'Where Water wells up'

Revisiting a forgotten Deposition Tradition from the Late Bronze Age on Funen, Denmark

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ABSTRACT

The article presents a deposition of ornaments from the Late Nordic Bronze Age period V. An archaeological excavation along with non-pollen Palynomorph (NPP) and pollen analysis has resulted in new knowledge about the poorly illuminated Bronze Age tradition of spring offerings. With a starting point in the find at Hedegyden this article aims to improve the understanding of the Bronze Age depositional practices in relation to springs. The article presents the ornaments, but focuses on their context as regards to the relationship between the objects within the deposition, as well as the site of deposition. Based on the stratigraphic observations, the preserved organic materials in the Hedegyden find and the scientific analyses, a *chaîne opératoire* is presented for the various sub-elements and phases of the depositional act.

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Introduction

Interest in the use of metal detectors has increased dramatically in recent years. This is also reflected by the growing number of Bronze Age detector finds. These finds help to improve our understanding of the utilisation of the landscape during this period – including the areas outside or between settlements and burials. The numbers of single and multi-type depositions have increased intensively since the turn of the century, almost matching the numerous finds that were made in agricultural fields and bogs during the 19th and 20th centuries (Frost and Beck 2023a, Fig. 3).

The Bronze Age deposition tradition is associated with water in its various forms (Bradley 2017; Dunkin et al. 2020; Fredengren 2011; Frost and Beck 2023a; Rundkvist 2015; Yates and Bradley 2010a). The specific relationship between the deposition contents and the landscape characteristics of the deposition site has however often been blurred by the broad generic terms 'field/ bog finds' or 'wetland finds'. Historically, archaeological research often focused more on the objects themselves than their context, which for example has been underlined by S. Hansen and others in the same publication (Hansen 2012, 23). This has however changed in recent years with the focus now also being placed on the context of depositions in the landscape (Bradley 2000, 2017; Fontijn 2002; Fredengren 2015, 2018; Frost 2008, 2015; Rundkvist 2015). Several studies indicate that water with different characteristics, or affordances as C. Fredengren refers to them (Fredengren 2011, 114-118), was decisive for the choice of deposition site. This can, for example, involve affordances in the form of water flowing out of the ground, water that runs quickly or stands still, or one water source that merges with another water source.

With this article, we aim to improve the perception and understanding of the Bronze Age offering traditions in relation to springs in particular. Firstly we present the spring find from Hedegyden with regards as to the content of metal artefacts and organic materials as well as their internal stratigraphic relationship. Especially the preserved organic material and the pollen and non-pollen palynomorph

(NPP) analysis are important aspects for our interpretation. Secondly, the Hedegyden find is placed in a local and regional landscape context and finally, we present a chaîne opératoire for a spring deposition, based on the excavation observations and scientific analysis made at Hedegyden, compared with observations from other offering finds.

Spring Offerings

Offerings and shrines placed around springs is a worldwide phenomenon known throughout most of prehistory and into historic times. The perplexing phenomenon of water flowing out of the ground was apparently of special value or even of divine importance, either constituting a passage between two worlds or reflecting the idea that the water had special qualities (Bradley 2017, 188; Fredengren 2015, 161-169, 2018, 227; Schoueri 2016, 63-66; Strang 2020, 113). The numerous Danish sacred springs that were frequented up until modern times emphasizes that the power of the spring was not exclusively associated with a pre-Christian world of beliefs (Henriksen 2003; Schmidt 1926, 23; Svane 1984, 13-24).

Despite their apparent frequency, both in geographical and chronological terms, only a few prehistoric spring offerings have been excavated and described within a Danish and Scandinavian context (e.g. Nilsson and Nilsson 2003; Nørlund 1973; Rasmussen and Skousen 2012, 153; Rundkvist 2015, 44-45; Skousen 2008, 161; Stjernquist 1997; Vebæk 1944, 1945). Danish spring offerings dating to the Bronze Age are mentioned in the archaeological literature (Kjær 1925, 123; Nordman 1920), but only a few well-documented examples have been investigated (Frost and Beck 2023b). From a broader North-West European perspective, in recent decades more emphasis has been placed on springs constituting an important factor or affordance in connection with the prehistoric offering tradition (e.g. Bradley 2017, 58-60; Bradley et al. 2015; Dunkin et al. 2020, 69; Fontijn and Roymans 2015; Fredengren 2015, 166 , 2018, 227; Yates and Bradley 2010a, 413, 2010b, 59).

The limited number of published spring offerings in a Danish/Scandinavian context is obviously related to the fact that such depositions are hard to recognise without an archaeological excavation of the find or thorough analyses of the landscape context. As the majority of the finds were made accidentally and in connection with agricultural work in fields or peat digging, only a very small proportion of the Danish Bronze Age depositions have been archaeologically investigated. They have therefore often been described simply as 'bog/wetland finds'. This generic term obscure the nuances of the find circumstances, and there is a marked tendency to only focus on whether a deposition was made on dry land or in wetland. This is due to both inadequate information about the circumstances of discovery in the case of many of the finds, but probably also the summary nature of the data and information about the finds when they are referred to in the literature (Hansen 2012, 40). There are therefore undoubtedly considerable numbers of spring offerings amongst the large group of finds that have been attributed to 'bogs/wetlands' (Frost and Beck 2023b). In the thoroughly cultivated and drained Danish landscape, many springs have dried out, but they are often still visible as marks in the subsoil, in the form of sand pockets with concentric rings. An excavation is required to detect the geological phenomenon with certainty, as well as, for instance, scientific analyses to support the reconstruction of the landscape (e.g. Frost and Beck 2023b; Skousen 2008, 161).

The Spring Offering from Hedegyden

In January 2020, a metal detectorist contacted Østfyns Museer, because he had found two hanging vessels in a field at Hedegyden near Kullerup Hede, 4 km west of Nyborg on Funen. A few days later, the museum excavated the remaining part of the find and documented, that the ornaments had been buried at a spring.[1] The find from Hedegyden provides a unique opportunity to study the relationship between objects and site of deposition at a micro level, and to shed light on spring offerings in general.

Topography and Place of Deposition

Today, the finding place is a cultivated field (Figure 1). To the south, the terrain rises and becomes

Figure 1. The offering find at Hedegyden is located west of Nyborg near a small tributary of Vindinge Å. Base map 25 cm map. Data from Styrelsen for Dataforsyning og Infrastruktur (Graphics: Malene R. Beck).

slightly undulating, but to the west, north and east it drops gradually down to Vindinge Å and two of its tributaries, which form a natural boundary in the landscape. A depression in the terrain, corresponding with information on the O1 map (First Cadastral Map), indicates that a fossilised stream flowed into a tributary of Vindinge Å 60-70 m west of the find spot. On the O1 map, large areas are marked with the wet meadow symbol, which to the north and east almost defines the finding place as a headland. The area was likely characterised by several springs or by water periodically flowing out of the ground. Within a radius of more than 1 km from the find spot no other archaeological finds from the Bronze Age are recorded.

The finder had dug up a considerable proportion of the find from the original deposition and important information therefore lost. It cannot be determined to what extent the ornaments have been damaged during the period in the ground or by partly being dug up by the detectorist. Information about the interrelationships between the objects and their packing is also deficient. Fortunately, parts of one hanging vessel and a belt ornament were still *in situ* (Figure 2). During the archaeologial excavation, the two objects were taken up in a block lift, and subsequently excavated by a conservator. The remaining ornaments were situated on the south side of a spring, which was visible as a 1.12 m east-west × 0.93 m north-south oval mark of white-yellow sand, with clear wavy marks and rust red iron deposits along the edge. Water still seeps out at the site. The colour of the fill around the objects indicates that they were buried at the edge of the spring in a pit, that eventually filled up with darker and more humus depositions. A grey-white stone measuring *c.*10 cm in diameter was recorded in the sand layer below the offering. Close to the bottom-most hanging vessel and in the same dark fill and level was a red granite crushing stone. It was not possible to determine whether the grey-white stone was part of the depositional activity, but on basis of the stratigraphic relationships, the crushing stone is interpreted as being part of the same event as the deposition of ornaments. Crushing stones and stones associated with spring offerings are known from Röekillorne (Stjernquist 1997, 41, 50) and white or light-coloured stones are common amongst Early Iron Age bog offerings. It remains uncertain what the

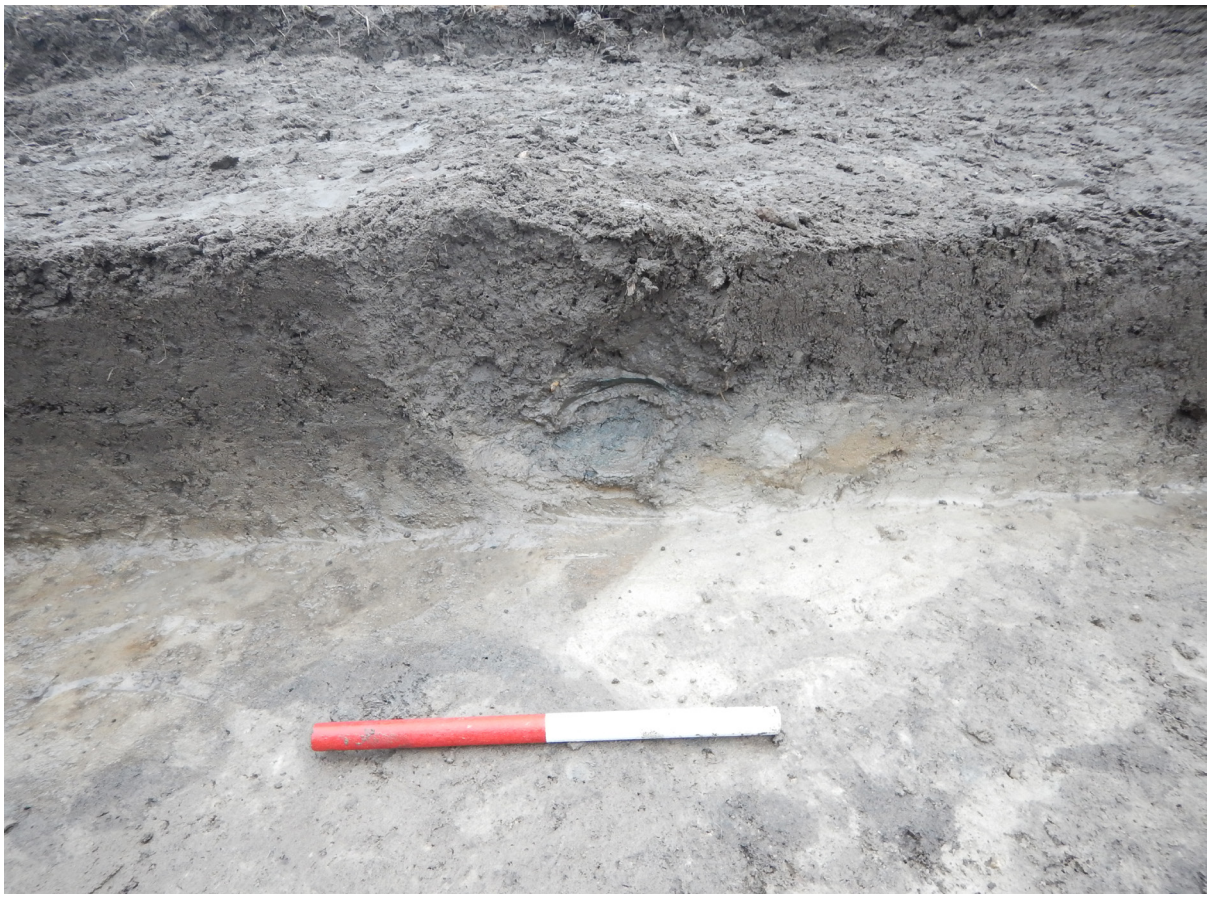

Figure 2. Photo from the excavation of the find at Hedegyden. The remains of a hanging vessel (1090x4) and a belt ornament (1090x3) are visible in the section. The light-coloured, white-yellow sand constitutes the spring itself, from which water still seeps up (Photo: Østfyns Museer).

stones symbolise, but they seem to be a fixed element of various depositional activities, and often appear to have been thrown into bogs (Lund 2002, 184; Pantmann 2020). The two stones in the spring at Hedegyden perhaps reflect the same act or thought associated with a deposition situation.

Presentation of the Find

The find from Hedegyden is a multi-type deposition from the Late Bronze Age period V (LBA V, *c*.900-700 BC), consisting of three hanging vessels, a belt ornament and three smelting lumps of copper alloy. The find also contained remains of a wooden lid or small container in one of the hanging vessels, and bark and wood fragments, probably from a larger bucket. The bronzes are generally in very good conditions and the ornaments are covered in verdigris, with areas of bright metal and only small amounts of corrosion. None of the objects are complete. The belt ornament is only represented by fragments and the two large hanging vessels have major fractures, some of which are fresh.

The Hanging Vessels

Approximately two thirds of the lower part of the largest hanging vessel 1090x1 is preserved (Figure 3a). Parts of the shoulder are intact, but there are no definite remains of the neck and suspension holes. The hanging vessel measure 25 cm in diameter, but other dimensions cannot be determined. Remains of a bronze lamina (Frost 2010, 16) can be observed inside the vessel.

At the transition between the neck and shoulder is an encircling plastic rib with diagonal hatching, and the decoration on the belly is divided into four zones, separated by two to four encircling plastic ribs, with alternating diagonal hatching, which is very worn in places. The centre of the belly is marked by a separate flat knob, decorated with a

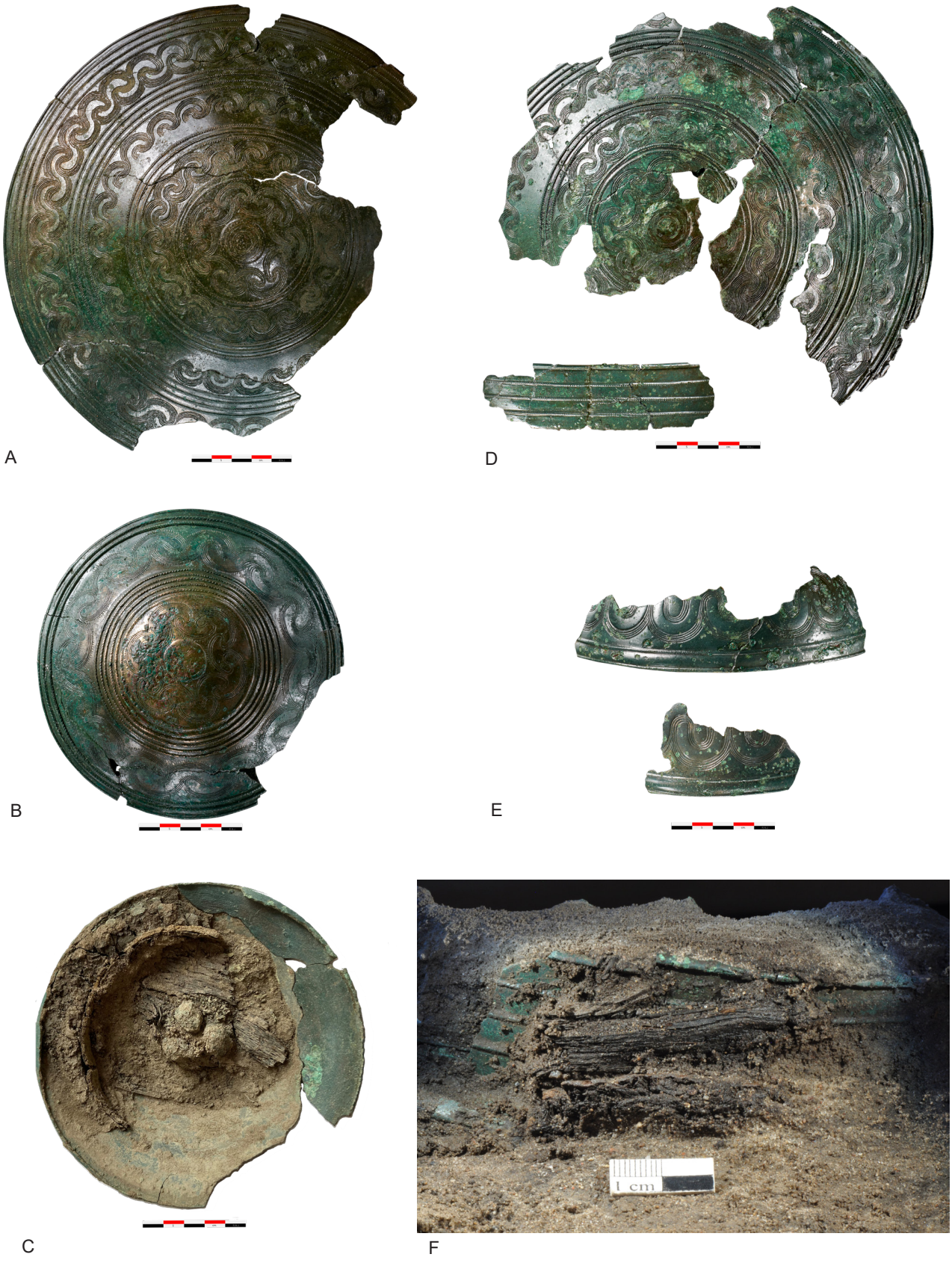

Figure 3. a) hanging vessel 1090x1; b) the smallest of the three hanging vessels 1090x2; c) the small hanging vessel 1090x2 during excavation and conservation. Inside the vessel, remains of a ring-shaped piece of bark can be seen, which in size corresponds to the opening of the hanging vessel. Thin wood/ bark flakes are also visible at the bottom, as well as three smelting lumps of copper alloy; d) hanging vessel 1090x4; e) the largest fragments of the belt ornament 1090x3; f) remains of the bark layer around the neck of the hanging vessel 1090x4, which were taken up in the block lift. A layer of bark was also found under the hanging vessel (Photos a, b, d, e by Rógvi N. Johansen, Moesgaard Museum, photo c by Malene R. Beck, Østfyns Museer, photo f by Ida Hovmand, Bevaringscenter Fyn).

dot surrounded by four circles. The first zone of decoration is filled with a wave motif, in which three to four lines form fourteen opposing, mushroom-like shapes. Zone two is filled with a classic, running-dog motif consisting of up to five lines. The motif in the third zone is a variation on the running dog, which only fills the bottom half of the zone. Instead of a continuous sequence, each wave ends as an open, upward facing S. The fourth and outermost zone is filled by the same variation of the running dog motif that is seen in zone two. This, however, involves the variation that the wave courses also have small fringes on the side that faces away from the centre of the vessel.

The smallest of the hanging vessels 1090x2 is relatively well preserved (Figure 3b). The vessel measures 14.3 cm in diameter and its mouth is 10.6 cm in diameter. At the neck-shoulder transition is an encircling, plastic rib with diagonal hatching. The centre of the belly is marked by a separate, flat knob. The surface of the knob is worn, where decoration consisting of four opposing arcs, each consisting of three lines, can still be clearly seen. Together, the arcs form a (sun) cross-like figure. The belly has a zoned ornamentation that is separated by three to six plastic ribs with diagonal hatching; the rib closest to the centre of the vessel are obviously worn. The first zone is decorated with a wave motif consisting of two to four lines, which forms mushroom-like figures. The motif can be deciphered in both 'negative' and 'positive', so that there are both six figures that face the top in towards the middle knob and six which face away from it. The uppermost arc of each of the 12 mushroom figures is decorated with small, upright fringes. The next decorative zone is filled with a variation of the running dog, in which 14 S-shaped figures intersect with one another and form a wave-like sequence. The figures consist of four to five lines. Short lines form a fringe-like pattern at the top of all inner and outer arcs in the motif. The characteristic fringe or line motif, as well as the use of the mushroom-like motif, correspond to the decoration on the largest of the hanging vessels 1090x1. The top of the hanging vessel and the uppermost plastic rib, as well as one of the preserved suspension holes, show obvious signs of wear, so it was used for some time before the deposition took place. The soil-filled inside of the hanging vessel contained preserved remains of wood and bark in a circular shape, which precisely corresponded to the diameter of the neck aperture (Figure 3c). This represents the remains of a lid, or perhaps a small bark container inside the vessel. At the bottom was another thin layer of wood, which may have been associated with the circular piece. Analyses indicate that this was most likely wood and bark from *Betula* (birch), all though *Acer* (sycamore) or *Pomoideae* (pome) cannot be ruled out.[2]

Very little is known about how the hanging vessels were closed and used, but they probably had some form of lid (Friis 1968). There are several examples of belt ornaments from EBA III (1300-1100 BC) and LBA IV (1100-900 BC) with metal lids (Broholm 1943, 225, M87 and M88, 1945, 190, M47). Lids of organic material in the form of wood are known from the Sæsing deposition from LBA IV (Friis 1961, 39), and at Hverrestrup bakker in Vesthimmerland, a hoard from LBA V (900-700 BC) has recently been excavated which also included remains of a wooden lid (Nielsen and Hjortlund 2021, 22).

At the bottom of the vessel 1090x2 and covered by the thin layer of wood, lay three much corroded smelting lumps of copper alloy (Figure 3c). These probably represent casting waste, but their poor condition make it difficult to determine their function and origin. The drops are 1.4-1.6 cm in diameter. Remains of casting, in the form of casting waste, 'scrap metal' and smelting lumps, are common elements of the Bronze Age deposition tradition (Broholm 1945, 263; Frost 2008, 57, 2010, 26; Jantzen 2008, 286-289; Thrane and Juottojärvi 2020), and may have been of symbolic importance (Hansen 2013, 186; Rundkvist 2011, 161).

Hanging vessel 1090x4 (Figure 3d) was placed on its belly and constituted the base of the deposition. Approximately half of the belly of the vessel is preserved. In addition, a quarter of the neck and some fragments of the shoulder are present. The diameter measures 24-25 cm and the neck is 3.1 cm high. The decoration is identical to that on hanging vessel 1090x1, although there are no fringes on the running dog motif on this vessel. At the transition between the neck and shoulder, there is a plastic rib with diagonal hatching (cord decoration). The decoration on the belly is divided into four zones separated by two to four encircling plastic ribs with alternating diagonal

hatching. The ribs show some signs of wear, but this is not as pronounced as on hanging vessel 1090x1. The middle of the belly is marked by a separate flat knob decorated with a dot surrounded by four circular strokes. The first zone of decoration is filled with a wave motif, in which three to four lines together make up 14 opposing mushroom-like figures. Zone two is filled with a classic running dog motif. The motif in the third zone is a variation on the running dog, which only fills the bottom half of the zone. Instead of a continuous course, each wave ends with an open, upward-facing S. The fourth and outermost zone is filled with the same variation of the running dog motif that is seen in zone two. The neck of the hanging vessel is decorated with three plastic ribs with diagonal hatching and the suspension holes are integrated into the neck.

Apart from the differences in size, the hanging vessels are so uniform in appearance and quality, that the same bronze caster may have produced them (Appel and Olsen 2011, 13; Kristiansen 1974, 22). The hanging vessels corresponds to Baudou's type XXII B2a (Baudou 1960, 70) and can be relatively dated to LBA V (900-700 BC).

The Belt Ornament

The belt ornament 1090x3 (Figure 3e) is very fragmented. The largest fragment was excavated from the block lift, which also contained hanging vessel 1090x4. It is therefore certain that the belt ornament was placed inside this hanging vessel.

Three quarters of the edge of the ornament are preserved and the diameter is 16 cm. Along the preserved edge fragments are remains of two suspension holes and a secondary hole has also been drilled near the edge, 2.7 cm away from one suspension hole. This suggests that the ornament has been repaired. On the inside of the belt ornament is a protrusion which ended in a disc for fastening the belt. Around the shank of the protrusion, on the inner side of the belt ornament, is a plastic swastika figure.

The belt ornament had two zones of decoration, in the form of the running dog motif. The bottom zone has closed, wave-like courses and the uppermost zone open courses. A band filled with punches and framed by diagonal hatched borders separates the two zones of decoration. The edge of the ornament is more domed and surrounded by plastic ribs with diagonal hatching.

The belt ornament has close parallels in the Lindø hoard (Thrane 1987, 204), and the find from Villingerød (Broholm 1945, 207, M101a), both in terms of size and decoration. It features the same decoration scheme as the hanging vessels and corresponds to Baudous type XXIIIB with a relative date to LBA V (Baudou 1960, 70). However, the dimensions of the belt ornament and the two hanging vessels 1090x1 and 1090x4 are quite considerable, which makes a dating closer to LBA VI (700-500 BC) more likely (Baudou 1960, 72). The obvious wear and evidence of repair of the ornaments indicates that they were used for a considerable period of time and the stylistic dating therefore does not necessarily correspond with the time of deposition (Jensen 1997, 153; Kristiansen 1974, 22; Lund and Melheim 2011, 449).

Packing Materials of Wood, Bark and Straw

Thanks to favourable conditions for the preservation of organic material, the find from Hedegyden has provided information about how the ornaments were packed in connection with the deposition, as well as knowledge about the landscape in which the deposition was placed.[3]

Remains of bark and hardwood around and under the lower hanging vessel 1090x4 suggest that the ornaments were stored in a wooden or bark container when they were deposited (Figure 3f). The wood cannot be identified more closely than as deciduous. Remains of wood/bark were also found between the hanging vessel 1090x4 and belt ornament 1090x3, as were patches of straw at the bottom of hanging vessel 1090x1.

It was apparently a common feature to wrap the bronze objects or deposit them in different kinds of containers. Remains of various organic material and raffia have been recorded in several cases in connection with deposited bronze objects, which may originate from the packing of the objects. This, for example, applies at Rannerød (Broholm 1945, 198, M67), to the Lindø hoard (Thrane 1987, 200), Mariesminde II (Thrane and

Jouttojärvi 2020), Røjle mose (Jensen and Runge 2008), Bækkedal (Sarauw 2015), and Vaseholm (Frost 2003). The most recent discoveries are the tanged sword from Håre packed in raffia (Madsen and Hansen 2021, 13), as well as two metal hoards from Baunshøjgård, which contained remains of wood and fur (Nielsen and Hjortlund 2021, 22). The phenomenon is also known from the beginning of the EBA where five large flanged axes from Boest in Central Jutland lay packed in a grass-lined depression (Christensen 2017, 4).

Several examples of depositions in pottery vessels are known (Broholm 1943, M89, M96, 1945, M47, M69, M96, M104, M122, M141, M148, M156, M162, M166, M190, M195 and M229; Sarauw 2015; Thrane 1987; Thrane and Jouttojärvi 2020; Varberg 2008), and fewer in metal vessels (Broholm 1945, 272; Frost 2003; Thrane 1975, 143-153). Depositions in wooden or bark containers or packing in other forms of organic material were probably a widespread phenomenon. In most cases, the organic material has either disappeared or not been documented, because the finds were discovered by accident. A number of bark buckets have been found in the oak coffin graves from EBA II and III (1500-1100 BC) (Boye 1896, 186; Thomsen 1929, 183-185). Wooden and bark containers have been recorded in LBA burials (Thrane 2004, 107, 258) and in North Zealand two bark buckets were recently found in well structures dating to LBA IV-V (1100-700 BC).[4] Remains of a bark bucket were also found in a house offering from Spjald (Becker 1989, 202-203). Some of the bark buckets in the oak coffin graves originally contained drinks, but there are also examples of bark buckets used as hatboxes (Boye 1896, 91). It is quite possible that ornaments were stored in a similar way, hidden away in a container when they were not in use. Bark buckets of a size and diameter, which could contain a set of ornaments like that which was found at Hedegyden are known from Norway (Henriksen 2014, 160).

Pollen and non-pollen Palynomorph (NPP) Analyses

Pollen and NPP analyses of preserved organic material in and around the hanging vessels from Hedegyden help provide a more nuanced picture of the landscape in which the deposition was made, as well as nuancing the deposition event itself and increasing our knowledge of the use of the hanging vessels. Two pollen samples were analysed, taken from inside the bottom-most hanging vessel 1090x4, and from the straw found in the largest hanging vessel 1090x1. The sample from inside the vessel 1090x1 was also analysed for NPP. The pollen and NPP analyses and the preparation procedure are presented in detail in Appendix 1.

Amongst the preserved pollen, the composition of grasses and herbs indicates that the immediate surroundings of the deposition site were meadow areas. This fits well with the landscape as it appears on the O1 map, with large areas described as wet meadows. The high frequency of ascospores from *coprophilous fungi* in the NPP analysis indicates that the meadow areas were grazed by large herbivores, possibly cattle.

The identification of a small number of the pollen grains as barley, as well as a number of the type including rye or barley, suggests that there were cultivated fields only a short distance from the deposition site (Robinson 1993, 20). The cultivated areas are also indicated by the straw that was used as packing material. A low proportion of pollen from hazel, alder, pine and oak indicate that there was scrubs or isolated trees within the area. In other words, the deposition seems to have been made at the edge of a landscape that was characterised by human activity.

Honey in the Hanging Vessel?

The NPP analysis revealed possible remains of bees' hairs. The bees' hairs may originate from honey or beeswax, and together with the considerable amounts of pollen from flowering herbs of the *Brassicaceae* family and *Cichorium*-type, this indicates that the vessel originally contained honey or more likely honeycombs. Studies demonstrate that pollen from the *Brassicaceae* family, if available, is favoured by honeybees (Guillermina and Caccavari 2006). Was a piece of honeycomb included in the deposition, or did the hanging vessel contain a honeycomb or beeswax, when it was in use? The latter is a possibility that we cannot rule out, given the medical properties of honey. Honey

is an antiseptic and was a fixed ingredient in the medicine chests of the ancient world and was also used to treat wounds up until modern times (Crane 1999, 502; Eteraf-Oskouei and Najafi 2013). We know very little about what function the hanging vessels had, but a medicine bag containing various remedies is a possibility. The EBA III female burial from Maglehøj on Zealand can be mentioned as a parallel. In the grave was a belt container in which there were horse teeth, bones from small animals, such as wild cats, birds, stoats and grass snakes, fragments of wood, and pieces of bronze sheet and thread. This group of objects may have been associated with esoteric or magical qualities (Kaul 1998, 16).

Considering how vital a resource beeswax was in relation to bronze casting, another possibility is that it was the beeswax rather than the honey that was important. In this connection, the three smelting lumps, which were also part of the deposition at Hedegyden, may constitute a ritual starter pack for a new casting process, together with beeswax. They may have been part of a symbolic transformation of the objects in the deposition (Brück and Fontijn 2013, 212; Lund and Melheim 2011, 449). Casting cones, casting cakes or 'bronze scraps', which were apparently intended for melting down, are relatively common elements of multi-type depositions. Nor is it uncommon for different kinds of organic material to be present together with bronze objects (Frost 2003; Matthews 2008; Madsen and Hansen 2021; Nielsen and Hjortlund 2021; Jensen and Runge 2008; Sarauw 2015; Thrane 1987, 200). Scientific analyses of the organic materials from the depositions, which could clarify whether beeswax was also a fixed element of an offering package, are, however, required. A single example is the find from Tranegård near Ramløse, North Zealand, consisting of an oath ring, two gold spiral rings and a gold bar (Jørgensen and Petersen 1998, 43). The objects were found encapsulated in an organic mass, which also contained beeswax. The cast bronze container shaped like a straw beehive in the Late Neolithic find from Skeldal can be regarded as a symbolic example of the close association between valuable metal craftsmanship and beekeeping, or rather the products of beekeeping (Jørgensen and Petersen 1998, 39; Vandkilde 1990, 117).

A third possible interpretation for the concentration of honey-indicating pollen is that honey or liquid containing honey constituted part of the overall offering package. The use of honey and honey-based drinks as offering gifts (libation) is described in ancient sources and depicted in art (Bowie 2020; Burkert 1985, 70-72). When Odysseus is to bring the souls of the dead up from the underworld, he digs an offering pit, around which he offers honey, wine, water and barley (Homer Od. 10,518-26, 11.26-34 in Otto Steen Due's translation). The use of honey in connection with Bronze Age depositions or offering activities is represented in a North European archaeological context by the offering well from Lichterfelde, Berlin, where more clay vessels contained honey-sweetened beer (Koch 2018, 82-84; Müller 1964, 25-27). In addition, Norwegian bog finds of bark buckets contain remains including beeswax (Henriksen 2014, 158-159) and honey-based mead in several oak coffin graves can also be mentioned in this context (Koch 2018, 71; Thomsen 1929, 184).

Overall Assessment of the Find

Based on the stratigraphic observations made during excavation of the site and the excavation of the block lift the following assessment can be made regarding the internal relationship between the ornaments in the deposition. Hanging vessel 1090x4 formed the base which the belt ornament 1090x3 was placed on top of. The straw in the largest of the hanging vessels 1090x1 suggests that something was packed down inside it, probably the smallest of the hanging vessels 1090x2. The preserved wood in hanging vessel 1090x2 indicates that, until quite recently, it lay undisturbed in an oxygen-poor environment. Because of the circumstances associated with the find, it cannot be determined whether this was a single combined deposition, or it was a contemporary deposition of two different sets of ornaments. The uniformity of the ornaments, compared with various examples of multi-type depositions consisting of carefully packed objects deposited together, indicates that the deposition at Hedegyden should be interpreted as one single event.

Four AMS dates have been undertaken on the organic material in the find (Figure 4, Appendix 2). The calibrated AMS dates of straw (AAR 34082), which has been used as packing material in hanging vessel 1090x1 and presumably is of the lowest age, falls within the date range 753-403 cal BC (95.4 % probability). This broad date range reflects the problems associated with the so-called Hallstatt plateau in relation to absolute dating in the late part of the Bronze Age (e.g. Kneisel 2013, 109; Olsen et al. 2011). A calibrated date (AAR 34083) on wood/bark found under the bottom-most hanging vessel 1090x4 falls within the period 909-800 cal BC (95.4 % probability), and thus within the classic period V division. The other two dates on wood/bark found between hanging vessel 1090x4 and belt ornament 1090x3 (AAR 35030), and from bark around the neck of vessel 1090x4 (AAR 35031), are however somewhat earlier, with calibrated date ranges within period III-IV.

Despite the unhelpfully long calibrated date spans, the AMS dating of the straw indicates that the deposition was made in the last part of the LBA, presumably around the period V-VI transition.

Hedegyden, the local and regional Context

Østfyns Museer has in recent years carried out excavations of three other offering finds dating to the Bronze Age. All discovered by detectorists. The finds all seem to be associated with springs or terrain where water flows out.[5]

At Mensalgård, south of Ladby, two highly corroded hanging vessels were found in 2020 (Frost and Beck 2023a, C19) (Figure 5). The two vessels were packed closely with a layer of straw between them and they had probably been twisted out of shape to fit into a very small hole. The straw has been AMS dated to 898-774 cal BC (95.4 % probability, AAR 34552; Figure 4, Appendix 2). Typologically, the two vessels can be placed in LBA V (900-700 BC) and the AMS dating of the packing material supports this. Charcoal found in the soil close to the vessels has been AMS dated to 1376-1057 cal BC (95.4 % probability, AAR 33358). This indicates that activities took place here during the EBA and could underline the sacred character of the area.

A pocket of light-coloured sand could be observed around the pit containing the hanging vessels. The sand differed from the otherwise clayey subsoil, suggesting that this was a dried out spring, where the objects had been deposited. The finding place is located in an area that according to both the O1 map and Historical Topographic Map (Høje målebordsblade 1842-1899) was wet meadow, and modern data shows that groundwater is still at a high level. From here a tributary of the brook Vejlebækken emanates, which around 1.6 km further north flows out into Kerteminde Fjord (Figure 6). The area must have been of special importance in the LBA, as the two hanging vessels are not the only finds. Within a short distance metal detector surveys have also resulted in the discovery of a celt and a socketed chisel, as well as a fragment of a gold bowl of the same type as the Mariesminde and Midskov vessels (Ebbesen and Abrahamsen 2012).

At Holemose, east of Ullerslev, in 2019 the museum excavated a multi-type deposition containing different types of equipment, often considered as either male or female objects, respectively, from EBA II (1500-1300 BC). On the basis of results of the excavation, as well as information from the O1 map and LIDAR maps, the find is associated with a probable spring, which runs down to Holemose, a small kettle bog just to the south of the find spot (Beck 2020, Frost and Beck 2023a, C300).

Only 1 km west of the find at Holemose, in 2021 a multi-type deposition containing ornaments from LBA IV (1100-900 BC) was found and excavated (Beck 2022, Frost and Beck 2023a, C301). Remains of the pottery vessel in which the ornaments were deposited were also present. The vessel had been placed with its rim facing downwards. The remains of the vessel were taken away from the site in a block lift and excavated. Charcoal found during this work has been AMS dated (Figure 4, Appendix 2). The calibrated dates fall within the EBA and can therefore hardly be directly associated with the deposition event. A small pocket of light-coloured, yellow sand was observed in connection to the pottery vessel. The

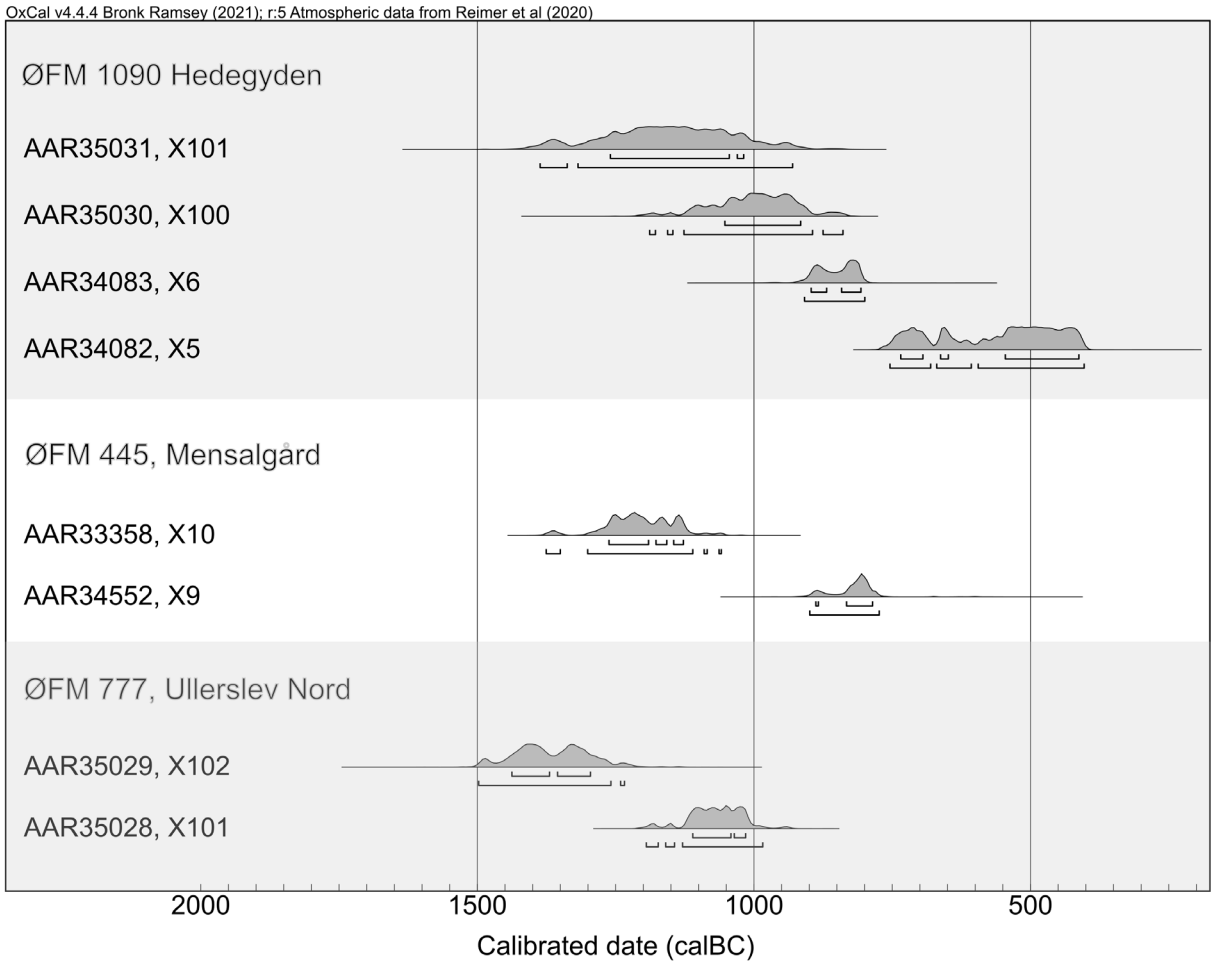

Figure 4. Calibrated AMS dates of three new offering finds excavated at Hedegyden, Ullerslev and Mensalgård in East Funen. For primary data see supplementary material Appendix 2 (Graphics: Jonas Ogdal Jensen, Moesgaard Museum).

subsoil at the location otherwise consisted of moraine clay. It cannot be established with any certainty whether this is a dried-out spring or merely a coincidental geological phenomenon. Excavations carried out in 2022 and 2023 testify a high ground water level in connection to geological phenomena of larger sand pockets in the morainic clay close to the deposition, and 12 m south of the deposition site, a well pit from LBA IV has been excavated. There are thus indications that the find may have been associated with water flowing out. However, as traces of a workshop site from the LBA have also been excavated, the hoard find may just as likely have been associated with this.

Besides these new finds a large number of Bronze Age depositions have been found near one of the sources of the Vindinge Å system in the Mariesminde bog area. The river runs close to the cooking

Figure 5. The best preserved of the two hanging vessels from Mensalgård. The maximum diameter is 14 cm. The surface of the hanging vessel is decorated with a punched dot running dog motif (Photo: Rógvi N. Johansen, Moesgaard Museum).

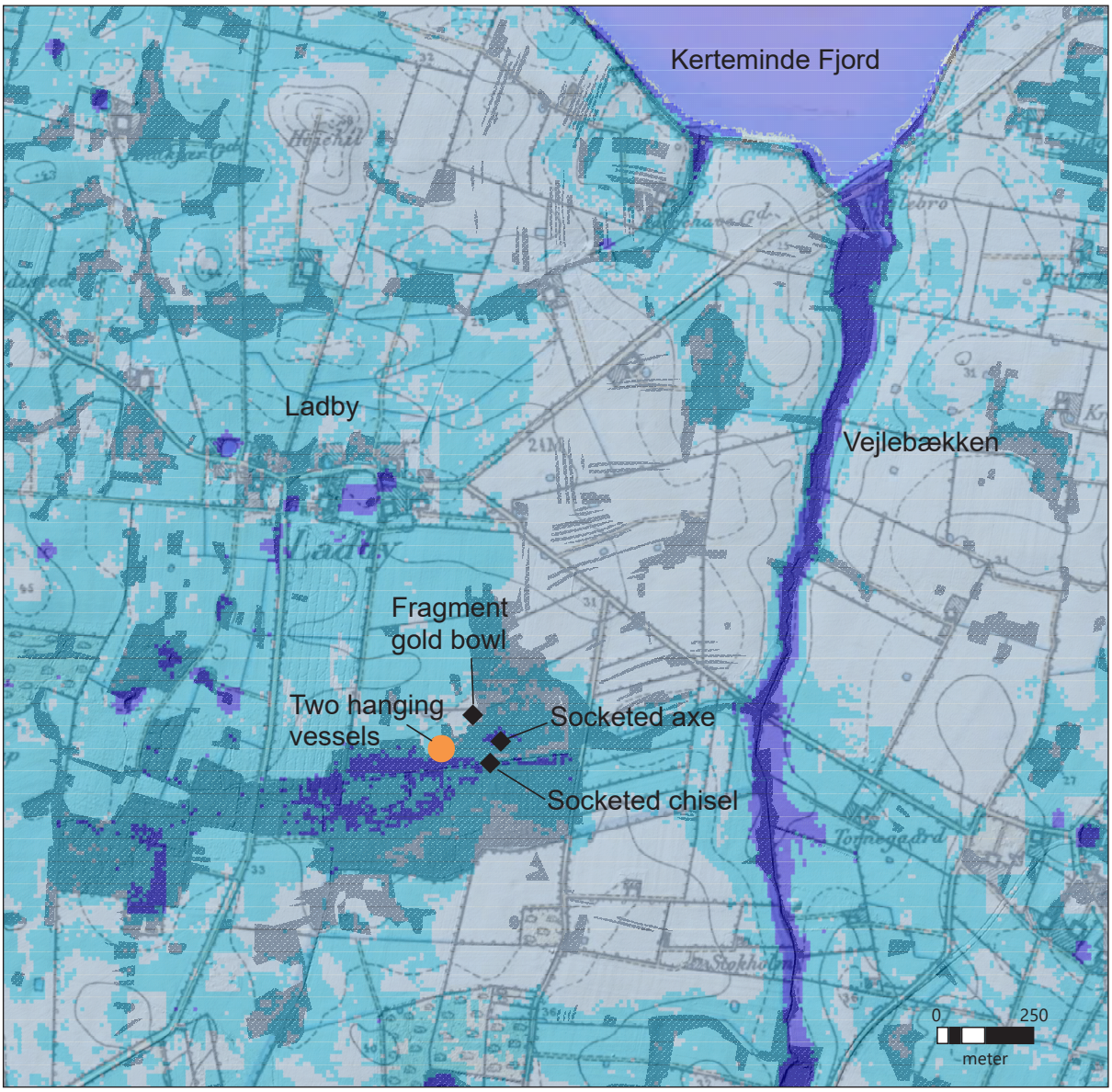

Figure 6. Distribution map of finds in the Mensalgård area. Base map involves Høje målebordsblade (1842-99), digitised wet meadows from the First Cadastral map marked with hatching, and present day summer groundwater level. Dark blue colour: groundwater 0-0.5 m below surface. Data from Styrelsen for Dataforsyning og Infrastruktur and Østfyns Museer (Graphics: Malene R. Beck).

pit area at Rønninge Søgård (Thrane 1974, 2009; Jensen 2011; Frost and Beck 2023a, fig.13), and flows around Nyborg and out into the Great Belt (Figure 7). A number of hoard finds from both the EBA and LBA are associated with the river, its tributaries and associated wetlands. Most of the finds are single finds of axes, which are distributed along the whole course of the river. In the lowest part of the river's course out towards the Great Belt coast, several sword finds have been made (Frost and Beck 2023a, Fig. 19), a situation often observed in a broader North European context (Fontijn 2012, 63). In the upper part of the Vindinge Å system and close to its different sources, however, greater numbers of arm and neck rings have been recorded (Frost and Beck 2023a, Fig. 9). It is uncertain whether different stretches of the river were associated with different meanings, but a number of researchers have pointed out that the changing nature of water in a watercourse may have been perceived as different characteristics (affordances such as slow running water, places where the water flows out, where one stream of water runs into another or where fresh water meets the sea), which also encouraged different approaches to which objects were selected for deposition (Fredengren 2011, 110).

Figure 7. Vindinge Å with offering finds and wetlands (dark grey) digitised from the First Cadastral Map. Early Bronze Age offering finds marked with green symbols. Per. I: dark green, Per. II: green, Per. III: light green. Late Bronze Age offering finds marked with yellow, orange and red symbols. Per. IV: yellow, Per. V: orange, Per. VI: red (Graphics: Malene R. Beck).

Even though both the EBA and LBA are represented amongst the hoard finds along the Vindinge Å, there is clear variation in terms of which areas were most actively or intensively utilised through the Bronze Age (Frost and Beck 2023a).

The find at Hedegyden is located in a landscape that is dominated by offering finds from the LBA. Along the course of the river, both to the west and east, however, depositions dating to the EBA are dominant. The chronological distribution may be the result of new landscapes being taken into use during the course of the LBA (Holst et. al 2013, 25; Kristiansen 2018, 128). In recent years, remains of settlements dating to the LBA have been excavated at several sites north of Vindinge Å. These include examples of sites with possible specialised functions in the form of metalworking.[6] The archaeological finds suggest that the north-eastern part of Funen was quite densely populated in the LBA, both in the coastal areas and the central part of the island (Runge 2010, 91-102). Almost no traces of LBA settlements have so far been recorded in the landscape south of Vindinge Å. This could reflect modern circumstances rather than the actual prehistoric situation. The pollen analyses suggest that cultivated fields were located only a short distance away from the deposition site at Hedegyden, and that the landscape nearby was also used for grazing animals. The deposition was therefore made in a border zone, between areas that had obviously been affected by human activity and a largely undisturbed natural landscape. Based on the topography, it is tempting to assume that a contemporary settlement with associated fields was located between 250 and 500 m to the south of the deposition, on the higher terrain.

The find from Hedegyden can be added to a group of multi-type depositions dating to LBA V (900-700 BC) from northeast Funen. These include the hoards from Lindø (Thrane 1987), Kertinge, Tårup and Mensalgård, all of which contain hanging vessels combined with a number of other objects (Frost and Beck 2023a Cat. no. 19, 22-23, 60 and 262). Several of the finds are located near the coast and none more than a few kilometres from open sea. There are suitable natural harbours at both Holckenhavn/Nyborg Fjord and Kerteminde Fjord (Beck et. al 2021; Crumlin-Pedersen et al. 1996, 71, 81), which may have been the starting point for contacts across the Great Belt (Höckmann 2012, 68) or for networks via the Baltic Sea and further south. The natural conditions around the Helnæsbugt bay in south-west Funen, with its suitable natural harbours, perhaps have a parallel in northeast Funen. So far no high-status burials or settlements are known from north-east Funen which match the level of the Voldtofte area (Henriksen 2011, 2018, 2021; Thrane 1984, 1989).

Recent excavations of settlements, where remains of casting moulds have been found, show that there were specialised metal workers in north-east Funen and therefore perhaps also a foundation for production, trading networks and contacts at a high social level, which are reflected by the offering finds.

Chaîne opératoire for the depositional Act at Hedegyden

Based on the internal relationships between the ornaments and stratigraphy, as well as the analyses of the organic remains, a *chaîne opératoire* is proposed for the depositional act at Hedegyden (Figure 8, Table 1). The *chaîne opératoire* is based on concrete observations from Hedegyden, but also proposes sub-elements and activities, which can be found in or demonstrated by other finds.

Preparation

The ornaments were carefully packed together in a specific order and according to an overall idea in a bark bucket (Figure 8.1). Perhaps the container in which they were usually stored when not in use. A piece of honeycomb filled with honey was placed in one of the hanging vessels and three smelting lumps of copper alloy in another hanging vessel. A layer of straw was placed between each ornament. The straw suggests that this part of the deposition event occurred in a settlement area, within the context in which the ornaments were normally used, and where straw was probably easily accessible after cereals had been threshed. Alternatively, the straw may have been directly removed from the field close to the settlement. If the last scenario is correct, the deposition probably took place in late summer, although threshed straw may have been available during longer periods of the year.

This first part of the act of deposition event may have been a private occurrence, involving only a few people. But it is also possible that a larger group of individuals witnessed the ornaments being packed down as part of a ritual practice. The deposition could emphasise the status of specific people or families (Frost 2011, 39; Kaul 1998, 44; Leonard 2015, 2). More likely though the ornaments, which based on the use-wear traces already had a long life behind them, were imbued with specific meaning and qualities that made them suitable for deposition at this exact place in the landscape (Brück and Fontijn 2013, 205).

After the ornaments were carefully packed down into the bark bucket, they were carried from the settlement area to the chosen deposition site – the spring (Figure 8.2). Different stages and activities may have taken place along the way, or a procession of people could have followed the journey of the ornaments from the settlement to the deposition site at the spring and thus out into the more open and probably common meadows or grazing area (Henriksen 2014, 301; Kaul 2004, 55).

The excavation indicated that the spring was a clearly delimited sand pocket in subsoil otherwise consisting of moraine clay. It must therefore be assumed that clear water flowed up from the ground within a quite well-defined area, and then ran down towards the tributary of Vindinge Å.

The ornaments were not merely placed at the spring: a pit was instead dug down at the edge of the area where the water flowed out (Figure 8.3).

Deposition

First, a crushing stone was placed in the pit (Figure 8.4), perhaps as an initiation of the site before the actual deposition.

Following the crushing stone, the bucket containing the ornaments was placed in the pit, into which the spring water had probably already flowed (Figure 8.5). The preservation of wood and the patination of the bronze objects indicate that the objects were rapidly absorbed into a wet/oxygen-poor environment (Figure 8.6). The water was probably clear, and the objects were therefore visible, so that the bright bronze of the ornaments could reflect in the water and sunlight (Fredengren 2011, 117). The spring had been decorated and the participating actors had witnessed the event.

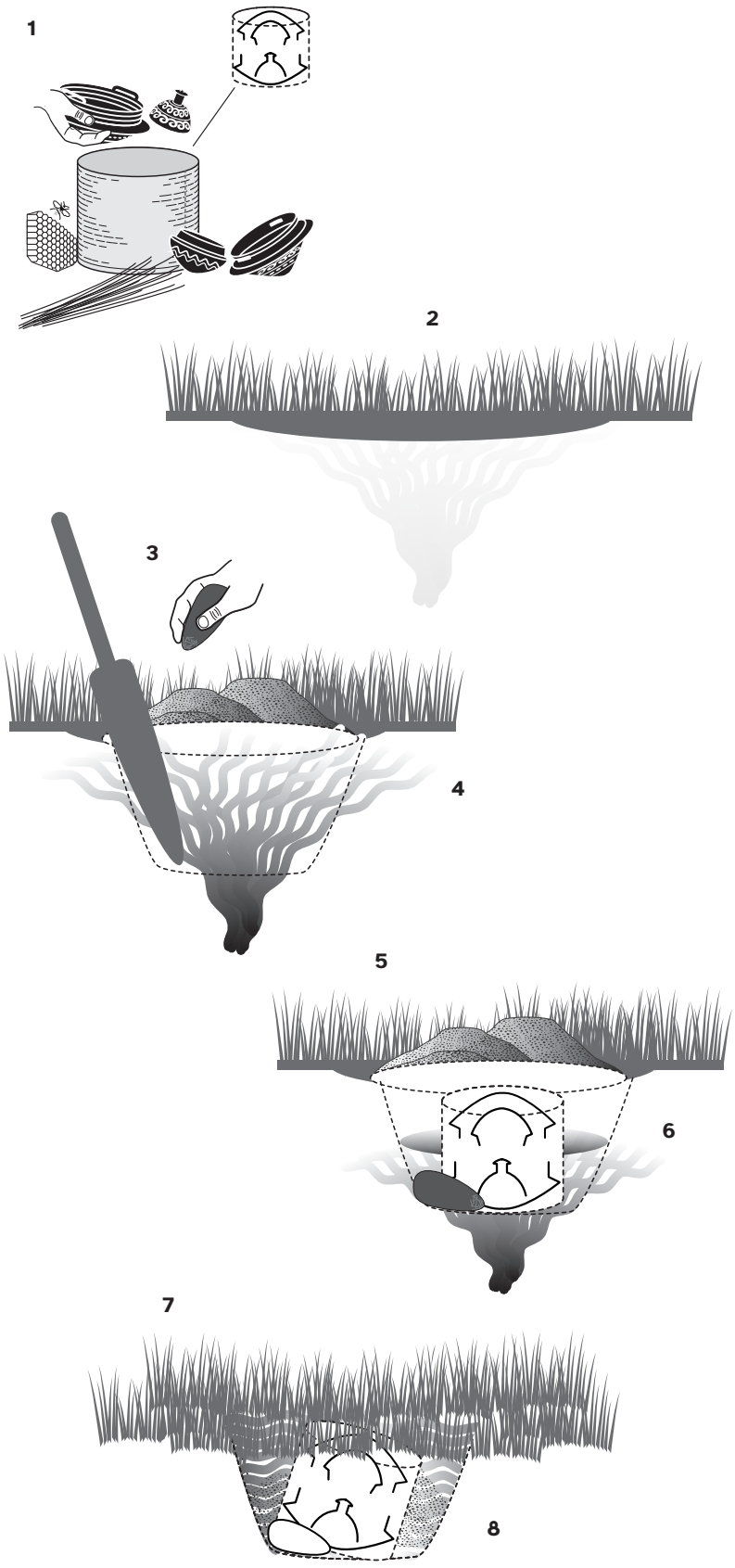

Figure 8. *Chaîne opératoire* of the deposit event at Hedegyden (Graphics: Louise Hilmar, Moesgaard Museum).

Post-deposition

After a few years, the pit became filled up with deposits from the spring and its surroundings (Figure 8.7). The water/landscape had encapsulated and accepted the deposition of ornaments, which were no longer visible, and perhaps only existed in the stories about the landscape and the memory of the sacrificial event. By digging a hole in the spring, the natural landscape was interacted with,

		Hedegyden	Overall idea and course of activity
Preparation	**1**	The ornaments are packed in a bark bucket in a specific order, with layers of straw between them. A piece of honeycomb containing honey is placed in the bottom hanging vessel.	Objects are selected, arranged and packed according to an adopted order and ritual.
	2	The offering package and crushing stone are carried down to the spring.	Procession with the objects to the chosen deposition site.
	3	A hole is dug into/at the spring.	Interaction with the landscape I. Intervention into the landscape. The deposition site is opened up.
Deposition	**4**	The crushing stone is laid down in the hole as an initiation.	Interaction with the landscape II. The deposition site is inaugurated.
	5	The bark bucket containing the ornaments is placed down in the hole, in which the water has begun to rise up.	Interaction with the landscape III. Deposition of the objects. Participants observe the site receiving the deposition.
Post-deposition	**6**	The ornaments are surrounded by spring water, which flows into the hole and fills it up. The ornaments are still visible for a period of time, perhaps several years.	The water/landscape accepts and surrounds the deposition.
	7	The hole becomes filled with deposits.	The water/landscape conceals and absorbs the deposition. The deposition is integrated into the landscape.
	8	The landscape is changed by the deposition.	The landscape is modified or humanised. The story of the deposition and its significance is handed down.

Table 1. *Chaîne opératoire* for the find at Hedegyden and depositions in general (Graphics: Louise Hilmar, Moesgaard Museum).

modified and humanised (Figure 8.8). The landscape was quite literally opened up and a mark was made by placing the crushing stone and then the hoard of ornaments into the water of the spring. The gift was possibly a humanisation of the spring (Fredengren 2018, 221, 234; Stevens 2008, 243), which perhaps ensured help and continued access to the life-giving water. The deposition could, however, also have been a way of making a (in)visible mark on an otherwise uncultivated landscape. For the participants and spectators attending the deposition act, the deposition added an extra dimension and meaning to the landscape. This knowledge and meaning could be handed down to future generations in stories and legends (Fredengren 2018, 232; Leonard 2015, 9) and also mark the right of to access and use of a landscape (Fontijn 2008).

Spring Offerings in a new Light

The new investigations in East Funen show that we need to adjust our perception of Bronze Age offering traditions in relation to spring offerings. A proportion of the many old wetland finds are undoubtedly associated with places in the landscape where water flows out, rather than simply depositions associated with water or wetlands in the broad sense (Frost and Beck 2023a, 2023b).

Today, the Hedegyden area consists of cultivated fields, and the character of the prehistoric landscape, in terms of wet and dry land, cannot be immediately deciphered. The metal detector find therefore highlights the important role played by archaeological and scientific investigations in understanding the character of the deposition site. Several new discoveries from East Funen emphasise that offerings in and around springs are probably an overlooked component of the deposition tradition during the Bronze Age. In the case of

Hedegyden, the interpretation from the excavation is supported by pollen analysis, which indicates that there was a meadow in the immediate surroundings. The same picture is also indicated by wet symbols on historical map material. Four ^{14}C dates, together with the typology of the objects, suggest that the deposition was probably made in late LBA V. The NPP analyses indicated that bees' hair was present, suggesting that honey or beeswax were included in the deposition. There is a marked tendency to focus on the metal objects when hoard finds are analysed. The Hedegyden find emphasises that the depositions not only consisted of ornaments, tools and weapons, but also organic materials, which were included in and were probably just as important to the rituals associated with the deposition (Matthews 2008, 106) as the antiquities that were less susceptible to decomposition.

The deposition itself, what happened before and what followed can be placed into a *chaîne opératoire*. This schematisation of the act provides detailed insight into the offering event itself. The find is significant in a local context along Vindinge Å, as well as in a regional context, emphasising the importance of the East Funen area. In terms of landscape and organisation, the deposition at Hedegyden also makes a valuable contribution to our knowledge about the Bronze Age communities' use of the landscapes located in border areas or completely outside settlements and fields.

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Declaration of Interests

No conflicts of interest are known by the authors in relation to the material addressed in this article.

Notes

1 The finding place is registered in the Danish Sites and Monuments database no. 090609-18. It has journal no. ØFM 1090 and the original documentation from the excavation is stored with Østfyns Museer. The excavation of the block lift was undertaken by conservator Ida Hovmand, Bevaringscenter Fyn.
2 Analyses of botanical material undertaken by PhD Peter Hambro Mikkelsen, MOMU. Rapport FHM 4296/3292.
3 Analyses of botanical material undertaken by PhD Peter Hambro Mikkelsen, MOMU. FHM 4296/3292. Pollen analyses by PhD Renée Enevold, MOMU.
4 Pers. comm. Thomas Jørgensen, curator, Museum Nordsjælland.
5 Mensalgård, Sites and Monuments no. 080106-108, Holemose, Sites and Monuments no. 090616-88 excavation carried out with a grant from SLKS, and Ullerslev Nord Sites and Monuments no. 090616-85 excavation carried out with a grant from SLKS.
6 Sites and Monuments no. 090110-44 Anhof, no. 090601-106, Bakkely, no. 090616-92 and 93 Kertemindevej.

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Supplementary

Supplements see .pdf-attachment