The transformative Pre-Roman Iron Age of the North

The example of the Mang de Bargen cemetery

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ABSTRACT

This paper presents the Pre-Roman Iron Age component of the cemetery at Mang de Bargen in Northern Germany. Thus far, the primary focus of investigations at this site has been on the Bronze Age. However, evidence indicates that intense activity also occurred during the pre-Roman Iron Age, which was not limited to the cemetery but also manifested in the surrounding area. The Iron Age is characterised by significant changes and innovations, particularly in material culture. This study examines these developments, with a particular focus on relative and absolute dating. The cemetery features demonstrate not only a new, institutionalised practice of cremation, but also a new approach to collecting the burnt bones at the pyre and their placement in the urn. Moreover, some urn burials are enclosed with different types of ditches – a custom that can be situated within a supra-regional context. Furthermore, the osteological investigation indicates a shift in age composition at the transition from the Late Bronze Age to the pre-Roman Iron Age. By integrating environmental data from pollen profiles and find distribution patterns, the cemetery can be contextualised within a region undergoing a transformation with the advent of the pre-Roman Iron Age, exhibiting a notable surge in activity.

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Introduction

The cemetery of Mang de Bargen (district of Segeberg) has been analysed in the context of the prehistoric social and environmental history of Schleswig-Holstein based on interdisciplinary research within the Collaborative Research Center (CRC) 1266 "Scales of Transformation - Human-Environmental Interaction in Prehistoric and Archaic Societies". This analysis allows reconstructions of moments of transformation to be made. The cemetery, which was used for burials from the Late Neolithic to the end of the pre-Roman Iron Age (*c.*2200-90 BC), has been the subject of extensive investigations with a particular focus on the Bronze Age material (Schaefer-Di Maida, 2023a,b). However, the pre-Roman Iron Age (*c.*500-90 BC) has only been addressed to a limited extent. The transition to the pre-Roman Iron Age represents a central and drastic change, which can be recorded in several aspects. These include grave construction, material culture and other features appearing on the cemetery and in the immediate surroundings. This contribution will present and discuss these features in the archaeological and environmental data. In order to achieve this, the graves and their associated burial complexes are presented and discussed anew with reference to absolute and relative dating as well as osteological investigations. The complex distinction between finds and time phases, as well as grave constructions, demonstrates that the pre-Roman Iron Age constitute a multi-layered development comprising different phases. These phases illustrate sequences of social and environmental changes at the local level. This prompts the question of the extent to which social changes are actually concomitant with environmental-archaeological transformations and to what extent these transformations are correlated with changes in iron technology. The introduction of new resistant cereal varieties, such as rye, could indicate a potential reaction to possible environmental crises. Moreover, it is pertinent to inquire whether these developments can be discerned at the regional and supra-regional levels. The cemetery at Mang de Bargen and its immediate surroundings thus yield a wealth of findings that permit the formulation of new hypotheses regarding the structure of society.

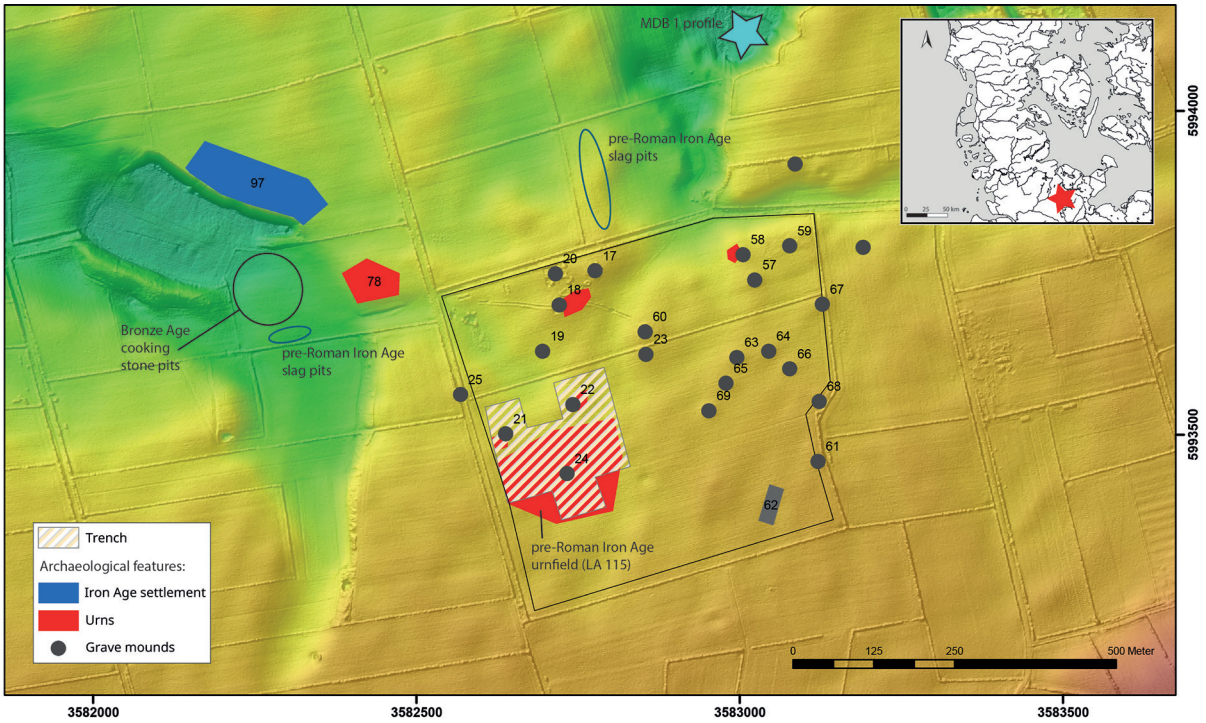

Figure 1. The cemetery of Mang de Bargen and surrounding prehistoric activities (Data after Lütjens 2014 and DGM2 © GeoBasis-DE/LvermGeoSH; graphics: S. Schaefer-Di Maida).

State of Research on the pre-Roman Iron Age on a local and regional scale

Pre-Roman Iron Age Chronology in Schleswig-Holstein

The study of the Iron Age in Schleswig-Holstein has its roots in the research conducted by Mestorf in the nineteenth century (1885). Subsequently, Knorr (1910) and Schwantes (1911; 1935; 1952) addressed the regional development of the pre-Roman Iron Age, delineating the Jastorf, Ripdorf, and Seedorf phases. The research of Hingst (1959; 1974; 1980; 1983; 1986; 1989) ultimately established a new standard for the Schleswig-Holstein region, as he developed a chronology for the early and late pre-Roman Iron Age based on metal and ceramic forms, incorporating material from a range of cemeteries. In 2013 and 2021, Kneisel presented a new analysis of the transition from the Bronze to the Iron Age based on material culture. In the present-day Danish region, the classification of the Iron Age proposed by Jensen (2005) is of particular relevance. For Mecklenburg-Western Pomerania, a chronology based on the work of Keiling (1969) is available. In light of the aforementioned studies on the chronology of the Iron Age, the artefacts from the Mang de Bargen cemetery were classified and verified using absolute dating.

Research in Mang de Bargen

The cemetery is situated within the municipality of Bornhöved, located in the district of Segeberg in the northern region of Germany (see Figure 1). To the north of the site are lakes that were formed as a result of repeated glacial erosion processes causing the terrain to sink to an elevation of approximately 30 metres above sea level. To the south, the area is bordered by a moraine, which attains its greatest elevation of 83 metres above sea level at Grimmelsberg. In the Late Neolithic and Bronze Ages, groups of burial mounds were constructed around the moraine. Their construction on top of natural hills was preferred. The group of grave mounds at the Mang de Bargen site (LA 17-25, 57-69) represents the highest concentration of barrows in this region. The long period

of use, spanning the Late Neolithic (2200-1800 BC), the Early Bronze Age (1800-1100 BC), the Late Bronze Age (1100-530/500 BC)[1] and the Pre-Roman Iron Age (530/500-90 BC), demonstrates that this burial ground was continually visited and utilised for burial purposes. Furthermore, it suggests that in later phases, reference may have been made to existing barrows.

The initial mapping of the barrow groups within the designated working area was conducted by Schwerin von Krosigk in 1976. The Mang de Bargen site was designated as group "K" within this mapping process. With regard to their states of preservation, dimensions and heights, 23 barrows and one long bed (LA 62) were recorded for this group. However, no further description was provided (e.g. Schwerin von Krosigk 1976, 106-108). In 2004, 2005 and 2014, the Schleswig-Holstein State Archaeological Office conducted archaeological investigations at the site as a result of gravel mining activities. With the exception of one barrow (LA 57), all visible barrow areas were subject to excavation (Lütjens 2014, 30-32). Some of the graves had already been significantly disturbed and were only discernible through the remnants that remained, while others had been extensively destroyed and no longer provided any indication of former burial mounds or burial complexes. Parallel to the archaeological investigations, a study of the soils and colluvial layers was also conducted (Dreibrodt et al. 2009, 481-483), as well as the reconstruction of the vegetation and settlement history of the *Bornhöveder Seenkette* (BMFT project "Ecosystem Research Bornhöveder Seenkette"; DFG project "Neolithisation in Schleswig-Holstein", Wiethold 1998, 55-59). In 1997, a comprehensive laminated pollen profile of Lake Belau (*c.*4 km from Mang de Bargen) was created and analysed for the first time with the aim of making archaeological-ecological comparisons (Wiethold 1998). This also formed the basis for further environmental-archaeological investigations conducted as part of the CRC 1266 project. The Belau off-site pollen profile and a near-site pollen profile enabled the reliable reconstruction of the site and its surroundings, thus facilitating a comparison of archaeological and environmental data (Feeser et al. 2023; Schaefer-Di Maida 2023a).

Funerary activities

In total, the site comprises 17 burial mounds, 60 urns in the mound areas and 201 further urn burials in an adjacent area. Additionally, the site includes other features, such as postholes, cooking stone pits, hearths, an oven complex and a pyre.

In the Late Neolithic period (2200-1800 BC), the cemetery was used for the burial of individuals in barrows, which may also have undergone multiple phases of construction. In the Early Bronze Age (1800-1500 BC), the construction of burial mounds persisted, albeit with a notable decline in complexity. For instance, the number of stone structures erected for burial purposes diminished. However, a considerable number of bronze objects were discovered within the graves, particularly during Period II (1500-1300 BC). The construction of the final burial mound (LA 57) is dated to approximately 1300 BC, which also marked the first example of cremation burial. The cremated remains of the corpse were interred in a tree trunk coffin, thus not yet indicating a change in grave construction. Subsequently, the practice of burial in a mound was superseded by the deposition of cremated remains on stone pavements, a custom known as the *Leichenbrandschüttung*. The transition in burial practices is most evident around 1200 BC, marking the beginning of the Late Bronze Age (1100-500 BC). This shift is not only reflected in the emergence of a new burial custom (urn burials) but also in the introduction of novel grave goods, predominantly personal items such as razors, toilet utensils, and jewellery. This coincides with a surge in burial activity at the site. The greatest concentration of Bronze Age graves is observed during Period IV (1100-900 BC), around 1000 BC. The cremations were situated in close proximity to the barrows, thus enabling the individual cremations to be attributed to specific grave mounds. A notable decline in burial activity is discernible from Period VI (700-500 BC) onwards, accompanied by a shift in the range of material culture forms. The advent of the pre-Roman Iron Age is marked by a notable shift, with a surge in burial activity at the site. The urns were interred in a cemetery situated in close proximity to the burial mound area, with some of them enclosed by ring ditches. Moreover, the grave goods now demonstrate significant

shifts in the range of types and materials, indicating the emergence of new cultural and technological influences (e.g., the appearance of belt parts). The level of burial activity remained relatively low until the onset of Iron Age Phase Ib (480-390 BC). Phase Ib is followed by a gradual increase in burial occurrences at the site, which accelerates around 390 BC, marking the onset of Phase Ic (390-300 BC). This is followed by a slight period of stagnation with Phase Id (300-250 BC), after which a very steep increase occurs with Phase IIa (250-150 BC). However, this declines rapidly again to Phase II b (150-90 BC), which continues to decline rapidly till the end of Phase IIc (90-60 BC).

Iron Age burial activities

Cemetery LA 115

Cremation burial ground LA 115 is situated in the south-western section of the Mang de Bargen burial ground. In addition, the site encompasses the burial mounds designated LA 21, 22 and 24. The excavation area spanned 3.4 hectares. In a significant portion of the 1.8-hectare area in the southern and eastern regions, the topsoil was removed without supervision using a bulldozer, wheel loader, and excavator until it reached the gravel. Furthermore, the colluvial terrain depressions in the eastern area were also removed down to the subsoil, resulting in the destruction of all features in these areas. Some features remained intact, including LA 22 and 24. In contrast, the area to the northwest covered an area of 0.9 hectares and was opened under the supervision of archaeologists. In some cases, the features had been partially ploughed and disturbed, resulting in the documentation of only their position. To the south of the excavation trench, topsoil removal was intermittently overseen in a further area of 0.8 hectares. If possible, urns were retrieved as a single unit and the material from disturbed graves was sieved. It is unlikely that the excavation has uncovered the full extent of the burial ground. It is possible that further burials, particularly to the south and west of the area, could not be investigated. In contrast, the distribution of burials to the north and east of the excavation site appears to have thinned out, suggesting the presence of a peripheral zone within the burial ground. Since 2019, the area has been entirely removed by gravel mining, rendering it unsuitable for further investigation. A total of 312 features were identified as being of archaeological significance during the course of the excavations. Of these, 201 were cremation burials, which exhibited a considerable range of preservation states. In some occurrences, only the remains of vessels or cremated remains served as evidence of the former existence of a burial. As proposed by the archaeological excavator Burkhardt, the cremations can be classified into three main categories: 181 urn graves, 14 cremated remains, and six grave complexes. The remaining features can be classified into the following categories: 25 sites of pottery and/or cremated remains, 22 post pits, 20 discolorations, 12 stone traces, 12 ring ditches, nine hearths, six pits, three stone pits, one cooking stone pit and one pyre.

Graves

The distribution of the graves across the excavation area was relatively uniform. The irregularities are primarily attributable to the unmonitored removal of the topsoil in the southern and eastern regions. The graves were embedded into the natural soil. At times, the graves were found to be interred within colluvium (in 13 cases, representing 7% of the total). The discovery of an urn covered by colluvial layers (feature 225) provides a temporal marker between the graves.

Urn graves

The typical arrangement of urn graves involved the interment of the urn within a stone structure, which was typically surrounded by a shell of stones. This structure included a base stone, which supported the urn, and a capstone, which covered the urn and sealed it within the structure. In some cases, a vessel was positioned over the urn in lieu of a stone, probably to serve as a cover. The condition of the graves was dependent on the state of preservation of the excavation areas with the quality of the stone protection varying considerably. The categories used to describe the condition

of the graves were as follows:

1. Good: stone protection can be completely reconstructed
2. Medium: stone protection consists only of parts, especially the bottom
3. Poor: the stone protection and the urn are largely destroyed
4. Very poor: the urn grave can only be located on the basis of surface finds and the construction is completely destroyed.

The construction of the urn graves was typically limited to a stone shell, which could comprise stone slabs or boulders. As a result of the predominantly moderate preservation, only the bottom stones and slabs of the construction were preserved (69% = 125 urn graves), allowing for the assumption of a more or less compact and closed stone shell. The presence of a stone covering with a capstone was observed in only 5% of the graves (9 graves). In some occasion, the urns were covered with a vessel (4 graves, 2%), sometimes, the stone protection was covered with a stone pavement, which could be reconstructed, and two urns were placed in stone cists (features 90 and 346). A construction could not always be identified, suggesting that the urn was not placed in a free-standing manner but rather that the structure was largely dismantled (6% = 10 urn graves). It is not possible to determine the location of these urns within the cemetery, as this would only reflect the degree of preservation and not the spatial distribution of the urn graves. The dating of the urn graves was primarily based on the analysis of associated artefacts and ceramic forms (see Schaefer-Di Maida 2023a). The majority of the urn graves are dated to the pre-Roman Iron Age. Two urn burials could be dated to the Late Bronze Age (features 92 and 321).

Depositions of cremations

The cremation deposits were predominantly constructed as a stone shelter, which was constructed using boulders and stone slabs. In three cases, the only evidence discovered was an accumulation of stones. In the absence of stone protection and accumulation, a single stone was observed at the base of the cremation deposit, which may be indicative of a former construction, being already destroyed. In one instance, only a discolouration remained, and the find was the sole cremation deposit (Find 360) enclosed by a ring ditch. In his report, Burkhardt highlights the notable concentration of cremated remains within a confined space, which led him to hypothesise that a former storage container made of organic material may have been used for the burnt bones (Burkhardt 2014). Containers of a similar nature are known from the Groß Timmendorf cemetery (Fischer 2000, 35). The cremation deposits of LA 115 yielded no datable grave goods.

Dating and finds

In the cremation graves, the majority of the artefacts were belt components, including belt hooks, belt accessories, belt rings with and without ferrules, and belt straps. Furthermore, dress pins were frequently placed with the deceased. The pins were of various types, including Holstein pins, a three-disc head pin, nail-head pins, swan-necked pins and rolled-head pins. Additional artefacts includes a ball brooch, an eye ring, an awl, an amber bead, and a knife fragment. A description and discussion of the Late Bronze Age and Iron Age material can be found within the monograph which deals with the site in question (Schaefer-Di Maida 2023a,b). The relative dating of the finds is largely consistent with the absolute dating, which is based on the radiocarbon dating of cremated bones from 28 graves, representing 14% of the total number of burials from the site (Figure 2).

The three oldest dates fall around 2450 uncalBP (KIA-55433, KIA-55434, KIA-55450) and thus within the Hallstatt Plateau and, consequently, do not allow a more precise dating than between 800 and 400 calBC. The following three dates (KIA-55446, KIA55424, KIA-55448) are more precise, as they provide a shorter time span and suggest the earlies use of the urnfield between 726 and 395 calBC, i.e. between mid/end Period V and Phase Ib. A 68% probability shows a beginning only around 500 calBC and an end around 400 calBC, which would imply Phases Ia to Ib for pioneer burials on the urnfield. Subsequent burial activities show a more or less frequent time horizon between 405 and 60 calBC, i.e. between the middle/end of Phase Ib and the end of Phase IIc, whereas with a 68%

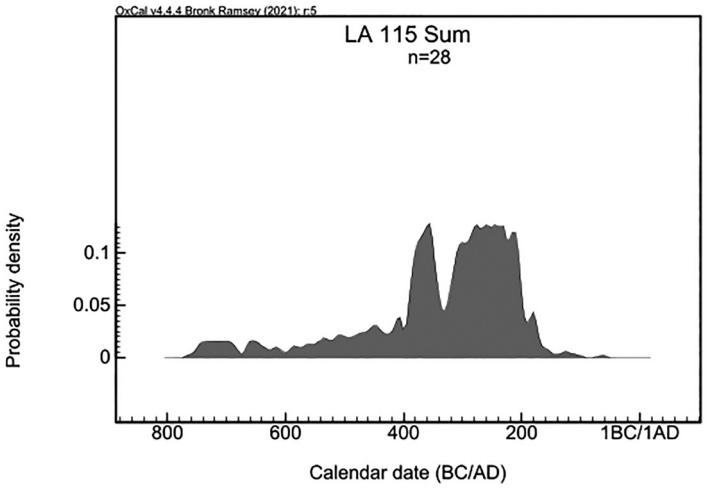

Figure 2. Sum calibration of absolute dated graves from the pre-Roman Iron Age urnfield LA 115 at Mang de Bargen (Graphics: S. Schaefer-Di Maida).

probability we could assume an activity up to 100 calBC, which would translate into a relative phase classification up to the end of PhasevII b. Based on these dates from the urnfield, two phases of burial activity could be identified: an early phase between 700 and 400 calBC, and a later phase between 400 and 60/100 calBC. As only a relatively small part of the burials from LA 115 have been dated, the exact burial horizons remain unclear. The grave goods confirm the use of the urnfield between the end of the Late Bronze Age and Iron Age Phase II b. With the help of the finds, a main period of use seems to correspond with Phase II a, i.e. between 250 and 150 BC, which is consistent with the larger number of absolute dates falling within this period (Figure 3). A comparison of absolute and relative dates shows that the relative dating horizons of the finds are in some cases narrower than those of the absolute dates and are therefore even more significant for the reconstruction of the burial sequences (cf. Rose et al. 2024).

The material from the end of the Bronze Age and the Pre-Roman Iron Age consists mainly of pottery, bronze, and iron. Around 480 BC, at the transition from Iron Age Phase I a to Phase I b, there is a marked change in the find material, meaning that the beginning of the Iron Age still has a Bronze Age echo before it changes significantly with the introduction of new find types and objects: As far as pottery is concerned, we can only mention the Late Bronze Age tripartite tureen (Schaefer-Di Maida 2023a, 171). As far as metal finds are found, a three-disk head pin (*Drei-Scheibenkopfnadel*, ibid. 146) on bronze and iron indicates the first use of iron. An eyelet ring (Ösenring, ibid. 151-152) with two eyelets and an eyelet lug shows only new forms, not new types of objects.

The Phase I b of the Pre-Roman Iron Age shows a paucity of evidence pertaining to urns from the site, i.e. the rarity of complete or reconstructible urns. It is worth noting the presence of a bipartite tureen (ibid. 170-171). In particular urn burials dating up to the end of Phase I c, are accompanied by a number of other items, including strap end fittings (*Riemenzungen*, ibid. 2023a, 157), tongue belt hooks (*Zungengürtelhaken*, ibid. 153) and belt rings (*Gürtelringe*, ibid. 155-156). Such finds are known for their longevity. Belt rings occur until the end of Phase II b, particularly in conjunction with short ferrules. As an example, for this longevity, it can be mentioned, that Rose has proposed a long-lived phase for simple belt rings in the context of the Aarupgaard urnfied from Denmark, which is dated to the beginning of Phase I c (Rose 2020, 230-231, Fig. 60). Furthermore, the following objects were found in association with the burials: The assemblage comprises an iron pin with a nail-shaped head (*Nagelkopfnadeln*, Schaefer-Di Maida 2023a, 146), a fragment of a triangular belt hook (*Dreieckiger Gürtelhaken*, ibid. 153) devoid of a central rib, swan-necked iron pin fragments (*gekröpfte Nadeln*, ibid. 146-147), a swan-necked rolled-head pin (*gekröpfte Rollenkopfnadeln*, ibid. 147), and a total of six belt plaques (*Gürtelbeschläge*, ibid. 156-157), two belt rings, an iron knife, a ball-brooch (*Kugelfibel*, ibid. 150), an awl, eight one-piece iron clasp-arm belt hooks (*einteilige Haftarmgürtelhaken*, ibid. 154), a bronze Holstein pin (*Holsteiner Nadeln*, ibid. 147-148), a plate belt hook (*Plattengürtelhaken*, ibid. 154-155) or fragment, a bean-shaped amber bead,

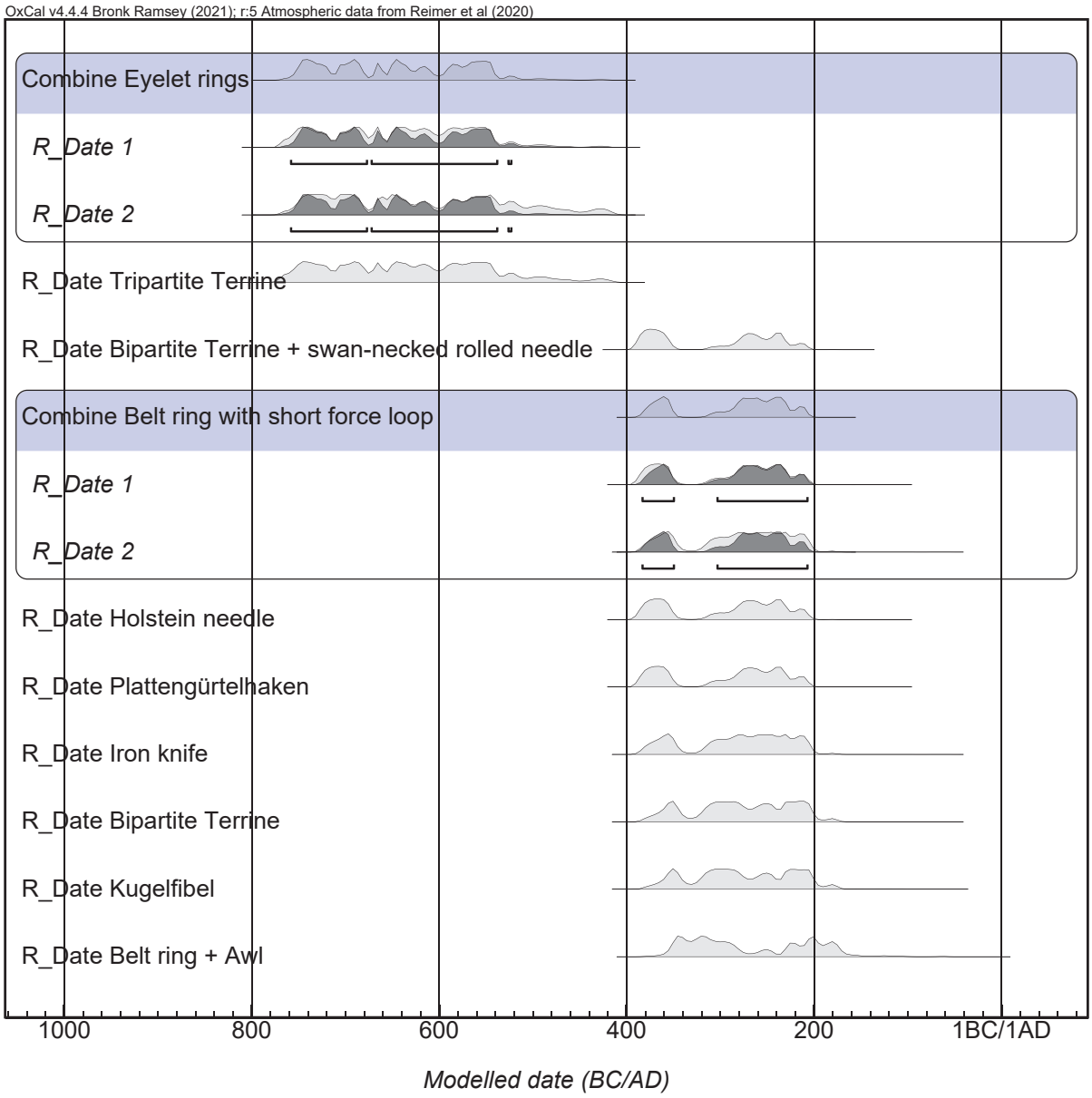

Figure 3. Calibration and combined calibration of absolute dated findings from selected graves (Graphics: S. Schaefer-Di Maida).

and the spike of an iron ring brooch (*Ringfibeldorn*, ibid. 149-150).

Changes in the find material between 700 and 90 BC.

The period between 700 and 90 BC can be divided into four main phases at the Mang de Bargen site (see coloured markings in Figure 4). The three Iron Age phases have already been recorded in this way in other studies (Schneider 2006; Kneisel 2013, 98-99., Figs. 30-31; Kneisel 2021).

The initial phase, which belongs to the Bronze Age, is designated as Period VI. This period introduces new forms and, for the first time, bimetal. However, it adheres to the established object categories of Bronze Age finds, namely pins and rings.

Schmidt (1993) observed a shift in the typological spectrum for the entire region of Schleswig-Holstein with the advent of period VI, which marked the conclusion of previous material culture traditions while simultaneously witnessing an influx of southern influences, particularly from the Hallstatt area in phase Ha D (e.g. swan-necked pins with ribbed or bowl heads) (Schmidt 1993, 113, 118, 150). There is amble evidence to suggest that exchange networks to the south were intensified during this phase. The incorporation of

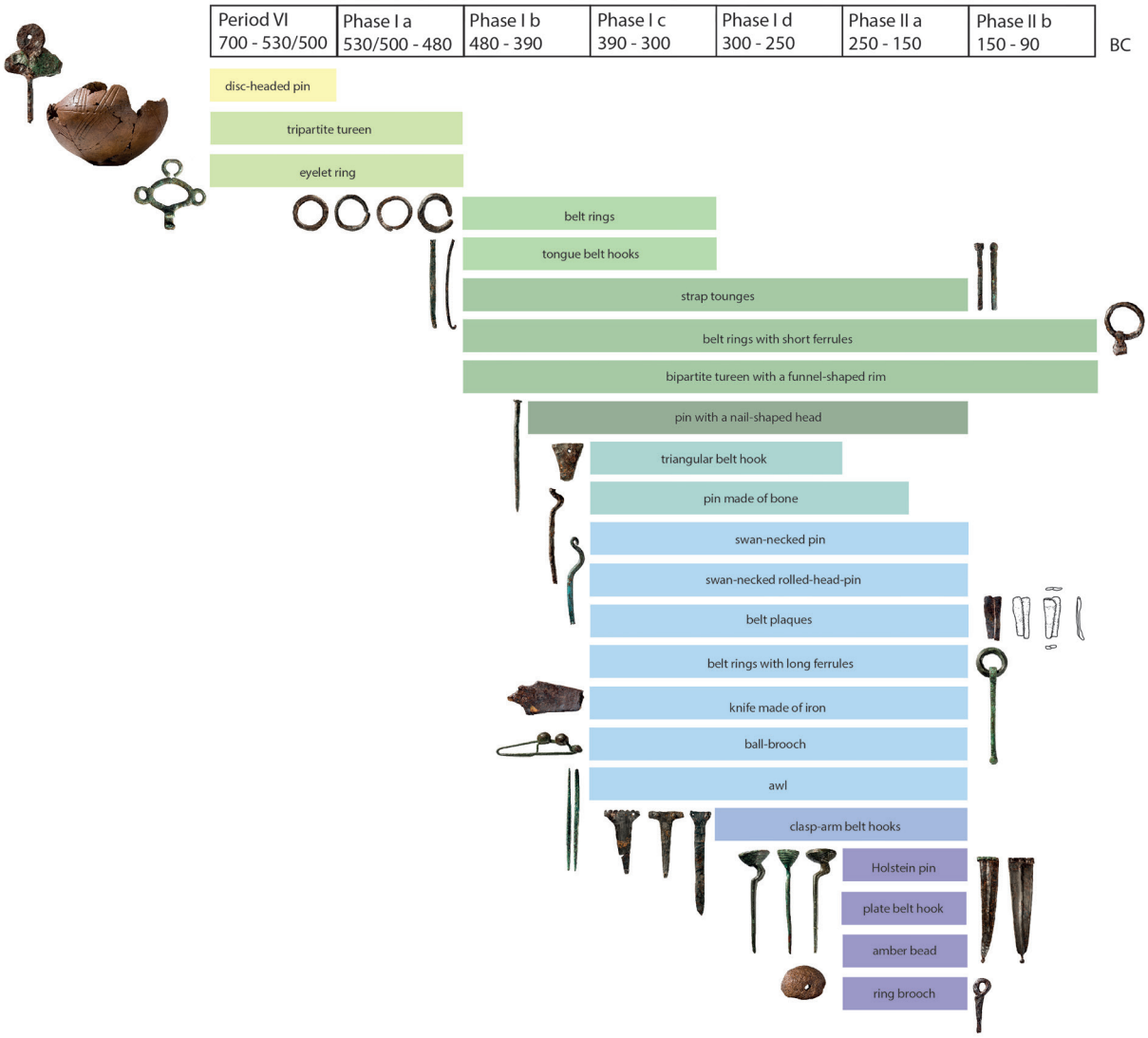

Figure 4. Formal und typological changes in the material during the pre-Roman Iron Age (Graphics: S. Schaefer-Di Maida).

object categories that are occasionally encountered, such as pins, was maintained, although their form underwent modification (for further details, see Kneisel 2021, 21). Moreover, Endrigkeit was able to ascertain comparable developments in the depot finds. The inventory appears to be primarily Wendelringe, pins, metal rings, buttons (horse accessories), and iron objects, while tools were no longer present (Endrigkeit 2010, 76). Consequently, the tradition of depositing 'female' deposits was sustained, a practice that continued into the early Pre-Roman Iron Age (Endrigkeit 2010, 106).

In Phase I a (530/500-480 BC), some of the new forms are retained, but the initial object categories are specific to this phase. For example, eye rings emerge as a notable feature. Moreover, the objects crafted from iron are met for the first time at this point. The material from Phase I a can thus be unambiguously attributed to the beginning of the Pre-Roman Iron Age in terms of form and material evolution. However, at the local level it still exhibits some adherence to Period VI formations. In light of these observations, it can be posited that Phase I a represents a transitional phase between the Bronze and Iron Ages. Phase I b is characterised by the emergence of find categories that can be unambiguously attributed to the Pre-Roman Iron Age, albeit with a discernible residual influence from the Bronze Age. The current spectrum is dominated by belt rings, tongue belt hooks, strap end fittings and nailhead pins. Subsequently, Phase I c marks the advent of a new phase, characterised by the emergence of novel forms. Belt hooks assume a triangular shape, pins are more

frequently cranked, belts are fitted with fittings, and belt rings are equipped with long-shaped ferrules for the first time. Moreover, the ball brooch was introduced. This spectrum persists until the start of Phase II a, which marks the commencement of the fourth and final phase. During this period, clasp-arm belt hooks, Holstein pins, and plate belt hooks emerge as the dominant finds. Furthermore, the number of bimetallic objects also increases significantly with this phase. The distinction between different artefact types is also evident when considering data from a supra-regional perspective. This reveals the emergence of a new pattern in which metal belt hooks and brooches assumed an increasingly prominent role in burial rituals. Conversely, items such as razors and tweezers became less common (Kneisel 2021, 23).

Osteological investigations on cremated bones

The human remains of six urns and one pyre feature were subjected to analysis from the urnfield (Storch 2023). Four female individuals, who died between the ages of 25 and 40, and one male individual, who reached an age of 25 to 60, were identified from the urn graves. Among the female remains, bones displaying the pathological abnormality of Worm's bone were observed, which is likely a simple anatomical variation. The hypervascularisation observed in the male individual may be indicative of inflammatory processes, which could also have been caused by parasitic infection (Storch 2023, 18-20). It is not possible to determine whether this was the cause of death. Five cremations were examined from the pyre (feature no. 286); however, a sex and age identification could not be made due to the preservation of the bone material. Furthermore, the identification of the bones as human or animal remains from the pyre is uncertain, with only one case indicating a probable cremated human (Storch 2023, 20, 44). 30 cremated human remains were identified during the sampling process for dating (in collaboration with Helene Rose, CRC-subproject G1). It is notable that the majority of the deceased were of an adult age at the time of death (Schaefer-Di Maida 2023a, Fig. 35). Only one urn belonged to a child who must have been under the age of six at the time of death. The overall age distribution thus presents a clear picture with a predominance of adult burials, which is in stark contrast to the urn burials of the Late Bronze Age, that showed a significant number of children's graves (Schaefer-Di Maida 2023a, 209-216). It is interesting that the early Iron Age child burial was interred in the barrow area of LA 18, alongside the other children of the Late Bronze Age. It may have been deliberate to situate this child in the vicinity of the older child burials, rather than within the urnfield.

Ditch systems

12 of the urn graves of the urnfield LA 115 were enclosed by a ditch (Figure 5), which typically surrounded one grave or up to eight graves in a ring (e.g. ring ditch no. 184, Figure 6). The dark humus filling of the ditches made them clearly visible during the excavation process. The widths of the ditches measured from 0.2 to 0.7 m, whereas the diameters ranged from 1.8-10 m. The orientation of these graves was always northwards, which Lütjens interpreted as evidence of a deliberate arrangement (Lütjens 2014, 32). Two of the ditches were only partially reconstructable (features 181 and 319). The ditches exhibited a variety of profiles, including trough-shaped, cylindrical, post-like, and irregular. In only one case did the ditch adopt a square shape (Feature 9, Ring Ditch No. 2), while another ditch was rounded-rectangular and ring-shaped (Feature 175, Ring Ditch No. 7). It is not possible to determine the spatial arrangement of the ditches in the cemetery.

The graves situated in the aforementioned ditch no. 7 are not constrained by a specific temporal framework. However, the ditches were used for repeated burials during the Pre-Roman Iron Age. It seems probable that social factors, rather than chronological considerations, were the primary concern in the placement of the graves. The occurrence of ring ditches on Late Bronze Age and Iron Age cemeteries is relatively rare. They are recorded in the district of Pinneberg during the Late Bronze Age (Schmidt 2018, 24-33), in north-eastern Lower Saxony during the Late Bronze Age (Fries and Näth 2008, 167-168),

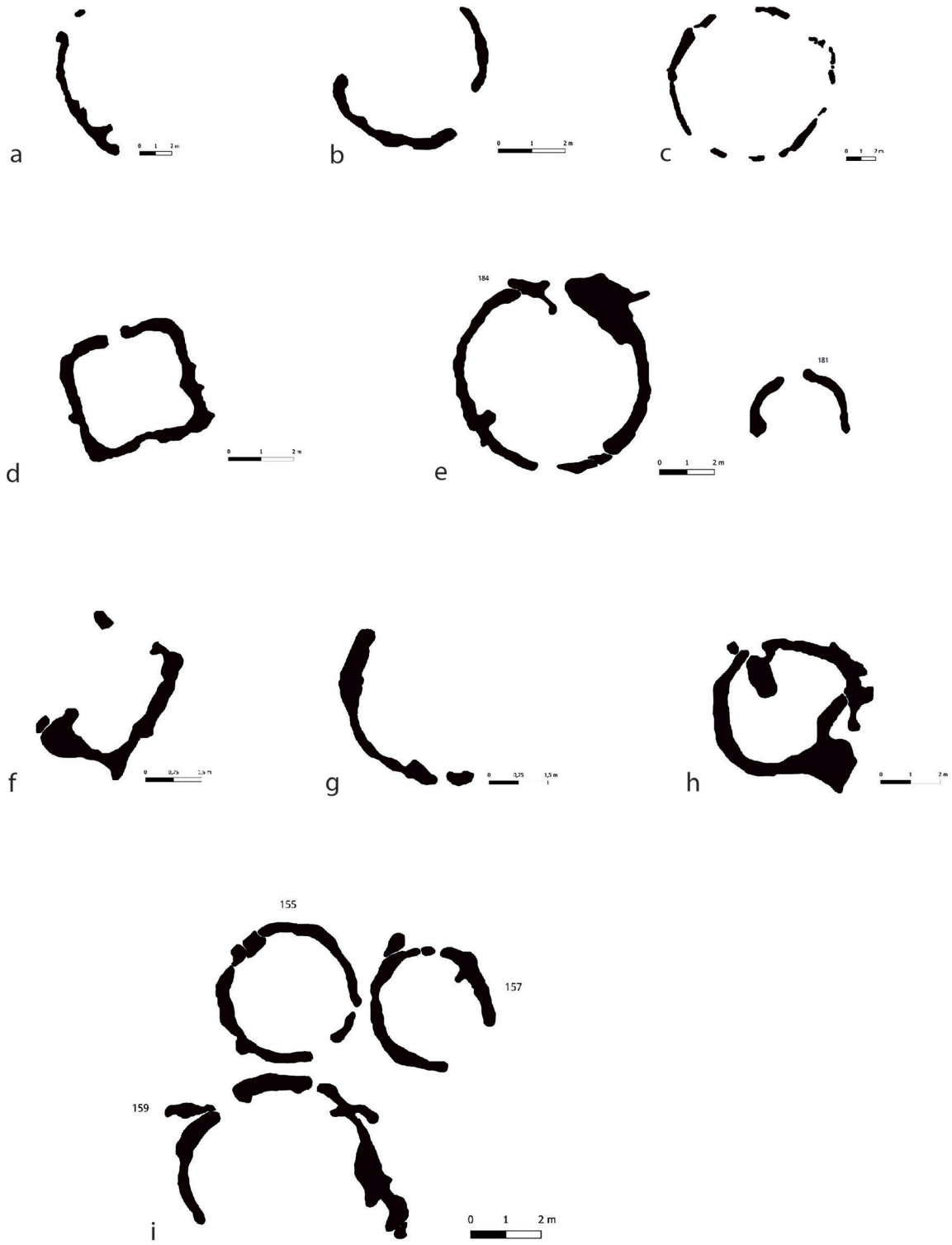

Figure 5. The ditches of the Pre-Roman Iron Age urnfield LA 115 at Mang de Bargen: a - feature 319; b - feature 376; c - feature 32; d - feature 9; e - feature 184 and 181; f - feature 175; g - feature 143; h - feature 257; i - features 155, 157, 159 (Graphics: S. Schaefer-Di Maida).

in Denmark, particularly in South-East Jutland (c. Qvistgaard/Grundvad 2023; Rose and Egelund Poulsen 2023; Rose 2020; Møller et al. 2020; Becker 1961), in the Netherlands, and in Belgium (Beek and Louwen 2012, 48, 50-52; Verlinde 1987, 198-200). They manifest in a wide variety of forms. In Mang de Bargen, the predominant form is a circular ditch with the occasional appearance of a square ditch structure. Keyhole-shaped and rectangular forms have been documented in

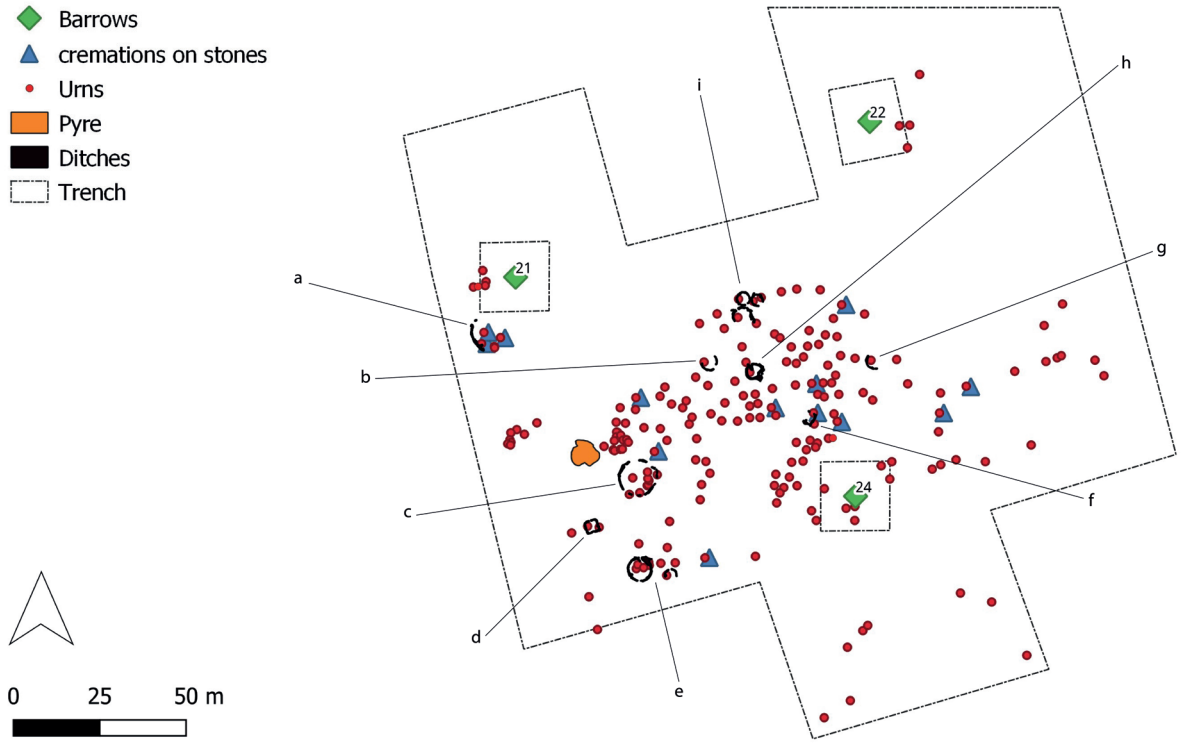

Figure 6. The spatial dirstribution of the features and the identification of the different ditches at the urnfield of LA 115 (Graphics: S. Schaefer-Di Maida).

Overijssel, Netherlands (Verlinde 1987). It can be assumed that multiple burials within such a barrier-like construction are part of a symbolic demarcation or enclosure of social connections, for example familial, hierarchical, or social. At the Groß Timmendorf site, several urns have been discovered beneath stone pavements. It has been demonstrated that the burials did not usually take place at the same time (Fischer 2000, 38), as is also the case at Mang de Bargen. The ditches at Mang de Bargen are analogous to those at Aarupgaard in south-west Jutland, Denmark, from the Pre-Roman Iron Age (500-200 BC). Here, each urn was surrounded with a ditch (Rose 2020; Rose and Poulsen 2023).

Further findings from the cemetery area

Find concentrations

The analysis revealed the presence of cremated remains, pottery, and charcoal at 25 features. These findings suggest that these materials may have been displaced finds or the relocated remains of cremations (Schaefer-Di Maida 2023a, Fig. 36). A significant proportion of the sites yielded evidence of cremated remains, with 28% of the sites displaying concentrations of ceramic material. A smaller proportion of the total number of sites, 16% (4 sites), exhibited both categories of finds. A mere two sites (8%) exhibited solely charcoal concentrations. These features are distributed across the entire excavation area.

Cooking stone pits and stone pits

Three stone pits were distributed evenly across the area, indicating that they were likely constructed recently to collect stones and remove them from the agricultural land. A cooking stone pit was identified in the far west of the trench. It was dug into the in-situ soil and composed of heat-crushed stones. A date cannot be assigned due to the absence of finds, but cooking stone pits dating to the Bronze Age are known from the cemetery and the surrounding area (Schaefer-Di Maida 2022).

Pyre

In the western section of the excavated area, a layer of burnt earth measuring 5 × 6 m was uncovered. This layer was 20-25 centimetres thick and comprised charcoal, heat-crushed stones, calcined bones, and pottery sherds. The layer exhibited an amorphous to slightly rounded shape, while its profile was bowl- to trough-shaped with an irregular base, which had been cut into the in-situ soil (Schaefer-Di Maida 2023b, plate 266). In the excavation report, Burkhardt posits that the feature is the remainder of a pyre, a hypothesis that seems highly plausible given the presence of multiple burnt layers and a considerable quantity of cremated human remains, in addition to objects that could be interpreted as ritual remains (e.g., scattered ceramic vessels). The cremation layer contained a considerable number of Iron Age sherds without any evidence of secondary firing and could therefore only have been deposited there subsequent to firing activities. The pottery assemblage comprises the remains of funnel-rim vessels, which may have been profiled in two or three sections. Such vessels are characteristically thin-walled with multiple handles leading Burkhardt to hypothesise that they were of a settlement pottery variety. Nevertheless, the possibility of its use as grave pottery cannot be discounted. The sherds do not permit a more precise dating than Pre-Roman Iron Age. The broken vessel indicates either that communal activities took place at the same site following a cremation process or that grave pottery was shattered (the intention behind this act is unclear). The cremated remains and pottery sherds originate from the same stratum, and no stratigraphic boundaries are evident. This eliminates the possibility of the cremation site undergoing a transition from pyre to waste disposal area. Instead, the site may have served as a location for the cremation of the deceased and for communal activities, or it may have been used exclusively for the deposition of cremated remains in urns. The presence of animal bones within the feature may also be explained by communal activities (Storch 2023). The cremation site was surrounded by six postholes, four of which were located to the north and two to the south. The distribution of the posts is highly irregular, suggesting the possibility of a unique roof construction, such as a slanted roof, or even a post position without a roofing structure. This could have served a functional purpose in relation to the ustrine.

Other finds

The area of the urnfield yielded several postholes and hearths, yet no stratigraphic connections were discerned. Six pits, which were distributed across the area in a seemingly haphazard manner, were excavated. One of the pits was oval in shape and exhibited a trough-like profile. The pit was situated within a ring ditch between the urns of features 39 and 192, and it is possible that it was associated with those burials. If so, a date for the pit can be assigned to the Pre-Roman Iron Age, although the purpose of the pit remains uncertain.

Pollen analysis

From the middle of the Bronze Age Period V (900-700 BC) until the beginning of the Iron Age with Phase I a (530/500-480 BC), a phase of increased forest clearance (*c.* between 750 and 450 BC) is discernible at the Mang de Bargen site. While the number of lime trees (*Tilia*) declines, the pollen profile indicates an increase in beech trees (*Fagus*). The notable reshaping of the local wetland and bog vegetation indicates a change in the hydrological regime. Feeser (2023) states that the increased forest clearance may have resulted in an uptick in groundwater levels. At the cemetery at Mang de Bargen relatively few burials are recorded during this period. Moreover, significant alterations in the grave goods are observed in the periods preceding and succeeding 700 BC, as well as 500 BC. From the outset of the Iron Age, Phase I to Phase II a (450-200 BC), there was a notable decline in soil erosion and the spread of lime (*Tilia*). Conversely, there is an increase in the presence of dung fungus spores (*Sporomiella* and *Podospora*). In general, the evidence suggests that soil depletion and the spread of broom heather (*Calluna vulgaris*) occurred during this phase. This may have been linked to hydrological changes or a change in land use, for example more grazing.

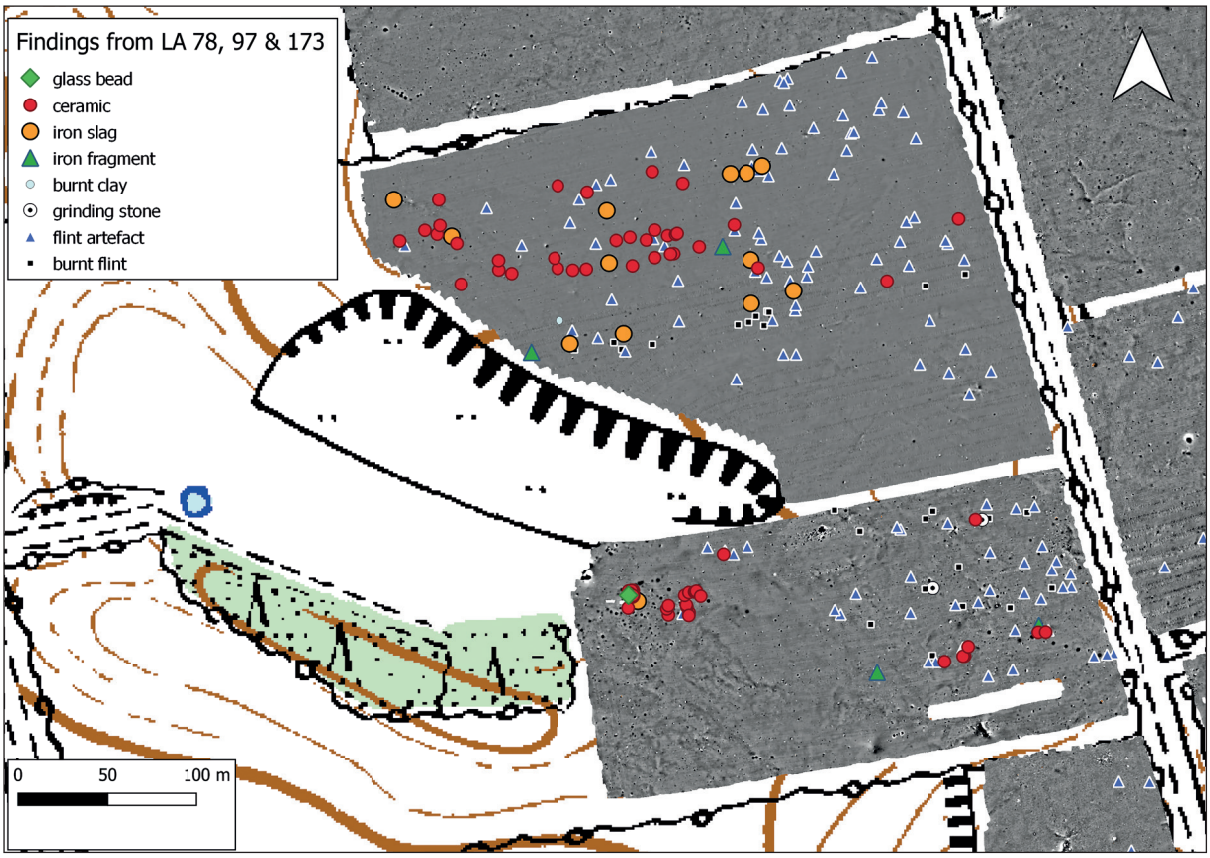

Figure 7. Pre-Roman Iron Age activities near the cemetery of Mang de Bargen (Graphics: S. Schaefer-Di Maida).

At the site, the number of burials increases at this time, initially at a gradual rate and subsequently at a more rapid pace. Moreover, a Pre-Roman Iron Age settlement site (LA 97) is located to the north-northwest of the cemetery (approximately 750 meters as the crow flies, see Figure 1 and 7). This suggests that the use of the area increased during this phase.

The final phase is dated to circa 200 BC, marking the beginning of Phase II a of the Pre-Roman Iron Age. This period is characterised by an elevated burial intensity at the urnfield site, though this subsequently declines slightly. The pollen profile indicates the start of rye (*Secale*) cultivation, which initially emerged as a weed in the crop spectrum. Given that rye is able to thrive in poor soil conditions and under unfavourable climatic circumstances, it is probable that it was particularly well suited to the region when environmental change occurred. Feeser (2023) suggests that its cultivation may be interpreted as a potential response to soil depletion, a phenomenon also observed at other sites in north-west Germany during this period (Behre 1992, 243). Moreover, the cultivation of rye also facilitated the harvesting of particularly long straw, which could then be employed for animal husbandry (e.g. horses) and roofing (Willerding 2006, 617). This suggests potential changes in house construction as well as the keeping and care of animals.

There is a shift in the non-tree pollen spectrum, with an increase in cruciferous plants (*Brassicaceae*) and a notable prevalence of field thistle (*Spergula avensis*), bird's knotweed (*Polygonum aviculare*), and fleabane (*Persicaria maculosa*). Additionally, the occurrence of ribwort plantain (*Plantago lanceolata*) has increased considerably, which can be used as an indicator for open landscapes and settlement activities.

Summing up: The advent of the Iron Age, along with the subsequent phases of change, is not only discernible in the archaeological evidence but also in the environmental data. Consequently, the emergence of new cultural influences has resulted in the documentation of novel subsistence strategies that may have been precipitated by hydrological processes of change.

Local and regional developments during the Iron Age

As mentioned above, there are Iron Age settlement features 750 m to the NNW of the Mang de Bargen site (see Figure 1 and 7, with site LA 97). In 2017, an initial surface inspection yielded a considerable number of finds, including pottery and slag. Moreover, a modest area containing urns from the Late Bronze Age/Pre-Roman Iron Age was unearthed in the surrounding area, situated approximately 450 metres to the north-west of the site (see Figure 1, LA 78). To the west, a cooking stone pit from the Bronze Age was excavated; it was covered by a cultural layer from the Pre-Roman Iron Age comprising several stone pavings. The discovery of ceramic sherds, slag remains, iron finds, and a green glass bead in this area indicates the presence of further parallel activities in the vicinity of the cemetery (Figure 1 and 7; Schaefer-Di Maida 2023a, 49-51, fig. 15, fig. 40).

In the southern area, in close proximity to the cooking stone pits, two slag pits and the remnants of a smelting furnace were unearthed. Further slag pits were identified at a distance of approximately 150 metres to the north of the Mang de Bargen cemetery. These were arranged in a relatively linear formation comprising approximately 20 pits, with some occurrences of three pits in close proximity. This indicates that the surrounding area was utilised concurrently with the burial activities within the cemetery, and that the iron grave goods from the graves were likely produced locally. The dating of the slag pits is still pending. Nevertheless, the slag pits may provide insight into the precise moment when iron was extracted on the site, potentially marking a pivotal shift in the society's dependence on raw materials and finished products from other regions. At present, the available data on the Schleswig-Holstein settlements are insufficient to permit an evaluation of whether this transformation was also expressed in other aspects of society. However, the transformations in the supra-regional form and material development of the finds illuminate a considerably transformative and complex phase (Schmidt 1993, 146-148). The Mang de Bargen site thus represents a significant contribution to the field of Iron Age research, offering insights into the complexity of this particular region.

Pre-Roman Iron Age Transformations

A notable rise in burial activity can be observed at the beginning of the Pre-Roman Iron Age, with a particular concentration in the urnfield LA 115. Conversely, no further secondary burials are identified in the Bronze Age barrow areas at this juncture. Two secondarily buried urns at barrow LA 18 (features 64, 76) could be dated to Phases I a and I b. The transition between Phases I a and I b is characterised by a change in the range of grave goods including various pins, eye rings and, from Phase I b onwards, mainly belt parts. The majority of the objects were crafted from iron, even though bronze objects were also observed. Bimetallic objects are primarily identified in Phase II a. However, as Fischer (2000, 111) notes, the presence of iron does not necessarily signify a transition to a new cultural phase, as it was already utilized in certain regions of Schleswig-Holstein prior to this period. Nevertheless, slag pits from the immediate vicinity indicate the presence of local iron extraction, the absolute dating of which is still pending. It may be posited that the start of new grave goods was concomitant with the emergence of local iron production, which could account for the pronounced shifts in material culture. The evidence from the Mang de Bargen site is of great significance in this regard, as it demonstrates a distinct autonomy in metal production, thereby introducing new dynamics into the social structure. The introduction of iron smelting and processing introduces a multitude of novel labour sectors, cooperative patterns, social domains, and organisational structures that did not previously exist. The complex patterns of change evident in the grave goods could thus be interpreted as evidence of various social changes and social structures. Of particular significance is the grave placements in conjunction with ditches, as they may serve to accentuate the nuances of group dynamics and social stratifications that may have existed not only in the afterlife but also in the realm of daily life. Although the construction of Iron Age graves for urn burial did not differ from that of Late Bronze Age examples, their surrounding by ring ditches could indicate a shift from the relatively uniform structures of the Late Bronze Age to the emergence of stratified social formations. It is

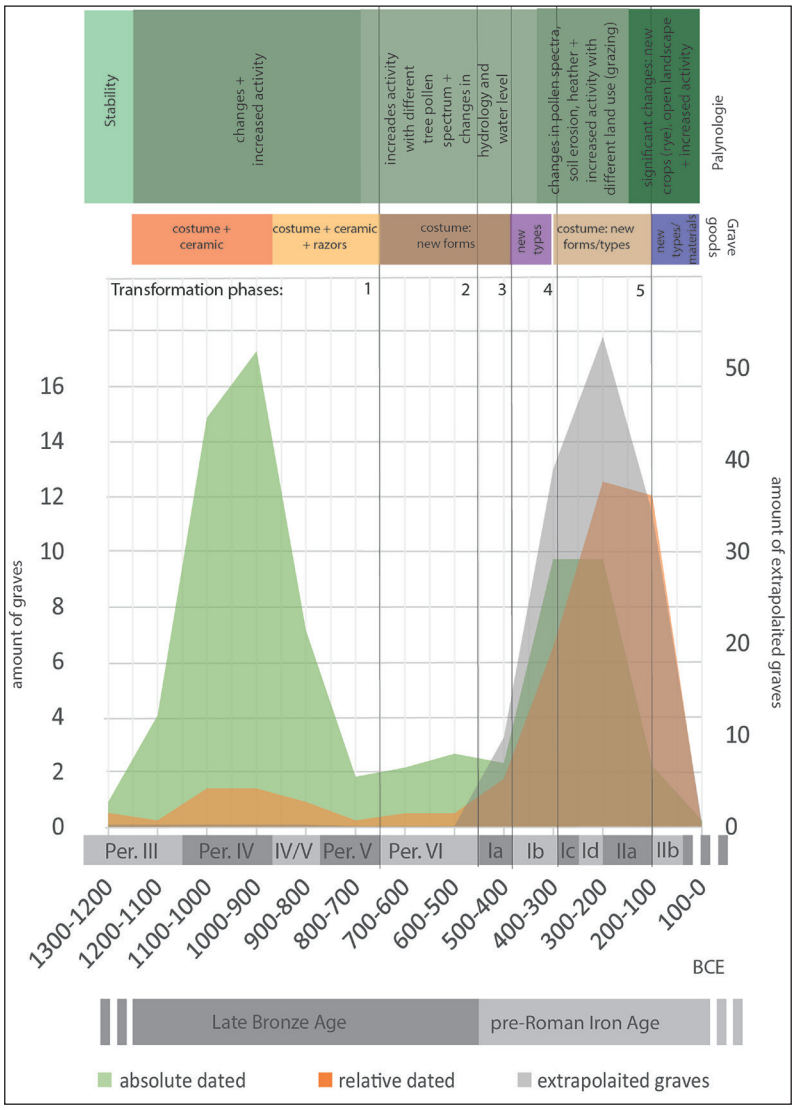

Figure 8. Human-environmental transformations at the cemetery of Mang de Bargen (Graphics: S. Schaefer-Di Maida).

possible that these ditches represented symbolic demarcations or enclosures of social connections, such as familial, hierarchical, or social.

Metal grave goods from the Pre-Roman Iron Age are more frequently thermally deformed, suggesting that they were frequently exposed to fire during cremation. Consequently, they may be classified as 'pyre goods' (Hofmann 2008, 158). Moreover, the Iron Age has yielded evidence of a pyre site containing a multitude of bones, which are presumed to originate from a variety of firing processes. In contrast, the Late Bronze Age lacks evidence of substantial bone deposits in pyre-like areas. Consequently, the start of the Iron Age is marked by a discernible shift in the manner of cremated remains collection and their deposition in urns. It seems plausible that the practice of cremation became more prevalent and perhaps even institutionalised during the Iron Age, as shown by the presence of post-cremation constructions around the pyre at the site. Conversely, the completeness of the cremated remains may have become less of a priority when deposited in the urns. It is, however, not possible to exclude the possibility that the cremated remains underwent further phases of body treatment prior to being deposited in the urn. Consequently, the process preceding burial may have become more complex with parts of the cremated remains being removed, used elsewhere or deposited.

In conclusion, four principal phases of transformation can be identified at Mang de Bargen and in the surrounding area (Figure 8):

1) The transition to the Pre-Roman Iron Age between 700 and 480 BC saw no significant change in the material spectrum, indicating a gradual transition also observed on other cemeteries in Schleswig-Holstein (Fischer 2000, 111; Hofmann 2008, 477). This is exemplified particularly in Phase I a, where the new

forms of Period VI are still present, but the initial new forms emerge, thus marking the transition to the Pre-Roman Iron Age. This is followed by further developments in shape and find categories, which unfold in a sequence of three subsequent phases. Between 700 and 530/500 BC, the level of burial activity is initially low, and the first changes can be observed in the pollen distribution, which are particularly indicative of hydrological changes and are accompanied by a change in tree pollen.

2) In the period between 480 and 390 BC, new forms with an Iron Age character became increasingly prevalent in the archaeological material. The number of burials increases markedly during this phase, and parallel to this, there are clear changes in the pollen composition. These indicate hydrological changes, grazing and a different land use with more grazing, as well as a general increase in activity. It is probable that these changes are connected to the smelting furnaces, slag pits and settlement finds in the area.
3) Between 390 and 150 BC, the extensive land-use activities persist, while new forms in the material emerge. It seems plausible that the potential increase in autonomy within the iron production process may have been a contributing factor in the diversification of forms observed in the region.
4) From 150 BC onwards, new forms and find types emerge once more, while others lose significance. The production of bimetallic objects is on the rise, which in turn indicates the existence of distant sources of raw materials. The cultivation of rye also demonstrates a transfer of knowledge. The number of burials at the site has increased markedly. This activity is also reflected in the pollen spectrum, indicating a significant level of settlement activity in open landscapes.

In conclusion, it can be stated that the settlement and land use activities increased significantly during the Pre-Roman Iron Age. The finds and features not only reflect new cultural influences but also, it may be presumed, social changes.

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Declaration of interests

No conflicts of interest are known by the author in relation to the material addressed in this manuscript.

Notes

1 In the chronological terminology of Schleswig-Holstein, the division into the Older Bronze Age and Younger Bronze Age is in use. However, this corresponds to the same absolute chronological classification into the Early and Late Bronze Age as that used in this paper.

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