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Typology and function of Late Bronze Age and Early Iron Age cremation graves – a micro-regional case study

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In Denmark, there has been little focus on characteristic differences between grave types from the transition period between the Late Bronze Age and the Early Iron Age with limited elaboration on the nature of the differences and on chronological variation. In nearby Scania, Sweden, a grave type classic for Southern Scandinavia, the 'cremation pit', has been interpreted as *in situ* remains of the actual cremation pyre, that is, a form of *bustum*. Here, we further explore this interpretation through both osteological and archaeological analyses of recently excavated graves from the Fraugde region on northern Funen, Denmark. In the Fraugde region, pyre debris in cremation graves clearly gain significance during the transition period from the Bronze Age towards the Pre-Roman Iron Age. The exclusive presence of cremation pits on the Pre-Roman Iron Age grave sites in contrast to the varied grave types present on the Bronze Age sites implies a change in cremation practice and technology during the transition period. Although clearly commemorated and left undisturbed for centuries, the cremation pits on the pre-Roman Iron Age sites must be interpreted as intentional, secondary deposits of the debris from the cremation pyre, but not as *in situ* pyre sites.

Keywords: cremation graves; grave typology; cremated bone; Late Bronze Age; Pre-Roman Iron Age; cremation pit

Introduction

Archaeologists face many challenges of interpretation linked to the classification of archaeological contexts. If we wish to understand the complexity of cremation practices and improve the methods we employ in the study of the many stages involved in past cremation ceremonies, we need to tackle and discern between intentional ritual technology and taphonomic processes. We further need to theorize and explore the varied and contrasting uses of 'fire' in the production of mortuary contexts. Although cremation graves vary in appearance, and also often in degree of preservation or 'intactness', they usually have the presence of cremated human bone in common. Nevertheless, we need to distinguish between what is a grave, that is, a place for a burial, and what is a burial, that is, the evidence of placing one or more dead bodies in a grave (the act of burial) (see, for example, Ericsson and Runcis 1995)[1]. This case study seeks to eliminate differences in osteoarchaeological results gained from various types of cremation graves and related archaeological features using data from the transition period between the Late Bronze Age and the Early Iron Age in the Fraugde region on northeastern Funen, Denmark.

In Scania, southern Sweden, grave sites hitherto interpreted as typical examples of transitional graves from the Late Bronze Age urn grave tradition towards the simple Early Iron Age cremation pit, have been interpreted as sites representing simultaneous phenomena with separate functions. Based on both similar ^{14}C-dates and osteoarchaeological interpretations, the graves of the urn grave tradition are interpreted as actual graves, whereas the cremation pits are seen as *in situ* remains of the associated cremation pyre, or, in particular, as a draught-creating pits similar to the roman *bustum* graves (see under Terminology). The combination of the two, the urn cremation pit, is suggested to represent an individual grave, cut into the associated pyre site (Lindahl Jensen 2004, Arcini 2005, 67ff., Arcini and Svanberg 2005, 323ff.).

These suggestions are a valid and much appreciated contribution to the debate on the interpretation of these archaeological features, which are found with similar characteristics in large areas of southern Scandinavia during the transition period and in the Early Iron Age (e.g., Vedel 1870, Albrectsen 1954, 1973, Klindt-Jensen 1957, Becker 1961, 128ff., 1990, Hansen 1975, Thrane 1984, 2004, Lind 1991, Jensen 1997, Hornstrup 1999, Ejstrud and Jensen 2000, Edring 2004, Arcini 2005, Arcini and Svanberg 2005, Feldt 2005, Fendin 2005, Frisberg 2005, Hornstrup *et al.* 2005, Widholm 2006, Therkelsen 2011, Clemmensen 2013, Kristensen 2013, Runge 2013, Mikkelsen 2013a). However, experimental studies reveal that further elaboration on this matter is needed. We can definitely rule out *in situ* cremation, which first and foremost would result in clearly visible burnt sides of the cut

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(e.g., Dodwell 2010, Marshall 2011, 36), which is not documented for cremation pits in the Bronze Age or earliest Iron Age in southern Scandinavia (Klindt-Jensen 1957, 46, Thrane 1984, 78, Henriksen 1993, 105). Second, *in situ* cremation would result in an identifiable stratigraphy reflecting the pyre settling gradually in the pit during the course of the fire. Lastly, only a very shallow pit is needed for creating draught, and expanding the cut does not increase the draught effect (Henriksen 1993, 2009, 83 and 102). Simple stratigraphic observations of Danish urn cremation pits and cremation pits further reveal that there is little or no difference in sequence between the cut and the placing of the urn or other artefacts. Hence, they were constructed in one single action, indicating that the pyre was originally located elsewhere and 'poured' as relatively cooled debris into the pits (Hornstrup *et al.* 2005, Runge 2010). Furthermore, although well preserved, there is rarely pyre debris corresponding to the remains of an entire cremation pyre, particularly for the Late Bronze Age cremation pits (e.g., Runge 2010, 24–25). In addition, the many Bronze Age pyre constructions excavated hitherto in southern Scandinavia are extremely varied and have very different dimensions and appearances than typical cremation pits. For example, the exceptionally preserved three-pole constructions excavated in southern Funen (Thrane 2004, 227, 237, 242, 275) and other examples of pyre constructions from the periods in question, which have markedly different characteristics (see Klindt-Jensen 1957, 46ff., 209ff., Henriksen 1991, 52ff., Olsen and Bech 1996, 171ff., Andersson 1997, Arcini 2005, 67–68). Hence, although the pyres may well have been located right next to the pit in the Bronze Age, which is known from both Pre-Roman and Roman Iron Age sites in Scandinavia and northern Germany (Lind 1991, Henriksen 2009, 84–85), they were not located exactly in or on top of the pits. In addition, there are several indications in Danish archaeology of a chronological difference between urn graves and the majority of the cremation pits. Although they clearly overlap chronologically, cremation pits are the typical archaeological remains of cremations found in several early Pre-Roman Iron Age sites in Denmark (e.g., Broholm 1949, 97ff., 100, Albrectsen 1954, 1971, 1973, Klindt-Jensen 1957, 44–45, Becker 1961, 181, 191, 1990, 68ff., Thrane 1984, 131, Lind 1991, 26, Ejstrud and Jensen 2000, 18, Hornstrup *et al.* 2005, Henriksen 2009, 72–73, 89, Runge 2010). Unfortunately ^{14}C-dates from this period fall into the so-called Hallstatt plateau, resulting in calibrated dates notoriously lying between 800 BC and 400 BC despite accuracy in sampling and measurement precision (see, for instance, van der Plicht 2004).

To osteologically confirm parts of the Swedish theory, it would therefore require an individual bone match (a positive refitting of bone fragments) between a given urn grave and a cremation pit within a site, which in anyway would be an extremely lucky coincidence. In contrast, the absence of such a match would not prove the opposite (see also Arcini and Svanberg 2005, 327). Also, if the classic cremation pit truly represents the cremation pyre alone, where are then the associated burials[1] on all the sites that exclusively contain cremation pits?

To follow up on these discussions, the above-mentioned hypothesis about the various functions and chronological aspects of the cremation grave types is evaluated. Several osteological parameters are interpreted in combination with grave typology.

Terminology

To discuss functional aspects of prehistoric cremation graves and related archaeological features, terminology of excavated structures containing cremated bones are crucial. In 1980, Tillmann Bechert discussed the phenomena *Bustum* and *Ustrinum*, known from roman literary sources and which archaeological traces they left behind (Bechert 1980, 254ff.). *Bustum* (comb-ustum) is a grave where the deceased is both cremated and buried, whereas *Ustrinum* (ustum) is a cremation spot without grave function. Despite the functional difference, *ustrina* can, in praxis, both contain cremated human remains, ceramics and other artefacts and thus, in principle, be easily confused with various other types of cremation pits and urn graves. In the following, the typical archaeological features from the periods in question, often determined 'graves' and 'pyre remains', are described. The below listed typology follow definitions of M. B. Henriksen (2009), originally based on N. F. B. Sehested (1878) and E. Albrectsen (1971). To embrace possible variations of these within the Late Bronze Age and Pre-Roman Iron Age, the types are correlated with definitions in recent publications (Lindahl Jensen 2004, Arcini 2005, Arcini and Svanberg 2005, 323ff., Hornstrup *et al.* 2005, Henriksen 2009, Wangen 2009, Runge 2010, Therkelsen 2011, 175ff.).

Stone-set cremation graves and similar differentiating features

Many cremation graves, particularly in Periods III and IV[2], are symbolically similar to the inhumation burials of the previous periods (e.g., Broholm 1949, 13ff., Brøndsted 1966, 156–257, Aner and Kersten 1973, no. 1548A, Thrane 1984, 45–46, 57, 2004, 163, Ille 1991, 111–127, Feveile and Bennike 2002, 120, 127, Arcini and Svanberg 2005, 339). The graves may be of human length, stone set, in stone cists or similar outer grave constructions, containing sorted remains from the cremation pyre such as cremated human remains, animal bone, artefacts or other personal belongings, either spread randomly in the grave

fill or neatly placed. There is, however, a marked variation within these early cremation graves, which reflect local traditions rather than being chronologically significant (see, for instance, Olsen and Bech 1996, Feveile and Bennike 2002, Goldhahn 2012).

Urn grave

The typical urn grave consists of a container of inorganic material (often a ceramic vessel) cut into the ground, containing sorted remains from the cremation pyre such as cremated human remains, animal bone, artefacts or other personal belongings, which may or may not have been with the deceased on the cremation pyre (Henriksen 2009, 68–69). During the Late Bronze Age, particularly in Periods IV and V, artefacts were primarily added to the burial after the cremation process, that is, as grave goods[3]. The urn grave is known as early as Period II of the Danish Bronze Age (Olsen 1992). Outer grave markings such as stone packing, stone cists, wooden cists and similar additional constructions are often associated with Bronze Age urn graves (Figure 1).

Bone layer grave

As in urn graves, cremated remains in bone layer graves are deliberately sorted out from the pyre, to be placed in a pit, occasionally associated with artefacts[2]. Bone layer graves seemingly represent grave content wrapped up or placed in organic material (e.g., an organic urn), and are therefore closely linked to the urn graves (Henriksen 2009, 69). Bone layer graves exist with or without a layer from the cremation pyre (pyre debris). Each version is closely linked to either the regular urn grave or the urn cremation pit (see below). Bone layer graves are known from Period III of the Bronze Age, yet becomes more common towards the end of the Bronze Age (Feveile and Bennike 2002, Hornstrup *et al.* 2005, 87ff., Runge 2010) (Figure 2).

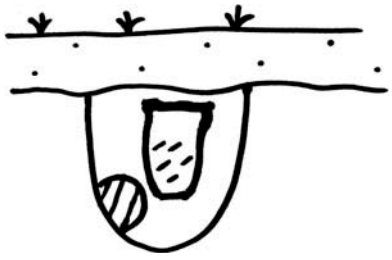

Figure 1. A simple sketch of the urn grave and its elements.
Legend: / cremated bone Θ stone · · plough soil.

Urn cremation pit

The urn cremation pit is clearly a category in between a regular urn grave and a cremation pit/patch, containing remains of the cremation pyre, and possibly cremated remains both inside and outside the container (Henriksen 2009, 70–71). The type appears sporadically from Period V of the Bronze Age in Denmark, but becomes common towards the Pre-Roman Iron Age in several Danish regions (see, for instance, Hornstrup *et al.* 2005, 887, Mortensen 2010) (Figure 3).

Cremation pit/patch

The cremation pit is defined as a cut in the ground containing remains of the cremation pyre, amongst other cremated remains. The difference between the cremation pit and the cremation patch is defined differently in practically all publications, but is generally the size and shape of the cut (e.g., Ejstrud and Jensen 2000, 18, Wangen 2009). The features are otherwise fairly similar in their content and are therefore described together here. The filling is often pitch-black with pieces of charcoal or heat-altered (often clearly burnt and destroyed) artefacts[3] from the cremation pyre. The cremation pit usually contains less cremated bone than other grave types. The function has

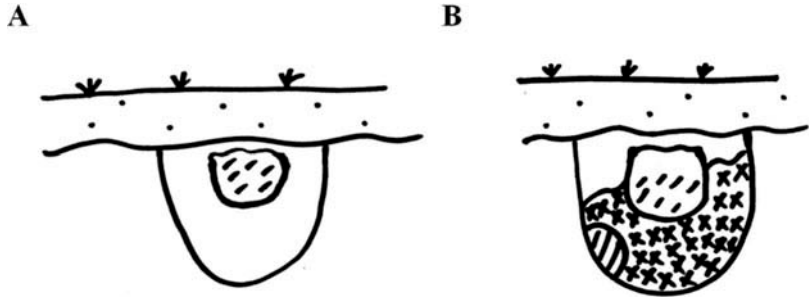

Figure 2. A sketch of the two types of bone layer graves and their elements. (A) the regular bone layer grave and (B) bone layer grave with cremation layer (pyre debris).
Legend: / cremated bone Θ stone · · plough soil x charcoal.

Figure 3. A sketch of the urn cremation pit and its elements.
Legend: / cremated bone ϴ stone · · plough soil x charcoal.

often been interpreted as part of the construction of the actual cremation pyre (*bustum*) (e.g., Madsen 1990, 36–37, Lindahl Jensen 2004, Arcini 2005, Dodwell 2010). The cremation pit is distinct from other archaeological evidences of cremation pyres by the actual cut in the ground, and not merely traces on the original surface (see, for instance, Madsen and Thrane 1992, Thrane 2004, 220ff., Henriksen 2009, 69–70). Besides examples of similar features in Stone Age contexts, cremation pits are known in a few examples from Period III of the Bronze Age in Denmark (e.g., Feveile and Bennike 2002, 122), and appears more frequently in Periods IV and V in the rest of southern Scandinavia (Stjernquist 1961, Thrane 1984, Edring 2004, 91, Runge 2013). Cremated remains from cremation pits or patches are often difficult to determine as of definite human origin (e.g., Arcini and Svanberg 2005, 326–327) (Figure 4).

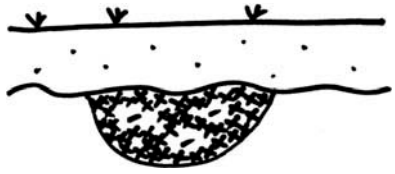

Figure 4. A sketch of cremation pit and its elements.
Legend: / cremated bone · · plough soil x charcoal.

Grave typology in the Late Bronze Age and Early Iron Age

In summary, many types of cremation graves[1] and cremation-related features exist in Late Bronze Age and Early Iron Age Denmark. In Table 1, the different types are described with common interpretations of their functions and representation.

Material

Late Bronze Age and Pre-Roman Iron Age cremation grave sites from the island of Funen, Denmark, are chosen as primary material for this case study because of their unique status as a totally excavated cultural landscape revealing the development of the mortuary landscape from the Bronze Age towards the Early Iron Age. Furthermore, each of the sites is recently excavated (2001–2008), and uniformly registered and sampled. The material comprises 137 graves from 7 sites; 1. ØSTRE BOULEVARD III (OBM 8441), 2. KILDEHUSE II (OBM 8414) and KRISTIANSMINDE NORD (OBM 8429), 3. KROGSGÅRD (OBM 8698), 4. SKOVLUND

Table 1. Types of cremation graves and cremation-related features known from Late Bronze Age and Pre-Roman Iron Age grave sites in Scandinavia. Definitions and descriptions are in consideration of other recent publications on the subject (Lindahl Jensen 2004, Arcini 2005, Arcini and Svanberg 2005, 323 ff., Hornstrup *et al.* 2005, Henriksen 2009, Wangen 2009, Runge 2010, Therkelsen 2011, 175 ff.). * Urn cremation pits occur much earlier in southern Jutland and northern Germany; however, these are chronologically and typologically different from the typical Bronze Age and Early Iron Age cremation pit discussed here. * Bone layer graves with pyre remains may be more common, but have only been published as such in a few cases (e.g., Hornstrup *et al.* 2005:87–88).

Type	Description	Main contents	Burial?	Periods	Representation
Early stone-set cremation grave	Highly varied cremation graves, e.g., cists or stone-set.	* Cremated human bone * Artefacts (grave goods)[2]	Yes	II–IV	Individual grave
Urn grave	Urn grave	* Cremated human bone * Artefacts (grave goods)	Yes	From Period II onwards	Individual grave
Bone layer grave	Similar to the urn grave, yet with organic container or no protection of the bones	* Cremated human bone * Artefacts (grave goods)	Yes	All	Individual grave
Urn cremation pit	Urn grave + pyre debris	* Cremated human bone * Artefacts (grave goods) * Pyre debris	Yes	From Period V* onwards	Individual grave + pyre debris
Bone layer grave with pyre debris	Urn grave (organic container) + pyre debris	* Cremated human bone * Artefacts (grave goods) * Pyre debris	Yes	Few from Period V*	Individual grave + pyre debris
Cremation pit/patch	Pyre debris in pit with few skeletal remains	* (Cremated bone) * Artefacts (pyre goods) [2]* Pyre debris	?	(BA III/IV) – PRIA III	Pyre debris?

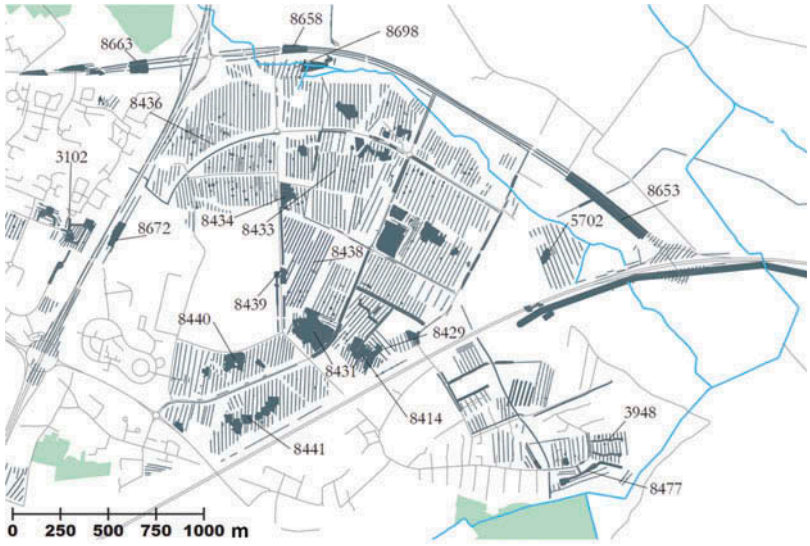

Figure 5. Map showing the location of the sites mentioned in the text.

(OBM 8658), 5. TIETGENBYEN NORDVEST (OBM 8433), 6. ENGBLOMMEN/FRAUGDE ØST (OBM 8477) and 7. KOHAVE SYD (OBM 8663) (see also Runge 2010, 102ff., 2013; and Figure 5).

Cremated remains were preserved in only 96 (71%) of these graves with a clear difference between the Bronze and Iron Ages; From the two Late Bronze Age sites, 56 out of 59 graves (95%) contained cremated bone, whereas only 39 out of 78 graves (51%) from the Pre-Roman Iron Age sites did – all cremation pits or undefined grave types (see Table 2).

Graves without cremated bone were only defined as graves because of striking similarity with other graves on the respective sites, horizontal stratigraphy and/or the presence of urn fragments or grave/pyre goods in the content (see also Runge 2010). For the Bronze Age cremation graves, there was a natural relation between the intactness of the individual grave contexts and the amount of cremated bone recovered (see also Runge 2010, 180–265, Harvig and Lynnerup 2013, 2717–2718, and Figure 6).

However, on the Pre-Roman Iron Age sites, there was no correlation between the intactness of the individual grave contexts and the amount of cremated bone recovered, with the highest amount of cremated bone weighing only 590 g, despite the presence of several intact grave structures within the individual grave sites (Figure 7).

Chronologically, the sites cover the transition period from the Early Bronze Age towards the Late Bronze Age, where cremations begin to outnumber inhumations, particularly the transition period between the Late Bronze Age and the Pre-Roman Iron Age. The grave sites all represent the common way of burying the dead in the Late Bronze Age and the Early Iron Age on Funen (e.g., Albrectsen 1954, 1973, Thrane 2004, Therkelsen 2011, Runge 2013), but the grave types represented on the analysed sites are

Table 2. Characteristics of the seven sites in the Fraugde area. Abbreviations used are LBA for Late Bronze Age and PRIA for Pre-Roman Iron Age. In all, 4 cremation pits at Skovlund (OBM 8658) cremated bone fragments were observed during excavation. These were, however, not preserved after excavation.

Site *(abbreviated)*	ØB III	K II	KRG	SKL	TGB NV	ENGB	KHV S	Total
OBM number	**8441**	**8414**	**8698**	**8658**	**8433**	**8477**	**8663**	
Primary dates	*LBA III/IV*	*LBA VI*	*PRIA (early)*	*PRIA per. II*	*PRIA per. II*	*PRIA per. IIIa*	*PRIA (late)*	
Number of graves	**19**	**40**	**41**	**4**	**13**	**7**	**13**	**137**
Graves with cremated bone	**19**	**37**	**16**	**1**	**6**	**6**	**11**	**96**
Inhumation-like graves	1	–	–	–	–	–	–	1
Urn graves	14	4	–	–	–	–	–	18
Bone layer graves	–	4	–	–	–	–	–	4
Urn cremations pits	–	21	2	–	–	–	–	23
Cremation pits	4	8	14	4	6	6	11	54
Uncertain cremation graves	–	3	25	–	7	1	2	38

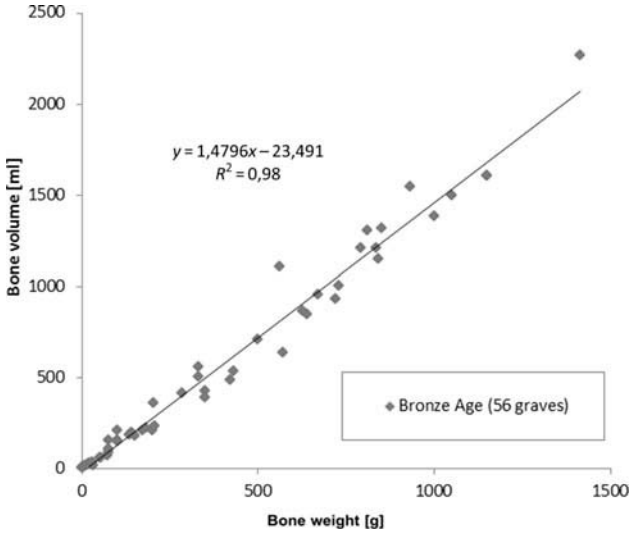

Figure 6. Plot of the regression line for weight and volume of the cremated remains from the 56 Bronze Age burials. The weight–volume ratio is approximately 1:1.5, reflecting a low degree of fragmentation.

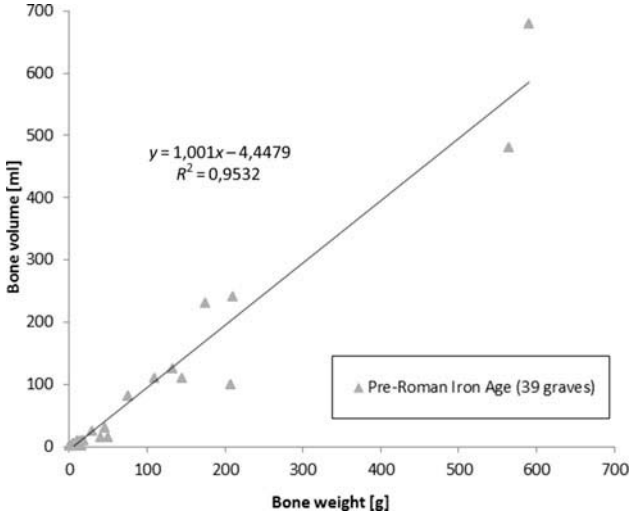

Figure 7. Plot of the regression line for weight and volume of the cremated remains from the 39 Iron Age graves. The weight–volume ratio is approximately 1:1, reflecting a high degree of fragmentation.

similar in construction and content to the types represented on many other southern Scandinavian grave sites from the transition period (e.g., Vedel 1870, Klindt-Jensen 1957, Thrane 1984, Becker 1990, Lind 1991, Ejstrud and Jensen 2000, Edring 2004, Arcini 2005, Feldt 2005, Fendin 2005, Frisberg 2005, Arcini and Svanberg 2005, Hornstrup *et al.* 2005, Clemmensen 2013, Kristensen 2013, Mikkelsen 2013a). They exhibit no exceptional wealth or status, and therefore reflect the 'norm' for the low status lineages in contrast to the exceptional elite evident in the rich sites on southern Funen in the same period (e.g., Thrane 1999, 227ff.). Archaeologically, the graves represent the general preservation state of graves found on modern excavations in contract archaeology on heavily cultivated lands.

The Fraugde area in its context

Although prehistoric cremation practices varied markedly both regionally and chronologically in southern Scandinavia, cremation practices dominated on Funen from the onset of the Late Bronze Age, around 1100 BC, until and including the Roman Iron Age, around 400 AD. Hence, the development was chronologically continuous. Furthermore, the landscape is thoroughly studied, in that a rich source material of cremation and inhumation graves is already published (Albrectsen 1954, 1973, Aner and Kersten 1977, Henriksen 1995, 2009, Thrane 2004, Runge 2010, 2013). The grave types on the sites analysed here are not unique. Cemeteries under level ground from the Late Bronze Age and the Pre-Roman Iron Age are found in several sites in southern Scandinavia with similar chronological developments of the grave types. As contract archaeology has emerged and larger connected areas have been excavated, focus has naturally changed from single finds of graves right below plough soil or in connection to mounds, towards the study of surrounding landscapes and fully excavated grave sites (Vedel 1870, Broholm 1949, 18ff., 64, 98ff., Thrane 2004,1, 33ff., Lindahl Jensen 2004, Arcini and Svanberg 2005, 333ff., Hornstrup *et al.* 2005, Runge 2010, 2013, Mikkelsen 2011, 42, 2013a).

The seven analysed sites were excavated by Odense City Museums in the period 2001–2008. The sites are situated north and east of the medieval village 'Fraugde', where a still standing twelth-century roman church indicates the long history of the area (Runge 2012). The landscape is characterized by wider landscape contours with regular smooth hillsides (Klitgaard 2002, 11–12, 22, Runge 2010, 15ff.). The Bronze- and Iron-Age settlements in the Fraugde region are, as the graves, primarily found within the 350-hectares large development area, Tietgen Byen, where Odense City Museums has conducted extensive excavations and uncovered a regular cultural landscape from the period (Runge 2010, 2012, 2013). The area represents the central third of a supposed village (bygd), which is bounded by the natural landscape (Runge 2012, 115).

The settlements of Tietgen Byen, the central part of Fraugde parish; OBM 5702, 8414, 8431, 8433, 8440, 8441, 8658 and 8698, all represent continuity from the earliest Bronze Age until and including the early Pre-Roman Iron Age (see Runge 2012, 113,132ff.). The settlements are all but one small and consist of one or a couple of contemporary farms. The exception is the locality OBM 8436, with around 100 houses, which must have

been a regular village through generations (Runge 2012, 122ff.).

During the periods in question, the settlements have moved gradually within the resource area. Single graves are in a few cases located between almost contemporary settlement features. However, in other cases, defined separations of grave sites or graves are clearly visible, for instance marked in the landscape by rows of cooking pits (Runge 2010, 83ff., 2013). The resource area consists of settlements, graveyards, gathering areas, and in one case a larger production area (OBM 8416). Between the resource areas, gathering areas are located. These were presumably used by more of the settlement units. Within Tietgen Byen, six to seven resource areas can be defined, separated by natural boundaries. The resource areas generally have an approximate diameter of 500–900 metres, whereas the large settlement, OBM 8436, may have had a somewhat larger resource area (for further discussions of the area in relation to the mortuary landscape, see Runge 2013, 18–19).

The grave sites

Østre Boulevard III, Tietgenbyen (OBM 8441)

Østre Boulevard III was excavated in 2007 and 2008. Besides a Stone Age grave and a cremation grave from the Germanic Iron Age (Migration period), the excavation revealed traces of settlement from the Late Bronze Age and Early Iron Age and two ploughed-over Early Bronze Age grave barrows (Figure 8). The site further contained two Early Bronze Age house constructions, which may have been related to the grave sites, and which are therefore not regarded as settlements, 16 Bronze Age cooking pit trenches oriented towards a moist hollow in the landscape (AMS-dated to the Early Bronze Age, Period III (1300–1100 BC)), 84 regular Bronze Age cooking pits, and lastly the fully excavated cremation grave site from the Late Bronze Age (see also Jakobsen 2009).

The Bronze Age grave site with 20 cremation burials date to the transition period and first half of the Late Bronze Age, Periods III–IV (1300–900 BC), evident through 14C-dates, ceramics, artefacts and stratigraphy. The graves are primarily located northeast of the northernmost Bronze Age barrow (Figure 8). One of the early cremation graves at the site, grave QA from Period IV (1057–921 cal. BC), represents a variation of an early stone-set cremation grave. With its oval shaped stone setting, it symbolically resembles other early cremation graves from the transition period (Broholm 1949, 13ff., Brøndsted 1966, 156–157, Aner and Kersten 1973, no. 1548A, Thrane 1984, 45–46, 57, 2004, 163, Arcini and Svanberg 2005, 339). The grave contained cremated bone and personal artefacts (a razorblade with a highly stylized animal head, and the poorly preserved remains of a set of tweezers) spread randomly in the grave. The grave site further consisted of seven simple urn graves, seven stone set urn graves and four cremation pits.

Kildehuse II, Tietgenbyen (OBM 8414)

Kildehuse II follow the site Østre Boulevard III (OBM 8441) both spatially and chronologically. The site was

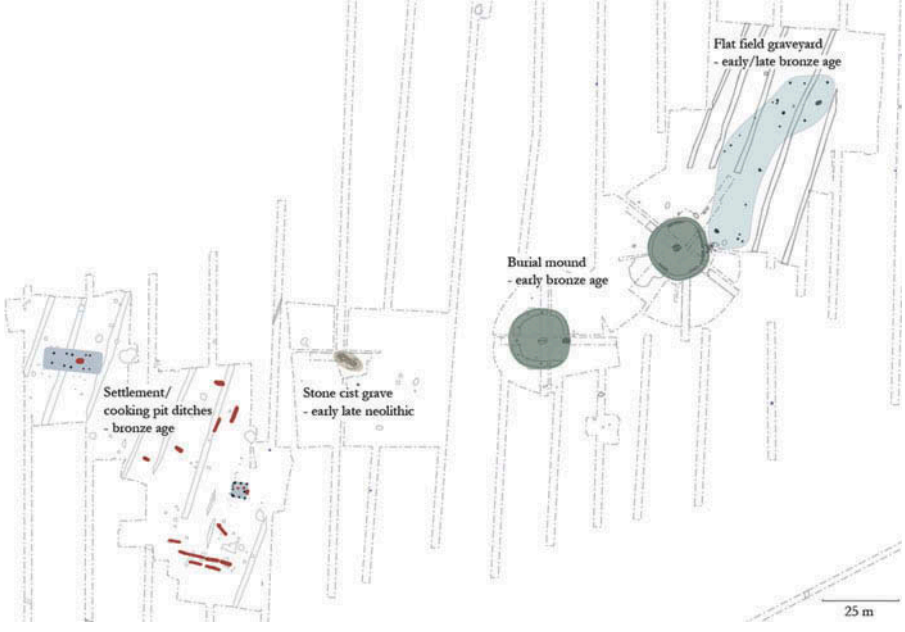

Figure 8. Location of the flat grave cemetery at Østre Boulevard III (OBM 8441) in connection to the two Early Bronze Age barrows.

excavated in 2004 and 2006. Besides a fully excavated grave site from the Viking Age, the excavations revealed two ploughed-over mounds, traces of settlement from the Late Bronze Age and Early Iron Age and a fully excavated Bronze Age grave site. Based on 14C-dates, ceramics, artefacts and stratigraphy, the 41 cremation burials date to the second half of the Late Bronze Age, Period VI (700–500 BC). The graves were primarily located in a belt between the two (undated) mounds, whereof one may have been a grave barrow (Figure 9). Several cooking pits in rows, besides various other features of unknown function were found in connection to the grave site. Several artefacts of distinctive character, for example, face urns, besides many and varying natural scientific results make the site unique (see Runge 2010, 11, 29–30, Harvig and Lynnerup 2010, 58ff.).

Krogsgård (OBM 8698)

The Krogsgård site was excavated in 2004, 2005 and 2006. Based on 14C-dates, ceramics, artefacts and stratigraphy, the graves on the site are dated to the beginning of the Pre-Roman Iron Age. Of a total 14 cremation pits and 25 uncertain cremation graves, primarily from the Pre-Roman Iron Age, only 16 graves contained cremated bone. Of these, only one grave contained bone fragments that could be determined as definitely of human origin, a fragment of a premolar. The graves seemingly cluster in two main groups, an eastern and a western, similar to the cooking pits in the area. Some of the graves further cluster in pairs of two and two, but it is unclear whether this is related to preservation or reflects social hierarchy on the site. Ceramics in the graves were in several cases affected by secondary burning.

Figure 9. Plan of cremation graves, cooking pits and the two mounds at Kildehuse II (OBM 8414). The two parallel rows of cooking pits form a boundary between the grave site and the profane settlement area to the west, although the AMS-dates are both early and Late Bronze Age (Runge 2010, 85–86). South of the southernmost mound, a possible cultic house with large stones in a floor-like construction was excavated. Both construction types may have facilitated various mortuary ceremonies.

Tietgen Byen Nordvest (OBM 8433)

Tietgen Byen Nordvest was excavated in 2008. Besides a large cooking pit field (with AMS-dates spanning from Early Bronze Age to the beginning of Early Iron Age), a minor cremation grave site was excavated. Of the 300 cooking pits, only few have been excavated and dated. The grave site consisted of six cremation pits, four uncertain cremation graves and three charcoal pits, all seemingly dating to Pre-Roman Iron Age (*AMS-dates from Pre-Roman Iron Age, around per. II,* 300–150 BC). The graves were oval shaped pits of 60–80 centimetres in diameter with a filling clearly containing remains of the cremation pyre (charcoal, ashes, cremated bone and ceramics). Intact ceramic vessels were found in several graves, but the content was similar to the grave fill. Ceramics from the graves revealed secondary burning, indicating that they were with the deceased on the pyre.

Skovlund (OBM 8658)

The Skovlund site was excavated in 2004. The excavations revealed a small concentration of cremation pits dated to Pre-Roman Iron Age. In the same area, five ploughed-over cremation pits had earlier been recognized during surveys, containing ceramic shards from Pre-Roman Iron Age, Period IIIa (150–50 BC). The extremely poor preservation of the graves indicates that the site could continue northwards beyond the limits of the excavated area (see also Runge 2010, 92, 97–98).

Engblommen/Fraugde Øst (OBM 8477)

Engblommen (or Fraugde Øst) was excavated in 2004. Besides a few pits, postholes and a fence, a grave site consisting of seven poorly preserved cremation pits was excavated. Based on ceramics, four of the graves have been dated to the late Pre-Roman Iron Age (Period IIIa)[2]. All seven graves were oval shaped cremation pits, less than a metre in diameter containing several remains of the cremation pyre (wood, charcoal, ashes and secondarily burned ceramics). One grave was located exactly in the middle of a Late Bronze Age or Early Iron Age house. It cannot be ruled out that there is some connection between the two, and that the house has served cultic purposes in connection to the grave sites and the cooking pits, possibly after decay or demolition of the construction. Probably some or all of the graves have been marked with stones on the surface. At least one (grave AFD) had stones placed around it resembling a ship setting. In the periphery of the grave site were 14 cooking pits.

Kohave Syd (OBM 8663)

Kohave Syd was excavated in 2001. Besides postholes and other features, 13 cremation pits with ceramic dates to late Pre-Roman Iron Age (250–0 BC) and 4 cooking pits, seemingly older than the graves, were found. The small cluster of 13 cremation pits was, except for one, located within a small area of 20 × 20 metres. The site may represent a single family group, if used over two to three generations. All graves were between 0.5 and 1 metre in diameter and contained charcoal, cremated bone fragments and few other remains of the cremation pyre, which as earlier described is a common phenomenon for these sites. A piece of iron had likewise been with the deceased on the pyre.

Methods

In supplement to discussions on handling of artefacts and pyre remains in relation to grave typology (e.g., Henriksen 2009, 87ff.), specifically the handling of the cremated human remains is in question here. By studying traits of the preserved skeletal material, such as wear patterns and post-cremation fragmentation patterns, in combination with methods commonly used in cremation osteology such as dehydration and crack patterns, colouration and skeletal representation, it is possible to compare the two mentioned periods and pinpoint similarities and differences in the cremation ritual despite the state of preservation. Collecting these descriptive data therefore gives an opportunity to compare material from the transition period without the bias of being totally dependent on post-depositional taphonomy (e.g., intactness of the individual graves) and stages of combustion of the cremated remains.

Results

Osteoarchaeological data

In the following, specific osteoarchaeological data for each of the graves in the Fraugde region containing cremated bone is discussed. The collected data sets reflect the huge variation in obtainable data from each grave depending on, for example, grave type, preservation and intactness. The raw data are available (in Danish) as an electronic supplementary file.

Chronological aspects

Because ^{14}C-dates are difficult to interpret during this period, primarily due to the Hallstatt plateau in the calibrated curves (see introduction), typological data are essential for differentiating funerary data during the transition period. Therefore, artefact typology (primarily ceramics and metal), ^{14}C-dates and stratigraphy are withheld in the interpretation of the overall chronology of the individual graves discussed in this study (see Table 2; materials section; and Runge 2010, 180ff.). Based on ^{14}C-dates, artefacts and/or stratigraphy, 92 graves from

Table 3. Grave typology and chronology based on data from 92 graves from the seven analysed sites in the Fraugde region. Whereas urn graves are linked to the first half of the Late Bronze Age in Period IV and V, and Urn cremation pits and Bone layer graves are associated with the second half of the Late Bronze Age in Period VI, cremation pits are primarily a Pre-Roman Iron Age phenomenon.

	LBA IV/V	LBA VI	PRIA I/II	PRIA II/III
Early stone.set cremation grave	1	–	–	–
Urn grave	18	5	–	–
Bone layer grave	–	4	–	–
Urn cremation pit	–	23	–	–
Cremation pit	1	7	16	17

the seven analysed grave sites have been categorized according to grave typology (Table 3).

Although the groupings naturally reflect the traditions at the individual grave sites within their given chronological time span (see Table 2), they also reflect the changing use of particular grave types over time, in that urn graves are predominantly found in the first half of the Late Bronze Age in Period IV, whereas urn cremation pits and bone layer graves are predominantly found in the second half of the Late Bronze Age in Period VI. Conversely, cremation pits are predominantly a Pre-Roman Iron Age phenomenon. Hence, pyre debris in the grave structures are a relatively late phenomenon in the Fraugde region, and the combination grave types, that is, urn cremation pits and bone layer graves with pyre debris, may therefore be the key to understanding the symbolism behind the gradual change in this region.

On Funen, the increase of pyre debris in the graves corresponds very well to a small peak in cooking pit complexes as a phenomenon in southern Scandinavia in the Periods IV and V (Thörn 1996, Edring 2004, 91, Mailund Christensen 2005, 29, 54–55), which in several ways seem to be linked to the mortuary ritual practices (Kaliff 1997, 70, Ejstrud and Jensen 2000, 19, Thrane 2004, 46–47, Mailund Christensen 2005, 41, 49–50, Henriksen 2005, 2009, 95–96, Runge 2013, 17ff.). Interregionally, however, the variety of the different grave types in this period and marked differences between (even closely located) sites (e.g., Olausson 1987) reflect that the gradual shift towards the Iron Age cremation rituals, as seen in the Fraugde region, is not a unilinear evolution, but a slow and complex process.

Throughout Scandinavia, fire symbolism and hearths seem to be related to the ritual sphere between burial practices and cosmology. In eastern Scandinavia, hearths, burials, layers of fire-cracked stones covering rock art figures and motifs damaged by fire are common (Lundström 1970, Bertilsson 1987, Wahlgren 2002, Bengtsson 2004, Kaliff 2007, 105). We, however, still face many challenges in deciphering the relative chronology of many of these pyrotechnical features, which are often broadly dated to the Bronze Age or dated through horizontal stratigraphy (see also Lütken 2013). Nevertheless, around 900–800 BC (Period IV/V) seem to be a time of radical changes in several aspects of material culture (Skoglund 2012, 34–35). Around this period, an increasing and different use of fire beyond the already diverse use of fire in mortuary technologies is also evident (Klindt-Jensen 1957, 209ff., Gansum 2004, Skoglund 2012, 27). These changes seemingly follow the beginning of the Early Iron Age in the rest of Europe around 800 BC, where a variety of cremation and inhumation practices were common (Collis 1984, 42,52,59). Particular changes in the Scandinavian burial traditions around 500 BC were similarly inspired by the European cremation practices, particularly those of the northern German and Polish cultures (von Keiling 1962, Nortmann 1983, Müller 1985, 45, Dąbrowska 1997, Schlüter 2007, 299, Budesheim and von Keiling 2009).

Fragmentation index

Bone fragmentation appears to be a good indication of how cremated remains were handled and deposited in the past, both intersite and intrasite (Harvig and Lynnerup 2013, 2720). In the Fraugde region, there appears to be markedly different traditions for handling the cremated remains for the two periods in question (see also Figures 6 and 7). If we calculate the Fragmentation Index[4] for the graves containing cremated bone and compare this with grave typology, the graves in the Fraugde region fall in separated categories (Table 4). Again, the cremation pits stand out, representing the highest degree of fragmentation.

Cremation intensity

It becomes increasingly evident, that oxygen supply and duration of the fire are equally, if not more, important parameters than temperature alone, when describing

Table 4. Grave typology and Fragmentation Index (N_{graves} = 64 graves) from the sites in the Fraugde region. Urn graves generally exhibit little fragmentation, whereas Urn cremation pits and Bone layer graves are associated with medium fragmentation of the cremated remains and cremation pits are closely linked to high fragmentation of the cremated remains.

	0–0.5	0.6–1	1.1–1.5
Inhumation-like grave	–	1	–
Urn grave	3	15	2
Bone Layer grave	–	3	1
Urn cremation pit	1	19	4
Cremation pit	–	9	6

Table 5. Grave typology and cremation intensity (N_{graves} = 72). The cremated remains from the Fraugde region were registered as representing high, medium or low cremation intensity. Low and medium cremation intensity is more closely related to cremation pits and urn cremation pits, whereas urn graves show highest cremation intensity. This contrasts the common assumption that cremation intensity increases during the period along with the increase of pyre remains in the graves. In fact, the opposite seems to be the case.

	High	Medium	Low
Urn grave	18	3	–
Bone layer grave	3	1	–
Urn cremation pit	7	11	4
Cremation pit	8	14	–
Uncertain type	3	–	–

cremation intensity based on the macroscopic appearance of cremated bone (Walker *et al.* 2008, Gonçalves 2011, 218). Therefore, the term cremation intensity is used here. Osteological evidence of varying cremation intensities should be clearly chronological or typologically differentiated to indicate differences in cremation technology for the periods in question. Nevertheless, a presumed increase in cremation intensity during the transition period from the Bronze Age towards the Iron Age, along with the increase of pyre remains in the graves, is a commonly discussed issue (Schutkowski and Hummel 1991, Kaul 2004, 186ff., Frisberg 2005, 148). However, this pattern is not seen in the Fraugde region. Conversely, the early Late Bronze Age grave types (e.g., bone layer graves and urn graves) are more often associated with high cremation intensity, whereas cremation pits and urn cremation pits (dated to the transition period and the Pre-Roman Iron Age) are associated with lower cremation intensity (Table 5).

Skeletal representation

One of Caroline Arcini's primary reasons for interpreting the Scanian cremation pits as pyre sites and not primary burials was the skeletal representation in the graves. She could demonstrate that cremation pits contained systematically fewer recognizable skeletal elements, particularly the petrous portion of the human skull, than did urn burials (Arcini 2005). For the Fraugde graves, similar tendency is seen (Table 6). Urn graves and urn cremation pits contain more recognizable elements and often elements from the entire skeleton (whole body representation), whereas cremation pits often contain few recognizable elements, independently of intactness of the grave and preservation. However, here it is evident that the main reason for this is the general amount of bones present in the cremation pits in combination with the high degree of fragmentation of these, which makes them less recognizable.

Table 6. Grave typology and skeletal representation (N_{graves} = 65). Urn graves and urn cremation pits contain more recognizable elements and often elements from the entire skeleton (whole body representation) whereas cremation pits often contain few recognizable elements.

Skeletal representation	Unclear/poor preservation	Only few recognized elements	Whole body representation
Urn grave	7	6	6
Bone layer grave	1	2	1
Urn cremation pit	2	9	11
Cremation pit	6	10	2
Uncertain type	1	1	–

Wear and handling

Post-cremation activities such as sorting, moving and otherwise handling the cremated remains, is reflected in wear on the (cremation-induced and post-cremation) fracture surfaces. Fresh fractures with sharp edges reflect little post-cremation handling, whereas smooth and heavily worn fractures reflect much handling. However, these patterns clearly also reflect post-burial taphonomic processes in the soil, in that the type of container used in the burial clearly seem to be the primary structuring factor for the Fraugde graves. This is reflected in markedly less wear for the two grave types with inorganic containers (urn graves and urn cremation pits; see Table 7).

Table 7. Grave typology and sample characteristics (N_{graves} = 63). Besides handling, the wear patterns clearly also reflect the type of container in which the bones were deposited, that is, deposits in bone layer graves (organic container) and cremation pits are less protected and therefore contain more heavily worn remains and fewer fragile elements.

	Few worn breaks, many fragile elements	Few worn breaks, some fragile elements	Some worn breaks, many solid fragments	Many worn breaks, only solid fragments	Unclear
Urn grave	3	8	2	1	3
Bone layer grave	–	–	2	1	1
Urn cremation pit	10	5	2	1	2
Cremation pit	1	2	5	8	3
Uncertain type	1	1			1

Discussion

Cremation technology and pyre construction

Based on osteoarchaeological analyses and skeletal representation in Swedish cremation graves, Caroline Arcini suggested three separate types of cremation pyre constructions for the Late Bronze Age and Early Iron Age; first, the well preserved human-length pyre site preserved under a mound at Gualöv; second, a log construction on large stones and then lastly, the typical cremation pits of the period were interpreted as draught-creating pits under the cremation pyre, that is, a form of *Bustum* (*in situ* cremation) (Arcini 2005, 67–68, Arcini and Svanberg 2005, 323ff., 331–332). However, as mentioned in the introduction, the several southern Scandinavian Bronze Age pyre constructions excavated hitherto have extremely varying dimensions and appearances (Klindt-Jensen 1957, 46ff., 55, 209ff., Thrane 1984, 171ff., 2004, 34, 43, 48, 221ff., 227, 237, 242, 275, 287, 305ff., Henriksen 1991, 52ff., Olsen and Bech 1996, Andersson 1997, Arcini 2005, 67–68, Arcini and Svanberg 2005, 323). Therefore, this is probably too simple a categorization of a vast and relatively unexplored material.

Besides the excavated features and osteological evidence of cremation technology in the Late Bronze Age and Pre-Roman Iron Age, we also have knowledge from other sources. The gradual decrease in cremation intensity from the Bronze Age towards the Iron Age, as suggested by the osteological material in the Fraugde region, is also reflected in the pyre remains from the sites. For the Fraugde region in general, oak logs larger than 20 cm in diameter were used in the Late Bronze Age cremation pyres, whereas samples of oak from the Pre-Roman graves were from wood of less than 5 cm in diameter (see also Mikkelsen 2010, 55, 2013b, 121–122). Particularly at the Late Bronze Age site Kildehuse II (OBM 8414), clinkers of organic material (slag) indicated that temperatures in some pyres had reached 1000ºC (Jensen 2010, 51), which is in line with temperatures gained in other Late Bronze Age cremation pyres on Funen, in some cases reaching 1100ºC (e.g., Thrane 1984, 78).

A similar gradual change in pyre technology may be relevant in other areas of Scandinavia, and could be related to a changing use of wood. Although ash, hazel and other fast burning wood for small firing branches are known from southern Scandinavian pyre remains throughout the transition period (Arcini and Svanberg 2005, 315, Fendin 2005, 401ff., Mikkelsen 2010, 55ff.), oak was frequent in Bronze Age cremation pyres (Mikkelsen 2013b, 123), whereas beech, hazel and alder of a more modest size became common towards the Roman period (Henriksen 2009, 273, Mikkelsen 2013b, 123–124).

Collecting the cremated remains from the pyre

A growing experimental work has revealed that cremated remains in a cooled pyre or in cooled pyre debris that is left untouched, contain large and diagnostic fragments with exclusively heat-induced fragmentation patterns and little, if any, post-cremation wear. Moreover, several studies indicate that it is surprisingly easy to collect cremated remains from the cooled pyre with high efficiency (Henriksen 1991, 1993, Marshall 2011, 34, Gonçalves 2011). Hence, it is argued that deposits that are obviously partial already at the stage of burial are so for deliberate reasons (e.g., Arcini 2005, 67ff., Marshall 2011, 37–38). However, from studies in modern crematoria we know that it is highly varying what is preserved from cremation to cremation. The lack of anatomical regions alone should therefore, ideally, never be used as indicator of ritual selection of bone (Gonçalves 2011, 221ff.). Nonetheless, the significant differences in skeletal representation diachronically, do imply a marked difference between the Late Bronze Age burials and the Iron Age cremation pits in the Fraugde region.

Sorting the pyre remains

In a recent methodological study using the majority of the Late Bronze Age graves from the Fraugde region, we were able to demonstrate that the typical Late Bronze Age urn burials often represented entire cremated individuals (Harvig and Lynnerup 2013). Conversely, the opposite is the case for the Early Iron Age cremation pits in the region, which is reflected in lack of anatomical regions, extreme fragmentation, heavy wear and overall characteristics of the cremated remains. This further suggests that we are not dealing with pyre debris falling directly from the pyre and into a pit in the ground, but instead sorted pyre debris. The high degree of fragmentation clearly suggests that the bones have been handled before deposition. Whether the fragmentation occurred during staking of the pyre while burning, clearing the pyre or similar post-cremation handling of the cremated remains is uncertain, but we are not dealing with post-depositional taphonomic processes alone. Conversely, the pyre debris in the cremation pits have clearly been sorted, and during this sorting process, the majority of the cremated remains have been sorted out, as also partly suggested by Caroline Arcini (2005). This leaves us with interpretations of the cremation pits as either solely pyre remains or symbolic representations of ‘graves’, but not actual pyre sites and by definition not burials[1].

Intentionality

Instead of discussing how much bone is needed to define a burial, we instead have to focus on the degree of intentionality. If we accept that there is a difference between the terms ‘burial’ and ‘grave’[1] as often discussed in current Scandinavian archaeology (e.g., Ericsson and Runcis 1995); we clearly see a change of focus from one towards

the other during the transition period in the Fraugde region. Although the remaining secondary deposition of cremated human remains in the cremation pits gives the impression of being 'unintentional', deliberate reburial, replacing and reusing of cremated remains is also worth considering (e.g., Gansum 2004, 51, Wickholm 2008). Moreover, evidence of markings of the cremation pits on the surface, as well as the fact that these graves extremely rarely cut one another, suggests that these grave types are in fact purposeful constructions, symbolically similar to many other grave types from the periods in question. Seemingly, they were commemorated during centuries on the accumulated grave sites, and therefore they were not merely unintentionally discarded pyre debris.

Although the many Pre-Roman Iron Age cremation pits excavated in the Fraugde region appear to be fairly similar, there is some variation intersite. Variation in shape (from oval to circular and from rounded to sharp-edged cuts) reflects local traditions and variation over time of the otherwise extremely conservative grave type.

Summary and conclusions

In the Fraugde region, grave typology and overall chronology are correlated in groups, reflecting the traditions at the individual grave sites and the chronological time span of the sites. However, it is evident that pyre debris in the cremation graves gradually gained significance during the Late Bronze Age. As such, urn graves were common in Periods IV and V, urn cremation pits and bone layer graves became common in Period VI, whereas the Pre-Roman Iron Age sites in the region almost exclusively contained cremation pits.

As for the cremation pyres themselves, we have no archaeological record of the actual cremation pyres in the Fraugde region. However, analyses of the cremated remains and pyre debris from the sites leaves us with evidences of highly varied cremation pyres, with temperatures up to 1100ºC in the Bronze Age and a decrease in cremation intensity from the Bronze Age towards the Pre-Roman Iron Age, which could be related to a changing use of wood species.

Whereas the many individual grave types on the Late Bronze Age sites in the Fraugde region contained deliberately collected cremated remains of deceased individuals, the occurrence of randomly deposited human remains in the Pre-Roman Iron Age cremation pits almost appear 'unintentional'. However, the pyre debris in the cremation pits were clearly sorted, and during this sorting process, the majority of the cremated remains were sorted out. Same goes for much of the archaeological material in these graves, which may have been left in the pyres or elsewhere. Although commemorated and left undisturbed for centuries, the evidence presented in this micro-regional case study leaves us with interpretations of the cremation pits as either solely pyre remains or symbolic representations of 'graves', but not *in situ* pyre sites and by definition[1] not burials. Seemingly, the meaning of the practice of burying changed gradually during the transition period in the Fraugde region, from being a burial of an individual to becoming a place in the ground for selected remains of the actual cremation process.

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Notes

1. Definitions used: Grave = a place for a burial (e.g., symbolic), Burial = the evidence of placing one or more dead bodies in a grave (the act of burial) (see also Ericsson and Runcis 1995).
2. Chronological periods mentioned are for the Bronze Age Oscar Montelius' typology-based chronology, Periods I–VI, 1700–500 BC (Montelius 1900), and for Pre-Roman Iron Age, Periods I–III, 500 BC–1 AD (after Albrectsen 1954 and 1973 (specifically for Funen), but see also Becker (1961). The datings of the graves after excavation was made according to this chronology by Odense City Museums.
3. Artefacts found in cremation graves can be separated into primary adding of artefacts on the cremation pyre (pyre goods) and secondary adding of artefacts during the funeral process (grave goods) (see, for instance, Williams 2008, 243–244, Henriksen 2009, 89).
4. The numbers for the fragmentation index are derived by dividing cremation weight in grams with cremation volume in millilitres (g/ml) for each of the graves. The Fragmentation Index is therefore not affected by the degree of preservation or the representation or the intactness of the grave. The numbers describe the general fragmentation of the sample, the Fragmention Index (FI). High volumes in relation to weight result in a low Fragmentation Index (0–0.5) and less volume in relation to weight result in a high Fragmentation Index (1.1–1.5) (see also Harvig and Lynnerup 2013).

Supplemental data

Supplemental data is available via the supplemental tab on the article's online page at http://dx.doi.org/10.1080/21662282.2014.942980

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