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Child mittens from Heynes in Iceland
(Image: Ívar Brynjólfsson)

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Editorial

Dear Readers,

If you are one of the many who have enjoyed the visual textile abundance in the popular Netflix drama series *Bridgerton*, which is based on the books by Julia Quinn, you are familiar with this short but powerful introduction and know that it heralds something super exciting. In the world of the *Archaeological Textiles Review* (ATR), "Dear readers" is the signal for a new issue of the journal containing a mix of interesting articles including Icelandic and northern mittens, Inuit clothing, an interesting textile survey, and millennia of Danish wool fibres. Maybe this is not quite as colourful as an episode of *Bridgerton*, but it is definitely not bland.

This issue also showcases the profusion of new research projects focusing on archaeological textiles and on textile heritage. The pages in ATR 66 report only a selection, but they still illustrate the vitality of the textile research field and promise new knowledge and future research. This is particularly well exemplified by the recent foundation of a new research centre dedicated to archaeological textiles, hosted by the Sapienza University, in Rome, Italy. The new A3Tex centre will focus on the integration of archaeometry into textile heritage research. We are looking forward to hearing more about it, seeing its activities grow, and reporting them here!

In other news, Eva Andersson Strand became professor in archaeology at the University of Copenhagen and was presented with a *Festschrift* which was (astonishingly) kept a complete secret from her for more than two years despite the stellar cast of authors who contributed to it from across Europe. We all know how fast news spreads through the textile network. Successfully swearing so many people to silence was quite an accomplishment.

This year we are sad to report the loss of textile research pioneers Nettie K. Adams and Amica Sundström. Nettie K. Adams was a textile archaeologist from the US, who drove the discipline through her life-long work on Nubian textiles in Egypt and Sudan. Nettie's personal archives were accepted at the Centre for Textile Research (CTR) by ATR co-editor Elsa Yvanez, who had the opportunity to compile a comprehensive obituary tracking Nettie's career and her rich bibliography. Amica Sundström from Sweden, who passed away far too young, was a dear and very much appreciated colleague. She was a competent and capable craftsperson within the world of north European textiles. Amica was among those educated at the Weaving School in Borås in Sweden. It was here that she was introduced to the North European Symposium on Archaeological Textiles (NESAT) community for the first time through her participation in the 1996 conference (NESAT VI). In 2018, she was employed at the Swedish History Museum in Stockholm as curator of their amazing textile collections, including the Viking Age Birka textiles which she competently and openly shared with interested colleagues. Amica Sundström will be deeply missed. A memorial fund has been established in her honour. It will provide scholarships for people who work with textiles. Her friend and colleague Maria Neijman (who wrote the obituary in this issue) and Amica's daughter, Ester Spetz, are collecting donations for it. For details on how to contribute, see the Historical Textiles Facebook page and search for "memorial" (https://www.facebook.com/historicaltextiles1/).

A new feature for this issue is the "trip down memory lane" by Lise Bender Jørgensen, who shares her lifetime of interesting work with us all. It is a lovely testimony to research before the digital age but also to the power and importance of personal relationships. Such bonds are fostered by in-person get togethers and collaborative projects. This year's section reporting conferences and projects rivals last year's impressive achievements and there is no doubt that these events will have sowed the seeds of forthcoming friendships and professional exchanges. They all show how textile research keeps growing and is able to attract both talented people and substantial funding.

Achievements for people in ATR's editorial team include Elsa Yvanez's appointment as the new director for CTR from 2025 and Jane Malcolm-Davies is now associate professor and senior lecturer in textile studies at Uppsala University.

Keep sending articles in good time for our annual deadlines, and please take great care to conform to the author's guidelines. The deadline for articles for each issue is the 1 May. We need project reports preferably before the end of June but we can accept conference reports right after the conferences, if they are held no later than 30 November. The same deadline applies to all other announcements.

All the past issues of ATR are available from the website (https://atnfriends.com/) but it is still possible to order a printed copy of any of the journals from the web shop at the University of Copenhagen in Denmark (www.webshophum-en.ku.dk/shop/archaeological-textiles-664s1.html).

So – Dear Readers – please do enjoy ATR 66 and spread the word about it. The ATR editorial team wishes you a colourful and super exciting new academic year 2025.

The Editors

Magdalena Przymorska-Sztuczka

Textile tools, fabrics and craftspeople in the Wielbark culture (Poland, first to third century CE)

Introduction

The aim of the project, *Textile tools, fabrics and craftspeople in Wielbark culture. Holistic approach to the evidence for textile production from Czarnówko, Lubowidz and Wilkowo as the case studies* is a comprehensive look at the relationship between the types of textile tools, fabrics, and the people who made them. The project is based on artefacts discovered in the Wielbark culture cemeteries in Czarnówko, Lubowidz and Wilkowo, Lębork commune, Poland. These three sites, dated from the second half of the first century CE to the third century CE, provide a rich set of textile tools – spindle whorls, distaffs, needles, hooks, and one of Poland's most numerous collections of fabrics from the Roman period. The numerous imports in the grave furnishings of the people of the Wielbark culture indicate extensive and intensive trade contacts with the Roman provinces. Of the many artefacts associated with the textile production of the population of the Wielbark culture, only fabrics (Maik 1988; 2012; 2013; 2015a; 2015b; 2018; Maik and Wtorkiewicz-Marosik 2020; Przymorska-Sztuczka 2017) and distaffs (Schuster 2010) have been thoroughly analysed. Other tools have yet to be the subject of detailed research. Despite their commonness, textile-related tools are artefacts with excellent research potential. Their detailed analysis can answer specific research questions regarding prehistoric textile economy, for example determining the leading type of spindle whorls or the co-occurrence of different categories of textile artefacts in burials, as well as determining changes and influences on textile production coming from other areas.

Methodology

The primary aim of the textile-related tool studies was a detailed metric analysis, of which the statistical analyses formed the basis of further research. The tool inventories were compiled according to the documentation principles formulated by the Centre for Textile Research team (Andersson Strand and Nosch 2015). They, therefore, included data on height/width/length, diameter, weight, bore diameter, shape, possible ornamentation, other features not mentioned above, and traces of use. A similar descriptive scheme was applied to all categories of textile-related tools discovered at the sites included in this study. Traces of use were documented using a Dino-Lite Edge digital microscope, model AM7515MZT, and a Sony Alfa 500 camera with a macro lens. Technological analyses of fabrics were made on standards, according to which the weave, the density of threads in the warp and weft per 1 cm of length, the direction and angle of yarn twist and its diameter are determined (Emery 1980). For archaeological textiles from present-day Poland, the description was developed by Janina Kamińska and Andrzej Nahlik (1958) and Jerzy Maik (1988), based on fabrics from the Roman and early medieval periods. Technical analyses of the textiles were carried out with a Dino-Lite Edge digital microscope, while a Zeiss microscope with transmitted light was used to determine the raw material. Approximately ten measurements of the diameter, thread, and twist angle were taken for the smallest textile fragments. If the fragment was large enough, 50 or more measurements were taken from the threads of both systems and the density per 1 cm at various locations in the fabric. SEM analyses and strontium isotope tests were performed

for ten fabric samples. Five samples were forwarded on for dye analyses by ultra-performance liquid chromatography coupled with mass spectrometry (UPLC-MS).

Objectives

The research plan analysed textile tools and fabrics. The analysis of the tools made it possible to summarise the data and draw basic conclusions and generalisations about the collection, for example, identifying the most common type of spindle whorls. An important aim was also to analyse the tools for traces of use and compare them with those observed on the reconstructions used in the experimental work. The project also verified the origin of the fabrics' raw material (local or non-local, gauging the strontium isotope content), determined fibre qualities, and identified dyes. The cemeteries in Lubowidz, Czarnówko and Wilkowo are all within a radius of 10 km of each other. Therefore, they form a complex of neighbouring and contemporary necropolises. It thus became possible to identify patterns of use and distribution of textile tools in burial equipment. Does it indicate the existence of a specialised group of people professionally involved in textile activities?

Research material and preliminary results

A total of 770 textile fragments were examined. Most of the textiles discovered in Czarnówko, Lubowidz and Wilkowo were made from sheep's wool. Only in 12 fragments was the raw material identified as plant fibre, probably flax. This collection is dominated by fabrics in a 2/2 twill weave, as in all Wielbark culture cemeteries where fabrics were discovered (Maik 2012, 109) (fig. 1). There are also 2/2 twill spin-patterned fabrics (mainly 4z4s in both systems) and less numerous textiles in diamond, herringbone, and tabby weave, as well as cords/fringes and selvedges made in tablet weave. However, given the considerable fragmentation of the material, the percentage of fabric of each type may have been somewhat different. Fabrics from cemeteries under study are, therefore, in line with the general trend in textile production prevailing in Europe at that time (Bender Jørgensen 1988, 1992; Maik 2012).

Selected fragments from the Czarnówko cemetery (ten samples) were sent for strontium isotope analyses, comparing ratios between 87Sr and 86Sr. The wool in the fabrics from the eight samples is likely to come from areas of northern Poland, thus indicating a local origin. However, the strontium isotope content of the fabrics from grave numbers 1458/10 and 1802/15 is much higher than in the other samples. The non-local origin of these fragments is evident, but their exact origin cannot be determined with certainty. The author of the analysis is very cautious in pointing to the area of central Scandinavia as one of the possible areas of their origin. Thus, in the fabrics examined, nothing indicates 'southern' imports.

For five fabric samples, dye tests were carried out using the technique of ultra-performance liquid chromatography coupled with mass spectrometry (UPLC-MS). No dyes were detected in one fabric sample only (grave number 1458/10). In two samples, from graves R406/99 and 1495/12, alizarin, rubiadin and purpurin were identified, i.e. the dye compounds that are found in madder (Eastaugh et al. 2004, 244; Hofmann-de Keijzer et al. 2013, 147; Bystry 2019, 182). Alizarin was also detected in fabric fragments from graves R374/96 and 1802/15, although it was the only dye substance preserved there in these cases. It is assumed with a high degree of probability that these fabrics were dyed in red or its derivatives obtained from madder roots.

A series of microphotographs of the fabric surface using scanning electron microscopy (SEM) techniques were also taken for ten selected fragments from Czarnówko. These photographs showed that, in some samples, there had been significant degradation of

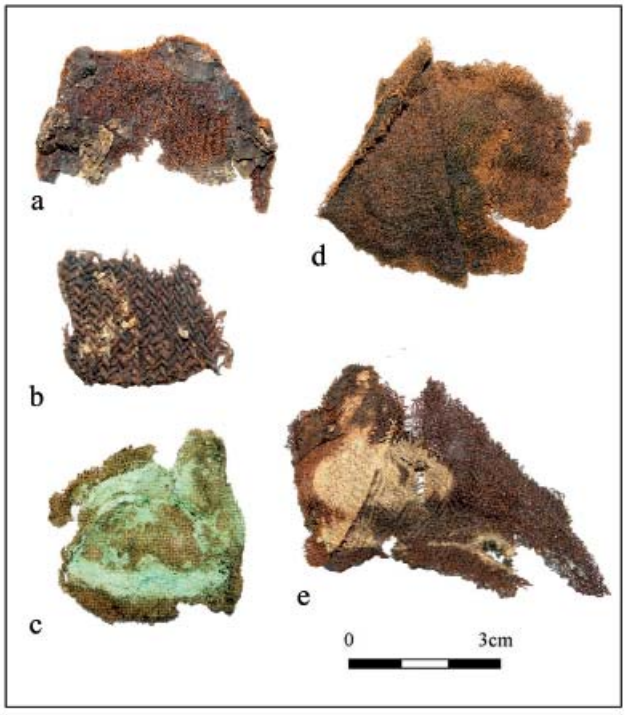

Fig. 1: Selected textiles from the cemetery in Czarnówko: a, b – 2/2 twill weave (wool); c – tabby weave (linen); d – 2/2 twill weave, spin-patterned 4s4z (wool); e – diamond weave (wool) (Images: Magdalena Przymorska-Sztuczka)

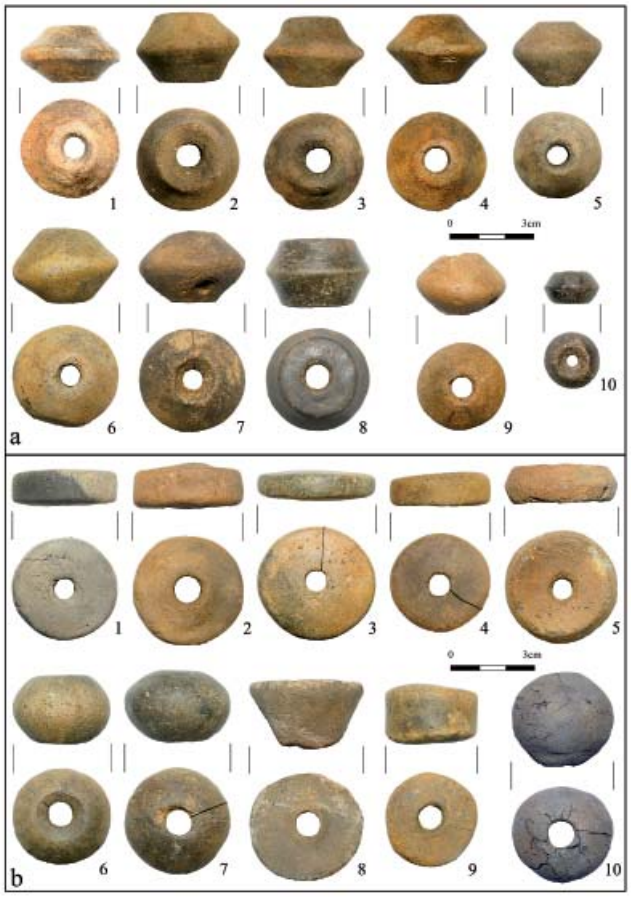

Fig. 2: Selected spindle whorls from cemeteries in Czarnówko, Lubowidz and Wilkowo: a – biconical; b – discoid (1–5), ovoid (6–7), conical (8), cylindrical (9), spherical (10) (Images: Magdalena Przymorska-Sztuczka)

the fibre surface, depriving the fibres of the scales characteristic of wool. In eight samples, the average thickness of the individual fibres was approximately 18.5 μm. In contrast, in the two remaining samples (from graves 530/09 and 1497/12), the average was approximately 25 μm. Therefore, the raw material used for these textiles was very high quality compared to earlier periods (Słomska and Antosik 2020, 128). The fabric quality remained consistently high throughout the Roman period in Poland (Maik 1988, 103–105).

Spindle whorls were the most numerous category of textile-related tools discovered in the analysed cemeteries. A total of 356 specimens were found during the excavations – 282 in Czarnówko, 35 in Lubowidz, and 39 in Wilkowo. These differences are due to the number of burials discovered at these sites (Wilkowo: 201 graves, Lubowidz: 308, Czarnówko: 1,730). The most numerous were biconical spindle whorls (fig. 2a). They accounted for approximately 80% of the total collection (fig. 3a). It is quite a diverse group of artefacts. Some have slightly concave or flat bases. There are also differences in how the largest diameter is shaped, the curve of which can be sharply or gently profiled. This type predominated at each cemetery under study and became the leading type for the entire Roman period (Przymorska-Sztuczka in preparation). Discoid spindle whorls ranked second in terms of quantity (fig. 2b: 1–5). They are also the most homogeneous. The vast majority were between 3.0 and 4.5 centimetres in diameter and mostly about 1 centimetre high. The weight, however, varied more – mostly oscillating between 15 and 30 g. A few of the whorls in this group have a sharp curve on their largest diameter, which gives them a slightly biconical cross-section (fig. 2b: 5). There were also specimens made of sandstone in this group. The ovoid spindle whorls were less common (fig. 2b: 6, 7). Other types, such as conical, cylindrical, and spherical, occurred only marginally (fig. 2b: 8–10). In the studied assemblage, spindle whorls weighing between 15 and 25 g were the most numerous (fig. 3b). Nevertheless, there is a wide variation in weight and diameter parameters across the groups, irrespective of the shape of the whorls (table 1).

Some attention should be given to the manufacture of spindle whorls. This collection contains carefully made specimens, especially for biconical whorls. They often have a sharp, well-defined curve. At the same time, however, there are asymmetrically made artefacts with a biconical cross-section on one side and an oval cross-section on the other. Some of these tools were probably made by people who were already highly experienced in the craft, while the more irregular specimens may have been made by beginners. A small group of tools also held traces of use. These were generally chipping

Type of spindle whorl	Average diameter [cm] (min.-max.)	Average weight [g] (min.-max.)
Discoid (N=35)	3,65 (2,10–4,50)	19,84 (4,15–44,00)
Cylindrical (N=10)	2,77 cm (1,90–3,50)	15,33 (5,96–24,10)
Conical concave (N=1)	4,10	15,63
Conical (N=9)	3,89 (2,80–5,00)	23,48 (15,45–38,38)
Biconical (N=267)	3,31 cm (1,70–4,70)	20,92 (2,67–43,93)
Ovoid (N=29)	3,20 (2,30–4,00)	19,30 (6,34–36,34)
Spherical (N=3)	3,43 cm (3,40–3,50)	32,17 (26,64–36,71)

Table 1: Average weight and diameter of particular types of spindle whorls

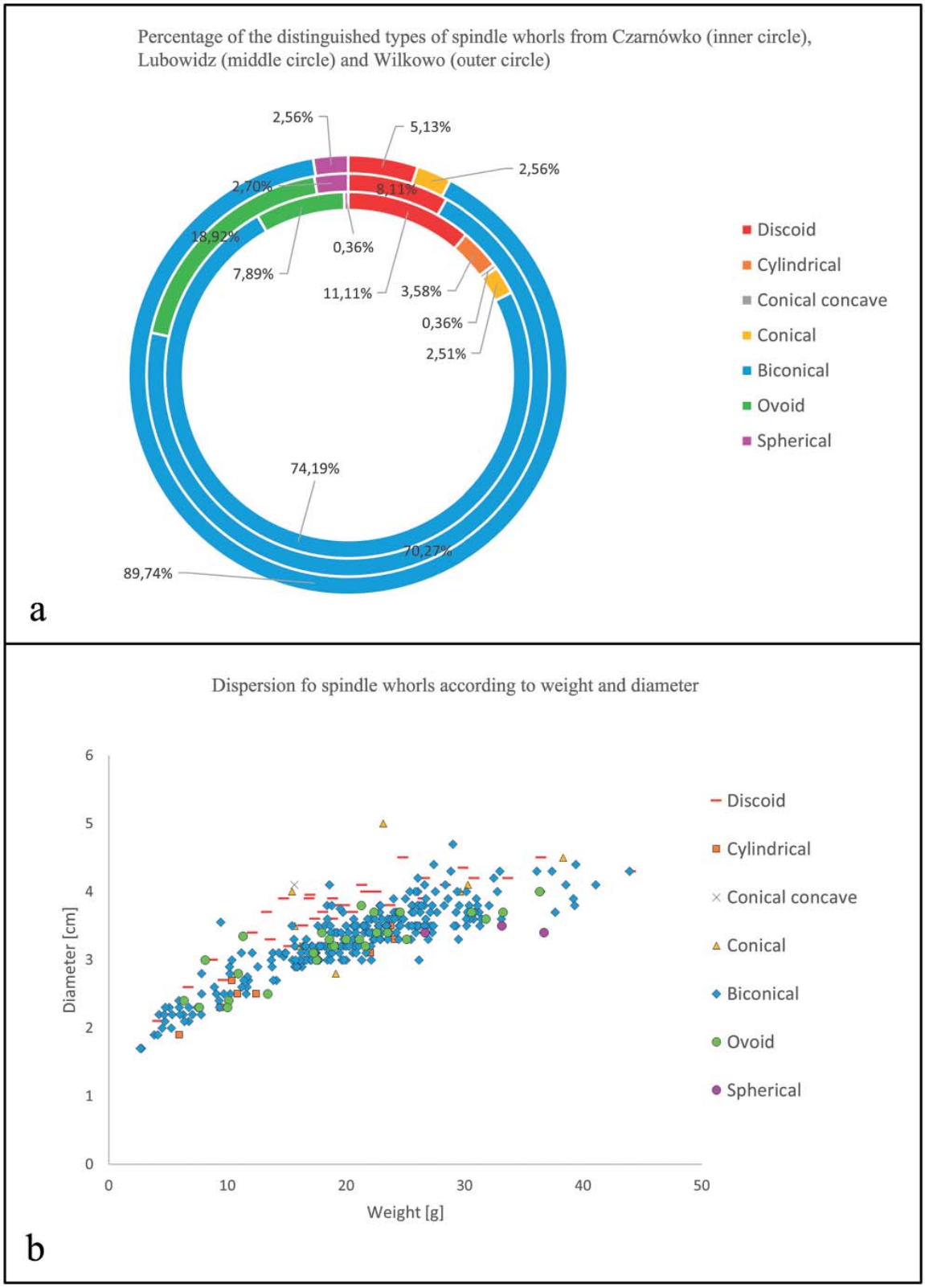

Fig. 3: Percentage of spindle whorls types in the studied collection (a) and dispersion of whorls according to weight and diameter (b) (Images: Magdalena Przymorska-Sztuczka)

on the edges and at the hole (fig. 2a: 4, 7), occurring when the spun thread breaks and the spindle hits a hard surface. However, it is essential to note that some of these traces may have happened in other ways, such as during storage or post-deposition processes.

Needles were the second most numerous category of artefacts related to the textile economy discovered in the cemeteries in the study area (fig. 4a). A total of 106 specimens were found in the graves. This collection included objects made of copper alloys (90) and iron (16). Among the copper alloy specimens, 7 to 8 cm long items predominate. Most have a slightly flattened eyelet with a groove to facilitate threading. Some needles, however, do not have this feature. The different ways of producing the eyelet suggest that needles were manufactured in more or less specialised workshops. Despite their smaller numbers, the artefacts made of iron were more varied – the specimens between 8 and 9.5 cm predominate. However, a more significant proportion of artefacts between 13 and 15 cm exist. Thus, needles are divided into two groups: slender and shorter specimens, mostly made of copper alloys, and larger objects made of iron.

Hooks, which originally were parts of spindles, first appeared in Polish territory in the pre-Roman period (Stącel 2021, 106). Forty-five spindle hooks were found in the archaeological material from the cemeteries under study (fig. 4b). All of them are made of a copper alloy wire, except for one object made of iron. Two types were distinguished: Group 1 comprises specimens with a twisted shank, while Group 2 comprises those with a plain shank. A further division considers their material: subtype A – hooks made of copper alloys, B – of iron. Because hooks were usually made of a wire 1 to 2 mm thick, we often deal with broken specimens, of which either the bent part or a fragment of the shank has survived. The length of the fully preserved spindle hooks in the analysed assemblage ranges from

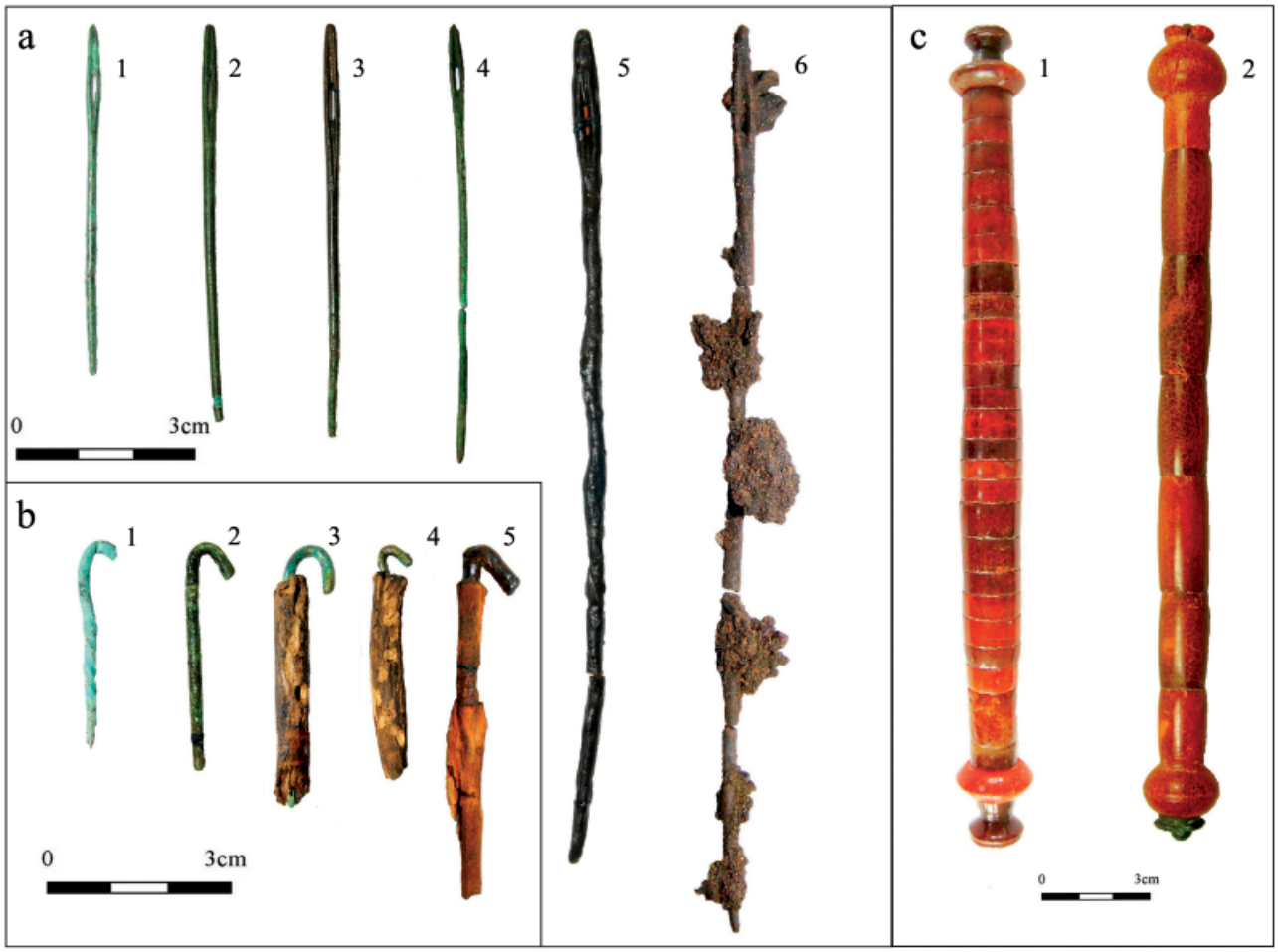

Fig. 4: Other textile-related tools discovered in cemeteries in Czarnówko, Lubowidz and Wilkowo: a – needles; b – hooks; c – distaffs (Images: Magdalena Przymorska-Sztuczka)

approximately 3 to 4.5 cm. The predominant specimens are those with a twisted shank. Five specimens show signs of use in the form of a groove on the bend of the hook. These have been formed by the spun thread rubbing against the surface of the copper alloy hook. A dozen hooks have the remains of a wooden shaft. These remains adhered to the part of the hook shank that was screwed into the spindle. Some wooden fragments are preserved enough that it was possible to measure their diameter: it varied between 5 and 8 mm, but they were probably slightly bigger, given some wood shrinkage. Unfortunately, the species of tree from which the spindle shafts were made was not determined.

The least numerous textile-related tools were distaffs (fig. 4c). Only two intact artefacts and one copper alloy element were discovered, the last being probably the end of a distaff. Both specimens were made of amber beads strung on a bronze rod. The distaff from Lubowidz has a total length of 22.7 cm. It consists of seven amber elements, while the specimen from Czarnówko is 22.5 cm long and made of 29 beads. It is difficult to determine today whether the distaffs discovered in the Czarnówko and Lubowidz cemeteries were merely an expression of the high status of the women buried with them or whether they were used in the spinning process. Based on the author's experience, spinning thread using such a distaff is very effective—the electrostatic properties of amber cause the fibres to stick to the tool. Therefore, the selection of a luxurious raw material like amber does not exclude the effective use of these objects as tools.

Conclusions

The data acquired, although limited, allowed the capture of many aspects of textile production. The high quality of the threads and the high density of some fabrics (even 20-25 threads per 1 cm) suggest that professionals were involved in at least parts of the production. The analyses indicate that most textiles were produced locally, and some were dyed. Cross-referencing tools and archaeological information made it possible to compare the frequency of burial equipment with textiles and/or textile tools and to identify the correlations between their components. Among the 2,200+ burials from the three cemeteries included in the study, 375 were equipped with at least one category of textile-related tools. The cemetery in Czarnówko stands out from the other contemporary necropolises in Lubowidz and Wilkowo. Of approximately 1,730 graves discovered there, at least one tool category was found in 291. This implies that about 17% of the burials were equipped with some textile-related tools. The percentage of graves in the other smaller cemeteries varies slightly. For Wilkowo, it is about 20%, while in Lubowidz, it is somewhat more than 14%. A similar situation is also found in other cemeteries of the Wielbark culture population, such as Kowalewko (about 17%) or Weklice (about 15%). Of course, with this type of calculation, it should be considered that some of the graves and their equipment may have been destroyed, providing only a partial picture. Unfortunately, in many cases, human remains were preserved in poor condition. The sex of the individuals was mainly determined based on archaeological gender markers, such jewellery (bracelets and necklaces), spurs, and textile tools. However, where it was possible to determine the sex of the deceased anthropologically, most textile tools belonged to female burials.

The research results presented here, although obtained for only three cemeteries, are of considerable importance for studying changes in textile production in Poland during prehistory. The broad approach of the project aims to undertake is the most comprehensive, source-based and experimentally justified reconstruction of different aspects of the textile industry of the Wielbark Culture. Both the tools and the remains of fabrics preserved in the graves provide a unique opportunity to conduct extensive, interdisciplinary research on the production and use of textiles in Poland during the Roman period.

Acknowledgements

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