

Some new radiocarbon dates on bone and antler artefacts from the Scheldt basin

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1. Introduction

The last few years we have had the opportunity to radiocarbon date a few bone and antler finds from different locations along the Scheldt basin (Fig. 1) which are part of public and private collections (Tab. 1). Although this limited dating program was not fully successful it provides some extra dates which are complementary to previously obtained radiocarbon dates on organic artefacts dredged from the Scheldt river (Crombé *et al.*, 1999; 2018).

2. Finds and their contexts

2.1. Collection Georges Hasse (1956)

From this well-known collection (1956) of mostly dredged finds (De Vos & Warmenbol, 2019), stored in the depot of the MAS (*Museum aan de Stroom*, Antwerp), three objects were selected for dating. The first one from Schoonaarde (Fig. 2) is a distal part of an antler beam of which both crown tines were cut off, by means of a circumferential groove. At the other extremity that was cut off from the beam an animal tooth was still embedded. The tooth was identified by Kim Aluwé as a lower premolar belonging to an undetermined deer-species. It displays an oblique cutting edge that was clearly humanly modified. A microscopic analysis conducted by Eva Halbrucker could identify several linear traces, possibly indicating that this artefact was used as a tool for scraping. However, a more detailed analysis is needed to verify this. Finally, this object is provided with a perforation positioned towards its distal extremity presenting clear cut marks. The second object (Fig. 3) from Wichelen is a typical unperforated antler beam mattock (so-called *ontschorser* or *pelloir*) provided with a long oblique and polished cutting edge. The last one (Fig. 4) also from Wichelen is a *ca.* 20 cm long metatarsus most likely from *Bos primigenius* which was split longitudinally to make a cutting edge. The latter presents long and deep linear traces which probably result from its use.

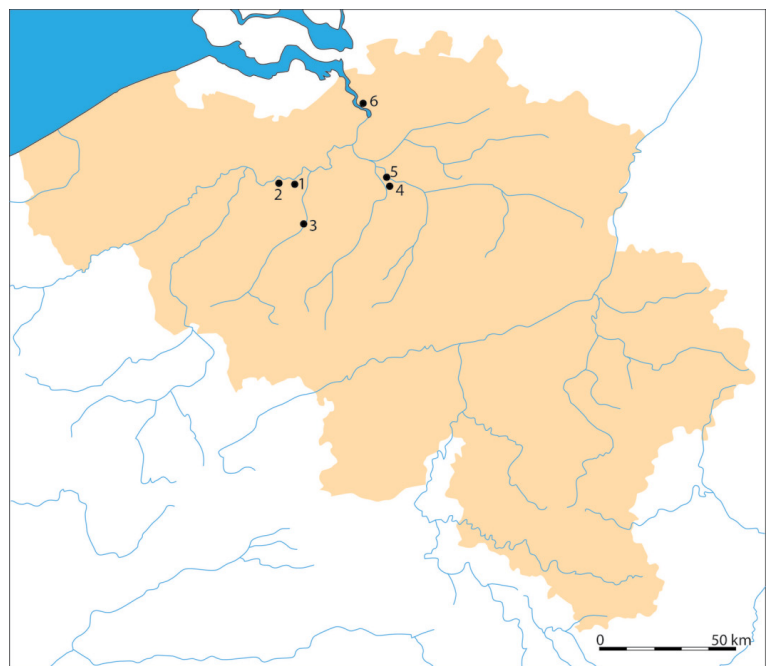


Fig. 1 – Map showing the position of the dated artefacts within Belgium.
1. Schoonaarde; 2. Wichelen; 3. Ninove;
4. Zemst; 5. Hombeek; 6. Antwerp.

Site	ID	Collection	Artefact type	14C date BP
Schoonaarde	AV.1956.035.2484	Georges Hasse	antler crown with inserted animal tooth	6169±46
Wichelen	AV.1956.035.2489	Georges Hasse	unperforated T-shaped mattock	6112±31
Wichelen	AV.1956.035.2487	Georges Hasse	bone chisel	5067±31
Ninove "Begijnenbrug"	709	Edmond De Deyn	bone awl	3232±27
Zemst "Bos van Aa"		Eddy Cuypers	reindeer antler with cut mark	34803±182
Hombeek "Eggelgembroekvijver"		Eddy Cuypers	antler tine with cut marks	7686±55
Antwerp harbour Esso refinery	F3781	Turninum	harpoon fragment	463±23

Tab. 1 – List of radiocarbon dated bone and antler artefacts and their isotope values; unreliable dates are indicated in italic (this page and the next one).

2.2. Collection Edmond De Deyn

This small collection is stored at the 't *Gasthuys* – *Stedelijk Museum Aalst* and consists of artefacts collected by Edmond De Deyn along the Dendre, a tributary of the Scheldt. The dated object (Fig. 5-1) was discovered in 1867 at Ninove upstream of the Begijnenbrug. It concerns an awl made on a bone, presenting weak, longitudinal striations and an intense polish. Both ends are broken; the tip is slightly broken, the fracture on the opposite side being much more severe.

2.3. Collection Eddy Cuypers

Two objects collected by Eddy Cuypers (private collection, Hombeek) were selected for radiocarbon dating. A first one comes from a quarry at Zemst "Bos van Aa" in the Zenne-valley, which already yielded lithic artefacts and faunal remains dated to the Middle Palaeolithic (Van Peer & Smith, 1990). The object (Fig. 5-2) consists of a long section (L=31.14 cm) of a reindeer antler beam, with the proximal (corona) part still attached to it. The distal end is broken recently, while the tine presents an oblique end. However it is difficult to determine whether this represents an old fracture or a human modification. The presence of a V-shaped cutting mark bordering the oblique end might be connected to the production of a cutting edge, although this needs further confirmation. The second object (Fig. 5-3) originates from Hombeek "Eggelgembroekvijver" and is a cut off tine with clear circumferential cutting marks at its base. The tip is broken, but the presence of a patina indicates that this did not happen recently.

2.4. Collection Volksmuseum Turninum

A last object, from the Volksmuseum *Turninum*, is a bone fragment which we identified as a proximal part of a harpoon, found in the 1980s nearby the Esso refinery in the Antwerp harbour (Fig. 5-4). However the name of the finder nor the find context are known, making this object less reliable. It displays a well-cut barb with traces of engraving, characteristic of Mesolithic harpoons.

Lab code	68.3 % probability (cal BC)	95.4 % probability (cal BC)	% C	% N	d13C	d15N	C/N
RICH-27176			6	1,47	-25,5	3,8	4,7
RICH-27178	5204 (14.6 %) 5180 5063 (53.7 %) 4989	5209 (19.6%) 5154 5126 (75.8 %) 4940	40,7	14,47	-23,6	4,9	3,3
RICH-27160			10	3,01	-24,5	6,6	3,9
RICH-26910	1517 (31.8 %) 1492 1481 (36.5 %) 1451	1538 (95.4 %) 1432	42	14,5	-22,4	7,6	3,4
RICH-27162	38240 (68.3 %) 37725	38521 (95.4 %) 37573	19,1	7,34	-19,7	1,3	3
RICH-27161			8,1	1,74	-28	3	5,4
RICH-27163	1429 (68.3 %) 1449 calAD	1420 (95.4 %) 1458	35,6	12,87	-21,3	6,7	3,2

3. Radiocarbon dating methodology

3.1. Collagen extraction

At the RICH laboratory, for collagen extraction Longin's (1971) method was used with additional steps. First, the samples were taken by drilling using a Dremel. Between 0.5 and 1 g of powder sample was placed into round-bottomed plastic tubes (16 × 100 mm) to be able to use Ezee™ syringe filters (polypropylene with a polyethylene filter and a 60–90 µm pore size) for the demineralization process. The samples were immersed in a 2.4 M HCl solution for 15 min, the HCl was removed using Ezee™ syringe filters and the samples rinsed thoroughly with Milli-Q™ water. This step also eliminates some organic contaminants (like fulvic acids), and breaks some collagen hydrogen bonds for the further solubilization in water (Longin, 1971). To remove any other contaminants such as humic acids (Arslanov & Svezhensev, 1993), the bone powders were placed into a 0.25 M NaOH solution for 15 min, and rinsed with Milli-Q™ water and Ezee™ syringe filters. The samples were again submerged in HCl at a lower concentration (0.3 M) for 5 min, in order to remove atmospheric CO₂ which could have been absorbed during the previous step, and to neutralize the base if still present. After this procedure, the bones were rinsed again with Milli-Q™ water. The treated bone fragments were transferred into Duran® glass tubes, containing a pH3 HCl solution, and left at 90°C for 10 hr. Then, the solution was filtered with a Büchner funnel and a Millipore® glass fiber filter (7 µm pore size, *i.e.*, about 525 kDa threshold), and the extracted materials were freeze-dried overnight. For RICH-27167, RICH-27160, RICH-26910, RICH-27162 and RICH-27161, the samples were placed twice in toluene for 15 min in an ultrasound bath before the solvent procedure (see Wojcieszak *et al.*, 2020) to eliminate an unidentified conservation product. The samples RICH-27178 and RICH-27163 were not suspected to contain contaminants and were not subjected to any solvent immersion.

3.2. AMS measurement

All samples were transformed into graphite using the automatic graphitization system AGE (Boudin *et al.*, 2019), and ¹⁴C concentrations were measured with accelerated mass spectrometry (AMS) at the Radiocarbon Laboratory of the Royal Institute for Cultural Heritage, using the 0.2 MV MICADAS AMS machine (Boudin *et al.*, 2015).

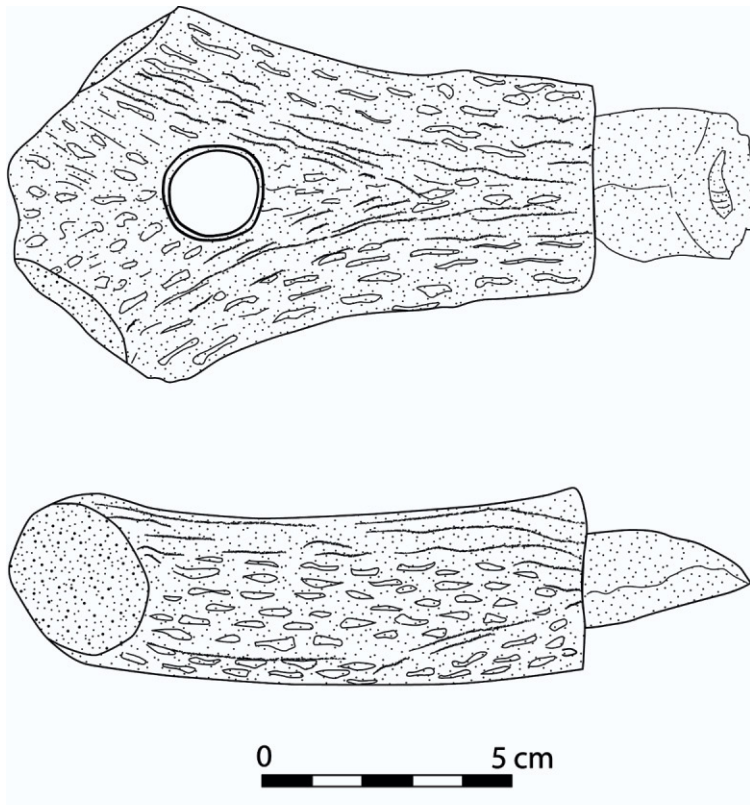


Fig. 2 – Distal antler beam with embedded tooth from Schoonaarde (drawing: Joris Angenon; foto: Michel Wuyts).

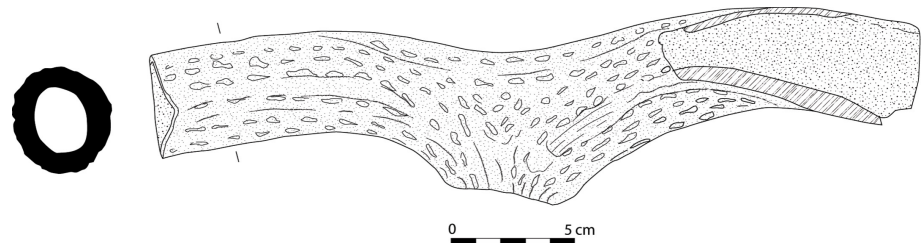


Fig. 3 – Unperforated antler beam mattock from Wichelen (drawing: Joris Angenon; foto: Michel Wuyts).

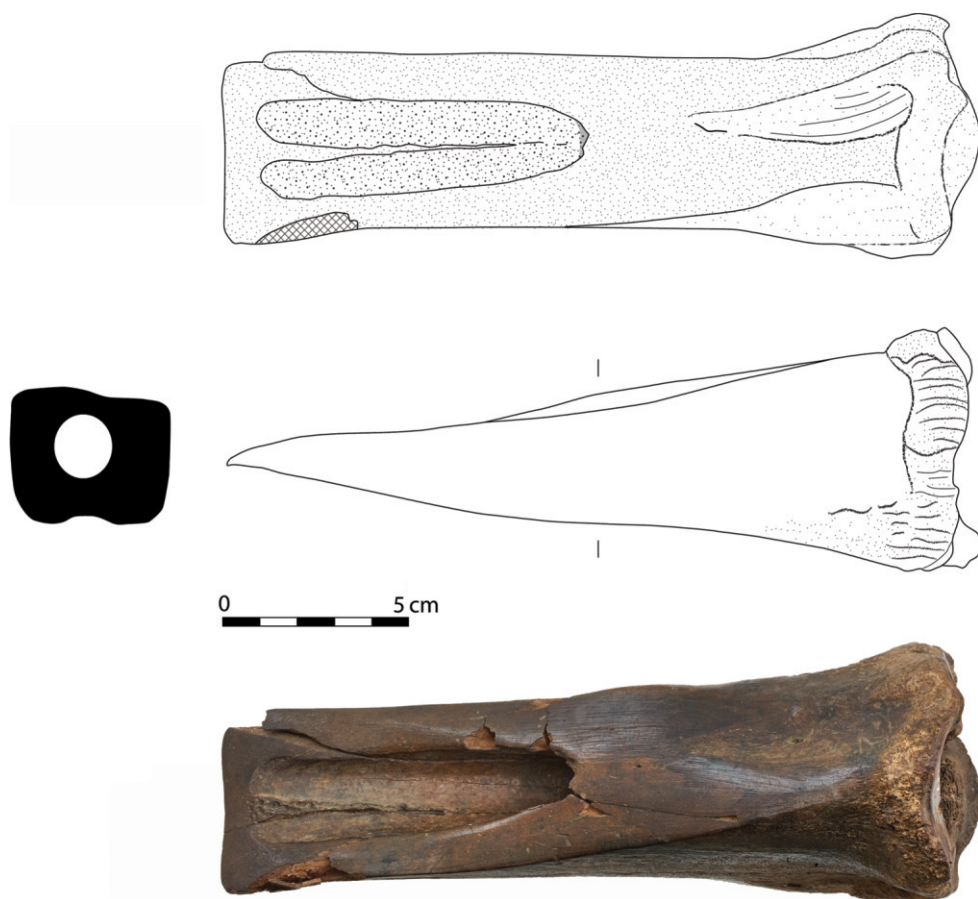


Fig. 4 – Bone chisel from Wichelen (drawing: Joris Angenon; foto: Michel Wuyts).

4. Results and discussion

Based on the C/N ratios (Tab. 1), just four out of the seven radiocarbon dates seem reliable. The dated antler with inserted tooth, the bone chisel as well as the cut-off tine have a C/N ratio higher than *ca.* 4, which is considered indicative for possible contamination and/or degradation of the dated collagen (Talamo *et al.*, 2021, and references therein). Although some of them, in particular the bone chisel, fall within the expected chronological range based on comparison with similar dated objects from the Scheldt basin and beyond (Crombé *et al.*, 2018), they will not be further discussed in this paper.

The remaining four dates can be termed reliable, having a C/N ratio between 3.0 and 3.4. By far the oldest artefact is the reindeer antler with cut mark from Zemst. The date situates between *ca.* 38,500 and 37,500 cal BC, which corresponds to the very end of the Middle Palaeolithic. This is much younger than the dating to the early Weichselian, based on tool technology and typology (Van Peer & Smith, 1990), the faunal composition (Germonpré, 2003), stratigraphy (Bogemans, 1993) and an ESR date on a mammoth molar ($126,200 \pm 9,300$ y BP) from the basal sediments of the quarry stratigraphy. Since the stratigraphical position of the dated reindeer fragment remains unknown, this chronological difference is not really problematic and might point to a younger (re) occupation of the site.

The date obtained on the unperforated T-shaped mattock from Wichelen fits perfectly within the range of the other dated specimens of the Scheldt basin, although it seems to belong to the youngest examples situated near the end of 6th millennium cal BC (Crombé *et al.*, 2018). This confirms the earlier observation that unperforated mattocks persisted until the appearance of the perforated ones and even slightly longer.

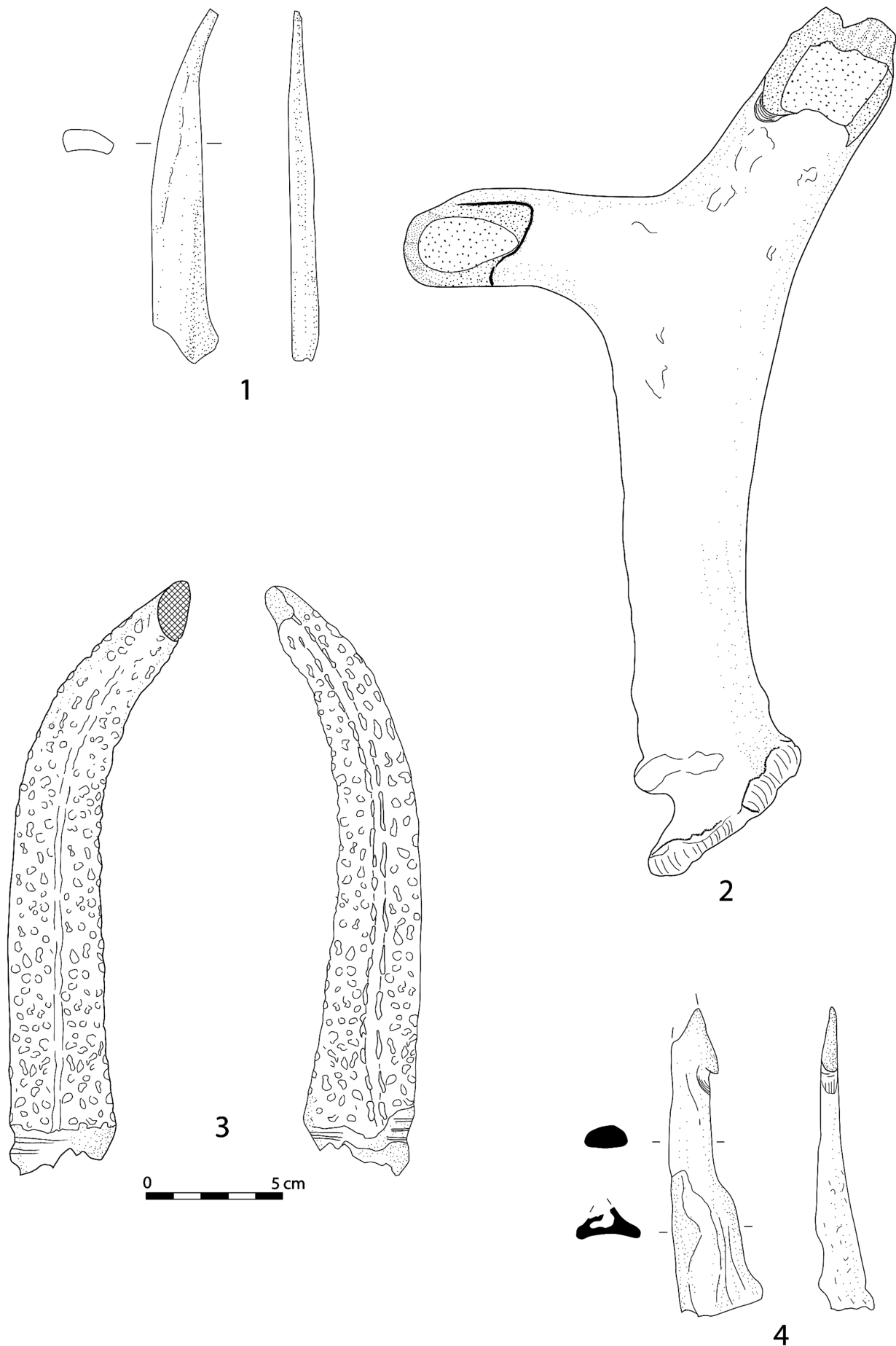


Fig. 5 – Bone and antler artefacts from Ninove (1), Zemst (2), Hombeek (3) and Antwerp harbor (4) (drawing: Joris Angenon).

The bone awl from Ninove apparently dates to the Bronze Age as it gave a date between ca. 1500 and 1400 cal BC. However most surprising is the very young date obtained on the fragment identified as a basal fragment of a harpoon. Although it has all characteristics of Mesolithic harpoons, the date points to an age in the 15th century AD. In order to check this further a second date has been performed on the same object (RICH-27488: 492±22 BP), confirming its Medieval age.

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Samenvatting

In deze korte bijdrage worden enkele koolstofdateringen gerapporteerd uitgevoerd op artefacten uit been en gewei afkomstig uit diverse openbare en private verzamelingen. Het oudst gedateerde object is een fragment van een rendiergewei met een duidelijk snijspoor afkomstig van een groeve in Zemst waar voorheen lithische artefacten uit het midden paleolithicum zijn aangetroffen. De verkregen koolstofdatering is merkkelijk jonger dan de techno-typologische datering van de steenindustrie en verwijst wellicht naar een jongere bewoningsfase op de site, meer bepaald naar het einde van het midden paleolithicum. De datering van de overige objecten is niet 100% succesvol gebleken; amper drie van de geselecteerde objecten leverden een voldoende betrouwbare datering op. Dit is vermoedelijk te wijten aan contaminatie en/of degradatie van het gedateerde collageen. Naast een niet-doorboorde volgtakbijl uit het late 6^{de} millennium en een benen priem uit de bronstijd, leverde de datering van een benen harpoenbasis een onverwacht jonge uitkomst in de late middeleeuwen op.

Trefwoorden: Koolstofdatering, midden paleolithicum, benen en geweien artefacten, Scheldebekken (BE), mesolithicum, bronstijd.

Abstract

This short paper reports on the radiocarbon results of some bone and antler objects from different public and private collections in Flanders. The oldest date belongs to a reindeer antler fragment with a cut mark found in a quarry at Zemst that also yielded Middle Palaeolithic lithic finds. The dating of the remaining finds was not always successful probably due to contamination and/or degradation of the dated collagen. Yet three reliable dates could be obtained among which one on an unperforated antler beam mattock belonging to the late 6th millennium cal BC and a bone awl from the Bronze Age. Most surprising, however, was a Medieval age obtained on a basal fragment of a bone harpoon, morphologically similar to Mesolithic specimens.

Keywords: Radiocarbon dating, Middle Palaeolithic, bone and antler artefacts, Scheldt basin (BE), Mesolithic, Bronze Age.

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