STIJN ARNOLDUSSEN · NIELS KAMPERT · ARNOUD MAURER
G. J. M. VAN OORTMERSSEN · NICOLIEN BOTTEMA-MAC GILLAVRY · BERTIL VAN OS

A LATE BRONZE AGE SPEARHEAD FROM HILVERSUM-DE BOSKUIL (PROV. NORTH HOLLAND / NL)

A CASE STUDY IN EXTRACTING INFORMATION FROM STRAY METAL-DETECTING FINDS

Since July 2017, a legislative change was put into effect in the Netherlands that rendered metal-detecting of the topmost 30 cm – for sites not listed as archaeological terrains – as no longer illegal (Kars/Heeren 2018). As an effect, (later prehistoric) finds by metal-detecting enthusiasts are now communicated more openly and to wider audiences than ever before. In November 2019, the second author was metal-detecting in the forest area south of the city of Hilversum (prov. North Holland/NL) when he uncovered a bronze spearhead at c. 20 cm depth in the forest's sandy topsoil. When he posted this remarkable find on social media, it was noticed by the first author who urged him not to clean it himself but to temporarily hand it over for scientific research at the Groningen Institute of Archaeology, University of Groningen. Due to his prompt and enthusiastic response, we can now report here on various details of this Hilversum spearhead.

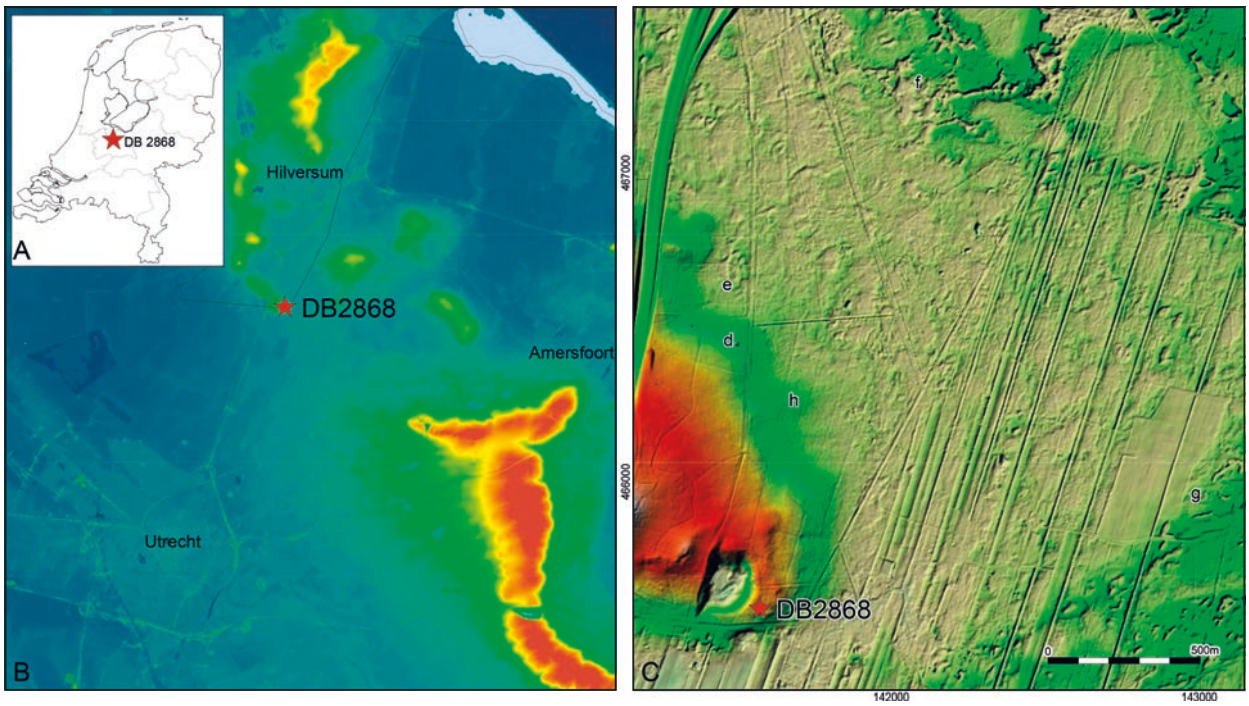

Fig. 1 Location of the find spot of the Hilversum spearhead (DB2868) within the Netherlands (**A**), its regional geogenetic context (**B**) and local topography (**C**) (altitude ranges between 1.3 m + D.O.D. [pale green-gray] and 20.1 m + D.O.D. [white]; **d-e** barrow locations Hilversum-Maartendijkseweg; **f** barrow location Hilversum-Smithuyserbosch; **g** unnamed possible barrow location; **h** tentative [levelled] tumuli group). – (Illustration S. Arnoldussen; altimetry data AHN3 Rijkswaterstaat).

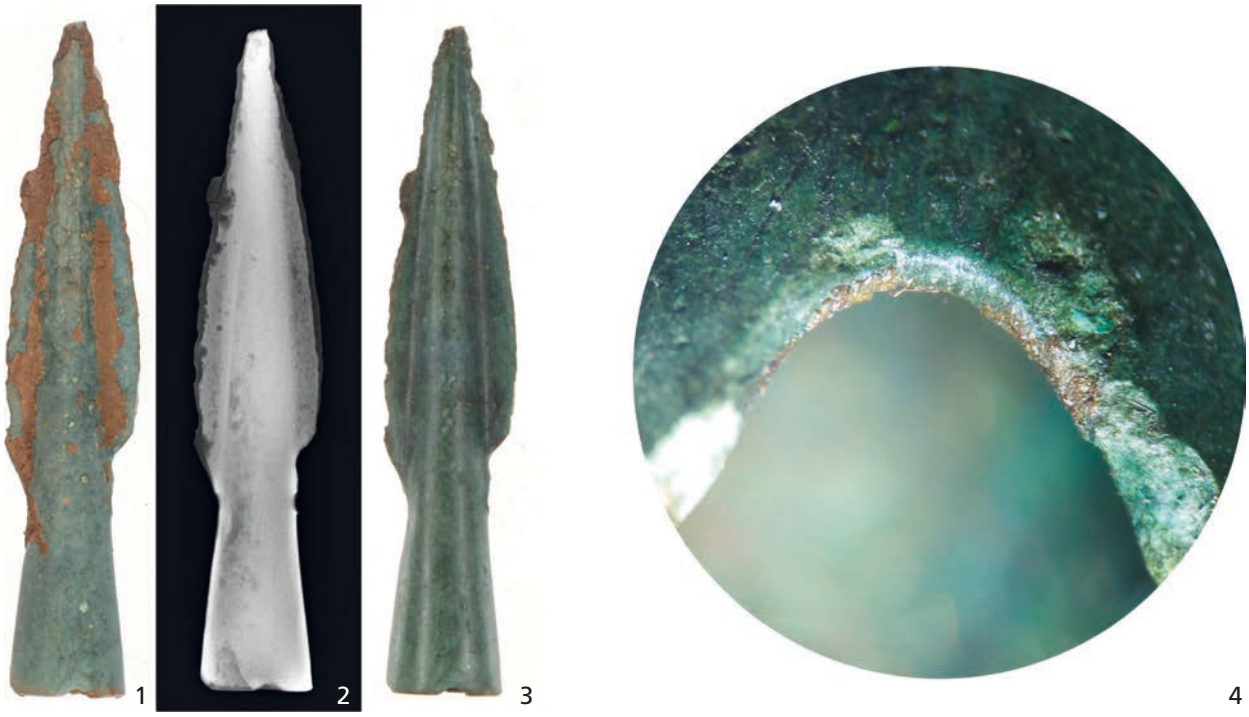

Fig. 2 The Hilversum spearhead as found (**1**), X-ray (**2**) and after preservation (**3**). The inset (**4**) shows the remaining part of the original peg-hole (reconstructed diameter 4 mm). – (Photos G. J. M. van Oortmerssen).

LOCATION

The spearhead was recovered from the forested area near Hollandse Rading, south of the city of Hilversum and close to a sand-extraction site known locally as »De Boskuil« (**fig. 1**). In geomorphogenetic terms, the find spot is located close to the tip of a series of minor ice-pushed deposits that are part of the Saalian Period central Netherlands ice-pushed landscape (the Laren-Huizen ice-pushed ridge; van der Wateren 1985; Ruegg/Koopman 2010). Locally, the landscape rises from c. 1.3 m above Dutch Ordnance Datum (D.O.D) to c. 20.1 m (c. 500 m to the northwest of the find spot). The actual find spot is situated at c. 8.7 m above D.O.D. (**fig. 1, C**).

OBJECT

The object was – upon arrival at Groningen – photographed and examined by Gert van Oortmerssen (Groningen Laboratory for Conservation and Material Studies), who treated active corrosion on parts of the outer surface and took X-ray and traditional photographs of the object (**fig. 2**). Also, sediment samples from the outside (sandy corrosion) and inside (from the shaft socket) were taken for additional analysis (see below). After obtaining the permission from the finder, corrosion was removed from an area of c. 6 mm × 3 mm on the inside socket of the shaft. From this cleaned surface, and using a ceramic milling bit, a small sample was taken (c. 20 mg) for compositional analysis of the alloy. This area was covered-up again to render the sampling spot invisible.

In terms of its technical characterisation, the Hilversum spearhead measures 11.3 cm in length and 2.4 cm in (remaining) width. As the blade edge is affected most by corrosion, the original blade outline was wider

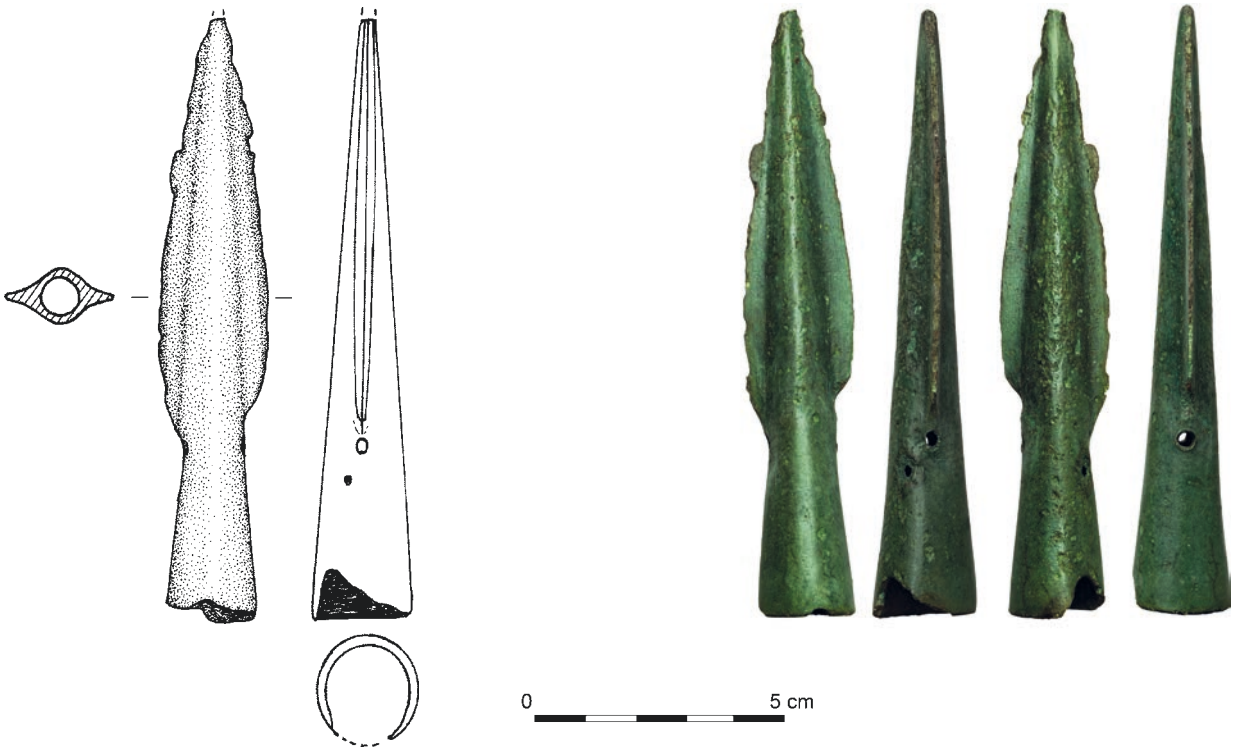

Fig. 3 Drawing and photo of the Hilversum spearhead (DB2868). – (Drawing H. Steegstra, Groningen Institute of Archaeology [GIA]; photo A. van de Bunt, Landschap Erfgoed Utrecht). – Scale 2:3.

(presumably 3-3.3 cm in width). Its weight is now 46.07 g but will have been around 50-55 g in original shape. At the base of the shaft, a part of the socket appears to have been sheared off. Presumably, this was the location of the original peg-hole, which was torn (possibly upon impact). A top part of the original peg-hole is still visible in the torn-off area (**fig. 2, 4**). As a substitution, a new perforation was made underneath the base of the blade. The deformation of the socket shows that this, secondary, perforation was put in (punched-in?) with considerable force – extending straight into the opposite side. This means that the secondary – albeit thinner – peg could go through-and-through rather than be fixed to just a single point on the shaft – as was the primary peg-hole. Close to the secondary peg-hole, a small hole represents a casting flaw (**fig. 3**).

Culturally and morphologically, the Hilversum spearhead belongs to a vast group (over 230 specimens known for the Netherlands in the Butler Archives) of what is known as »plain pegged spearheads«. They range in date from c. 1675 to 775 BC, yet most appear to be associated with metalwork from the final two centuries of the Middle Bronze Age-B (i. e. 1500-1100 cal BC) and the Late Bronze Age (i. e. 1200-800 cal BC; cf. Fontijn 2002, 117 fig. 7.2; 129). Whilst presumably produced mostly locally (Fontijn 2002, 129), their similar form is spread over Western Europe and variously classified as »plain pegged spear heads« (e. g. Burgess/Colquhoun 1988, 42-44), »undecorated and not typologically classifiable« spearheads (e. g. Tarot 2000, 22-23), or as »spearheads with long shafts and shorter, wide blades« (Laux 2012, 89-92). Single peg-holes are rare but have been observed previously on the Bokhoven (DB269; prov. North Brabant/NL), Putbroek (DB289; possibly a forgery; prov. Limburg/NL) and Nieuw-Weerdinge (DB1015; prov. Drenthe/NL) spearheads.

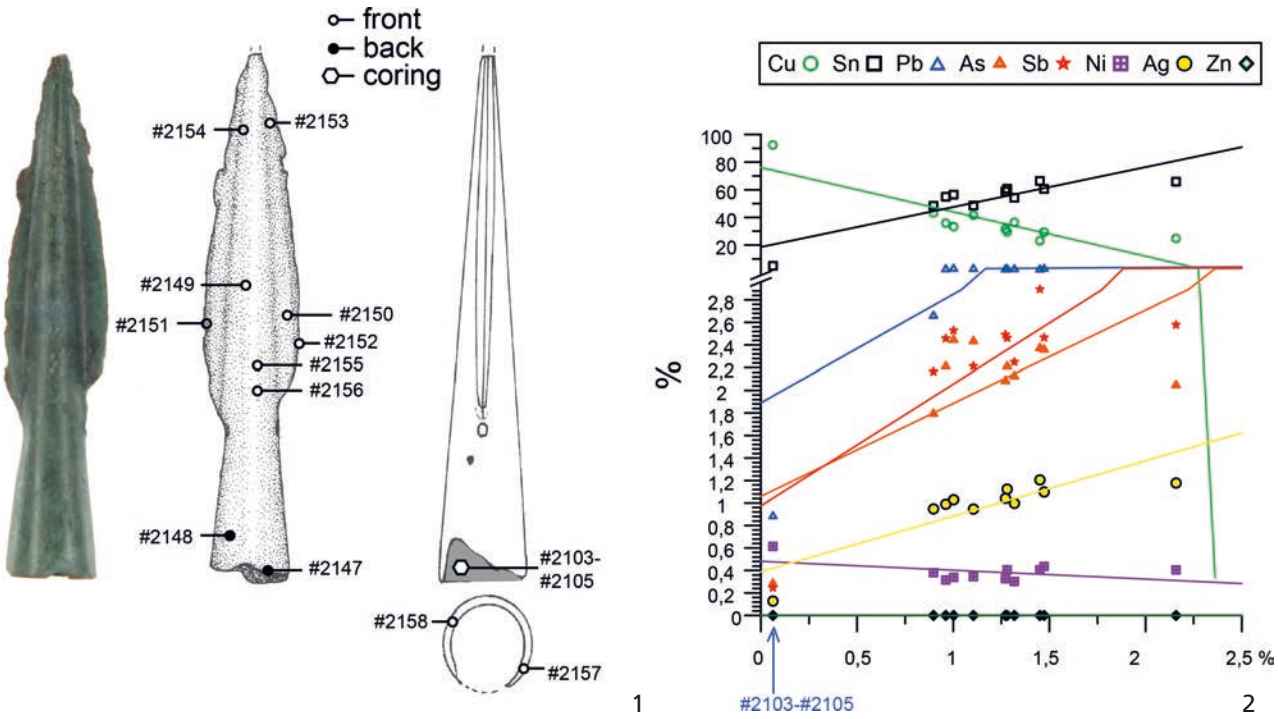

Fig. 4 Measurement locations (**1**) and compositional analysis (**2**). – (1 photo G. J. M. van Oortmerssen, drawing H. Steegstra, GIA; 2 graph B. van Os).

COMPOSITION

To study the composition of the alloy, portable X-ray fluorescence (pXRF) was undertaken under the supervision of Bertil van Os of the Cultural Heritage Agency of the Netherlands (RCE). The instrument used was a Thermo Scientific Niton XL3t, which measures up to 25 elements simultaneously in the elemental range from sulphur (atomic no. 16) to uranium (atomic no. 92), and can also detect light elements in the range of magnesium (atomic no. 12) to chlorine (atomic no. 17). The uncorroded alloy material obtained from the (cleaned) socket inside was measured thrice (180 seconds each) and twelve different locations on the (patinated) outside surface were measured for 30 seconds. All measurements were taken in »Electronic metals mode« and corrected for oxides and lighter elements using reference standards (**fig. 4**).

From the plot of the compositional analyses (**fig. 4, 2**), it is clear that there is an evident difference in the composition as determined for the (freshly drilled, unpatinated) core-residue (measurements #2103-#2105) and those on the outside patination. Copper is severely leached-out (c. 60 % reduction; mean 90.23 %wt in coring, mean 32.46 %wt in patina) and elements present at < 1 %wt levels in the coring samples (Ag, As, Pb and Sb) therefore show a seemingly average increase of 0.9 %wt, 1.9 %wt, 2.32 %wt and 2.2 %wt respectively in the measurements on the outside patina. Particularly tin is overrepresented in the patina (57.89 %wt average vs. 4.96 %wt average in the coring residue), but this process (known colloquially as »tin-sweating«) is well documented for prehistoric bronzes (e. g. Meeks 1986, 133; Wouters 1994, 45; Orfanou/Rehren 2015, 392; Nørgaard 2017, 102. 105-106). Based on the values for trace elements such as Sb, Ni, Ag, Bi and As, an eastern Alpine origin of the base ores seems possible (albeit that for a fit with the Birkstein lode the As value is a bit high [0.23 %wt vs. 0.05-0.1 %wt; cf. Lutz/Pernicka 2013, 124 fig. 3]), but the admixtures of tin (and lead) may have taken place elsewhere in Europe (cf. low readings for Sn and Pb in Pernicka/Lutz/Stöllner 2016, 51-53 tab. 4).

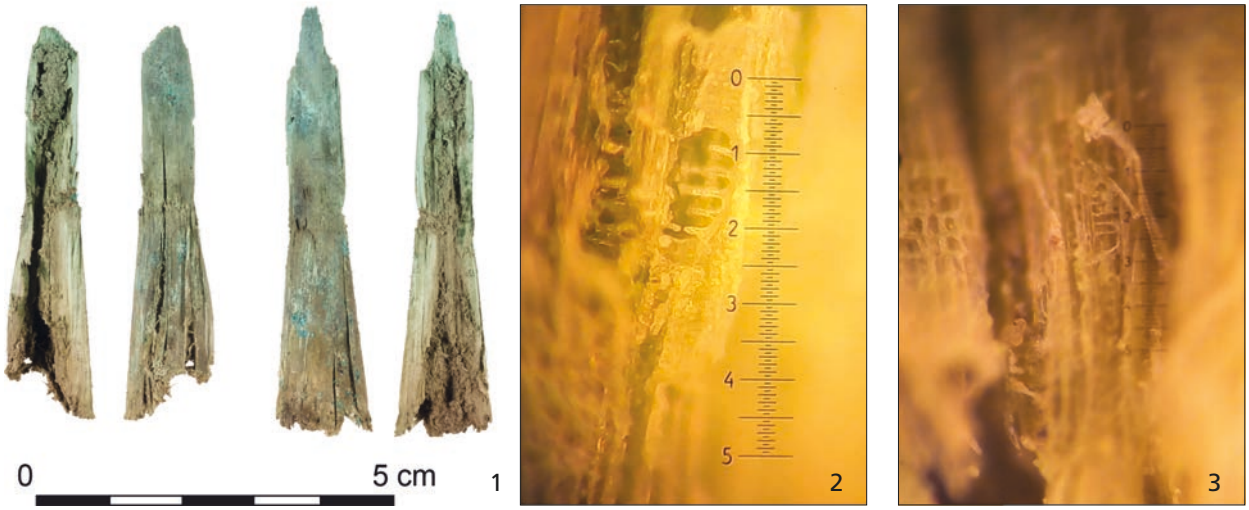

Fig. 5 **1** photo of the split conical fragment of the wooden shaft. – **2-3** radial sections (200× magnification). – (Photos 1 G. J. M. van Oortmerssen; 2-3 S. Arnoldussen).

DATING

Based on the close examination of the X-ray photographs (**fig. 2, 2**), the possibility of wood being preserved inside the shaft was considered. Fortunately, the artefact was not cleaned by the finder, so the shaft hole could be investigated under laboratory conditions. Indeed, a careful study by the fourth author resulted in the extraction of a 6 cm long conical fragment of wood, split lengthwise (**fig. 5, 1**). The wood was dry and very brittle (mainly cellulose remained and much of the lignin had decayed) and was presumably preserved because the corrosion products of the alloy on the inside of the shaft created an environment hostile to complete organic decay. The precipitation of copper-oxides was visible in the green discolouration of the wood at the contact surfaces. Based on the scalariform perforation plates with widely spaced bars that were visible in the cells in the radial sections (**fig. 5, 2-3**; cf. Schweingruber 1990, 92), Nicolien Bottema-Mac Gillavry was able to identify the wood species with certainty as hazel (*Corylus avellana*). Hazel shafts were also recovered from the Bronze Age spearheads found at Amsterdam-Damrak (Drenth/Bouma 2015, 55 tab. 1), Diffelen (prov. Overijssel/NL; Verlinde 1969) and possibly at Wijthmen (could also be alder; prov. Overijssel/NL; Verlinde 1990, 129). Whilst ash is the better and more popular choice for spear shafts in terms of flexural and compression strength, hazel was the next most popular option – and stayed so from later prehistory (Drenth/Bouma 2015, 55 tab. 1) to the Early Medieval Period (cf. Tegel/Muigg/Büntgen 2016, 150. 152; Haneca/Deforce 2020, 9). Based on the ring-count, presumably, a young (max. 3 years old) shoot of hazel was used for the shaft.

A small fragment (c. 200 mg) of the hazelwood from the shaft was selected for AMS dating. This yielded a radiocarbon age of 2880 ± 25 BP (GrM-20322) or 1188-946 BC. This places the Hilversum spearhead firmly in the Late Bronze Age. A brief overview of other dated spearhead shafts (**fig. 6**) shows that this date aligns with the (shorter and stouter; Drenth/Bouma 2015, 53 fig. 2) Empel spearhead (prov. North Brabant/NL) but the Hilversum spearhead is in a form much more related to the Leeuwarden spearhead (prov. Friesland/NL) dated to the 9th century BC (Arnoldussen/Visser 2014, 98 fig. 2) – stressing once more the longevity of this basic shape.

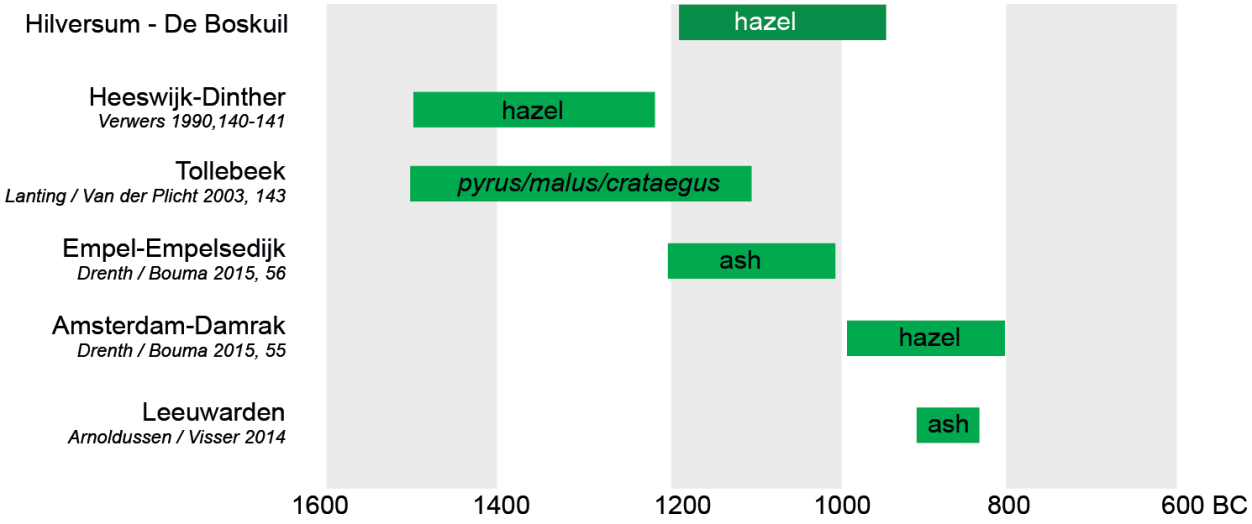

Fig. 6 Wood-identification and dates (2 sigma BC) for Dutch spearhead shafts. – (After Drenth/Bouma 2015, 55 tab. 1).

LANDSCAPE CONTEXT

The sediment taken from the outside and inside (socket) of the shaft was analysed for pollen content (cf. Arnoldussen/Visser 2014) to assess whether a prehistoric landscape signal may have been preserved on the outside of the hazel shaft. The thus obtained palynological samples (method: Erdtman 1960) were studied by the third author, and both on the outside and inside of the shaft pollen appeared to have been preserved. The pollen from the inside of the shaft may represent a proxy signal of the landscapes in which the wood was procured and where the spearhead was fitted, whereas the pollen from the outside may inform us of the landscape context in which the spearhead became embedded (**tab. 1**).

The inside sample contained a substantial amount (c. 60 %) of tree pollen, amongst which oak (*Quercus*, 24.5 %) and alder (*Alnus glutinosa*, 22.4 %) dominate, but birch (*Betula*, 4.1 %), pine (*Pinus sylvestris*, 4.1 %) and hazel (*Corylus avellana*, 8.2 %) are also present. The hazel pollen could represent the shrub from which the shaft was taken, but the other tree pollen presents a mixture of dryland (oak, pine) and wetland (alder, birch) landscapes. Pollen of heather (*Calluna*, 16.3 %) and oak fern (*Polypodium*) fit with a dryland component of the landscape. The pollen of grasses (Poaceae) also recovered may represent a wider range of landscapes.

The sample from sediment taken from the exterior of the blade presents a remarkably similar composition of woodland species (**tab. 1**) but is supplemented by pollen of beech (*Fagus*, 3.3 %), lime (*Tilia*, 1.1 %) and Norway spruce (*Picea abies*, 2.2 %). Whereas an association with beech is plausible from the 2nd millennium BC onwards (Maes et al. 2013), Norway spruce was not native to this landscape in later prehistory (nearest natural stands near Cologne, Germany; Latalowaa/van der Knaap 2006). As the pollen of spruce generally does not disperse beyond a 10-15 m zone (Burczyk/Lewandowski/Chalupka 2004), it must represent a local signal. Norway spruce were planted in great numbers in the 19th century to counter sand drift and as a commercial species. Its presence on the outside of the Hilversum spearhead reflects the sub-modern depositional environment instead.

		outside		inside	
species	English	number	%	number	%
AP	arboreal pollen	51	56.0	31	63.3
NAP	non-arboreal pollen	40	44.0	18	36.7
pollen sum		91	100.0	49	100.0
Picea abies	Norway spruce	2	2.2		0.0
Pinus sylvestris	Scots pine	1	1.1	2	4.1
Fagus sylvatica	beech	3	3.3		0.0
Tilia	lime	1	1.1		0.0
Quercus	oak	19	20.9	12	24.5
Corylus avellana	hazel	4	4.4	4	8.2
Alnus	alder	17	18.7	11	22.4
Betula	birch	4	4.4	2	4.1
Calluna	heather	22	24.2	8	16.3
Poaceae	grasses	13	14.3	5	10.2
Plantago lanceolata	ribwort plantain	1	1.1		0.0
Cyperaceae	cypergrasses	4	4.4	5	10.2
Dryopteris	wood fern	3	3.3	2	4.1
Polypodium	oak fern		0.0	6	12.2
Debarya	algae	1	1.1	3	6.1

Tab. 1 Analysis of pollen from the Hilversum spearhead. – (Analysis A. Maurer).

IMPLICATIONS

As the subtitle of this contribution frames our efforts as an exercise in extracting information from what is often too easily dismissed as »stray find without too much scientific value«, it is important to discuss the main implications of our study here. Foremost, it is clear that getting finds quickly to the attention of interested scholars is key: in this both social media (as in this case) or dedicated websites (such as www.portable-antiquities.nl) may play a vital role. Second, the present study should urge metal-detectorists not only to report potentially important finds but moreover to refrain from cleaning the artefact themselves. Rather, photographs of the artefact still in the encasing soil, photographs of the sediment(s) in the pit from which the item came and the soil still adhering to the artefact and GPS locations add much information and can generally be recorded with metal-detectorist's cellphones. In terms of typological considerations, the Hilversum-De Boskuil spearhead represents a remarkable specimen: its single peg-hole is a rarity and unlike many others, it shows a specific life history in which an originally low-placed peg-hole was torn-off and replaced by adding new peg-holes higher-up the shaft.

The fact that laboratory analysis (X-ray, portable X-ray diffraction) could be undertaken, indicated the presence of a fragment of a hazel shaft that might otherwise (due to its brittle state) may have gone unnoticed. Laboratory analysis, moreover, provided information on the composition of the alloy. The alloy tells a story of the acquisition of base materials (copper ingots?) of possible eastern Alpine origin, that were smelted down, possibly elsewhere in Europe, together with tin (and a tiny bit of lead) to create the bronze for this spearhead.

Pollen analysis of the inside of the shaft showed a mixture of upland (oak, hazel, Scots pine, wood- and oak-ferns) and wetland (alder, birch, cypergrasses and freshwater algae) landscapes. Its location of recovery, at the proximal tip (and near the dip) of a local ice-pushed hill, may have provided both landscape zones within a few hundred meters of each other, yet the risk of contamination of the shaft's interior by younger pollen through bioturbation or groundworks (e. g. levelling or ploughing before commercial spruce planting) is considerable. What argues against a contamination of the inside, however, is the observation that indicators of subrecent contamination (i. e. Norway spruce) were found solely on the outside of the spearhead, suggesting that sediments encased in corrosion of later prehistoric bronze artefacts may still hold potential for studying original (depositional) landscapes.

The above observations have focused mainly on properties observable on the object itself, but have neglected the issue of why it was recovered where it was. Most later prehistoric spearheads in the Netherlands are recovered from wetland locations (c. 75 %: Essink/Hielkema 1997/1998, 278; cf. Fontijn 2002, 261 fig. 14.1; 264; van Beek 2010, 519), where they were presumably left as offerings (or as relics of battle? cf. Drenth/Bouma 2015, 57-58). Secure indications of spearheads originating from contemporaneous settlements are much rarer, but have been documented for Oss-IJsselstraat (prov. North Brabant/NL; Verwers/Beex 1978, 16), Wijk bij Duurstede (prov. Utrecht/NL; Drenth 1996, note 3), Rhenen-Remmerden (prov. Utrecht/NL; Fontijn 2005, 66-68) and possibly Nijmegen-Garden Mr Smit (prov. Gelderland/NL; Fontijn 2002, 354). Finally, a series of Bronze Age spearheads have been recovered from funerary contexts. For example, spearheads were recovered from (Middle and Late) Bronze Age tumuli at Tiel-Medel De Roeskamp (prov. Gelderland/NL; van Renswoude 2014, 119 fig. 62), Tubbergen (prov. Overijssel/NL; DB1610; Mulder 1889), Herikerberg (prov. Overijssel/NL; van Beek 2010, 527 note 106), Vledder (prov. Drenthe/NL; van Giffen 1938), Holset (prov. Limburg/NL; DB1874; Butler 1990, 98-100) and allegedly at Grathem (prov. Limburg/NL; DB710; Butler 1987, 31 fig. 1.2). Could the Hilversum spearhead have also originated from a barrow? This calls for a re-evaluation of the wider (cultural context) of the Hilversum find (**fig. 1, C**).

At 950-1100 m north of the find spot, two prehistoric barrows are known (**fig. 1, C: d-e**; Hilversum-Maartendijkseweg). They are – like the find spot of the spearhead – situated on the flank of the very same ice-pushed hill (cf. Wimmers/van Zweden 1992, 54). At Hilversum-Smithuyserbosch, c. 1900 m north of the find spot, yet another barrow is known (**fig. 1, C: f**). At c. 1300 m directly to the east of the site, another location of a prehistoric barrow is known (**fig. 1, C: g**). Mindful of the proximity of these barrows, a location of low round elevations c. 700 m north of the find spot (**fig. 1, C: h**) may represent a levelled group of tumuli. This proximity of barrows at least renders plausible that the Hilversum-De Boskuil spearhead once too was interred in a prehistoric funerary monument (particularly as no ceramics or lithics that could indicate a local settlement site nearby have been reported as of yet). Its presumed original funerary monument may have been placed on the south-eastern promontories and flanks of the ice-pushed hills – as was common in such landscapes (cf. Verlinde/Hulst 2010, 75; Fontijn 2010, 14-15. 19-20; Bourgeois 2013, 74. 80) – but became disturbed during the levelling and forest-ploughing that generally preceded commercial pine afforestation (cf. Fontijn 2010, 151; Bourgeois 2013, 46).

Evidently, through the combination of careful study of a stray find's cultural and geogenetic surroundings, complemented by laboratory analyses of adhering sediments, preserved organic remains and its constituent alloy, singular metal-detecting finds can add much to scholarly understanding at the level of the artefact (e. g. typology, composition), original landscape (e. g. geogenetic characterisation, cultural landscape fabric [barrows, settlements], and preserved wood and pollen) and wider contacts (e. g. bronze procurement, distributions of artefact types). We hope that our efforts may inspire a new and increased appreciation of »stray« metal-detecting finds.

References

Arnoldussen/Visser 2014: S. Arnoldussen / R. Visser, More than a point on a map: the Leeuwarden late Bronze Age spearhead. In: E. M. Theunissen / S. Arnoldussen (eds), Metaaltijden. Bijdragen in de studie van de metaaltijden 1 (Leiden 2014) 97-108.

van Beek 2010: R. van Beek, Reliëf in Tijd en Ruimte. Interdisciplinair onderzoek naar bewoning en landschap van Oost-Nederland tussen vroege prehistorie en middeleeuwen (Leiden 2010).

Bourgeois 2013: Q. P. J. Bourgeois, Monuments on the horizon. The formation of the barrow landscape throughout the 3rd and 2nd millennium BC (Leiden 2013).

Burczyk/Lewandowski/Chalupka 2004: J. Burczyk / A. Lewandowski / W. Chalupka, Local pollen dispersal and distant gene flow in Norway spruce (Picea abies [L.] Karst.). Forest Ecology and Management 197, 2004, 39-48.

Burgess/Colquhoun 1988: C. B. Burgess / I. Colquhoun, The swords of Britain. PBF IV, 5 (München 1988).

Butler 1987: J. J. Butler, Bronze Age connections: France and the Netherlands. Palaeohistoria 29, 1987, 9-34.

1990: J. J. Butler, Bronze Age metal and amber in the Netherlands (I). Palaeohistoria 32, 1990, 47-110.

Drenth 1996: E. Drenth, Over de herkomst van bronzen bijlen en beitels in bronstijd-graven in Nederland. In: E. M. Theunissen (ed.), Onderzoek naar bronstijdgrafheuvels in Nederland en Vlaanderen (Leiden 1996) 33-38.

Drenth/Bouma 2015: E. Drenth / N. Bouma, Een bronzen lanspunt met houten steelrestant uit de omgeving van Empel (prov. Noord-Brabant, Nederland). Lunula. Archeologica Protohistorica 23, 2015, 53-60.

Erdtman 1960: G. Erdtman, The Acetolysis Method – A Revised Description. Svensk Botanisk Tidskrift 54, 1960, 561-564.

Essink/Hielkema 1997/1998: M. Essink / J. B. Hielkema, Rituele depositie van bronzen voorwerpen in Noord-Nederland. Palaeohistoria 39/40, 1997/1998, 277-231.

Fontijn 2002: D. R. Fontijn, Sacrificial Landscapes. Cultural biographies of persons, objects and »natural« places in the Bronze Age of the Southern Netherlands, c. 2300-600 BC. Analecta Praehistorica Leidensia 33/34 (Leiden 2002).

2005: D. R. Fontijn, De speerpunt van Rhenen. In: L. G. L. van Hoof / L. Meurkens (eds), Vluchtige huisplattegronden. Erven uit de midden-bronstijd B en nederzettingssporen uit de vroege bronstijd en midden-bronstijd A (verslag van een tweede opgravingscampagne te Rhenen-Remmerden). Archol Rapport 51 (Leiden 2005) 65-66.

2010: D. R. Fontijn (ed.), Living Near the Dead: The Barrow Excavations of Rhenen-Elst: Two Millennia of Burial and Habitation on the Utrechtse Heuvelrug (Leiden 2010).

van Giffen 1938: A. E. van Giffen, Das Kreisgraben-Urnenfeld bei Vledder, Provinz Drente, Niederlande. Mannus 1938, 331-383.

Haneca/Deforce 2020: K. Haneca / K. Deforce, Wood use in early medieval weapon production. Archaeological and Anthropological Sciences 12, 2020. DOI: 10.1007/s12520-019-01000-5.

Kars/Heeren 2018: M. Kars / S. Heeren, Archaeological small finds recording in the Netherlands. The framework and some preliminary results of the project Portable Antiquities of the Netherlands (PAN). Medieval Settlement Research 33, 2018, 18-27.

Lanting/van der Plicht 2003: J. N. Lanting / J. van der Plicht, De ^{14}C chronologie van de Nederlandse Pre- en Protohistorie IV: Bronstijd en Vroege IJzertijd. Palaeohistoria 43/44, 2001/2002 (2003), 117-261.

Latalowaa/van der Knaap 2006: M. Latalowaa / W. O. van der Knaap, Late Quaternary expansion of Norway spruce Picea abies (L.) Karst. in Europe according to pollen data. Quaternary Science Reviews 25, 2006, 2780-2805.

Laux 2012: F. Laux, Die Lanzenspitzen in Niedersachsen. PBF V, 4 (Stuttgart 2012).

Lutz/Pernicka 2013: J. Lutz / E. Pernicka, Prehistoric copper from the Eastern Alps. Open Journal of Archaeometry 25/1, 2013, 122-126.

Maes et al. 2013: B. Maes / J. Bastiaens / O. Brinkkemper / K. Deforce / C. Rövekamp / P. van den Bremt / A. Zwanepoel (eds), Inheemse bomen en struiken in Nederland en Vlaanderen. Herkenning, verspreiding, geschiedenis en gebruik (Amsterdam 2013).

Meeks 1986: N. D. Meeks, Tin-rich surfaces on bronze – some experimental and archaeological consideration. Archaeometry 28/2, 1986, 133-162.

Mulder 1889: J. W. Mulder, Overblijfselen der oudheden in Overijssel. Verslagen en Mededelingen der Vereeniging tot Beoefening van Overijsselsch Regt en Geschiedenis 17, 1889, 1-15.

Nørgaard 2017: H. W. Nørgaard, Portable XRF on Prehistoric Bronze Artefacts: Limitations and Use for the Detection of Bronze Age Metal Workshops. Open Archaeology 3/1, 2017, 101-122.

Orfanou/Rehren 2015: V. Orfanou / Th. Rehren, A (not so) dangerous method: pXRF vs. EPMA-WDS analyses of copper-based artefacts. Archaeological and Anthropological Sciences 7/3, 2015, 387-397.

Pernicka/Lutz/Stöllner 2016: E. Pernicka / J. Lutz / Th. Stöllner, Bronze Age Copper Produced at Mitterberg, Austria, and its Distribution. Archaeologia Austriaca 100, 2016, 19-55.

van Renswoude 2014: J. van Renswoude, Metaal. In: E. Norde / J. van Renswoude (eds), Van grafheuvel tot boerenerf. Plangebied Medel 2, gemeente Tiel Archeologisch onderzoek: proefsleuven. RAAP Rapport (Amsterdam 2014) 116-125.

Ruegg/Koopman 2010: G. Ruegg / S. Koopman, Stuwwalfasering en kame-afzettingen in het Gooi. Grondboor en Hamer 2010/3, 81-89.

Schweingruber 1990: F. H. Schweingruber, Anatomie europäischer Hölzer: ein Atlas zur Bestimmung europäischer Baum-, Strauch- und Zwergstrauchhölzer (Bern, Stuttgart 1990).

Tarot 2000: J. Tarot, Die bronzezeitlichen Lanzenspitzen der Schweiz unter Einbeziehung von Liechtenstein und Vorarlberg. Universitätsforschungen zur Prähistorischen Archäologie 61 (Bonn 2000).

Tegel/Muigg/Büntgen 2016: W. Tegel / B. Muigg / U. Büntgen, The wood of Merovingian weaponry. Journal of Archaeological Science 65, 2016, 148-153.

Verlinde 1969: A. D. Verlinde, Hardenberg. Bulletin van de Koninklijke Nederlandse Oudheidkundige Bond 68, 1969, *132.

1990: A. D. Verlinde, Archeologische kroniek van Overijssel over 1989. Overijsselse Historische Bijdragen 105, 1990, 123-158.

Verlinde/Hulst 2010: A. D. Verlinde / R. S. Hulst, De grafvelden en grafvondsten op en rond de Veluwe van de Late Bronstijd tot in de Midden-IJzertijd. Nederlandse Archeologische Rapporten 39 (Amersfoort 2010).

Verwers 1990: W. J. H. Verwers, Archeologische Kroniek van Noord-Brabant, 1988-1989. Brabants Heem 42, 1990, 135-162.

Verwers/Beex 1978: W. J. H. Verwers / G. A. C. Beex, Oss-IJsselstraat. In: W. J. H. Verwers / G. A. C. Beex (eds), Archeologische Kroniek van Noord-Brabant 1977-1978. Bijdragen tot de Studie van het Brabantse Heem 17 (Eindhoven 1978) 16-17.

van der Wateren 1985: D. F. M. van der Wateren, A model of glacial tectonics, applied to the ice-pushed ridges in the Central Netherlands. Bulletin of the Geological Society of Denmark 34, 1985, 55-74.

Wimmers/van Zweden 1992: W. H. Wimmers / R. R. van Zweden, Archeologische en historisch-geografische elementen in een natuurgebied; antropogene achtergronden van de Gooise natuurgebieden. DLO-Staring Centrum Rapport 143 (Wageningen 1992).

Wouters 1994: H. Wouters, Metalen gebruiksvoorwerpen uit de late bronstijd uit de Maasvallei: een analytische en metallurgische benadering van de depots van Dilsen en Maaseik-Heppeneert. Archeologie in Vlaanderen IV, 1994, 39-48.

Zusammenfassung / Summary / Résumé

Eine spätbronzezeitliche Speerspitze aus Hilversum-De Boskuil (Prov. Nordholland/NL).
Eine Fallstudie zur Gewinnung von Informationen aus Metalldetektorfunden

Dieser Beitrag hebt das bedeutende akademische Potenzial prähistorischer Bronzeartefakte hervor, die von Metalldetektoren als Einzelfunde entdeckt und allzu oft als von geringem Informationswert abgetan wurden; als Beispiel wird eine spätbronzezeitliche Speerspitze diskutiert, die in Hilversum gefunden wurde. Eine Röntgenaufnahme des Objekts ergab, dass ein Teil des Schaftes noch intakt erhalten war (obwohl er in einer sandigen Hochgebirgslandschaft gefunden wurde). Die Metallanalyse mittels Röntgenfluoreszenzanalyse zeigte, dass möglicherweise ostalpine Erze oder Barren für das Basiskupfer verwendet, jedoch sowohl mit Zinn als auch mit Blei (vielleicht anderenorts) vermischt wurden. Das aus dem Schaft geborgene Holzfragment entpuppte sich als junger Haseltrieb (*Corylus avellana*), der in der mittleren und späten Bronzezeit für Speerschäfte verwendet wurde (zusätzlich zu der häufigeren Esche). Ein Stück des Haselschaftes wurde einer ^{14}C-Datierung unterzogen, die eine solide Datierung in die Spätbronzezeit (1188-946 v. Chr.) lieferte. Pollenanalysen der Sedimente an der Innen- und Außenseite des Speerspitzenschaftes ergaben Indikatoren sowohl für Hochland- als auch für Feuchtlandschaften, aber die Tatsache, dass sich die offensichtliche Kontamination (d. h. die im 19. Jh. gepflanzte Fichte) auf die Proben der Außenseite des Schaftes beschränkte, lässt vermuten, dass der Speerspitzenschaft mit erhaltenem Holz auch paläoökologische Informationen enthalten könnte. Eine sorgfältige Auswertung des Fundes und seines breiteren Kontextes legt nahe, dass er ursprünglich aus einem Bestattungskontext stammen könnte.

A Late Bronze Age Spearhead from Hilversum-De Boskuil (prov. North Holland/NL).
A Case Study in Extracting Information from Stray Metal-detecting Finds

This contribution highlights the significant academic potential of prehistoric bronze artefacts found later as stray objects by metal-detectorists and all too often dismissed as being of low information value by discussing a Late Bronze Age spearhead discovered at Hilversum as an example. X-ray photography of the object revealed that part of the shaft was still preserved intact (despite being found in a sandy upland landscape). Compositional analysis using pXRF spectrometry indicated that eastern Alpine ores or ingots were possibly used for its base copper, but these were mixed with both tin and lead (perhaps elsewhere). The wooden fragment recovered from the shaft turned out to be a young shoot of hazel (*Corylus avellana*), which was used for spear shafts in the Middle and Late Bronze Age (in addition to the more common ash). A piece of the hazel shaft was submitted to radiocarbon dating, providing a solid dating in the Late Bronze Age (1188-946 BC). Pollen analysis undertaken on the sediments on the inside and outside of the spearhead socket presented indicators of both upland and wetland landscapes, but the fact that evident contamination (i. e. Norway spruce, planted in the 19th century) was limited to the samples of the shaft's exterior, suggests that the spearhead shaft with preserved wood may also preserve palaeoecological information. Careful evaluation of the find and its wider context suggested that it may originally have been placed in a funerary context.

Une pointe de lance du Bronze final de Hilversum-De Boskuil (prov. de Hollande-Septentrionale/NL). Une étude de cas sur l'obtention d'informations à partir d'objets métalliques isolés trouvés avec détecteur

Cette contribution souligne le grand potentiel académique des artefacts en bronze préhistoriques détectés comme trouvailles »isolées« et écartés trop souvent en raison de leur soi-disant »faible valeur informative«. La pointe de lance du Bronze final découverte à Hilversum servira d'exemple. Une radiographie de l'objet a révélé qu'une partie de la hampe était encore intacte (malgré le contexte sableux et sec de la découverte). Une analyse de la composition du métal par spectrométrie pXRF indique que des minerais ou des lingots provenant des Alpes orientales auraient été utilisés pour le cuivre, mélangés, peut-être ailleurs, à de l'étain et du plomb. Le fragment conservé de la hampe s'est révélé être une pousse de noisetier (*Corylus avellana*), souvent utilisé au Bronze moyen et final (outre le frêne plus commun). Un échantillon prélevé sur la hampe a été daté au radiocarbone de l'âge du Bronze final avec une grande fiabilité (1188-946 BC). L'analyse du pollen des sédiments fixés à l'intérieur et l'extérieur de la douille de la pointe de lance a révélé des indicateurs de paysages secs et humides, mais le fait qu'une contamination éventuelle (épicéas de Norvège plantés au 19e siècle) se soit limitée aux échantillons de la surface de la hampe suggère que le bois préservé peut encore livrer des informations paléoécologiques. Un examen approfondi de l'artefact et de son milieu suggère qu'il se trouvait à l'origine dans un contexte funéraire. Traduction: Y. Gautier

Schlüsselwörter / Keywords / Mots clés

Niederlande / späte Bronzezeit / Speerspitze / Palynologie / pXRF / Metalldetektorsuche / Holz / Hasel
Netherlands / Late Bronze Age / spearhead / palynology / pXRF / metal-detecting / wood / hazel
Pays-Bas / Bronze final / pointe de lance / palynologie / pXRF / détection de métaux / bois / noisetier

Stijn Arnoldussen
Arnoud Maurer
G. J. M. van Oortmerssen
Nicolien Bottema-Mac Gillavry
Rijksuniversiteit Groningen
Groningen Institute of Archaeology
Poststraat 6
NL - 9712 ER Groningen
s.arnoldussen@rug.nl
a.maurer@rug.nl
g.j.m.van.oortmerssen@rug.nl
nicolienmg@hotmail.com

Niels Kampert
Benedictushof 139
NL - 4133 AJ Vianen
nkampert@ziggo.nl

Bertil van Os
Rijksdienst voor het Cultureel Erfgoed (RCE)
Smallepad 5
NL - 3811 MG Amersfoort
b.van.os@cultureelerfgoed.nl