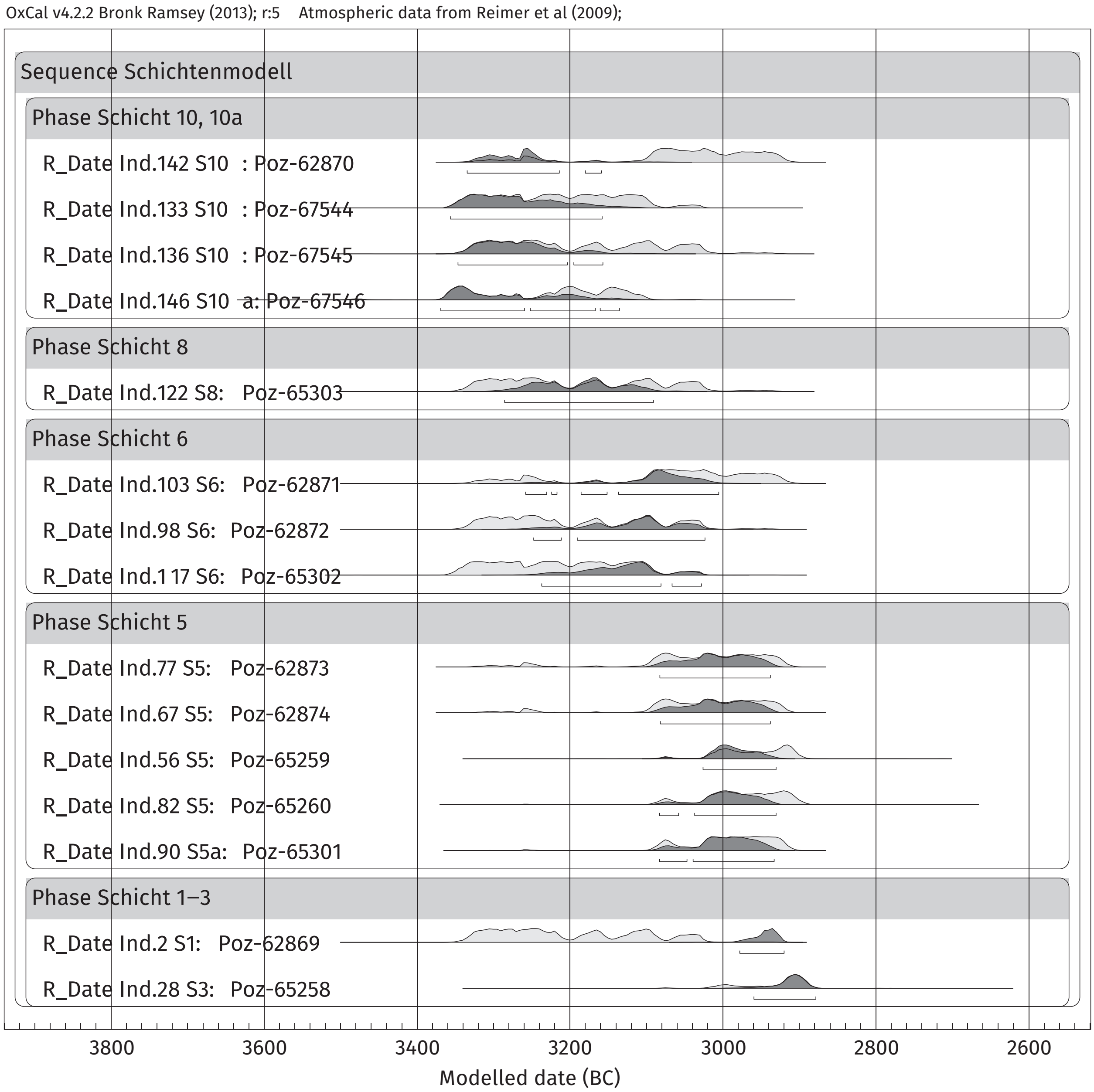

Fig. 3. Radiocarbon dates modelled in the stratigrafic sequence (OxCal v4.2.2).

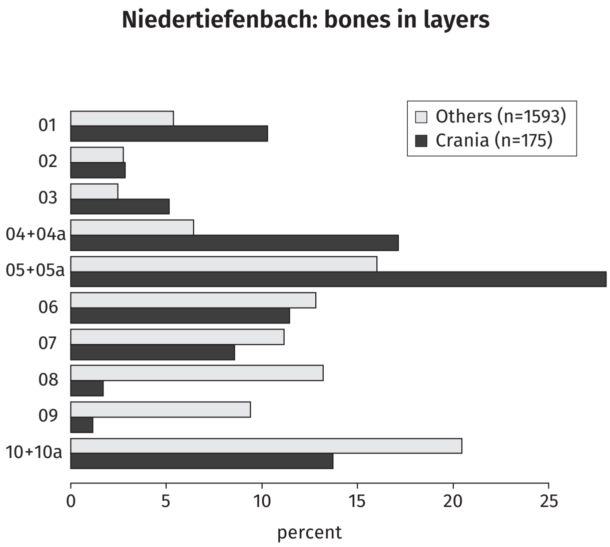

Fig. 4. Percentages of crania and postcranial bones in the strata (top to bottom).

indicators of individual sex and age, as well as many pathological lesions. As part of this preliminary study, a total of 157 cranial remains were examined macroscopically. These fragments represent a minimal number of 42 individuals, located in different layers of the inner burial structure. The age and sex distribution provides evidence that the sample is representative of an average population. Although the sample size is not yet sufficiently strong to make concrete interpretations, it is sufficient for a first impression regarding the diseases present in the population.

Skeletal changes due to disease and physical stress can be numerous and diverse, with various causes; for instance, infection, trauma or malnutrition. The human skulls of the Niedertiefenbach grave showed lesions of different aetiologies and conditions. This paper focuses on two main aspects of paleopathological conditions: one relates to anaemic reactions and the second is associated with non-specific changes to the ectocranical and endocranial surfaces.

The human physical response to anaemic conditions is the increased production of blood cells in the bone marrow in specific areas of the skeleton, including the skull. Trabecular expansion in the orbital roof (cribra orbitalia, (Fig. 5) and porotic structures on the lamina externa (hyperostosis externa) are said to be typical symptoms for intensified haematopoiesis[1] (ORTNER 2003, 363–376; ROBERTS/MANCHESTER 2005, 165–170; WAPLER et al. 2004). A higher activity of haematopoiesis can be caused by blood loss or increased physical stress (growth process, pregnancy, menses, trauma, diseases; e.g. malaria, parasitic infections, high pathogen load, dyspepsia, vitamin C deficiency), increased blood cell breakdown (genetic disorders; sickle cell anaemia, thalassemia) or disorders of the erythropoiesis itself (e.g. iron, nutritional; folic acid or vitamin B 12 deficiency; all c.f. WALKER et al. 2009).

Symptoms associated with anaemia were identified in the majority of the relevant cranial fragments (cribra orbitalia: 66 %, n=47[2]; porotic hyperostosis: 12.5 %, n=68), with different stages of severity (WAPLER et al. 2004; SCHULTZ 1988). Sub-adults, very young children and females tended to be more affected, in terms of both frequency and severity. This is especially true for infants. Regardless of the exact reasons for the anaemic symptoms, the data from Niedertiefenbach suggests that the age of an individual seems to be more significant than gender[3].

Given that bone is a tissue that remodels extensively, it reacts to changes of internal processes such as the production of blood cells. Other diseases can also cause non-specific lesions, such as the inflammation of bony structures or the surrounding soft tissue, as well as bleeding into the external cortical layers or increased vascularisation (fig. 7; SCHULTZ 1993; WESTON 2012; LEWIS 2004). These types of lesions are prevalent on the outer (ectocranial) and inner (endocranial) surface of the crania. It cannot be diagnosed whether these pathological changes are due to chronic or acute physiological processes[4] without applying further analyses, e.g. histology.

For the human remains from Niedertiefenbach, a total of 62 cranial fragments were examined for changes to the bone surface associated with haemorrhagic or inflammatory processes. The results indicate that a high number of individuals were affected by disease processes on the endocranial surface (84 % of individuals affected, with 29 % high severity), as well as the ectocranial surface (61 %). Regarding the age and

1 The pathogeneses of cribra orbitalia and porotic hyperostosis as part of a convergent symptom is discussed. This is also true for the potential confusion of cribra orbitalia with other porotic lesions, due to e.g, inflammatory processes of the orbita (WALKER et al. 2009; SCHULTZ 2001).

2 To avoid doubling, only fragments with more than 25 % preservation and different labelling had been considered

3 As sex determination of children and juveniles has not been conducted, this cannot be claimed for subadults. It cannot be excluded that girls were more prone to anaemic reactions than boys.

4 The exact character and interdependences of the prevalent lesions and thus further diagnoses shall not be an issue of this paper.

sex distribution, there is a slight tendency for stronger bony reactions with increased age and among males. Severe symptoms also occur in young children. Causes for the observed lesions are again multifarious. The inner cranial surface is often affected by inflammation (e. g. of the meninges due to bacterial or viral infection, cf. PATTERSON 1993) or cerebral haemorrhages (due to trauma or vessel damage), while similar conditions occur on the outer cranial surface (e. g. inflammation of the scalp, cf. SCHULTZ 1988, fragile vessels due to scurvy, cf. MAAT 2004).

This data suggests that a high number of people buried in the gallery grave suffered from diseases related to specific and/or unspecific pathological modifications of the cranial surfaces. Considering palaeopathology as an indicator for quality of life, it is important to consider whether diseases are highly infectious or primarily due to malnutrition. For more detailed and careful diagnoses, we need to explore disease aetiology and progression. This requires careful analysis of the postcranial skeleton and the expansion of analytical methods (e. g. histology, scanning electron microscopy, cf. SCHULTZ 2001). Another approach to identify is to detect the causing agents through aDNA analysis. Aside from applying further methods, we must embed the results in a wider context and compare them to those of contemporary, pre-modern and modern populations.

Fig. 5. Anaemic symptoms, cribra orbitalia: A 3–4 year old infant showing strong trabecular growth at the orbital roof as a result of increased blood production (photo: S. Jagiolla).

ANCIENT DNA: INTERIM RESULTS

The analysis of the human genome allows a variety of insights into the individual, such as gender or genes associated with the susceptibility to diseases. However, in addition DNA also provides information about ancestry and kinship of individuals and groups. The special advantage of aDNA analysis is the chance to have a diachronic view of individuals or living beings. Recovering human DNA from archaeological material also reveals DNA from other organisms such as bacteria, fungi or plants. This genetic information can be used to look into decomposition processes after death and related inhumation processes. The skeletons from Niedertiefebach provide a potential resource for investigations related to this topic, as it remains under debate whether gallery graves have been used as an ossuary or places where decomposition took place. To investigate the remains from Niedertiefenbach, a pilot study was initiated with two objectives: first, to test the preservation of aDNA in the bone material; and second, to establish methods and bioinformatic tools for decomposition and taphonomic processes.

Ancient DNA was extracted following well-established and previously-described methods (e.g. LEE et al. 2012; 2013). All samples were processed in clean room facilities dedicated to ancient DNA work and blank controls were included in all steps of ancient DNA work. To test the preservation of aDNA in the bone specimens, a PCR-based approached was used to amplify and sequence 180 base pairs of the mtichondrial hypervariable region 1 of seven samples (NT002, NT023, NT110, NT145, NT146, NT147, NT148). This was successful in four cases (NT002, NT146, NT147, NT148), which indicates good preservation conditions in the skeletons of Niedertiefenbach in comparison to single graves in the same region (KRAUSE-KYORA/RINNE 2014) and considerable better than in other contemporaneous samples from collective burials (LEE et al. 2014).

Fig. 6. Endocranial lesions: Male individual, lamina interna and superior sagittal sulcus. Traces of increased vascularisation and new bone formation, probably due to inflammatory processes of the dura mater and the venous sinus (photo: S. Jagiolla).

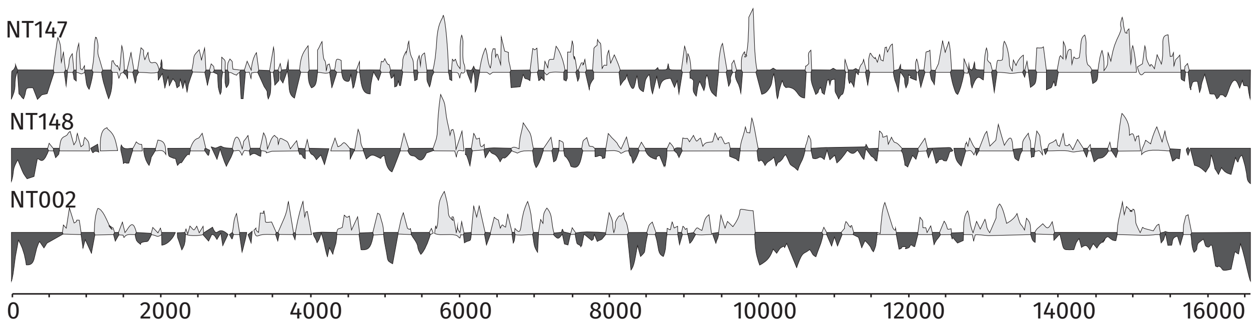

Fig. 7. Outline of the sequence and the covering of the mitochondrial genome of the samples NT002, NT147 and NT148.

To determine DNA of other bacteria involved in the decomposition processes, we performed high throughput screening (HTS) for all seven samples. In theory, this method allows sequencing all DNA fragments present in a sample. Protocols for HTS followed those previously described (SCHUENEMANN et al. 2013). Every sample underwent two different processes: one part was sequenced directly showing all kinds of deterioration (SAWYER et al. 2012) to determine the authenticity of the extracted DNA; and for a second part, we used an enzymatic repair in advance to the sequencing. This procedure allows correcting mutations that accumulate over time in ancient DNA by different chemical and physical degradation processes. A first bioinformatic analysis was performed using the pipeline EAGER established by Alexander Peltzer (Integrative Transcriptomics, Tübingen). In all seven samples, authentic human aDNA could be observed. The HTS of the blank control revealed no evidence of human DNA.

Despite the small amount of sequences produced, the entire mitochondrial genome could be reconstructed for three samples. The variants in the sequence were determined in comparison to the rCRS (revised cambridge reference sequence) (Fig. 7). Using the software Haplograp (KLOSS-BRANDSTÄTTER et al. 2011), the following haplogroups could be determined: NT148 : U5b1d2, NT002 : X2b and NT147 : X2c1. Both haplotypes are well known from Neolithic sites in central Europe (BRANDT et al. 2013; 2015; HAAK et al. 2015). The small number of successful typed individuals did not allow any conclusions about the haplotype frequencies of the burial community from Niedertiefenbach. The rare hyplotyp U5 is regularly related to Mesolithic groups in Europe (BRAMANTI et al. 2009; HERVELLA et al. 2012; LEE et al. 2012; MALMSTRÖM et al. 2009; BRANDT et al. 2013; BRANDT et al. 2015). The frequency rapidly decreases in the early Neolithic and does not increase from rare evidence during the following period before the final Neolithic (BRANDT et al. 2013; 2015). Thus, the single evidence in Niedertiefenbach fits well into this general pattern. The two pieces of evidence of the rare but continuously present haplotype X2 seem remarkable, although the samples do not belong to the same haplogroup. The results of the first screening showed that the preservation conditions for aDNA are given in Niedertiefenbach and promising results in further analyses can be expected.

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Physical strain on megalithic grave builders from Wartberg and Funnel Beaker Culture in Northern Germany – Erwitte-Schmerlecke, Völlinghausen, Calden I, Großenrode II and Rheine

Susan Klingner, Michael Schultz

ABSTRACT

The human remains from two megalithic tombs (ERWITTE-SCHMERLECKE II and III) were examined. The two gallery graves were erected near Erwitte-Schmerlecke, Westphalia, by the people of the Wartberg Culture approximately between 3600/3500 and 2900/2800 calBC. In addition, the human remains of four other megalithic tombs, from Völlinghausen, Calden I, Großenrode II and Rheine were examined during the course of two medical dissertations for comparative purposes. The results obtained from these six megalithic tombs provide a broad overview of the nature and the frequencies of diseases and various non-physiological changes in these early Neolithic populations in north-west Germany. The human remains excavated at Erwitte-Schmerlecke – altogether more than 60,000 bones and bone fragments – were examined with anthropological methods for age at death, sex and stature as well as palaeopathological diagnoses macroscopically by low power microscopy and – if necessary – radiologically, endoscopically, scanning electron microscopically and biochemically. The minimum number of individuals based on the teeth in Erwitte-Schmerlecke II is 324, in Erwitte-Schmerlecke III 446, in Völlinghausen 53, in Calden I 26, in Großenrode II 40 and in Rheine 21. Based on the femora, the minimum number of individuals in Erwitte-Schmerlecke II is 216, in Erwitte-Schmerlecke III 54, in Völlinghausen 19, in Calden I 49, in Großenrode II 23 and in Rheine 5. In Erwitte-Schmerlecke II, all age groups are present and the average stature in females was 148.41 cm and in males 163.7 cm. A large proportion of the remains showed signs of physical strain due to intensive physical activity, as might be the case during the work on megalithic tombs, certainly due to daily intensive labour for basic needs like food and housing. Stress markers seen at the bone surfaces are evidence of this.

INTRODUCTION

Little is known about the people living in megalithic times in Central Europe, especially those buried in the gallery graves of the Hessian-Westphalian Megalithic Soest Group and from Wartberg Culture and the Funnel Beaker Culture in general. There are anthropological studies on the collective graves of Erwitte-Völlinghausen (FIBIGER 2012) and Soest-Hiddingsen (MAUÉ 1939; CZARNETZKI 1966), which are part of the Soest Group and others like Rimbeck (HAUSCHILD 1940), Henglarn I (GÜNTHER 1992), Wewelsburg I (GÜNTHER/VIETS 1992), Warburg I, III and IV (LÖWEN 1997) and Kirchborchen II (CZARNETZKI 1976) in Westphalia; Altendorf (PERRET 1938), Niedertiefenbach (CZARNETZKI 1963 and 1966), Calden I and II (CZARNETZKI 1966; UENZE 1951 and 1956; RAETZEL-FABIAN 2000; PASDA 2000), Züschen I (BOEHLAU/VON GILSA ZU GILSA 1898; KAPPEL 1981), Niederzeuzheim (UNRATH 1980) in Hesse, and Sorsum (CZARNETZKI 1966), Bredelem (CZARNETZKI 1966) and Großenrode I (examined by K. KREUTZ, Gießen, M. POHL, Düsseldorf und H. SCHUTKOWSKI, Göttingen, cf. RINNE2002) in Lower Saxony. However, almost all of these analyses were carried out in the 20th century and make no claim to be complete or remain even unpublished (cf. SCHIERHOLD 2012; CZARNETZKI 1966; HAUSCHILD unpublished). Moreover, many human remains were destroyed and lost in wartime and can no longer be investigated (cf. SCHIERHOLD 2012). Besides, in the 19th century most of the anthropological findings were not documented and preserved (cf. SCHIERHOLD 2012; ERHARD 1836; BOEHLAU/VON GILSA ZU GILSA 1898; ROSSEL 1859).

Only in recent times have the importance and informative value of human remains been acknowledged and the excavation methods have become more extensive with the use of technical instruments and better documentation, as was realised – for example – for the excavations in Erwitte-Schmerlecke (e. g. SCHIERHOLD et al. 2012).

It is important to carefully investigate the preserved human remains of previous excavations again with present-day anthropological and palaeopathological knowledge and methods and especially standardised methods within one workgroup, whereby the results are comparable with results of Erwitte-Schmerlecke, investigated for the first time. With the determination of the personal status (sex, age at death, stature and handedness) and the state of diseases for the individuals in the different megalithic populations, insights can be gained into the casuistics, aetiology and epidemiology of diseases in the Megalithic Culture in north-west Germany. It is also possible to write – to a certain extent – a biological biography for the buried persons based on individual research results, even for just one examined bone type (e. g. SCHULTZ 2011a).

The research results provide additional information about the biological ancestry, morbidity (frequencies of diseases) and mortality of these megalithic burial communities. To a certain extent, the results also allow a reconstruction of environmental conditions (diet, habitation, labour, climatic conditions, hygiene) and, therefore, of the quality of life in megalithic times. Details of social, economic and political conditions can possibly also be obtained (KLINGNER/SCHULTZ 2009; KLINGNER/SCHULTZ 2012; SCHULTZ 1982; SCHULTZ/SCHMIDT-SCHULTZ 2007; SCHULTZ 2011a). By comparing the results of different megalithic burial sites, a broad overview of living and health conditions in megalithic times can be gained.

MATERIALS AND METHODS

Materials – Graves examined and their locations

The human skeletal remains examined from gallery graves Erwitte-Schmerlecke II and III in North-Rhine Westphalia were excavated from 2009 to 2013 within the scope of the DFG-funded cooperation project »Genesis and Structure of the Hessian-Westphalian Megalithic Soest Group« by the department of Pre- and Protohistory of the University of Münster in Westphalia and the LWL-Archaeology for Westphalia in Olpe.

The late Neolithic necropolis of Erwitte-Schmerlecke is located westward of the city of Schmerlecke next to the motorway 1, which follows the course of a medieval long path, the »Hellweg« and belongs – together with the graves of Soest-Hiddingsen, Soest-Ostönnen, Erwitte-Völlinghausen and Anröchte-Uelde – to the Hessian-Westphalian Megalithic Soest Group (SCHIERHOLD et al. 2012). This necropolis was erected during the Wartberg Culture between 3600/3500 and 2900/2800 calBC (dating results from DFG-Project »Improved Timescales from Bone Dates: Isotopes, Reservoir and Diet« within the DFG-Priority Program 1400) and originally comprised three collective graves, one of which had already been excavated and destroyed (SCHIERHOLD et al. 2011; SCHIERHOLD et al. 2012; LENTZE 1882). The newest archaeological results suggest otherwise. The necropolis of Erwitte-Schmerlecke comprises two graves, rather than – as originally thought – three. There is evidence that Grave III presented here is the disturbed Grave I, known since 1880 (personal communication from K. Schierhold; see also Schierhold in this volume). In order to avoid any confusion, this Grave I will still be alluded to as Grave III in this article.

The archaeological analysis of the two burial chambers took place at the University of Münster (SCHIERHOLD et al. 2011; SCHIERHOLD et al. 2012) and the recovered human remains of both graves were examined in the Palaeopathology workgroup at the Center of Anatomy of the University Medical Center Göttingen (KLINGNER et al. 2012; KLINGNER/SCHULTZ 2012; KLINGNER/SCHULTZ 2015; KLINGNER/SCHULTZ 2017).

In general, the preservation of the human remains from Erwitte-Schmerlecke is very good on the outer bone surfaces as well as the inner structure of the bones, which is a result of the limestone slabs used for building the burial chambers (KLINGNER/SCHULTZ 2012). The preservation and representation of the human bones in Erwitte-Schmerlecke Grave II is much better than for those in Grave III. In this grave, only the lower part of the chamber was preserved and

Fig. 1. Locations of the megalithic tombs in North-West Germany. The location of the graves of Erwitte-Schmerlecke are marked in red, Völlinghausen in blue, Rheine in green, Calden I in yellow and Großenrode II in purple.

the bones are highly fragmented. This is due to ploughing in this area and the topographical higher location of Grave III, which made it more prone to erosion over the millennia. Unfortunately, in the two graves, there were no intact anatomically-correct relations – as could be expected for collective burials – and the examinations had to take place for individual bone types.

For comparison purposes, the human remains already excavated from the Wartberg Culture graves of Völlinghausen in North-Rhine Westphalia and Calden I in Hesse, the megalithic tomb of Rheine in North-Rhine Westphalia and the Wartberg Culture to Walternienburg culture collective burial chamber of Großenrode II in Lower Saxony were also examined within the project in the course of two medical dissertations (Fig. 1). These four megalithic tombs were excavated up to several decades ago. Völlinghausen was first excavated in 1968 and 1991 to 1993 and Calden I in 1948 (SCHIERHOLD 2012). Rheine was examined in 1983 (WIECHERS-WEIDNER 1985) and Großenrode II in 1989 and 1990 (e.g. HEEGE/HEEGE 1989; HEEGE 1992; RINNE 1996). No comprehensive research results on the human remains in these graves could be found. Besides, the results produced within one workgroup with standardised research criteria provide a more stable basis for the comparison of the results.

Preliminary work

Very time-consuming preliminary work was necessary before the actual examinations of the human remains excavated in Erwitte-Schmerlecke could begin. The remains had to be carefully and competently cleaned at the excavation site and this was also kindly undertaken in Olpe at the LWL before they were transported to Göttingen.

During the excavation more than 20,000 teeth, bones and fragments of each were measured with a tachymeter to assign a number in Erwitte-Schmerlecke II and more than 11,000 teeth, bones and fragments of each in Erwitte-Schmerlecke III. Altogether, there are more than 60,000 finds, due to varying numbers of different bones, teeth and fragments of each for one number.

The bones and teeth had to be sorted and catalogued according to anatomical regions. During this process, bones and teeth had to be reconstructed partly from very small fragments and from fragments found in different parts of the grave, but belonging to one bone or one individual (Fig. 2).

The fragments were glued together with water-soluble wood glue (Ponal®). Often merely due to the reconstruction, the identification of from which side of the body the bones and teeth came was possible.

Methods

Age at death (e.g. ACSÁDI/NEMESKÉRI 1970; BROTHWELL 1972; FLECKER 1932; GRAY et al. 1967; HANSMAN 1962; HARET et al. 1927; KERLEY 1965; KERLEY/UBELAKER 1978; MARESH 1970; MCKERN/STEWART 1957; NOVÁČEK 2012; NEMESKÉRI et al. 1960; PYLE/HOERR 1955; SCHEUER/BLACK 2004; STLOUKAL et al. 1999; KOPSCH 1952; RUFF 2007; SCHINZ et al. 1979; WOLF 1999; WOLF-HEIDEGGER 1954), sex (e.g. BLACK III 1978; ČERNÝ/ KOMENDA 1980; DIBENNARDO/TAYLOR 1979 and 1982; HERRMANN et al. 1990; MACLAUGHLIN/BRUCE

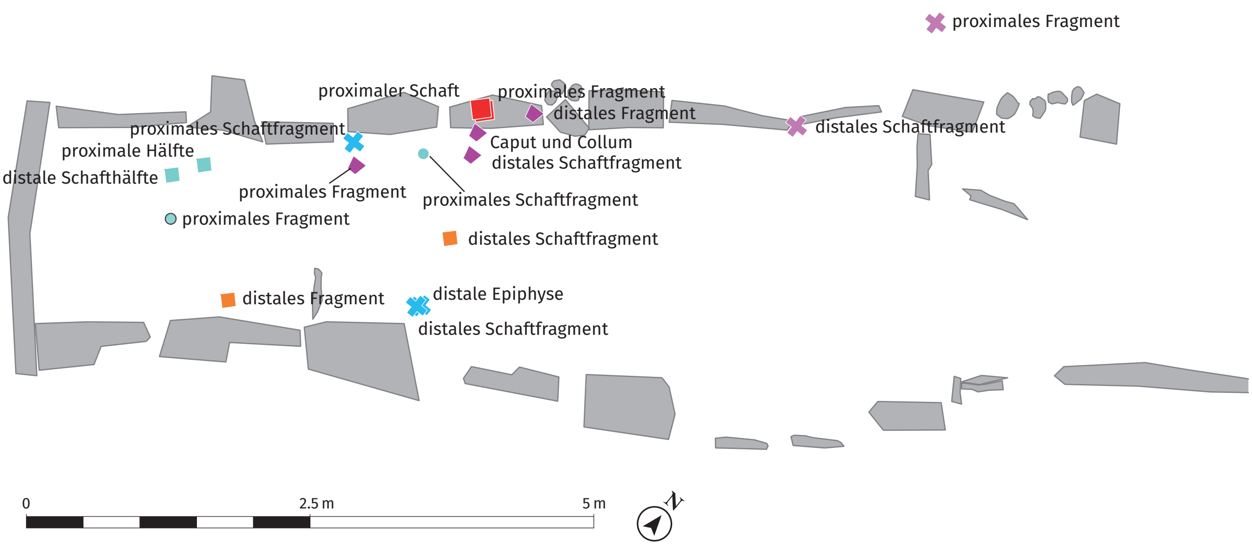

Fig. 2. Scattering of femur fragments originating from one bone in Erwitte-Schmerlecke II. Examples of six femora (each femur with a different symbol).

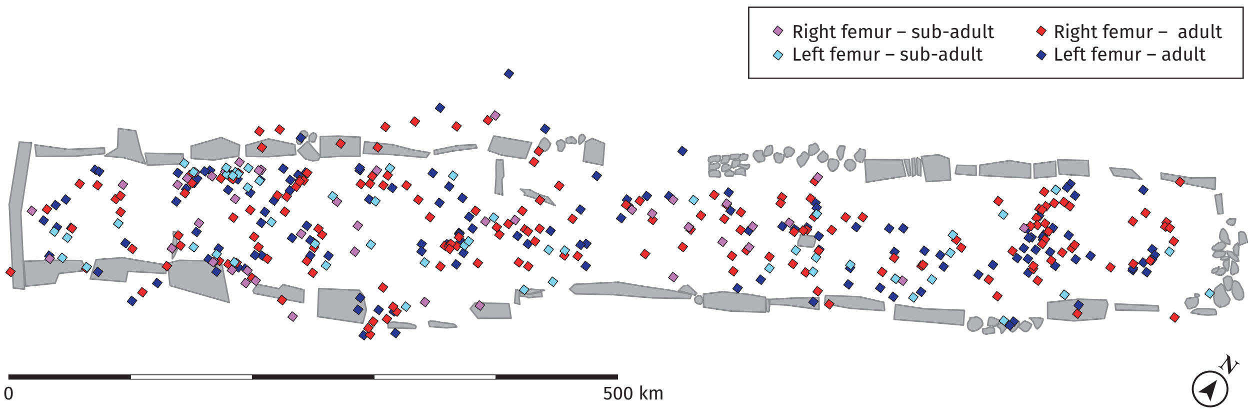

Fig. 3. Points where the left and right sub-adult (pink: right femur, light blue: left femur) and adult (red: right femur, dark blue: left femur) femora in Erwitte-Schmerlecke II were found. So far, for 23 individuals, a left femur could be assigned to a right femur (Fig. 4).

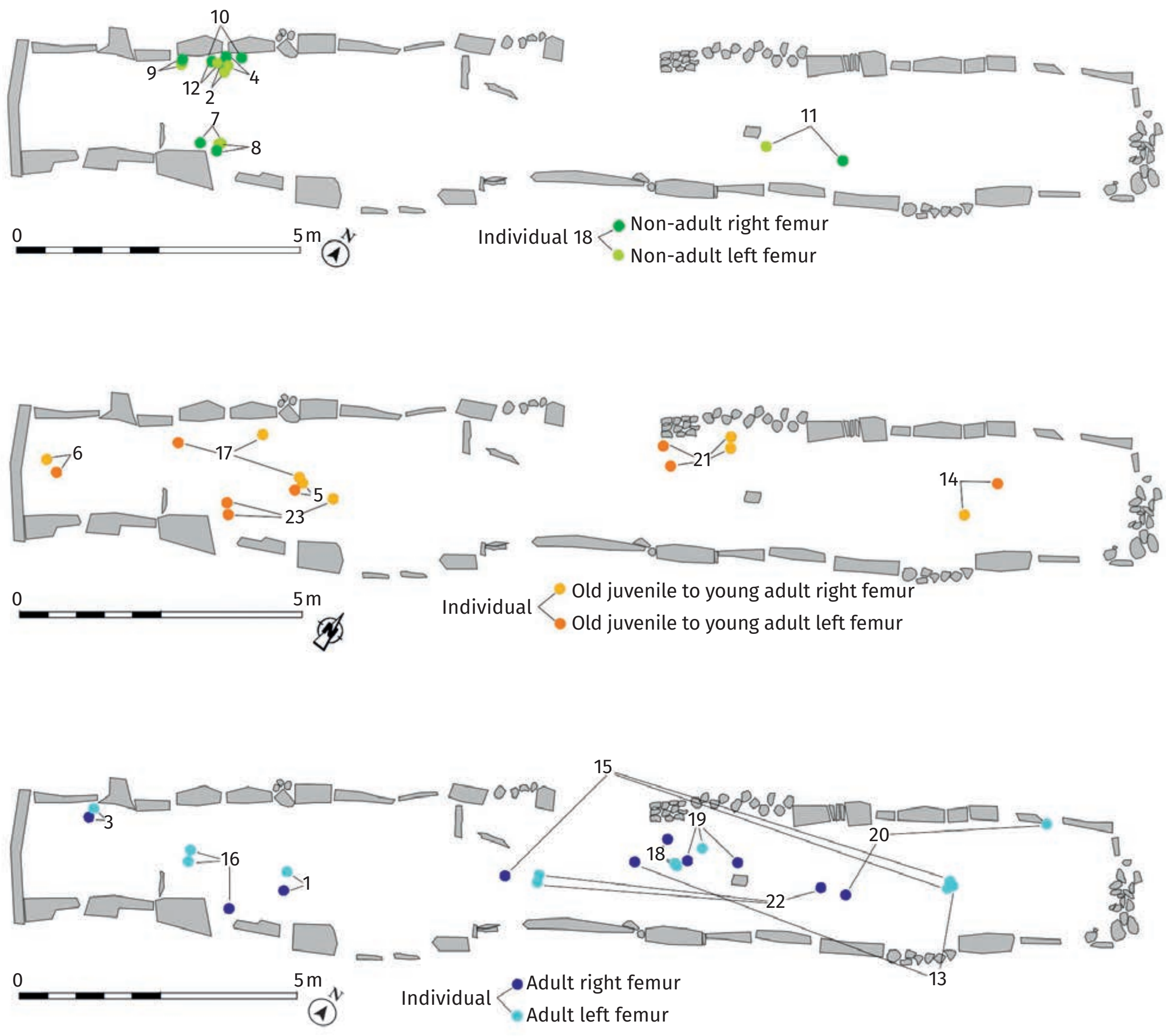

Fig. 4. Distribution of left and right femora of individuals within all age groups in Erwitte-Schmerlecke II.

Tab.1. Individuals present in different age groups in Erwitte-Schmerlecke II.

AGE GROUP	INDIVIDUALS
Infans Ia (0–2.9 years)	8
Infans Ia to Infans Ib	2
Infans Ib (3–5.9 years)	6
Infans Ib to Infans II	4
Infans II (6–13.9 years)	19
Infans II to Juvenis	4
Juvenis (14–19.9)	3
Old Juvenis to young Adultus	14
Adultus (20–39.9 years)	9
Young Adultus (20–29.9 years)	24
Old Adultus (30–39.9 years)	not determinable
Maturus (40–59.9 years)	4
Young Maturus (40–49.9 years)	not determinable
Old Maturus (50–59.9 years)	not determinable
Senilis (> 60 years)	not determinable
»Adult«, not further determinable	119

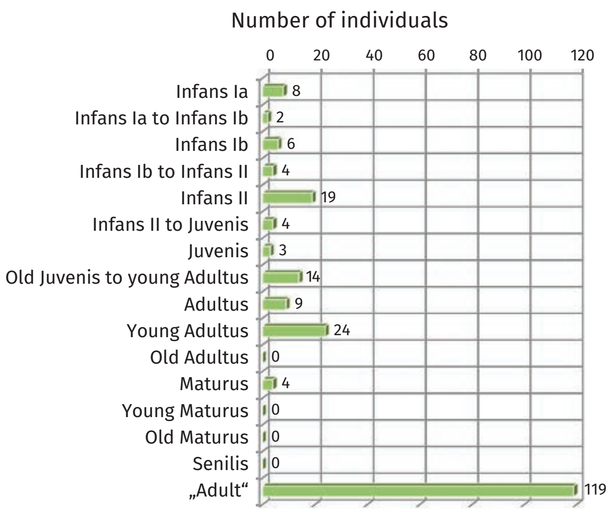

Fig. 5. Individuals present in different age groups in Erwitte-Schmerlecke II.

1985; PEARSON/BELL 1917–19, PETTENER/BRASILI-GUALADI 1979; SCHEUER/BLACK 2004; SEIDEMANN et al. 1998; STEWART 1979) and stature (PEARSON 1899) were determined by forensic anthropological and physical anthropological methods, because no real anatomic relations could be found and the examinations had to be carried out for single bones, teeth and bone and tooth fragments.

For palaeopathological diagnoses (SCHULTZ 1988a), all accessible bone surfaces were examined macroscopically and by low power microscopy. Furthermore, X-rays were prepared for palaeopathological diagnoses, age estimation (ACSÁDI/NEMESKÉRI 1970; NEMESKÉRI et al. 1960; STLOUKAL et al. 1999) and inspection of the development of the pneumatic cavities in skulls. An endoscopic examination took place for the internal skull and its cavities, if the skull was preserved whole and for cavities of long bones, which were fractured post-mortem – for example – for pathological changes in the paranasal sinuses and the middle ear and signs of pathological changes in the cancellous bone structure of long bones. For macroscopically non-diagnosable findings, thin-ground sections were prepared, which allow the identification of diseases and their stages by light microscopy (SCHULTZ 1988b; SCHULTZ 2001; SCHULTZ 2011b). Thin-ground sections were also prepared for all useable adult femurs of the best represented side of the body, for age estimation (KERLEY 1965; KERLEY/UBELAKER 1978; NOVÁČEK 2012; WOLF 1999) and to obtain a more detailed age distribution. Scanning electron microscopy was used for differentiation between intravitam and post-mortem changes which generally allows examining surfaces of three-dimensional specimens with a magnification of up to 2,000 (SCHULTZ 1988b). For further specification of diseases, a few selected samples were analysed using very time-consuming biochemical analyses of extracellular matrix proteins (SCHMIDT-SCHULTZ/SCHULTZ 2004; SCHULTZ et al. 2007).

RESULTS

Given that bone preservation is better in Erwitte-Schmerlecke II, primarily the results of the examination of the human remains for this grave will be shown. Due to the numerous specimens of femora and teeth and due to the informative value and the significance of both anatomical regions, only the results of these examinations will be presented. These results will be compared to selected examination results of femora and teeth from Erwitte-Schmerlecke III, Völlinghausen, Calden I, Großenrode II and Rheine.

Erwitte-Schmerlecke II – Femora

Of the 1,081 femora and femur fragments, a minimum number of 216 individuals could be established. Among these individuals, 46 were sub-adult, 14 in transition from sub-adult to adult and 156 adult. Figure 3 shows the points where the left and right femora of sub-adult and adult individuals in Erwitte-Schmerlecke II were found.

Almost all age groups were present (Tab. 1, Fig. 5). Of the 156 adult individuals, 119 could not be assigned to a

Tab.2. Female, male and-non-sex-determinable individuals in different age groups in Erwitte-Schmerlecke II.

AGE GROUP	SEX						
	FEMALE	PRESUMABLY FEMALE	TENDENCY FEMALE	FEMALE = MALE	TENDENCY MALE	PRESUMABLY MALE	MALE
Sub-adults	*n. d.*	*1*	*6*	*33*	*5*	*1*	*n. d.*
Old juvenile to young adult	*2*	*0*	*1*	*0*	*4*	*4*	*3*
Adult	*21*	*29*	*18*	*6*	*15*	*29*	*38*
Total number	*23*	*30*	*25*	*39*	*24*	*34*	*41*

n. d.: not determinable

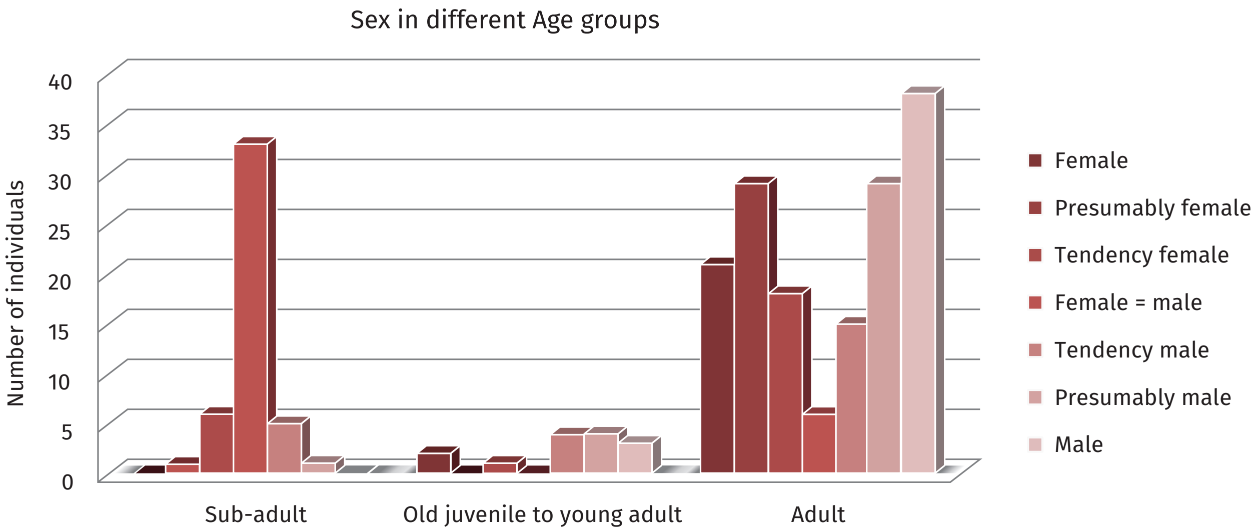

Fig. 6. Female, male and non-sex-determinable individuals in different age groups in Erwitte-Schmerlecke II.

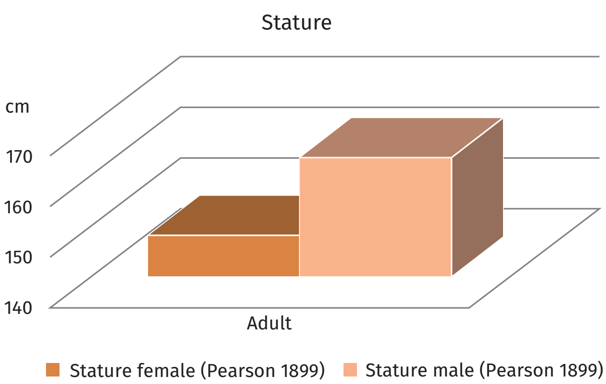

Fig. 7. Mean stature of females and males from Erwitte-Schmerlecke II. Calculated according to Pearson 1899.

special adult age group. The most frequently-seen side for sub-adults was the left side and for adults the right side. From the shafts of all adults, right femora thin-ground sections were prepared for a histomorphometrical and histomorphological age determination if the bones were suitable for these determination methods. The examination of the thin-ground sections is not yet completed, but it already allows classification of the adult femora within the adult age groups for periods of ten years.

Among the human remains (femora) of Erwitte-Schmerlecke II, a minimum number of 53 females and 75 males could be determined. For 88 individuals, no certain sex classification was possible (Tab. 2, Fig. 6). Including the tendency female and tendency male individuals, the maximum number of females is 78 and the maximum number of males is 96 (Tab. 2, Fig. 6). The individuals whose sex could not be determined are almost all sub-adult individuals, because the sex of sub-adult individuals determined only based on femora is not reliable (SCHUTKOWSKI 1989).

The stature (according to PEARSON 1899) of adult females varied between 144.8 cm and 153.6 cm (± 3.3 cm) and the stature of adult males between 158.4 cm and 168.7 cm (± 3.3 cm). The mean stature of adult females was 148.4 cm and of adult males 163.7 cm (Fig. 7).

In sub-adult individuals, all examinable femora showed signs of deficiency diseases as well as signs suspicious of anaemia (Tab. 3, Fig. 8). The frequency of signs suspicious for deficiencies in adults is over 30 %. Moreover, musculoskeletal stress markers (MSM; e.g. HAWKEY/MERBS 1995), respectively entheseal changes (EC; VILLOTTE/KNÜSEL 2013; GRESKY et al. 2016) and likely markers of occupational stress (MOS, e.g. KENNEDY 1989; KENNEDY 1998; CAPASSO et al. 1999) could be seen on the femora. Signs of stress on bone surfaces – for example, due to activity, infection, deficiency or several conditions – together show a very high frequency in adults. Signs of muscular overload, ligament and joint capsule overload are also shown in high frequencies on adult femora. Almost 60 % of the adult

Tab. 3. Overview of signs of physical strain and disease in the individuals (femora) from Erwitte-Schmerlecke II.

PHYSICAL STRAIN, DISEASE	LEFT FEMUR NON-ADULT	RIGHT FEMUR OLD JUVENILE TO YOUNG ADULT	RIGHT FEMUR ADULT
Suspicion of deficiency diseases (others then anaemia)	*12 (100 %)*	*3 (100 %)*	*10 (31.3 %)*
Suspicion of anaemia	*18 (100 %)*	*4 (100 %)*	*11 (34.4 %)*
Suspicion of stress on bone surface (e. g. activity, infection, deficiency)	*7 (15.2 %)*	*9 (64.3 %)*	*81 (81.8 %)*
Pulled muscle (strain) and signs of muscular overload	*4 (8.7 %)*	*7 (50 %)*	*17 (30.9 %)*
Signs of ligament/joint capsule overload	–	*0*	*18 (45 %)*
Highly-distinctive muscle marks	–	*0*	*55 (57.3 %)*
Osteoarthrosis of hip joint	–	*0*	*2 (6.7 %)*
Osteoarthrosis of knee joint	–	*0*	*4 (7.1 %)*

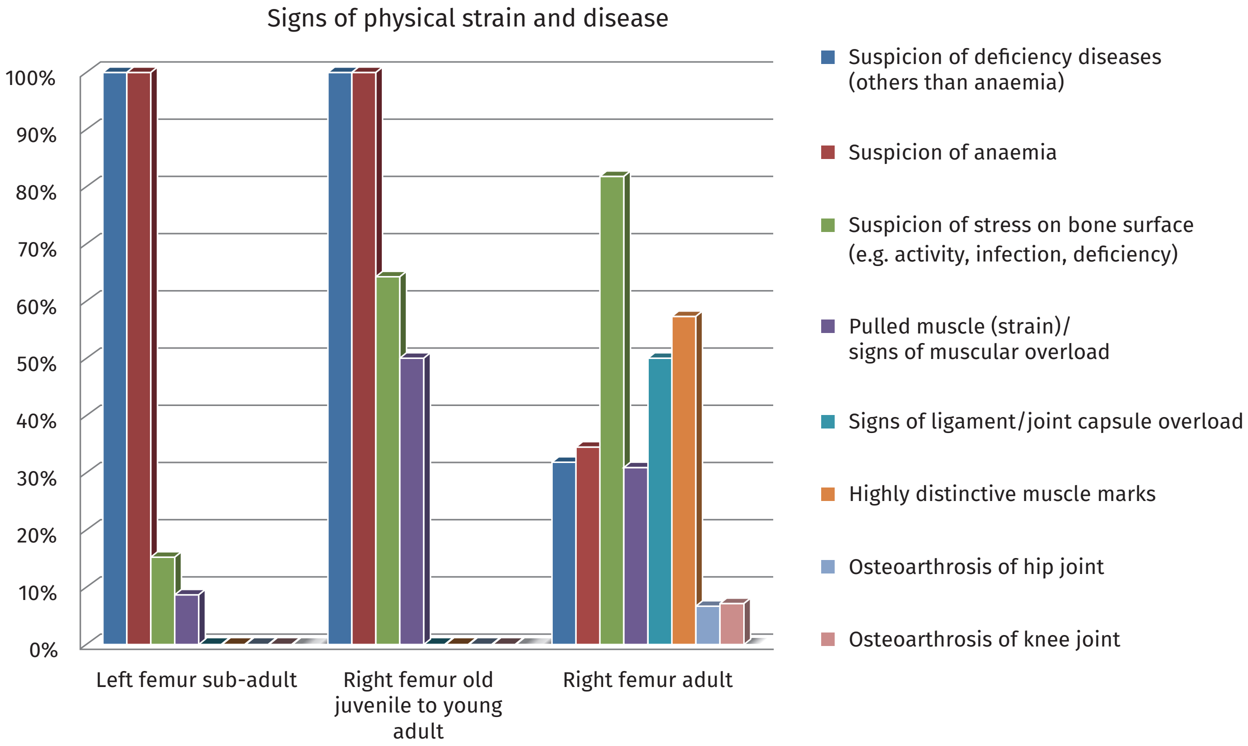

Fig. 8. Overview of signs of physical strain and disease in the individuals (femora) from Erwitte-Schmerlecke II.

individuals had highly-distinctive muscle marks on the bony muscle attachments on the femur surface. The frequency of signs of osteoarthrosis in the hip and knee joint – only for the femur parts – is very low in adults.

Erwitte-Schmerlecke II – Teeth

For Erwitte-Schmerlecke II, 4,534 teeth were examined and a caries intensity of 1.81 % was determined. The most frequently-represented tooth was the permanent mandibular first molar on the left side (tooth 36). Based on this tooth, the minimum number of individuals of 324 was established (results from dissertation research of medical student M. Gottstein).

Comparison of selected results of Erwitte-Schmerlecke II with the results of Erwitte-Schmerlecke III, Völlinghausen, Calden I, Großenrode II and Rheine

The minimum number of individuals established from the femora and femur fragments preserved in Erwitte-Schmerlecke III is 54, in Völlinghausen 19, in Calden I 49, in Großenrode II 23 and in Rheine 5 (Tab. 4). The highest minimum number of individuals established from the femora is 216 in Erwitte-Schmerlecke II. This is due to the very good preservation of the human remains in this grave. For Calden I, the femora are the most frequently-represented part of the human remains and provide a higher minimum individual number than found in previous publications for this grave (CZARNETZKI 1966 and 1978).

Established from the preserved teeth, the minimum number of individuals in Erwitte-Schmerlecke II is 324, in Erwitte-Schmerlecke III 446, in Völlinghausen 53, in Calden I 26, in Großenrode II 40 and in Rheine 21 (Tab. 4).

Except for Calden I, the teeth are the most frequently-represented part of the individuals buried in these graves. For Erwitte-Schmerlecke, Völlinghausen, Großenrode II and Rheine, the results provide new information about the minimum number of individuals, because this was the first examination of the human remains from Erwitte-Schmerlecke and examinations from Großenrode II do not exist or are unknown. Furthermore, the minimum individual numbers known thus far for Völlinghausen (FIBIGER 2012) and Rheine (ECKERT 1999) are lower than those established with the new examinations.

The most frequently-represented tooth in Erwitte-Schmerlecke II as well as Calden I was the left permanent mandibular first molar (tooth 36; Tab. 4). In Erwitte-Schmerlecke III and Rheine, the most frequently-represented tooth was the left permanent maxillary first molar (tooth 26), in Völlinghausen the right permanent maxillary first molar (tooth 16) and in Großenrode II the right permanent mandibular first molar (tooth 46). For these graves, the caries intensity is the lowest in Erwitte-Schmerlecke II at 1.81 % and the highest in Völlinghausen at 6.12 %. Overall, the caries intensity in all graves is very low for these megalithic populations, at a level of partially far less than 7 % (Tab. 4).

The frequencies of signs of physical strain and diseases presented for the femora of Erwitte-Schmerlecke II are similar in the other populations investigated.

DISCUSSION AND CONCLUSION

Individuals of both sexes and all age groups were buried in Erwitte-Schmerlecke II. To date, in this grave no special burial places for different sexes or age groups could be determined.

The stature of the individuals in Erwitte-Schmerlecke II was estimated according to PEARSON (1899), because this estimation method was determined based on data prior to the onset of the secular acceleration and therefore it is highly suitable for Neolithic populations. The stature was also estimated according to PEARSON (1899) to make the results directly comparable to those of SIEGMUND (2010) for several other Neolithic populations. The mean estimated stature of the adult females in Erwitte-Schmerlecke II (3600/3500–2900/2800 cal. BC) is 148.4 cm and the mean estimated stature of adult males is 163.7 cm. Stature estimations for the other culture populations examined within the project are not yet available. Results for stature from original publications about other Wartberg Culture populations cannot be compared to those presented here, because the stature there was estimated according to BACH (1965), TROTTER/GLESER (1958; TROTTER 1970) and BREITINGER (1938), whose methods lead to a slight overestimation for European Neolithic populations (SIEGMUND 2010). SIEGMUND (2010) estimated data for the Neolithic from literature (e. g. for Bredelem, Calden, Central Germany, Heilbronn, Niedertiefenbach, Pully-Chamblandes, Alsace, Sorsum, Talheim, Taubertal, Trebur, Central Europe, Hungary) according to PEARSON (1899) and summarised the results. The mean stature of females in the Neolithic between 3500 and 2000 BC is 151.5 cm and the mean stature in Neolithic males is 163.5 cm (SIEGMUND 2010). This means that in the Wartberg Culture and during the period of cultures with gallery graves, the mean stature of females and males was similar to the mean stature of females

Tab. 4. Comparison of selected results of Erwitte-Schmerlecke II with the results of Erwitte-Schmerlecke III, Völlinghausen, Calden I, Großenrode II and Rheine.

GRAVE	NUMBER OF TEETH	MOST FREQUENT TOOTH	MINIMUM NUMBER OF INDIVIDUALS (TEETH)	CARIES INTENSITY (FOR ALL TEETH)	MINIMUM NUMBER OF INDIVIDUALS (FEMUR)	MINIMUM NUMBER OF INDIVIDUALS FROM LITERATURE
Erwitte-Schmerlecke II (results teeth: M. Gottstein)	*4534*	*36*	*324*	*1.81 %*	*216*	*first examination*
Erwitte-Schmerlecke III (results teeth: J. Gernhardt; results femora: A. Rüther)	*5902*	*26*	*446*	*3.80 %*	*54*	*first examination*
Völlinghausen (results: T. Lewandowski)	*1112*	*16*	*53*	*6.12 %*	*19*	*48 (FIBIGER 2012)*
Calden I (results: J.-C. Cyris)	*592*	*36*	*26*	*4.40 %*	*49*	*30 (CZARNETZKI 1966 and 1978)*
Großenrode II (results: J.-C. Cyris)	*600*	*46*	*40*	*4.30 %*	*23*	*unknown*
Rheine (results: J.-C. Cyris)	*215*	*26*	*21*	*4.70 %*	*5*	*12 (ECKERT 1999)*

and males in Neolithic times. The stature difference between females and males in Erwitte-Schmerlecke II is 15.3 cm, which means that a sexual dimorphism is recognisable. On average, in the Neolithic, the males were 12 cm taller than females (SIEGMUND 2010). Apparently, the difference in stature between females and males in the Wartberg Culture is slightly higher than in other Neolithic cultures.

All sub-adults (12 individuals, 100 %) examinable and 31 % (10 individuals) of the adults from the population of Erwitte-Schmerlecke II showed signs (inter alia Harris' lines) of deficiency diseases at the femur. Furthermore, all sub-adults (18 individuals, 100 %) examinable (for this deficiency) and 34 % (11 individuals) of the adults showed signs suspicious of anaemia.

Deficiencies that become manifest in bones could be chronic protein-calorie deficiency (BÉHAR/VITERI 1975), chronic vitamin D deficiency, chronic vitamin C deficiency (MOELLER-BARLOW disease in children) and anaemia (e.g. SCHULTZ 2001), which can also be caused by chronic vitamin C deficiency (GREINACHER 1990; LANG 1979). Chronic infections can also cause deficiency syndromes despite an adequate supply of vitamin C (SCRIMSHAW 1975). On the other hand, chronic vitamin C deficiency and chronic protein-calorie deficiency make especially children more susceptible to infectious diseases (e.g. SCHULTZ 1983 and 1990).

The high frequency of deficiencies in children could be due to weaning or a different diet from adults (e.g. less protein for children), because they need – depending on their age and other factors – relatively up to three times more protein and other nutrients than adults (LANG 1979; WETTERSTROM 1986) or because children are generally more susceptible to deficiencies and infections (e.g. SCHULTZ 1990).

Especially signs suspicious of anaemia could be found in children and adults. Besides physical strain, anaemia is possibly the main cause of stress markers in/on bones.

The most frequent reasons why people – especially children – suffer from anaemia are parasitic diseases (e. g. REINHARD 1992; LARSEN/SERING 2000), chronic iron deficiency due to iron-poor diets (e.g. EL-NAJJAR 1976; EL-NAJJAR et al. 1976), thalassemia (e.g.

ASCENZI et al. 1991) or chronic malnutrition (e.g. lack of aminoacid tryptophan → lack of protein; GARN 1992; SCHULTZ 1982; SCHULTZ 1992; SCHULTZ 2001).

On the surface of the femur, 81% of the adults showed signs suspicious of stress (MSM or EC, MOS); for example, including due to deficiencies, infections or physical activities. The stress due to physical activities would be accompanied with the high frequency of highly-distinctive muscle marks (57.3%), pulled muscles (strain) and signs of muscular overload (30.9%) and signs of ligament and joint capsule overload (45%). It can also be assumed that these people were all physically very active and had infections or/and deficiency diseases at the same time.

The frequency of signs of osteoarthrosis (degenerative joint disease) in the hip (6.7%) and knee (7.1%) joint is very low on the joint facets of the femur (cf. BACH et al. 1978). This suggests that there could be a correlation between the low frequency of degenerative joint disease and the highly-distinctive muscle marks, because joints are very well protected by strongly-developed muscles.

The high frequency of highly-distinctive muscle marks and signs of physical stress at the adult femora suggest a high strain on the musculoskeletal system due to intensive physical activity (occupational stress; c.f. MERBS 1983; KENNEDY 1989; KENNEDY 1998; CAPASSO et al. 1999). It can only be assumed that the cause was intensive labour with mainly repetitive movement for basic needs, such as food and housing. Moreover, one-time events or one-off trauma such as accidents have to be considered as the cause of physical strain (e.g. VILLOTTE/KNÜSEL 2013)

To a lesser extent, causes of physical stress were also deficiencies, such as anaemia and infections. Assuming a diet based on sufficient available animal proteins (e.g. meat and milk), the diet should not have been the main cause for deficiencies, because the biological valence of animal proteins is much higher than that of plant proteins, especially cereal proteins (SCHLIEPER 1992).

The deficiencies (e.g. anaemia, infections) could be caused primarily by parasites (e.g. worms, protozoans) and iron deficiency, as well as probably by malnutrition in children.

The examination of the other Wartberg Culture populations within this project showed similar results; therefore, these assumptions can also be conveyed for them.

The results for the minimum number of individuals in these six burial collectives reveal that the time-consuming part of sorting, identifying and cataloguing the commingled human remains is very important. The teeth represent a valuable source for determining the number of individuals buried in collective graves.

In the course of taphonomic processes, dental tissue is more likely to be preserved than bone tissue, since teeth are the hardest tissue in the body.

Thus far, from published literature it is known that the minimum number of individuals in other Hessian-Westphalian gallery graves varies between 2 (Kirchborchen II; GÜNTHER/CZARNETZKI 1976) and 235 (Altendorf; PERRET 1938) individuals. For Altendorf, the minimum number of individuals was assumed to be 250 (PERRET 1938). Generally, a minimum number of 200 to 250 individuals for gallery graves of the Hessian-Westphalian Megalithic Soest Group has been postulated (e.g. PERRET 1938; RAETZEL-FABIAN 2000; SCHIERHOLD 2012).

With the careful examination of the teeth from Erwitte-Schmerlecke, it could be shown that 300 to 450 individuals can be buried in megalithic gallery graves. Therefore, it is important to determine the minimum number of individuals not only based on the most represented bone type, but also the most commonly-represented tooth. A careful excavation conducted in Erwitte-Schmerlecke is indispensable especially for this purpose. It can be assumed that in other Hessian-Westphalian gallery graves with a similar chamber size, the minimum number of individuals was also higher than 200 to 250 individuals and more likely varied between 300 and 500 individuals, particularly because in former excavations bones and teeth were missed or destroyed on purpose (e.g. ROSSEL 1859).

It is also known that the number of individuals is underestimated, especially in a burial site with commingled and fragmented remains (ADAMS/BYRD 2008).

The minimum number of individuals (MNI) does not necessarily represent the number of individuals buried, especially in collective graves (ADAMS/KONIGSBERG 2008).

This could mean that the Wartberg communities were larger than originally thought.

The caries intensity for these Wartberg Culture populations was – at an average of 4.2% – the lowest in Neolithic populations in central Germany. In the earlier Linear Pottery Culture, the caries intensity was on average 12.9% and in the later Walternienburg-Bernburg and Corded Ware Culture around 11% (BACH/BACH 1989; PENSER 1985). For the Bell Beaker Culture, the caries intensity was on average 8.2% (BACH/BACH 1989). The comparatively low caries intensity in the Wartberg Culture populations suggests that the people consumed fewer cereals and therefore may have not been tillers. In comparison to Linear Pottery Culture populations – who were the first tillers – the intake of carbohydrate from cereals must have been lower in the Wartberg Culture, or they had an effective oral hygiene.

The results of isotope analyses (Grave II: 43 samples, Grave III: 17 samples) show that the people from Schmerlecke had a diet with higher plant than animal proportions and with only rare or no consumption of fish (personal communication from M. Hüls, see also Schierhold in this volume). They consumed many plants, but possibly more wild plants and fewer cereals, due to the low caries intensity.

The enormous number of pendants made of dog teeth – around 80 % (4,000) of all tooth pendants (determination by Dr. Christian Meyer, University of Mainz) – found in both graves in Erwitte-Schmerlecke (MEYER/SCHIERHOLD 2013) is an indication of subsistence as herders in these megalithic populations, where herding dogs would have been needed. There were also other pendants made of the teeth of wild animals; for example, wolf, fox, badger, wild cat, red deer, otter and marten among others. To a lesser extent, there were tooth pendants made of pig, cattle and sheep/goat teeth. They either consumed mostly wild animals or hunted them for their fur and as trophies and probably consumed the animals bred, possibly mostly pigs (see also SCHIERHOLD in this volume).

The results of pollen analyses (R. Stritzke, Geologischer Dienst NRW) point to slightly open and deforested landscapes that were anthropogenically shaped and presumably used for the growing of cereals and field and pasture farming. Grains of cereals have only rarely been found, but still suggest farming at some distance from the graves.

These results show that the Wartberg people had various food resources. They were hunting and gathering wild plants and may have been partly herders and animal breeders as well as tillers.

It should be kept in mind that only selected results based on teeth and femora were evaluated here. By including the examination results of the other skeletal regions, a more detailed overview of life and health conditions in the Wartberg Culture will be available and will be presented in the near future.

In summary, both sexes and all age groups are presented in Erwitte-Schmerlecke II. The stature of females and males does not differ from other Wartberg Culture populations and a sexual dimorphism is recognisable. Compared to other Neolithic populations, the females were slightly shorter among Wartberg Culture populations. All sub-adults and about 30 % of the adults show signs of deficiencies mostly suspicious of anaemia on the femur. Some 80 % of the adults show signs of stress on the femur surface; for example, due to deficiencies, infections or physical activities. There is also a high frequency of highly-distinctive muscle marks on the femur. The frequency of signs of degenerative joint disease in the hip and knee joint is very low and suggests that there could be a correlation between the low frequency of degenerative joint disease and the highly-distinctive muscle marks. For Erwitte-Schmerlecke II, a minimum number of individuals of 324 could be established based on the teeth. Moreover, for the other Wartberg Culture populations, a higher minimal number of individuals than has hitherto been known from the literature was shown and possibly means that the communities were somewhat larger than believed. The low caries intensity in the populations examined, the highly-distinctive muscle marks, the low frequency of degenerative joint disease and signs of stress on surfaces in the lower extremity as well as the huge number of dog tooth pendants found in Erwitte-Schmerlecke II and III and the analyses results of stable isotopes and pollen indicate diverse subsistence strategies, such as herding, farming, hunting and gathering for Wartberg Culture populations.

ACKNOWLEDGEMENTS

The authors would like to thank the German Research Foundation (DFG) for funding the research project »Genesis and Structure of the Hessian-Westphalian Megalithic Soest Group«, which was part of the DFG-Priority Program 1400 »Early Monumentality and Social Differentiation. On the origin and development of neolithic large-scale buildings and the emergence of early complex societies in Northern Central Europe« (sub-project: Anthropology and Palaeopathology: Schu 396/31-1-3).

Furthermore, we thank Prof. Ralf Gleser, Dr. Kerstin Schierhold, Stefanie Bussmann (Department of Pre- and Protohistory of the University of Münster in Westphalia) for excavation, data, images and cooperation and Dr. Michael Baales, Herman Menne, Karin Peters, Bernd Schneider and others (LWL-Archaeology for Westphalia, branch office Olpe) for excavation, cleaning of the bones and transport to Göttingen, documentation, images and cooperation.

We also want to thank the doctoral candidates Jan Christian Cyris, Johannes Gernhardt, Maximilian Gottstein, Thomas Lewandowski and Alexa Rüther for their contributions of selected results from their medical dissertations in progress.

Above all, we thank the research assistants Maren Holzgräfe, Friederike Jugert, Theresa Klatt, Stephanie Wolf and some of the students in training for sorting a great deal of the mostly fragmented remains, Ingrid Hettwer-Steeger for preparing the SEM-samples and Michael Brandt, Maria Feicke and Marc Moll for preparing the thin-ground sections.

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Moraines, megaliths and moo: Putting the prehistoric tractor to work

Eva Rosenstock, Astrid Masson, Bernd Zich

ABSTRACT

Models estimating the effort necessary to construct the megalithic monuments of Northern and Western Europe are usually based on manpower. They appear to be heavily influenced by ethnographic analogies derived from cultures where suitable draught animals are not available, as well as by a biased selection of historical records. However, the use of cattle for traction is now well attested in the later Funnel Beaker groups and related cultures by osteological indicators, ard and wheel marks preserved under megalithic monuments, as well as from pictorial evidence.

As the ard and megalith construction coincide in the TBK at ca. 3500 cal BC, our hypothesis is that removing stones and glacial blocks from the fields to create and maintain plots suitable for cultivation with the cattle-driven ard went hand in hand with the use of the retrieved material for construction purposes. We present calculations for the erection of a megalithic grave with teams of cattle used for the hauling of boulders, taking into account the size of the animals and harness type as a proxy for tractive power, the implementation of sledges and sliding surface preparation as proxies for friction, as well as the reconstructed size and frequency of erratic boulders in the moraines of the postglacial landscape. Assuming cattle traction, the human work force necessary to clear the landscape from erratics and erect the monuments of the later TBK calculated in a men-based model can be significantly reduced.

These figures might provide us with the possibility to infer the number of cattle teams needed and thus to assess the degree of specialisation of cattle traction in the Funnel Beaker socio-economy on a scale between multipurpose cows used for meat, milk and traction at the household level on the one end and specialised draught oxen kept at the community level on the other.

INTRODUCTION: FARMING ON THE MORAINE IN THE 4TH MILLENNIUM CAL BC

The conditions that the earliest farmers of the northern European plain had to face have been reconstructed thoroughly in terms of climate and vegetation (KIRLEIS et al. 2012). However, it is often neglected that the preferred soils – the lodgement tills of the ground moraines – were strewn with erratic blocks of various sizes. After several thousand years of removal of such erratic blocks – first for the construction of megalithic graves during the later Funnel Beaker Culture (TBK) from ca. 3600 to 3200 cal BC (KRISTIANSEN 1984, 79–80; MÜLLER 2011, 19) and later for the erection of stone buildings, partially quarried again from the remains of megalithic monuments – such a primeval glacial landscape can no longer be found in Europe anymore. However, with their much shorter history of permanent settlement, animal husbandry and plant cultivation, some regions in northern America can give us a rough idea of what such a landscape might have looked like (Fig. 1). Nonetheless, it has to be noted that for a European moraine the original size classes, numbers and distributions of erratic boulders on the surface are so difficult to reconstruct that no such attempt in geology is known to

Fig. 1. Glacial erratics dating ca. 14,000 BC and cattle in a field outside of Waverly/Iowa: ANDERSON/PRIOR 2014.

the authors. Moreover, the moraine landscape of the European Holocene was characterised by a dense forest cover (Kirleis et al. 2012, 223).

Hence, early TBK people at ca. 4100 cal BC first had to clear the forest. For plant cultivators using hoes or digging sticks – possibly aided by fire (Schier 2009) – neither remaining tree stubs or lopped and ringed stems nor the occasional erratic boulder would have posed a problem; rather, they would just have worked around them. However, by ca. 3500/3400 cal BC, the ard was introduced into the later TBK (Mischka 2014). While some researchers have argued that the pre-Single Grave use of the ard was only sporadic (for an overview of evidence and positions, see Milisauskas/Kruk 2002, 206–207), we think – following Ester Boserup – that in the more open TBK landscape after the middle of the 4th millennium, occasional fallows of the field could have led to root growth rendering the soil difficult to work with a hoe or digging stick (Fokkens 1998, 102), whereby the ard would have presented a good solution.

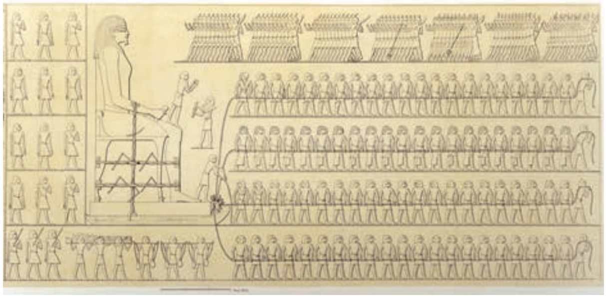

Fig. 2. Transport of a monumental statue, grave of Djehutihotep, el-Bersche (12. Dyn., 19. cent. BC): Fauerbach 2014, fig. 1.10.

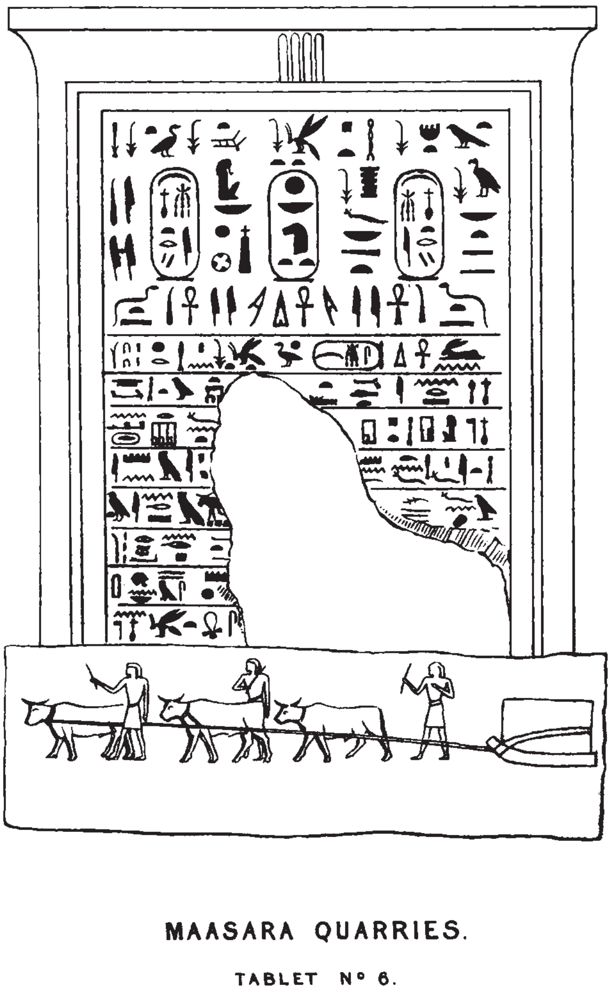

Fig. 3. A block of stone, drawn on a sledge by six male cattle, and attended by three drivers, tablet no. 6, Maasara (18. Dyn., 16. Cent. BC): Vyse/Perring 1842, 98ff.

The notion that cattle was the tractor in front of the ard is attested by various kinds of evidence for cattle draught, such as the wheel tracks connected to the construction of the TBK megalithic tomb at Flintbek (Zich 1992; Mischka 2011), the engravings of pairs of cattle attached by yokes and drawbars to two-wheeled vehicles at the Wartberg tomb of Züschen (Kappel 1981) and wagons with drawbars, yokes and four wheels on a TBK ceramic vessel from Bronocice (Milisauskas/Kruk 1991; Bakker et al. 1999). Moreover, distal broadening of the metatarsals of TBK cattle has been interpreted as a sign of draught strain (Johannsen 2006). With a pair of cattle, the ard is able to loosen the topsoil fast and efficiently (Kerig 2013, 14–19; Mischka 2014; Ebersbach 2002), especially if the plot is worked in the criss-cross fashion attested in most of the preserved ard marks from the TBK, as – for instance – at Flintbek (Mischka 2011). As turning the device around at the end of the furrow is a time- and energy-consuming process, a rough square is the most parsimonious shape for an ard-worked plot. Corresponding to the fact that cattle should not work more than ca. 3h without a longer break on a regular basis to ensure that they are kept healthy (Masson 2015, 160), traditional units of area such as Turkish *dönüm,* Greek *stremma*, German *Morgen* or English *acre* represent what a team can do in one shift, i. e. the area of the squares should range somewhere between ca. 1,000 m^2 and 10,000 m^2.

It is highly likely that around 3500 cal BC, TBK people had a hard time finding plots that were void of erratic boulders, even if we lack data on the original distribution of erratics on moraine surfaces. This is illustrated visually in Fig. 1, as well as through the following rough calculations based on the number of archaeologically-attested megalithic monuments: There is evidence of 1,200 megalithic graves on the territory of Schleswig-Holstein (Müller 2011, 19). If each comprised only 50 blocks of at least 1 t mass and the resulting 60,000 blocks were distributed over the total area of moraines in Schleswig-Holstein with an estimated area of approximately 8,000 km^2 (LLULR 2012), we would encounter one large block per 0.13 km^2 or one every 365 m. As these are minimum estimations, it is likely that each potential field plot in the later TBK had at least one such block. In order to enable a steady workflow with the ard, fields had to be cleared of stones and blocks beforehand, so it appears no coincidence that cattle traction and megalithic graves appear simultaneously at ca. 3500 cal. BC: the stone material retrieved by cleaning up the landscape for the needs of ard-based agriculture was integrated into monuments. To put it pointedly, megalithic graves could be viewed as means to turn clearance cairns into meaningful structures. Taking this argument first presented by Kristian Kristiansen (1984, 79–80) a step further, our paper demonstrates that cattle traction was both the problem and solution, as cattle were capable of hauling away many of the blocks that were in the way of the ard that they were meant to pull (ZICH 2009, 18).

TRANSPORT OF LARGE BLOCKS: MAN-BASED VS. CATTLE-SUPPORTED MODELS

Archaeological reconstructions of how megaliths were transported are inspired by two types of sources, one of which is historical evidence. While the pyramids of 3rd millennium Egypt were already constructed from blocks with masses of at least 1 t, the details of their transport are a matter of lively discussion among mostly laypeople and only few Egyptologists (see TERNES et al. 2014 for an overview), as pictorial evidence of large stone transport is only known from the 2nd millennium onwards. Here, the unique depiction of a colossal transport involving more than 140 men (Fig. 2) eclipsed the fact that smaller stones were transported by means of cattle-drawn sledges (Fig. 3) (FAUERBACH 2014). Subsequently, in Greek and Roman antiquity, the use of wooden-wheeled vehicles in heavy stone transport with as many as nineteen teams of oxen per vehicle is attested (OSTHUES 2014a; b).

Ethnographical observations constitute the second type of sources (MÜLLER 1990a). As most recent and subrecent megalithic cultures are economies without working animals, these reconstructions are based on manpower as the sole traction force, as is – for example – practised among the Niha of Indonesia (Fig. 4; BONATZ 2001). However, the Tandroy of southern Madagascar could be seen as a better analog to the cattle raising TBK and related cultures. Cattle have been part of the economy of the region since at least the 15th century AD, and while megalithic tombs are first attested in the 18th century, people started transporting large stones for their tombs by means of oxcarts (Fig. 5) in the 1930s. Additionally, oxen also play an important role as sacrificial animals at Tandroy funerals (PARKER PEARSON 2010, 18–19, 18–39), forming a similarity to developments in the latest TBK.

Moreover, cattle – like horses – have been used in European forests before the introduction of tractors. As this is a comparably demanding task in terms of draught force and precision, it should encourage us to experimentally test the potential of cattle in the transport of erratics. However, until more systematic experiments can be performed, impressions from a pilot

Fig. 4. Dragging the stone »darodaro« for the dead Saoenigeho of Bawamataloea, Nias. Photo by Ludwig Borutta ca. 1915: Nationaal Museum van Wereldculturen Leiden, 2016, photo-Nr. TM-10000952.

Fig. 5. Tandroy tomb-builders in southern Madagascar unloading and erecting a standing stone from a bullock-cart, on which it has been transported from the quarry (photo: Mike Parker Pearson).

Tab. 1. Erratics used in the construction of Kleinenkneten 1 (Müller 1990b).

ERRATICS	WEIGHT IN KG	NUMBER
Chamber	2,000	9
	5,000	1
	9,000	1
	15,000	1
	42,000	2
Passage	4,000	4
Facade	2,000	69

Tab. 2. Loose material used in the construction of Kleinenkneten 1 (Müller 1990b).

LOOSE MATERIAL	VOLUME IN M^3	WEIGHT IN KG
Rubble	90	170,000
Granite slabs	1	8,000
Earth	700	240,000

test at Domäne Dahlem in Berlin (Fig. 6) can only illustrate the feasibility of the theoretical calculations we present here. As a marginal note, only a few hundred metres away from our test area and the Freie Universität Berlin, a glacial erratic of 50 t mass obstructed the tube constructions in 1912. An attempt to move it on a sledge (Fig. 7) with sixteen oxen failed, and the boulder had to be moved by workmen and rope winches 40 m into a park area, where it can still be seen today (BZ Online 2013).

In the following, the performance of cattle in the transport of blocks and erratics and other building material for a megalithic monument will be demonstrated hypothetically using Kleinenkneten 1 (Fig. 8), a large and exceptionally well-preserved TBK long barrow with a passage grave situated in Oldenburg county in Lower Saxony (Michaelsen 1978) as an example. In the construction of both passage grave and façade, a total of 86 blocks and erratics with masses ranging from 2 t to 42 t were used (Tab. 1). It is important to note that of the 78 specimens, by far the majority of blocks had a mass of around 2 t. Additionally, a total of 418 t of loose material like granite slabs, rubble and earth was necessary. The grave has been the subject of a study assessing the necessary labour (Müller 1990b), assuming mere man power. According to these estimations (Müller 1990b, 219 fig. 12), quarrying of the material required 1,400 and construction 33,000 man hours, whereas transporting the material to the construction site forms the largest task with as many as 75,000 man hours. In the following, we demonstrate that this value can be considerably reduced if cattle traction is implemented.

VEHICLES AND IMPLEMENTS: WAGONS VS. SLEDGES

Sisyphus was certainly not the first person to move stone blocks without much further equipment: with a mass of up to approximately 1 t, a block can be »rolled« by hand by a few men, whereas beyond that levers or ropes have to be used. However, for longer distances, simple sledge constructions are the more efficient solution. Hauling a sledge directly over bare ground is not impossible if the load is not too heavy and if the necessary high draught force can be provided. In turn, the latter highly depends on the conditions of the surface: waiting for frozen ground might be an option and long grass cover has been demonstrated to significantly reduce friction (Atkinson 1956, 109). This effect could probably be imitated by laying out straw sheaves in the direction of the transport (pers. comm. Walter Dörfler, Kiel). For instance, barley straw has a mean surface roughness R_a = 0.02µm (Wiśniewska et al. 2003), which is comparable to glass and should – accounting

Fig. 6. Rotes Höhenvieh cow Emma (Landgut und Freilichtmuseum Domäne Dahlem, Berlin) pulling a glacial erratic of with a mass of approximately 1 t harnessed with a modern cattle collar and a chain at the Zugrindertreffen at the Domäne Dahlem, Berlin on 31.1.2016. Her calf Elsa of ten days age is watching the scene in the background. Cameras and observers watching the simple hanging scale (manufactured by Silverline, 200 kg maximum load) hooked between sledge and rope recorded mostly values around 100 kg, but also a maximum of slightly more than 160 kg, i. e. ca. 1000 and 1600 N. (photos: Eva Rosenstock).

for the softness of straw – lead to sliding friction values of around μ = 0.2. An average Kleinenkneten 1 block weighing 2 t plus the sledge (150 kg) would result in a normal force F_N of approximately 21,500 N. Theoretically, on straw a necessary draught force of approximately 4,300 N should result, although experimental verification is necessary:

$$F_R = \mu \cdot F_N = 0{,}2 \cdot 21500N = 4300N.$$

Solutions with rollers directly on the soil (e. g. Universität Kiel 2015) are simple, but regardless whether raw or barked timber, natural or prepared soil is used, such settings still suffer from high friction and hence the necessity to work with large draught forces. At the other end of the range, wooden or stone ball bearings have been proposed (University of Exeter 2010) as a way of reducing friction and draught force to a minimum. An intermediate solution that we have tried in our pilot test (Fig. 6) involves the use of a simple roller bearing, i. e. rollers used on wooden rails instead of on soil (e. g. Albers/Vieht 2003; Fauerbach 2014). An average Kleinenkneten 1 block weighing 2 t plus the sledge (150 kg) would result in a normal force F_N of ca. 21,500 N. On 20 cm-diameter-rollers and a rolling friction factor c_R of 0.7 cm, the necessary draught force would be ca. 1,500 N:

$$F_R = \frac{c_R}{r} \cdot F_N = \frac{0{,}7cm}{10cm} \cdot 21500N = 1505N.$$

The heaviest Kleinenkneten 1 erratic with 42 t plus hypothetical 8,000 kg for the sledge (with a normal force FN of ca. 500,000 N) would result in a draught force of about 35,000 N:

$$F_R = \frac{0{,}7cm}{10cm} \cdot 500000N = 35000N.$$

However, the TBK most likely knew wheeled vehicles. Combining evidence from various regions in the 4th millennium BC of Central and Eastern Europe, they can be reconstructed as carts or wagons (for an overview, see Fansa/Burmeister 2004). Based on Hajo Hayen's (1990) reconstruction, a 4th or 3rd millennium wagon with a cargo hold of approximately 115 cm × 140 cm sidelights was able to carry a volume of 1 to 2 m^3 depending on the height of the side pieces. However, the maximum mass that a wooden vehicle of 4th/3rd millennium construction type could bear still remains to be investigated and largely depends on the axles (Hayen 1990, 190). A very preliminary assessment for an axle of approximately 1.2 m functional length between the two hubs, approximately 8 cm in diameter and with a mass of 8 kg as the deadload was done for this text with a free online tool for static assessment (Irsigler o. J.). The resulting maximal bending of 1 cm[1] opens up the possibility that 2 t blocks, the average at Kleinenkneten 1, were transported on wagons. Although 1,000 kg for a two-wheeled cart and 2,000 kg seem a lot upon first glance, it should be noted that pre-industrial values for the English »cartload« or German »Fuder« also vary between 800 kg and as much as 1,800 kg. Axle friction between the axle and the hub of a prehistoric wagon is difficult to assess (Hayen 1990, 190), although lubricants such as animal and plant fats or simply slugs (Svanberg 2006) can reduce wood on wood sliding friction to values of μ = 0.05 to μ = 0.08. Rolling resistance between wheel and ground is dependent on the surface type and the wheel diameter, which is approximately 90 cm in our case (Hayen 1990). Both sources of friction are usually summed up as the tractive resistance coefficient μ (Volov 2005, 115). From data on traditional wheeled vehicles collected in Baker (1906, especially tables 3 and 7), coefficients between μ = 0.05 for bad earth roads and μ = 0.2 for an unharrowed ploughed field are assumed here as the best- and worst-case values for prehistoric wagons. Hence, a maximum load of 2,000 kg and a wagon mass of ca. 300 kg (Hayen 1990) corresponding to a normal force F_N of ca. 23,000 N would result in a tractive resistance of 1,150 N to 4,600 N depending on the terrain:

$$F_R = \mu \cdot F_N = 0{,}05 \cdot 23000N = 1150N$$

$$F_R = \mu \cdot F_N = 0{,}2 \cdot 23000N = 4600N.$$

THE MOTOR: MEN VS. CATTLE

Human draft force depends on how the load is handled and the published values considerably vary. According to DIN 3311 (Steinberg et al. 2008), the maximum draught force ranges between 110 N to 260 N for females and 190 N and 400 N for males if the load is pulled backwards. A suitable handle attached to the draught pole or rope used allows people to subjectively push forward while they pull on the load. This

1 As the tool can only deal with rectangular timbers, the area of the section of the axle was calculated to ca. 50 cm^2 and hence a 7 cm × 7 cm beam with a section area of 49 cm^2 was entered.

Fig. 7. A 50 t erratic having been removed on a wooden sledge in the course of tube construction in Berlin 1912 (BZ online 2013).

increases the draft power exerted on the load to 310 N to 770 N for males and 140 N to 400 N for females. A comparison with ethnographic (Müller 1990a) and experimental data (e.g. Atkinson 1956, 109–110; Albers/Vieht 2003; the latter the only study known to the authors with measurement of the tractive forces) shows that these should be read as conservative values. As an additional minimal rule of thumb, in long-term work only ca. 15 % of the maximum force should be exerted (Steinberg et al. 2008).

Cattle harnessing is – strictly speaking – also a means by which the animal pushes the load. All evidence available for the 4th millennium – e.g. TBK yoked figurines (Matuschik 2002) or the yoke find from Chalain ca. 3000 BC (Pétrequin et al. 2002) – points to the neck yoke, which forces the animals to lower their head in heavy draught, hence reducing the power that they can exert (Masson/Rosenstock 2011, 89–90). We have to take into account the fact that most measurements are done with modern and more physiological cattle collars enabling greater draft power (e.g. Wenger 1939; Minhorst 2007; Masson 2015). Moreover, modern cattle are usually taller and heavier than TBK cattle with their withers heights of only ca. 120 cm and a mass of approximately 400 kg to 500 kg (Kyselý 2013), which lies within the range of recent *Hinterwälder* cattle. In the short haul of a 15 m distance, an animal's tractive force expressed in kg is ca. 25 % to 30 % of the mass of the animal, hence approximately 1,000 N to 1,500 N for one Funnel Beaker animal and approximately 2,000 N to 3,000 N for a team. Traditional pulling contests in Spain and the Americas using neck yokes and sledges on gravel regularly show that even total loads of 4,000 kg can be hauled by teams of oxen over a distance of approximately 2 m (Masson 2015, 156), although we have to keep in mind that friction coefficients in these cases are unknown and the oxen are heavier than those of the TBK. In the long haul of 3,000 m, 10 % to 15 % of the mass of the animal – hence ca. 400 N to 750 N for one animal and 800 N to 1500 N for a team – should be good estimates and match data with traditional harnessing from developing countries (e.g. Belyea/Tribe 1983, 244; Epstein 1983, 66–67; O'Neill/Kemp 1989). For multiple teams, a rule of thumb says that each additional animal reduces the draught force by approximately 10 %.

Assuming a mean maximum draught force of TBK humans of approximately 190 N and a mean maximum draught force of TBK size cattle of approximately 1,250 N, we can conclude that cattle are about seven times stronger than humans, which matches both the weight relations (approximately 65 kg according to Ruff et al. 2012 vs. 450 kg) and the observation that when used for towing ships, one draught animal replaces up to ten people (Ellmers 1972, 264; Meyer 2003, 281). The basic and very important difference between wagons, sledges on the surface and sledges on rollers or roller bearings is workflow. While wagons and sledges pulled directly on the surface can be drawn steadily after the initial jerk and need no other attendants than the cattle driver, in addition to the drawing team sledges on rollers or roller bearings need several persons to shift rollers and – if so – rails. Steering can be done by either rearranging the sledge on the rollers during stops between pulling episodes or assigning additional teams of men to steering the sledge on the go (Atkinson 1956, 109–110).

Applying cattle draught to the Kleinenkneten 1 model leads to the following calculations, assuming a very slow working speed of 1 km/h for the cattle, paired draught and adopting the distances of approximately 100 m for earth and 1 km for rubble, stones and blocks used by Müller (1990b). For loose material, the limits for transport on a cattle-drawn TBK cart or wagon are set by either the mass or the volume of the load, hence for a cart:

- approximately 1 m^3 of earth with a mass of ca. 700 kg
- approximately 0.6 m^3 of rubble with a mass of 1,000 kg
- 0.6 m^3 of stones with a mass of 1,000 kg

For a wagon, doubling the above values gives the maximum capacities that can be transported with a pair of cattle. Good terrain provided, a 1 t block can be transported on a cart, and even the 2 t blocks could be transported on a wagon. Alternatively, blocks with a mass of up to 3 t – covering 1 km on a sledge with rollers and rails – would require ca. 50 to 200 jerks depending on terrain and the maximum acceptable length of the rope(s) between the yoke and sledge. Assuming some minutes each for rearranging rollers, rails and sledge as well as the animals after

Fig. 8. The TBK long barrow with passage grave of Kleinenkneten 1, Oldenburg, Lower Saxony (Michaelsen 1978, Plan 1).

each jerk, the whole transport would last ca. 10 h. Hence, we can derive the following guiding values in material transport:

- earth: 7 t per cattle team hour on 100 m
- rubble and granite slabs: 1 t per cattle team hour on 1 km
- small blocks: 2 t per cattle team hour on 1 km on carts/wagons and 2 t per 10 cattle team hours on sledges and rollers bearings

For the transport of the material used in Kleinenkneten 1, the calculations are:

- 240 t of earth: 34 cattle team hours
- 170 t of rubble: 170 cattle team hours
- 8 t of granite slabs: 8 cattle team hours
- small blocks: 78 cattle team hours on wagons, 780 cattle team hours on sledges and roller bearings

If five people – as a rather conservative figure – are needed to control a pair of cattle while hauling loose material on a wagon or small blocks on sledges, respectively, we have to add to the model some man hours:

- 240 t of earth: 171 man hours
- 170 t of rubble: 850 man hours
- 8 t of granite slabs: 40 man hours
- small blocks: 390 man hours on wagons, 3,900 man hours on sledges and roller bearings

While the transport of loose material and small blocks by sledges and rollers hence requires ca. 992 cattle team hours and 815 man hours, erratics exceeding 5000 kg would probably be beyond the capabilities of even multiple teams of cattle, although in jerks even the heaviest Kleinenkneten erratic of 42,000 kg could have been hauled by some hundred people on rollers and rails.

Using the guiding values for men-based transport according to Müller (1990b):

- earth: 455 kg per man hour on 100 m
- rubble and granite slabs: 50 kg per man hour on 1 km
- small blocks: 1 t per 132 man hours on 1 km
- large blocks: 1 t per 132 man hours per 1 km

a re-calculation for the material used in Kleinkneten 1 results in the following values:

- 240 t of earth: 527 man hours
- 170 t of rubble: 3,400 man hours
- 8 t of granite slabs: 160 man hours
- small blocks: 20,592 man hours[2]
- large blocks: 17,028 man hours

Assuming that 40 % of the total men hours needed in the transport of loose material and small blocks is spent on un- and uploading (Müller 1990b, 213), we assume a total of 9,872 man hours to be added to the cattle-supported model, as loading times are only pre-embedded in the men-related figures.

- 240 t of earth: 211 man hours
- 170 t of rubble: 1,360 man hours
- 8 t of granite slabs: 64 man hours
- small blocks: 8,237 man hours

Additionally, according to Müller (1990b), 1,400 man hours for digging earth and rubble and quarrying slabs as well as 33,160 man hours needed for construction have to be added to both models (Tab. 3).

Hence, by investing 290 or 992 cattle team hours – depending on whether wagons or sledges on roller bearings are used to transport the small blocks – for moving all material except the large blocks, the men hours needed to create the Kleinenkneten 1 grave can be significantly reduced. While a total of 76,267[3] man hours is calculated for a men-only scenario, only 62,911 man hours are necessary if cattle are hauling small blocks on wagons, meaning a saving of almost

Tab. 3. Man hours needed for creating the Kleinenkneten 1 grave in a men only and a cattle supported model.

	Men only model	Cattle supported model
Digging earth and rubble, quarrying slabs	*1,400*	*1,400*
Loading loose material and small blocks	*9,872*	*9,872*
Hauling loose material and small blocks	*14,807*	*0*
Loading large blocks	*6,811*	*6,811*
Hauling large blocks	*10,217*	*10,217*
Observing cattle (loose material on wagons; small blocks on wagons or sledges)	*0*	*1,451 or 4,961*
Construction	*33,160*	*33,160*
Sum	*76,267*	*62,911 or 66,421*

2 The value of ca. 50 000 man hours for 69 blocks of the Kleinenkneten 1 façade in Müller 1990b cannot be reproduced with his own guiding values.

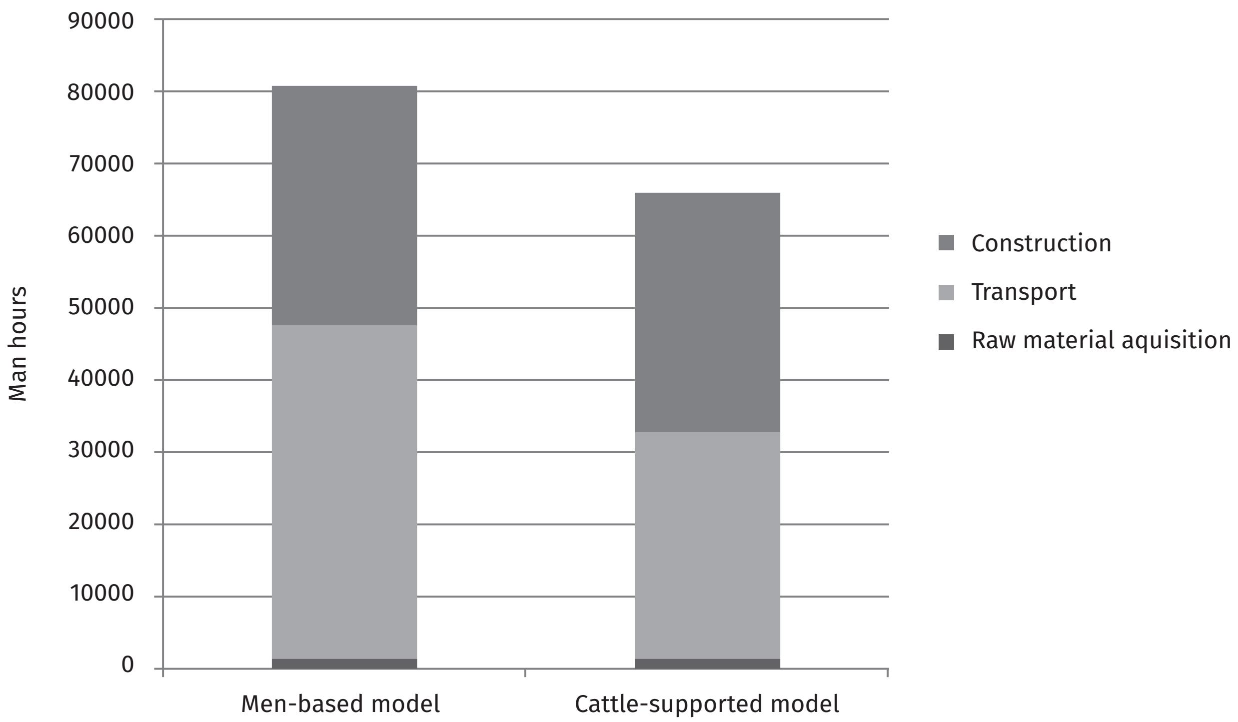

Fig. 9. The man hours needed for the erection of the TBK long barrow Kleinenkneten 1 in a man power based and cattle-supported model, assuming carts or wagons have been used for the transport of small blocks (after Müller 1990b).

20 % on human resources (Fig. 9). Even if small blocks are hauled on sledges and roller bearings as in our small experiment (Fig. 6), the resulting 66,421 men hours still mean a saving of more than 10 %.

DISCUSSION: CLEARING THE LANDSCAPE AND BUILDING THE MONUMENTS

Exerting jerks of great force is not only easier for the human glucose driven metabolism; moreover, it can also be a source of fun (»heave ho!«) for teams of people erecting a megalithic tomb. Hence, it is conceivable that the few larger erratics used in a megalithic tomb were transported by men in an event-like manner. However, hauling smaller blocks is not such a challenge, is physically exhausting when done for longer periods of time and can be quite time-consuming: in the Kleinenkneten 1 example, almost two-thirds of the men hours needed for transport would end up in long days of hauling smaller blocks, which – in contrast to the few large erratics – present no real challenge for a working gang. By contrast, cattle can sustain their force and power over extended periods once they are trained to accept a given workload. Hence, it is not unlikely that there was a temptation for TBK people to use their cattle for transporting loads: after all, no one really imagines that the ard was pulled by man power either. Consequently, the model proposed here assumes that during the TBK centuries in question, the task of moving blocks out of the field plots was not only identical to the task of moving them to the current construction site for a megalithic tomb, but that this task was also integrated into the agricultural routine. Once a small erratic was dug out and loaded onto a wagon, which would probably require some hours and a dozen or so men, a pair of cattle and one person could haul it to its destination in one leg assuming fair surface conditions, or two teams could haul it on a sledge on straw. Alternatively, one team could haul it in a series of maximum jerks of some metres each on a sledge on roller bearings.

3 See note 2.

While training cattle nowadays appears to involve a huge investment of work, traditional cattle keeping involves much more contact between people and animals, especially when they are used for milk as in the TBK (Isaksson/Halgren 2012). A certain degree of training can hence be assumed to ensure safe handling of the animals, regardless whether they are cows, oxen or bulls, and it is also difficult to imagine that cattle trained to pull the ard were not involved in other pulling tasks. While the presence of quite high numbers of castrated male animals in the bone record from TBK sites like Bronocice (Milisauskas/Kruk 2002, 204) and the presumably high traction forces needed to pull an ard through a moraine soil fallow make it likely that oxen were also used as traction animals in the transport, cows – especially those not currently pregnant or lactating – could theoretically also do the work as calculated here. However, taking erratic-removal into account, where several hundred if not almost 1,000 cattle team hours were needed for Kleinkneten 1 and had to be split up into work days of three hours each for cows or six days each for oxen (Masson 2015, 158), keeping a pair of oxen appears even more justifiable for a TBK community than for the sake of ploughing, harvest and firewood transport (Bogucki 1993) alone.

Fair surface conditions or tracks for large parts of the transport are not an unrealistic scenario assuming that the source area of the boulders was the TBK fields: wagons would have also been useful for bringing home the harvest, and hence a system of good dirt tracks would have been a sensible investment. Rather than binding large fractions of the human workforce of a region for weeks of stone transport, the model proposed here would allow for a steady workflow for teams of cattle in times of the year when their ploughing and harvesting work on the fields was paused, e. g. in winter and during the growth season. Ploughed fields on the moraine are in constant need of being cleared from stones of various sizes that are dug up and are detrimental to ard action. As their sizes vary, the amount of action needed varies accordingly: while the smallest can be thrown away, many require one or two men carrying them away. According to our model, larges ones were hauled using teams of cattle and would require no more human workforce than other agricultural activities like ploughing, sowing and harvesting. Megalithic monument construction appears – in this model – as a side-effect of the tendency that erratics as well as smaller boulders and stones in the way of the ard tend to be concentrated at the edge of the arable land (Schafferer 2014, 97). What was probably something similar to a clearance cairn would be structured into a megalithic monument by adding a few huge erratics in a large men-based event only when the time had come for the erection of a new tomb.

ACKNOWLEDGEMENTS

The idea for this paper was conceived during our discussions with Kirsten Gebhard, Arnold Muhl, Karol Schauer and Wolfram Schier at the occasion of a small cattle traction workshop held at the Domäne Dahlem, Berlin, on 24th May 2011. The organisers of the conference »Megaliths, Societies, Landscapes: Early Monumentality and Social Differentiation in Neolithic Europe« gave us the possibility to further explore the topic. We thank Walter Dörfler for sharing his technical know-how and the ropes used at his experiment, as well as Michael Parker Pearson for sharing unpublished Tandroy data and encouraging discussions. Tobias Gabele made important comments on earlier versions of this paper, and Julia Ebert proof-read and edited the manuscript. Moreover, we are most grateful to one anonymous reviewer for crosschecking our calculations. Our biggest thanks goes to all participants of the Zugrindertreffen 2016 in Berlin, especially Anna Bauer, JörgBremond, Gerhard Döring, Claus Kropp, Rolf Minhorst and Anne Wiltafsky. Without their encouragement, practical help and advice during our experiment on January 31st 2016, we could not have tested the feasibility of some of our assumptions. Last but not least, Emma's central contribution to our experiment should not go unmentioned, although it has already been acknowledged with carrots.

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Building workforces for large stone monuments: The labour dynamics of a living megalithic tradition in Eastern Indonesia

Ron L. Adams

ABSTRACT

Megalithic monuments are clear signifiers of labour mobilisation at a significant scale. In addition to their impressive size and the intriguing implications they present for the social and symbolic features of ancient societies, megaliths can provide important insights into modes of prehistoric labour mobilisation as some of the earliest examples of manipulating large labour pools. Given the limited scale of the earliest societies in which megaliths were built, the feasibility of mobilising large labour pools for monument building is pivotal to the study of prehistoric megaliths. In this paper, I present an ethnoarchaeological examination of the labour dynamics associated with the living tradition of building megalithic tombs in West Sumba, Indonesia. The case of West Sumba and comparative examples from other ethnographically-documented megalith-building societies shows how large pools of both kin and non-kin labour can be assembled for monument building in societies of limited scale, while offering important insights into potential modes of labour mobilisation in megalithic societies of the ancient past.

INTRODUCTION

Labour mobilisation is a key component of the social dynamics of prehistoric middle-range societies. The presence of megalithic monuments built by what are typically early agricultural societies provides clear evidence of the mobilisation of substantial amount of labour and resources in groups of limited scale and administrative organisation. However, the issue of how labour and resources were mobilised for megalith building has generally been explored to a small degree in archaeological discussions of megaliths in comparison to issues related to landscape, power, territories and the cosmos. Nonetheless, one of the central problems associated with prehistoric megaliths is how labour and resources were mobilised for their construction, especially given the relatively limited scales of the social groups who built the monuments. Exploring this topic in the context of a living megalithic society in eastern Indonesia offers important insights into the dynamics associated with mobilising labour in middle-range societies of the ancient past.

As a living tradition, the practice of building megalithic tombs in West Sumba, Indonesia sheds important light on how labour and resources could have been utilised for monument building in antiquity. In West Sumba, the dynamics of power and social obligations within and between clan groups allow for the mobilisation of large labour pools and resources for tomb building. The purpose of this paper is to explore the problem of labour mobilisation in prehistoric megalithic societies and illustrate the utility of ethnoarchaeology and comparative ethnography in addressing this issue. Analyses of the dynamics of mobilising the labour and resources for megalith building in West Sumba and other ethnographically-documented societies reveal important commonalities that can help explain how such large-scale endeavours were possible in prehistoric societies of limited scales.

Studies of prehistoric complex societies throughout the world have considered the importance of labour mobilisation in the political economy. In discussing labour mobilisation in the context of pre-contact Cahokia in the North American Mississipian Period, Pauketat (2004, 35) posited that the act of labour associated with the production of crafts and magico-religious objects as well as monumental earthwork construction would have been associated with the creation and embodiment of Cahokian social meanings. By extension, value would have been reckoned through labour and not things, with labour and cultural practices being promoted through monuments, feasts and exquisite crafts. Likewise, Arnold (1993) identified labour mobilisation as a key component in the emergence of social inequalities in complex s hunter-gatherer societies of pre-contact California. Kolb (1997) identified various modes of labour mobilisation with differing degrees of complexity corresponding to the scale of the undertaking and the sociopolitical scale group involved in his ethnohistoric and archaeological examination of labour dynamics in ancient Hawai'i. Of particular relevance to the current discussion of megaliths, Dietler (1997, 104, 105) explored the importance of labour mobilisation to the political economy in the European Neolithic that is manifested in the presence of megaliths and large earthworks, asserting that the labour for megalith building was garnered through »work-party« feasts. Similarly, Kim (2014) has suggested that the dolmens built during the Middle Mumun period (1300–700 BCE) of southwestern Korea reflect strategies of exercising political power through labour mobilisation. According to Kim (2014, 266, 269, 270), aspiring elites would have been able to garner large labour pools by reinforcing an ideology of group-identity and egalitarianism that was manifested in longhouse architecture (apparently representing the shared residences of multi-family groups), a dolmen tomb-building tradition that was likely not limited to the society's elites, and the lack of significant differentiation in mortuary treatment among dolmen tombs.

Indeed, the evidence for mobilising labour on a grand scale in prehistoric megalithic societies is fundamental to the discussion of manipulating large labour pools in antiquity. More generally, the impressive scale of megaliths has long drawn archaeologists seeking to address questions related to the social, symbolic, spiritual and astronomical concerns of the ancient societies who built these monuments. The works of Flemming (1973) and Renfrew (1973; 1976) represent some of the earliest attempts to bring prehistoric megaliths into an anthropological archaeological framework by considering the social implications these monuments held prehistorically. Later studies have continued to become refined with new insights. Avenues of exploration include consideration of the social significance of megaltihs as aggregation centres (Scarre 2001), markers of territories or resources (Chapman 1981; 1995; Lidén 1995; Madsen 1982; Renfrew 1976), representations of the power of emerging elites (Nelson 1999), and representations of descent groups (Sjögren 1986; Hinz 2007). Other approaches have tended to be oriented toward the more symbolic significance of megaliths by emphasised concerns related to materiality (e. g. Kirk 2006), phenomenology (e. g. Tilley 2004), astronomy (e. g. Mackie 1977; 1997), ideology (e. g. Hodder 1990; McMann 1994; Parker Pearson/Ramilisonina 1998; Bradley 1998), symbolically charged landscapes (e. g. McMann 1994, Parker Pearson et al. 2008), and dominant locales (e. g. Thomas 1993). With few exceptions, namely Dietler (1997), Kim (2014) as well as Sheratt (1995), issues related to labour mobilisation have received little attention in previous studies of megaliths, perhaps largely due to the paucity of empirical data related to labour mobilisation in the ethnographic literature of extant megalithic societies.

LABOUR REQUIREMENTS AND GROUP SIZES

The social groups associated with the megaliths (as well as monumental earthworks) in early agrarian contexts were undoubtedly of limited scale. Scarre (2001, 308) suggested that the groups that erected the massive stone monuments in Neolithic Brittany were »… dispersed, small-scale, and impermanent.« Recent estimates of population densities for the Neolithic in central and northern Europe have ranged from 0.6 (about 5100 BCE) to 1.75 persons per km^2 (after about 3500 BCE) (Müller 2013, 8; Zimmerman et al. 2009, 368). Zimmerman et al. (2009, 362, 363) estimated that social group sizes ranging from several hundred to possibly 1,000 individuals were present during the Early Neolithic Bandkeramik period in western Germany between 5250–5050 BCE. The social groups who built dolmens during the early Mumun Period (1300–700 BCE) in southwestern Korea were likely even smaller based on house and settlement sizes of this period (Kim 2014, 266).

Given the limited group sizes associated with the early agricultural societies who built megaliths, the problem of mobilising the large labour pools needed for these labour-intensive endeavours is of paramount importance. Labour estimates for building large prehistoric megaliths typically range to well over 100 workers. It has been estimated that it would have required a minimum of 500 people to move the stone of the Grand Menhir Brisé in Brittany (Le Roux et al. 1997; cited in Scarre 2001, 300). A community with a total population of 1500–2000 has been considered necessary to support the construction of the La Hougue Bie passage grave on Jersey, Channel Islands (Patton 1992, 394). An estimated labour force of 200 people would have been necessary to transport the largest stone of the passage grave (Patton 1992, 393). In discussing dolmens of Britain and Ireland, Cummings and Richards (2014, 8, 9) noted the undoubted complexity that would have been associated with coordinating the labour, resources, and food (to feed the workers) needed to build these monuments.

The distances from the quarries to the location in which the monuments were built put further strains on the time and labour associated with megalith building. The traditional transport of megalithic stone discs measuring up to 2 m in diameter in western Micronesia entailed a journey on the open sea for a distance of approximately 400 km (HAZELL/FITZPATRICK 2006). Large stones for megalithic monuments in northern France have been found to have been transported over land for distances up to five kilometres from their sources (BURL 1985; MOHEN 1989, 160). The large stones comprising the passage grave La Hougue Bie are from sources spread out between 1 km and 7 km from the monument including places where the stones would have had to have been transported uphill to reach the passage grave location (PATTON 1992, 343). Likewise, the megalithic Atteln I tomb in the Altenau Valley of North Rhine-Westphalia, Germany is comprised of stones transported 2.7 to 2.8 km from their source outcrops (GÜNTHER 1979; SCHIERHOLD 2009, 38, 39). Stones forming the passage grave of Newgrange in Ireland were transported an estimated distance of more than 50 km (MITCHELL 1992). The most famous example of prehistoric long-distance transport of megaliths comes from Stonehenge where the sandstone ›sarsen‹ stones were derived from sources approximately 50 km from Stonehenge (BOWEN/SMITH 1977; HOWARD in Pitts 1982, 119–123), while the bluestones were from a source 250 km west of Stonehenge (GREEN 1997; THOMAS 1923; THORPE et al. 1991).

Comparable transport distances apply to the stones used to build megalithic tombs in West Sumba, which – at times – are transported up to 100 km over sea and land, although the distances between quarries and tomb sites are typically within 10 km (see section below). Importantly, the ongoing practice of erecting large stone tombs in West Sumba, Indonesia can provide insights into not only the labour requirements for transporting these stones and building megalithic tombs, but also into the way in which large labour pools are mobilised for these undertakings. This empirically based study examines the socio-economic factors that prompt people to participate in megalith building in West Sumba, where megalithic tomb building is linked to relevant social, political and economic concerns for both individuals and groups.

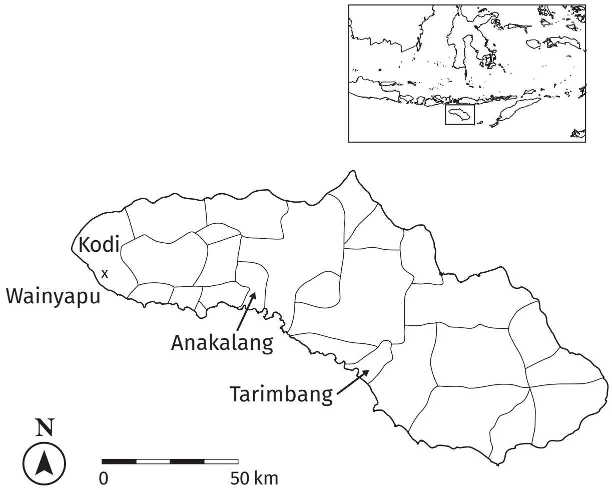

Fig. 1. Map showing location of Sumba with traditional cultural domain boundaries and places mentioned in the text.

MATERIAL AND METHODS

Field data for this study was collected in West Sumba as part of the Ethnoarchaeology of Southeast Asian Feasting Project directed by Brian Hayden. The bulk of the data presented in this article was collected from ethnoarchaeological work done in the Kodi area on the west coast of Sumba, with supplemental work conducted in the Anakalang area of the west-central part of Sumba. During the time of these investigations, Anakalang was part of the administrative regency of West Sumba and is culturally linked more closely with other parts of West Sumba than it is to East Sumba, although it is currently part of the regency of Central Sumba, which was created in 2007. The main portion of the ethnoarchaeological fieldwork conducted in West Sumba took place in research conducted by R. Adams in collabouration with Ayu Kusumawati of Balai Arkeologi Denpasar (Indonesia) and Haris Sukendar of the Indonesian National Research Centre for Archaeology (Pusat Penelitian Arkeologi National) in 2003 (for other aspects of this research see ADAMS 2005; 2007a; 2007b; 2009; ADAMS/KING 2010; ADAMS/KUSUMAWATI 2010). Adams visited West Sumba in a follow-up trip in 2005. Preliminary ethnoarchaeological data on tomb building in West Sumba was collected as part of a field study project undertaken by Adams in collabouration with Stanislaus Sandarupa of Universitas Hasanuddin (Indonesia) in 2001. Unless cited otherwise, the following discussion is based on primary ethnographic data collected by the author in West Sumba.

The island of Sumba is located in the eastern part of the Indonesian archipelago, approximately 1,500 km east of Jakarta (Fig. 1). Unlike other parts of Indonesia, Sumba has traditionally lacked highly valued trade commodities and is an island with relatively low rice agricultural productivity. These factors have kept Sumba, particularly West Sumba, away from the historical trade routes of the region. It was not until the early 20th century that direct colonial administration over West Sumba was instituted by the Dutch, although the effectiveness of this system was largely dependent upon traditional power structures (Adams 2007a, 96). Even into modern times, West Sumba has remained one of the least »globalized« parts of Indonesia. As a result, West Sumba has retained many of its traditional practices and a significant portion of its population remains tied to the traditional agrarian economy based on livestock rearing and rice agriculture.

WEST SUMBA SOCIOPOLITICAL CONTEXT

In West Sumba, traditional societal organisation revolves around patrilineally-based exogamous clan groups (*parona*). Clans are comprised of several large ancestral houses (*uma*) and numerous smaller attached houses. The ancestral houses (*uma*) are always located in the clan ancestral village, the traditional political centre of the clan. *Uma* represent lineage subgroups within the clan, and can be associated with dozens of affiliated households. In total, there can be more than 200 households affiliated with a particular clan group in West Sumba. Politically, clans have remained significant domains of political action despite the restructuring of West Sumba into larger districts and regencies during the Dutch colonial administration and the current political framework of the Indonesian nation state.

Large stone tombs in West Sumba are found in the central ceremonial plazas (*natara*) of clan ancestral villages. The *natara* is the location of the major feasts held within a clan, including the large feasts associated with tomb building. The tombs and the *natara* are surrounded by the main ancestral houses of the clan. In the Kodi area of the west coast of Sumba, tombs are situated in the front of the clan ancestral houses in a ring around the central ceremonial plaza of the clan (Fig. 2). In other parts of West Sumba, tombs are arranged in a linear pattern in front of ancestral houses flanking the *natara*. Tombs are also found in between and behind houses due to space limitations in front of ancestral houses. In Kodi, some tombs are found flanking the fields where traditional *pasola* events are held involving the staged battle of men on horseback armed with wooded staffs. In all cases, tombs are spatially associated with the clans to which those who are interred in them belonged.

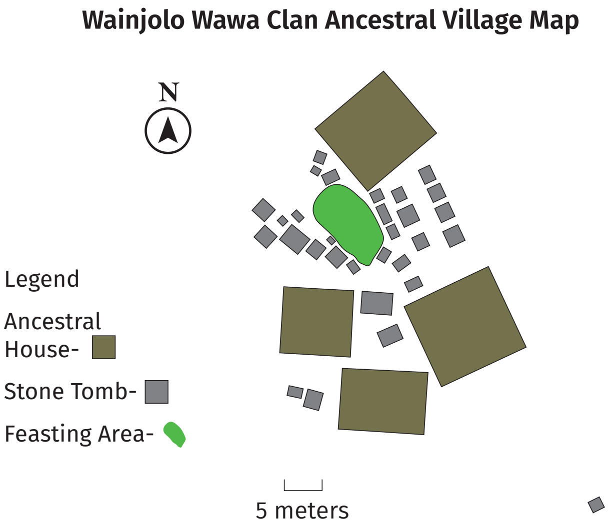

Fig. 2. Wainjolo Wawa clan ancestral village map.

While the ancestral villages are the focal point of traditional ritual activity for clan groups, most clan members in Kodi live up to several kilometres outside of their affiliated clan ancestral villages in household clusters and hamlets adjacent to cultivated land where dry rice and maize are grown along with more minor crops, such as beans, coconuts and sweet potatoes. This cultivated land and a certain amount of uncultivated forest makes up what is considered to be the collectively held property of the clan. However, despite this theoretical collective ownership, each household holds exclusive use rights over pieces of agricultural land that are passed down to successive generations.

Political power within the clan was traditionally wielded by a group of 5–10 men who achieved renown through sponsoring large feasts and building stone tombs. In Kodi, these men are traditionally referred to as *rato*, a word that can be translated as »big man« or »man of renown« in English. In Kodi, the word *rato* also refers to ritual specialists in the traditional animistic *marapu* religion of Kodi, although these ritual practitioners are typically referred to as *rato marapu*. In addition to their accomplishments related to feasting in tomb building, the secular *rato* were known for their oratory prowess and their ability to attract a large following. In the past, clan leadership was not vested in powerful and autocratic clan heads (a position that was instituted by the Dutch in the early 20th century (Hoskins 1984, 289)) but in the small group of prominent *rato*. The key to this power was in the mobilisation of supporters to contribute livestock and labour for the tomb building and feasting endeavours associated with the path to being a *rato*.

The traditional clan-based social structures in West Sumba appear to have originated during the second millennium AD. Oral histories claiming that the noble classes of Sumba, and perhaps associated clan-based social structures, are descended from migrants originating from Java during the time of the Javanese

Madjapahit Kingdom (AD 1294–1478) (BÜHLER 1951, 57; COLFS 1888, 128–129; KEERS 1938, 931; NEEDHAM 1960, 257). Keers (1938, 931) estimated that a migration of people was possible during the fall of the Madjapahit kingdom in the 15th century AD based on estimates of the genealogical depth of the earliest noble ancestors on Sumba. These oral accounts do not necessarily offer definitive proof of a direct migration from Java; however, they indicate that the current clan-based societies and associated noble classes on Sumba may have originated from a migration of people into Sumba during the first half of the second millennium AD.

Later historical developments, namely the growth in regional and global trade during the second half of the second millennium AD, undoubtedly had an impact on traditional societies throughout Sumba. Oral accounts indicate that Sumba was active in trade with the neighbouring islands of Savu, Flores, and Sumbawa for centuries during the second millennium AD (HOSKINS 1984, 9). Trade with colonial powers, particularly the Portuguese and the Dutch, and the eventual Dutch colonisation of Sumba likely constitute the most impactful historical developments.

Trade and connections with the outside were more focused on East Sumba than West Sumba throughout much of this time. The Dutch also instituted direct colonial control over East Sumba in the early-/mid-19th century, while similar Dutch administrative control over West Sumba was not established until the beginning of the 20th century (ADAMS 2007a; KAPITA 1976). Prior to colonisation, the Dutch East India Company was actively involved in trade with East Sumba, giving preferential trade access to specific local rulers in East Sumba. These local rulers were later granted administrative authority in the Dutch colonial administration in the 19th century (HOSKINS 1984, 14; KAPITA 1976, 21, 26). Megalithic tombs in East Sumba appear to have been linked to these authority figures, where as in West Sumba, tomb building was associated with the achievement of status and power even after the period of Dutch colonisation in the early 20th century (ADAMS/KUSUMAWATI 2010).

In connection with Sumba's increased involvement in international trade was reportedly an increase in internecine warfare and slave raids on the island. By the 16th century AD, prominent nobles on Sumba sold war captives as slaves to visiting trade ships (KAPITA 1976, 18). At this time, many ancestral villages were relocated to hilltop locations for defensive purposes and powerful nobles were able to enhance their power by establishing dependent-type relationships with less powerful individuals in their clans, who relied on the prominent nobles for protection (HOSKINS 1984, 11, 12). It is reasonable to infer that these conditions also shaped and enhanced the solidarity ethic that currently characterises clan groups in West Sumba.

Although clans were the highest level of formalised political organisation before the Dutch colonial administration of West Sumba began in the early 20th century, in Kodi – for example – groups of closely allied clans within close proximity formed largely informal confederations (*kabihu*) that lacked a formal administrative organisation or hierarchy. Different traditional cultural domains (often linguistically distinct) larger than confederated groups of clans existed throughout the island of Sumba as well (Fig. 1). Clans within these domains shared the same cultural traditions (e. g. named rituals and feasting occasions) and created a sphere of interaction reinforced through marriage alliances. Modern Indonesian administrative district (*kecamatan*) names and boundaries are sometimes based on these cultural domains.

After Dutch »pacification« of West Sumba through the prohibition against headhunting and warfare in the early 20th century, more emphasis was placed on competition expressed through the peaceful means of traditional feasting and megalithic tomb building (HOSKINS 1989). Later in the 20th century, with the advent of elected positions in local districts and villages in the modern Indonesian administration of Sumba, individuals who garnered wealth through non-traditional, modern commercial means and educational opportunities sponsored traditional feasts and tomb building, partly to achieve renown and gain political support in seeking public office (HOSKINS 1984, 26, 27). Sponsoring large feasts and tomb building persisted as pathways to gain political support in this modern context into the beginning of the 21st century as well (ADAMS 2007a, 205, 206).

WEST SUMBANESE MEGALITHIC TOMBS

The tradition of building megalithic monuments is a practice that has undoubtedly occurred in West Sumba for centuries and has adapted to – and persisted in – the modern context with continued relevance in the 21st century. However, the full-time depth of the megalithic tradition in West Sumba has not been established. During my time conducting ethnographic interviews on Sumba, many informants insisted that simple tombs made from single large stone slabs were made using stone tools. Some people stated that water buffalo mandibles were used to make carved designs on limestone tombs prior to the introduction of

Fig. 3. Dolmen tombs in Kodi, West Sumba (photo: R. Adams).

Fig. 4. Stone tomb with modern tile exterior in Kodi, West Sumba (photo: R. Adams).

metal tools. This assertion does not seem to be entirely implausible, as the limestone used for making stone tombs in much of West Sumba is relatively soft and can almost be flaked with a fingernail.

There is presently no archaeological data on Sumba that irrevocably confirms or refutes the notion that megalithic tombs were built on the island prior to the introduction of metals, although current archaeological evidence and ethnohistoric accounts suggest that this is very unlikely. What appears to be a burial tradition pre-dating megaliths but also post-dating the introduction of metals on the island has been documented at the Melolo earthenware jar burial site in East Sumba. Based on the presence of high-necked ceramic flasks and metal artefacts characteristic of the Metal Phase (500 BC–AD 1000) of Island Southeast Asian prehistory (SOEJONO 1971, 85; VAN HEEKEREN 1956; BELLWOOD 1997, 303–304). Furthermore, the estimated genealogical time depth of the oldest tombs in villages that I visited ranged from just over 100 years to more than 450 years old. Thus, it seems as though megalithic tomb building commenced on Sumba at some point within the last millennium, long after metals were introduced into the area, likely in association with the establishment of the current clan-based societies of the island (see section above).

Currently, megalithic tombs in West Sumba can take on a variety forms attributable to sub-regional stylistic variation. The simplest stone tombs consist merely of a capstone placed atop a burial in the ground. A more common tomb type comprises a four-walled stone box tomb with a capstone laid atop four wall stones that are typically about 1.5 m tall. This is the dominant tomb type in the Kodi area of the west coast of West Sumba (Fig. 3). Being made up of large slabs forming the walls supporting a larger capstone, these tombs take on the general form of stone monument that is referred to as a dolmen. Dolmens are a common tomb type found prehistorically throughout most of western Europe and the British Isles, northern and central Africa, the Arabian peninsula, Madagascar, India, East Asia (northern China, Korea and Japan), and Columbia (JOUSSAUME 1985; 1988, 16–24).

In Kodi, some of the most elabourate dolmens are accompanied by free-standing stones (about 1.5 m in height) placed at one or both ends of the tomb. The largest dolmens in Kodi comprise six wall stones and two capstones, forming a tomb twice as large as the typical dolmen. The application of cement and mortar in tomb building more recently has led to other embellishments to tombs in Kodi that include a tomb in the village of Wainyapu covered with white tiles (Fig. 4).

In Anakalang and other areas in the central and eastern parts of West Sumba, tomb forms are yet more complex. The most elabourate tombs in these areas constitute large stone table-like structures with four or six legs (about 1 m tall and 50 cm wide) and a stone slab top that can be 2–3 m long and 1–2 m wide. These stone tables are built over stone box tombs. A large tabular stone (*kado watu*) measuring up to 3 m in height is placed in front of the most elabourate versions of these tombs (Fig. 5). The combined weight of all of the stones making up these tombs can be well over 60 metric tonnes.

Throughout West Sumba, the exteriors of elabourate stone tombs are embellished with carvings. The carved designs can be overt symbols of traditional wealth, such as gongs, gold earrings or buffalo horns. In some cases, the tomb owner (person who sponsored the construction of the tomb) has their genealogy carved on the exterior of the tomb (HOSKINS 1986, 39). In all cases, the addition of carvings to a tomb's exterior further enhances its prestige value.

Fig. 5. Free-standing kado watu stone in front of large tomb in central part of West Sumba (photo: R. Adams).

Fig. 6. Removing a limestone slab from a quarry in Kodi, West Sumba (photo: R. Adams).

LABOUR AND RESOURCE REQUIREMENTS FOR TOMB BUILDING

In West Sumba, prominent individuals can sponsor the construction of their own tombs within their lifetime, and as a demonstration of wealth and kinship support, the sponsorship of this endeavour remains one of the keys to accessing traditional political power. The recognition of the role of tomb builder or sponsor, along with the sponsorship of other large feasts, is a critical element in the acquisition of power within clan groups. Mobilising the large labour force for tomb building is not only a means to an end, but an end in itself. The visual impression of hundreds of people hauling a megalith across the landscape is a very important aspect of the tomb building practice. In fact, informants in West Sumba stated that the size of the crew pulling a stone does not always reflect the number of people actually required to move a megalith and that, at times, the crew is much larger than necessary to create an impressive display of the tomb builder's ability to attract a large labour pool. It is these grand displays of labour mobilisation that can build the renown of the most prominent individuals in traditional West Sumbanese society. The construction of a megalithic tomb is the material proof of the ability to mobilise large labour forces.

The tomb-building process in West Sumba begins with quarrying limestone slabs used to construct the megalithic monuments. In Kodi, it typically requires between 5 and 50 stone quarriers approximately one week to two months to cut the tombstones from a limestone quarry (Fig. 6). The quarry crews use metal picks with bamboo shafts to quarry large slabs of limestone. Commonly, the tomb sponsor contracts the quarry crew, unless the tomb sponsor is a skilled stone worker. When contracting a quarry crew, the tomb sponsor gives the quarry crew a payment of livestock and traditional woven cloth or, as can be the case currently, cash. In the village of Wainyapu, lead quarriers (*tukango*) reportedly receive one large piece of traditional cloth, one buffalo, one pig, and, sometimes, one horse each time they are contracted to dig stones for a tomb (payment for one capstone or the four walls). After receiving the payment, the *tukango* retains the largest portion and then divides the payment among his quarry crew of about five individuals (the livestock is sold for cash and then divided).

Similar payments in livestock for quarriers occur in the Anakalang area of West Sumba, although cash payments are more typically made to contract quarry crews in Anakalang. Based on estimates taken in 2005, each member of a quarry crew in Anakalang would receive between about 5000 and 7500 Rupiah per day (between about \$0.65 and \$0.90 in 2005 US Dollars). The larger and more complex tombs in Anakalang can also necessitate larger quarry crews and more time spent quarrying the stone. Quarrying all of the stones required to build a large tomb in Anakalang can require one to two months of quarrying. The size of the quarry crews (about 20–50 people) used to quarry the large tombs in Anakalang tends to be larger than those in Kodi as well. In cash terms, the quarrying expense can equate to more than 20,000,000 Indonesian Rupiah (approximately \$2500 US Dollars in 2005). This is a very large expense in an area where the cash assets of many households are tied up in the value of their domesticated animals and rice surpluses and augmented by wages and cash crop sales that equate to much less than 20,000,000 Indonesian Rupiah in a given year (ADAMS 2007a, fig. 5.1).

Permission to use a quarry owned by another clan can add additional expenditures. While it is common for ancestral villages to be within a relatively short distance to a limestone quarry, ownership of quarry locations is not universal among clans. In Kodi, the main quarry used by numerous clans is adjacent to the village of Wainyapu, which is located a distance of no greater than approximately 10 km from the other ancestral villages in Kodi (Fig. 7). Six clans (Wainjolo Wawa, Wainjolo Deta, Wainggali, Kaha Malagho, Kaha Katoda, and Wainjoko) within Wainyapu own sections of the quarry. The six other clans represented in Wainyapu (which together form the *kabihu* of Balaghar) can use the quarry, if a payment of one chicken, one dog and one traditional *parang* knife is presented to a clan owning a portion of the quarry. For clans outside of Wainyapu, a payment of five water buffaloes and five horses (which equates to a bridewealth payment in Kodi) is traditionally made for the tombstones of a quarry owned by a Wainyapu clan (Hoskins 1984, 164). In these cases, the quarrying of the stone is done by a labour force from within the quarry-owning clan.

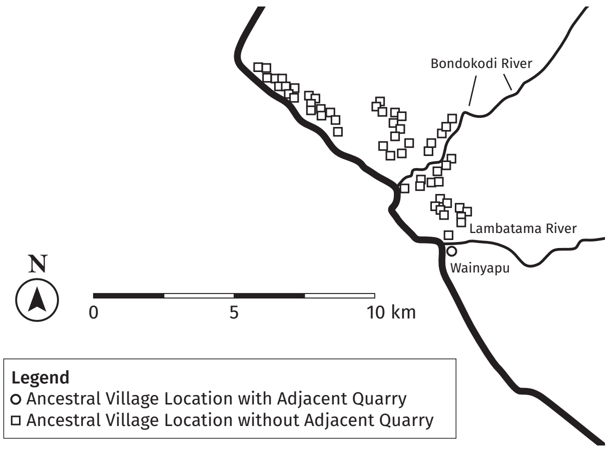

Fig. 7. Map showing village locations in Kodi in relation to major limestone quarry (majority of village locations outside of Wainyapu derived from Hoskins 1993, map 3).

In addition to the requisite payment for contracting a quarry crew, coffee, tea, meals (e.g. rice with chicken, pig, or dog), and sometimes cigarettes are provided for the quarriers on the days in which they work in Kodi. In Anakalang, pigs or goats are often slaughtered for quarry crews. Throughout West Sumba, the animals slaughtered for the quarry work feasts are usually provided from the tomb owner's own stock, although some represent contributions from other households.

The greatest expenditures in labour are associated with transporting the tomb stones. When transporting the stones, the large slabs are traditionally tied to wooden sledges with vines or ropes and pulled by up to several hundred people (primarily males over 10 years old) to the ancestral village of the tomb owner (where tombs are erected) (Fig. 8). The process of stone pulling in West Sumba is very similar to that observed ethnographically on Nias island off of the west coast of Sumatra, where hundreds of men would pull a large megalith tied to a sledge (Schröder 1917; Schnitger 1989). According to Schröder (1917; cited in Bakker 1999), 525 men spent three days pulling a 4-m^3 limestone slab a distance of 300 m up a significant slope on Nias. The stone haulers were given fourteen pigs, rice, and a yellow cloth each day the stone was pulled (Bakker 1992, 34). Similar costs in labour and resources are typical of transporting large stones for megalith building in West Sumba.

Fig. 8. Hauling a large capstone for a tomb in Anakalang, West Sumba (photo: R. Adams).

In West Sumba, it can require up to 1,000 or more people to haul large stones from quarries to ancestral villages. When documenting stone tomb building in West Sumba in the 1980s, Janet Hoskins (1986, 39) wrote that an estimated 1,200 men were needed to pull a large tombstone fastened to a sledge with vines from a quarry to an ancestral village in Kodi. For each of the two to three days the stone was pulled, Hoskins (1986, 39) noted that 3 to 5 water buffaloes were slaughtered for the stone haulers and an additional 6 to 10 water buffaloes were slaughtered for a feast when the stone arrived at the tomb site. These estimates are high compared to the majority of recent accounts I recorded for stone hauling episodes in West Sumba (especially those recorded for Kodi), although the largest examples are close to this general range (see also Joussaume 1997 and Steimer-Herbert 2012 for descriptions of tomb building in Sumba).

Data gleaned from a survey of accounts of tomb building from informants in West Sumba, and from observations of stone hauling, indicate that there is considerable variability in the requirements for building a tomb that depends upon the size of the tomb and the distance from the quarry to the ancestral village of the tomb owner. The number of people pulling the stone and the duration of the pulling is dictated by the size of the stones and the distance from the quarry to the tomb site, which can range from 500 m to well over 10 km. In Kodi, the greatest distance tombstones travel from a quarry to an ancestral village is approximately 100 km when unique tombstones from Tarimbang in southeast Sumba are desired (Fig. 1). Stones quarried in Tarimbang are a hard and smooth type of sandstone or siltstone that is quarried and distributed to parts of East and West Sumba. These stones are much smoother and more refined than the limestone quarried in Kodi, where stones from Tarimbang are sometimes used for tomb capstones. Tarimbang capstones were traditionally transported by boat and pulled using traditional methods, although they are currently moved by truck for part of their journey from Tarimbang to Kodi. Informants in Kodi claimed that it traditionally required a payment of 20–30 heads of livestock (water buffaloes or a combination of water buffaloes and horses) to have a stone quarried in Tarimbang and transported to Kodi (Adams 2007a, 149, 150).

The individuals who haul the stone stones are typically males between the ages of 10 and 60, although there are cases in which women become involved in stone dragging. The greatest input of labour and fanfare throughout West Sumba is associated with the movement of the capstone, the largest stone slab used to build a stone tomb. Dragging a capstone from the quarry to the village can take from 150 to more than 1,000 stone haulers between one day and one month. In Kodi, Informant accounts indicate that it required more than 2,000 people (not all of whom were pulling the stones at one time) one week to drag three large slabs (each weighing approximately 11.5 metric tonnes) that together made up one large capstone from the quarry to the village. Members of various clans helped pull these stones, and one water buffalo and one pig was slaughtered for feasts on each of the days the stones were pulled to feed the workers and others in attendance. Overall, based on data collected in Anakalang and Kodi, it typically requires between about 300 and 500 people from one day to one week to move a capstone from the quarry to the ancestral village of the tomb owner.

Moving the wall slabs for the tombs is a relatively small undertaking in comparison to transporting the capstone. The wall stones for tombs in Kodi usually measure about 1 m in width and 1.5 m in length (weighing approximately two metric tonnes). I witnessed one occasion in which roughly 25–30 individuals dragged two wall stones (one at a time) a distance of 500 m in one afternoon. On another occasion in Kodi, four wall stones were moved about one km (approximately 50 m of which was over water through a small estuary). Two of the wall stones were moved by approximately 50 people in one day, while the other two were moved on two separate days. A total of eight pigs were slaughtered (four for large work feasts and four for the workers to take home) during the three days in which the stones were pulled from the quarry to the village.

In Anakalang as well, transporting wall stones is a smaller undertaking than hauling the capstone, although trucks are now often employed to move these less impressive stones. However, the free-standing *kado watu* stones that are erected in front of the largest tombs in Anakalang require nearly as much labour as that associated with the capstone. Estimates from Anakalang indicate that it requires from 100 to 600 people to move a single *kado watu* stone for a distance of a few hundred metres in a day.

After all of the tombstones have been brought to the village, the process of tomb building begins with the erection of the wall slabs, followed by the placement of the capstone atop the walls. Erecting the tomb walls tends to be a relatively modest undertaking, requiring about five men (usually close family members of the tomb owner) and about five days to complete. On each day work is completed, workers are fed a lunch comprising a chicken, eggs or fish along with rice, coffee and betel nut. More workers usually take part in placing the capstone atop the walls, which can necessitate the labour of about 50 to 200 individuals and a larger feast with two to four pigs as well as rice, coffee and betel nut.

The tomb building process can be more elabourate in Anakalang. When all of the stones arrive in the village, a traditional ritual feast known as *Weisa Boalara* is sometimes, but not always, performed to symbolically open the doors of the village. At least one pig or water buffalo is killed and eaten along with rice by those dragging the stones and others invited to the feast (which can include hundreds of people). A rite to obtain permission for the stones to enter the village is also performed by a ratu (equivalent to the *rato marapu* in Kodi – see above) priest for this event.

Regardless of whether the *Weisa Boalara* is held, building a tomb in Anakalang tends to be a larger undertaking than building a tomb in Kodi. The construction of a *watu parisi* (a dolmen-type tomb with a standing *kadu watu* stone placed in front of it) requires more time and effort due to the presence of the table stone over the simple dolmen tomb and the free-standing *kado watu* stone in front of the tomb. The whole process of erecting a *watu parisi* can take more than one hundred people about a week and entail work feasts with a pig or a goat and rice each day.

When tombs are carved with special motifs (e.g. water buffalo horns or prestige items) on their exterior, additional expenses of labour and resources are required after the main tomb has been assembled. A specialised stone carver and one or two assistants are usually contracted for such a purpose and paid in livestock, finely woven cloth, and/or a cash sum of well over 1,000,000 Indonesian Rupiah (approximately $125 US Dollars in 2005) before work commences. The carving work can require from one week to more than a month to complete, during which time the tomb owner is required to provide meals (e.g. chicken and rice) for the stone carvers.

Modern technological advancements have changed tomb building in various aspects over time. Trucks are now sometimes used to transport tombstones from quarries to ancestral villages. This is more common for the stone slabs that form the tomb walls, which are not as large as the capstones. Renting a truck to transport stones can lower the costs associated with tomb building. Sometimes tomb wall stones are also made from limestone bricks and cement, which is less costly than having stones hauled by hand. The advent of non-traditional technologies have also changed the way in which tombs have become adorned. As noted above, cement is sometimes applied to the exterior of a tomb to create three dimensional designs applied to a tomb's exterior, such as buffalo horns or a house (see also Hoskins 1984). Ceramic tiles are sometimes applied to the exteriors of tombs in West Sumba as well (Fig. 4). Perhaps the most significant overall effect of these modern technological advancements is that more people are able to build tombs than was the case previously. Informants in West Sumba claimed that building a tomb was traditionally associated with much more planning and the gradual accumulation and raising of large quantities of livestock than it is today. However, despite these changes, very high costs of labour and resources are still required to build the most elaborate of stone tombs, and it is considered preferable to employ traditional methods when building a tomb (i.e. having large numbers of people pull the stone manually with vines). The use of these more costly traditional methods adds significant prestige to the tomb, as the number of heads of livestock slaughtered and the size of the labour force required to build the tomb can be remembered for decades.

Indeed, the expenditures in labour and resources needed for tomb building using traditional methods can be staggering. The overall labour costs range up to more than 47,000 person days, with a total resource expenditure estimated at the equivalent of up to approximately $27,000 US Dollars (Tab. 1). Given these high costs – which require at least some support from other households – the central issue concerns the feasibility for a single household to mobilise the labour and resources required for tomb building.

RESULTS: MOBILISING LABOUR FOR TOMB BUILDING

Labour mobilisation on a large scale in West Sumbs is tied to the importance of 1) relations of mutual support, 2) concerns for solidarity and collective prestige within clan corporate group structures, 3) inter-clan alliance relationships, and 4) the achievement of renown in the political economy of large feasting events. The ways in which these issues are played out in the context of tomb building are discussed below.

In its most basic form, labour organisation beyond the household level in West Sumba is based on inter-household reciprocal obligations. For the most common labour needs associated with agriculture, labour-exchange networks are utilised in West Sumba. For agricultural work, labour is organised around a system of labour-exchange groups generally referred to as *gotong royong* groups. These groups are typically made up of individuals in the same clan who rotate from one member's land to another's to perform work associated with planting, harvesting and preparing fields. In exchange, the host household provides food for the work group. *Gotong royong* group members also receive a small share of the host household's harvest when helping with their rice harvest.

The essential element of a *gotong royong* arrangement is the mutual benefits accrued by those participating in the work groups. The tangible benefits of *gotong royong* comprise a successful rice crop and assurances of future support. A modest meal provided by the host represents a small »work feast,« the provision of which is considered essential to maintaining the continued support of fellow *gotong royong* households. Work feasts and mutual assistance obligations are also associated with house building. In these cases, like *gotong royong*, labour support comes from fellow clan members, who expect some kind of support-in-kind when they need assistance with a similar type of endeavour. This basic principal of mutual support extends to tomb building, but at a much larger scale in which support from outside of one's clan is usually essential.

Unlike *gotong royong* arrangements, the number of people used to quarry tombstones, transport them, and assemble the tomb (ranging from the hundreds to well over 1,000) can be far greater than that available in an entire clan. In several recorded cases of tomb building, well over 1,000 people (5,000 in one case) were reportedly invited to either pull a tombstone or watch it being pulled from the stone quarry to the village of the tomb owner. To put this in perspective, a clan group in the Kodi area of West Sumba, where

Table 1. Estimated Labor and Resource Costs (expressed in U.S. Dollars) for Specific Tomb Building Cases in West Sumba, Indonesia.

CASE*	TOMB SIZE (METRIC TONNES)	DISTANCE FROM QUARRY TO TOMB SITE**	LABOR COSTS (PERSON DAYS)	RESOURCE COSTS (U.S. DOLLAR EQUIVALENCY ESTIMATES FOR FEASTS AND WORK CREW PAYMENTS NEEDED FOR TOMB BUILDING)
2	4.9	500 m	2,030	$ 1,208
3	9.75	100 km	Incomplete Data	$ 23,600
4	15.5	500 m	6,444	$ 12,500
5	12.9	500 m	10,624	$ 3,500
6	12.9	500 m	30,158	$ 4,000
8	12.9	500 m	10,404	$ 1,300
9	12.9	500 m	5,882	$ 3,000
10	18.9	500 m	12,000	$ 2,000
11	36.6	7 km	32,370	$ 11,400
15	18.8	500 m	12,992	$ 7,200
16	22.4	500 m	47,288	$ 4,800
17	5.2	500 m	4,158	$ 1,100
18	5.2	500 m	4,158	$ 1,200
19	12.8	500 m	5,052	$ 10,400
20	6.5	700 m	9,918	$ 3,300
21	15.2	500 m	24,600	$ 6,400
22	6.5	500 m	6,192	$ 4,300
24	28.1	500 m	29,450	$ 27,000
25	5.9	500 m	8,056	$ 2,700

* *Individual case numbers derived from Adams (2007a).*
** *Majority of cases are from same village, resulting in similar transport distances from quarry to tomb sites.*

the bulk of this tomb building data was collected, can comprise approximately 200 households and a total population of approximately 1,000–1,500 individuals.

With corvée labour, it is conceivable that one would be able to call upon perhaps 300–400 able bodied male clan members (it is men who traditionally build tombs) to build a tomb. However, large-scale corvée arrangements are absent in West Sumba and tomb building typically requires at least some labour from outside of one's clan and from outside one's village. Even when not absolutely essential, labour from households living in other clans is typically present due to inter-clan exchange obligations (see below).

The most obvious attraction for those who provide labour for such an endeavour is food. For all undertakings that require labour from outside of one's household in West Sumba (from working in rice fields to building houses), it is essential for the host to provide workers with a meal in a work feast. Each day that work is undertaken for tomb building, this meal typically comprises rice and meat, usually chicken, pig or water buffalo depending upon the size of the crew, foods that are usually not eaten on a daily basis. With large crews and a long duration, these work feasts can entail the slaughter of many heads of livestock. For a particularly large stone tomb in Kodi, 130 pigs, 9 water buffaloes and 2 cows were reportedly slaughtered for the work feasts associated with building the tomb.

The large size of tomb-building feasts – which require large quantities of rice, coffee and other items in addition to livestock – usually necessitate food contributions from other households. The livestock slaughtered for these feasts often comes from households within the tomb owner's clan or from allied households in other clans. People who contribute livestock or other food items, such as rice or coffee, for the associated tomb building feasts also often assist in pulling the stone from the quarry to the tomb owner's village. It can take the tomb owner several years of planning to ensure that the labour and food contributions required for tomb building are in place. The specific timing of a tomb building endeavour is not dictated by a particular age-related milestone, although one cannot build a tomb for themselves if large tombs have not yet been built for their parents and grandparents. Those who cannot afford to build a tomb in their own lifetime are interred in simple burials in hamlet communities outside of the ancestral village and are only transferred to a proper megalithic tomb after their descendants build one on their behalf. As a result, a person can sponsor the construction of three tombs in their lifetime. Tomb building is also not related to a specific event cycle for a clan group. However, the timing of a tomb building episode and the location where the tomb is placed within the ancestral village are decided in meetings with fellow clan members of the tomb builder.

From a political standpoint, the question is why would people provide labour and substantial material support for tomb building when, on the surface, the undertaking primarily enhances the power and renown of the tomb owner? For supporters within the same clan as the tomb owner, the social dynamics of West Sumbanese clan groups offer insights into why it can be advantageous for people to support their fellow clan members in tomb building. While tombs do confer a considerable amount of power and prestige on those who build them, at another level, they are viewed as collective clan property. Entering the ceremonial field of a clan group, one can immediately take stock of the number and size of tombs erected by a clan. Affiliation with a strong clan can be important in the context of the competition between clans over land and resources that has traditionally characterised inter-clan relations. Thus, group solidarity and self-interests involved in clan membership can be considered a factor in motivating people to support a fellow clan member in building a tomb as a corporate group strategy (HAYDEN/CANNON 1982; HAYDEN 2013).

However, there are other, perhaps more tangible concerns that explain why people choose to support fellow clan members in megalithic tomb building. At an individual level, the decision to participate in tomb building can be attributable to the pressures associated with clan membership. Active participation in tomb building and other large feasts held within one's clan – by providing either food (livestock and/or rice) or labour – is necessary for maintaining a voice in clan affairs and accessing clan support networks. These networks allow clan members to access cooperative labour within clans that is used for housebuilding and agricultural work. In addition, clans are important for political support in cases of dispute with other clans and in accessing modern administrative posts. People can even be phased out of these support networks altogether when failing to participate in clan activities (HOSKINS 1984, 311, 312). Unsurprisingly, informants in West Sumba spoke of an obligation to provide livestock or labour for tomb building and other large feasts within their clan.

When labour and resources for tomb building comes from non-affiliated clans, contributions are usually tied to reciprocal exchange relationships. While there is competition between clans that can escalate into violent confrontations at times, clans are very interdependent in the context of inter-clan marriage relationships. As a patrilocal society with exogamous clans, affinal relationships in West Sumba are very well defined and are essential to the maintenance of the social order. Certain clans in West Sumba are linked by wife-giver/wife-taker relationships in which women from the wife-giver clan periodically marry into and take up residence in the wife-taker clan. Once a wife-giver or wife-taker relationship is established with another clan, the relationship can last for several generations.

These wife-giver/wife-taker relationships are manifested in material exchange that begins with marriages. Weddings entail the exchange of large quantities of livestock and other valuables (e.g. finely woven cloth and gold ornaments) between two clans. In these cases, the brideprice typically requires a payment of five horses, five water buffaloes, and one *mamoli mas* (gold earring) (an expense totalling up to 35,000,000 Indonesian Rupiah or about $4375 US Dollars in 2005), while the return-bride price payment (from the bride's family) is five sarongs, five large pieces (for men) of finely woven cloth, and two pigs (one of which is killed for a feast at the time payments are exchanged) (an expense totalling up to 7,000,000 Rupiah or $875 US Dollars).

Once established, wife-giver and wife-taker relationships between clans are manifested in later reciprocal material exchanges, primarily in the context of traditional feasts, between the two clans. When a household from a clan has a wife-taker relationship with a clan hosting a feast, the household from the wife-taker clan is obligated to provide a water buffalo or a horse for the feast. The wife-giver household that receives this livestock contribution is obligated to bring a pig and/or piece of finely woven cloth as a reciprocal contribution to a feast hosted by the wife-taker household who made the initial feasting contribution (see also GEINAEART-MARTIN 1992, 242–246). Due to these exchange obligations, affinally-related clans represent one of the primary sources of external livestock contributions (i. e. contributions from other households) for the feasts associated with tomb building in West Sumba and also important sources of the labour for tomb building.

When marriage relations are not involved, contributions of labour and livestock for tomb building from households of non-affiliated clans can be valuable in building alliances for future marriage consideration and sociopolitical support in a political economy in which »network strategies« (BLANTON et al. 1996) exist alongside corporate group strategies as keys to accessing wealth and power. Acquiring power and renown in West Sumba is linked to the establishment and maintenance of important debt relationships with households in other clans established through feasting. Likewise, social renown and credibility are built up by being recognised as a major contributor of livestock for large feasts. In short, making grand contributions to feasts held by other households, as in the case of hosting large feasts, can be a key element in achieving power in West Sumba, similar to what has been documented in many other traditional societies (see ADAMS 2004; HAYDEN 2001)

More generally, and regardless of clan affiliation, people choose to participate in tomb building to ally themselves with a prominent individual. The ability to sponsor tomb building is indicative of a wide and powerful network of kin and non-kin supporters. This renown makes a tomb builder an attractive investment for a poor household wishing to invest labour or livestock with the expectation of some kind of positive return in the future (KUIPERS 1990, 158). For a wealthier household, such support can be beneficial and associated with a debt which will need to be repaid in the future. An individual can contribute livestock and/or labour for a tomb building feast to create a debt that would need to be repaid when the individual builds their own tomb at a later time. It is common for people to make these kinds of contributions when planning to build a tomb of their own.

Breaking it down to simple economics, people are compelled to participate in the construction of another household's tomb for very real practical concerns. From the pressures associated with participation in clan-wide endeavours, such as large feasts and tomb building, to feasting debt relationships, there are clear socio-economic benefits to providing labour and/or livestock for megalithic tomb building and large feasting occasions. These benefits are reflected in the overall positive relationship between wealth and contributions of livestock to tomb building and other feasts (ADAMS 2007a). Given the connection between tomb building/feasting and the political economy, this relationship is unsurprising and illustrative of the degree to which social renown is tied to wealth in West Sumba.

DISCUSSION

The dynamics of labour mobilisation in West Sumba are symptomatic of the larger pattern in which individual achievement and aggrandisement is constantly mediated by concerns related to the collective power and significance of clan corporate groups and the important alliance relationships between clans. This balance between individual concerns that require the maintenance of a large support network as well as grand displays of wealth in the form of megalithic tombs and large feasts and the collective concerns of clan groups is one of the driving forces behind traditional sociopolitical life in West Sumba and facilitates the mobilisation of labour and resources for large endeavours such as tomb building without the need for classically-defined corvée labour.

ETHNOHISTORIC AND ETHNOGRAPHIC COMPARISONS

Mechanisms of labour mobilisation similar to those associated with tomb building in West Sumba are discussed by Kolb (1997) in his ethnohistoric study of the labour dynamics of traditional Hawai'ian chiefdoms. Kolb refers to »festive« works, which included storage facilities, terracing systems and roads, whose construction was paid with a commodity, such as food or prestige. Among Hawai'ian chiefdoms, festive works entailed more labour than small-scale »family« labour projects, such as building domestic structures, that were solely dependent upon the labour force of a kin group, but did not require such a large labour force as that required for temple building, tomb building, agricultural field systems, or elite residences, for which corvée labour was used (KOLB 1997, 268, 269).

In West Sumba, food and enhancing or maintaining one's position in relationships of mutual support are the »commodities« exchanged for contributions of labour and resources for tomb building. Where the dynamics of labour organisation for West Sumbanese tombs differ from those associated with festive works is in the scale of tomb building. The scale and complexity associated with the organisation of labour for the various steps in the tomb building process – from quarrying to the carving of motifs on the tombs' exteriors – is undoubtedly greater than that associated with festive works projects. For the largest tombs, labour requirements appear to approach the scale of corvée projects in traditional Hawai'ian chiefdoms. The absence of large-scale systems of corvée labour in West Sumba is probably attributable to the heterarchical nature of traditional sociopolitical power and the lack of powerful individual leadership roles, such as paramount chiefs, with the authority to call upon obligatory labour contributions mandated by their central authority. Elsewhere in Indonesia, large-scale labour mobilisation for megalith building traditionally also did not require corvée labour arrangements. In Tana Toraja, Indonesia, the erection of large stone menhir monuments and associated funeral feasts entailed livestock and labour contributions (totalling up to 1,000 stone haulers) from several different kindred groups (ADAMS 2001, 181; HAYDEN 1999, 47, 48). Similar to the case in West Sumba, the labour force available in a particular social group (*tongkonan* kindred groups in this case) did not dictate the labour pool available to build monuments in Tana Toraja. The funeral feasts associated with megalith erection in Tana Toraja did and still do entail similar exchange obligations to those found in West Sumba, and are part of a system in which power consolidation is linked to the sponsorship of lavish feasts (ADAMS 2001, 2004).

In other cultures where megalith building occurred until recent times, megalith building was often associated with major feasting events. On the island of Nias, off the west coast of Sumatra, large stone monuments were traditionally erected on the occasion of a very large *ovasa* feasts of merit which led to the conferring of a prestige title on the feast host (BEATTY 1992; FELDMAN 1988). The megalithic monuments built by the Batak of northern Sumatra were traditionally large stone sarcophagi erected for prominent members of lineage groups on the occasion of large feasts reportedly held for the purpose of displaying the wealth of the organisers (BARBIER 1988, 58, 78; SHERMAN 1990, 78; WARNECK 1909, 85). Naga groups of northeastern India erected large free-standing monolithic monuments traditionally as part of a series of large feasts of merit and an associated labour force that could number in the hundreds and include individuals from many different lineages (MILLS 1922; JACOBS 1990; SIMOONS 1968). As in West Sumba and Tana Toraja, hosting such large feasting events was a means to achieve power in Naga society (JACOBS 1990, 69)

In addition to the association with lavish feasts, these megalithic cultures shared similarities in their social orders. All of these groups can be classified as mid-level societies ranging from transegalitarian societies with many characteristics of simple chiefdoms, such as social ranking and an incipient settlement hierarchy among the Batak (BARBIER 1988, 54; SHERMAN 1990, 76–82), Nias (BEATTY 1992, 30, 31), and Naga groups (MILLS 1922, 96), to full-blown chiefdoms in the case of Tana Toraja (ADAMS 2001). These societies are also characterised by descent groups that traditionally controlled corporately-held land (BEATTY 1992, 31, 38, 39, 267; SHERMAN 1990, 138, 139; JACOBS 1990, 27–29). Competition between these descent groups was traditionally expressed through warfare and political instability among the Toraja, Naga, and Batak (ADAMS 2001; BARBIER 1988, 57, 58; BEATTY 1992; JACOBS 1990).

Apart from the link between power acquisition and sponsoring large feasts, it is unclear whether relationships of mutual support were established and maintained at feasts in these other societies in the same way as in West Sumba and Tana Toraja. As noted previously, important feasting debt relationships within and between kin groups were established and maintained at large feasts in West Sumba and Tana Toraja. The dynamics of tomb building and other endeavours requiring labour beyond the individual household in West Sumba illustrate how these relations were important in mobilising labour. The importance of alliances of political support between groups are also important when considering the considerable labour costs tied to building very large megalithic monuments. While the data are not very clear for societies that no longer build large stone monuments, political alliances between corporate groups were important in Tana Toraja, among the Batak, and in West Sumba (ADAMS 2001, 2004, 2007a; SHERMAN 1990, 81–86). Alliances formed as part of the competitive struggles between corporate groups that characterises these megalithic cultures.

APPLICATION TO PREHISTORIC MEGALITHIC SOCIETIES

It is plausible to envision a similar connection between megalith building, corporate group social structures and the importance of feasting to the political economy among megalithic societies prehistorically. Megalith building would have certainly involved similar challenges of marshalling large amounts of labour and resources, given the estimated group sizes for early agricultural societies in Europe (up to 1,000 individuals) and Korea (about 50 individuals) (KIM 2014, 266; ZIMMERMAN et al. 2009, 362, 363). Furthermore, based on estimates of population densities for the European Neolithic – for example – labour pools available outside of these groups would have undoubtedly been more dispersed when compared to the current context of West Sumba, where population densities ranged from about 26 and 143 persons per km^2 at the beginning of the 21st century (ADAMS 2007a, 43, 44; Badan Pusat Statistik Kabupaten Sumba Barat 2001, 29). Among other ethnographically-documented megalithic societies, mid to late 20th century population densities are comparable to those from West Sumba, with the lowest density attributed to the Tandroy of Madagascar (4.9 persons per km^2) still representing a scenario of much greater population density than estimates of population density for the European Neolithic, which average about one person per km^2 (see above) (ADAMS 2007a, 371; THOMPSON/ADLOFF 1965; MÜLLER 2013; ZIMMERMAN et al. 2009). However, these population densities from the 20th and 21st centuries should not be considered to reflect the population densities of these same megalith-building societies prehistorically, given the obvious improvements in medicine and the overall dramatic population increases that have occurred historically within the nations in which these groups exist.

In terms of the social groups who built large stone monuments in antiquity, several studies have linked prehistoric megaliths to corporate kinship groups, such as lineages and clans, and have considered the monuments to be territorial markers or signifiers of use rights for these groups in the context of the European Neolithic (CHAPMAN 1981, 1995; LIDÉN 1995; MADSEN 1982). In an analysis of megalithic Wedge tombs of the Irish Chalcolithic, Jones et al. (2015) attribute the revival of monument building during this period to a context of achievement and competition among small-scale corporate groups held together through kinship and ritual practice much like clan societies in West Sumba.

Evidence for competition in prehistoric megalithic societies (perhaps between corporate groups) comes in the form of the varying sizes of the megalithic monuments (larger ones requiring more than local labour), grave goods and art motifs of the European Neolithic that comprise axes, maces, and shields (CAUWE 2001a, 100–102; Hutton 1991, 18–19; Joussaume 1988, 29, 60, 64). There is clear skeletal evidence for violence in the early to middle Neolithic from Denmark and the British Isles, where a substantial number of individuals appear to have suffered violent deaths (SCHULTING 1998, 277–286). Mass graves from the Neolithic of Germany and Austria likely represent massacres of large numbers of individuals (CAUWE 2001a, 102; HOFFMANN 1971; BOULESTIN et al. 2009). Archaeological evidence suggests that 22 individuals were cannibalised at the Swedish megalithic site of Fosie (BRADLEY 1993, 95). Among megalithic cultures of the Korea as well, there is evidence for inter-group competition and conflict in the construction of hill forts (AHN 1992; cited in Kim 2001; KIM 2001, 460).

Inter-group competition in prehistoric megalithic societies also was likely expressed in the context of feasting events. When discussing evidence from various European Neolithic sites, Hayden (2014, 285–289) envisions a scenario in which these feasts would have been lavish, competitive events. Fischer (2002) also notes the apparently competitive nature of feasting among megalithic communities of Neolithic Denmark. Dietler (1997, 104–105) posited that these kinds of feasts, specifically work feasts, could account for the labour mobilisation required for building megaliths in Neolithic Europe and called into question the notion that centralised authority would be needed to mobilise the necessary labour for these endeavours.

Archaeological evidence for feasting among European megalithic societies includes skeletons interred in tombs in association with ceremonial feasts (CAUWE 2001b, 156; HEDGES 1984, 135), ceramic pot fragments and food remains in front of tombs (HAYDEN 2003, 232, 233; SHERATT 1991, 56), the feasting refuse (ceramics and animal bone) found at Stonehenge (PARKER PEARSON/RAMILISONINA 1998, 316), and unusual food remains inside tombs (HEDGES 1984, 145). HAYDEN (2003, 233) has suggested that the unusual food remains found inside European megalithic tombs tombs are indicative of special ceremonies held within tombs, while feasts of a public nature were held outside of tombs among European megalithic societies. At Neolithic enclosure sites as well, evidence for cattle and pig remains have been interpreted as feasting remains at Durrington Walls (ALBARELLA/SERJEANTSON 2002; PARKER PEARSON 2007, 142; cited in HAYDEN 2014, 287) as have cattle remains at Late Neolithic Michelsberger earthwork enclosure sites in central-western Europe (JEUNESSE/SEIDEL 2010).

Feasting remains have also been found to be associated with prehistoric megaliths in Korea, including ceramic jars potentially used as vessels for the consumption of rice wine on ritual occasions (NELSON 1999, 162). Additionally, archaeological indicators, such as the presence of inter-village household clusters with shared storage facilities and extended family dwellings (LIM 1985; cited in Nelson 1993, 142), suggest that the Korean megalithic cultures were characterised by corporate groups much like what has been proposed for European megalithic societies and has been documented in ethnographic megalithic societies. Kim (2014, 269, 270) suggested that public mortuary rituals among these groups served to reinforce the collective identity of these types of social groups.

Indeed, the alliance and solidarity building aspects of large feasts among such prehistoric corporate groups must also be considered. Relations between groups are important »network strategies« (BLANTON et al. 1996) in the contexts of achieved power (through megalith building and other endeavours) that characterises leadership among ethnographic megalithic societies. These strategies of alliance formation exist alongside corporate group strategies linked to inter-group competition. The importance of alliances in ethnographic megalith building has important implications for how labour was mobilised for megalith building prehistorically, especially given the high labour costs associated with monument construction. Indeed, there are indications that social groups did not have large populations in some areas where megaliths were built prehistorically and that some kind inter-group cooperation would have been necessary for monument building. Scarre (2001, 300) has proposed that the large megalithic monuments in the Golfe du Morbihan area of Neolithic Brittany may have been erected by a population that congregated from dispersed locales to build these monuments. Scarre (2001, 304) also suggests that the large monuments (e.g. the Grand Menhir Brisé) of the southern Morbihan in particular were aggregation centres and ritual locales for dispersed, and often mobile, populations.

In cases with such dispersed populations, inter-group alliances likely would have been important. It is also possible that aggregation centres marked by megalithic monuments and their associated ritual feasts linked members of the same descent group living in separate settlements throughout the area, much in the way that clan ancestral *uma's* and villages are aggregation centres for clan rituals involving members living in surrounding hamlets and household clusters. Thomas (2010, 11, 12) has suggested that

Grooved Ware Complex pottery and its use in feasts in Neolithic Wessex, particularly Durrington Walls, integrated members of kin groups and possibly individuals throughout the region for specific purposes, such as building the stone phases of Stonehenge. Clan-wide ritual feasts in West Sumba are similarly a mechanism for integrating households living in dispersed locales (ADAMS 2007b). Maintaining these relations within and outside of one's clan group is important especially for those engaging in the prestige-driven endeavours of hosting large feasts and building tombs given the high expenditures of labour and resources associated with megalith building.

CONCLUSIONS

The issue of labour mobilisation is critical to the discussion of prehistoric megalithic monuments. In West Sumba, Indonesia, very high expenditures of labour and resources are required to build megalithic monuments of comparable sizes to those documented archaeologically. This study of the living processes associated with megalith building in West Sumba has shown how examining the ways labour and resources are mobilised for monument building is not only important for determining the feasibility of the endeavour, but also can illuminate the entanglements that make the practice socially, politically and economically relevant. Megalith building and associated large feasts are linked to dynamics of power, competition, survival and inter-group alliances that are everyday practical concerns for traditional clan-based societies of West Sumba. The achieved power and statuses linked to stone tomb building motivates tomb owners to sponsor their construction. Other practical issues related to establishing and maintaining alliances, survival, clan solidarity, and sociopolitical aggrandisement are what drive people to support tomb builders with contributions of labour and/or resources. In the absence of corvée labour, these concerns collectively represent the catalyst for the persistence of the practice and ensure that people are willing to invest labour and resources for the massive undertaking it represents.

Similar sociopolitical issues were associated with megalith building in other ethnographically-documented megalithic societies in South and South-East Asia. Taken together, these examples of living megalithic traditions are pivotal to the analyses of prehistoric megalithic societies. Indeed, there are indications that the social contexts of megalith-building groups in the Europe and East Asia may have had similar characteristics, such as an emphasis on corporate group structures, competition between corporate groups and feasting. The dynamics of corporate clan structures and the feasting economy are tied to labour mobilisation in West Sumba and plausibly were in antiquity as well, and present-day costs (in animals) may provide a basis for rough estimates for costs of prehistoric megalithic construction (in terms of animals). At the very least, this case study of megalith building in West Sumba provides a direction for further studies of the social forces that can account for the presence of megaliths, particularly in early agricultural societies of limited scale.

Given the continued relevance of clan social structures in West Sumba, particularly in Kodi, the practice of megalith building will likely persist into the near future. However, traditional tomb building in portions of West Sumba has diminished in its frequency in recent times. Certainly, the high cost of tomb building has always prohibited many from sponsoring the practice and was cited as a reason why the traditional methods associated with the practice were rarely used by the late twentieth century in the traditional domain of Weyewa to the east of Kodi (KUIPERS 1990, 54). Although new opportunities for wealth attainment related to modern commerce and educational achievement has made it possible for a larger spectrum of individuals to sponsor tomb building than was reportedly the case in traditional times, as wealth and power become increasingly linked to investments in educational opportunities and the modern economy, the practice of building megalithic tombs will undoubtedly loose its relevance and become much less frequent in the areas where it currently thrives. Thus, as with many other ancient practices in traditional societies, ethnoarchaeological documentation of the various aspects of megalith building in West Sumba has reached a critical phase in need of further research.

ACKNOWLEDGEMENTS

There are many who have contributed to the research discussed in this paper. The ethnoarchaeological data for this essay were collected as a part my Ph. D. thesis at Simon Fraser University. Brian Hayden acted as the senior supervisor for this thesis and provided insightful comments on an earlier version of this paper. The current state of this written work has also benefited greatly from the insightful comments of two anonymous reviewers, leaving any drawbacks and inadequacies of this paper the sole responsibility of the author. Those who played a role directly or indirectly in the fieldwork described in this paper include Piter Rehi, Thomas Tedawonda, Agusthinus Galugu, Pak Agustinus Sabarua, Pak Rehi Pyati, Pak Octavianus Ndari, Suzanne Villeneuve, Umbu Siwa Djurumana, Webb Keane, Janet Hoskins, David Mitchell, and many informants in West Sumba, Indonesia. The fieldwork in Indonesia was funded by the Social Sciences and Humanities Research Council of Canada and was conducted in collabouration with Haris Sukendar (Pusat Penelitian Arkeologi Nasional, Jakarta), Ayu Kusumawati (Balai Arkeologi Denpasar), and Stanislaus Sandarupa (Universitas Hasanuddin). Field research in Indonesia was undertaken with permission from the Indonesian Academy of Sciences (LIPI).

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Social implications of megalithic construction – A case study from Nagaland and Northern Germany

Maria Wunderlich

ABSTRACT

As one of the dominant objects of the Early and Middle Neolithic in northern-middle Europe, megalithic monuments are one important part of archaeological research asking for corporate structures and social developments. The analysis of possible social implications and the influence of megalith building on socioeconomic features of the communities involved in this practice can be broadened by the inclusion of ethnographic examples. Recent megalith building activities can be found in Nagaland, north-eastern India. These building traditions reflect competitive behaviour and the social representation of individuals and/or communities. The close connection between megalith building and »feasts of merit« illustrates the socioeconomic meaning of this tradition. Due to the requirement of high amounts of resources and labour force, feasting activities and megalith building are influential regarding the balance and development of social relations and positions. Thus, in analysing the social implications of megalithic constructions, an inclusion of economic and spatial information is promising. In this study, questions dealing with the importance of competitive behaviour, cooperation and the possibility to detect a social differentiation resulting from inequalities among individuals will be asked.

One of the areas with dense evidence of Funnel-Beaker activities in Northern Germany is south-eastern Schleswig-Holstein and north-western Mecklenburg-Western Pomerania. Extensive research on environmental conditions, settlements and grave structures by various projects provides good conditions for further analyses. An analysis of the occurrence of various grave goods in different grave types and a comparison of house sizes reveals no greater differences among the data set. Hence, a social differentiation or inequality based on unequal access to material goods and the ability to build unusual large houses is rejected. The comparison of megalith building traditions and the economic productivity – as reflected by the occurrence of flint axes – reveals interesting variation among local communities and different regions. As a result of this study, megalithic monuments can be interpreted as important objects of representative and competitive character, affecting social structures of the related communities.

INTRODUCTION

Alongside the first documentation of megalithic monuments in Nagaland, India and other parts of the South and South-East Asia, a direct connection between the ancient European megaliths and those recent examples has been made by scholars (Rousseleau 2006, 770). While this diffusionist view has subsequently been refused, anthropological case studies still offer valuable extensions of archaeological data sets and interpretation. An integrative approach of both archaeological and anthropological datasets is used within the project »Equality and Inequality« of the Priority Program »Early monumentality and social differentiation«.

The archaeological case study deals with Early and Middle Neolithic (4100–2800 cal BC) Funnel-Beaker communities in Northern Germany. The erection of megalithic monuments in Funnel-Beaker societies (including Northern Germany, Denmark and Sweden) is closely connected to similar practices in other parts of Europe, where a wide range of megaliths has occurred from the 5th millennium BC onwards. Such areas can be found in the Iberian Peninsula (e.g. Carrera Ramírez 2011), France (e.g. Scarre 2011) and Britain (e.g. Scarre 2007). The archaeological approaches to these phenomena are multifaceted and originate from diverse research approaches. Nevertheless, a direct integration of ethnographic case studies has seldom been undertaken (Adams 2007, 38–39; compare Parker Pearsson/Ramilisonina 1998).

The visibility, longevity and continuous use including for ritual depositions indicate an active role of these monuments in the construction of social realities and the definition of social identities (compare Tilley 1996; Fleming 1973). Besides quite obvious functions as graves and places of commemoration, the practice of erecting large monuments may involve several mechanisms and goals. They may be connected to the performance of lavish feasts (compare ADAMS 2010; HAYDEN 2009), as well as serving as competitive displays of (military) strength and cooperation (ROSCOE 2009, 106).

In this article, observations from the ethnographical case study of megalith building traditions among communities in Nagaland will be used to formulate two assumptions about the relation between social organisation and megalith building activities. These will then be tested along the archaeological material from Neolithic Northern Germany to assess whether the case of Nagaland can be used as a model for Funnel-Beaker societies and point to differences between the two case studies. This approach offers the possibility to directly test possible social implications of megalith building along the archaeological material.

Nagamese societies are not the only example of recent megalith building activities that can be used in comparative studies. Recent megalith building activities can also be found in Indonesia, specifically on the islands of Nias and Sumba (e.g. ADAMS 2010; SUKENDAR 1985). Especially in the cases of Nagaland and Sumba, a high amount of in-depth data on megalith building practices, social structures and economic factors is available (e.g. ADAMS 2007; GUNAWAN 2000; HUTTON 1969; MILLS 1922). Furthermore, these examples offer information on the social mechanism of megalith building in rather different social contexts as both examples include communities that used to be

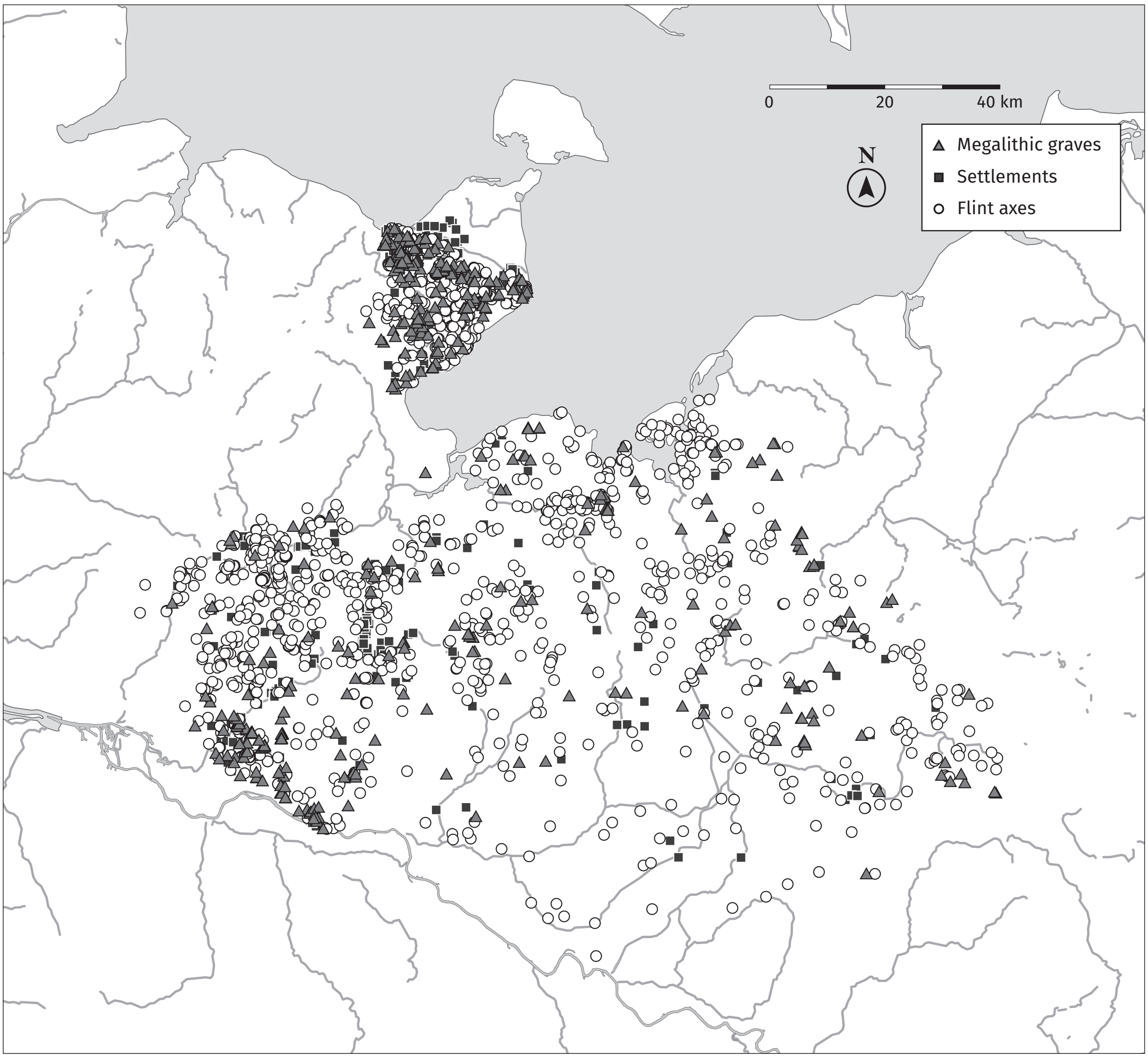

Fig. 1. The archaeological test region covering south-eastern Schleswig Holstein and north-western Mecklenburg.

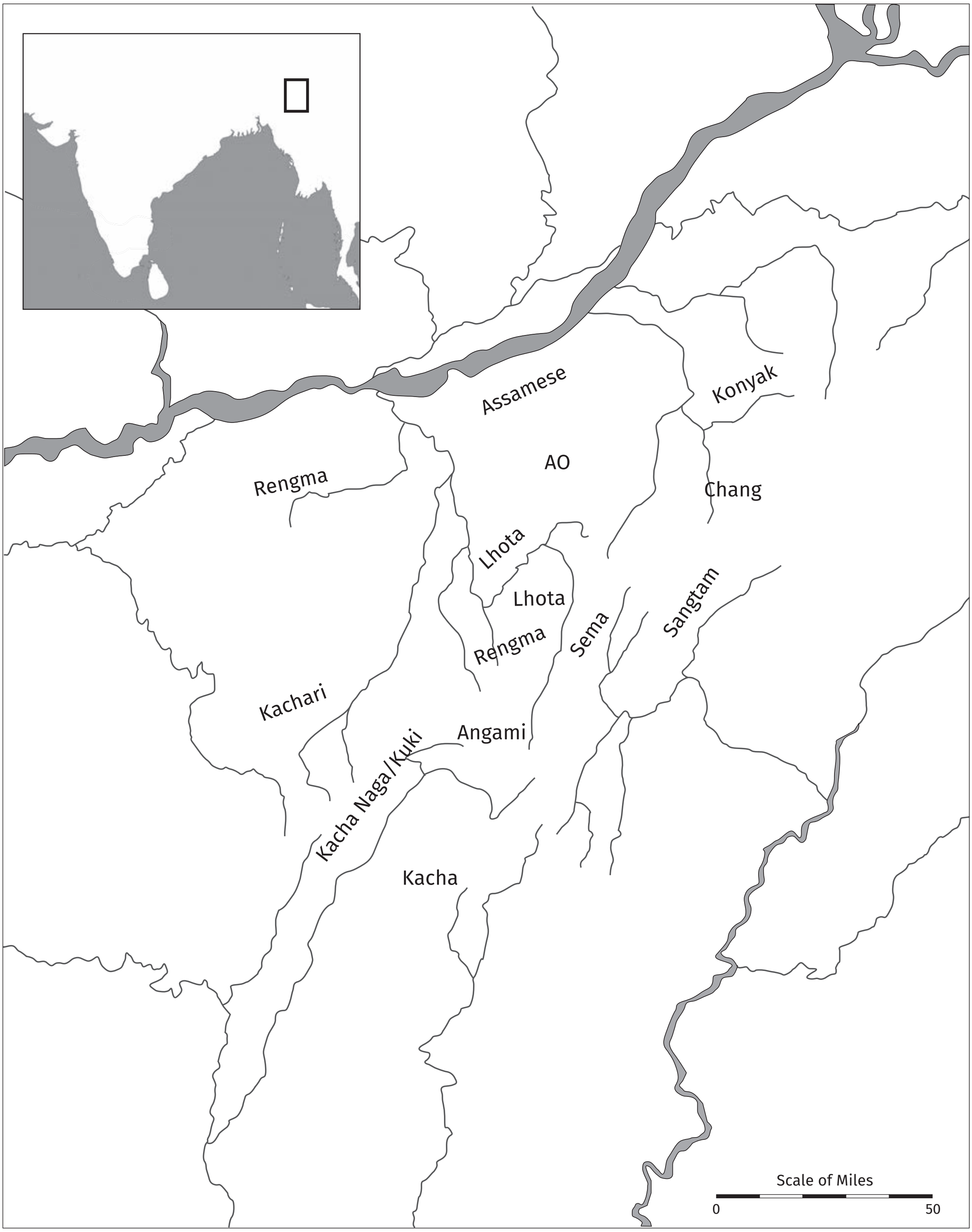

Fig. 2. The location of the different Naga tribes as they were documented by British anthropologists and officials (modified after Hutton *1969).*

organised in more or less institutionalised social hierarchies (compare JAMIR 2004, 111; GUNAWAN 2000, 1–3). As a result, megalith building practices can be evaluated in their social significance and their connection to economic factors, etc. Therefore, these ethnographic case studies were chosen for comparative purposes. In this article, the case study of Nagaland will be used as a comparison for Funnel-Beaker communities to show how this kind of approach may be handled to develop hypotheses testable on the archaeological record. The example of Sumba is integrated in the overall study of social implications of megalith building traditions by the author and is not considered in this article in favour of a concentration on Nagaland and Funnel-Beaker communities in modern-day Northern Germany.

MATERIAL AND METHODS: THE ARCHAEOLOGICAL AND ETHNOGRAPHICAL DATA SET

One of the main distribution areas of Neolithic megalith building traditions is that connected to the Funnel-Beaker communities in northern Europe. Especially in the Netherlands, Germany, Denmark and Sweden, a great number of megalithic monuments were built in a time span of at least 400 years. The assumptions deduced from the ethnographic case study will be tested on an archaeological test region spanning south-eastern Schleswig-Holstein (Stormarn, Herzogtum-Lauenburg districts and parts of Ostholstein) and north-western Mecklenburg (Nordwestmecklenburg and Ludwigslust-Parchim districts; Fig. 1). This region is characterised by a less dense distribution of megalithic tombs compared to Denmark. Nevertheless, a great diversity of megalithic and non-megalithic grave types – such as dolmen, passage graves and long barrows – is documented in this area. Megalithic tombs and non-megalithic long barrows, settlements and single finds of flint axes are included in the analyses. As ^{14}C-dates are not available for most megaliths, the grave types can be used for a rough chronological classification (see FURHOLT/MISCHKA, this volume). The size of the chambers and barrows is used as an indicator for possible competitive behaviour. The sizes of flint axes, grave chambers and barrows were interpolated using inverse distance weighting (IDW) to facilitate a direct regional comparison of the intensity of megalith building traditions and the deposition of long flint axes. In order to test possible correlations, Spearman correlation was used. This comparison along with analyses on grave goods and house sizes serves to answer questions dealing with the presence of social differences caused by inequality and which mechanisms affect megalith building traditions.

As one of the last remaining areas with a living megalith building tradition, Nagaland holds strong interest for this case study. The inhabitants of this area belong to different Naga groups. Since the area was remote and rather isolated for a long time, information is sparse.

Nagaland was extensively investigated by British researchers and officials of the government during the period of colonisation and the 19th and 20th century. The results of this research are detailed ethnographies of different tribes. These monographs represent a limited and highly influenced view on the communities with which they are dealing. Nevertheless, they contain valuable information regarding megalith building. This is even more important since Naga communities underwent great changes during years of civil wars and are nowadays influenced by globalisation. The designation and location of the different groups has already been illustrated by British ethnographers (Fig. 2). The groups named in this map indeed vary from each other in some aspects. One uniting feature is the strong self-perception as part of the Naga community, which found its definition with the establishment of a district called Nagaland. This district was formerly part of Assam, but was separated due to efforts by the Nagaland government in 1963 (JOSHI 2008, 36–40).

The groups with a megalith building tradition include the Angami, Lhota, Rengma and Konyak Naga, as well as the Khasi, which are not part of the core communities of Nagaland. One common characteristic of these groups is the traditional subsistence strategy. Intensive cultivation of rice, millet and maize is common among them. The cultivation of rice includes both wet-rice terrace cultivation and shifting cultivation. Supplementary elements are hunting/gathering and animal husbandry. Animals of importance are Mithan (*Bos frontalis*), cattle, chicken and pigs. Structures and rules of land ownership appear in various forms. Both individual and commonly-inherited land is present (JAMIR 2004, 112–114; HUTTON 1965, 28–29). Traditionally, the social structures are mainly based on lineages, which are organised in clans of varying size. One major difference is the presence of chieftainships among several groups, including – for example – the Konyak Naga. On the other hand, there are also groups that can be described as egalitarian; for example, the Angami and Lhota Naga. Megalith building appears among both sides of this range (JAMIR 2004, 111).

In the following, the structures and principles of the megalith building traditions among the Angami and Lhota Naga will be analysed. Subsequently, these underlying mechanisms can be used to test specific hypotheses on the archaeological material.

NAGALAND: CONCEPTS OF MEGALITH BUILDING

A basic characteristic of megaliths in Nagaland is the occurrence of both grave and commemorative monuments. Typically, commemorative monuments are standing stones, which may be erected alone, in pairs or smaller groups. Grave monuments include small dolmens and stone platforms, which are situated above single or collective tombs (ROUSSELEAU 2006, 771–772). Especially collective tombs may also be used for other purposes; for example, as sitting platforms. In this case, these monuments are integrated into public activities. Despite this public meaning, both graves and commemorative monuments are explicitly dedicated to the individuals building them (MILLS 1937, 219–222; VON FÜRER-HAIMENDORF 1939, 215–222).

Megalithic structures can be placed both inside and outside the villages. The erection in front of the communal houses (*Morung*) as well as a placement in front of the houses of the monument builders is common. Outside the villages, megaliths can be placed in specific ritual places or along the roads connecting the different communities. While the monuments are in general closely connected to their builder, the number and size of monuments erected along the roads may also provide information about the general economic capability of a village (HUTTON 1969, 45–50; MILLS 1937, 195–222).

The erection of megalithic monuments is closely connected to the performance of feast series, the so-called feasts of merit. The completion of these series is a common precondition for megalith building activities. The feasts of merit differ among the Naga groups, whereby the number of feasts may vary from three to seven. Each feast requires a larger amount of resources. Tables 1 and 2 shows two exemplary series among the Angami and Lhota Naga.

The feasts of merit among the Angami comprise seven different feasts. While the first three feasts are rather unimportant and can be repeated arbitrarily after good harvests, the complexity and importance increases from feast four to seven. After each feast, the sponsor is allowed to decorate his house in a specific way. Furthermore, his relatives are also allowed to wear special clothes and jewellery. Obviously, the required amounts of different resources are constantly rising and cumulate in the last feast, which accompanies the erection of a monolith (HUTTON 1969, 230–233).

Among the Lhota Naga, the feasts of merit are also organised according to such rules of importance. Nevertheless, the amount of resources is not constantly growing but rather variable. The required slaughtering of Mithan is a demanding task for individual families. After the performance of the fourth feast, one is allowed to drag a stone in another ceremony. This ceremony requires the supply of all attending individuals and again requires high amounts of resources (MILLS 1922, 136–144). In general, it is not easy for single households to provide the mentioned investment. Therefore, it is usual for the age group (*kienga*) or the clan of the sponsor to participate in the organisation and performance of the single feasts. This pattern ultimately leads to a common meaning and importance of the feast series. Feasts are used to strengthen kinship and friendly relations. Furthermore, the redistribution of wealth in terms of rice and meat is encouraged by them (JAMIR 2004, 111; HAYDEN 2009, 37–39).

The building process itself is not as complex as the preceding organisation of feasting activities. During each construction step, specific smaller rituals are executed, which require further resources. Each helper and even the visitors have to be supplied by the monument builder and his relatives. The transport of the stones is achieved with the help of sledges or – in case of smaller stones – supporting frames (Fig. 3). The male members of the *kienga* and clan of the builder participate in hauling and erecting the stones. During this process, the number of people involved might easily increase to 100 or more. Dependent on the individual status and age, the helpers are dressed in full ornament and positioned regarding their social position within the community (HUTTON 1922, 244–247). The number of participants is not only regulated by the size of the stone, but mainly by the ability of the monument builder to attract and supply supporters. The attendance in building activities serves for the development of support networks and relationships.

Tab. 1. The process of the Feasts of Merit among the Angami Naga, as they were documented by HUTTON (1969).

	RICE	MITHAN	CATTLE	PIGS
no. 1–3	*low amount*	–	*1*	–
no. 4 (2x)	*2 baskets*	–	*4*	*2*
no. 5 (2x)	*3 baskets*	–	*8*	*4*
no. 6	*6 baskets*	–	*10*	*5*
no. 7	*12 baskets*	–	*12*	*8*

Tab. 2. The process of the Feasts of Merit among the Lhota Naga, as they were documented by MILLS (1922).

	RICE	MITHAN	CATTLE	PIGS
no. 1	*Yes*	–	*1*	–
no. 2	*Yes*	–	*1*	*3*
no. 3	*Yes*	–	*1*	*some*
no. 4	*Yes*	*1*	–	–

Fig. 3. The transport of a commemorative stone with help of a sledge, documented in Nagaland (HUTTON 1929, pl. XIII).

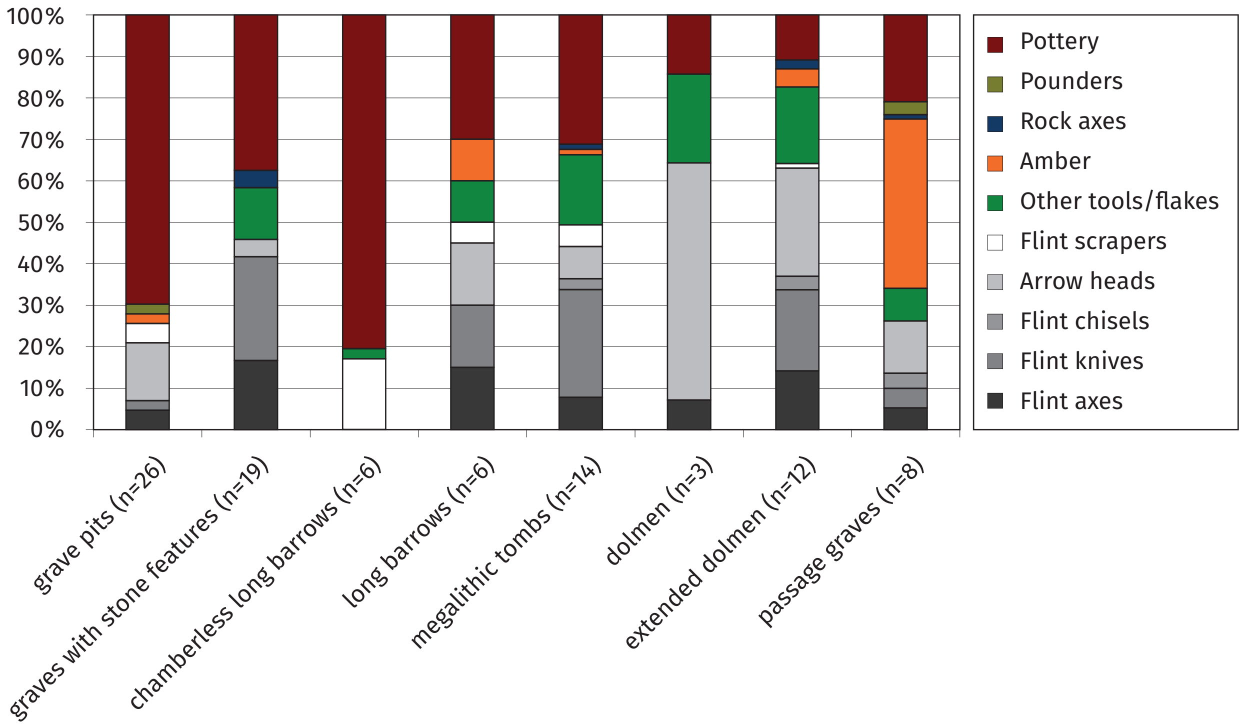

Fig. 4. The occurrence of different grave goods among megalithic and non-megalithic grave types within the archaeological test region.

Social networks and support are urgently required to enable the builders to realise building plans. Megalith building helps to establish a higher individual status and social standing, as well as strengthening the position of one's own lineage segment within the larger clan. The commemorative character of the monuments in connection with complex rituals and events is very important for the enduring integration of the success and capabilities of individuals and social groups, as shown by the location of megalithic monuments at roads leading to villages. In this context, feasts of merit serve as one tool for status competition and the redistribution of wealth within a community (TESTART 2014, 331–332).

The presented characteristics and mechanism of megalith building activities among Naga groups lead to two basic assumptions that were tested on the archaeological data.

1. The cooperation and participation of larger groups in feasting and building activities strongly influences social relationships and social structures. The economic expenditure of these activities is high. Therefore, an analysis of the expenditure of human labour in building activities and an evaluation of possible economic markers seems urgent.
2. The representative character and its association with status distinguishes megaliths as an indicator of competitive behaviour. In order to retrace this statement in the archaeological record, a comparison of building activities and size distributions of monuments on different levels is needed. Furthermore, individual differences among Funnel-Beaker communities hold interest.

THE ARCHAEOLOGICAL CASE STUDY: DISCUSSION OF THE DATA BASE

Individual differences

Following the assumptions made above, the first level of relevant archaeological data is those connected to individual differences among megalith building communities. Two possible archaeological markers for a differentiation between individuals are grave goods and house sizes.

Grave goods are one possible marker for an inter-group differentiation, pointing – for example – to fixed social roles or unequal access to goods. The distribution of grave goods in different grave types and the question of standardised furniture thus holds strong interest. Nevertheless, there has been extensive criticism on the direct connection of grave goods and social standing. The distribution and selection of grave goods may have been strongly influenced by the idea and request of the burying group to represent itself and the dead person. Existing social differences might have been actively masked by a burial ritual that is determined by ideological systems (BURMEISTER 2000, 97; BERNBECK/MÜLLER 1996, 17–18). Existing studies regarding assemblages of grave goods in megalithic and non-megalithic graves did not indicate the presence of regular patterns or specific associations of certain combinations of grave goods to grave types (compare BAKKER 2011; KOSSIAN 2005, 110).

Megalithic tombs of the Funnel-Beaker communities contain one specific problem when dealing with individual grave goods. Due to the repetitive and collective burial customs and the openness of many chambers, it is not possible to connect grave goods to single individuals. Megalithic tombs cannot be expected to represent complete inventories and it has to be assumed that a significant number of artefacts is generally missing. By contrast, inventories from non-megalithic single graves are undisturbed in many cases and therefore represent full inventories. Taking into account all megalithic and non-megalithic grave inventories in the test region, it becomes clear that only a few differences exist (Fig. 4). First of all, the ratio of pottery among all grave goods is higher in non-megalithic grave types (first three bars), such as simple earthen pits and chamberless long barrows. The diversity of grave goods in megalithic grave types appears higher, with amber and flint chisels mainly occurring in these graves. The greater diversity and higher number of grave goods in general can easily be explained by the fact that many of the megalithic tombs contain collective burials and therefore grave goods of many persons. Nevertheless, it has to be stated that due to the generally poor bone preservation a clear identification as a single or collective grave is difficult. All non-megalithic grave types are smaller in size and therefore most probably single burials, or burials for a very small number of people. In general, they do not show signs of reopening events (KOSSIAN 2005, 130–143). There are examples where small dolmen have been used for single burials, although from this few cases (NIELSEN 1984, 376–379) no generalisation can be deduced for this type of grave. All of the other megalithic grave types have to be considered as collective burial types.

Summing up, no significant differences can be detected among the grave types, which might hint at inequalities among the individuals buried. Nevertheless, the absence of clear differences among grave goods in the different grave types cannot be taken as clear

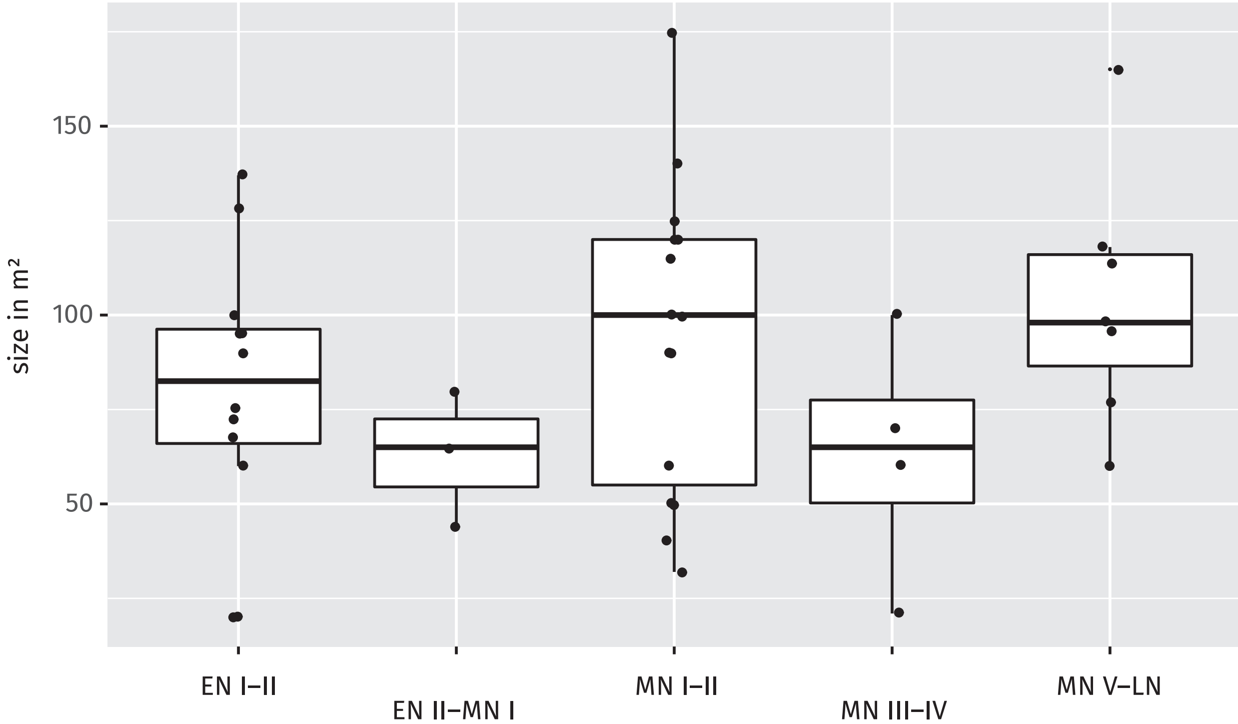

Fig. 5. Boxplot of house sizes in the early, middle and late Neolithic. The data set contains house plans from Denmark, Sweden and Northern Germany.

evidence of social equality. Previous archaeological studies have already highlighted that an analysis of grave goods frequently hinders unclear associations between artefacts and individuals. Furthermore, grave goods may be influenced by specific choices of the groups related to the dead and representative or political reasons and can – but do not necessarily – serve as a display of social rank and inequalities (compare PARKER PEARSON 2003, 83–86; SHANKS/TILLEY 1982, 138–152). Therefore, more indicators have to be taken into account to tackle the topic of social structures in Funnel-Beaker communities.

A second potential indicator for social organisation is the size of houses. House sizes are suited as an indicator for comparisons of small groups of individuals due to their function as the basic unit for everyday life. Significant differences in size might point at a varying status among individuals of a community, represented by the possibility to construct large houses. Therefore, house sizes are relevant to detect a possible process of a social differentiation among households.

While megalithic tombs have long been an easily detectable and dominating object of research, settlements have been heavily under-represented. Rescue excavations and intensified research on settlements have revealed a number of house plans of the Early to Late Neolithic (MÜLLER 2011, 50–51). A major problem is the small number of settlement and house plans per region, resulting in inadequate numbers for statistical analyses. In the area of Schleswig-Holstein and Mecklenburg-Vorpommern, only five excavated settlement sites with house plans exist. Overall, eleven house plans from the settlement phase of Büdelsdorf (HAGE 2015) and the settlements of Oldenburg-Dannau 77 (BROZIO 2015), Oldenburg-Dannau LA 191 (HOIKA 1981), Rastorf LA 6 and Carpin 10 (STEFFENS 2009) are known. These houses mainly range from 90 to 130 m², whereas only two houses lie outside this range (60 and 175 m²).

To enlarge the sample size, all excavated houses from Germany and Scandinavia from the Early to Late Neolithic were included (n=41). The presentation of the floors areas in a boxplot follows a normal distribution (Kolmogorov-Smirnov: p-value 0.9115; Shapiro: p-value 0.7138) and does not contain significant differences between the time slices (Fig. 5). Furthermore, no outliers are traceable for any of the time slices, except for the Late Neolithic. The only visible difference is an indicated rise of the floor area from the Early Neolithic to Middle Neolithic. Overall, the Neolithic houses are characterised by rather uniform plans in terms of size.

The case of Nagaland shows how important collaboration and collective building efforts are and how these influence social relations. Therefore, possible cooperative building activities in Funnel-Beaker communities will be examined. In this case, collaboration

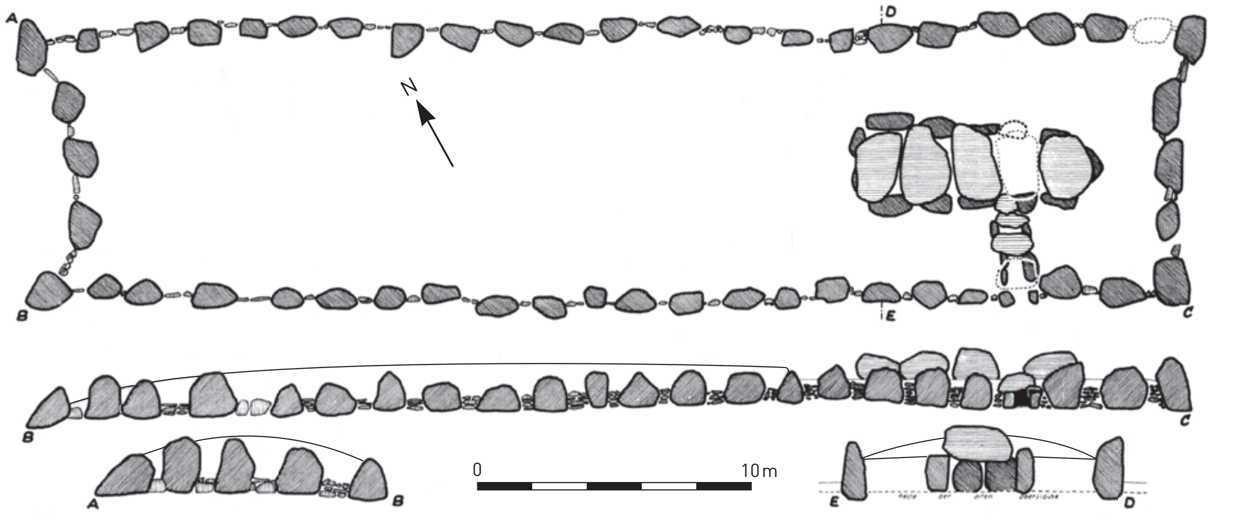

Fig. 6. The plan of the passage grave near Naschendorf, district Nordwestmecklenburg (SCHULDT 1970d, 61).

between specific segments of communities might also provide information regarding an individual differentiation.

Recurring labour investment, large structures and ritual activities at enclosures and megalithic tombs point at an emphasis on collective efforts (KIRLEIS/FISCHER 2014, 82; HAGE 2015, 228–230). In order to compare building efforts of specific monuments with settlements and communities, an estimation of energy expenditures is important. The largest and most complex grave monument of the test region is that of the passage grave near Naschendorf, Mecklenburg-West Pomerania (Fig. 6). The passage grave is part of a cluster of monuments, comprising two passage graves, two extended dolmens and one small dolmen (SCHULDT 1970d, 61). In consideration of ethnographic and experimental archaeology, the expenditure of human labour to build this grave monument was calculated. While the building activities might have included several phases, the total work amount is estimated at around 78,000 man-hours.

Unfortunately, no Funnel-Beaker settlement is known from the surrounding area that might be connected to the grave. Therefore, assumptions based on other settlements from the Middle Neolithic will be used. An estimation of the size of Neolithic settlements must deal with a range of possible values. Excavations indicate an intensification of the formation of settlements and a growing number of houses during the Middle Neolithic (BROZIO 2015, 148). One of the few exactly-dated Middle Neolithic settlements is Oldenburg-Dannau (LA 69) in Ostholstein. During the MN Ia/b, the excavator assumed a number of eighteen houses. With reference to LBK models and a generation model of 25 years, two to three contemporary houses are assumed (BROZIO 2015, 87–91). Regarding ethnographic examples, a number of one to four families – comprising five to ten people – per house can be assumed (compare RICHTER 1992; STARNA 1980). Based on these calculations, the number of inhabitants in a Middle Neolithic settlement is around 10 to 120 persons, of whom around 60 % can be said to be able to work. With reference to a calculation of available free time per month by T. KERIG (2010, 242), July is the month with most available free time. Based on this, a number of 2,424 (six persons) to 29,088 hours (72 persons) of time available for monument construction is supposed. Even with consideration of a high number of inhabitants, the construction work would have taken three months. This leads to the assumption that co-operation between several smaller groups would have been beneficial to construct the monument in a rather short time period.

According to the data presented above, a differentiation of grave goods and house sizes – which could be led back to existing inequalities among individuals – cannot be identified. More probable is a social concept integrating the cooperation of smaller groups and an emphasis of collective actions and structures. This emphasis on collectivity is even more important regarding the construction of monumental structures such as enclosures. While no enclosure is known from Ostholstein or Lauenburg/Stormarn, analyses from other parts of Schleswig-Holstein illustrate the high energy expenditure required for construction activities. This expenditure and the small size of settlements

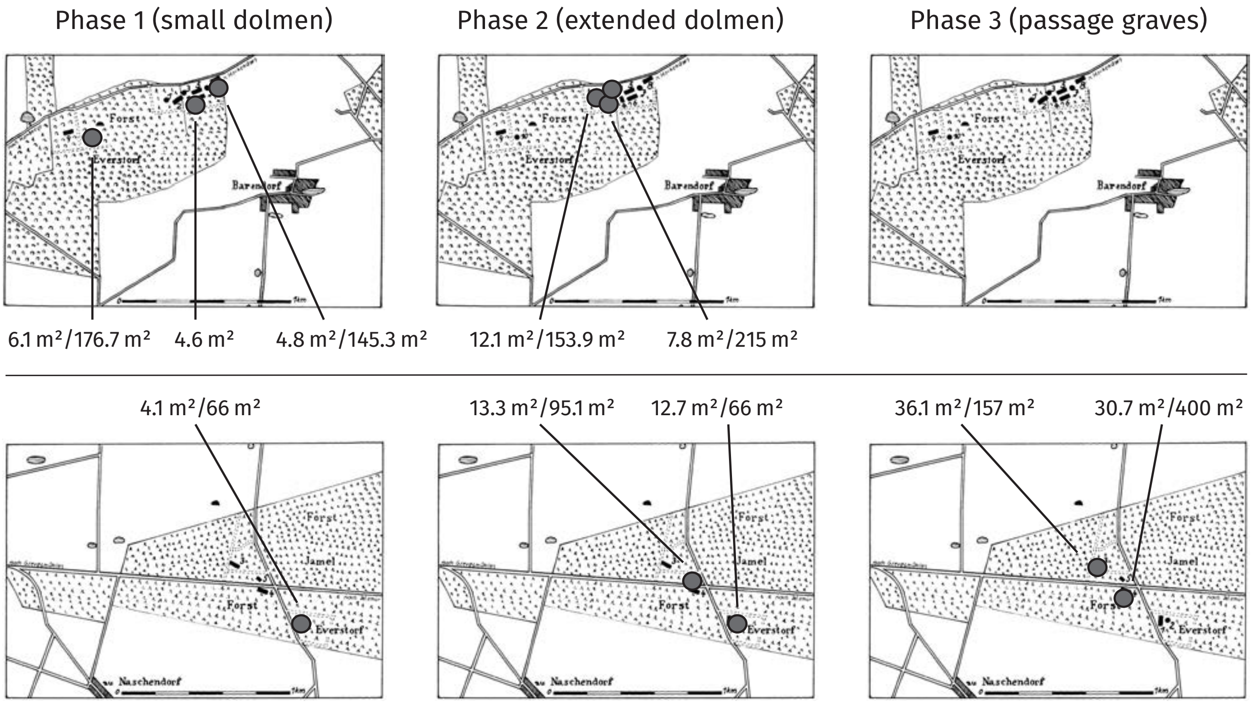

Fig. 7. The different building phases of the two clusters near Barendorf and Naschendorf. The phases are differentiated following the grave types. The size of chambers and/or barrows is stated, if available (modified after Schuldt *1970a, 7;* Schuldt *1970d, 61).*

points at a joint organisation and the existence of networks between the communities involved in the building process (compare Hage 2015, 230). As indicated by the ethnographic example, this form of cooperation and shared rituals might have strongly influenced social relationships and structures.

Local structures and differences

Resulting from the described characteristics and leading to the second assumption developed from the ethnographic case study, local and regional structures of monument clusters will be analysed. In this context, competitive behaviour between groups and/or communities could be an important mechanism in megalith building practices. This idea of competitive behaviour is based on the assumption that local communities strongly cooperate with each other to build representative monuments. In the following, these monuments serve to display the abilities and resources of the groups. Therefore, local and regional structures must be observed in detail.

The local comparison of grave clusters is hindered by the high number of destroyed megalithic monuments. Already during medieval times, stones from megalithic tombs were reused for the construction of churches. Even more destructive was the continuously-proceeding utilisation of land for cultivation (Schirren 1997, 147–149). Thus, complete local assembles of megalithic tombs are rare.

In the selected research area, a presumably intact cluster of graves is only present in a small forest area in Mecklenburg-West Pomerania. Near Naschendorf and Barendorf, two clusters of megalithic tombs are preserved and were extensively excavated in the 1960s (Schuldt 1970a-d; Hollnagel 1970). Both clusters comprise several megalithic monuments of different types, thus pointing at a continuous use by distinct groups or communities. Based on a good state of preservation, most of the graves could be defined due to the grave type and dimensions of chamber and barrow. While the clusters themselves are located at a distance of two kilometres, the graves were built around 200 to 300 metres away from each other. The first cluster near Barendorf (in the following: cluster A) comprises ten graves, of which eight graves are situated at a close distance. The remaining two graves are ca. 600 metres away from the main group and thus it is unclear whether these graves belong to the described cluster or not. The grave cluster of Barendorf includes two »Urdolmen«, three extended dolmen and three graves of undefined type. The spatial separated group also contains one »Urdolmen« (Schuldt 1970a, 7–8). The cluster near Naschendorf (in the following: cluster B) – which was already mentioned – includes one

»Urdolmen«, two extended dolmen and two passage graves (SCHULDT 1970b-d; HOLLNAGEL 1970).

Although the graves themselves were not ^{14}C-dated, analyses and modelling including other graves indicate a relative chronology of the monuments. With the help of AMS measurements, calibrating and modelling graves from Northern Germany and Scandinavia, it was possible to develop absolute phases of monument building. While these curves are overlapping, it became clear that passage graves were built slightly later than dolmen and extended dolmen types. Owing to partly imprecise measurements, the chronological sequence of the different dolmen types is not entirely clear. While these sequences are only valid for Scandinavia and Flintbek, the general sequence will be transferred to the test region (compare PERSSON/SJÖGREN 1995, 82; MISCHKA 2014, 132–135; FURHOLT/MISCHKA this volume). Finally, the uncertainty of the chronological differentiation of small dolmens and extended dolmens has to be kept in mind. For this analysis, two phases are supposed, including building activities starting with small dolmens.

With these results, a rough building sequence of the two grave clusters in Mecklenburg can be made (Fig. 7). The first phase of building activities starts with the construction of small dolmens in both groups. In cluster A, two small dolmens are constructed within the main cluster. A further small dolmen is built in the smaller group near cluster A. In cluster B, only one small dolmen is erected. During this first phase, both the chambers themselves and the barrows are larger in cluster A.

The second building phase is indicated by the erection of extended dolmens in both clusters. In cluster A, at least three of these monuments are built, all of them located in the main cluster. In the second cluster B, two graves are constructed. The distribution of chamber and barrow sizes changes during this phase. The chamber size of the extended dolmen in cluster B is larger than in cluster A. Nevertheless, the extent of the barrows is still higher in cluster A.

Passage graves represent the last phase of activities and are only present in cluster B. With respect to the higher degree of destroyed and undefined tombs in cluster A, the presence of passage graves in this cluster cannot be eliminated. The passage graves of Naschendorf are the largest of all the megalithic monuments.

With respect to the incomplete record, a change in building traditions between the first and second building phases can be postulated. Most obvious is the uneven number of monuments per cluster. While the groups using the burial ground A invested in the erection of a high number of monuments during the first and second phases, the group B were building fewer but – since phase two – larger tombs. Thus, the investment of the cluster B is concentrated on few, but large chambers, cumulating in the erection of two massive passage graves. By contrast, cluster A built many smaller chambers. One possible scenario for the absence of passage graves in the first cluster is that it reflects the missing ability to build such monuments.

To sum up, the case of the Everstorfer Forst clearly shows how different strategies of representation might have been developed within a small local environment. Two smaller groups interacting with each other over a long period of time might have been in a partly competitive relationship.

Regional structures and differences

The third level of interest is a regional comparison of preconditions and developments. Based on the described results concerning individual and local differentiation, a comparison of regional structures and conditions of megalith building will be examined. One key point of the ethnographic case study is the ability to cooperate and attract support, which is strongly based on economic factors. The analysis of a local structure already points in this direction. Nevertheless, there is no information available that might connect the factors of megalith building and economic potential. Unfortunately, archaeological data on differences in the settlement structures and the distribution of flint axes is not available at such a small scale to allow a direct comparison with – for example – the Naschendorf case. Therefore, a regional comparison will deal with broader comparisons of different areas within a region.

While the number of settlements reflects population structures and density, flint axes will be used as a marker for the intensity of economic activities. The production of flint axes requires various and partly costly steps. While flint axes are commonly found in settlements and represent a common and important tool, they also occur outside of settlements as single finds. These single finds might reflect ongoing activities, connected – for example – to wood-working. On the other hand, complete objects might also reflect deliberate depositions; for example, in a ritual context. Both options represent different activities that are strongly connected to the ability of communities to expand their activities beyond settlements and even devote part of their production to non-economic purposes. Therefore, flint axes are considered as markers for the ability or potential of single regions and/or communities to enlarge the production of axes and especially intensify wood-working and non-utilitarian activities (compare SJÖGREN 2011, 130–132).

One problem regarding the comparison of the regional density of megalithic tombs is the variation in the state of preservation. Especially in areas intensely

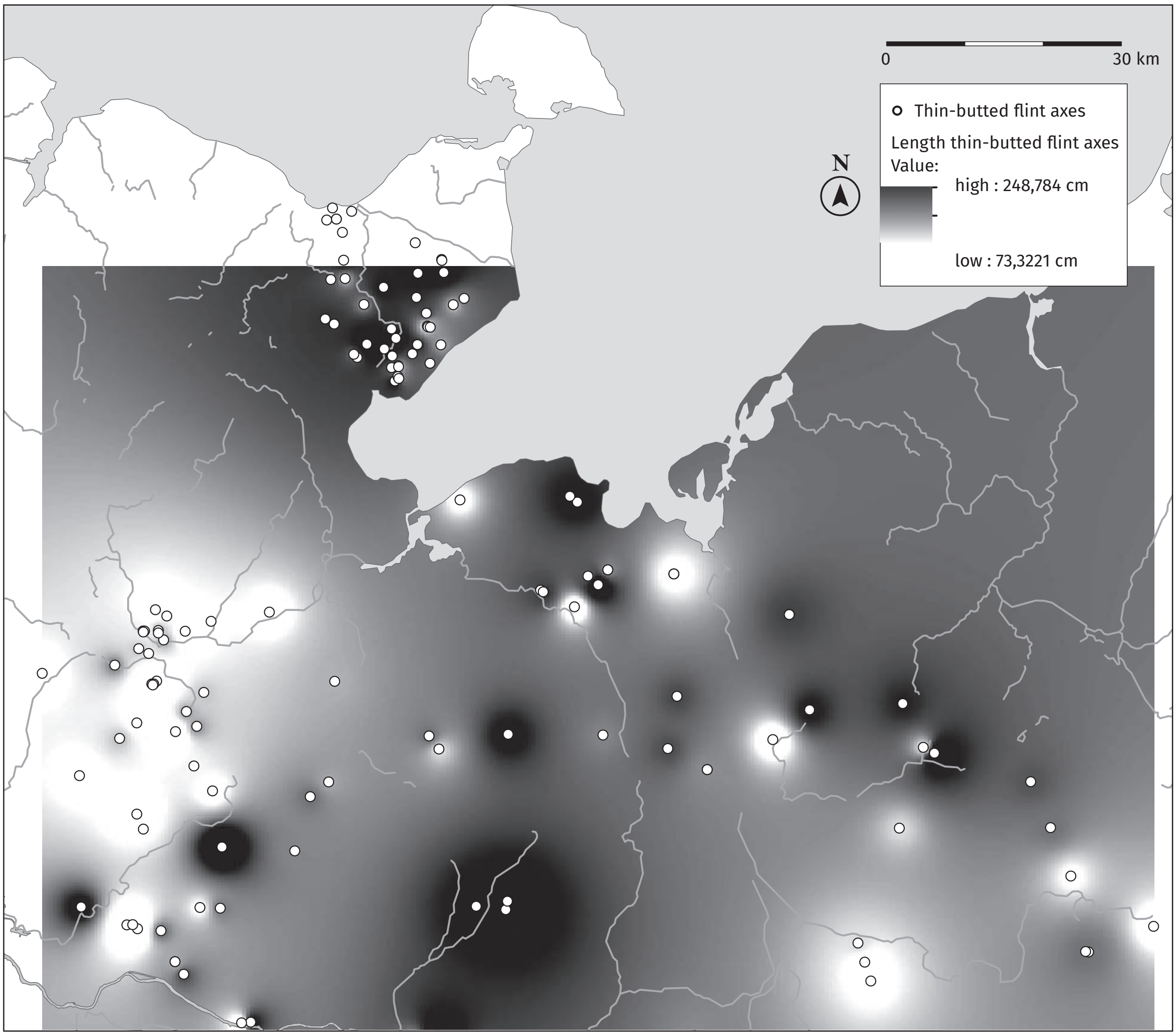

Fig. 8. Interpolation of the length of thin-butted flint axes within the archaeological test region.

Tab. 3: The number and density of megalithic tombs, settlements and flint axes in the different areas within the archaeological test region. The number of flint axes includes also those which cannot be located precisely.

	AREA	SETTLEMENTS	SETT./KM²	MEGALITHS	MEG./KM²	FLINT AXES	AXES/KM²	AXES>180MM
Northwestern Mecklenburg	5710 km²	80	0.01	114	0.02	646	0.1	31 (4.8%)
Stormarn/Lauenburg	2055 km²	191	0.09	151	0.07	1062	0.5	46 (4.1%)
Ostholstein	581 km²	103	0.2	176	0.3	540	0.9	47 (8.7%)

used for agriculture, the number of remaining graves could only account for a small percentage of the original amount (SCHIRREN 1997, 149). For example, this example could apply to regions in the districts Stormarn, Herzogtum-Lauenburg and Mecklenburg. A more accurate number of megalithic monuments might be assumed for forest areas, such as the mentioned areas in Mecklenburg, as well as the Sachsenwald in Herzogtum-Lauenburg. The number of destroyed tombs in eastern Holstein remains high but may be smaller due to a better preservation around the Oldenburger Graben. The number of settlements is also under-represented, while the number of flint axes is less influenced by destruction. Table 3 shows the number of settlements, megalithic tombs (including chamberless long barrows) and flint axes overall and per km^2. The structures already visible in this table are even more obvious in the distribution map (Fig. 1). As a remaining problem, flint axes without exact coordinates could not be integrated in this map. The map shows a clear concentration of both settlement and megalith building activities in Ostholstein. This area offers good environmental conditions and was probably more densely settled than the regions more to the south and south-east.

In order to test a possible connection between the economic potential of different regions and the intensity of megalith building, the number and length of flint axes were analysed. The main phases of megalith building include the phases EN II and MN Ia/b, which are contemporary with the occurrence of thin-butted flint axes. A possible correlation between the number of flint axes and megalithic tombs was tested with use of density maps of both categories. Subsequently, it was tested whether the number of flint axes and graves per density value correlate. Indeed, there is a significant (p-value: 0.04) positive correlation (0.52) between the two numbers. Nonetheless, the number of flint axes may also be influenced by the intensity of settlement activities. Therefore, the length of complete single finds of thin-butted flint axes was integrated. In general, a length over 180 mm can be seen as inefficient and non-practical and may – for example – represent depositions (LÜTH 2003, 5–6). Hoards and long exemplars of flint axes can be seen as prestige items reflecting the access to suited mining areas and competitive behaviour between resident communities (compare LARSSON 1985, 110–116; KLASSEN 2004, 269–270). Fig. 8 shows an interpolation of the length of complete exemplars. As already shown in table 3, there are some differences in the distribution of these axes. Ostholstein provides the highest number of large flint axes and appears as a central area. Moreover, north-western Mecklenburg shows a quite large number of large axes, although the number is considerably lower than in Ostholstein. The area with least large flint axes is Stormarn/Lauenburg. This is apparent both in the interpolation and the percentage of larger flint axes.

Regarding the size of chambers and barrows, a similar situation as in the local clusters is visible. The interpolation of both categories shows some interesting regional variation. The distribution of smaller and larger chambers indicates a concentration of larger chambers in Ostholstein and Mecklenburg (Fig. 9). Especially in Mecklenburg and Ostholstein, a high number (n=13 of 16) of preserved chambers reach a size over 20 m^2. By contrast, only three chambers in Stormarn/Lauenburg exhibit this dimension. The extent of the barrows is characterised by a different distribution (Fig. 10). Both Ostholstein and Stormarn/Lauenburg have various graves with large barrows. In this case, Mecklenburg contains only smaller types. The barrows in the south-western part of Lauenburg (Sachsenwald) are mainly long barrows, partly of a very early chamberless type (HINZ 2014a, 70). These grave types are not common in Mecklenburg and might represent the earliest stage of monument building. In Mecklenburg, mainly dolmens and passage graves are common; therefore, the extent of the barrows in general is lower. In Ostholstein, both types are present. The distribution of size parameters and the length of flint axes indicates a relation between these factors. Ostholstein – the area mostly intensely used for settlement activities and with the highest number of long flint axes – shows the appearance of both comparatively large chambers and barrows. By contrast, Stormarn/Lauenburg and Mecklenburg include either large chambers or barrows. The higher number of flint axes in Mecklenburg in this case correlates with more elaborated chamber constructions. These constructions are more resource-intensive than barrows and therefore more suited to showing economic capabilities.

In summary, the regional distributions of settlements, flint axes and megalithic tombs reflect different concepts of land use, economic potential and resource investment. The representation of the different regional communities seems to follow varying patterns, which could – for example – depend on economic factors.

DISCUSSION

At the beginning of this paper, two basic assumptions were made relying on the ethnographic case study of Nagaland. The documentation of British officials and more recent studies revealed that cooperation

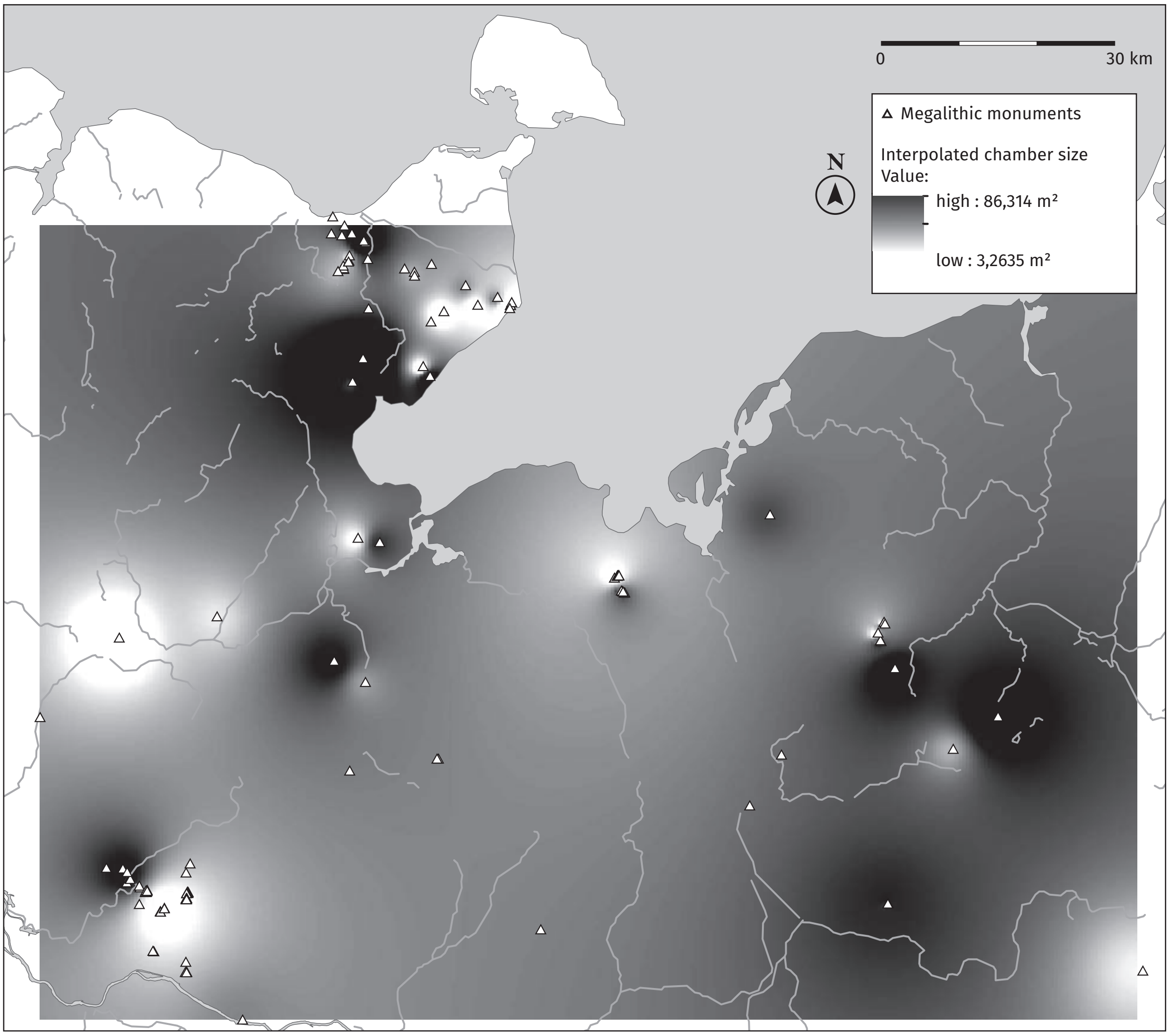

Fig. 9. Interpolation of the chamber sizes within the archaeological test region.

of closely-connected groups – for example, members of an age group or the clan – is a common practice in elaborated building actions with high economic expenditure. The participation of relatives and associated groups shows the importance of these actions in terms of the creation and cultivation of social relationships and structures. Consequently, and as a result of the representative and durable character of megalithic monuments, competitive behaviour and status is – among others – expressed by these building activities.

An analysis of some basic aspects of Funnel-Beaker communities points at some similar structures. A comparison of grave goods from different grave types – including both megalithic and non-megalithic forms – revealed no differentiation based on the placement in a specific grave type. While the proportion of ceramics and the presence of amber beads indeed differ, no specific assemblages depending on the grave type could be determined. Therefore, no fixed rules and hierarchies of the grave types can be detected based on the adornment of the dead. This result indicates an equal access to material goods for all members of the burying communities. This leads to the assumption that inequality did not exist among the members of the living societies. In this context, I refer to inequalities that are connected to vertical hierarchies among members of a community. A horizontal differentiation – based on a craft specialisation, for example – could also be part of a society based on egalitarian structures.

Due to the difficulties connected with an analysis of grave goods as a marker for social differentiation, house sizes were also observed. The only distinction to be made refers to a change of house size from the

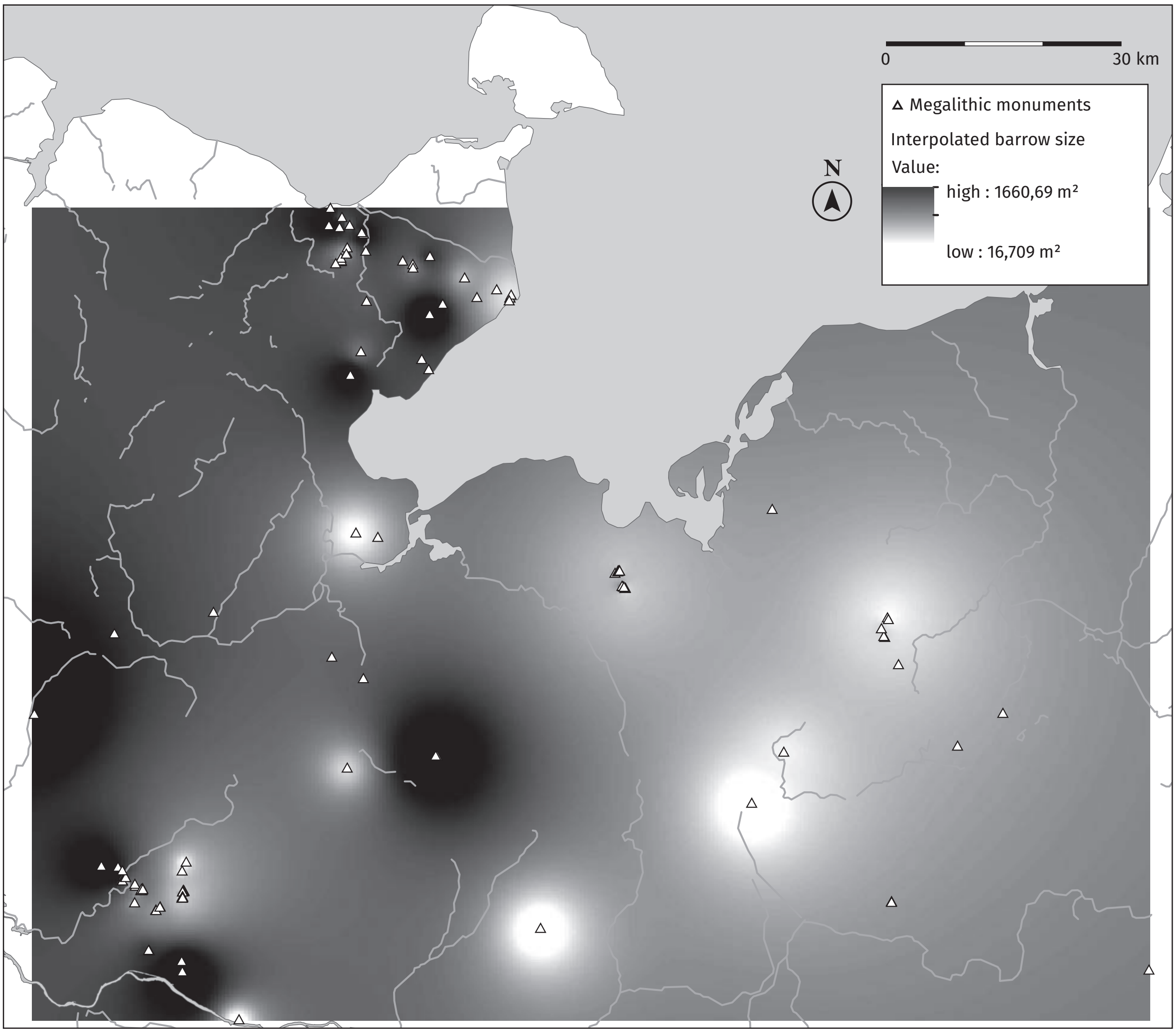

Fig. 10. Interpolation of the barrow sizes within the archaeological test region.

Early to the Middle Neolithic. Nevertheless, this development might be influenced by an intensification of economic factors such as crop growing during the EN I and II, as indicated by archaeobotanical analyses (KIRLEIS/FISCHER 2014, 91). The absence of outliers in the EN and MN and the normal distribution of the data point at a uniformity of house architecture.

Based on these two factors, an institutionalised inequality among individuals and within small communities is rejected.

Another important aspect concerning the question of existing individual differentiation is the need for cooperation in building activities. The calculation of the expenditure to build a specific monument – in the presented case study, a large passage grave –strongly points at the benefits connected to cooperation. The small size of a closely-located settlement illustrates the relatively small number of available work forces. If the construction time should be narrowed down to one or two months, collective actions are needed. The existence of grave groups containing several numbers of similar grave types can be seen as another hint at this practice. This tradition of monument building was probably a meaningful factor in the development and cohesion of social groups and identities. A constant collective reference to the monuments after the construction process is traceable in the repeated deposition of ceramics and flint in front of the graves (compare ANDERSEN 2000, 52–55). These actions are most probably connected to ritual festivities, possibly intended to negotiate and strengthen social structures.

Local structures of grave groups indicate another important factor. Competitive behaviour is another meaningful aspect in the ethnographic case study. This competition may be visible in a strong desire for proper representation and a close association of monuments with the groups building and using them. The social composition of these funeral communities remains unclear. Except for a few cases (e.g. BERTHOLD 2008), no data is available showing the extent to which the buried individuals were related to each other. However, the ethnographic record shows that extended networks are very important, especially regarding construction activities. In Sumba, megalithic tombs are usually erected by and seen as the property of the whole sponsors' clan. However, only the sponsor himself, his spouse and – under certain circumstances – his (grand)children are buried. Nonetheless, the whole clan is involved in the allocation of resources and required manpower during the building process (ADAMS 2010, 281). Similarly, while single monuments are closely associated with the sponsor of the feasts of merit, further mechanisms were valid in the case of some Naga tribes (e.g. the Angami and Lhota Naga). For the allocation of resources, required work and the erection of the megaliths themselves, all relatives, the whole clan and in cases more members of the village will be expected to participate (JAMIR 2004, 110–112). In case of the Merina in Madagaskar, funerary communities normally contain local family clusters. The same group will also be responsible for all the associated building activities (BLOCH 1994, 111–115). These examples comprehensively show that the social groups involved in the overall building processes of Funnel-Beaker communities can be assumed to be rather large and extending beyond the actual funeral community being buried together in one tomb. Especially in Sumba and Nagaland, feasting activities hold the strongest importance for the cooperative efforts in the construction of megalithic monuments and the competitive gain of social prestige (compare JEUNESSE 2016). In the archaeological case study, the importance of social groups involved in megalith building could be visible in the depositional practices observable especially around passage graves (compare WUNDERLICH 2014; ANDERSEN 2000, 55). Reoccurring events involving the ritual deposition of ceramic vessels and flint artefacts may have served to strengthen the togetherness and cohesion among these groups.

The local grave clusters of Naschendorf and Barendorf are interpreted in such a competitive way. The traceable process of monument construction and the increase of chamber sizes in two directly neighbouring clusters are seen as a way to represent status and capabilities. The first group of monument builders places its emphasis on the construction of a high number of monuments, especially during the first chronological phase. While the second group only built one small chamber during this phase, the picture changes during the second phase of construction activities. While the number of monuments erected in this second cluster was still low, the chambers were now built larger. The first group may have reacted with the construction of larger barrows. As a last stage of activities, two massive passage graves were built, accompanied with the inability of the first group to keep up with this development. With respect to the overlapping construction phases of different grave types, simultaneous building activities of different dolmen types by the first group are possible. This process is interpreted as a differing approach to represent the group's abilities and – taken further – as an indicator of competitive behaviour within a local environment.

Nevertheless, this behaviour might also be traceable in regional contexts. The distribution of graves with a concentration of non-megalithic and megalithic long barrows in the area around the Sachsenwald might point to an early emphasis on building activities in this area. However, large chambers are missing here, although the state of preservation seems good in general. As a result, these communities might not have had the opportunity and/or desire to construct the much more complicated large chambers. These can be found more to the north-east and east, in Ostholstein and western Mecklenburg. The presence of early grave types in these areas proves the simultaneous development of the whole region. An emphasis on both chamber and barrow size is only found in Ostholstein. Therefore, different modes of representation are again visible in the archaeological record. Interestingly, the only area containing both factors is also the region with the highest number of long flint axes. This might be connected to a higher population density, which is indicated by the number of settlements. At this point, the number of flint axes per m² and the percentage of long axes are important. These differences are observable in the interpolation of flint axe sizes. The distribution of the factors size of flint axes, chambers and barrows show similar results. A higher concentration of the production and perhaps deposition of outstanding axes is associated with the more complicated construction of large chambers. Overall, competitive behaviour among several communities that are part of a region resulted in differing attempts to represent status. This competition could have been closely connected to economic possibilities, as indicated by the distribution of flint axes.

CONCLUSIONS

The erection and continuous use of megalithic monuments is a complex tradition implying several functions and aspects. While some of the small dolmens and non-megalithic long barrows point more to single burials and an emphasis on individualism, open and complex chambers certainly mirror collective aspects (SCHÜLKE 2014, 121–122). Furthermore, megalithic tombs are characterised by both their use as burial places and as places of ritual depositions. These aspects imply a strong commemorative function of the monuments, which is connected to a culture of memory (compare for example ASSMANN 2013). Nevertheless, these central places could have also played an active role in the negotiation of social relationships and structures. At this point, the invested energy in constructing the monuments must be taken into account. Regarding the small size of settlements and generally thin density of population (compare SCHIESBERG 2012), the erection of large monuments represents collective efforts and a highly-developed social organisation. In the described analyses, no differentiation of individuals was observed, which might point to the existence of fixed hierarchies. More important is the representative character of the monuments, which might be interpreted as a competition between different communities. With respect to the complexity of the development of an absolute sequence of grave types, a rise in chamber sizes and a direct interaction and reference of neighbouring groups building grave clusters can be assumed. An important premise of these building activities is the economic background. During the transition from the late early Neolithic and early Middle Neolithic, an intensification of such economic factors is observable (compare HINZ 2014b, 209–210). The ability to enlarge megalithic monuments and intensify building activities might have been dependent and triggered by these circumstances. Coming together, these developments might indeed have had a strong influence on social structures of Funnel Beaker communities. Summing up, megalithic tombs of the Funnel-Beaker communities can be seen as an object used for representative and competitive purposes. The construction of these monuments is influenced by economic factors and vice versa having an influence on the social structures of the connected communities.

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Building community: Significant places now and before

Lara Milesi

ABSTRACT

This paper aims to summarise the objectives and premises of a cross-cultural research project focused on understanding one of the existing interpretations of Iberian late prehistoric ditched enclosures. It first focuses on the notion of social aggregation that has been applied to these monumental constructions, as well as the closely-related concept of ›meeting or gathering place‹. Secondly, it proposes a more anthropological approach in the use of plausible ethnographic data and analyse the difficulties inherent to this methodology. Finally, it stresses that the research project should attempt to recognise other forms of conceiving the space and construction of significant places to advance our understanding of ditched enclosures and other prehistoric monumental sites. In this respect, some preliminary results of ethnographic fieldwork in Chile and New Zealand will also be presented.

OBJECTIVES

A matter of definitions

The project described here is part of the activities of two Spanish research groups: PERUMA[1] from the University of Málaga and GEA[2] from the University of Granada. It derives from the objectives of a larger project studying the chronology, formation and interpretation of the circular ditched enclosures of late prehistoric Europe (6th – 3rd millennia BC), with a special interest in the Iberian sites.

In this case, the main objective is to critically examine the different definitions of what are considered social aggregation processes (Márquez-Romero 2001, 2006; Díaz-del-Río 2003, 2013; Márquez-Romero/Jiménez-Jáimez 2010, 2013; Márquez-Romero 2013; Valera 2009; Valera et al. 2014) that are being applied to the interpretation of some Iberian prehistoric ditched enclosures. In turn, this is often based on earlier European prehistoric enclosure studies that have discussed the functionality and communal processes behind the construction of such recurrent earthworks.

The similarities recognised between some European and Iberian sites – although it is true that every case is unique – have led researchers to share information, ideas and interpretative tools. Research into Iberian ditched enclosures has substantially changed in the last fifteen years. The number of known sites has grown exponentially (Jiménez-Jáimez 2015) and innovations have allowed a better study of the features defining them, such as ditches, palisades, pits, depositional practices, profuse food remains and human bones.

However, whereas new techniques and material analysis – aerial photography (Delibes de Castro et al. 2014), ground magnetometric surveys (Márquez-Romero et al. 2011; Becker/Valera 2012) and stable isotopes analyses (Valera et al. 2014; Díaz-Zorita Bonilla et al. 2014) – are proving helpful in the characterisation of Iberian ditched enclosures, the interpretations tend to repeat assertions made for other European contexts decades ago.

This sometimes entails the comparison of specific ideas, such as those of ›fortified settlements‹ (Pellicer 1986; Martín de la Cruz 1995; Ferrer 1996; Nocete Calvo et al. 2008) and ›settlements‹ (Díaz-del-Río 2003; García Sanjuán/Murillo 2013). However, researchers often settle on claims with vaguer meanings,

1 Focused on the study of monumental prehistoric enclosures in general and southern Iberian ditched enclosures in particular. www.peruma.es

2 Focused on the study of prehistoric material culture and social identity in southern Iberia. www.webgea.es

such as ›meeting place‹ (Márquez-Romero 2001, 2006; Márquez-Romero/Jiménez-Jáimez 2010, 2013) or aggregation sites (Díaz-del-Río 2013; Valera 2009).

As Andersen has summarised (1997) for different European cases, the notion of a non-permanent settlement site has usually been linked to specific functions such as worship or trade. It has contrasted the concepts of symbolic and economic, or ritual and functional.

Due to the complexity of many Iberian cases, interpretations that consider social aggregation as part of the formation process of an enclosure tends not to include such dichotomies (see Díaz-del-Río 2008). However, scholars who defend this last idea seem to understand ›aggregation‹ in different ways, especially in terms of duration.

Another important aspect to be studied in depth is the use of ethnographic data to support interpretations that depend on ideas of mobility and gathering. For instance, the European proposals that work with ideas of ›meeting place‹ and communal activities to explain this prehistoric phenomenon in Central and Western Europe (Smith 1965, 1971; Pryor 1988; Edmonds 1993; Andersen 1997; Whittle 1977, 1988, 2003; Whittle/Pollard 1998; Thomas 1999; Whittle et al. 2011, among others) often make use of ethnographic ›parallels‹ to illustrate the notion of meeting or gathering place.

In general, archaeologists have used ethnographic examples to reinforce their interpretations of archaeological evidence. Unfortunately, the lack of explicit explanations of the rationale behind the use of certain ethnographic parallels over others – or how they relate to archaeological cases – often makes the practice seem arbitrary.

In prehistoric Iberian enclosure research, this practice is not profuse, although there are some examples. In terms of political scale and social dynamics, reference has been made to studies carried out for Asian groups (Díaz-del-Río 2013). In other cases, analogical reasoning has been applied to understand community behaviour in relation to possible ritual activities, structured deposits (Márquez-Romero 2013) and feature building (Valera 2009). However, in the majority of cases, the ethnographic data has been partial or has been used as ›piecemeal parallels‹, as Orme (1981, 21) summarised decades ago.

Regarding these two main aspects, this project aims to understand the act of establishing a communal place, working through the redefinition of what is considered ›social aggregation‹ and what is understood by ›meeting place‹. The main objective is to assess the suitability of these concepts for the interpretation of Iberian ditched enclosures by examining both categories and defining them based on anthropological methodology. For this reason, the research will also make critical use of data from ethnographic sources and fieldwork carried out among contemporary populations.

METHODOLOGY

Formalising old practices

As stated above, the project intends to reflect on the notion of a meeting place through an anthropological study focused on mobility, gathering and the construction of significant places. Both objectives will be part of an ethnographic research programme examining several plausible anthropological cases in depth, with special attention paid to two of them.

However, once we have recognized the fact that the use of ethnographic data in this kind of prehistoric investigation needs to be enhanced, the difficulties lie in the use of analogies or direct comparisons between different cultural contexts, as has been questioned for decades.

Regarding the literature review, the aim will be to identify plausible ethnographic examples of special events in which communities gather in significant and delimited places. As it is difficult to infer similarities between different cultures and contexts – even more so when the comparisons are not made with specific material culture items – this information will be put together not to derive broad law-like generalisations, but rather to build an interdisciplinary concept of ›meeting place‹. As stated earlier, the issues of social aggregation and the construction of significant places need a broader approach that underlines the main elements constituting this kind of phenomena (*sensu* Parkinson/Duffy 2007).

The starting point for the project will be two main questions:

— How have the notions of ›social aggregation‹ been used in archaeology and anthropology?
— What characteristics is a ›meeting place‹ supposed to have according to them?

In this study, social, spatial and temporal factors will be considered as the basis on which social aggregation takes place and communal sites develop. There are three elements that cannot be disassociated in the analysis of such monumental earthworks and that are linked to principles of negotiation and cosmology as basic components of time and community organisation.

Therefore, a necessary first step is to identify the conceptual elements that are usually included in the

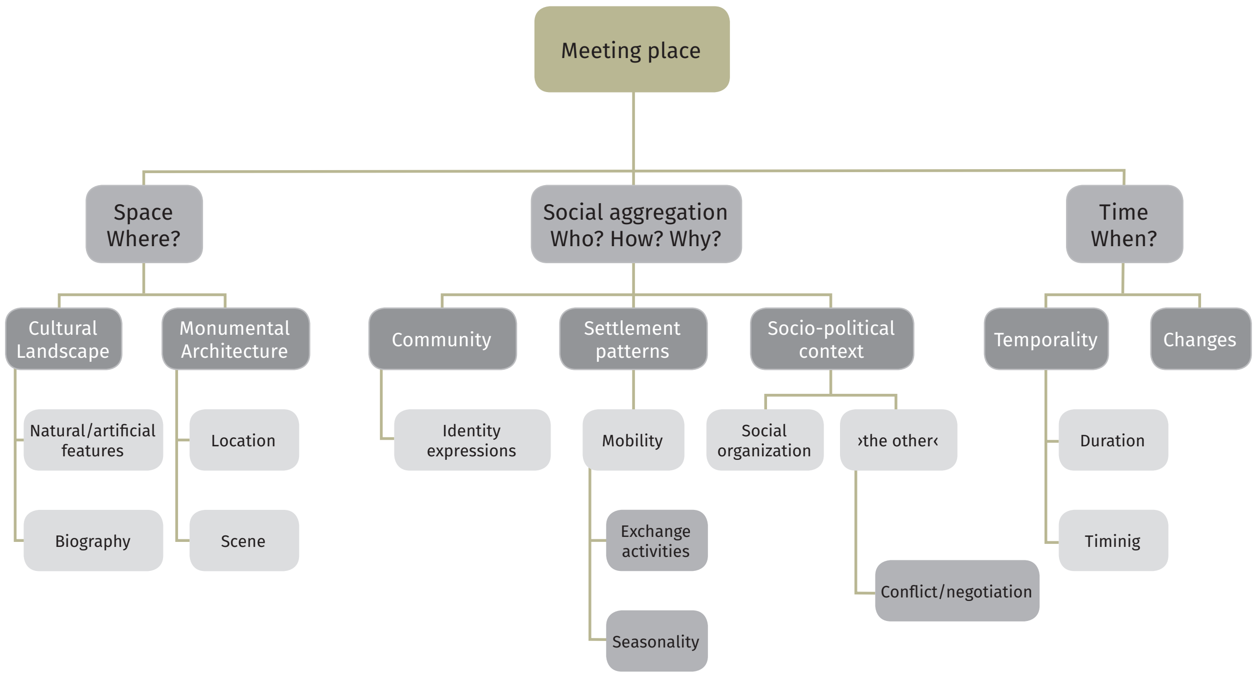

Fig. 1. The diagram represents the principal issues that will be considered in the research.

notion of ›meeting place‹. Three dimensions that are recognised are:

a. aggregation, a fundamentally social phenomenon;
b. the time of gathering; and
c. the use of a bounded and significant space.

These three wide-ranging topics will be developed through more specific aspects according to the diagram (Fig.1). The resulting parameters will be used as guidelines to observe and analyse each of the ethnographic and archaeological cases under study.

One of the more complicated issues in this project was the choice of relevant and appropriate ethnographic cases according to the research design. As mentioned earlier, an anthropological perspective will be adopted and this will be implemented through literature review, ethnographic fieldwork and archaeological inquiry.

In this respect, different cases of gathering activities were considered among different cultures, but two important contemporary examples stood out: the Mapuche gatherings around the rewe ground and the Māori gatherings in the so-called marae and meeting houses. Other cases – such as the Fulni-ô Ouricuri or Quechua Quyllorit'I – that are analysed under the same parameters offer interesting information but a lack of archaeological and contextual information.

In terms of archaeological studies and literature review, Tom DILLEHAY's work on the construction of the Mapuche *kuels* mounds in southern Chile (1990, 2003, 2007) and Douglas Sutton, Lousie Furey and Yvonne Marshall's research on the Māori archaeology of *pā* and *kainga* – fortification and surrounding domestic areas – in northern New Zealand (SUTTON et al. 1994, 2007) provided a solid research background to begin the analysis of past earthworks and mobility contexts.

Their most distinctive feature is the combination of archaeological and ethnographic sources in the study of monumentalised archaeological remains associated with the ancestors of contemporary non-Western communities. Both studies analyse archaeological data but consider the cultural and historical contexts of the communities involved in these constructions. Furthermore, both cases have been used in the past by European archaeologists for analogical purposes. However, they have been referenced sporadically and often uncritically. Thus, the Mapuche example was linked to prehistoric ditched enclosures by Andersen in 1997, while the Māori *pā* were related to Iron Age hill forts in Britain many decades ago by ELLISON/DREWETT in 1971. In this latter case, one of the oldest references is probably comparison between Māori forts and European prehistoric sites (1927), when – using analogical reasoning – he ended up calling Maiden Castle another ›English *pā*‹.

This project will provide new ethnographic data to continue exploring how past and present gathering grounds are among these two important cultures and confirm whether its use in the interpretation of European prehistoric enclosures is plausible.

Concerning the second level of research, ethnographic fieldwork is being conducted in Chile and New Zealand to study interesting examples of significant places where cosmology is represented and traditional or renewed ceremonies take place (MILESI 2014). The specific subjects of these respective tasks will be the Mapuche *rewes* – a kind of ritual field monument – and the Māori *wharenui* and *marae*, meeting houses and meeting grounds. Their study will consider how they were formed, how they changed over time and the social activities held at them. It will also examine whether these places stand alone or work in conjunction with similar structures.

Finally, on a third level, the conclusions drawn from the literature review and fieldwork will be assessed against archaeological data from different southern Iberian sites where material culture analyses, chronological studies and strontium isotopes analyses – among others – will be considered as potential evidence of cyclical mobility and social aggregation.

In accordance with the project proposals, the last part of this paper will summarise some of the aspects studied as part of the first ethnographic fieldwork carried out in Chile and New Zealand. The information described here will correspond to one of the three dimensions previously mentioned. It will stress the use of space considering landscape and features construction in relation to specific celebrations.

Fig. 2. Territories where the Mapuche population is concentrated. (Image by NASA Earth Observatory).

THE MAPUCHE CASE

These lines point out some contextual information that will be expanded through an intercultural collaborative project to be developed with the assistance of Mapuche communities and the Intercultural Education Programme that the University of Santísima Concepción is developing in Cañete (Chile) in collaboration with the International and Intercultural Mapuche Lavkenche Centre, in line with what is called Collaborative Anthropology. It will focus on the study of the construction of *rewe* – ceremonial fields – and the use of culturally-significant places.

As already mentioned, among the known earthworks identified in South America, the Mapuche *kuels* appear to be one of the best examples with which to work. Tom Dillehay has been the main researcher of these archaeological remains, especially mound building. His studies have considered diachronic cultural approaches where history, ethnography and archaeology have been combined to understand *kuel* builders throughout time, giving us some clues in terms of understanding their special design, stratigraphy or the community activities related to the construction of significant places.

Some considerations[3]

Today, there are over 600,000 Mapuche living in Chile, most of them in Santiago – the country's capital – as the result of major migrations. However, the historical Mapuche territories are located in central-southern Chile, specifically in the Bio-Bio and Araucanía regions where many communities still live (Fig. 2).

Regarding local history, we can briefly say that it is a history of contacts, first with the Inca Empire, second with the Spanish conquistadors, and finally with

3 For further information, see: MILESI GARCÍA, L. B (2013): *We Tripantu: territorialidad y agregación social mapuche: estudio del caso del Valle de Elicura.* In GREDOS http://hdl.handle.net/10366/122419

Fig. 3. Elicura Valley location and names given to natural features: Treng-Treng and Kay-Kay Mountains (mythological snake spirits responsible for creating the Mapuche world); Kül-Kül mawida (horn spirit, a musical instrument used in ritual and conflict contexts); Nongen-Nongen mawida (outer mountain spirit) and Lavken mawida (lake spirit).

Chilean governments (Bengoa 2007). These circumstances influenced a process of ethnogenesis (Boccara 1998) in which different communities were included under the global designation of Mapuche, while maintaining – until now – their particularities, especially those based on the geographical distribution of the groups.

These contacts also led to resistance, with periods of war and negotiation when geographic borders – sometimes permeable in cultural terms – were established. The most important was the Bio-Bio River and lands south of the border. The majority of mound monuments built by Mapuche groups are concentrated in some locations in this area.

Having explored in depth the historical data, our fieldwork focused on traditional celebrations that required special places where they could be performed. We had the opportunity to participate in the so-called *We tripantü* or ›new cycle of nature‹ celebrated on 23rd–24th June and directly connected with the winter solstice. Its annual celebration was resumed in the 1980s when its significance and name were transformed into a Mapuche expression. Prior to then, it was celebrated as a catholic tradition known as San Juan.

It usually takes place in *rewe* fields and *rukas* – Mapuche huts – or in spaces that can act as ceremonial fields in urban contexts.

Although other locations were part of the research, the town of Cañete and the Elicura Valley in Arauco province were the principal places where ethnographic data was recorded. Cañete is a small town with a population of approximately 30,000 inhabitants, 40 % of whom are Mapuche. Historically, it was one of the towns from which the Spanish empire tried to expand its territory, as it is located in the problematic border area or ›frontera‹ to which we referred earlier.

The region around Cañete also has a large density of Mapuche population. One of the most interesting – not far from Purén, where Dillehay focused his research – is the Elicura Valley. Mapuche make up 60 % of the valley's population and they are organised in five different communities. All of them recognise the landscape organisation as explained in Fig. 3 and define the construction of *rewe* fields and *rukas* according to these geo-symbolic directions.

Given the orographic conditions of these lands, the notions of Earth, mountains, rivers and lakes are an integral part of Mapuche cosmologies. Their understanding of the world cannot be disassociated from their cultural expressions (myths, building orientation, ceremonies, and some clothes designs, among other things).

Rewes – translated as »the genuine places« – are circular spaces with vertical features that can be four figures representing ancestors – *che mamüll* – or one carved figure closely connected with shamanic activities. They are sometimes just trees and in other instances important, heavy, ritual wood carvings, whose function is to generate places where communities cyclically celebrate traditional ceremonies. They may or may not be built next to *rukas* and their size depends on the number of people expected to participate. There are important public *rewes* such as the one located in Cerro Ñielol in Temuco (see Fig. 4), as well as more private *rewes* built for one community, such as those studied in Elicura Valley. In all of them, the attributes are those of a time and space bridge, not only due to the biography of the object that links the community to past times, but also owing to the use that shamans make of them to contact Mapuche ancestors.

The significant places generated by the *rewes* are specially designed to hold different socio-political and ritual activities called *nguillatun*, *machitun* and *cahuin,* among others. All of them are closely related to Mapuche communal living and understanding of nature. For instance, in the *We tripantü* celebration, *rewe* fields are the ritual places where part of this tradition is held. This event also involves other meeting and feasting activities that require the participation of ancestors, communities and nature, such as giving thanks to Mother Nature – *Ñuke Mapu* – by offering prayings and some drops of *chicha,* the traditional drink of Andean communities. These actors and actions also take place inside and outside the *ruka* and at water sources such as rivers or creeks.

THE MĀORI CASE

As stated earlier, this project will pay attention to contemporary Māori marae. They are paradigmatic examples of meeting places and more complex constructions than Mapuche *rewe*. Studying what the factors that trigger their changes throughout time are and the standardisation of forms and gatherings can allow us to reflect on the nature of elements that are part of a meeting place. Some preliminary results of the first fieldwork carried out in New Zealand will be presented in this paper. They will be developed through collaborative approaches in the following years.

Fig. 4. Nguillatun celebrations and rewe fields. Sketch by Alonso de Ovalle (1646); Photography by Knittel (1890) in Alvarado *et al. (2001); Nguillatun pewenche by* Astete *(2009); ritual field in* Temuco *(2013).*

Some considerations

According to Statistics New Zealand, 86% of the Māori population lives on the North Island and 23% of the total Māori population live in Auckland. Historically, the region of Auckland was part of the territory of iwi Ngāti Whātua, but conflicts with other iwis – tribes – and land concession to Europeans provoked massive loss of land. Nowadays, tribe lands are distributed along Ōkahu Bay, Ōrākei dominion and Bastion Point.

Several *marae* were visited on the North Island, although the majority of research activities were carried out in Marae Ōrākei, which belongs to the Ngāti Whātua tribe. It is important to mentioned that even when there is a common idea of buildings and functions, every *marae* has its own history, community and geographical context. Ōrākei Marae was built following standard forms, considering landscape and NE orientation, according with Māori cosmological beliefs (see Fig.5) but also incorporating new designs and buildings in the space.

Traditionally, the word *marae* meant the courtyard in front of a Māori meeting house or *wharenui*. It is also named as *marae atea*. It is a *tapu* or sacred area and as such may not be crossed by visitors until respect has been paid to the *tupuna* or ancestor. It is literally understood as the meeting ground.

One of the most important buildings in a *marae* is the *wharenui* or meeting house. This building is named after the ancestor and it is said to embody his *mana* or ancestral power (SISSONS 2010). Every part of the building represents parts of the *tupuna* body. Carving designs represent the head, arms, ribs, hands and other parts of the body of an ancestor. Furthermore, carvings and pictures inside the house represent significant ancestors of the group. The buildings' locations follow the *tapu and noa* – sacred and ordinary – principles. For this reason, the *wharekai* or dining hall as an ordinary space is at a respectable distance from the meeting house as well as the rest of the buildings related to domestic activities, such as weaving or carving, *wharepora and wāhi whakairo,* respectively. However, it is important to consider that *noa* spaces are as relevant as *tapu* ones to develop *marae* social life. For instance, w*harekai* has been an important part of showing community hospitality to guests. In this sense, food and cooking are fundamental components of any gathering and enable hosts to empower feasts (*sensu* DIETLER 2001).

Finally, *marae* gatherings – *hui* – serve a multitude of purposes. The most significant are funeral

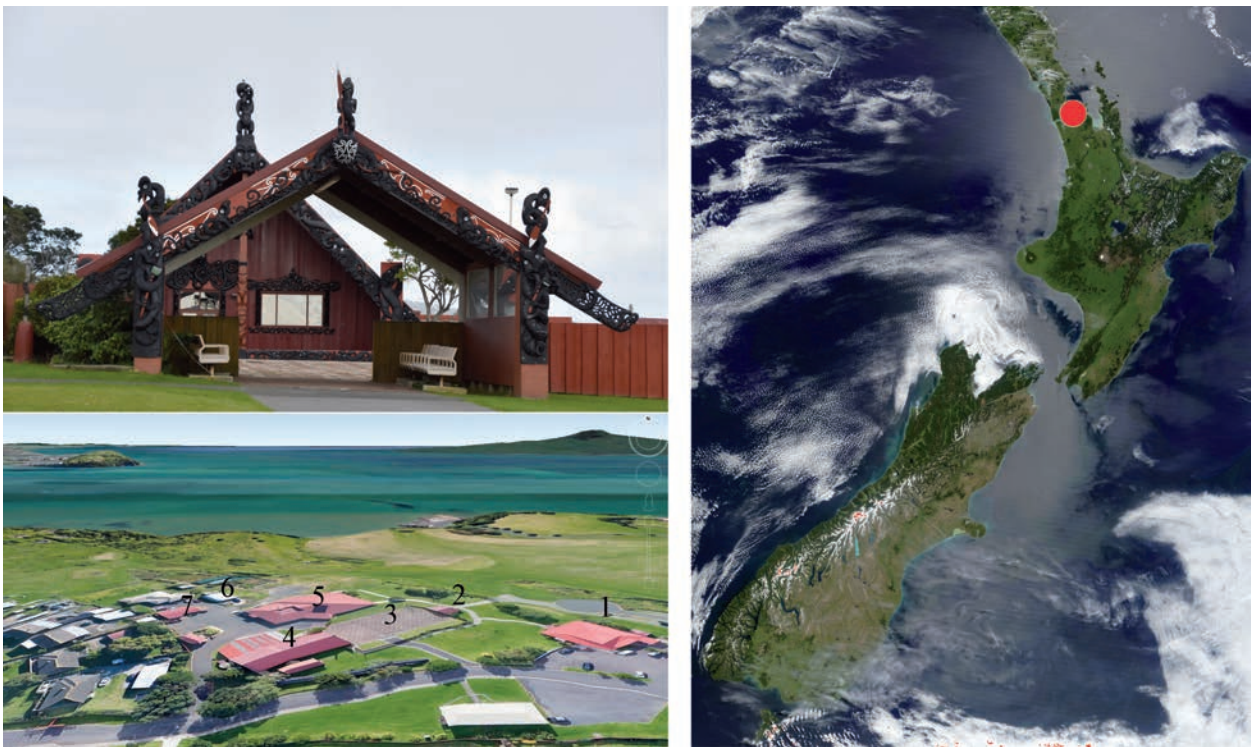

Fig.5. Left: (Up) Marae Orākei, see waharoa, marae atea and wharenui. (Down) Building locations: 1. wharekai, 2. waharoa, 3. marae atea, 4. wharenui, 5. wharekai, 6. wāhi whakairo, 7. wharepora. Bay with Rangitoto volcano and Norht Head pa Right: Marae location (Auckland, New Zealand). Images by MILESI (2016), Google Earth and NASA Earth Observatory.

gatherings or *tangi*, during which the body of the deceased is placed in the meeting house until it is buried in the *urupa* or cemetery. Other occasions include weddings, anniversaries, political meetings and educational activities.

One of the most important things about *hui* are protocols. All gatherings are ruled through strong traditions and Māori values. For instance, to enter the *marae*, the celebration of a ceremonial Māori welcome is necessary, in which the main intention is to unite the *manuhiri* or visitors with the *tangata whenua* – people in charge of *marae* – through a series of rituals of encounters and negotiation.

CONCLUSIONS

With these brief ethnographic summaries in mind, there are several ideas that we can consider. First, the historical and political context allow us to understand how relevant the meeting places are in times of encounters. There is the necessity of having a special place where to gather and celebrate social activities through which hosts and guests negotiate relationships. This has been registered in colonial times in both cases studies.

Nowadays – as I have previously stated (MILESI 2014) for *We tripantü* meeting – the celebration of old or ›renewed‹ traditions held in a context of intercultural anti-discrimination programmes works as a claim for political and institutional recognition in the process of identity reinforcement, even more so when feasting expresses cosmological beliefs and an understanding of nature and human relationship that is completely different to that of the West.

Second, gatherings among members of the same communities usually follow cyclical calendars ruled by local celebrations. Nevertheless, special events such as funeral gatherings also make use of these significant meeting grounds.

Third, the importance and purposes of meeting grounds require the construction of buildings and features that usually combine functional and symbolic characteristics. The design of buildings and decoration of features appears to be always related with ancestors and memory of community.

This situation allows us to study some of the aspects that have been determined for our main research. In general, gathering for feasting – without explicitly differentiating ritual or functional activities – as well as choosing locations to place symbolic artificial features in a natural setting are two of the components that shape the study of Mapuche and Maori spaces. Locally, marking land possession and claims for cultural recognition appear as important components of the whole *rewe* and *marae* building, as well as their use for communal events.

We consider that ethnographically studying gathering activities and *communal living places* as persistent phenomena – although understood and built in different ways over time – can offer some clues for understanding different ideas of the world and society. For this reason, it is argued that it is possible to redefine obsolete or incomplete concepts by looking at different ontologies from an anthropological perspective.

Incorporating anthropological methods into analysing the interpretation of Iberian ditched enclosures is useful and necessary. Due to the complexity of archaeological data from this type of enclosure, some conceptual matters need to be taken into account to use certain concepts such as ›social aggregation‹ or ›meeting place‹.

Ultimately, this project proposes a different approach to the factors that trigger the formalisation of a significant place. Among others, dichotomies between functional or ritual purposes – where enclosure influence ends in terms of territory organisation, or how communities can change the meaning of a place throughout its life – are important components in the prehistoric ditched enclosure debate in Iberia that have to be studied in depth.

ACKNOWLEDGEMENTS

I would like to thank Yvonne Marshall, Tom Dillehay and Victor Jiménez-Jáimez for helping me to incorporate new perspectives in my research. I would also like to thank José Enrique Márquez-Romero and Margarita Sánchez-Romero for giving support to a research project that will be developed in the next four years.

My participation has been promoted by the Spanish Ministry of Education, Culture and Sports and by the Spanish Ministry of Economy and Competitiveness.

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