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A new Final Neolithic charcoal-rich pit feature and Mesolithic/ Neolithic artefacts from Outer-Stuypenberg (Ninove, East-Flanders, BE)

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1. Introduction

Salvage excavations conducted in 2019 by the regional archaeological service SOLVA in response to the building of a sports complex at the Stuypenberg in Ninove (East-Flanders, Belgium) revealed, amidst a vast amount of Medieval features, a charcoal-rich feature dating to the Final Neolithic. Besides that, 254 lithic artefacts are gathered from reworked contexts such as windthrow features or Medieval features. A typochronological analysis showed that the lithic assemblage could be divided into a Mesolithic and Neolithic component. Although the artefacts could not be linked to contemporary features, they offer an insight into material use and site occupation in both the Mesolithic and Neolithic period.

2. Site and excavation

The project area is located beside the hamlet of "Lebeke", 4 km north of Ninove, in the south of the province of East-Flanders (Flanders, Belgium) (Fig. 1). The project area itself is slightly sloping towards the brook "Molenbeek" from southwest to northeast with elevations ranging from 35 to 30 m TAW (reference height Ostend). The wider landscape is part of the so called "South-Flemish loamy hilldistrict" according to the classification of Sevenant (Sevenant *et al.*, 2002). This district is characterized by a hilly tertiary landscape on which mainly loamy aeolian soils were deposited. The waterways around the research

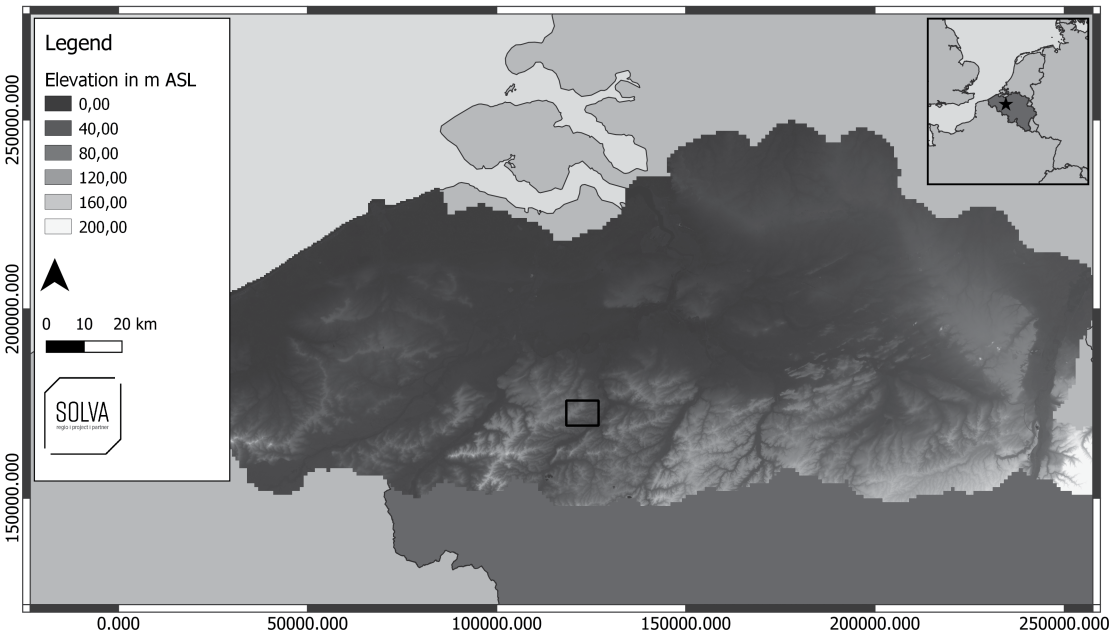

Fig. 1 – Location of the research area on a DTM of Flanders (Belgium).

area all drain towards the river Dender (Fig. 2). There are no holocene or tardiglacial sequences on top of the pleistocene deposits in the research area. Just north of the project area there are some fluviatile sequences due to the deposits of the Molenbeek.

The soils of the project area largely consist of moderately dry loamy soils without profile development (Acp(c)/Acp). In the northeast, towards the Molenbeek, there are moderately wet loamy soils without profile (Adp). In the far south-east there are wet loamy soils without profile (Ahp).

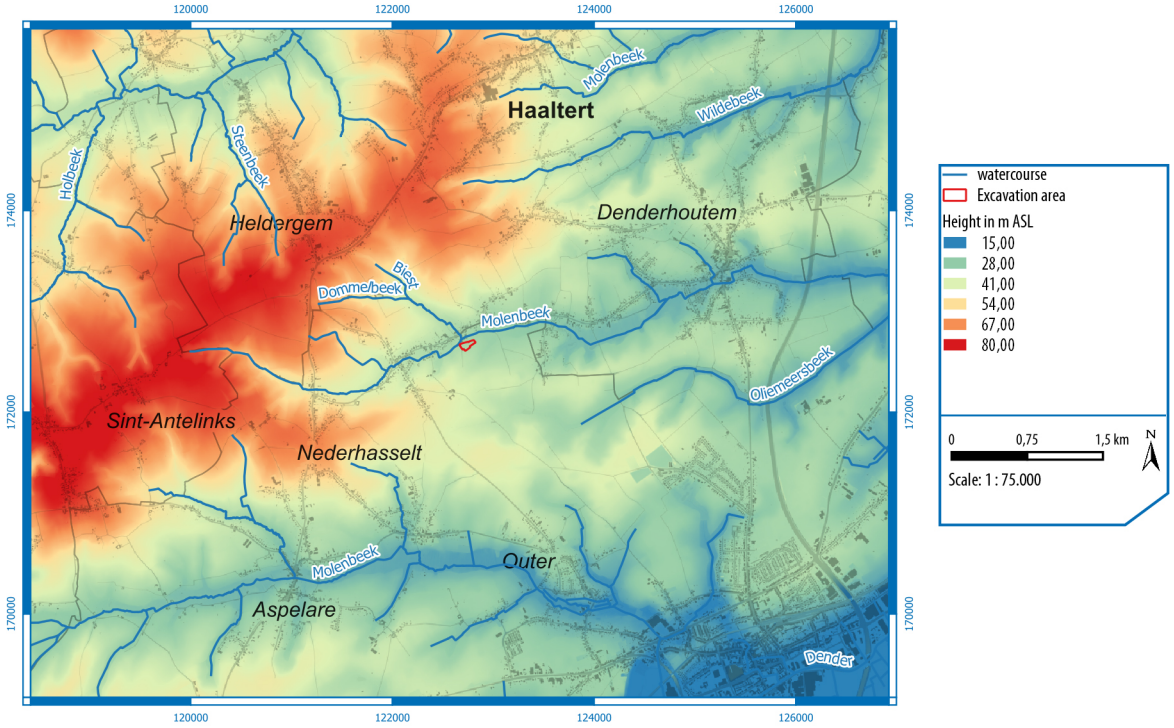

Fig. 2 – Position of the excavation area on a DTM.

The excavation focused on a dense medieval settlement consisting of buildings, ditches and waste pits. During the research of the Medieval features the amount of lithic material in the fill of the features was remarkable, which was also the case with 16 windthrow features containing lithic artefacts. Although the artefacts in the windthrow features were clearly not *in situ*, the excavated soil of six windthrow features was afterwards wet-sieved through 4 mm meshes.

3. The charcoal-rich feature

During the research of a medieval wastepit, a circular feature with *in situ* combustion on the outer rim appeared at a lower level (approx. 40 cm below the main excavation level). The feature has a diameter of approximately 120 cm. The filling consists mainly of two layers: at the bottom there is a thick layer of charcoal, on top a grayish loamy layer. The *in situ* combustion could be found all around the side of the feature and above the charcoal layer. This indicates that the charcoal lens must have still been warm when the feature was filled in. It is therefore noteworthy that there are no traces of combustion underneath the charcoal layer (Fig. 3).

The charcoal layer was wet-sieved through 1 mm meshes and studied by W. van der Meer & K. Hänninen (2021). A twig of hazel (*Corylus Avellana*) was selected for radiocarbon dating which resulted in 2287-2050 calBC (95,4 %) (RICH-29981: 3766±26BP, OxCal v. 4.4.4. Bronk Ramsey, 2021).

Fig. 3 – Charcoal-rich feature: a. Feature seen from above, b. Detail of the *in situ* combustion, c. Cross section of the feature.

A hundred randomly selected samples of charcoal were studied. They were identified using a transmitted light microscope with magnifications up to 500 x. Fracture or cleavage planes are created in three directions (transverse, radial and tangential). Determination took place on the basis of the work of Schweingruber (1982). The selected samples contain over a thousand pieces of reasonably preserved charcoal. They are relatively angular and fragmented (less than 1.5 cm^3). The angularity indicates that little mechanical weathering has occurred afterwards. The pieces were probably covered shortly after burning. Most of the fragments are hazel (*Corylus Avellana*) (Tab. 1).

Most of the pieces were too small to determine from which part of the three/shrubs they originated, but some branches and twigs are present. The remaining pieces probably come from thicker branches and the storage of the hazel bushes. In addition, several pieces of oak trunk wood were found. Twelve pieces could not be identified. Fungal threads and insect feeding galleries have been observed in the charcoal. These are indications for the use of dead or diseased wood. Many pieces are glazed, partly strong. It is possible that the fuel consisted of old objects or old construction wood. Oak was the preferred wood for standing parts, while hazel was often used for the plaiting parts of a wall (Verbrugge *et al.*, 2021).

Taxon	
Corylus avellana	66 %
Cf. Corylus	4 %
Quercus	18 %
Indet	12 %

Tab. 1 – Results of the charcoal analysis.

4. The lithic assemblage

Apart from the four lithic artefacts found in the fill of the charcoal-rich feature, the site yielded 250 (Tab. 2-3) other lithic artefacts that were exclusively recovered from reworked

General typology	*N*	*%*
Cores	10	3,9
Flakes	44	17,3
Bladelets	57	22,4
Undet. flaking fragments	43	16,9
Preparation/Rejuvenation	11	4,3
Chips	14	5,5
Debris	5	2,0
Tools	68	26,8
Microburins	1	0,4
Burin spalls	1	0,4
Total	*254*	*100*

Tab. 2 – General typology of the lithic assemblage.

Tool typology	*N*	*%*
Scrapers	11	16,2
Burins	2	2,9
Retouched bladelets	19	27,9
Retouched flakes	14	20,6
Microliths	4	5,9
Arrowheads	1	1,5
Polished axe/adze fragment	6	8,8
Polished flake	3	4,4
Faceted tool/*Pièce esquillée*	3	4,4
Undetermined tool fragment	5	7,4
Total	*68*	*100*

Tab. 3 – Tool typology of the lithic assemblage.

contexts, *i.e.* windthrow features and the fill of the Medieval features documented at the site (n = 105). While not being associated with the charcoal-rich feature, these other artefacts offer a perspective on the prehistoric occupation history of the site and of the position of the Final-Neolithic feature within this general framework.

One of the characteristics of this assemblage is that it consists of both Mesolithic and Neolithic artefacts. Four microliths (Fig. 4:3-6) and a proximal microburin, for example, unmistakably date to the Mesolithic. The microliths more specifically include an elongated scalene triangle (Fig. 4:3), a backed point (Fig. 4:4), a point with an oblique base (shaped by flat retouch at its ventral side, Fig. 4:5) and a symmetrical trapeze (Fig. 4:6). While the former three can be associated with an Early to Middle Mesolithic occupation of the site, the trapeze dates to the Late Mesolithic. Several other elements confirm this repeated presence at the site during the Mesolithic, *i.e.* a backed bladelet fragment, three artefacts in Wommersom quartzite (*e.g.* Fig. 4:1), as well as six bladelet cores. Three of the latter could indeed fit perfectly in an Early to Middle Mesolithic assemblage (*cf.* irregular bladelet negatives, two opposed striking platforms with relatively sharp angles between the striking platform and the table). The other three, by contrast, share features with 'Essart A and B' type cores (Marchand & Michel, 2009; Allard, 2017; Messiaen, 2020) and therefore seem to further support a Late Mesolithic date for at least a part of the lithic assemblage. The edges and ribs on both flanks of one of these Essart type cores (Fig. 4:7) are furthermore damaged and abraded, perhaps due to a re-use of the core as a pounding/grinding implement.

As mentioned above, besides these Mesolithic artefacts, the assemblage is also composed of some clear Neolithic elements: a tanged and barbed arrowhead (Fig. 5:3), several polished axe/adze fragments (n = 6, *e.g.* Fig. 5:1-2), flakes with remnants of polished surfaces on their dorsal side (n = 3), a potential fragment of a transverse arrowhead, also made on a polished flake, and finally, a medial fragment of a potential pointed blade/dagger or of a leaf-shaped arrowhead (Fig. 5:4).

The raw materials characteristics of the polished artefacts indicate that they originated from different mining centers in the Mons Basin, including the Baudour-Douvrain (*i.e.* Ghlin type flint), Flénu-L'Ostenne (personal comment J.-P. Collin) and Spiennes (?) mining centers (*cf.* Collin, 2019). A more detailed study of these raw materials is, however, needed to rule out whether other types of mined flint could also be present in the collection. For the time being, the Flénu-L'Ostenne mining site is only known to have operated in the 3rd millennium cal. BC (Collin, 2019: 295). While the other Neolithic artefacts can be placed more generally within a Middle to Late/Final Neolithic timeframe, the two polished artefacts can therefore be regarded (*e.g.* Fig. 5:2), together with the charcoal-rich feature, as a second indication for an occupation of the site in the 3rd millennium cal. BC.

A final remarkable feature of the lithic assemblage that needs to be discussed is that, in total, more than half of the artefacts > 1 cm (n = 124) are made on a variety of exogenous raw material types, with outcrops situated at distances of up to 70 km from the site.

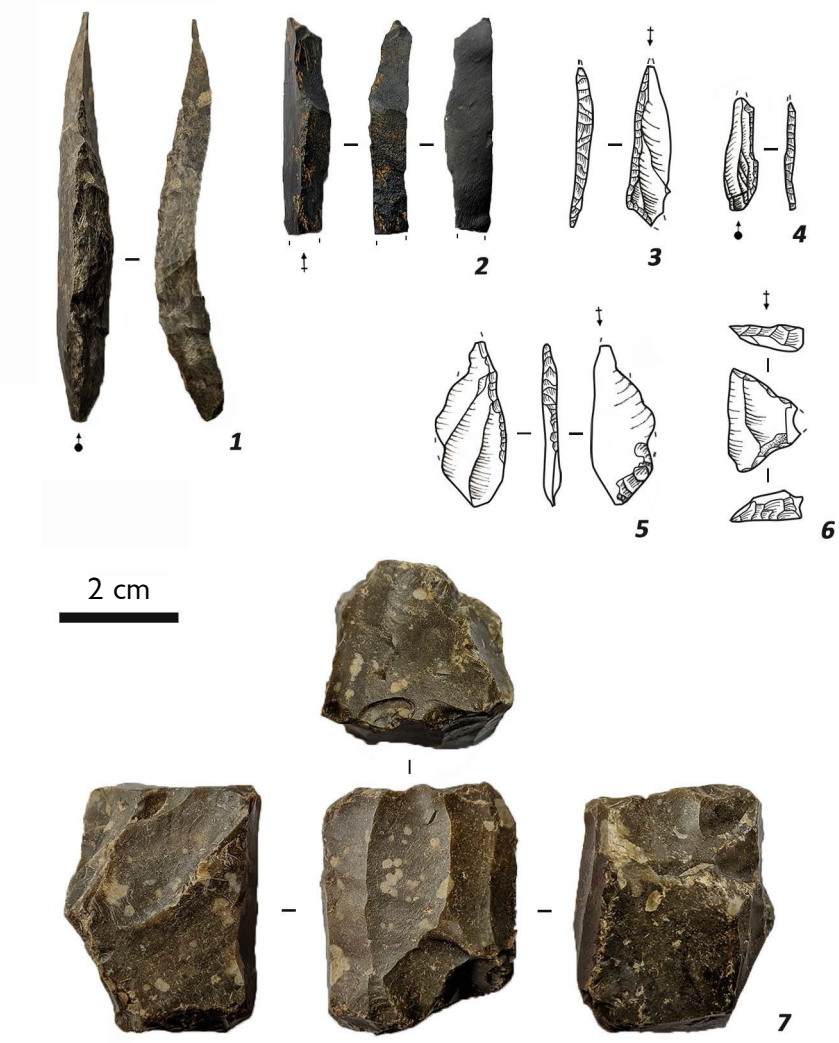

Fig. 4 – Selection of Mesolithic artefacts:
1-2. Crested bladelets, respectively made on Wommersom quartzite and phtanite;
3-6. Microliths;
7. Essart A type core.

Among these exogenous raw materials, we have recognized Upper Turonian flints from the Mons basin (n = 50) and the Lille-Tournaisis area (n = 28), as well as a considerable amount of 'Ghlin-flint' (n = 29), Spiennes/Orp/Rijckholt flint (n = 13), Wommersom Quartzite (n = 3) and phthanite (n = 1).

Based on the typotechnological features of the artefacts, the exploitation of some of these raw materials can be linked to a certain degree to one of the above described occupations, e.g. the Wommersom quartzite and the Upper-Turonian flints seem to be associated with the Mesolithic occupations; the Spiennes/Orp/Rijckholt type flints to the Neolithic occupations. The chronological attribution of the Ghlin flint is, by contrast, less straightforward. A few of the Ghlin artefacts are definitely related to the import of mined flint to the site during the Middle to Final Neolithic period (see above). The other Ghlin flint artefacts (Fig. 6) could either date to the Mesolithic; knowing that imports of this raw material in a northern direction have been attested at least from the Late Mesolithic onwards (Messiaen, 2020); or to the Early Neolithic, knowing that Ghlin flint played an important role in the lithic industries of the Early Neolithic Blicquy culture sites in the nearby Upper-Dendre Basin (Denis, 2017).

5. Discussion

The charcoal-rich feature from Outer Stuypenberg dates back to the Final Neolithic period. This feature has traces of *in situ* combustion on the side, and a charcoal layer at the bottom. The characteristics and age of the feature from Outer Stuypenberg corresponds so strongly

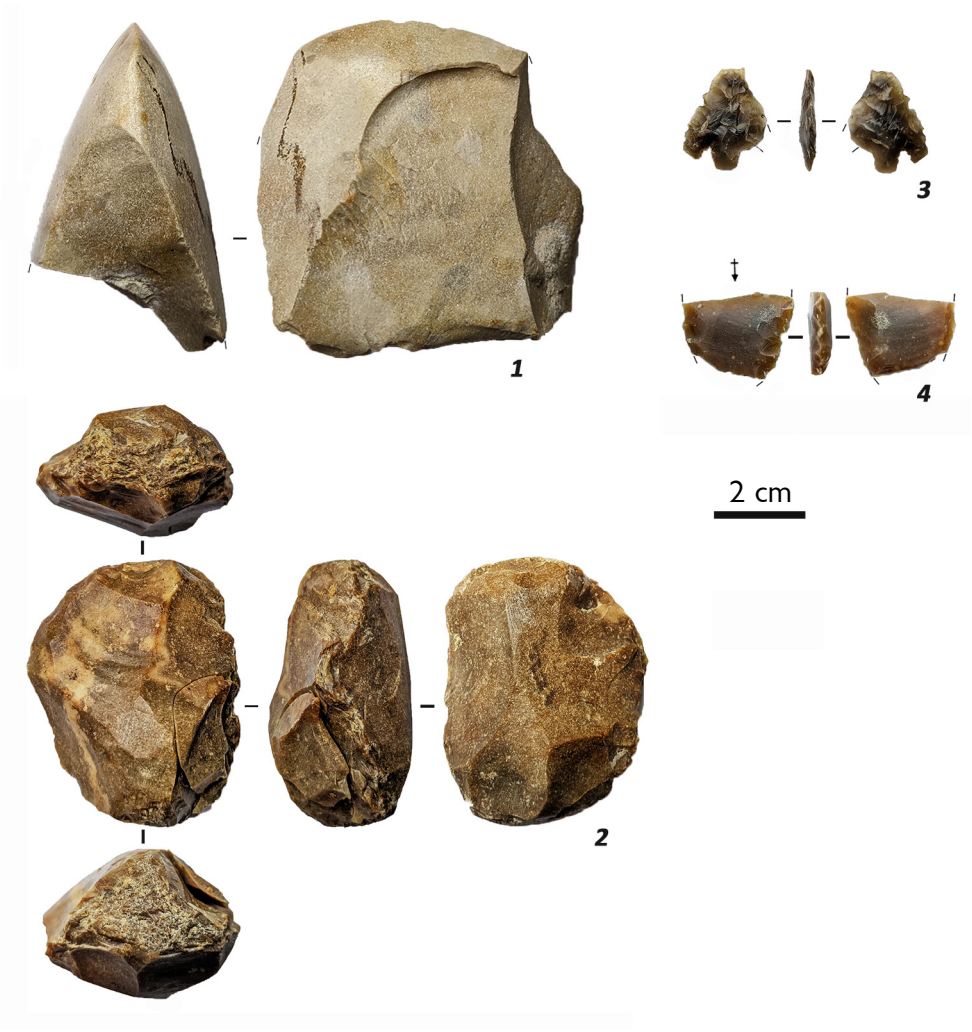

Fig. 5 – Selection of Neolithic artefacts. 1-2. Polished axe fragments; 3. Tanged and barbed arrowhead; 4. Pointed blade/dagger or arrowhead fragment.

to the feature excavated in Wortegem that they are almost identical (De Maeyer *et al.*, 2018) (Tab. 4). Apart from the feature in Wortegem, no other examples are known in the wider region. In the surrounding area at Leeuwergem-Spelaan and Erembodegem Zuid IV, two round pits from the Neolithic have been excavated (Vandendriessche *et al.*, 2015). However, these pits have a stone floor likening them to the structures in France called *four à pierres chauffées* (Lejay, 2011). The time investment for collecting and arranging the stones implies a multiple use, certainly in the south of Flanders, where stones are quite rare. This type of pit is not only older than the pits from Wortegem and Outer (confirmed in the study area by a Middle Neolithic date of the feature in Leeuwergem-Spelaan), they are also clearly different in terms of morphology and appearance. So they may have served another purpose.

	Outer Stuypenberg	*Wortegem Diepestraat*
Dimensions	Round; 1,2 m diameter	Round; 1,4 m diameter
Composition	66 % Corylus avellana	79,9 % Corylus avellana
	4 % cf. Corylus	1 % fraxinus excelsior
	18 % Quercus	11,8 % Quercus
	12 % indet	7,8 % Sambucus sp.
Age (BP)	3766±26 BP[1]	combine date: 3798±21 BP[2]
Age (calibrated)	2287 (95,5 %)2050 calBC	2296 (95,5 %) 2142 CalBC

Tab. 4 – Characteristics of the feature of Outer Stuypenberg and Wortegem Diepestraat.
1. RICH-29981. 2. Combine: RICH-25326: 3797 ± 30 BP and RICH-26225: 3799 ± 28 BP.

Due to the lack of references, the interpretation of these pits remains difficult. The possible explanations given by De Maeyer *et al.* (2018) are also relevant for the feature of Outer Stuypenberg, but they cannot give a full explanation.

The hypothesis that this type of structure is (a part of) a grave seems less likely with the discovery of the feature of Outer Stuypenberg. No grave goods or burnt bone were found in either structure. The shape is similar to charcoal kilns, but these, as far as is known, date largely from the Iron Age or afterwards (Deforce

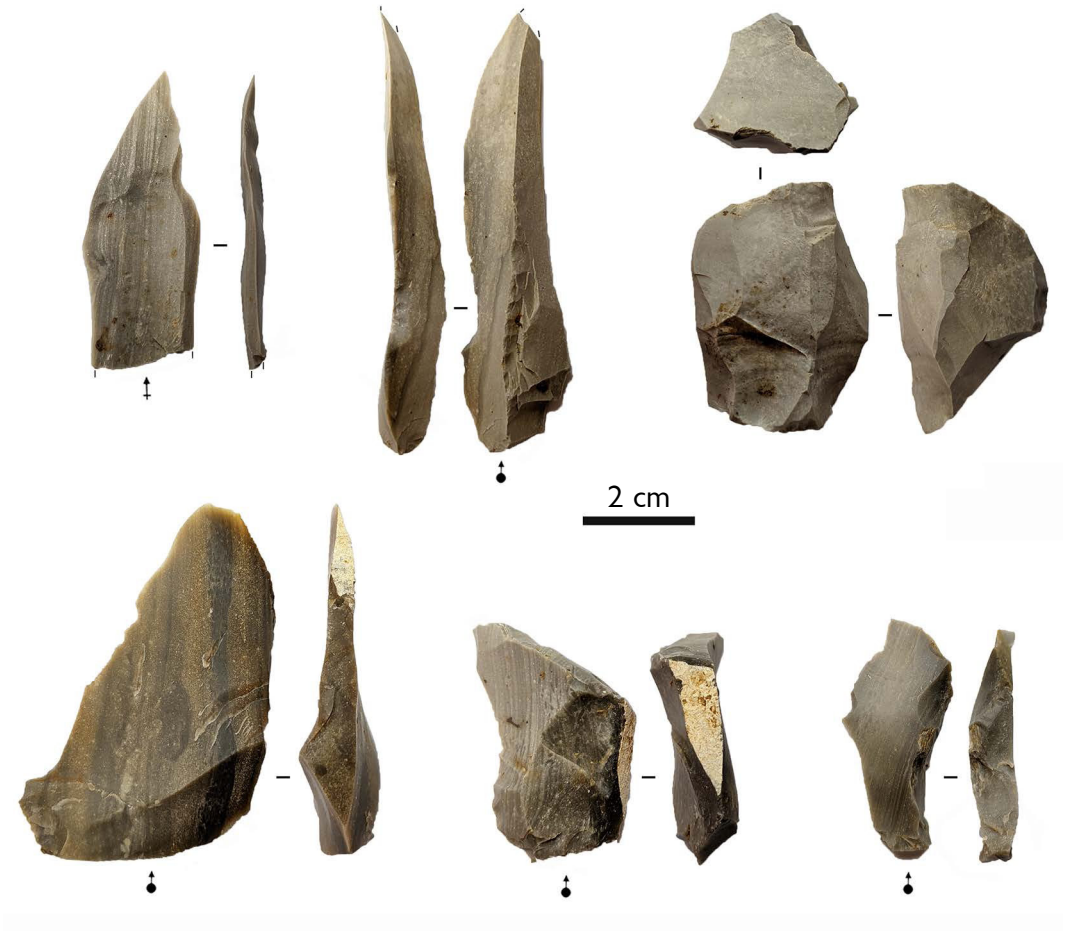

Fig. 6 – Selection of Ghlin flint artefacts.

et al., 2020). The reason being that charcoal production was especially important for metalworking. Moreover, the charcoal composition of such charcoal kilns almost always consists of oak and/or beech: hard wood species with which a high temperature can be reached for a long time.

In both structures, no indication was found that there was a superstructure in the form of a (semicircular) dome such as known from Kortrijk-Schaapsdreef, although this cannot be ruled out (Teetaert *et al*., 2019).

The *in situ* combustion layer in both contexts indicates that the pit certainly burned at this location, and that the charcoal did not burn elsewhere before being deposited in the pit. The composition of the charcoal therefore has a direct link with the activity carried out in the pit. The loam layer above the charcoal in Outer Stuypenberg also shows burn marks, indicating that the loam ended up on top of the charcoal while the latter was still hot. In addition, the composition of the fuel with a low percentage of slow firewood (oak), and a high percentage of fast burning wood (hazel) seems to have had a specific reason.

The pits may be remnants of (open) field ovens without superstructure. However, they may have had an insulating wall made of wood, bark and sod (Thér, 2004). This type of open fires (bonfires) was used in the Neolithic to make pottery. The *in situ* burnt loam on top of the charcoal layer could be an indication of a wood and loam roof that (partly) collapsed after using the kiln when it was still partly warm. The combination of slow burning wood like oak and a fast burning wood type such as hazel is used in pottery production (Thér *et al*., 2019).

The charcoal analysis of Outer Stuypenberg showed that there were indications that dead wood had been used, which may suggest that the wood had been allowed to dry for a longer period of time before using it. After all, the dry wood quickly produces higher temperatures. The shape, composition of the firewood and the lack of food

remains could indicate that the structures were used for artisanal purposes such as making pottery. However, because no ceramic fragments have been found in the filling of the pits, it is difficult to prove this hypothesis. One would expect broken pottery fragments to have been left behind in the pit after a firing session. Similarly, the lack of food remains does not allow us to entirely rule out a 'culinary'/food processing function for these types of pits.

Conclusion

A charcoal-rich feature was discovered in Outer Stuypenberg, in a very densely occupied medieval settlement. The pit, with a charcoal layer at the bottom, had *in situ* combustion traces at the sides and above the charcoal layer. This indicates that the charcoal lens must have still been warm when the feature was filled in. It is therefore noteworthy that there are no traces of combustion underneath the charcoal layer. Radiocarbon dating dates the charcoal between 2287 (95,5 %) 2050 calBC. The characteristics and age are almost identical to that of a feature found in Wortegem. The composition of the charcoal is also very similar, consisting predominantly of hazel with a small portion of oak. At this point of research, it is still unclear what purpose the features served. The charcoal composition may indicate the use of a fire with wood and loam roof to make pottery, although no pottery sherds are found. The lithic assemblage, finally, is composed of a clear Neolithic component, that might in part date to the Final Neolithic. Apart from the feature, however, no other Final Neolithic settlement traces were found at the site.

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Abstract

A charcoal-rich feature with in situ combustion traces at the sides and above a charcoal layer was discovered in Outer Stuypenberg. Radiocarbon dating dates the charcoal between 2287 (95,5 %) 2050 cal BC. The composition of the charcoal consists predominantly of hazel with a small portion of oak and may indicate the use of a fire with wood and loam roof to make pottery, although no pottery sherds are found. The lithic assemblage, is composed of a clear Neolithic component, that might in part date to the Final Neolithic. Apart from the feature, however, no other Final Neolithic settlement traces were found at the site.

Keywords: Ninove, Outer-Stuypenberg, East-Flanders (BE), Final Neolithic, charcoal feature, mixed lithic assemblage.

Samenvatting

Te Outer-Stuypenberg is een houtskoolrijke kuil aangetroffen met in situ verbrandingssporen aan de zijkanten en bovenop een houtskoolrijke lens. Een C14-datering plaatst de houtskool tussen 2287 (95,5 %) 2050 cal BC. De houtskoollens bestaat vooral uit hazelaar met daarbij een kleine fractie eik. De samenstelling van het houtskoolpakket en de morfologie van de kuil, kunnen er op wijzen dat de structuur voorzien was van een dak in hout en leem, en gebruikt is als oven voor potten te bakken. Echter zijn er geen scherven aangetroffen in de kuil. De lithische artefacten op de site bevatte een duidelijke Neolithische component die mogelijk dateert in het finaal-Neolithicum. Echter zijn er naast de houtskoolrijke kuil geen andere sporen uit deze periode aangetroffen op de site.

Trefwoorden: Ninove, Outer-Stuypenberg, Oost-Vlaanderen (BE),finaal-neolithicum, spoor met houtskoolrijke vulling, gemengde lithische assemblage.

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