

Macrolithic stone artefacts from Swifterbant and Michelsberg Culture sites in the Lower Scheldt valley (NW Belgium) and their significance for understanding interregional contact and exchange during the Mesolithic-Neolithic transition

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1. Introduction

The macrolithic (non-flint) stone assemblages of four wetland sites from the sandy lowlands of northern Belgium were studied as part of a larger project investigating all material culture remains in view of understanding the neolithization process of the Lower Scheldt basin. The sites of Doel, Bazel and Melsele are located in the vicinity of the river Scheldt on sealed Pleistocene coversand dunes and natural levees (Fig. 1), and yielded large numbers of pottery fragments, lithics (flint, Wommersom and Tienen quartzarenite and vari-

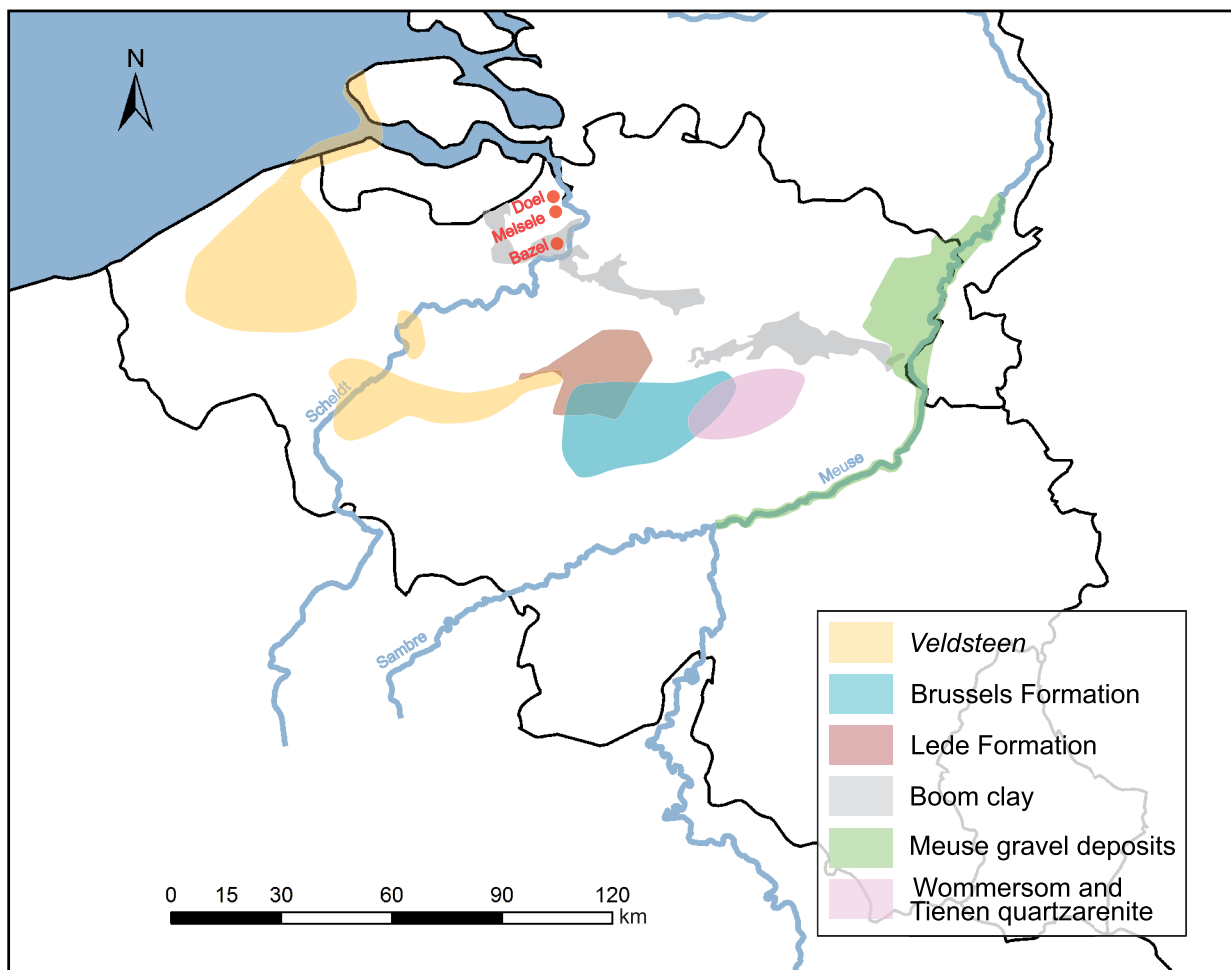


Fig. 1 – Location of studied sites and approximate outcrop locations of raw materials discussed in the text, based on Dusar *et al.*, 2009; Gullentops & Wouters, 1996; Pirson *et al.*, 2008.

ous non-flint stone types) as well as organic materials (consumption waste, bone and antler tools). These remains are associated with the Final Mesolithic/Early Neolithic Swifterbant culture and the subsequent Middle Neolithic Michelsberg culture. Several concentrations at Doel “Deurganckdok” B and M date to the 2nd half of the 5th millennium cal BC and are clearly linked to the Swifterbant culture (Crombé *et al.*, 2002; Crombé *et al.*, 2015). The situation at Bazel and Melsele is more complex, as these sites yielded additional small amounts of ceramic finds linked to the Linearbandkeramik, Limburg, Blicquy and Epi-Rössen cultures. At Bazel “Sluis” two trenches revealed occupations dating back to the Early and Middle Mesolithic, however the majority of finds dates back to the 5th millennium and the 1st half of the 4th millennium cal BC (Crombé *et al.*, 2015; Meylemans *et al.*, 2016). The site of Melsele “Hof ten Damme” was excavated during several campaigns between 1984 and 1990; for this paper only the stone artefacts from the 1984 excavation will be presented. Occupation at this location is thought to have taken place during the 5th and 4th millennium cal BC (Van Berg *et al.*, 1992), but the flint and quartzarenite industries associated with the stone artefacts point to a main occupation in the 5th millennium cal BC.

2. Raw material analysis

At all studied sites less than 1 % of the entire lithic industry consists of other than flint and quartzarenite stone artefacts. To determine the raw material origins of this category the larger fragments were examined macroscopically supplemented by thin sections on a selection of stone artefacts from Doel and Bazel. 30 µm thin sections were prepared at the UGent Department of Geology and studied with a petrographic Zeiss Axioscope.A1 equipped with AxioCam for photographs.

	Doel B & M	Bazel	Melsele 1984
"Veldsteen" / Field sandstone	10	19	
Other Tertiary stone	2	37	
(Paleozoic) sandstone	10	47	41
Vein quartz	5	4	9
Other Paleozoic stone	4	2	9
Undetermined	17	42	4

Tab. 1 – Categorization of raw materials per site (artefacts > 1 cm).

Belgian geological formations range from the Lower Cambrian to the Holocene, with Paleozoic rocks occurring in the Ardennes and the valleys crosscutting the Brabant-London Massif, Mesozoic rocks in Middle-Belgium (the provinces of Hainaut, Liège and Limburg) and the Belgian Lorraine region, and Cenozoic sediments in the northern half of Belgium (Pirson *et al.*, 2008). Stones of both Cenozoic and Paleozoic age were procured as non-flint raw material and used as stone tools (Tab. 1).

2.1. Cenozoic stones

Stones with a Cenozoic origin comprise a considerable part of the macrolithic objects excavated at Bazel (38 %) and Doel (25 %). The majority is glauconite-bearing silicified sandstone which will be referred to in this paper as *veldsteen* (*grès lustré* or “fieldstone”; Fig. 2:a; Fig. 3:a & b). It crops out in the provinces of East and West Flanders and Flemish Brabant (De Jonghe *et al.*, 1996; Duser *et al.*, 2009) but can also be collected on the North Sea shores in the broad vicinity of the Scheldt river estuary (Duser *et al.*, 2009; own prospections at Nieuwvliet and Vlissingen [NL]; Fig. 1). At Bazel this is supplemented with small numbers of other stones, such as a trace fossil typically associated with Cenozoic deposits, Landenian sandstone (former appellation) and calcareous stones. The latter category consists of sandy limestones, comprising on the one hand stones of the Brussels Formation (Fig. 4:a) and on the other hand conglomerate with quartz grains and glauconite

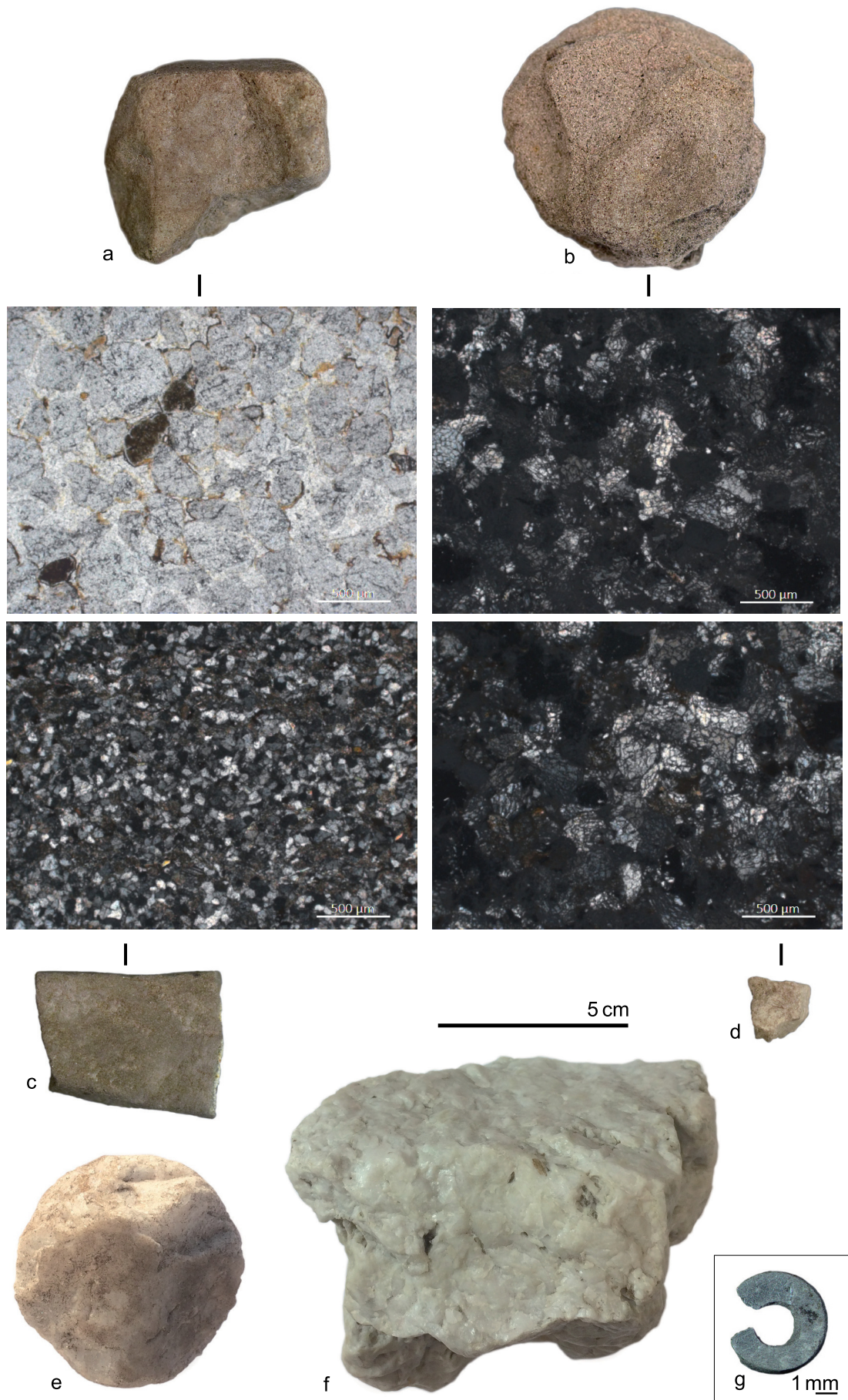


Fig. 2 – Selection of artefacts from Doel “Deurganckdok” B & M.

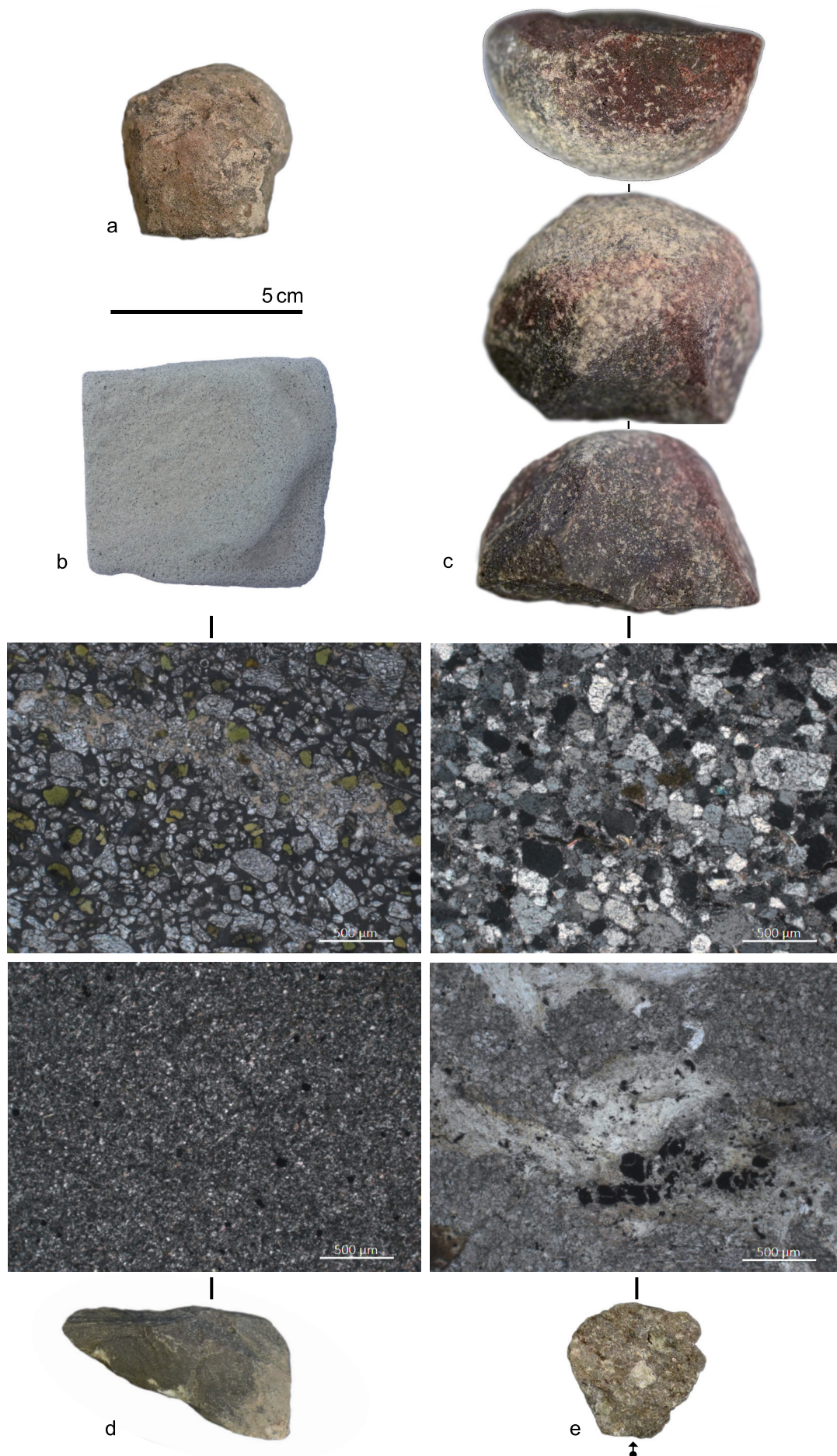


Fig. 3 – Selection of artefacts from Bazel “Sluis”.

in a carbonate cement, possibly originating from the basal Lede Formation gravel layer. All these can be procured within the Brussels Capital Region and by expansion roughly in the Flemish and Walloon Brabant provinces (De Jonghe *et al.*, 1996; Duser *et al.*, 2009; Fig. 1). Additionally, at Bazel, 27 carbonate concretion fragments from septarian nodules were retrieved (Fig. 4:c). They occur in marly bands in the Boom clay (Boom Formation, Rupelian) which crops out in the vicinity of the site (Gullentops & Wouters, 1996; Vandenberghe *et al.*, 2014; Fig. 1). Lastly, at Melsele Cenozoic stones seem to lack but this can be a bias caused by the selection.

2.2. Paleozoic stones

Most stones from Melsele (94 %) and less than half from Bazel (35 %) and Doel (40 %) are Paleozoic in origin: the largest category on all four sites comprises quartzitic sandstones which could originate from both Cambrian or Devonian deposits (Fig. 2:b, 2:c & 2:d; Fig. 3:c & Fig. 5:a). At Bazel and Doel siltstone (Fig. 3:d), green stained phyllade or phyllite (Fig. 3:e), phyllite (Fig. 2:g) and vein quartz cobbles (Fig. 2:e & 2:f) are present in smaller numbers. At Melsele we noted the presence of phyllite (Fig. 5:b), arkosic sandstone (Fig. 5:c), granite (Fig. 5:d), quartz porphyry (Fig. 5:e) and a lydite breccia (Fig. 5:f). All of these rock types have a primary origin in the south of Belgium, except for the latter three, which are present in Pleistocene Meuse gravels and have most probably been derived from the Vosges region (FR). Their small dimensions and the presence of natural surfaces and joints points to a secondary collection as pebbles and cobbles (*galets*), more specifically in Meuse-valley gravel deposits (Pleistocene terraces or Holocene alluvial deposits) (Fig. 1). Rubble from the massifs of South Belgium was transported by the Meuse during the Pleistocene and deposited in terraces in the Lower-Meuse valley (BE, NL) and on the Campine plateau (BE). The stones from the Vosges region were transported when the Moselle was still connected with the Meuse, a connection that got lost during the Saalien glacial stage. As a consequence, the artefacts in Vosges gravel present at Melsele can only have been collected at the location of the oldest gravel deposits: either the Campine plateau or on the highest – oldest – Meuse terraces, the so-called *Trainée Mosane* (Liège Formation; Paepe & Vanhoorn, 1976; Bosch, 1992; Dreesen *et al.*, 2014).

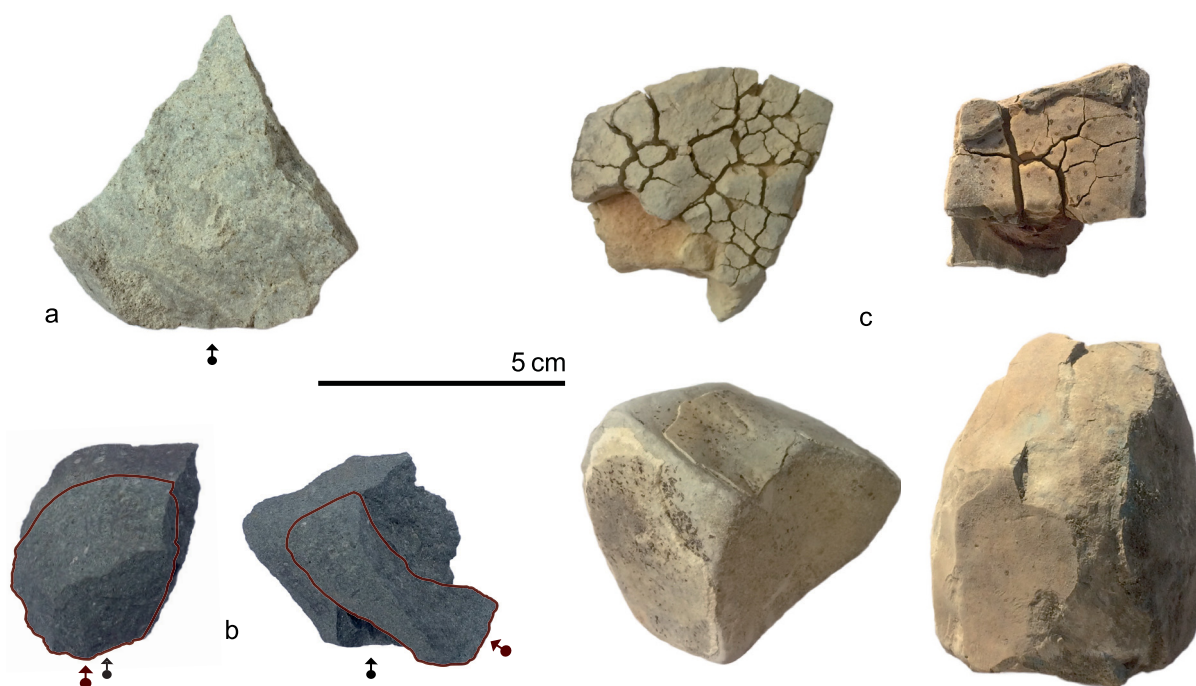


Fig. 4 – Selection of artefacts from Bazel “Sluis”.

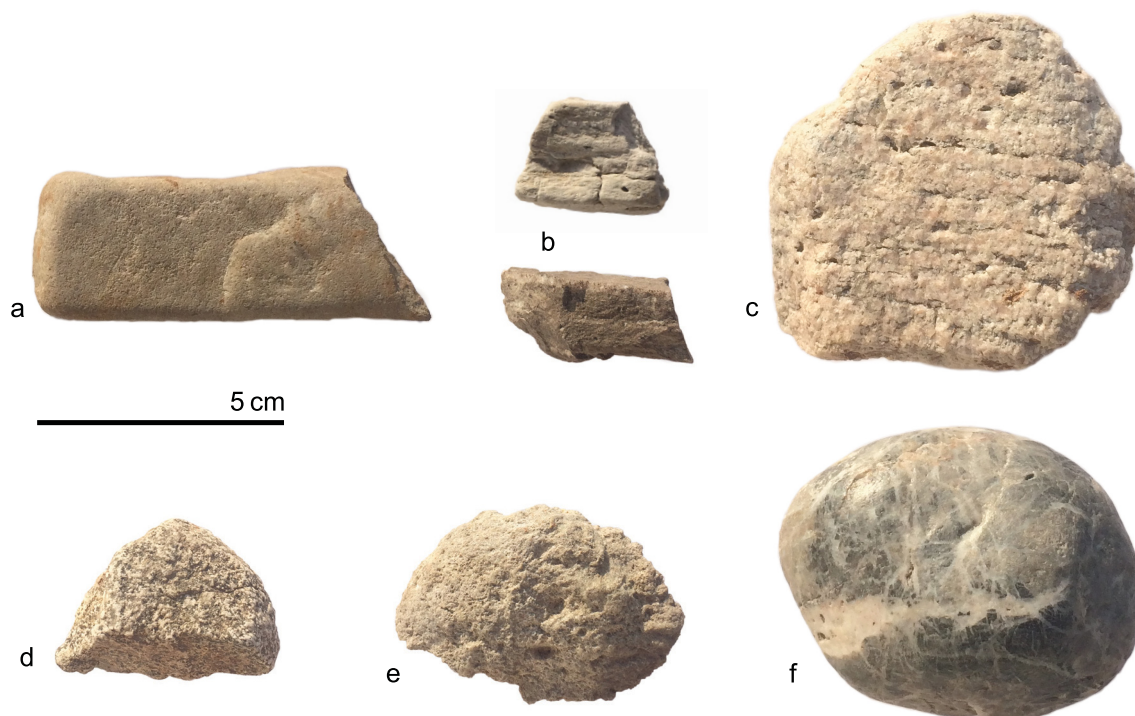


Fig. 5 – Selection of artefacts from Melsele “Hof ten Damme”, excavation 1984.

3. Typology

A basic categorization was made of all stone artefacts (Devriendt, 2013; Hamon, 2006 & 2008) into grit or pieces of stone smaller than 1 cm; undetermined fragments and other pieces such as pebbles; debitage products; ornaments and macrolithic tools (Tab. 2). The latter category consists of artefacts that display macroscopically visible use-wear traces, such as polish, impact points, striations and/or residues.

	Doel B & M	Bazel	Melsele 1984
Tool	9	18	9
Debitage	1	34	1
Ornament	1		
Other / undetermined	37	99	53
Grit	38	226	not recorded

Tab. 2 – Categorization of stone artefacts per site.

The tools from Doel B and M (n = 9) are mainly manufactured in Paleozoic sandstones, *veldsteen* and quartz cobbles. Four artefacts show the clearest use-wear traces: a fragment with macroscopically visible striations and microfractures (Fig. 2:a), a heavily weathered sandstone possibly used in a combined movement of crushing and grinding (*concassage et broyage*; personal communication C. Hamon; Fig. 2:b), a *plaquette* with polishing traces (Fig. 2:c) and a partially preformed quartz cobble with numerous impact points and crushed edges (Fig. 2:e).

The only ornament found on all of the examined sites is a tiny round phyllade (schist) bead (Fig. 2:g).

All tools from Bazel (n = 16) are manufactured in sandstone and *veldsteen* and include a partially heated sandstone with a red residue which might have been used in a double movement of crushing and grinding (personal communication C. Hamon; Fig. 3:c), a hammerstone (Fig. 3:a), some polishing stones (Fig. 3:b), and two small fragments of polished stone axes. A series of flakes (n = 4) in Paleozoic quartzitic sandstone (Fig. 4:b) and to a lesser extent Tertiary stone (Fig. 4:a) are present, in some cases with remnants of used

surfaces, pointing to shaping or rejuvenation of tools on site. The abundantly present septarian concretions (Fig. 4:c) – of which at least 1/3 is burnt – could have been used as a source of red powder in the absence of other regional Fe³⁺-rich resources. Along the cracks and in the cavities of the concretions coatings of iron sulfides (pyrite) occur, which are transformed into hematite after heating over 350° C.

Finally at Melsele nine possible tools were retrieved, among which two sandstone *plaquettes* with polishing traces (Fig. 5:a).

4. Interpretation

As no lithic resources are present in the direct vicinity of the studied sites – with the exception of the carbonate concretions from Bazel – stone had to be procured over larger distances. *Veldsteen* is regionally available with the nearest potential outcrops at distances of 50 to 60 km to the southwest and less than 50 km to the west. At least for the site of Doel a plausible option is that *veldsteen* was collected on the North Sea shores, as there are clear indications that flint pebbles were collected on the beaches. Other Cenozoic stones associated with the Brussels and Lede Formations occur together in the north of Brussels, around 30 km southeast to south-southeast. However we should also note that the outcrop area of the Brussels formation overlaps with that of Wommersom quartzarenite (Fig. 1), a raw material present on all of the sites. Lastly river cobbles can be collected at distances of at least a 100 km to the east along the Lower-Meuse valley or on the Campine plateau.

At contemporary sites in the Dutch Delta attributed to the Swifterbant culture a similar raw material procurement could be witnessed: while most stones originate from local boulder clay deposits, a small number of sandstones, pebbles and vein quartz were collected over large distances from the Ardennes or the Rhine area (Devriendt, 2013). Moreover, at the early Mesolithic site of Verrebroek “Dok”, in the vicinity of our studied sites, a similar – though less pronounced – procurement strategy was witnessed. Here the raw material of the macrolithic tools was a combination of *veldsteen* supplemented with a small number of polishing *plaquettes* made of a southern Upper Devonian micaceous sandstone (*grès famennien*) (Hamon, 2009). All this points to long-term east-west interactions and exchanges between groups occupying the Scheldt and Meuse valleys. This pattern is also confirmed by the ongoing provenance analysis of clays used to make the earliest pottery in the Lower-Scheldt basin (research Dimitri Teetaert, UGent), as well as the provenance analysis of flint artefacts.

Although there is a variety of stone types present at all studied sites, the preferred categories of raw material used for tools are clearly hard Paleozoic quartzitic sandstones, followed by *veldsteen* and vein quartz. The main activities appear to be related to polishing, grinding and hammering/pounding. We should mention that the action of grinding and hammering was not limited to macrolithic stone artefacts, as numerous flint hammer- and grinding stones (often re-used cores) were found on all sites, often displaying traces of residue. A tool category completely lacking on all sites are grinding tools associated with the processing of cereal.

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Abstract

The macrolithic stone assemblages of four wetland sites – Doel “Deurganckdok” B and M, Bazel “Sluis” and Melsele “Hof ten Damme” – located in the sandy lowlands of northern Belgium were studied as part of a larger project investigating all material culture remains in view of understanding the neolithization process of the Lower Scheldt basin. These remains are associated with the Final Mesolithic/Early Neolithic Swifterbant culture and the subsequent Middle Neolithic Michelsberg culture, and date back to the 5th and 4th millennia cal BC. The macrolithic stone tools were used for polishing, grinding, hammering and pounding. Due to a lack of local lithic resources – with the exception of carbonate concretions used at Bazel for possible hematite production – stone had to be procured over larger distances. The preferred categories of raw material used for tools are hard Paleozoic quartzitic sandstones and quartz cobbles, procured along the Lower-Meuse valley or on the Campine plateau. Additionally regional raw materials such as *veldsteen* and other Tertiary stones were used.

Keywords: Neolithization, raw material procurement, macrolithic tools, Swifterbant culture, Michelsberg culture, Final Mesolithic / Early Neolithic, Middle Neolithic, Lower-Scheldt valley (BE), Lower-Meuse valley (BE, NL), Campine Plateau (BE), sandstone, *veldsteen*.

Samenvatting

De macrolithische stenen werktuigen van vier sites gelokaliseerd in de Scheldepolders van Zandig Vlaanderen – Doel “Deurganckdok” B en M, Bazel “Sluis” en Melsele “Hof ten Damme” – werden bestudeerd in het kader van een groter project dat de neolithisatie van het Benedenscheldebekken onderzoekt. De materiele overblijfselen op de sites zijn geassocieerd met de Finaal Mesolithische/ Vroeg Neolithische Swifterbant cultuur en de daaropvolgende Midden Neolithische Michelsberg cultuur, en dateren in het 5^{de} en 4^{de} millennium cal BC. De werktuigen werden gebruikt om te polijsten, malen, stampen, pletten en hameren. Omdat lokale ontsluitingen ontbreken – met uitzondering van septaria fragmenten uit Bazel die mogelijk werden verhit om hematiet te produceren – was het noodzakelijk om steen over grotere afstanden te verwerven. De voorkeur werd gegeven aan harde Paleozoïsche zandstenen en kwartskeien die verzameld werden langs de benedenloop van de Maasvallei (BE, NL) of op het Kempisch plateau (BE). Aanvullend werd ook regionaal steen verzameld, vooral veldsteen maar ook andere Tertiaire stenen.

Trefwoorden: Neolithisatie, grondstofbevoorrading, macrolithische werktuigen, Swifterbant cultuur, Michelsberg cultuur, Finaal Mesolithicum/ Vroeg Neolithicum, Midden Neolithicum, Beneden Schelde-vallei (BE), Beneden Maas-vallei (BE, NL), Kempisch Plateau (BE), zandsteen, veldsteen.

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