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Non-Woven Textile Techniques in Pre-Columbian Peru

Introduction

Weaving was invented almost simultaneously all over the world in around 5,000 BC without there being any connections between the developments. Long before that, many extremely complicated and similar, non-woven textile techniques were already in use. These non-woven techniques can produce any kind of textiles – from cloth to accessories. Most of these techniques, however, require more production time than woven items, and the loom could be said to have been an invention that simplified and expedited the manufacture of textile items. Nevertheless, non-woven techniques were sometimes better suited for certain items or conditions, and they continued to be widely used after the invention of the loom.

In this discussion I wish to focus on these non-woven techniques, and as examples I primarily use the pre-Columbian American artefacts with which I am most familiar (Bjerregaard 2002 and 2007). In some cases I also refer to objects from Europe produced using similar techniques in order to illustrate similarities or differences in the use of non-woven textiles in the Old and the New World.

The New and the Old World

Around the time of the Spanish conquest in AD 1532 Peru was home to a very rich textile production culture with a long history (Stone-Miller 1992). Textiles dating from as early as 500 BC have been recovered as part of the archaeological material excavated along the very dry coast of central and southern Peru: they were found in excellent condition and are today very well preserved and accessible in museums around the world. During my work as the conservator responsible for the largest European collection of Peruvian archaeological textiles in the Ethnological Museum in Berlin in Germany, I was able to study a vast number of pre-Columbian textiles, and especially the non-woven textile artefacts are fascinating in their complexity. The majority of the techniques were independently used in the Old and the New World: knitting was the only technique not found in pre-Columbian Peru, and fist-braiding was not used in Europe, although it is still practised in Tibet (Bjerregaard 2015).

Fibres and dyes of pre-Columbian Peru

In Peru textiles were made using cotton, camelid fibre and plant fibre; silk was first introduced by the Spaniards. The Peruvian cotton was of a local type (Barbadense) and grew abundantly on the coast. This was a long-fibred but quite coarse type of cotton. The camelid fibre was mainly obtained from alpacas, who were kept in herds in the highlands, and sometimes from the wild vicuña, a smaller type of camelid. The alpaca, and especially the vicuña, have finer hair than most sheep, and the fibres do not have many scales. The wool is therefore more lustrous and softer than most sheep wool, and can be spun into very fine yarns. Due to the lack of scales on the fibre surface it cannot be felted, and therefore felt was not used in pre-Spanish Peru. The plant fibre used in most pre-Columbian textiles was a South American agave called *Furcreae andina*. It is still used in many South-American villages, mainly to produce bags and hats (Rowe 2003/2004).

The old Peruvians were master dyers. Of the three fibre types mentioned, the camelid fibre was the easiest to dye. The bright colours of the camelid fibre textiles are in many cases still preserved today because of the optimal preservation conditions in the graves in which they were found. With no humidity, no air and no temperature changes, in the salty environment of the Peruvian coast, 2500-year-old textiles can today look as bright as the day they were made. Cotton is

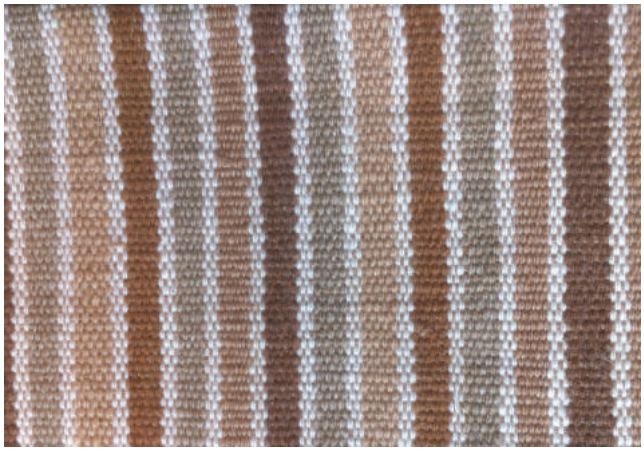

Fig. 1. Modern shawl from Peru made from undyed cotton in four shades of natural colours (Photo: Lena Bjerregaard).

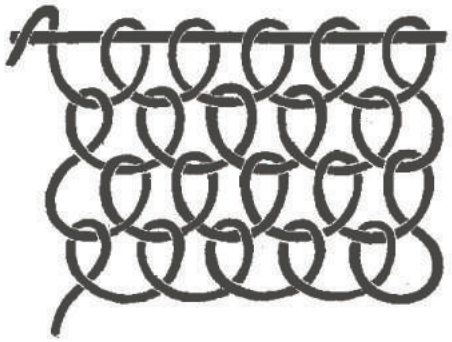

Fig. 2. Simple looping. (After D'Harcourt 1975, Fig. 68).

harder to dye, and only paler colours can be obtained, but the Peruvian cotton grew in different shades, and so offered a variety of natural colours from white through tan to brown and greenish grey (Fig. 1). Plant fibre is the hardest to dye, and so it was mainly used in its natural tan colour. However, some plant fibre objects such as the hairnets from the central coast were painted purple using the shellfish *purpur mullox* (Bjerregaard 2010).

Various non-woven techniques in the New and the Old World

Simple looping

In ancient Peru both small and large items were sometimes made in simple looping instead of weaving (Fig. 2). Simple looping is still widely used in Latin America, Asia and the Pacific for making bags, but to my knowledge is not used for making larger textiles, as it was in the case of the large male tunics from the Paracas culture (500 BC – AD 500) in southern Peru (Fig. 3).

Fig. 3. Tunic in simple looping from the Paracas culture in southern Peru dated to 250-1 BC. The tunic was folded in the centre over the shoulders. It is made from simple looping using S2z camelid fibre yarns. There are 6 rows x 6 loops per cm. At the bottom edge and along the sleeve openings are tied-on fringes of un-spun camelid fibre. (VA 64262, Ethnological Museum, Berlin. Photo: Claudia Obrocki).

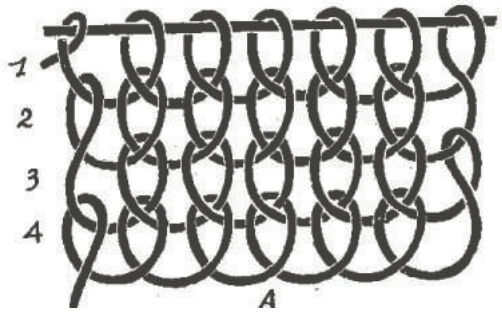

Fig 4. Needle-looping. (After D'Harcourt 1975, Fig. 73).

Needle-looping

In ancient Peru needle-looping or 'cross knit looping' was used mainly in the Paracas/Nasca culture (500 BC–AD 500) (Paul 1974) (Fig. 4). The technique was used for making three-dimensional figures of the most elaborate kind. The most famous textile created in this technique is *The Calendar Mantle* now belonging to the Museo National de Archaeologia y Anthropologia in Lima in Peru (Fig. 5). The Ethnological Museum in Berlin also has several bands with colourful hummingbirds suckling at flowers made using needle-looping with camelid fibres, using S-plied yarns made from two z-twisted yarns (in the following referred to as S2z). Such bands were stitched to the neck and arm openings of the woven tunics of the early Nasca culture in southern Peru (AD 250–400) (Fig. 6). In Europe, needle-looping was most often used for making thick woollen winter mittens and socks (Fig. 7).

Fig. 5. The Calendar Mantle from the Gothenburg Collection, now at the Museo Nacional de Antropologia, Arqueologia y Historia Peru (1935.32.0179/RT-38072. Photo: The National Museums of World Culture, Sweden).

Fig. 6. Band made from needle-looping (VA 44829, Ethnological Museum, Berlin. Photo: Lena Bjerregaard).

Fig. 7. Woollen mitten made from needle-looping found in Copenhagen in Denmark. It is dated to c. 1600 (D7303b, National Museum of Denmark. Photo: Charlotte Rimstad).

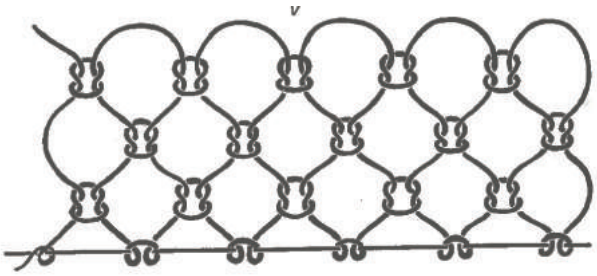

Fig. 8. Square knot network (after D'Harcourt 1975, fig. 77).

Fig. 9. Four-cornered hat from the Tiwanaku culture in highland Bolivia dated to AD 600–1000. It is made in a single piece (including the triangular points) with square knots in S2z camelid fibre yarns (VA 63996, Ethnological Museum, Berlin. Photo: Lena Bjerregaard).

Knotting

Knotting was a technique used in Peru for fine hats and hairnets. The square knot and Larks' head knots were especially favoured:

The square knot (Fig. 8) was used to create the four-cornered hats of the Tiwanaku culture (AD 600-1000) (Young-Sanchez 2004) in highland Bolivia (Fig. 9). In the contemporary Wari culture (AD 600-1000) (Bergh 2013), similar four-cornered hats had cut pile from camelid fibres knotted into the square knots (Fig. 10 and 11). Some of the later central coast hairnets also added cut pile to their square knot mesh (Fig. 12).

The square knot was also extensively used in Europe. As an elaborate textile production technique, it is the basic knot in macramé (Priscilla 1923) (Fig. 13). Macramé is thought to originate from 13th-century Arab weavers (Knotter, Peter the 2012). They knotted the excess warps of hand-woven fabrics into decorative fringes on shawls and veils. The art was taken to Spain by the Moors, then to Italy, and from there spread through Europe.

Nineteenth-century British and American sailors made hammocks and fringes in macramé in spare hours while at sea, thus spreading the art to China and back to the New World. They called the process 'square knotting' after the knot they used most frequently. Macramé regained popularity during the 1970s and is still widely used for making decorative networks.

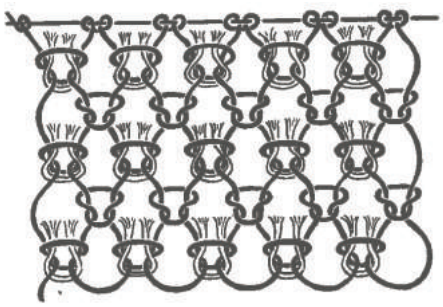

Fig. 10. Square knot network with pile (after D'Harcourt 1975, fig. 77).

Fig. 11. Four-cornered hat with cut pile from the Wari culture in the southern Peruvian highland dated to AD 600-800. It is made with square knots, partially with cut pile inserted in the knots and is made entirely of S2z camelid fibre yarns. The hat consists of a rectangular panel, 8 x 50 cm, sewn together on the short side to form a tube that is attached along the upper edge to a separately-made square, 7 x 7 cm, with four rolled squares stitched to the corners. Cut pile made of unspun camelid fibre is inserted into the knots of the rectangular panel and the corner peaks. The top lacks pile (VA 64271, Ethnological Museum, Berlin. Photo: Lena Bjerregaard).

Fig. 12. Hairnet from the central coast of Peru dated to AD 1200-1500. It is made in square knots in S2z camelid fibre yarns. Tufts of camelid fibres are stitched on for adornment. At the sides are two reed sticks, which have been wrapped with camelid fibre yarns, and tassels are fixed to their tops (VA 42350, Ethnological Museum, Berlin. Photo: Lena Bjerregaard).

Tatting

On the central coast of Peru from around AD 1300 until the Inca conquest in 1470 (Castro et al. 2013), women and men were wearing delicate little hairnets made from native plant fibre (*Furcreae andina*). The hairnets could be tightly or loosely knotted with square knots, while more elaborate hairnets were knotted with lark's head knots in a tatting-like technique (Fig. 13 A-E and 14). The Ethnological Museum in Berlin has 56 of these hairnets. Most of them have provenience in Pachacamac, where the central-coast Ychsma people lived. Hairnets are also depicted on figurative ceramics from the Chancay culture, and some are found in weaving boxes from the Chimu culture on the north coast (Rowe 1984). Some of the hairnets were painted with shellfish purple between the patterns to make the patterns stand out as light areas (Fig. 15) (Bjerregaard 2010).

In Europe the technique of tatting has mainly been used for producing white lace-like objects, imitating point lace (Fig. 16). Tatting in Europe dates to the early 19th century. German and Danish tatting is usually known by the Italian-derived word *Occhi/Orkis* (Hoare 1910/1988).

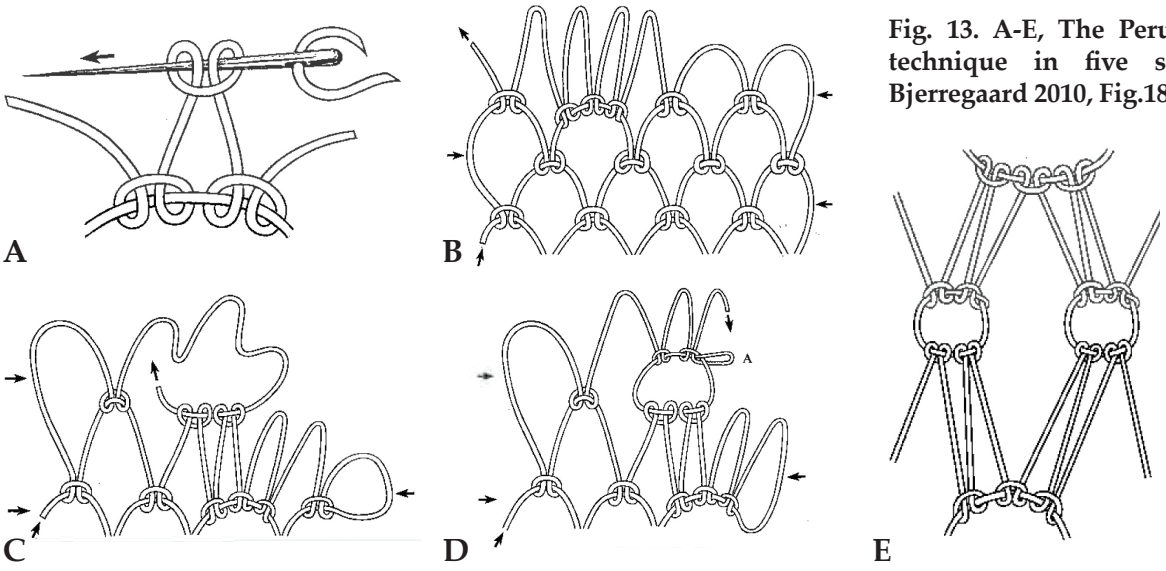

Fig. 13. A-E, The Peruvian tatting technique in five stages (after Bjerregaard 2010, Fig.18-22).

Fig. 14. Hairnet in tatting technique made from S2z plant fibre yarn (Furcrea andina). The tying strings were braided from 4-8 strands. Pachacamac, AD 1200–150 (VA 42663, Ethnological Museum, Berlin. Photo: Lena Bjerregaard).

Fig. 15. Hairnet in tatting technique with purple shellfish painting around the animal figures. Pachacamac, AD 1200–1500 (VA 42673, Ethnological Museum, Berlin. Photo: Lena Bjerregaard).

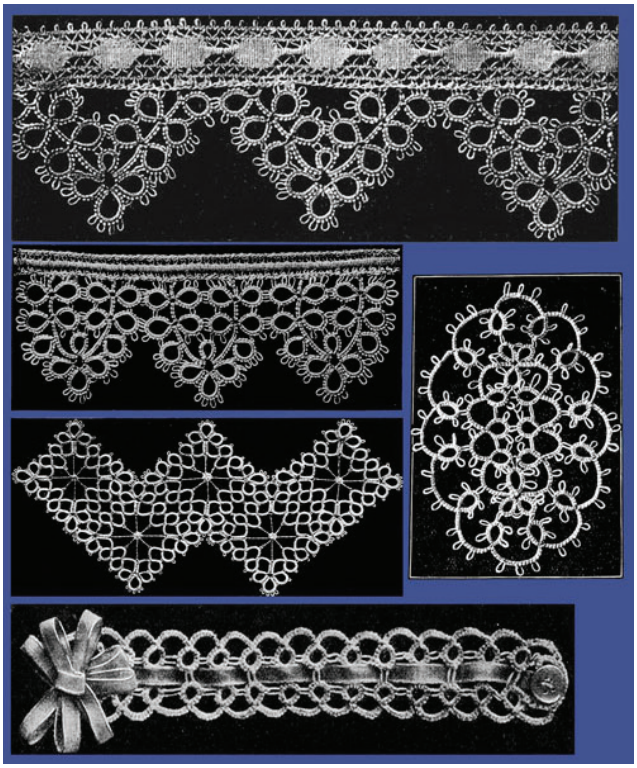

Fig. 16. Tatting patterns (after Beyers Håndarbejdsbøger 1915).

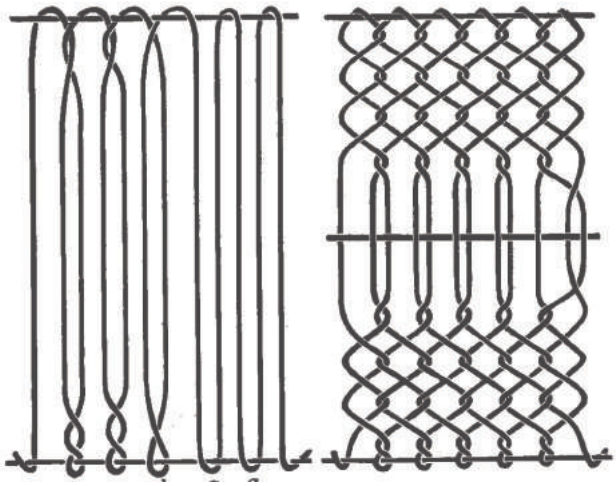

Fig. 17. Sprang (after D'Harcourt 1975, fig. 51).

Fig. 18. This fragment of a camelid-fibre sprang textile is from Ica in the southern part of Peru. It is dated to 300–100 BC, belonging to the Paracas Cavernas Culture. It is unknown what the textile was used for. It has two side selvages, and was 34 cm wide; the length is unknown (VA 29449, Ethnological Museum Berlin. Photo: Lena Bjerregaard).

Fig. 19. Headgear with tassels in double sprang. This head ornament from the Nazca Culture, AD 400–600, has an unknown provenience, but it is probably from the south of Peru, where the Nazca people lived. The cord between the tassels was wound around the head and the tassels arranged to be at the two sides of the head. The artifact is made in S2z camelid fibre yarns. The tassels are made in double oblique intertwining (sprang). Two layers of warps (yellow and black) were stretched out on a frame over each other and then interworked in sprang technique. The double sprang was finished when there was about 10 cm loose warps left in the centre. The interworked warps were then fixed and the textile folded at the centre, sewn together at the sides, and the loose warps covered with loop-stitch embroidery. The 7.22 m-long cord connecting the sprang tassels is made in tube weave and has supplementary warp patterns (VA 65807, Ethnological Museum in Berlin. Photo: Lena Bjerregaard).

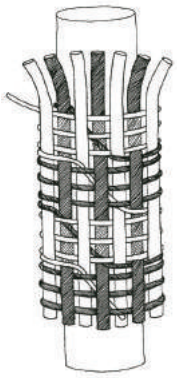

Fig. 20. Tubular plain weave with alternate warp order (after Cahlander 1980, Fig.1-20).

Sprang

In Peru textiles were only produced in sprang (Fig. 17) in the early pre-Columbian period, and only camelid fibre yarns were used for this technique (Fig. 18). Some were extremely refined double sprang textiles, like the head ornament from the Nazca Culture shown in Fig. 19, which has a fine tubular woven cord (Fig. 20) connecting the tassels.

The earliest surviving example of sprang in Europe is a cap from around 1400 BC that was recovered in a female oak coffin in Denmark (Fig. 21). The word *sprang* is of Swedish origin, and the technique possibly spread southward towards the Mediterranean during the Iron Age or possibly the late Bronze Age (Collingwood 1974).

Fig. 21. Sprang cap found in a female oak coffin from Borum Eshøj in Denmark dated to the Early Bronze Age period II, 1500-1300 BC (Photo: Roberto Fortuna.).

Fig. 22. Woman's belt in complementary embroidery from Pisco on the Peruvian south coast. The belt is dated to AD 1450-1550. The centre part of the belt (23 cm) is made by joining thick bundles of plied 2S-twisted cotton yarns and wrapping them with S2z camelid fibre yarns in a weft face weaving way. The edges of this centre piece are embroidered using stem-stich. The side panels (24 x 6 cm) are embroidered with S2z camelid fibre yarn in stem stitches perpendicular to a spiral cotton yarn wrapping. The area to be embroidered is flattened, instead of being left as a tube, and an embroidery yarn from the top side is exchanged with a yarn from the bottom side (of alternate colours) at intervals according to the pattern. Therefore, the llamas come out in alternate colours on the two sides of the belt. The tying cords are made in 8-strand plaiting, where the yellow and black S2z camelid fibre yarns alternately make up the core and the outer plaiting. At the cord ends, the loose yarns are tightly wrapped in various colours (VA 44702, Ethnological Museum in Berlin. Photo: Lena Bjerregaard).

Double embroidery

Another much-used technique for creating non-woven textile accessories in ancient Peru was wrapping bundles of yarn and then perpendicularly fixing the wrapping by double stem-stitch embroidery (Fig. 22). This technique was used at the end of the pre-Columbian era (AD 1400-1550) on the south coast of Peru. Female belts from Pisco on the Peruvian south coast are made in this technique and adornment pieces for bags from the same time and culture were also made in double embroidery (Fig. 23). I do not know of a similar technique used in Europe.

Fig. 23. Bag with complementary double-embroidery ornament from Ica on the Peruvian south coast dated to AD 1450-1550. The bag is made from four pieces of llama leg fur sewn together lengthwise. At the bottom is an adornment piece made in double stem-stitch embroidery over a foundation of coarse cotton yarns in two layers. These cotton yarns are covered in stem-stitches in red on one side and yellow on the other. At intervals according to the pattern the red and yellow yarns cross to the other side of the embroidery and thus create two similar designs in alternate colours. At the edges the textile has a finer one sided stem-stitch design, and at the bottom an 18 cm-wide, red, camelid fibre fringe. All yarns are S2z (VA 29524, Ethnological Museum in Berlin. Photo: Lena Bjerregaard).

Fist-braiding

Fist-braiding was a technique used in Pre-Columbian Peru for making slings. It is an *upward* braiding technique (Fig. 24), contrary to most braids, which are braided *downwards*. Fist-braiding is done over the fist without any special tools. The technique employs groups of four yarns twisted together lengthwise and interworked horizontally with groups of two or four yarns likewise twisted (Bjerregaard 2011). To my knowledge this technique was and still is only practised in Pre-Columbian Peru and in Tibet (Bjerregaard 2015) (Fig. 25).

Fist-braided slings were used – apart from as herding and hunting tools – as ornaments wrapped around the head. They were special markers of the geographical identity of the wearer and probably also indicated status. In Inca times they were sometimes sewn together from several slings and served only as adornments; they could not be used for herding and hunting (Fig. 26-28) (Bjerregaard 2011, 2015).

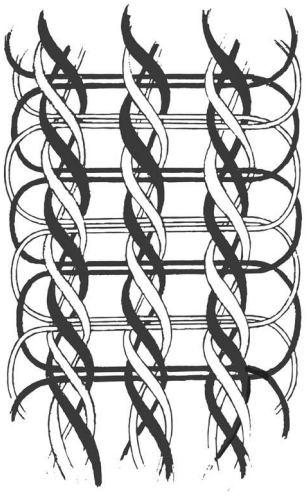

Fig. 24. Fist-braiding with one twining unit on the horizontal side and three units on the vertical side (after Bjerregaard 2011, fig. 8).

Fig. 25. Sling in fist-braiding from Ica on the Peruvian south coast dated AD 1200-1500. The material used is a S2z camelid fibre. The centre part cradle is wrapped and the flat side-bands extending from it are fist-braided with 2-floats braiding with SZ twist. They have one twining unit on the narrow side. The side cords are 4-braids at both ends with wrapping (VA 47185, Ethnological Museum in Berlin. Photo: Martin Franken).

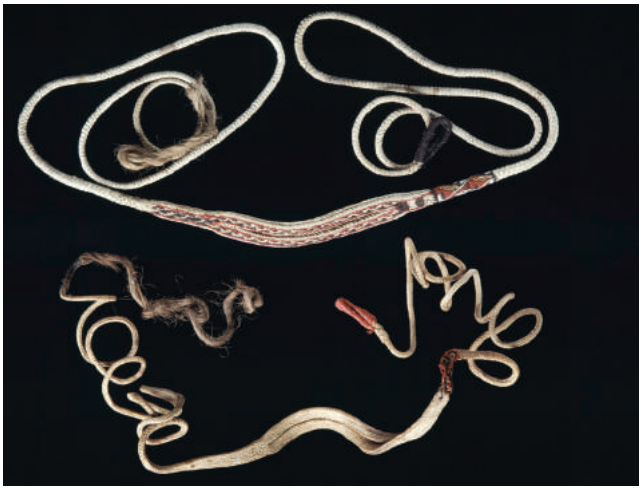

Fig. 26. These fist-braided slings are not flat (like Fig. 24) but have a rectangular form, due to the two twining units on the narrow side, which makes the shape rectangular. The slings are also from Ica on the Peruvian south coast, but are dated to the Inca period, AD 1450-1550. They are made in S2z plant fibre (Furcreae andina) and S2z camelid fibre yarn. The technique is fist-braiding with 2- and 3-span floats. The extending cords are 8-strand braids. The finger loop is wrapped (V A 47216 and V A 24216, Ethnological Museum in Berlin. Photo: Martin Franken).

Fig. 27. Four slings stitched together for a head ornament. The same pattern in two alternate colours is on the two sides of the artefact. From Ica, AD 1200-1500 (V A 47221 Ethnological Museum, Berlin. Photo: Martin Franken).

Fig. 28. Mummy bundle with a head ornament consisting of four slings joined together. Chuquitanta, AD 1200-1500 (V A 28464, Ethnological Museum, Berlin. Photo: Martin Franken).

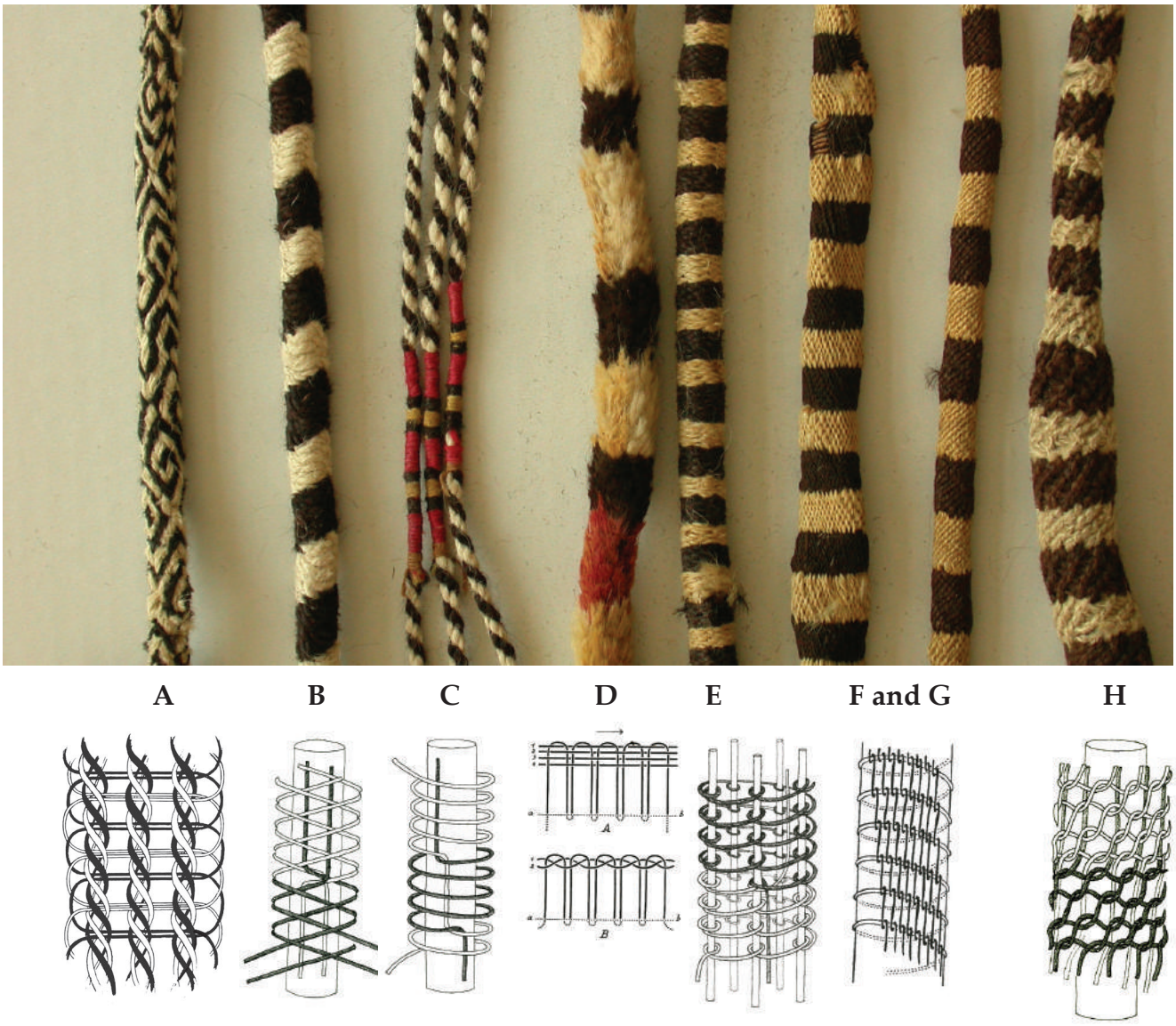

Fig. 29. Seven different techniques used for making black/white cords in Pre-Columbian Peru. (Ethnological Museum, Berlin. Photo: Lena Bjerregaard).
A. Fist-braiding (after Lena Bjerregaard 2011, fig.8)
B. Tubular braiding (after Cahlander 1980, fig. 1-14)
C. Spiral wrapping (after Cahlander 1980, fig. 1-12)
D. Wrapping with woven fringe (after D'Hartcourt 1975, fig. 83)
E. Wrapping around vertical elements (after Cahlander 1980, fig.1-18)
F and G. Wrapping around horizontal elements, stem-stitching (after D'Hartcourt 1975, fig. 93)
H. Spiral interlinking (after Cahlander 1980, fig. 1-16)

Cords

Cordmaking could fill a whole chapter of its own. In ancient and modern Peru very many techniques were and are still are used in order to make cords for slings and various headgear (Cahlander 1980). The extension cords of the slings could be made from skin or leather or could be interlinked, braided, wrapped, woven or embroidered. Even though they often look similar at first sight, the techniques are often totally different from one aother (Fig. 29 A-H).

Conclusion

Identical non-woven techniques have through time been independently invented and used in various parts of the world that were in no way connected. Non-woven techniques were sometimes used to produce large items like nets and cloth, but more often these techniques were used to create accessories or trimmings. Unlike woven textiles, their production was very time-consuming, and mostly needed no tools.

The non-woven techniques seem in all cultures to have been used for very specific items, which were always produced in the same technique. Some of these techniques were, in both the Old and New Worlds, used to produce the same types of items, such as fist-braiding for slings in Peru and Tibet, but in most cases they were used to produce different items. In Europe, for instance, tatting is still used for making white lace-like, cotton or linen placemats, while in ancient Peru it was used only to make hairnets in natural-coloured agave fibre painted with shellfish purple. Needle-looping was used to produce coarse winter hats and gloves in medieval Europe, but was used for making multi-coloured, three-dimensional flowers and hummingbirds for lace-like borders on Peruvian tunics. Likewise, the knotted Wari hats of Peru, which have a very similar surface structure to Persian carpets, were made in a completely different technique.

The above-mentioned non-woven techniques are only glimpses of the many ways threads can be interworked to create a textile item, but hopefully this brief record of non-woven techniques primarily in the New World will inspire others to work more closely on this subject.

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