Ugly, but pure! A votive deposit of as-cast axes from Emmerhout (prov. Drenthe, The Netherlands)?

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Ugly, but pure! A votive deposit of as-cast axes from Emmerhout (prov. Drenthe, The Netherlands)?

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1. Find circumstances

In 1982, a hut was being constructed in the Emmerdennen area, during which "…on a single spade, at c. 60 cm below the surface" two Bronze Age palstaves emerged. Later investigation in 1983 by the Groningen Institute for Archaeology, discovered that the axes originated from a prehistoric pit (fig. 1; star-symbol). This pit comprised a quartzite stone (761 grams, unworked), four tiny fragments of quarts-tempered Bronze Age pottery (1.51 gr) and a single flint flake (1.66 gr). The remainder of the fill consisted of soil with tiny fragments of natural granite rock (in part dislocated pottery temper) and small fragments of charcoal, indicating that soil enriched with settlement debris was used to backfill the pit.

In terms of landscape position, the pit was situated in a lower-lying part of the landscape (*c.* 24 m above D.O.D. and less than 20 m west of an urnfield investigated by F.C. Bursch in 1933 (Bursch 1936: 53-72). At the center of this urnfield, an elongated (Type Vledder; Kooi 1979: 131; Verlinde 1987: 173-178) long-bed barrow was erected. This type of funerary monument is dated to *c.* 3000-2860 BP (Lanting 1986: 107; Hessing & Kooi 2005: 636; 653 note 12), although a dating after the 13th century is generally advocated (*cf.* Herring 2009: 262). At *c.* 290 m to the southwest, houses datable to the Middle Bronze Age-B were found (Kooi 2008: 66), as is suggested by the date of 3090 ± BP for charcoal from a pit in the aisle of house 32 (Van der Waals & Butler 1976: 56). Evidently, the Emmerhout axes were placed in part of the cultural landscape that was used for habitation and interment throughout the Bronze Age (see Arnoldussen & Scheele 2012 for the long-term developments at this site).

2. Description: as-cast axes?

As the axes have been published before by Butler and Steegstra (1997/1998: 170 cat. nos 179-180 (Assen 1983/I.4-4a)), only a summarized description of their properties will be given here (fig. 2). The most intact axe (DB2054/cat. 179 / Assen 1983/I.4) measures 17.5 cm in length, 4.5 cm in width and 2.6 cm in thickness (weight 412 gram). A narrow mid-rib is visible on the blade. Various gaseous pores and some cracks are visible in the topmost part. Casting seams are preserved on both sides and the cutting edge is not sharpened.

The less complete axe (DB2055/cat. 180/Assen 1983/I.4a) measures 17.5 cm in length, 4.6 cm in width and 2.6 cm in thickness (weight 364 gram). Again, casting seams are preserved on both sides and the cutting edge is not sharpened. A pronounced narrow mid-rib is visible on the blade. The top part of the axe shows severe longitudinal cracking and irregular bulges are visible on the septum above the stop-ridge.

The unsharpened cutting edges and visible casting seams indicate that the axes were deposited in "as-cast" condition (save perhaps from the loss of the top part of DB2055). We agree with Butler and Steegstra (1997/1998: 170) that both axes are "evidently miscast". Based on different degrees of constriction of the blade body below the stop-ridge and the different shape of the stop-ridge, the axes were cast in different – but comparable – moulds. What was described for the longest axe (DB2054/cat. 179 /Assen 1983/I.4) as a "damage" to the butt by Butler and Steegstra (1997/1998: 170), to our minds could also result from incomplete filling-up of the mould during casting. Similarly, the missing top piece of the incomplete axe (DB2055/cat. 180/Assen 1983/I.4a) may either have been lost prior to deposition or was never present to begin with (again due to incomplete filling of the mould).

3. Typological considerations

Based on their overall outline and distinguishable narrow blade mid-rib, the Angelo axe pair both can be classified as "Group I North European palstaves, with narrow midrib" (AXP:ne.AMIN; Butler & Steegstra 1997/1998: 171). Beyond the Netherlands, such palstaves can be found under Bergmann's (1970: liste 88) "*Form 2*" palstaves or as Kibbert's (1980: 201-213; Taf. 34 nos. 501-508) "*Typ Kappeln, var. A*" palstaves. The centre of gravity for their distribution is placed around the Lüneburger area and middle Weser areas, with more westward occurrences along the Weser and Ems channels and tributaries (fig. 3; Bergmann 1970: Karte 36; Kibbert 1980: Taf. 64B).

No direct dates are available for palstaves with narrow midribs, but a dating in the 15th to 13th centuries seems plausible based on Kibbert's (1980: 211) attribution of Type Kappeln axes to periods II (and a few to period III; Butler & Steegstra 1997/1998: 172; 179).

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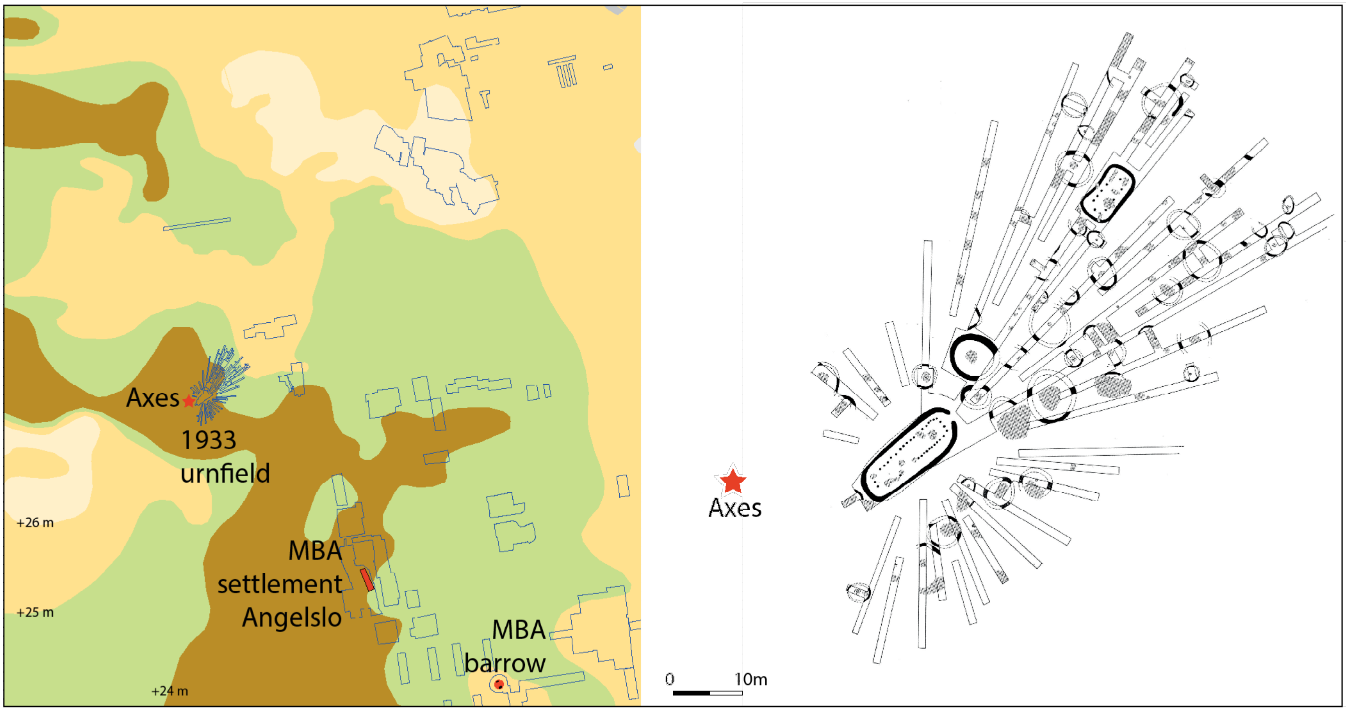

Fig. 1. Left: overview of excavation trenches at Angelslo-Emmerhout (from: Arnoldussen & Scheele 2012) with location of findspot indicated. Right: overview of Bursch 1933 urnfield excavations (from Bursch 1936: 54 fig. 27).

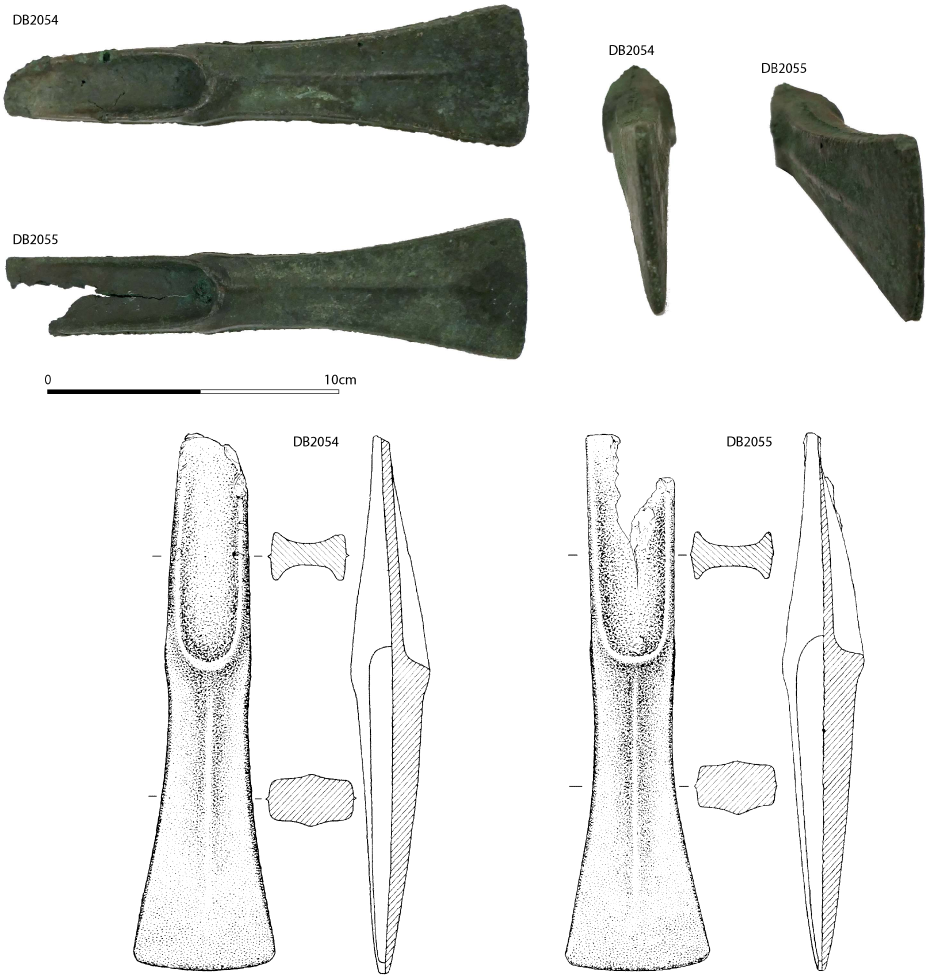

Fig. 2. Photos (top) and drawings (from: Butler & Steegstra 1997/1998: 171 fig. 43) for the Emmerhout axes.

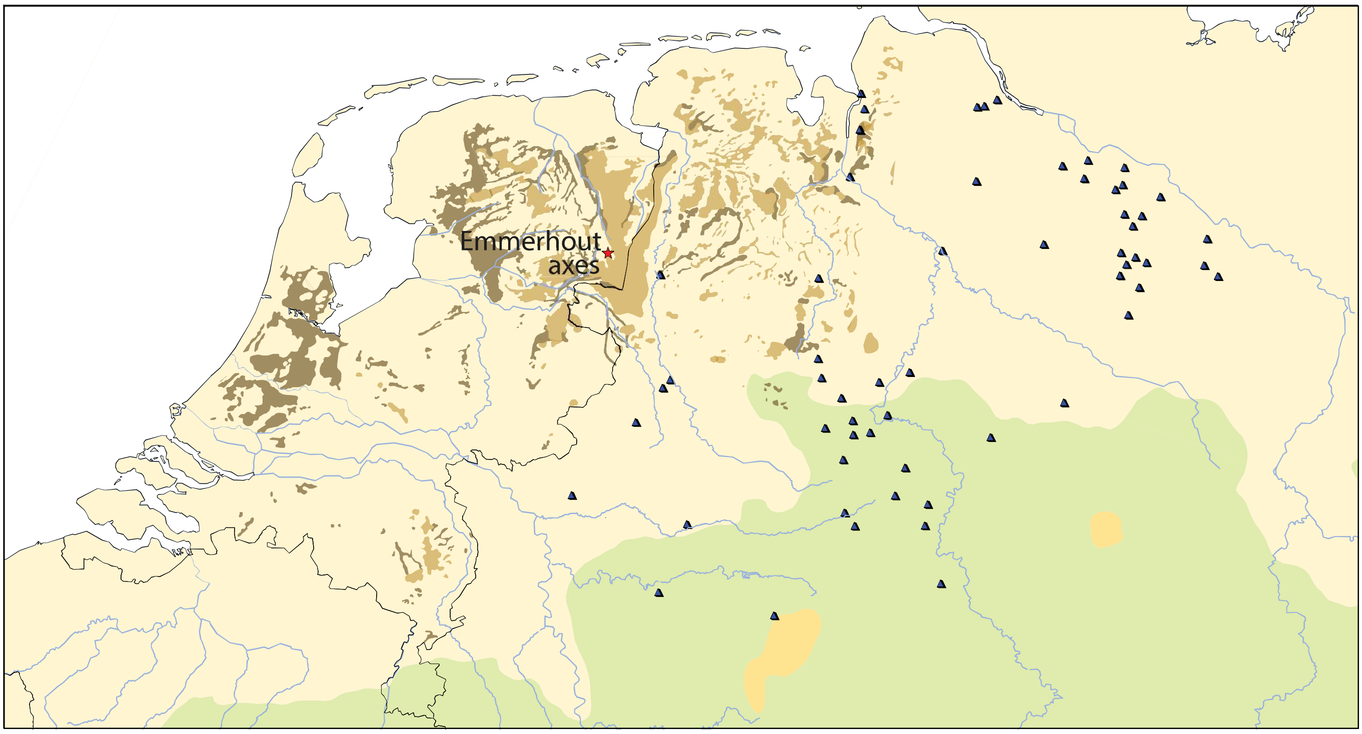

Fig. 3. Distribution pattern (triangles) for Bergmann's (1970: karte 36) "Form 2" palstaves and Kibbert's (1980: Karte 64B) 'Typ Kappeln, var. A' palstaves. The location of the Emmerhout axes is indicated with the star-symbol. The brown-green zones denote peatlands and marshes.

4. Composition

A study of the axes' composition was undertaken in cooperation with dr. Bertil van Os and dr. Liesbeth Theunissen of the National Heritage Agency (RCE) of the Netherlands. The elemental composition of the alloy of the Emmerhout axes was determined with portable X-ray fluorescence (pXRF) using a Thermo Scientific NitonXL3t. This device measures up to 25 elements simultaneously in the elemental range from sulphur (atomic nr. 16) to uranium (atomic nr. 92), but can also detect light elements in the range of magnesium (atomic nr. 12) to chlorine (atomic nr. 17). All measurements were taken in "alloy mode" for a duration of 25 seconds. All objects were measured four times, incorporating both – if available – areas devoid of corrosion and corrosion locations. As corrosion was limited (iron content measured less than 0.34% wt), the measurements with the highest copper content (taken at locations of recent damage to the patina) are held most representative for the composition of the axes (table 1).

	DB 2054	DB 2055
Cu	77,74	81,96
Sn	22,16	18,02
Pb	<0,0	<0,0
Zn	<0,1	<0,1
As	<0,1	<0,1
Ag	<0,1	<0,1
Sb	<0,0	<0,0

Table 1. Composition of the main alloy elements for the Emmerhout axes.

It is clear that both axes represent a high-tin, low-impurity copper alloy. Frequently occurring trace elements such as arsenic, antimony, lead, nickel, silver, zinc and bismuth are all absent (or below detection limits of <0,1 %wt). Allowing for some differences in tin-content in the patina of both axes (on such increased tin-content of the surface corrosion or tin-sweating see: Meeks 1986: 133; Wouters 1994: 45; Orfanou & Rehren 2015: 392; Nørgaard 2017: 102, 105-106), both axes could have been cast in a single melt due to their highly similar, pure, tin-bronze composition.

5. Contextualisation of location, composition and finish

Dutch Bronze Age finds of similar low-impurity copper are almost absent (based on a review of finds with impurity levels <0,05 %wt). A possible comparandum also originates from Drenthe. The blade of a Wohlde rapier dredged from the Mussel-Aa (RMO c1928/IX.1), contained no measurable amounts of antimony, nickel, bismuth and silver, but did show minor additions of lead (0,025-0,03 %wt), zinc (0,05-0.15 %wt) and arsenic (0-0,03 %wt). Whilst not a perfect copy, it shows that in the 16th century BC objects of such pure tin-bronze reached Drenthe. As for objects contemporary to the Emmerhout axes (i.e. 15-13th BC) but from wider Europe, the relative scarcity of such a pure alloy persists. We can, however, cite a knobbed sickle from Neuchatel that contained 0.025%wt As, 0,005 %wt Pb, 0.088 %wt Sb, 0.048 %wt Ni and no detectable bismuth and silver (Rychner & Stos-Gale 1998: 173). Two flanged axes found in Denmark but classified as "of English type" (SAM-2734 and 3883; Nørgaard, Pernicka & Vandkilde 2019: 9; supplementary materials) also show 10-11 %wt tin but no other impurities above the 0.05 levels. These are interpreted as locally remelted objects from the British Isles (*ibid.*). In the data-sets of British metalwork analysed by Britton (1961, 1963) and Needham (1983) a total of 12 objects (dated to metalwork assemblage phase 6; Roberts *et al.* 2013) of comparable composition are listed: eight flanged axes, three daggers and a socketed spearhead. Evidently, similar compositions are known from insular as well as continental contexts.

Amongst the Mitterberg ores, low-impurity deposits are common (Pernicka & Lutz 2016: 29; 30 fig. 8, in Pernicka *et al.* 2016). Particularly the Burgschwaiggang deposit has a very low-impurity signal (Pernicka & Lutz 2016: 31 fig. 9), but similar low-impurity values are known for the Kitzbühel-Kelchalm deposits (Lutz & Pernicka 2013: 123). This renders an east-Alpine origin of the copper in the Emmerhout axe-ingots plausible (but to be proven with lead-isotope characterisation). Also, it does not allow to pinpoint where or when the tin was added to create the alloy.

Two conclusions are to be taken from the above. First, at the start of the MBA-B (15-13th BC) very low-impurity ores were exploited and rendered into circulation (Lutz & Pernicka 2013: 123; Pernicka & Lutz 2016: 31 fig. 9). Second, a pyrotechnical recycling economy (*cf.* Bray & Pollard 2012; Bray *et al.* 2015: 206; Pernicka & Lutz 2016: 33; Nørgaard, Pernicka & Vandkilde 2019: 9) implies that "pure" alloys of any given composition are prone to swift "corruption" by almalgation upon remelting and mixing. This means that that the Emmerhout axes avoided such a fate…but why?

The as-cast condition of both axes and pure alloy hints at a use of the axes from Emmerhout as axe-shaped ingots. The supposed use of ingot-axes has recently been argued to be part of a shape-based exchange economy, where objects are valued as exchange items because their basic shapes communicate their potential to be re-cast into functional objects (Pare 2013: 513-514; Fontijn & Roymans 2019: 178). The presence of as-cast axes is not common in the Netherlands (see Butler & Steegstra 1997/1998; Fontijn 2003: app. 2.5-2.8), but they have been reported for the Hogeloon hoard (Fontijn & Roymans 2019: 170) and in a hoard from Flevoland (Butler & Steegstra 1997/1998: 191). Other examples include the Danish Smorumovre (Johannsen 2015) and Store Tyrrestrup hoards (Nilsson 1996).

When we see these axes as playing a part in a shape-based exchange economy, their miscast state is in no way problematic. In their form and principle alloy, the potential to be re-cast into functional axes was already communicated by the two Emmerhout axes (*cf.* Fontijn & Roymans 2019: 176-178). This rendered moot any time investment towards refining them (*i.e.* removal of casting seams, hammering/sharpening of the cutting edge). In this sense, the axes are only "miscast" when they are viewed as axes, but decidedly functional when viewed as ingots. Casting flaws such as cracks or incompletely filled-up moulds do not matter for "ingot-axes": their projected life-purpose was remelting already when they were cast themselves. So why were the Angelslo "axes" never smelted?

In his re-interpretation of the Voorhout palstave hoard, Fontijn (2008:13-15) offers an attractive interpretation that the Voorhout "hoard" may be a votive deposit that – through the very act of deposition of a *pars-pro-toto* of a much bigger scrap import (presumably of mixed Channel origin) – allowed the conversion of non-local shapes and alloys into new, local, objects. The Hoogeloon hoard inventory also references the French-British exchange network responsible for introducing large amounts of metal to the Low Countries (Fontijn & Roymans 2019: 163, 172). Not only are these axes visibly of French-British origin, the depositional logic employed also seems to mimic French-British standards of the time (Fontijn 2008: 13). The deposition of axe trade stock seems to have been a practice that explicitly references the larger exchange networks (Fontijn & Roymans 2019: 178-182).

In this sense, the Emmerhout "axes" (or axe-ingots) may have served an identical purpose. We presume that these two "axes" represent the *pars-pro-toto* of a much bigger ingot transport into the Drenthe sandy soils. Based on axe-typology and composition, the upper Weser or lower Elbe area (*Teutoburger Wal*d or *Lüneburg-Uelzen* districts) could very well be the area of origin, with possibly the Mitterberg as the ultimate source of its constituent ores. In order to cosmologically legitimize its conversion from decidedly non-local forms into new – decidedly local? – forms, a symbolic part of the precious ingot cargo was offered prior to entering the local bronze crafters' crucibles.

The non-local provenance of the objects could therefore have been the deciding factor determining whether or not the axes were to be deposited. A concern with provenance is also visible in other hoards from the north of the Netherlands. Arnoldussen (2015) notes a preference to configure hoards containing combinations of local and non-local items throughout the Middle and Late Bronze Ages. In these cases, axes can both constitute the local component (n = 6) or the non-local component (n = 5), but are combined with a larger array of non-local objects including knives, buttons, razors and fibulae whilst the only other local components include bracelets (Arnoldussen 2015, table 1). Deliberate effort was made to somehow combine non-local objects with local objects upon deposition. In fact, together with the Angelslo axes discussed here, the only other completely (typologically) non-local hoard from the Northern Netherlands concerns the Nijeveen hoard. This hoard contains two Type Mägerkingen high-flanged axes of German origin (Arnoldussen 2015: 25; Butler 1995/1996: 220-221).

In terms of its cultural landscape context, the location of the Emmerhout votive deposit is imbued with overlapping potential significances that are impossible to disentangle: it may have been placed within the immediate settlement realm (as shown by sherds and flint from the pit's fill; albeit that this is rare: Arnoldussen 2008: 442-444), placed next to a founders grave of the local urnfield, or could have been placed in the lowermost parts of the landscape (as was common: Essink & Hielkema 1997/1998; Fontijn 2003). However, seeing that the as-cast state of the axes and their foreign provenance is relatively rare, this begs the question to what degree these were deciding factors steering where the objects were to be deposited. Supporting analyses where the provenance of a larger amount of objects is investigated, not just using typological markers but using for instance lead-isotope analyses, is evidently much-needed. Moreover, the study of provenance and depositional context should be combined with enquiry into the life-paths of objects chosen for deposition, in order to recognize traces of manufacture, use and repair. This multi-faceted approach has the potential to further our understanding of the criteria that governed the selection of these objects for deposition.

The Emmerhout "axes" were possibly cast as ingots, and were traded from central or northern Germany towards the west to be reworked into functional axes. The fact that they never reached that point, certainly doesn't diminish their significance. Rather, they presumably served an important ritual role in the conversion of non-local ingots into local objects. Additionally, the fact that they have remained "pure" of composition – even if ugly in terms of finish – serves to highlight how the economy of bronze items functioned in areas devoid of ores. Lastly, they were placed in the ground in a part of the landscape where the significances of everyday settlement, the ancestors and chtonic entities associated with the lower-lying parts of the landscapes overlapped.

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