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SPINNING IN THE LEGIONARY CAMP AND CITY OF NOVAE*

Abstract: The site of Novae has yielded so far 133 spindle whorls. Five formal types can be distinguished: biconical, conical, hemispherical, oval and discoid. The insignificant mass of the whorls make them suitable for spinning wool yarn. Stone whorls decorated with concentric circle merit special note. A few of the bone whorls also bear interesting decoration. Whorls of clay without any decoration were in the majority.

Key words: spindle whorls, Novae, wool, textiles

Archaeological excavation at the site of Novae, conducted between 1960 and 2016 by the Archaeological Expedition of the University of Warsaw and later the University's Center for Research on the Antiquity of Southeastern Europe, yielded 133 artifacts identified as spindle whorls. Part of this collection was lost, probably during the quake that destroyed Svištov in the 1970s. The remaining ones were described again, measured and weighed. Regarding the lost artifacts, data copied from excavation tags and published in a 1993 article by Jacek Okrzesik in *Novensia*[1] were taken into consideration.

Novae

Novae lies in historic Lower Moesia (*Moesia Inferior*). The fort was established for the VIII Legion of August in the first century AD. In the fourth century, a city replaced the fortress. The largest number of whorls (more than 80%) was discovered in sector IV, in the *valetudinarium* (army hospital) and in later architecture. Singular artifacts came from sectors I, II, V, XI, excavations in the Roman road and the southern defenses. Three whorls were surface finds from the nearby site of Ostrite Mogili.

Whorl function

The function of a whorl is to keep the spindle spinning and maintain proper yarn tension. Choice of whorl depends on the length of spun yarn and its fineness as well as thickness. How a whole works depends on its moment of inertia. This value may be calculated, multiplying mass of a point

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[1] Okrzesik 1993, pp. 179–196.

by the square of the distance from the spinning axis ($x = m \times r^2$). Calculating the moment of inertia in the case of a whorl, which is a set of points, is much more difficult.[2]

An examination of whorl properties takes into consideration foremost the weight of these artifacts. It is responsible not only for the moment of inertia, but also for proper yarn tension. It cannot be too small because the yarn would be weakly twisted, nor can it be too big because the yarn could break. Diameter and height of a whorl are also important. The bigger the diameter and smaller height, the greater the moment of inertia. Heavy whorls of large diameter are preferred for spinning long yarn that does not need to be strongly twisted. For short yarn, high whorls are better because they ensure faster rotation. This is theory, of course. In practice, the skill and experience of the spinner are of paramount importance.

Ethnographic observation coupled with archaeological experiments and analysis of archaeological finds have led to the establishment of weight divisions for whorls used to spin animal and plant fiber depending on their different properties.[3] To make it simple, whorls for spinning woolen yarn are between 8 g and 60 g. Whorls for spinning flax and hemp must be much heavier.

General characteristic of whorls discovered at the site of Novae

Whorls from the archaeological excavation at Novae are of different shape, size, material and ornament. Clay was the most popular raw materials with 58% of the finds being ceramic whorls. Of these a few were made from pottery vessel walls or bottoms. Stone whorls constituted about 24% of the finds and 11% of the collection were of bone. Glass and metal whorls are the rarest [Fig. 1]. The weight of the whorls ranges from close to 5 g at the lightest to almost 40 g at the heaviest. The predominant weight of the whorls is between 10 g and 25 g.

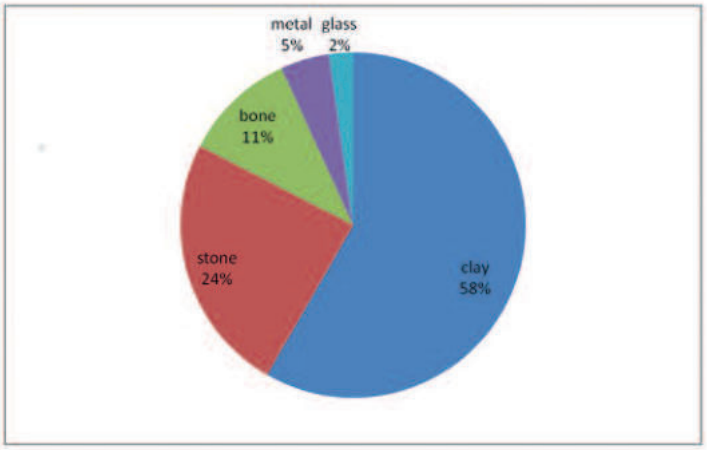

Fig. 1. Percentage share of raw material used for making the spindle whorls found at the site of Novae

Typology of whorls from Novae

The great diversity of shapes of the whorls from Novae makes a typology difficult to establish. Five principal shapes can be distinguished [Fig. 2], further differentiated within these types by clear differences of the diameter to height ratio, as well as inclination of the sides and diameter of the

[2] Chmielewski, Gardyński 2010, pp. 870–871; Verchecken 2009, pp. 257–270.

[3] Carington Smith 1975, pp. 80–81, after Chmielewski 2009, pp. 125–126; Mårtensson *et alii* 2006.

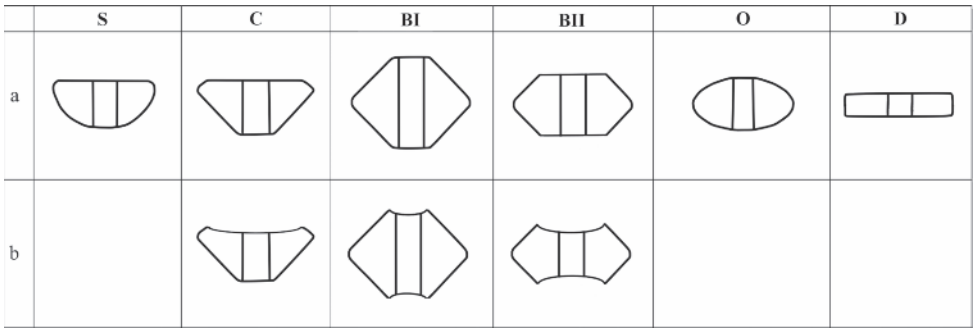

Fig. 2. Typology of spindle whorls discovered in Novae

pierced channel opening. These parameters determine how the whorl works. Thus, artifacts within one type may have had a different function. Biconical whorls are the most common (36%); they are attributed to types BI and BII. BI approaches a double cone in shape with two subtypes: biconical with finely truncated top (BIa) and biconical with slightly depressed top (BIb). The BII type is a double truncated cone, again with two subtypes: a flat top (BIIa) and a depressed top (BIIb). The next type is hemispherical (S) (33%). Discoid-shaped whorls (D) are much less numerous as a group (16%) and the least common were oval whorls (O) (6%) and conical ones (C) (5%). The latter are subdivided into conical whorls with flat base (Ca) and a slightly concave base (Cb). Whorls shaped from vessel walls and bases (so-called sherds), 4% of the collection, are outside this typology [Fig. 3].

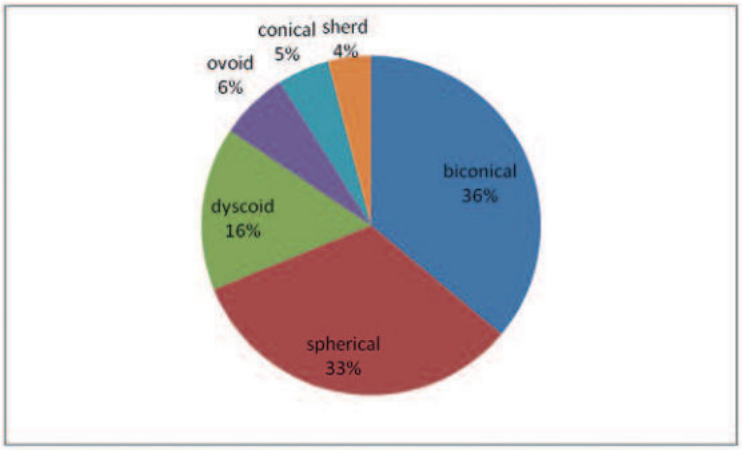

Fig. 3. Distribution of types of spindle whorls known from Novae

Stone whorls decorated with concentric circles

Stone hemispherical whorls (S) with engraved concentric circles on the top as well as base of the artifact form the most uniform group (21 examples). The stone is of the same kind in all these cases, the decoration is very similar, but there are clear differences in the diameter to height ratio [Fig. 4] and even the diameter of the pierced openings. Some have the top surfaces truncated slightly. A few oscillate on the border of type S (hemispherical) and C (conical). In two cases, the whorls are flattened enough to put them already among the discoid-shaped examples (D).

The weight of whorls from this group oscillated between 5.75 g and 18.35 g [Fig. 5]. The diameter was from 2.15 cm to 3.4 cm, the most frequent measurement being 2.6–2.8 cm. The difference in height is substantial (0.6 to 1.6 cm) [Fig. 4], but the most surprising differences were noted in the shape and size of the pierced opening. The diameter ranged from 0.7 cm to 1.1 cm and it was always larger at the base of the whorl than at the top, usually by 0.1 cm, sometimes 0.05 cm and in three cases even 0.2 cm. The differences in the size of this opening indicates that the spindles on which these whorls were mounted were not the same, unless these tools narrowed toward the ends, thus enabling the whorls to be placed at different heights.

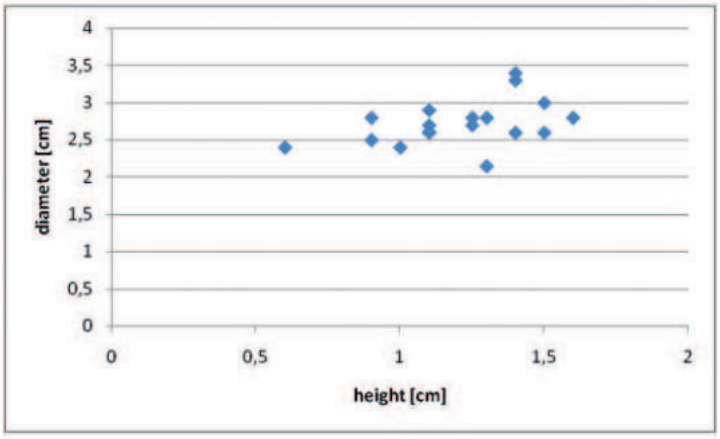

Fig. 4. Height to diameter ratio of stone spindle whorls decorated with concentric circles

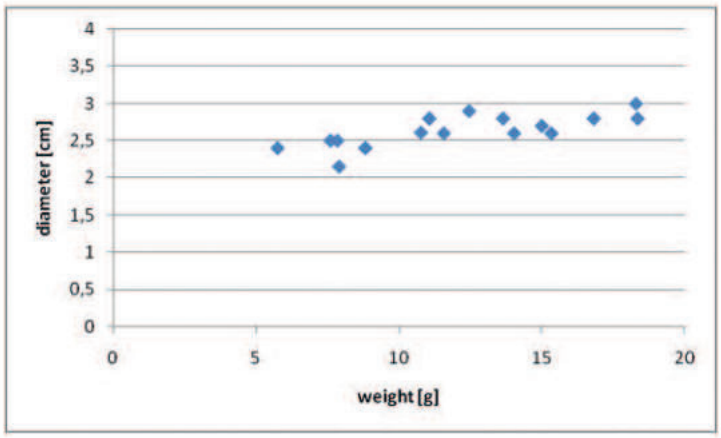

Fig. 5. Mass to diameter ratio of stone spindle whorls decorated with concentric circles

Whorls of bone

Bone whorls make up the next group and merit attention in their own right. The excavation has yielded 14 examples so far. The weight ranged from 8 g to 33 g. These were mostly hemispherical whorls, more rarely discoid-shaped. A group among the whorls was distinguished by a similar form and decoration (inv. nos 100/96 w; 18/98 w; 452/15 and most probably the lost whorl 55/60). These are hemispherical examples, from 3 cm to 3.7 cm in diameter, 1.4 to 1.5 cm in height. The

base of the whorls is decorated with clusters of small dotted circles forming a unique design in every case despite using the same motif. Two hemispherical whorls (inv. nos 61/99 and 98/77) are decorated with engraved triangles and lines.

Weaving and spinning in Novae

The whorls discovered at Novae are evidence of a local weaving industry, even if some of the textiles for the army were imported (most probably from Gaul and Italy).[4] However, no ancient textiles survive from the excavation,[5] making it difficult to discuss the role of local weaving. Considering raw material availability, wool may have been processed on site, as well as possibly hemp.

Animal remains identified as ovicaprids were recorded from the *principia* and the Western District. Examination of the bones identified the species of sheep as a short mouflon type.[6] The percentage share of sheep bones was rather low in most deposits,[7] save for a post-consumption deposit from the hypocaust cellar of the headquarters building from the fourth century AD, where the percentage of sheep is predominant.[8] The analysis also showed that the animals had mostly been young. The sporadic presence of sheep bones in post-consumption material from an earlier period indicates that sheep were raised mainly for wool and milk. Metal scissors, a few of which were found on site, are further proof, their shape indicating that they were used as shears for sheep.[9] Hooves impressed in bricks and tiles are also proof of sheep being raised in Novae and its nearest neighborhood.[10]

Hemp may have also been used in the local weaving industry. Its popularity in the Danube region is borne out by a mention in Herodotus (*Histories* IV 74). Nineteenth century travelers also noted the use of hemp in this region.[11] However, there is no evidence for plant fiber use from the excavation in Novae. The discovered whorls are too light to have been used for spinning either hemp or flax, although they would have been suitable for spinning nettles.

The archaeological record in Novae brings no other accessories that could be enlightening for the local weaving industry, the sole exception being a few loom weights.[12] Most of them were net sinkers, although it is quite likely that they were used for weaving, too. These finds show that a warp-weighted loom was in use; this kind of loom was the most common in the Roman Empire (two beam looms were also known).[13]

The local weaving industry may not be reconstructed on the grounds of the finds discovered to date, but the whorls indicate that woolen yarn was chiefly produced on site. Only a few whorls were actually heavier than 30 g. The decorated stone and bone whorls were used presumably for spinning thin and medium-sized yarn. Interestingly, only the stone group of whorls included whorls lighter than 8 g, presumably intended for spinning very fine and delicate yarn.

Further analyses of spindle whorls from other legionary camps and city complexes in this section of the Roman *limes*, as well as new finds from Novae may yet throw light on weaving in former Moesia.

[4] Liu 2013, pp. 131–132.
[5] The sole recorded piece of textile is of medieval date; it is a woolen fragment in canvas weave.
[6] Grężak, Piątkowska-Małecka 2006, p. 42.
[7] Schramm 1975, pp. 215–241; Schramm 1979, pp. 97–130; Grężak, Lasota-Moskalewska 1998, pp. 203–209.
[8] Grężak, Piątkowska-Małecka 2000, pp. 100–101.
[9] Gacuta 1987, pp. 89–90; Alfaro Giner 1997, figs. 5–6.
[10] Dyczek 2011, p. 92.
[11] Yates 1843, pp. 292–293.
[12] Kowal 2011, pp. 127–147.
[13] Alfaro Giner 1997.

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Streszczenie

Przędzalnictwo na terenie obozu legionowego i miasta Novae

Na stanowisku Novae podczas badań prowadzonych przez Ekspedycję Archeologiczną Uniwersytetu Warszawskiego, a później przez Ośrodek Badań nad Antykiem Europy Południowo-Wschodniej UW w latach 1960–2016 odkryto dotychczas 133 przęśliki. 58% stanowią przęśliki gliniane, 24% to przęśliki kamienne, a 11% kościane. Ponadto okryto nieliczną grupę przęślików metalowych i szklanych. Ze względu na ich formę można wydzielić pięć typów: bikoniczne, koniczne, semisferyczne, dyskoidalne i owalne. Najczęściej występują przęśliki bikoniczne i semisferyczne, rzadziej dyskoidalne, a pozostałe typy reprezentowane są jedynie przez kilka egzemplarzy. Masa przęślików waha się od 5 do 40 g, co sugeruje, że wykorzystywano je do produkcji przędzy wełnianej. Na szczególną uwagę zasługuje dosyć jednorodna grupa przęślików kamiennych z rytym ornamentem w kształcie koncentrycznych kół. Dekoracja występuje jeszcze na kilku przęślikach kościanych, podczas gdy przęśliki gliniane w zdecydowanej większości są niezdobione.

Analiza przęślików z pozostałych obozów legionowych oraz założeń miejskich na tym odcinku limesu rzymskiego, a także nowych znalezisk ze stanowiska Novae, może rzucić nowe światło na problematykę tkactwa na terenie dawnej Mezji.

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