

6 Beads and pendants of amber and jet

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6.1 Introduction

Amber is a common find category at many of the Single Grave sites located in the province of Noord-Holland. Piena and Drenth wrote a detailed account of the amber ornaments and prefabs found at Aartswoud, as Bulten did in relation to the ornaments from Mienakker.²³² All evidence points to local production of amber ornaments in this area. The Keinsmerbrug site is the exception, with only three amber finds, but this can probably be attributed to its special role in the settlement system, as it was not an ordinary permanently occupied settlement.²³³ Zeewijk has produced a large number of amber finds, ranging from unmodified nodules of amber to a few heavily worn beads. Ornaments in varying stages of production predominate.

The present study is based on a biographical approach to the study of ornaments, including a characterisation of the raw material, a reconstruction of the production processes, and examination of its use life, and a study of the context of deposition.²³⁴ Since it was obvious that ornaments in varying stages of their production dominated the assemblage, the focus was on the detection of production traces and the reconstruction of the *chaîne opératoire*. Another question was whether there was evidence of special activity sites, pointing to specific workshops for amber bead production, or whether this was a task carried out more widely within the settlement.

6.2 Sample and methods of study

All amber and jet finds, in total 269 artefacts, were first classified into broad categories (beads and bead fragments, pendants, semi-finished products, blocks, flakes and nodules). Only one jet artefact was encountered in the assemblage. All artefacts were weighed to assess the spatial distribution of amber.²³⁵ The total weight of the amber and jet assemblage amounts to just under 38 grams. In the second stage of analysis, all beads and pendants as well as any artefacts with suspected traces of production were studied by stereomicroscope and observations were entered into an Access Dbase. Roughly half

the artefacts were selected for such detailed study (n=135), revealing information on the technology used, the colour of the amber, the degree of use and indications of reworking. The selection included all the beads, pendants and semi-finished products, as well as flakes, blocks and nodules with possible traces of modification. As can be expected, small flakes (measuring less than 3 mm) were for the most part rejected as the initial counts included 125 flakes. The sample of 135 artefacts includes 89 beads or bead fragments and eight pendants (Fig. 6.1). In terms of weight the selection represents 26.3 grams of amber and 0.09 grams of jet. Considering the fact that some find material from Zeewijk could not be located (see Section 1.5), the possibility that yet another find box containing amber ornaments will surface in the future cannot be excluded.

All artefacts were examined by stereomicroscope, using magnifications of 10-160x under both oblique and reflected light. This allowed a detailed examination of the traces of production such as cut marks, traces of scraping, grinding and perforation. A metallographic microscope was also used to examine the wear traces around the perforation and on the surface of the beads. This was a Nikon Optiphot, with magnifications ranging from 100-500x. The microscope was fitted with Nomarski Differential Interference Contrast for greater contrast and depth of field. Some of the amber finds were too oxidised for traces of wear and tear to have been preserved.

6.3 Raw material

The amber nodules in the assemblage were rolled and did not display the extensive weathering commonly seen on amber that was not water-worn but retrieved from sediments.²³⁶ It is most likely Baltic amber (succinate) that was transported along the North Sea. Amber floats in salty waters and is carried along the tidal streams of the North Sea. It is still found on the shores of the Frisian Islands today.²³⁷ If one examines the frequency of amber finds in the Neolithic coastal sites of the Netherlands, it becomes clear that amber is much more common further north along the Dutch coast. In Schipluiden, located near the present-day city of

²³² Piena & Drenth 2001; Bulten 2001a.

²³³ Garcia-Diaz 2012; Smit *et al.* 2012b.

²³⁴ Jones 2002.

²³⁵ See Nobles, this volume Chapter 11.

²³⁶ Faber, Frandsen & Ploug 2000.

²³⁷ Waterbolk & Waterbolk 1991.

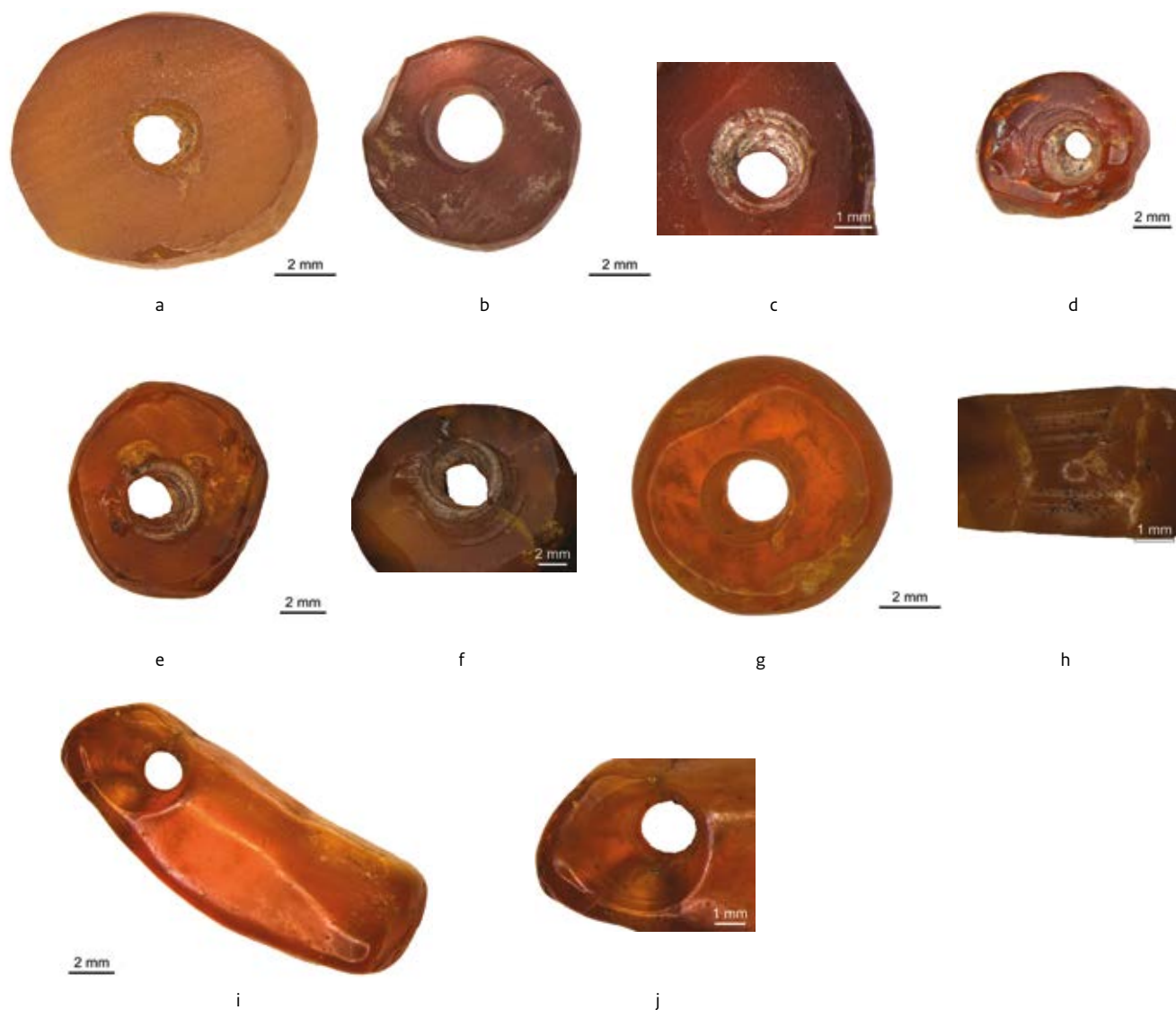


Figure 6.1 Photographs of beads and a pendant, showing traces of manufacture and use: a. freshly ground bead (17501-2) with faceted edges. The grinding traces are still clearly visible and the bead does not show traces of use; b. disc-shaped bead (15784-1) with faceted edges. The grinding traces and perforation marks are clearly visible and show that the bead was hardly used, if at all. One side of this bead consists of a flake negative. This bead does not display traces of wear; c. disc-shaped bead (17554-4) with faceted edges without traces of wear, with fresh production marks. The perforation was made by a flint drill bit; d. bead (16901-2) displaying a misplaced biconical perforation made with a flint drill. The bead lacks traces of wear; e. disc-shaped bead (17564-3-1) with faceted edges, without traces of wear. The biconical perforation, made with a flint drill, is slightly misplaced; f. detail of the perforation of bead (17564-3-1) and the adjustments made in the placing thereof; g. heavily worn disc-shaped bead (17604-8) with a rounded, worn perforation and faceted edges; h. heavily used, broken bead (17563-3). Note the worn biconical perforation; i. heavily worn and polished pendant (17504-2); j. detail of this same pendant (17504-2).

The Hague, only 17 amber finds (with a total of only 10 grams) were retrieved, as compared to 37 finds of jet, totalling 212 grams.²³⁸ In contrast, at Zeewijk only one jet artefact was recovered amongst 269 amber finds. This indicates a much greater availability of amber in the area around Zeewijk and a relative scarcity of jet. The source area of this latter material is most likely the area around Cap Blanc Nez in the Pas de Calais area. From here small fragments may have been transported north by the tidal working of the Channel and the North Sea.²³⁹

The presence of numerous amber finds suggests that the raw material was collected on nearby beaches, located approx. 15 km downstream along the nearby tidal creek.²⁴⁰ We cannot entirely exclude the possibility that some of the amber was obtained from the ice-pushed ridges of the boulder clay deposits located approx. 8–10 km north of the site. The other two sources of amber mentioned in the literature seem less likely as the source of amber at Zeewijk, due to the fact that they are situated at a much greater distance. These are the Pliocene lignite deposits of the northern Netherlands,²⁴¹ in which small amounts of amber are present, and the amber from tertiary sources transported by the rivers in the central Netherlands.²⁴²

The amber is for the most part slightly translucent (n=92), though the opaque variety is also present (n=38). In four cases the surface was so oxidised that it was impossible to determine whether or not the amber was translucent. The colour varied from yellow (n=16), via orange (n=90) to brown (n=21) with a small number of milky amber pieces (n=6). The nodules, 20 of which were present in the sample, have a mean weight of 233 mg. The largest nodule weighed 630 mg.

6.4 Production and shape

The blanks for the ornaments were either nodules, blocks or flakes (Table 6.1). It is relatively easy to flake amber due to its conchoidal fracture and generally homogeneous structure. Quite a number of flakes were found, which could probably be related to the production phase of the ornaments. Many of the blocks, forming the blank for some of the beads,

also display flake negatives, indicating that flaking of amber nodules was certainly practised in the early stage of production. Blanks were also made in another way. A total of 13 artefacts display traces of sawing (Fig. 6.2a), probably related to the segmentation of larger nodules of amber into blanks. This has also been observed at Mienakker.²⁴³ A total of 24 semi-finished products of ornaments could be distinguished, 21 beads and three pendants that were never completed because, for instance, the perforation was aborted. It was impossible to determine the kind of blank used for these semi-finished products. One bead was made from an older bead, indicating that heirlooms were occasionally refurbished for a second life. Finally, 45 beads and five pendants were completely finished, obliterating any indication as to whether they were made from a block, a flake, or a nodule.

The relatively good preservation of the ornaments allowed examination of the traces of production. Of the 89 beads, seven were made from a flake (Fig. 6.2b), ten from a block (Fig. 6.2c) and eight from a nodule (Fig. 6.2d). The blanks of the pendants could not be reconstructed. The next phase of production is variable, indicating that there was no strictly defined *chaîne opératoire*. Some blanks were subsequently faceted and ground into a preform, or else the piece was first perforated (Fig. 6.2e). Many artefacts displayed traces of grinding (n=42) (Figs. 6.1a, b and 6.3a, c), three showing traces of scraping and grinding. The grinding marks were sometimes incredibly fresh, with the grinding dust still visible. A sizable number of beads (n=24) have faceted edges, especially the small, flat, disc-shaped beads. These facets are so small that it is hard to imagine them being produced on a grinding stone. Past experiments with fixing a perforated bead on a bow drill and applying the facets with a flint blade proved successful.²⁴⁴

However, the fact that several semi-finished small, flat disc-shaped beads showed no perforation, but were nevertheless faceted, indicates that another method must have been practised. They may indeed have been applied to a grinding stone, but our experiments show that this is not an easy task, especially on small beads of 5–7 mm in diameter. Holding the bead firmly enough and switching positions in order to obtain the tiny facets requires a dexterity

²³⁸ Van Gijn 2006a, 195.

²³⁹ Van Gijn 2006a, 2008.

²⁴⁰ Smit this volume, Fig. 2.1.

²⁴¹ Huisman 1977.

²⁴² Van der Valk 2007.

²⁴³ Bulten 2001a.

²⁴⁴ Drenth, Meurkens & Van Gijn 2011.

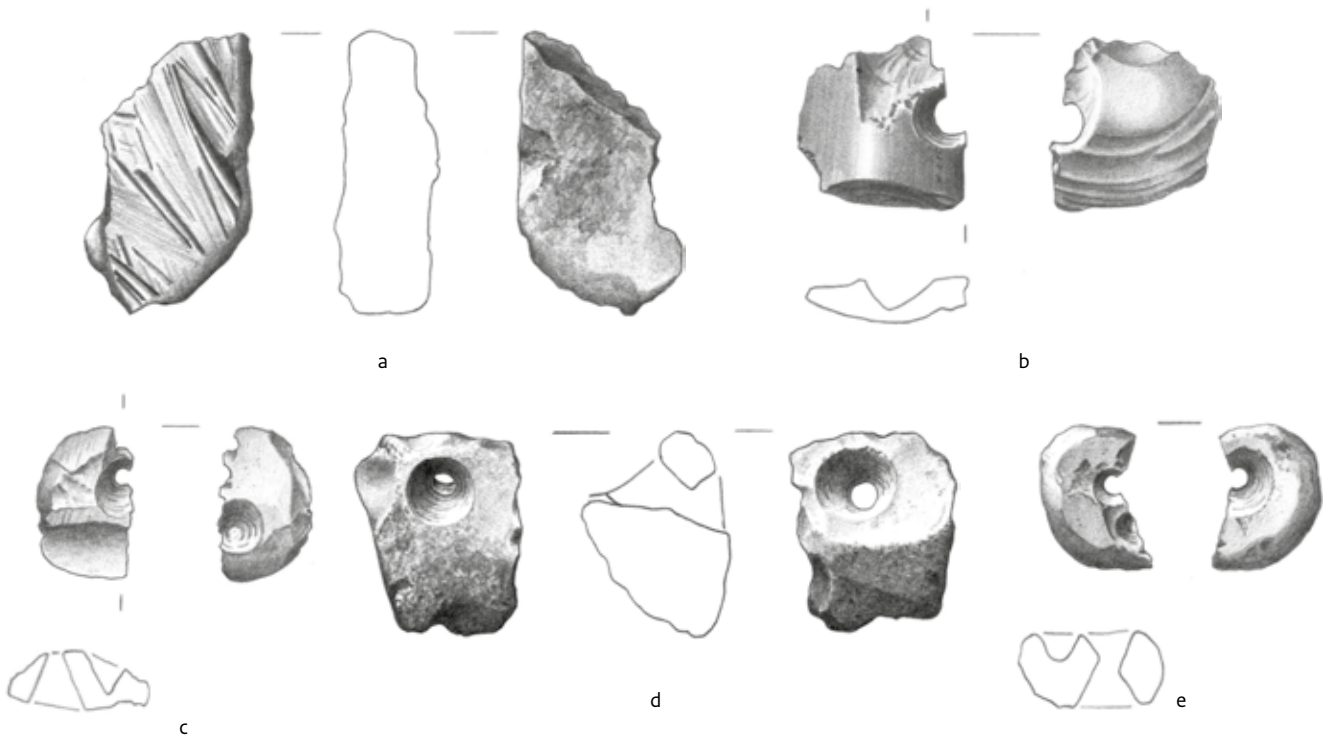


Figure 6.2 Drawings of blanks and semi-finished beads: a. saw marks on blank (19423-6-7); b. amber flake with perforation, probably aborted when the flake broke (21321-5-8); c. semi-finished bead on a block with biconical perforation which does not match (16233); d. perforated nodule (18141-2); e. broken semi-finished bead, probably broken during the perforation, with edges that are only partially finished. Note the aborted attempt at perforation just below the finished one (11803-4). Scale 2:1.

that we experimenters do not at any rate possess. After faceting, which is mainly visible on the sides, the top and the bottom of the disc-shaped bead were ground flat. The fine scratches indicate that the grinding was probably performed using a fine-grained sandstone. A number of beads and pendants have a very shiny surface, suggesting that after grinding the surfaces were polished (Fig. 6.1g). However, the fact that this shininess was observed only on ornaments that were interpreted as heavily used, indicates that this polish is due to use, not to manufacturing (see below under Section 6.5).

Perforations were applied either directly in the blanks (Fig. 6.4a), or in the shaped and ground preforms (Fig. 6.2b). They were for the most part biconical (Table 6.2). This pertained both to the beads (n=35) and to the pendants (n=3). Often, the placing of the two conical perforations was badly judged so that the makers had to improvise in order for the two sides of the perforation to meet (Figs. 6.1d,e). On a number of artefacts only one conical perforation is visible, with the perforation being

Table 6.1 Primary classification and type: frequencies.

Typology	Primary classification	Number
Bead	block	10
Bead	flake	7
Bead	nodule	8
Bead	old bead	1
bead	unknown	42
Semi-finished bead	unknown	21
Subtotal		89
Pendant	unknown	4
Semi-finished pendant	unknown	4
Subtotal		8
Unmodified	nodule	12
Unmodified	block	6
Unmodified	flake	20
Total		135

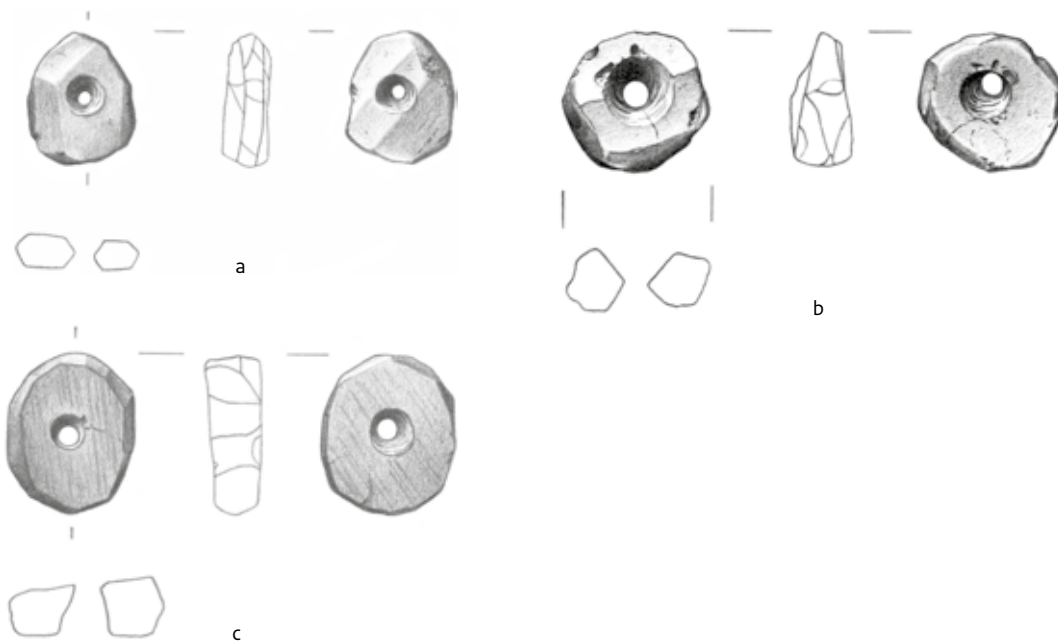


Figure 6.3 Small disc-shaped beads, often with faceted edges: a. bead with prominent grinding traces on both flat sides displaying no traces of wear (17544-4); b. very fresh bead without traces of use but displaying fresh grinding traces, a slightly misplaced biconical perforation and faceted edges (17564-3-1); c. disc-shaped bead with faceted edges and perfectly preserved grinding traces. It lacks any traces of use. The grinding occurred after the faceting (17501-2). Scale 2:1.

Table 6.2 Type of perforations seen on the beads and pendants.

Typology	Type of perforation	Number
Beads	conical one-sided	5
	biconical	35
	conical indet.	3
	cylindrical one-sided	1
	cylindrical two-sided	1
	cylindrical indet.	9
	unfinished perforation	12
	not perforated	21
	indeterminate	2
Subtotal		89
Pendants	biconical	3
	cylindrical	1
	unfinished perforation	2
	not perforated	2
Subtotal		8

aborted, possibly because the placing of the first perforation was wrong (Fig. 6.4a). A small number of beads ($n=11$) and one pendant displayed a straight, cylindrical perforation. A total of 12 beads showed perforations that were not finished. Finally, 21 beads and two pendants were completely shaped, but lacked a perforation. The conical and biconical perforations displayed very prominent rills (Figs. 6.1c,d), suggesting that flint drills were used. Microwear analysis of the flint tools from Mienakker by García-Díaz has revealed the presence of small flint drills with traces of drilling amber.²⁴⁵ García-Díaz was able to experimentally replicate these traces with exact copies of the small archaeological flint drills. The presence of these drill bits constitutes yet another indication that the amber beads were produced locally. However, some of the perforations display circular scratches that are so regularly spaced that it is unlikely that they come from use of a flint drill (Fig. 6.6c). Most likely they were made with a pointed piece of wood or antler, using a fine slurry; experiments show this to be an effective drilling method, resulting in

²⁴⁵ García-Díaz 2013, Fig. 5.5.

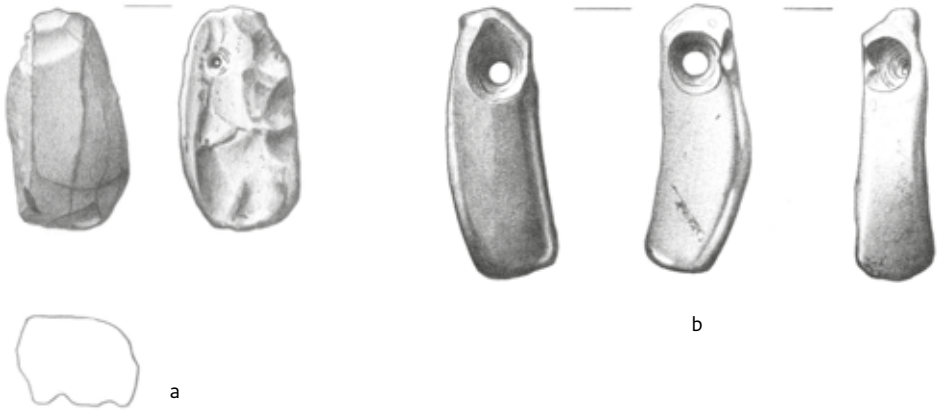


Figure 6.4 Pendants: prefab and finished ornament: a. prefab for a pendant with an initial perforation attempt which was abandoned (20074-2); b. finished pendant, heavily worn and displaying a strange secondary but unfinished perforation (right) (17504-2). Scale 2:1.

fine, regular circular scratches.²⁴⁶

If we look at the end products – the finished beads and pendants – several types can be distinguished (Table 6.3). Among the beads the disc-shaped variety predominates (n=33). These are round, relatively flat ornaments, often with faceted sides, measuring 6-8 mm in diameter and 2-4 mm thick. They are usually biconically perforated. Two barrel-shaped and one globular bead complement the picture. The remaining beads could not be assigned to a specific type (n=53). Among the pendants two were irregularly shaped, and the other six could not be classified typologically (Fig. 6.4).

Table 6.3 Typological classification of the beads and pendants.

Typology	Ornament type	Number
Beads	barrel-shaped	2
	disc-shaped	32
	globular	1
	indeterminate	21
	type unknown	33
Pendants	irregular	2
	indeterminate	3
	type unknown	3
Total		97

6.5 Use

All ornaments were studied by stereomicroscope to determine the extent to which the perforations were worn. This was the main indication of the intensity of use. Many of the beads did not display traces of wear (n=27), three were slightly worn, five displayed intermediate wear and 14 displayed heavily developed traces of use (Figs. 6.1g,h and 6.5). In three cases the extent of wear could not be assessed. Of the five finished pendants, four were heavily worn, considering the considerable rounding of the perforations (Fig. 6.1i, j and 6.4b). One was worn only slightly, whereas the remaining three pendants were actually prefabs without perforations. The four pendants

interpreted as having been heavily worn, also displayed a well-developed polish over their entire surface (Figs. 6.1i,j). A polished surface was relatively rare in the assemblage: besides the pendants only 19 beads showed evidence of polishing (Fig. 6.1g). Considering the association with heavily worn perforations, I have interpreted the well-developed sheen as having been caused by prolonged use, rather than intentional modification. Many of the beads with a heavily polished surface are broken (Fig. 6.5), and may have been discarded after they broke. However, one broken bead (no. 15032-3) (Fig. 6.5c) with heavy traces of use displayed two biconical perforations, both of which display only moderately developed wear around their rims. This may suggest that old beads were

²⁴⁶ Personal observation by author.

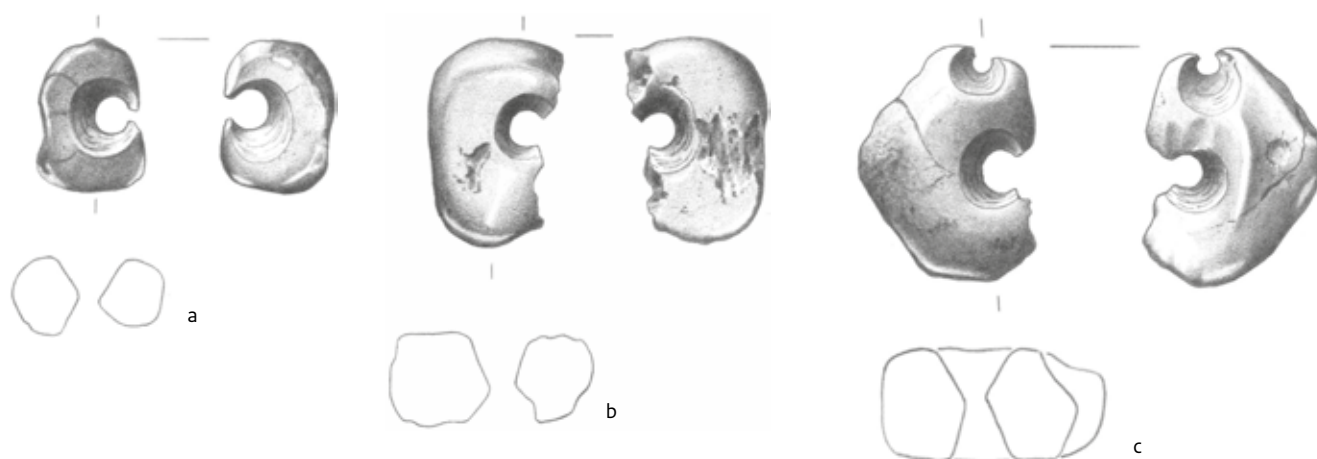
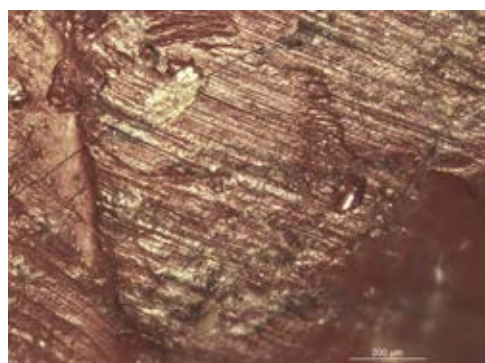
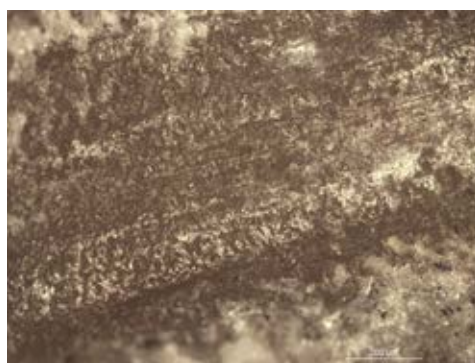


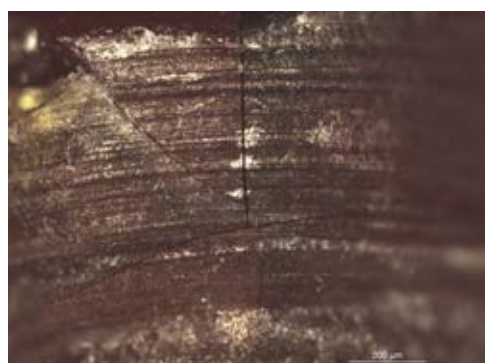
Figure 6.5 Broken beads, all displaying extensive traces of wear: a. no. 14984-3, broken at perforation; b. no. 17564-3-2, broken at perforation; c. no. 15032-3, broken at perforation. The bead surface is highly worn but in contrast both perforations are only moderately worn. This may be a reworked old bead. Scale 2:1.



a



b



c



d

Figure 6.6 Microwear pictures of bead surfaces: a. fresh grinding marks (15003-1; 100x); b. scratches from grinding (13691-6; 100x); c. circular scratches on the inside of a perforation. The regularity of the scratches suggests a tool other than a flint drill (13724-9; 100x); d. extensive abrasion from a cord on the inside of an amber bead (22684-1; 100x).

reworked, something that was also noted in a child's burial at the Middle Neolithic site of Ypenburg, for example.²⁴⁷

The number of worn beads is therefore quite limited. This is not unusual at settlement sites. The beads that are found in such a context were either accidentally lost or were discarded because they were broken.²⁴⁸ It is rare to find finished, still usable beads in living areas. They do, however, appear in funerary contexts like Ypenburg or in the Funnel Beaker megaliths.²⁴⁹

6.6 Spatial distribution

Nobles performed a spatial analysis of the ornaments as far as they were located within the sampled areas.²⁵⁰ He found that the amber is concentrated on the higher ground of Zeewijk-West where habitation seems to have occurred.²⁵¹ Although there is a concentration of amber in the northeastern part of the area sampled by all researchers, it would be premature to interpret this as evidence of the former presence of a workshop as amber is present throughout most of the excavated area.

6.7 Conclusions

The analysis of the beads and pendants from Zeewijk has confirmed the conclusions of Piena and Drenth for Aartswoud²⁵² and Bulten for Mienakker²⁵³ that the production of amber ornaments occurred locally in this area, i.e. within the settlements. Ample evidence of the presence of production waste like flakes, blocks, nodules and semi-finished beads supports this. Moreover, microwear analysis of flint drills at both Mienakker and Zeewijk has shown them to have been used on mineral materials, probably amber.²⁵⁴ The amber, most likely Baltic amber or succinate, was washed ashore by the North Sea. It is also possible that small amounts of amber were collected in the glacial deposits at Wieringen, located north of the settlement. Regardless of the exact provenance, the supply of amber must have been sufficient to meet the need, considering the rather careless way in which the raw material was treated. Jet on the other hand, abundant further south, is very rare,

represented by only one artefact. Whether this was obtained as rare find on the beach, or by exchange, is impossible to determine.

Beads and pendants were made from flakes, sawn blocks or flaked nodules. The exact production sequence varied: in some cases the perforation was applied prior to the grinding into shape of the ornament, in others the order was reversed. This variability in the exact production sequence supports the assumed domestic production of the beads, with different people having slightly different techniques. If the amber beads had been produced in workshops, a more standardised production sequence would be expected. A certain lack of standardisation and expertise (or care) is also visible in the way the biconical perforations were applied: on many beads the two sides of the perforations do not match perfectly. On the other hand, however, many of the beads are very much alike in terms of their shape and dimensions and seem to be based on a similar concept of what a bead should look like. The presence of a large number of unfinished beads, prefabs and especially the numerous finished beads without traces of wear, seem to indicate that more beads were produced than were necessary for the personal use of the inhabitants. It may therefore be proposed that the inhabitants of these coastal settlements produced beads for Single Grave communities further inland. However, amber beads have so far been found exclusively in burial contexts, settlements from this period being exceedingly rare. One such example is a series of 39 amber beads from burial mound 4 near Garderen, in the Veluwe region.²⁵⁵ These beads appear to be shaped rather haphazardly, certainly not displaying the more standardised disc shape of many of the beads from Zeewijk. Moreover, they were made from an opaque, yellowish amber, unlike the more transparent, orange-coloured amber found at Zeewijk. Many of the beads from the Garderen burial mound are heavily worn, sometimes reworked. A few fresh beads are also included in this assemblage²⁵⁶ but again, they do not resemble the Zeewijk beads in terms of their morphology. It is thus not very likely that the beads from the Single Grave burial contexts in the central part of the Netherlands were produced by the Single Grave inhabitants of coastal Noord-Holland. The question of who the amber beads produced at Zeewijk were intended

²⁴⁷ Van Gijn 2008.

²⁴⁸ See for instance Van Gijn 2006a.

²⁴⁹ Van Gijn 2008; Verschoof 2011.

²⁵⁰ Nobles, this volume Chapter 11.

²⁵¹ See Nobles, this volume Chapter 11, Figs. 11.34 and 11.35.

²⁵² Piena & Drenth 2001.

²⁵³ Bulten 2001a.

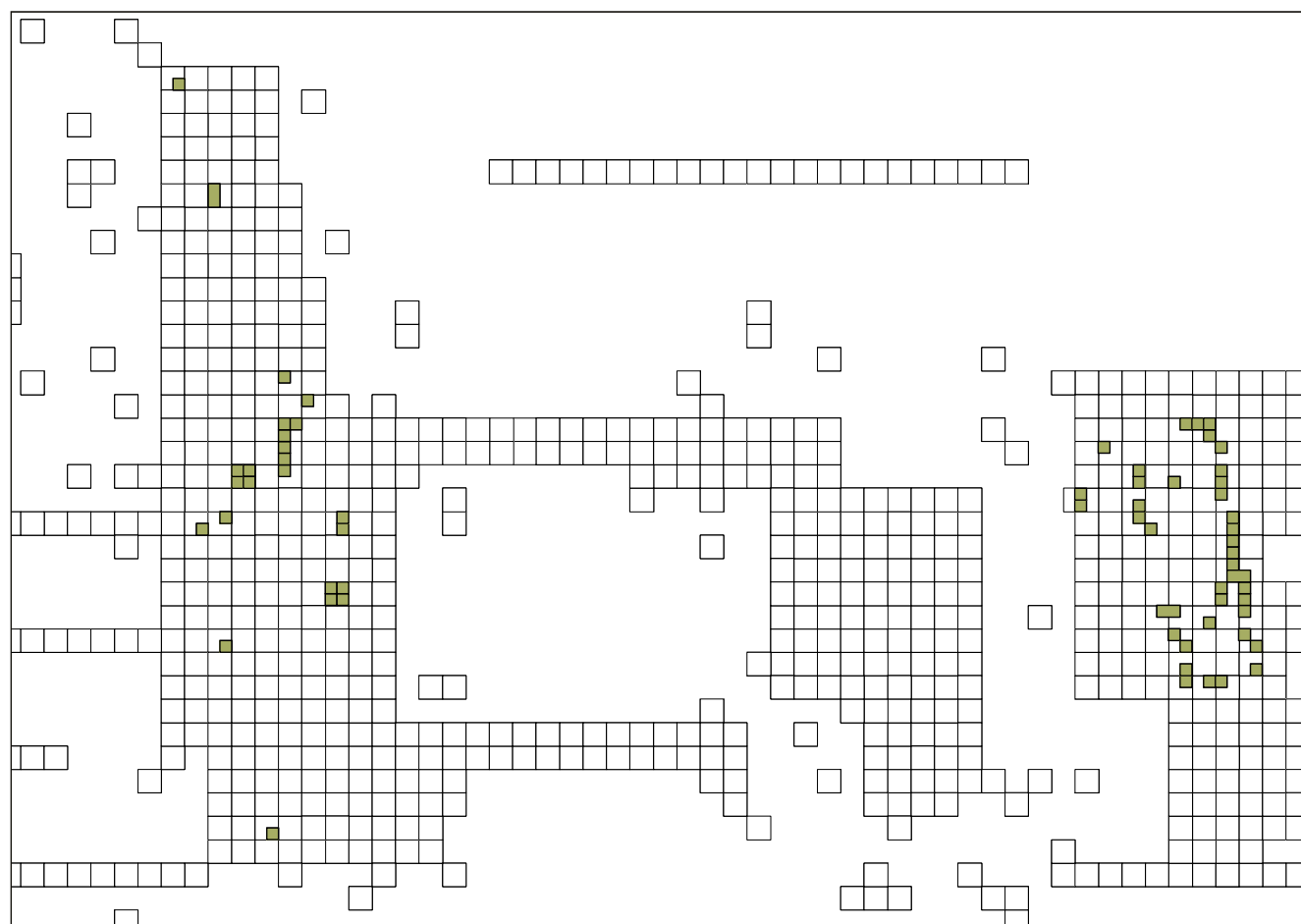
²⁵⁴ García-Díaz 2013, García-Díaz, this volume.

²⁵⁵ Laning & Van der Waals 1976.

²⁵⁶ Van Gijn, personal observation.

for therefore remains unanswered. The number of beads seems considerable, but we should remember that amber necklaces can consist of hundreds of beads. From that point of view, the amber ornaments recovered archaeologically are actually not all that numerous and the finds can be interpreted as leftovers, rejects or specimens that were lost accidentally. Domestic

production for personal use is thus the most likely explanation. In conclusion, the relative abundance of amber on the coast enabled the inhabitants of Zeewijk and other nearby settlements to produce amber ornaments in considerable quantities, probably for personal use only, and most likely for incorporation into composite jewellery like necklaces or bracelets.



■ Location of the botanical samples

Figure 7.1 Location of the one-meter squares (in the two-metre squares of the excavation grid) from which the botanical samples were taken.