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SCHIPLUIDEN

A NEOLITHIC SETTLEMENT ON THE DUTCH NORTH SEA COAST *c.* 3500 CAL BC

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AND PETER F.B. JONGSTE

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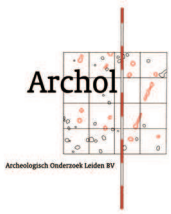

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12 Fabrics of fibres and strips of bark

Laura Kooistra

The fills of two wells dated to phases 1 and 2a yielded two parts of a fine basketry-like fabric and four fragments of a fabric made using a twining technique. The first type was made from two single elements using the looping-around-the-core technique. The other was made by twining composite fibres. The raw material of both types of fabric was bark, possibly of willow (Salix). The fragments were sadly too small to provide any clues as to the fabrics' original functions. Although the employed techniques were widespread in the Neolithic, these finds are unique in the Netherlands.

12.1 Introduction

The former waterlogged conditions in the peripheral zone of the dune and in a large number of wells ensured the survival of a comparatively large amount of organic material. Chapters 11 (wooden artefacts), 19 (botanical macro-remains) and 21 (wood and charcoal) provide a survey of the remains, though it should be added that – considering the duration of the occupation – those remains represent only a fraction of what was once available. Among the organic remains were also some fragments of fabrics made from fine bark fibres using two different techniques, which were recovered from two well fills on the northwestern side of the dune. From fragments found elsewhere in Europe it is known that various techniques and raw materials were available for the manufacture of fabrics in the Neolithic, but information relating to the Netherlands and its wide surroundings is scarce. Little is also known about the function and the use of the objects that were made with the aid of basketry and fabric-twining techniques.

12.2 Materials

The two fragments numbered 3279 and 3280, which will for the sake of convenience be referred to as 'basketry-like fabrics' in this chapter, were contained in the secondary fill of a well dating from phase 1, which also yielded remains – likewise well-preserved – of plants deriving from both salt marshes and ruderal environments or fields (fig. 12.1).

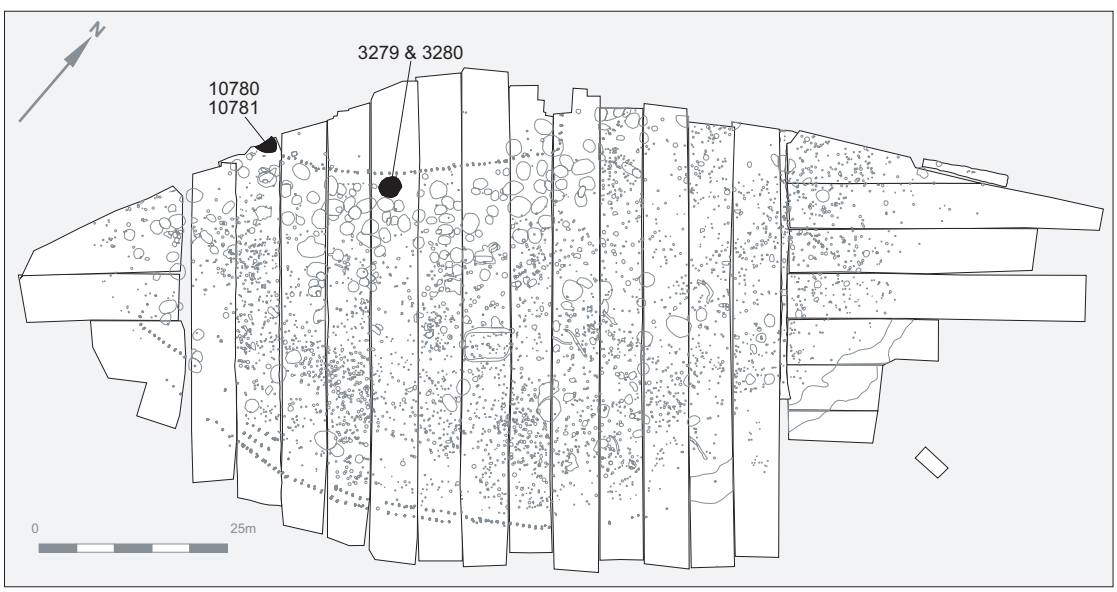


Figure 12.1 The features that yielded bark fibre artefacts and raw materials.

Some fifteen metres further west the fill of a well from phase 2a yielded remains of another type of very fine manufactured fabrics (no. 10,780). This fill contained a fairly large number of branches and twigs of alder (*Alnus*) and willow (*Salix*), plus some parts of wooden implements, waste produced in woodworking and nine strips of bark of Pomoideae (no. 10,781).

So both wells contained remains produced in several activities. The remains appear to represent waste or dumped material.

12.3 Methods

One of the parts of basketry-like fabrics was identified as such during the manual excavation of the well fill, the second was recovered from the sieve residue of one of the botanical samples. The fragments of fine fabric had been cemented together by post-depositional pressure. They were so indistinct in the soil and among other organic remains that it is quite possible that other fragments were overlooked.

The fragments were carefully cleaned with a soft brush and a pair of tweezers under water-saturated conditions under an incident light microscope (at 5x enlargement). Adhering soil was removed, and where necessary also plant roots that had at some later stage grown into the fabric. During the cleaning, the cemented package of fabrics was found to comprise at least four individual fragments of fabric (fig. 12.6). They were in fairly poor condition and penetrated by many roots. At a certain point the cleaning had to be discontinued due to the risk of the fabrics disintegrating completely.

The techniques employed to manufacture the fabrics were described by Willy Minkes, who based herself on Emery (1980).[1] The technique used for the basketry-like fabric could be readily identified. That employed in the manufacture of the fine fabrics was more difficult to determine due to the

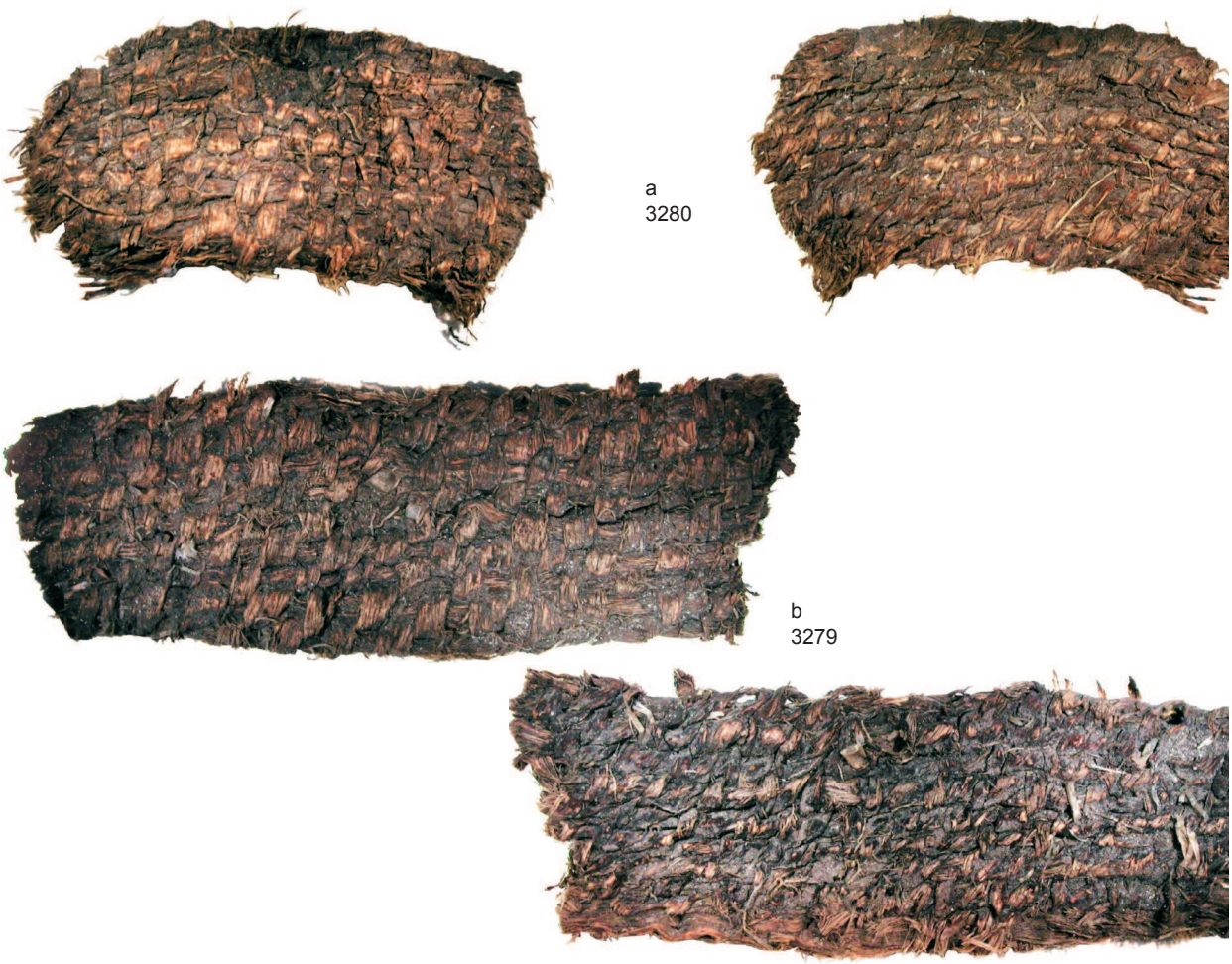


Figure 12.2 The two pieces of basketry-like fabrics viewed from both sides (scale 1:1).

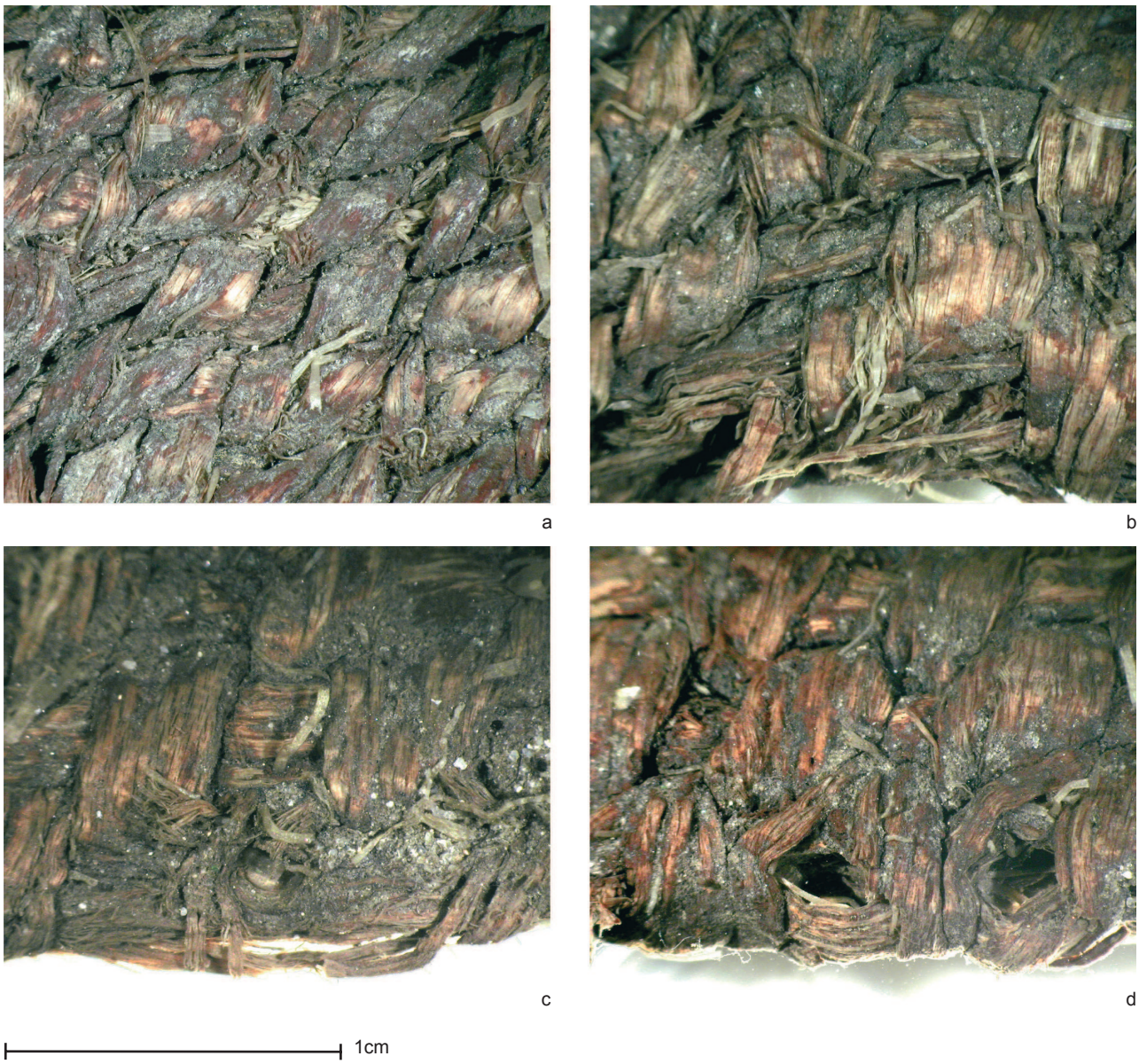


Figure 12.3 Basketry-like fabrics, details (magnification 8x).
a-c no. 3279
d no. 3280

poor preservation of the remains. To nevertheless form an impression of the technique, one of the fragments was picked apart and the process was recorded with a video camera.[2] Samples were taken of the different structural elements of both the fragments of basketry-like fabrics and the fine fabrics to identify the fibres. After the remains had been described and the raw materials identified, the fragments were conserved by Archeoplan at Delft.

12.4 Analysis

12.4.1 Fabrics made using the 'looping-around-the-core' technique (figs 12.2-4)

The basketry-like fabrics were made from two single elements, of which an active element (the looping) was as it were sewn round a second element (the foundation). Loopings can be sewn round foundations in various ways. In the case of the basketry-like fabrics from Schipluiden the

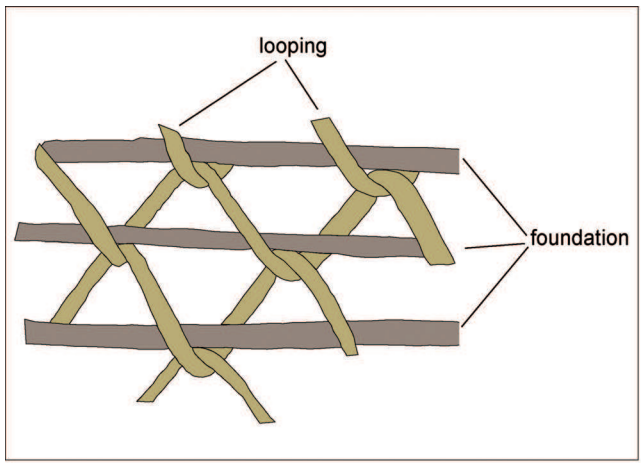


Figure 12.4 Schematic representation of the employed 'looping-around-the-core' technique.

loopings were each time inserted only through the underlying looping (so not through the looping and the underlying foundation together) and were sew around the adjacent foundation.

This technique involves almost exclusively spiral looping, rather than working to and fro as in weaving. Whether the fragments found at Schipluiden were also made by spiral looping is not entirely clear. The general appearance, with the loopings oriented diagonally on one side and more vertically on the other, indeed suggests spiral looping. If that is correct, the fragments probably derive from mats or tubular or cylindrical objects.

Fragment 1 (no. 3279) measures 10.5 × 3.5 × 0.4 cm. It comprises five foundations over a height of two centimetres and three loopings over a width of two centimetres. The foundation is slightly twisted; this was probably caused during manufacture. The loopings and the foundations are on average three mm in diameter. Regularly spaced small holes are visible on one side. They may have been made with an awl, presumably with the intention of inserting the loopings through them.

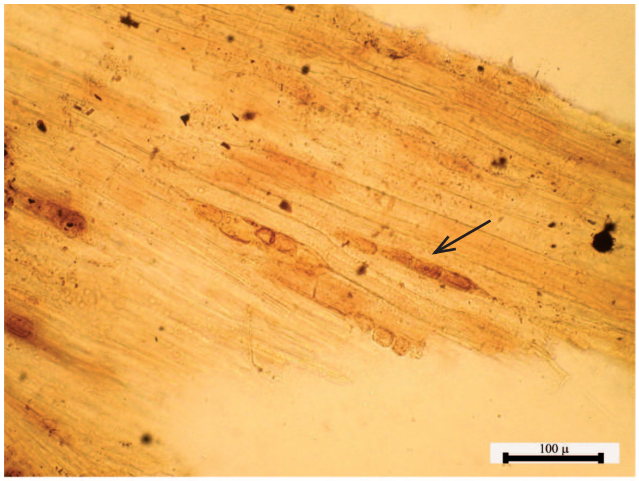
Fragment 2 (no. 3280) is a little smaller: 7 × 3 × 0.5 cm. It is finer in texture than the basketry of the first fragment: seven foundations are visible per two cm in height and four loopings per two cm in width. The foundation has an oval cross-section without any torsion and is thinner than the looping, which is flattened and varies in thickness from 2 to 4 mm.

Samples of the foundations and loopings of both fragments were examined to study their anatomical characteristics. They were all found to consist of bark that was processed into strips of a few millimetres in diameter. Bark is often difficult to identify on the basis of anatomical features because properties that are invariable in wood, such as the width of the wood rays, vary in bark. The bark fibres however remarkably contain rays with a width of one cell that closely resemble those of willow (*Salix*) (fig. 12.5a). Due to the poor preservation it was not in each case possible to determine the width of the rays. Other characteristics of willow bark are chains of rhombic crystals in the outermost layers (fig. 12.5b) and rhombic and clustered crystals in the innermost layers (Gale/Cutler 2000, 236-241). No such crystals were observed in the fibres of the basketries, but the microscope did reveal chains of black rhombic structures (fig. 12.5c) that bear a close resemblance to willow bark crystals. In the case of crystals, polarised light would cause such structures to fluoresce, but no fluorescence was observed. The crystals could theoretically have dissolved and been replaced by organic matter during the long time they spent in the soil, but this was not the case here, because incident light did cause the black structures to fluoresce. Such structures could belong to pyrite if not for their shape, which is not characteristic of pyrite. The absence of evidence of clustered crystals makes it likely that we are after all dealing with the outer layers of willow bark; the rhombic crystals must have disappeared and been replaced by a different substance.

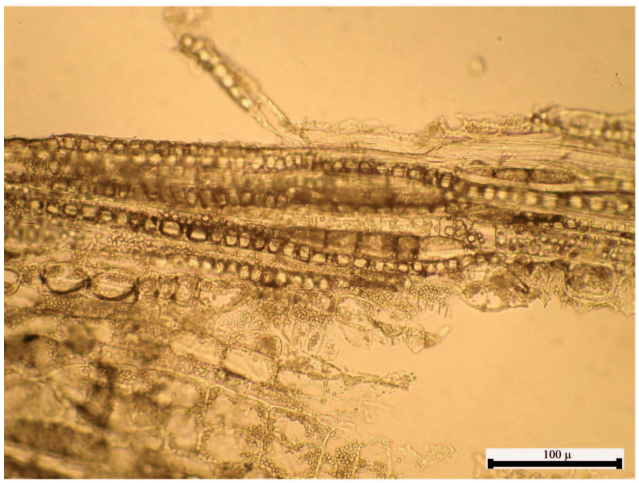
12.4.2 Fabrics made using a twining technique (figs. 6-7)
The four fabric fragments differ in size and thickness. The largest (5 × 3 cm) appears to have a wavy selvedge at the top. In spite of the poor preservation condition of the fabrics it could be ascertained that the technique employed in their manufacture was much finer than that used to make the basketry-like fabrics. The fabrics' function is not clear. The fragments could derive from bags or clothing.

The passive elements in the investigated fabrics, *i.e.* the warps, consist of at least two thin fibres. The fibres themselves have an S orientation, but the warps are in Z orientation. The warps vary in diameter from one to one-and-a-half millimetre and probably lie parallel to one another. The warps were connected by twining two elements together (fig. 12.7). The distance between the twining elements seems to be about 3.5 millimetres. The twining elements are on the whole thinner than the warps, some consisting of a single fibre. Whether the twining elements investigated here consist of one or more fibres could not be ascertained. It was however clear that they were twisted, possibly as a result of the twining. Contrary to the technique discussed above, twining involves no implements such as piercers or awls.

Examination of the anatomical structure of the fibres led to the surprising conclusion that they, too, were made of bark, just like those used for the basketries. Even the structure of the bark fibres is comparable: the rays are one cell wide and



a



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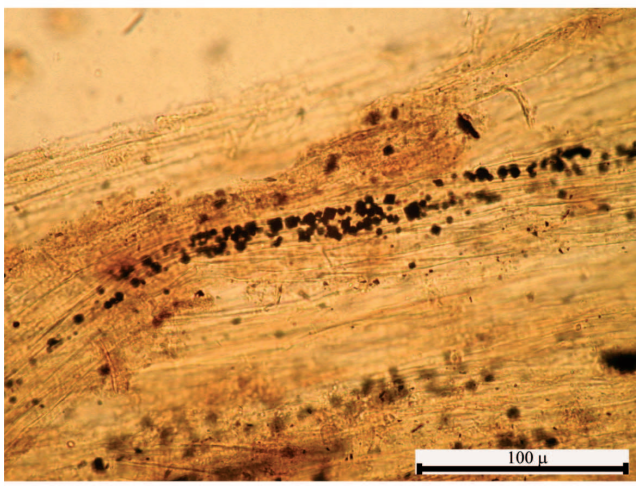

c

Figure 12.5 Fibre characteristics (magnification 250×).
a basketry-like fibres with uniseriate rays (no. 3279)
b presen-day bark of willow (*Salix*)
c black rhombic structures (no. 10,780)

the fibres contain chains of black rhombic structures (fig. 12.5c). So these fibres may likewise derive from the outermost parts of the bark of willow. These results show that Neolithic man was capable of processing bark into fibres with a thickness of less than half a millimetre.

12.5 Conclusions

The fragments of the different types of fabrics found at Schipluiden can be classed as highly unusual finds. Parallels of the Schipluiden fabric are scarce in northern Europe.

Fragments of basketry made using a similar technique and of a similar age (mid-fourth millennium cal BC) were uncovered in 1994 at the intertidal Neolithic site of Carrigdirty Rock, in the Shannon estuary, western Ireland (Maria Fitzgerald in O'Sullivan 2001, 78-82). They were not woven from bark fibres, but from thin (less than one-year-old) shoots of alder. The basket was made using a coiling technique in which 'a foundation coil, consisting of a bundle of shoots, was fastened together with a swing strip.' The technique is very similar to that used to make the somewhat finer fabric of Schipluiden. An exceptional textile fragment from Tybrind Vig, Denmark, Ertebølle Culture, was made using an entirely different, knitting technique (Coles/Coles 1989, 68).

In the Netherlands, comparable remains have been found only at the Hoge Vaart-A27 site, where they were recovered from the fill of a pit (no. 92, feature 901) that was dated 5710 ± 50 (UtC-4621, 4689-4409 cal. BC), *i.e.* an early phase of the Swifterbant culture, making them approximately 1000 years older than the Schipluiden finds (Hamburg *et al.* 2001, 17-21). There, the impressions of at least four mats with a minimum diameter of one metre were found in the clay. Parts of the mats were carbonised, which meant that the employed technique and raw materials could be identified. The technique used to manufacture the mats is the same as that used to make the Harnaschpolder basketry-like fabrics, but a different raw material was used. The Hoge Vaart-A27 mats were made from bundles of grass or rush with a thickness of between 1.2 and 10 mm, which were sewn together with twigs or bark of – most probably – birch (*Betula*). The technique according to which foundations were sewn together via loopings was widespread in the Neolithic and was used for the manufacture of a wide variety of objects (see for example Bender Jørgensen 1992; Rast-Eicher 1990; 1992). Insofar as can be ascertained, the foundation used in the case of this technique consisted of a single uninterrupted bundle or yarn, which was sewn onto itself with a different yarn, using an awl to make the required holes. The bone awls illustrated in figures 10.3 and 10.13 could have been used for this purpose. Wendrich (2000) calls this technique 'looping around a core'. It was used for manufacturing such objects as mats, baskets, hampers,

Figure 12.6 The four fragments of fine fabrics (no. 10,780), the largest with a wavy selvedge (scale 1:1).

quivers, hats and shoes. The raw materials varied, but bundles of grass and bark fibres were frequently used.

The twining technique was also commonly used to make a great diversity of objects from different raw materials. Many fish traps were for example made with this technique, but it was also used in the manufacture of fish nets and supple fabrics, as shown by the textile finds from Hornstaad-Hörnle I on the western shore of Lake Constance (Schlichtherle 1990, 124-131). The thickness of the warps and twining elements and the distance between the individual warps determines the texture and suppleness of the fabric. Flax (*Linum usitatissimum*) was usually used to obtain supple fabrics, but the use of bark in such fabrics is often underestimated. A surprisingly large proportion of the basketries and fabrics of the Neolithic lakeside settlement of Arbon were for example found to be made of the bark of lime (*Tilia*), whereas it had been assumed – partly on the basis of the many archaeobotanical finds – that flax was the main raw material used for the fabrics (Leuzinger 2002, 115).

The nine strips of bark (no. 10.781) found in the fill of a well dating from phase 2a acquire a deeper meaning in the light of the use of bark as a raw material for the manufacture of basketry and fabrics. Wood remains adhering to the strips of bark allowed the bark to be identified with certainty as deriving from Pomoideae. The strips are at most 13 cm long, 5.5 cm wide and 0.2-0.5 cm thick. They were stripped longitudinally from the tree. They may well be remnants of bark that was gathered for some specific purpose.

Little is known about the use of the bark of Pomoideae or that of willow in Neolithic contexts. From ethnographic studies it is known that occupants of British Columbia use bark, in particular willow bark, for many different purposes, including the manufacture of string and fish nets, baskets and clothing (Turner 1998). The inner part of the bark is even processed separately, to obtain a cotton-like substance that is used to dress wounds. The bark is isolated by stripping it from trees (sometimes even specifically dead trees) and drying it. It is then made soft and supple by rubbing it many times with a stone scraper.

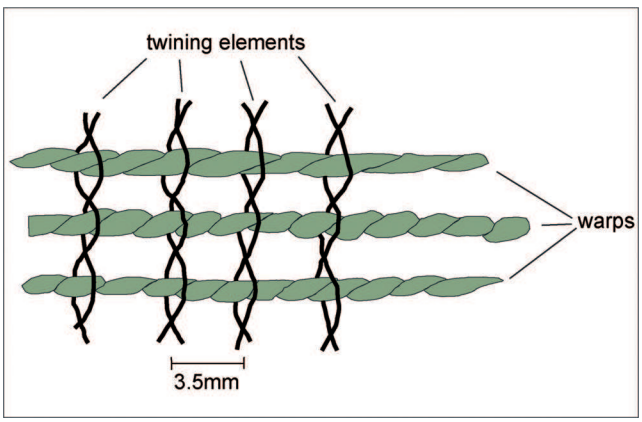

Figure 12.7 Schematic representation of the twining technique used to make the fine fabrics.

notes

1 Willy Minkes is a specialist in the field of archaeological textile. She devoted her doctoral thesis, which she wrote at the Faculty of Archaeology of Leiden University, to fabrics of prehistoric Andes cultures (Minkes 2005). We would like to thank her for her help in the investigation.

2 With thanks to the *Laboratorium voor Artefactstudie* (Laboratory for the Study of Artefacts), Faculty of Archaeology, Leiden University, for making the necessary equipment available.

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