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Plants in the artefacts not used for their original purpose. A remarkable case from the Lazdininkai (Kalnalaukis) cemetery in western Lithuania

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Keywords

Pendant, bead, repurposed artefacts, spinning tools, aquatic plant, wood, Lazdininkai-Kalnalaukis cemetery

Abstract

This article investigates tinned bronze ornaments found in two graves of the Lazdininkai-Kalnalaukis cemetery dated to the end of the 2nd century to the first quarter of the 3rd century AD from the perspective of archaeological materials, intercultural contacts, 14C AMS dating, and chemical-physical and biological research. These ornaments — a wheel-shaped pendant and a bead — were originally parts of fashionable necklaces. However, these ornaments went into the graves as spinning tools. The wheel-shaped pendant from grave 8(1992) contains the first ever found, or at least officially recorded, use in Lithuania of an aquatic plant for a spinning tool bobbin. The piece of possible linden tree wood was used to compose the spinning tool bobbin found in grave 68(2001). These spinning tools are the first to have appeared in Lithuanian archaeological material from as early as the end of the 2nd century to the first quarter of the 3rd century. In addition, both spinning tools are unique in the Lithuanian archaeological record so far in that the copper alloy spindle whorls were used to compose both working tools. The closest analogues for the wheel-shaped pendant are known from the Wielbark culture and this example should be considered as an import from that cultural area. Copper alloy beads and various local derivatives, however, are numerous in the range of the Baltic cultures area. The copper alloy wheel-shaped spindle whorls from the Migration period cemeteries are the spinning tools created for the specific purpose of spinning which were produced locally, even possibly in the same workshops.

Introduction

Despite comprehensive growing knowledge of Lithuanian archaeological material, there are still finds that constitute remarkable cases. This article discusses two artefacts — a wheel-shaped pendant and a spherical bead — found in graves of Lazdininkai-Kalnalaukis cemetery dated to the end of the 2nd century to the first quarter of the 3rd century AD that were not used for their original purpose.

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Originally, these two ornaments were parts of fashionable necklaces. However, both ornaments were found in the graves repurposed as spinning tools with plant bobbins and copper alloy spindle whorls (or flywheels). The uniqueness of these two artefacts lies in their function, because they were intended to be used in the afterlife for spinning yarn. The surfaces of both repurposed finds are tin-covered and they are among the earliest tinned wares found in Lithuania (cf. Bliujienė and Butkus 2017). Furthermore, the find from grave 8(1992) contains the first discovered, or at least officially recorded, use of an aquatic plant for a spinning bobbin. The bead found in grave 68(2001) was used to compose a spinning tool for which a bobbin possibly made of linden wood was used.

Since we do not know of any other examples of jewellery used as spindle whorls and botanical finds used as bobbins, the Lazdininkai-Kalnalaukis spinning tools are also unique in this sense. The bronze open-worked wheel belongs to the group of miniature wheel-shaped charm pendants. So far, the closest analogue for the wheel-shaped pendant from Lazdininkai-Kalnalaukis is known from the southwestern part of the Wielbark culture and would likely be an import from this cultural area (Fig. 1.4, 17). Copper alloy beads and various local derivatives, on the other

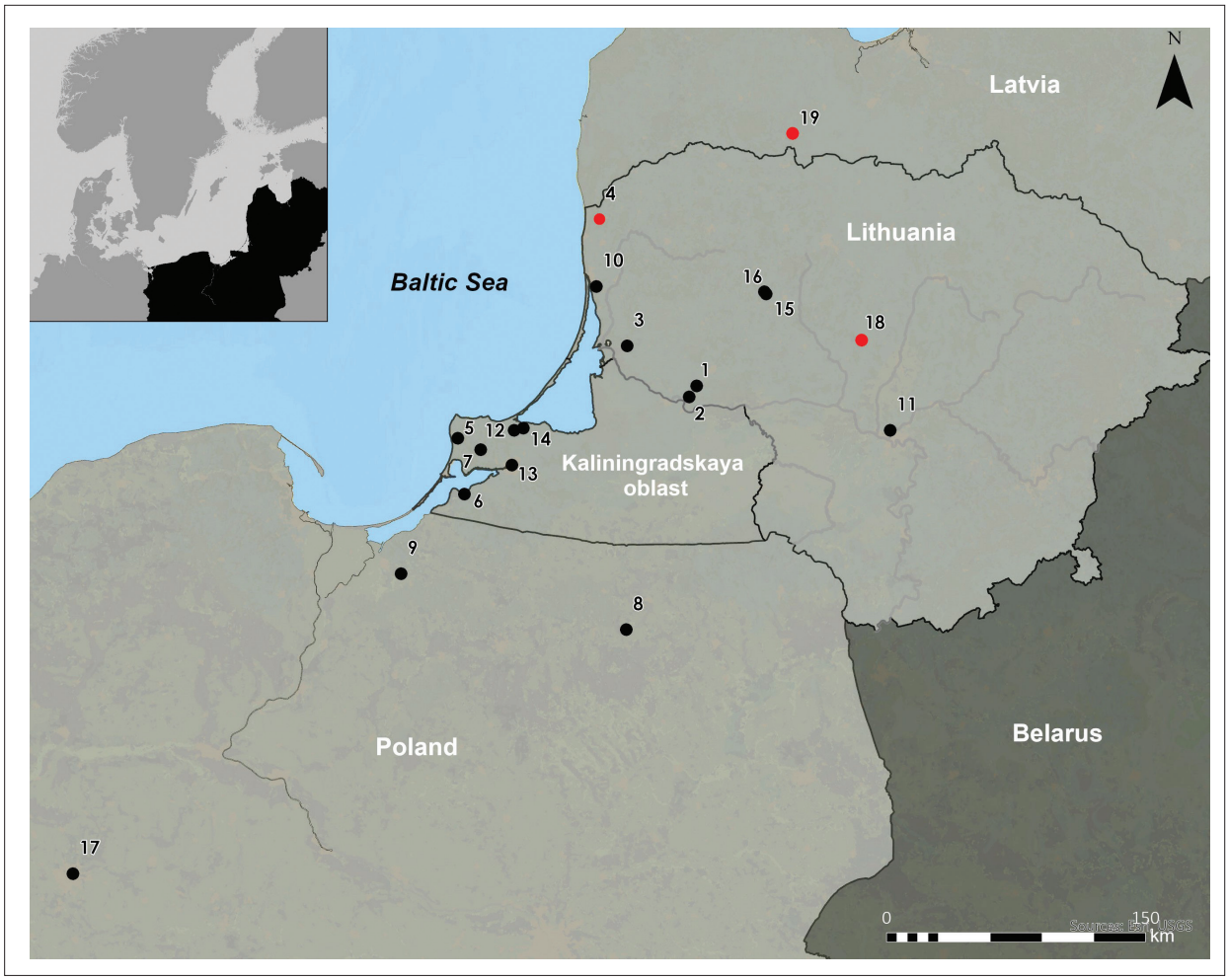

Figure 1. Distribution of copper alloy massive spherical beads (close to types 521, 520 and 528a and wheel-shaped pendants. After Tempelmann-Mączyńska 1985) in west Lithuania, Lower Nemunas River, Samland Peninsula, Mazurian Lakes region and Elbląg Heights cemeteries.
1. Barzūnai (Barzuhnen), Pagėgiai municipality; 2. Palumpiai (Polompen), Pagėgiai municipality; 3. Barzdūnai (Barsduhnen), Šilutė district; 4. Lazdininkai-Kalnalaukis, Kretinga district (site indicated in red square); 5. Pavarovka (former Kirpehnen, presently Zelenogradsk district; 6.Tropinino (former Heyde, presently Gvardejsk district); 7. Warengen, Kreis Frischhausen, presently Zelenogradsk district; 8. Bartlikowo (former Bartlickshof), Giżycko County; 9. Weklica, powiat Elbląg. Poland
10. Bandužiai (Bandhuszen, Klaipėda city); 11. Sargėnai, Kaunas city; 12. Lužki (former Kiauten, presently Zelenogradsk district; 13. Kaliningrad (former Königsberg); 14. Lugovskoe (former Lobitten, presently Zelenogradsk district.
15. Akmeniai, Kelmė district; 16. Perkūniškės, Kelmė district; 17. Poznań-Szeląg (former Schiling, Winiary, former west Preussen; presently województwo wielkopolskie, Poland; 18. Plinkaigalis Kėdainiai district); 19. Vecauces Lozberģi (Dobeles district, Latvia). After Chilińska-Drapella 2010; Natuniewicz-Sekuła 2017a; Gałęzowska 2007; Kazakevičius 1993; with additions by authors of this article. Map drawn by Minkevičius).

hand, are numerous in the range of the Baltic cultures area (Fig. 1.2–16). Examining the botanical fragments could provide valuable insights into how these plants were used practically or symbolically in burial contexts at the end of the 2nd century to the first quarter of the 3rd century AD.

In the context of artefacts not used for their original purpose, two copper alloy wheel-shaped spindle whorls from the Migration period should be mentioned. These spindle whorls were found in cemeteries of central Lithuania (Plinkaigalis in Kėdainiai district) and southern Latvia (Vecauces Losberģi cemetery in Duobeles district) (Kazakevičius 1983, pp. 31–33, Fig. 4; 1993, p. 68, Figs. 116, 118–120) (Fig. 1.18, 19). The Plinkaigalis and Vecauces Losberģi spindle whorls are mentioned here because of the hypothesis put forward by Vytautas Kazakevičius in 1983 and developed in 1993 about a possible connection of both artefacts with finds of cult chariots of the 7th century BC from southern Europe. Undoubtedly, artefacts that have not been used not for their original purpose can be found from many periods all over Europe. Graves of the Migration period, especially, often contain objects from considerably older periods. In such cases, the objects were deliberately collected and cautiously placed in the grave (Schopper 1998, 325). Kazakevičius, in announcing the discovery of the spindle whorl found in the cemetery of Plinkaigalis in female inhumation grave 115, pointed out that it contained the remains of a wooden bobbin (Kazakevičius 1983; 1993, p. 68). However, the wooden bobbin did not survive, presumably due to the high degree of deterioration, and the wood has not been analysed. There is no record of wooden bobbin remains in the inventory books and card catalogue of the Lithuanian National Museum.

According to the grave goods set, this grave is one of the richest female burials in the Plinkaigalis cemetery from the very late 5th to the first quarter of the 6th century AD or a bit later. ^{14}AMS data for Plinkaigalis encompasses the chronologically long period of 435–602 cal AD, and according to the significantly higher δ^{15}N and δ^{15}C ratios, this female's diet was based on terrestrial animal and aquatic protein sources. Both the grave goods set and the diet indicate that the woman belonged to the elite of society (Kazakevičius 1983; 1993; Kurila 2023, Table 1; Simčenka et al. 2023). As mentioned, a similar wheel-shaped spindle whorl of copper alloy was found accidentally in the Vecauces Losberģi cemetery in archaeological context of the 5th–7th century AD (Kazakevičius 1993, p. 68, Fig. 120).

1. Archaeological background

The first artefact discussed in this article which was not used for its original purpose is the unique wheel-shaped bronze pendant found in a partly disturbed inhumation grave, 8(1992), in Lazdininkai-Kalnalaukis cemetery (Kretinga district, western Lithuania). Only scattered finds were discovered at a depth of 35–38 cm from the ground surface in an approximately 200 x 80 cm area. The skeleton of the deceased has not survived, except for a small fragment of the skull vault found in the middle of the grave pit (Fig. 2.8). Fragments of the disturbed grave goods were found scattered in the head and chest area. Their former position in the grave is therefore unclear. This grave contained a small fragment of a headdress or cap, some fragments of chest ornament, and small pieces of spiral bracelets (Fig. 2.5–7). Roman sestertii of Marcus Aurelius (161–180) and Commodus (177–192) were found in the head area. An artefact in the shape of a wheel was found in the approximate area of the deceased's head, on the left side (Butkus 1993). The wheel-shaped pendant is open-worked with 11 spokes coming out of a small hole in the centre, but does not have a hanging loop. The wheel is 5.0 cm in diameter, the diameter of the hole is 0.6 cm. The artefact weighs 12.4 g. According to the burial practice of western Lithuania in the Roman period, the wheel, together with the Roman sestertii, belongs to items of the additional grave goods set (Michelbertas 1986, p. 39; Bliujienė 2013, Figs. 250 and 288) (Fig. 2.1, 3). The wheel-shaped pendant contained a stick that resembled the stem of an aquatic plant species, but only a fragment 0.8 cm long and 0.6 cm in diameter remains (Fig. 3.2–4). The stick fragment was relatively well preserved due to the mineralisation process resulting from the close contact with bronze. The hole of the wheel does not show traces of iron corrosion, therefore, the iron rod also discovered there is part of another find, not related to the wheel-shaped pendant. This iron fragment is most likely part of an awl or needle spike. Awls and needles are also often found in the additional grave goods sets of western Lithuanian burial grounds (Michelbertas 1986, p. 39). Judging from this disturbed grave, a woman may have been buried there in the range of the first quarter of the 3rd century AD (inter-regional phase B2/C1–C1a, after Michelbertas 1986). The nature of the disturbance suggests that the grave had already been robbed in antiquity.

Another artefact not used for its original purpose is a large spherical bronze bead (close to type 521, group LX after Tempelmann-Mączyńska 1985, Table 20 and 74) found in the highly disturbed inhumation grave 68(2001) in Lazdininkai-Kalnalaukis cemetery. The bead's diameter is 1.83 cm and the height is 2.02 cm. This item has an approximately 0.5–0.6 cm diameter hole into which a wooden stick had been pulled, but only a fragment 3.3–3.4 cm in length survived. The stick is unequal in width, the narrower part being inside (diameter 0.4–0.5 cm) the bead and the wider part (diameter 0.6–0.7) of the stick protruding from the bead. The bead weighed 7.48 g (Fig. 4.2). Besides this bead, three spiral rings, a circular red enamel bead, and sestertii of Antoninus Pius (138–161) and Faustina

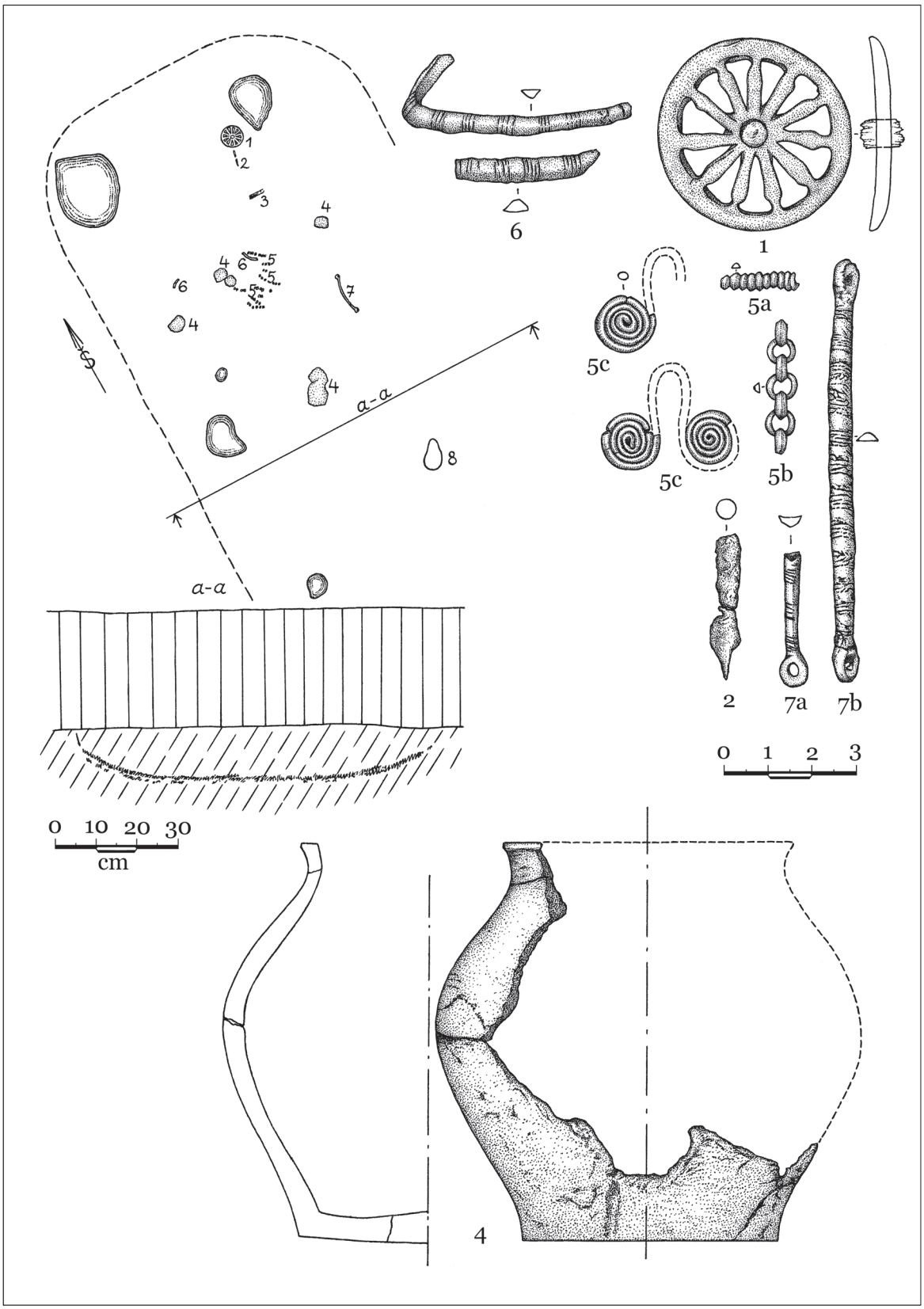

Figure 2. Lazdininkai-Kalnalaukis cemetery, partly destroyed woman grave 8(1992) in situ and the part of the grave goods. 1. Bronze; 2. Iron; 4. Pottery; 5–7. Copper alloy (KM LS 2967: 1–7; after Butkus, 1993; drawing by J. Kanarskas and S. Andrulevičienė).

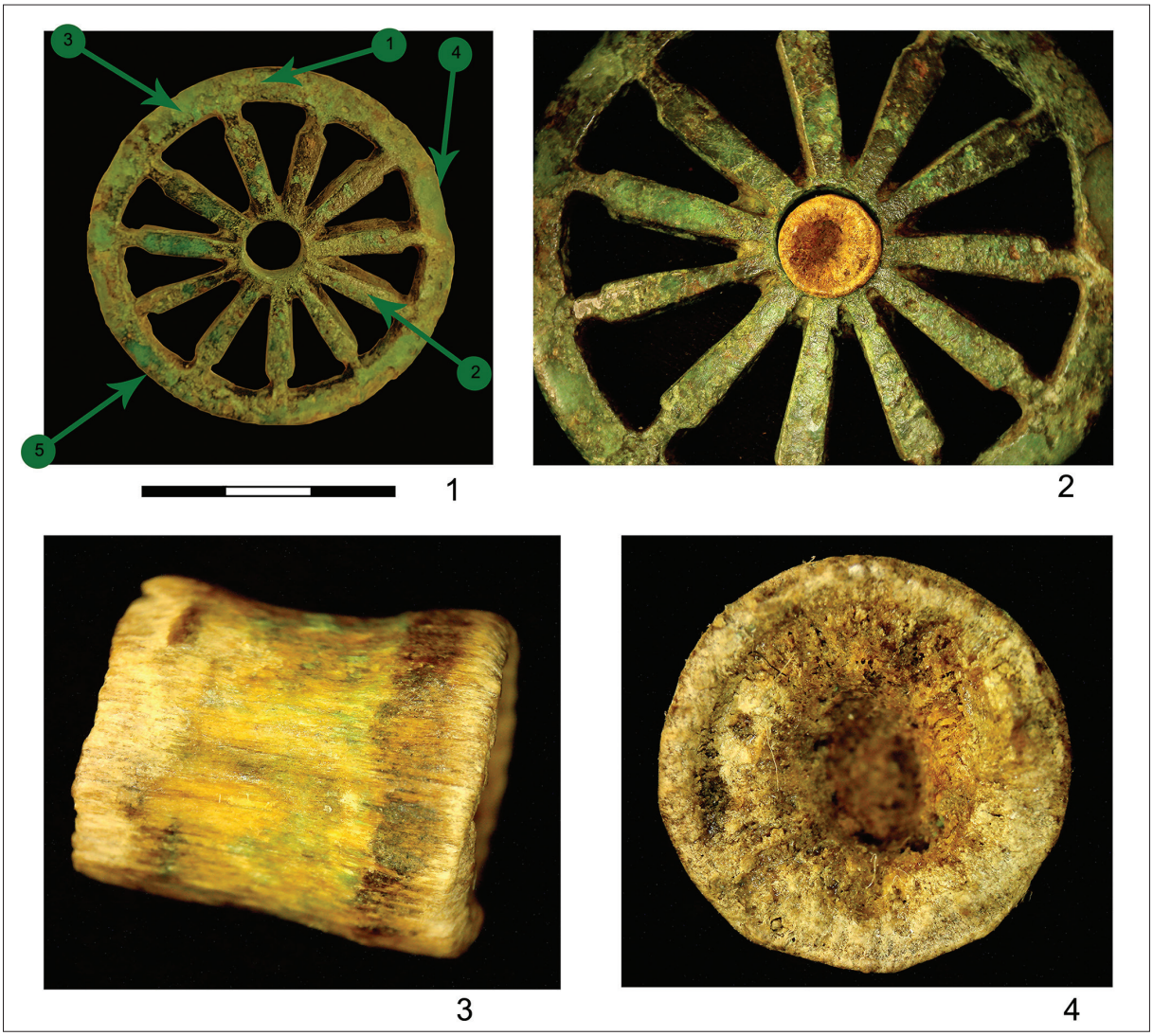

Figure 3. Bronze wheel-shaped pendant with the tin-covered surface and small piece of aquatic plant (*Phragmites australis* or *Schoenoplectus lacustris*) bobbin. Lazdininkai-Kalnalaukis cemetery, partly destroyed woman grave 8(1992). XRF surveyed points marked with arrows. Photograph by A. Bliujienė (1) and E. Babenskas (3–4).

I (?–140) were scattered in the grave pit (Butkus 2001). A woman may have been buried in grave 68(2001), judging from the remains of the grave goods set. This grave might be dated to the end of the 2nd century to the beginning of the 3rd. century AD, or even a bit later.

As already mentioned above, two wheel-shaped artefacts originally produced as spinning whorls were found in graves of the Migration period. As these wheel-shaped artefacts were used for their original purpose, in the context of this article they are mentioned because of the similar shape and potential to perform a spinning function. However, it should be stressed that there are no links between the Roman and Migration period wheel-shaped artefacts except for the spinning function.

Anthropological evidence from Plinkaigalis grave 115 suggests that a woman aged 20–25 was buried there (Kazakevičius 1993, pp. 149–150; the sex and age of the individual was determined by anthropologist Professor Gintautas Česnys).[1] The burial's grave goods set includes jewellery produced from copper alloys, silver and white metal, and amber, as well as iron: a fashionable necklace strung together from 140 white metal and 16 amber beads, two crossbow brooches connected with a chain, six bracelets, nine spirals (possibly dress adornments) and four-spiral finger-rings. Approximately between the right knee and femur area, a big amber bead, and several fragments of a chain, a spiral, a small cylinder, and an awl, together with a wheel-shaped spindle whorl were found (Kazakevičius 1993, Fig. 118). It should be noted that the grave goods set of the female in this burial are of typically local origin. However, $^{87}Sr/^{86}Sr$ ratios suggest that the female buried in grave 115 was not born locally, and that

[1] It is currently claimed that a woman aged 20–29 was buried in grave 115 of the Plinkaigalis cemetery (Kurila 2023, Table 1; Simčenka et al. 2023, Table 2).

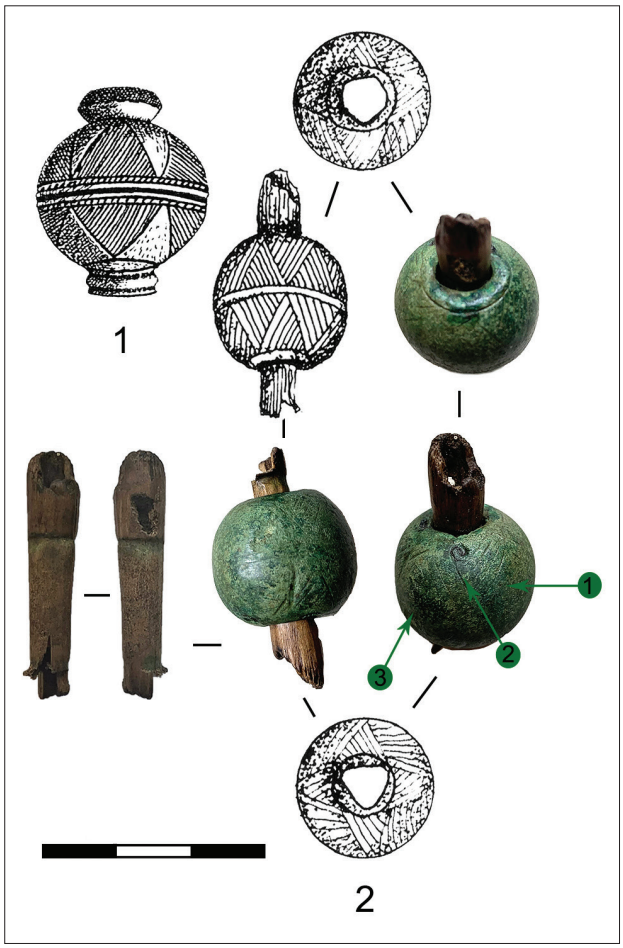

Figure 4. Bronze massive spherical beads found in from Pavarovka, former Kirpehnen, Zelenogradsk district, cremation grave F (1. after Gaerte 1929, Fig. 140.e) and from Lazdininkai-Kalnalaukis cemetery, in woman grave 68(2001) with the possible linden (*Tillia cordata*) tree stick (2. KM LS 2561:128, after Butkus, 2001; drawing by I. Idaitė. XRF surveyed points marked with arrows).

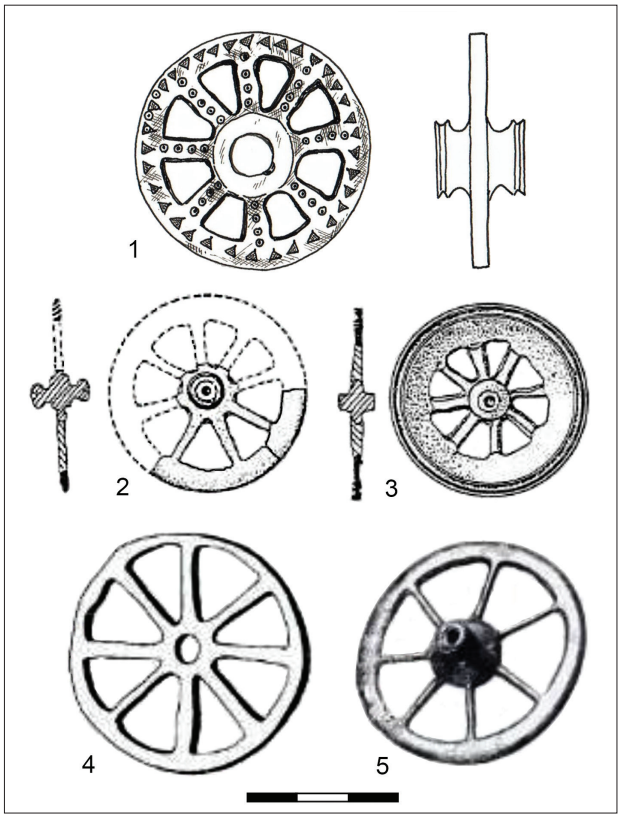

Figure 5. Copper alloy wheel-shaped spindle whorls with eight and seven spokes
1. Plinkaigalis (Kėdainiai district) cemetery inhumation female grave 115 (diameter 4.07 cm; Lithuanian National Museum, Archaeological department card catalogue, AR 700:490);
2, 3. From sacrificial offerings found at Nanteuil-sur-Aisne (Ardennes in France) Gallo-Roman culture temple (no scale, diameter might be about 4.0 cm; Parmentier, 2013a, Fig. 4);
4. Armentières-sur-Ourcq 2 (Aisne) cemetery, grave number unknown, diameter 4.8 cm (Parmentier, 2013b, pp. 4, 63); 5. Paris 3 (Ile-de-France) Saint-Denis, cemetery, female's grave 50 (Parmentier, 2013b, pp. 6, 63).

her potential place of origin was a more radiogenic area abroad (Simčenka et al. 2023). Plinkaigalis cemetery itself contains a number of imported finds or items produced following foreign cultural and technological innovation, mostly Germanic (Kazakevičius 1993, pp. 108–109, 113–114, 135–136; Bliujienė 2007).

The find circumstances suggest that the spinning whorl, as well as the big amber bead and awl, were attached to a sash, as no belt buckle was found in the grave. It should be noted that in the Plinkaigalis cemetery, stone and clay spindle whorls (only flywheels) were found in 20 female graves. In terms of their position in the graves, 15 of the spindle whorls were found in the area between the knees and femurs or on the pelvic bones of the deceased females (Kazakevičius 1993, p. 48). This circumstance clearly shows that all the spindle whorls would have been attached to sashes. The custom of attaching spindle whorls to a sash is not exclusive to the Plinkaigalis women's graves, although this is one of the most frequent cases where spindle whorls are found close to the knees in the Migration period (Kazakevičius 1993, pp. 48, 67; Vaitkunskienė 1995, pp. 90–91).

The wheel-shaped spindle whorl from grave 115 resembles a miniature (4.07 cm in diameter) of a wheel, as it has a hub in which the small remains of a wooden bobbin were found. The spindle whorl has eight stamp-decorated spokes and the so-called 'eye' motif on the front and only the 'eye' motif on the back. In addition to this, the wheel's edge is stamped with triangles filled in with left- and right-leaning slashes forming a net-like motif (Kazakevičius 1993, pp. 67–68, 149–150, Figs. 116 and 119; Bliujienė 2013, p. 404) (Fig. 5.1). These geometrical patterns are common motifs in the eastern Baltic region during the Migration period (Bliujienė 2013, Fig. 264). In terms of ornamentation and size, the Vecauces Losberģi wheel-shaped spindle whorl is similar to the Plinkaigalis one (Kazakevičius 1993, p. 68, Fig. 120).

2. Methods

2.1. Determination of plant taxa

Microscopic analysis of the plant stem fragment from grave 8(1992) was performed using a binocular stereo microscope with x10 to x120 magnification. The analysis revealed depressions across the outer layer of the stem. This indicates that prior to deposition, a fresh plant stem was forcefully pulled through the narrower hole of the artefact. The cross-section of the stem fragment was then compared to reference material derived from common reed (*Phragmites australis*) and lakeshore bulrush (*Schoenoplectus lacustris*). This revealed that the porous inner structure of the stem fragment is similar to that found in these species (Fig. 3.2–4). However, due to the morphological alterations resulting from the mineralisation process and prolonged deposition period, it was not possible to perform the identification with sufficient certainty. Also, the fragility of the fragment prevented the acquiring of a high-quality cross-section. Therefore, the hypothetical attribution of the plant stem to either *Phragmites australis* or *Schoenoplectus lacustris* ought to be treated with caution (results are given in Table 1).

The manufacturing technique of the wooden stick from grave 68(2001) was defined through a digital microscope (Qscope 9.0 MP, 200x). In the example studied, there are no visible boundaries to the tree's annual rings, so it was possible to identify a single annual ring. The stick could therefore have been carved from either a thicker log or a thinner branch of the tree. In addition, the surface of the stick was found to have clear traces of whitening caused by a sharp instrument (knife). These puncture marks run vertically. No other signs of processing were observed (Fig. 4.2). Microscopic analysis of wood samples was performed with the scanning electron microscope Quanta FEG-250. Wood anatomical features were identified with reference to wood anatomy atlases (Schoch et al. 2004; Wheeler 2011). The preserved wooden stick, being surrounded by copper alloy (bronze), survived due to the mineralisation and biocidal properties of the alloy, as well as the specific microclimate conditions in the grave (Cronyn 1990; Gillard et al. 1994; Stelzner and Million 2015). The process of mineralisation is known to help preserve fibre morphology. For anatomical analysis, a 3 x 2 x 2 mm sized piece of wood was cut from the end of the stick. Only in a small part of the transverse section of the wood were anatomical features visible. Pores grouped in radially oriented files and clusters were observed and most pits seem to be polygonal in shape (Fig. 6.1, 2). Spiral thickenings in vessels and very small ray-vessel pits were visible in the radial section. The tangential section, due to high mineralisation, could not be properly examined. Observed microscopic features seem to mostly resemble that of linden (*Tilia cordata*) (results are given in Table 1).

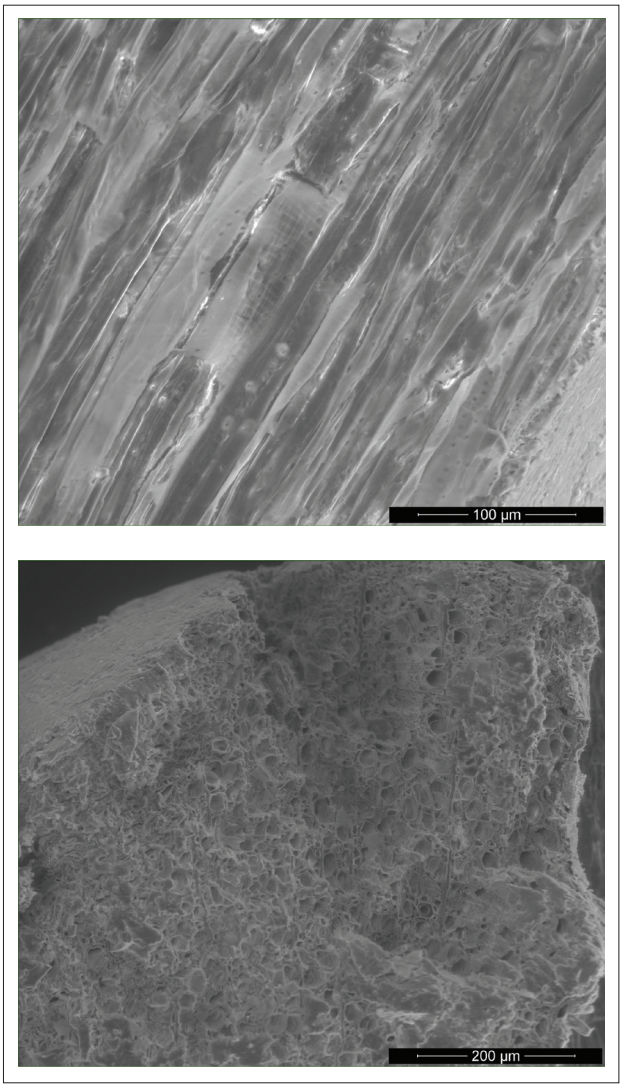

Figure 6.1-2. The samples of dicotyledon wood stick from grave 68(2001, possibly linden (*Tilia cordata*). 1. Transversal section; 2. Radial section. Photograph by Peseckas.

2.2. X-ray fluorescence analysis of copper alloys

X-ray fluorescence analysis was carried out using a handheld portable Niton XL3t spectrometer (power 2 W, voltage – 50kV, detector area ~ 50 mm^2), using calibration mode 'General Metals'. The test bench research area covered the 8 mm spot, and the depth of measurement for most elements was restricted to below 0.1 µm, the optimal thickness for XRF is >2 mm. The results ceased to vary within 30 seconds. From three to five measurements were taken at different points. Each investigated point was automatically photographed and the spectra lines were recorded, enabling records to be checked individually for inconsistencies and unexpected overlaps. By application of the fundamental parameters (FP) correction method, one assumes that all analysed elements add up to 100%. Copper alloys were characterized by their principal

Table 1. X-ray fluorescence (XRF) analyses and plant taxa data from Lazdininkai-Kalnalaukis cemetery from graves 8(1992) and 68(2001). XRF data given in wt.%.

Grave	Plant and wooden sticks	Cu	Zn	Sn	Pb	Fe	Ni	Ag	Sb	As	Bi	Co	Mn	Au	Cd
8(1992)	Possible *Phragmites australis* (common reed)/ *Schoeno-plectus lacustris* (lakeshore bulrush)	74.16	1.19	13.17	8.02	2.32	<LOD	0.30	0.65	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
		76.61	0.89	13.66	6.55	1.65	<LOD	0.20	0.40	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
		78.58	1.03	11.22	7.25	1.55	<LOD	<LOD	0.33	<LOD	<LOD	<LOD	<LOD	0.04	<LOD
		84.76	1.84	5.82	6.24	0.96	<LOD	<LOD	0.35	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
		82.62	1.34	7.92	6.25	1.22	<LOD	0.22	0.39	<LOD	0.03	<LOD	<LOD	<LOD	<LOD
68(2001)	Possible linden (*Tilia cordat*a) tree	75.35	3.12	12.58	4.03	4.16	<LOD	0.30	0.35	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
		71.40	2.99	11.54	3.63	4.09	<LOD	0.28	0.31	<LOD	0.02	<LOD	<LOD	<LOD	<LOD
		68.46	1.67	20.81	3.82	4.13	<LOD	0.46	0.61	<LOD	0.02	<LOD	<LOD	<LOD	0.02

alloying elements (Zn, Sn and Pb) and the presence of small amounts of the deliberately added alloying elements (Fe, Ni, Ag, Sb, As, Bi, Co, Mn, Au, Cd). Values of all elements are given in wt% (results are given in Table 1).

2.3. Radiocarbon (^{14}C) pre-treatment and measurements

The linden tree wood and aquatic plant fragments were dated at the Accelerator Mass Spectrometry Laboratory of the Centre for Physical Sciences and Technology in Vilnius. Since the samples were contaminated with polybutyl methacrylate ($C_4H_9O2CC=CH_2$), used as a preservative material, the Soxhlet procedure was performed. This treatment involves 30-minute washes in hot hexane, acetone and ethanol (Hajdas 2008). Soxhlet extraction was followed by sample preparation using the base-acid–base-acid-bleaching method (Němec et al. 2010). In brief, the samples were treated with 4% NaOH overnight, followed by sequential treatments with 4% HCl and 4% NaOH for 1 hour each; then samples were bleached for 30 minutes using 5% NaClO2 and two drops of 4% HCl. Graphitisation of the samples was performed using Automated Graphitisation Equipment AGE-3 (IonPlus AG). Radiocarbon was measured with a single-stage accelerator mass spectrometer (SSAMS, NEC, USA). Typical SSAMS system parameters can be found in the paper by Ežerinskis et al. (2018). All dates were calibrated by OxCal v4.4. (Bronk Ramsey and Lee 2013) and the IntCal20 atmospheric curve (Reimer et al. 2020) (results are given in Table 2).

3. Results and discussion

3.1. Original purpose and chronology of the artefacts

The wheel-shaped pendant from grave 8(1992) and the large bead from grave 68(2001) were parts of additional grave goods sets. However, in the burial context, both artefacts constitute finds not used for their original purpose, given that they were parts of fashionable necklaces. Yet more, changing the purpose of both ornaments in the graves, they were enclosed as spinning tools. The first spinning tools appeared in Lithuanian archaeological material as early as the end of the 2nd century to the first quarter of the 3rd century according to the grave goods sets with Roman sestertii. The ^{14}C AMS dating of the possible lakeshore bulrush fragment associated with the wheel-shaped pendant yielded a radiocarbon date of 40 BC–198 cal AD (1955±29 BP) (Fig. 7.1; Table 2). The radiocarbon age of the dated lakeshore bulrush plant is earlier than the chronology established by the grave goods and of course the Roman sestertii found in this grave. Therefore, it is possible that the freshwater radiocarbon reservoir effect (hard-water effect resulting from the absorption of dissolved inorganic carbon) was a key factor in prematurely dating the ^{14}C AMS (Philippsen 2013; Ervynck et al. 2018). Thus the date of the ^{14}C AMS from the second half of the 2nd century to the end of the 2nd century is close to the archaeological context, or at least does not significantly contradict it.

The possible linden tree the bobbin was pulled through the hole in the bead found in inhumation grave 68(2001) of Lazdininkai-Kalnalaukis cemetery. The ^{14}C AMS

Table 2.

^{14}C dates of Lazdininkai-Kalnalaukis graves 8(1992) and 68(2002). Investigations conducted i FTMC – Mass Spectrometry Laboratory of the Center for Physical Sciences and Technology, Vilnius; KM –Kretinga museum. Calibration according to OxCal v4.4.4 manual program (Bronk Ramsey and Lee 2013; Bronk Ramsey 2021), atmospheric data from Reimer et al. 2020, for the diagrams. Isotopic fractionation correction has been applied to the reported results based on the measured 13/12 ratio.

Sample	Material	Museum inventory No.	^{14}C lab. No.	Date: conventional BP	pMC	Date calibrated BC 2σ probability (95.4.%)
Grave 8(1992)	Plant	KL LS 2967: 2	FTMC-GN41-1	1955±29	78.40±0.28	40BC-198 AD
Grave 68(2001)	Wood	KL LS 2961: 128:	FTMC-GN41-2	1997±28	77.90±0.28	47BC- 110 AD

dating of the piece of this linden tree bobbin is 47BC–110 cal AD (1997±28BC) (Fig. 7.2; Table 2). The radiocarbon age of the dated linden tree stick is earlier than grave goods including Roman sestertii dating but the ^{14}C AMS dating is not significantly different. Furthermore, the linden (*Tilia cordata*) is a long-lasting tree and can survive for 500–600 years or more (Aleksandravičiūtė et al. 1971). As mentioned above, it is unclear what part of the linden tree was used to carve this stick which was used as a bobbin. The ^{14}C AMS date obtained indicates that the wood is from the Roman period. Even if grave 68(2001) is an inhumation, it is possible that the old tree effect could have influenced radiocarbon dating (for this, see Snoeck et al. 2014). Alternatively, the deviation in chronology could result from human behaviour, such as prolonged use of an item or a secondary use of construction material. Therefore, according to the grave goods set and ^{14}C AMS date, this grave might be dated in the range of the end of the 2nd century to the first quarter of the 3rd century AD.

The Lithuanian historiographical tradition associates the Plinkaigalis and Vecauces Losberģi wheel-shaped spindle whorls with artefacts not used for their original purpose (Kazakevičius 1983; 1998). However, if these spindles are artefacts with an altered purpose, they should be treated as long-lasting heirlooms, because Kazakevičius, a researcher at the Plinkaigalis cemetery, stated that the spindles found in grave 115 there and at Vecauces Losberģi are probably miniature cult chariot wheels of the 7th century BC (Kazakevičius 1993, p. 68). Certainly, during the younger Bronze Age, wheel-shaped pendants in many variations were widespread enough south and north of the Alps (Kossack 1954; Schopper 1995, p. 34). While relatively rare, miniaturised cult chariots do also occur throughout many European regions during the Bronze Age. However, the wheels of the cult chariots are constructively distinct items from the Plinkaigalis and Vecauces Losberģi wheel-shaped spindle whorls, as Bronze Age chariot wheels mostly have only four spokes. In addition, south of the Alps, so-called 'pin-heads' in the shape of wheels are present. Almost never found connected with a pin shaft, they show a one-sided hub. They were probably used as hair ornaments in Italy (Schopper 1995, pp. 37–45, Figs. 6–10). Thus the Plinkaigalis and Vecauces Losberģi wheels do not fit in any way with the early wheel-shaped artefacts which have hubs. At the same time, it must be once again considered that both of these wheel-shaped spindle whorls were found in the Migration period archaeological context. The position (between the right knee and femur area) of the spindle whorl in the Plinkaigalis grave links them with the graves of Alemannic, Bavarian, Frankish and Ostrogoth females during the Merovingian period (Christlein 1978; Fischer 1988, p. 45, Fig. 38; Menghin 1995, Figs. 19 and 21; Krapp, 2007, 119; Parmentier 2013a, 20; Parmentier 2013b, pp. 4–6). In this case, the Plinkaigalis and Germanic females' way of wearing spindles whorls are identical as they were attached to a belt or sash and reached the knees and femur area. But Germanic females, besides the spindle whorls, used to hang from their belt various amulets, disc-shaped pendants,[2] keys, combs, small working tools and

[2] However, disc-shaped pendants (type IB-XXI, according to the typology of Parmentier 2013b) are not related to the wheel-shaped spindle whorls from Plinkaigalis and Vecauces Losberģi. Germanic females' disc-shaped pendants are flat, open-worked, even 5–9 cm in diameter, with a geometrically ornamented front, with decoration based on the division of the circle into six to eight parts, swastikas and triskeles motifs, or on the images of horsemen and two intertwined people. Perhaps these disc-shaped pendants are amulets. Mostly they come together with the archaeological evidence of 600/610–700/710, or 520/530–600/610 (Parmentier 2013a, pp. 120–125). However, Germanic disc-shaped pendants and the way they were worn undoubtedly influenced the

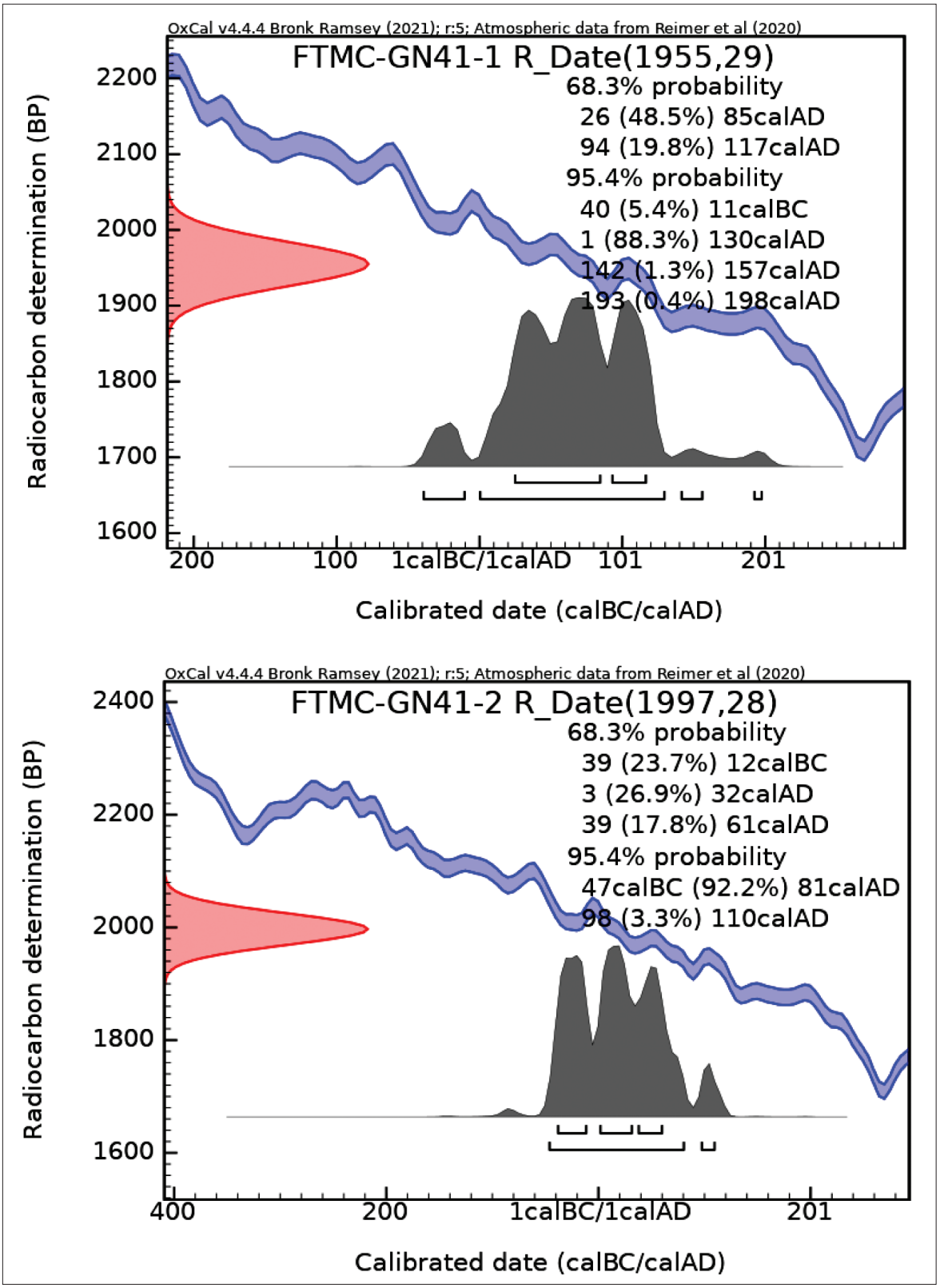

Figure 7.1-2. Aquatic plant: Radiocarbon age 1955±29 BP (in red), calibration curve (in blue) and calibrated probability density function calculated with OxCal (in grey); 6.2. Linden tree: Radiocarbon age 1997±28 BP (in red), calibration curve (in blue) and calibrated probability density function calculated with OxCal (in grey).

heirlooms (e.g. Roman coins, sherds of *terra sigillata*, Gallo-Roman culture spindle whorls, etc.; see Krapp 2007, pp. 121, 147), and in some cases spindle whorls made of clay were found. However, the spindle whorls with hubs found in the Merovingian period graves are a legacy of Gallo-Roman culture that was distributed between the Rhine and Loire Rivers. Good evidence comes from the Nanteuil-sur-Aisne temple, where large numbers of bronze spindle whorls were found during the excavations carried out in 1959–1961 (Parmentier, 2013a, pp. 20, Fig. 4, Map 1). The spindle whorls are about 4.0 cm in diameter, have hubs and mostly eight, but also seven or six, straight spokes, and are not decorated with any motifs (Fig. 5.2–3). They belong to the Type I subtype A-2 (according to the classification by Jérôme Parmentier in 2013b, pp. 4–7). These spindle whorls belong to the end of the La Tène period and perhaps were offerings sacrificed to the temple (Parmentier 2013a, p. 21, Fig. 4). Most significant, however, is that some of these (Type I subtype A-2) undecorated specimens more closely resembling Gallo-Roman spindle whorls, because of their small size and craftsmanship, were used symbolically or as a real spinning implement substitute in the Merovingian period. Perhaps the best example is a spindle whorl found in Saint-Denis (Île-de-France) in a level of princely females grave number 50 dated to the Merovingian period (ca. 560/530–600/610), which is in many ways very similar to Gallo-Roman spindles (Parmentier 2013b, catalogue no. 18). It is a bronze wheel-shaped spindle whorl with seven straight spokes and a hub, with no surface pattern, weighing 20.4 g and measuring 4.5–4.6 cm in diameter (Fig. 5.5).[3]

Summing up, to the best of our knowledge, there are no contemporaneous analogues of wheel-shaped spindle whorls in central and western Europe. Therefore, it is most likely that the Plinkaigalis and Vecauces Losberģi wheel-shaped spindle whorls were produced somewhere in the range of Lithuania and southern Latvia, possibly in the same workshop, and were originally produced as spinning whorls. The fact that both spindle whorls more or less resemble a real wheel is not surprising, as the hub ensured that the wooden bobbin might be more firmly anchored during the spinning process. The division of circular artefacts into eight or six parts is a common feature of this style of geometric ornamentation tradition, along with the stamped geometric motifs.

emergence of distinctive pendants amulets characteristic of the Lithuanian coastal area, and the lower reaches of the Nemunas River (cf. Bliujienė 2003, pp.71–72). Thus, the obvious cultural influences and imports (e.g. equal-armed brooches or *Gleicharmige Bügelfibeln* in German) of the from the Germanic world (especially from Frankish area) reached the Eastern Baltic Sea region during the time of the Late Merovingian period (Bliujienė 2003; Skvortsov and Bliujienė 2015, pp. 632–634, Fig. 1).

[3] Saint-Denis female grave 50 is a slightly later than Plinkaigalis grave 115.

3.2. Technology and possible spinning function

To determine the purpose of the finds discovered in the graves of Lazdininkai-Kalnalaukis cemetery discussed in the article and evidently not used for their original purpose, their manufacturing technologies must be considered. The wheel-shaped pendant discussed in the article is still a unique find in Lithuanian archaeological material and can be assigned to the category of miniature charm pendants with a possible other symbolic meaning. As is indicated by the elemental composition of X-ray fluorescence (further XRF) analysis, the wheel-shaped pendant was produced from bronze and its surface on the front is tinned (Figs. 2.1; 3.1-2; Table 1). The bead from grave 68(2001) was also produced from bronze and this item is also tinned (Fig. 4.2). The wheel-shaped pendant from grave 8(1992) and the bead which came from 68(2001) discussed, together with Almgren's type A133 brooches, are the earliest group of tinned finds known in Lithuania so far (Almgren 1897; Bliujienė and Butkus 2017). During the Roman period, the most common types of copper alloys in Lithuania were brass, brass/gunmetal, gunmetal, bronze, bronze/gunmetal and leaded copper alloys (Bliujienė et al. 2023).4 However, the relationships between these types of copper alloys were different in the Early and Late Roman periods. In terms of production technology, bronze is better for casting and brass for forging or hammering. The wheel-shaped pendant from grave 8(1992) was cast. However, the bead found in grave 68(2001) was hammered from a sheet of tinned bronze and engraved with a geometric pattern composed of triangles that was common in the ornamentation of this bead type.

Beads of types 251, 520 and 528a were spread over a large area inhabited by the Balts (after Tempelmann-Mączyńska 1985, Tables 20 and 74). These beads are known from the people of the Sambian-Natangian, Bogaczewo, Lower Nemunas region and West Lithuanian Stone Circle Graves cultures (Gaerte 1929, Fig. 140.e; Banytė-Rowell 2009, Fig. 4.4, 5; Bliujienė and Bračiulienė 2007, Fig, 3; Bliujienė 2013, Fig. 274; Chilińska-Drapella 2010, Table 30.m, n and 40.s–u; Fig. 7 and 8) (Fig. 1.2–16). This huge territory already had close contacts in the early Roman period, primarily involving the exchange of different commodities and cultural ideas. To these contacts among the Balts must be added an intensive and varied contact with the people of the Wielbark culture (Bitner-Wróblewska 1989; Natuniewicz-Sekuła 2017a; Bliujienė et al. 2020). In other words, the prevalence of these types of copper alloy beads indicates that they were very common in the Baltic lands and, of course, in the Wielbark culture area during the

[4] A comprehensive paper on the changes in the elemental composition and types of copper alloys from the 1st to the 12th century is currently in preparation.

second half of the Early and the beginning of the Late Roman period (Chilińska-Drapella 2010, Table 30.m, n and 40.s–u; Natuniewicz-Sekuła 2017a, Figs. 7 and 8).

However, large copper alloy beads of types 520 and 528a and various local derivatives are numerous in the range of cultural areas of Samogitia and central Lithuania (Michelbertas 2006, Figs. 27.5 and 77.3; Svetikas 2019, Figs. 12.4, 14.1, 16.20 and 18.23-49). Large spherical beads close to 521, 520, and 528a types can be manufactured either by hammering from a sheet of tin or by casting. Copper alloy beads found in Lithuanian burial sites are mostly cast (Fig. 1.10–16). In this case, it must be acknowledged that local jewellers used the simpler production technique of casting to produce the beads. On the other hand, the large cast beads found especially in the graves of the Samogitian barrows and in central Lithuanian cemeteries can be seen as derivatives, as they are somewhat distant from types 520 and 528 and are ornamented not only with engraved triangular motifs but also with horizontal lines and eye motifs or irregular motifs composed of lines. The latter motifs were more common in the ornamentation of the Early Roman period and the beginning of the Late Roman period.

Hammering technology was used differently. It should be mentioned that beads of type 521, found in the Wielbark culture area as well as in some cemeteries in the Sambian Peninsula and the Masuria Lake district, were manufactured from two hammered-in dome parts and combined into one piece, producing a spherical bead. This is a technologically complex procedure. So far, no hammered two-part beads have been found in Lithuania. As a result of this manufacturing technology, these beads have a characteristic connecting seam encircling them. Jewellers included this connecting seam as a single motif, and at the same time as a disguising line, in the scheme of geometrical embellishment. Geometric motifs (mainly triangular) were arranged on both sides of the seam and were created using the repoussé technique. However, it is rare to find hammered beads in Lithuania (Natuniewicz-Sekuła 2017a, pp. 469–470, Fig. 6.1b).

This is especially true for copper alloy beads that used wood in the manufacturing process. While researching the manufacturing technique of beads found in Weklica (powiat Elbląg, Poland) grave 536, a spherical-shaped wooden form (produced from possible linden tree (Tilia cordata)) of a bead of type 531 was found. On the surface, wooden form imprints left by the chisel were found (the manufacturing technology is described in detail by Natuniewicz-Sekuła (2017a; 2017b)). The bead from grave 68(2001) at Lazdininkai-Kalnalaukis cemetery weighs only 7.48 g, which is too low a weight for a spindle whorl that could have been used in real life for spinning, although, in a symbolic sense, the weight should not be of great significance.

As the bobbin, the stem of either *Phragmites australis* or *Schoenoplectus lacustris* was used to construct the spinning tool found in grave 8(1992). However, this attribution ought to be treated with caution. Since the weight of the wheel is 12.4 g, as a spindle whorl, this item falls into the group of lighter spindle whorls or flywheels weighing between 10 and 20 g, making them capable of spinning yarn in everyday life. The minimum spindle whorl weight suitable for spinning is about 10 g (Bliujienė 2013, p. 402). In other words, a spinning tool consisting of a bronze wheel-shaped pendant intended as a spindle whorl and a bobbin from an aquatic plant was found in grave 8(1992), however, it is uncertain whether the stem of a bulrush reed or a similar aquatic plant could even be used for spinning. The cross-section of the plant indicates its frailty and tendency to deform, which would make it less suitable for spinning that its wooden counterparts. Therefore, the fact that the plant fragment likely originates form an aquatic species could be particularly significant as it once again hints at the symbolic purpose of the artefact in the burial context.

The closest known analogue for the wheel found in the Lazdininkai-Kalnalaukis cemetery in grave 8(1992) is known from the Wielbark culture, Poznań-Szeląg burial ground (formerly Schiling, Winiary cemetery in former West Prussia; presently Wielkopolskie voivodeship in Poland) (Gałęzowska 2007), excavated in 1886. Approximately half of a similar open-worked wheel-shaped pendant (diameter 5.1 cm) with eight spokes coming out of a small hole in the centre was found in a child's cremation grave in an urn together with a green transparent glass bead (close to type 158a, after Tempelmann-Mączyńska 1985) and three(?) rock crystal beads (Gałęzowska 2007, p. 203, Fig. 13.6). Only part of the material found in this grave is known from archival documentation (Fig. 8.4). It should be noted that the Lazdininkai-Kalnalaukis and Poznań-Szeląg artefacts are in principle of similar size, with a diameter of 5.0–5.1 cm. The original purpose of this artefact is not entirely clear, although it is likely that it could have been a necklace pendant and might have served as the charm pendant (Gałęzowska 2007, p. 176).

It is possible that the wheel-shaped pendant found in Lazdininkai-Kalnalaukis grave 8(1992) once also belonged to the group of miniature wheel-shaped charm pendants. It is likely that this pendant appeared on the Lithuanian coastline from the Wielbark cultural area by exchange. From the Roman period, there were some finely decorated wheel-shaped pendants in Gotland and Bornholm (Krogh 1970).

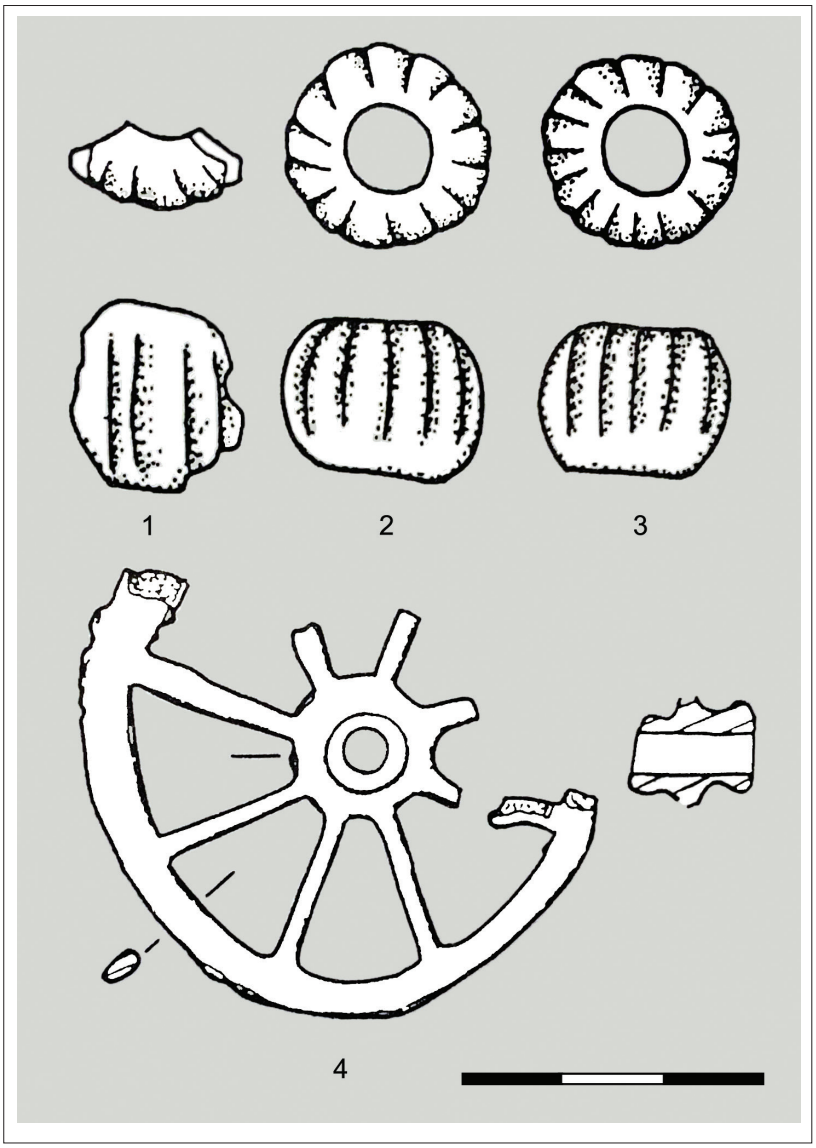

Figure 8. Grave good from Poznań-Szeląg (former Schiling, Winiary, województwo wielkopolskie, Poland) cemetery the child's cremation grave. 1–3. glass; 4. bronze (after Gałęzowska 2007, p. 203, Fig. 13).

The wheel found in Lazdininkai-Kalnalaukis cemetery is not connected with the other ornaments such as dress pins, the components of the necklace or the chest ornament found in the grave. Therefore, it is unlikely that the wheel had served a functional purpose. This is further supported by the position of the wheel in the grave, which is characteristic of the additional grave goods set. The wheel-shaped pendant's position in this grave, in the approximate area of the deceased's head, indicates that in this context the artefact could have played the role of a spindle whorl. In graves from the Roman period onwards, it is common to find only spindle whorls, because the wooden bobbin does not survive. Due to poor preservation conditions, plant remains from prehistoric burial contexts in Lithuania are a rare find in general. Only a handful of textile fragments and plant parts have been reported to date (i.e. Kanarskas 2006; Budvydas 2010). In the case of grave 8(1991), due to the favourable conditions, a fragment of a bobbin made from the stem of either *Phragmites australis* or *Schoenoplectus lacustris* was preserved.

3.3. Symbolic meaning

As already mentioned, originally the wheel and bead were parts of fashionable necklaces. In addition, the wheel-shaped pendant could be categorised as a charm pendant according to the examples of the Wielbark culture. Such an assumption would be implicitly supported by traditions from antiquity. It is known that small wheel-shaped pendants were worn by both children and soldiers as protective amulets (Krogh 1970). The conventional interpretation of wheel-shaped ornaments is based on their connections to the sun. However, it is likely that, in the funereal context, the wheel-shaped pendant and the bead were accorded the function of spinning tools. As a result, it

was for the first time that it was modified from its original purpose. The second transformation took place when an aquatic plant that could not perform a working function was used as a bobbin in the wheel, with the chosen bead lacking a little weight to enable it to function certainly as a spinning tool. It seems that both objects had a symbolic meaning in the worldly realm. In the afterlife, however, they regained their working function as spinning tools.

As ancient tradition and the archaeological material discussed above shows, spinning traditions were important in everyday life and in funerary customs. In fact, spinning was so significant an everyday practice that the concept was transferred to the afterlife. However, death itself and burial customs do not allow us to exclude the symbolic meaning of the breaking of the thread of life. The assumption is, therefore, that spinning tools might have some important mythological meaning. Spinning and weaving are closely related to fate, and the linden tree itself is closely related to the goddess Laima (Vaitkevičienė 2002, pp. 130–133). In Latvian and Lithuanian mythology, the goddess Laima is revealed through three mythical codes: fate, fortune and childbirth. Therefore, it is likely that the spinning tools placed in the graves might be the material expression of these mythological images as the thread of life that begins with childbirth, continues along the path of life, with fate and fortune determined by the goddess, and ends with the termination of the thread of life by death (Vaitkevičienė 2002).

Conclusions

Originally, the artefacts discussed in this article were parts of fashionable necklaces. The closest analogue for the wheel-shaped pendant from Lazdininkai-Kalnalaukis grave 8(1992) is known from the southwestern part of the Wielbark culture, where such ornaments functioned as charm pendants. Perhaps this pendant is the product of Wielbark jewellers and appeared on the Lithuanian coast as an import. It is likely that the charm function of the pendant was also known to the Balts living on the Lithuanian coastline. The bronze bead from grave 68(2001) was part of a fashionable necklace, together with glass and enamel beads.

However, these ornaments went into the graves as spinning tools and they were the first spinning tools that appeared in Lithuanian archaeological material as early as the end of the 2nd century to the first quarter of the 3rd century. ^{14}C AMS dating of the wooden bobbins is close to the archaeological context, or at least does not significantly contradict it.

The bronze wheel-shaped pendant and bead were both coated with tin. Interestingly, the bronze pendant features a unique use of an aquatic plant, possibly either *Phragmites australis* (common reed) or *Schoenoplectus lacustris* (lakeshore bulrush). To date, these are the earliest recorded finds of this sort. However, it is unlikely that the fragile plant could have been used for spinning in real life. The plant fragment's origin from an aquatic species likely holds symbolic significance within the burial context, however, spinning functions in the afterlife remain uncertain.

The piece of possible linden tree wood was used to compose the spinning tool bobbin found in grave 68(2001). However, it could hardly have been used in everyday life due to the low weight of the spindle whorl. Meanwhile, this spinning tool might acquire symbolic meaning in funereal customs and must have been thought to be able to perform the function of spinning in the afterworld.

The copper alloy wheel-shaped spindle whorls from the Migration period Plinkaigalis and the Vecauces Losberģi cemeteries were the spinning tools created for the specific purpose of spinning that were produced locally, even possibly in the same workshops.

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Augalai, rasti dirbiniuose, naudotuose ne pagal pirminę paskirtį. Įsidėmėtinas atvejis iš Lazdininkų-Kalnalaukio kapinyno Vakarų Lietuvoje

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Straipsnyje archeologinės medžiagos, tarpkultūrinių kontaktų, AMS 14C datavimo, cheminių-fizikinių ir biologinių tyrimų požiūriu nagrinėjami bronziniai alavu dengti papuošalai: rato formos kabutis su 11 stipinėlių ir karolis, rasti dviejuose Lazdininkų-Kalnalaukio kapinyno kapuose (2–4 pav.; 1, 2 lentelės). Originaliai abu dirbiniai buvo prabangių vėrinių dalys. Remiantis įkapėmis, tarp jų Marco Aureliaus (161–180) ir Komodo (177–192) sestercijais ir AMS 14C datomis, abu kapai datuojami II a. pabaiga – III a. pirmuoju ketvirčiu (7 pav.). Į abu kapus šie papuošalai pateko kaip verpimo įrankiai – verpstukai su augalinėmis šeivomis. Abu verpimo įrankiai yra pirmieji, atsiradę II a. pabaigos – III a. pirmojo ketvirčio Lietuvos archeologinėje medžiagoje. Labiausiai tikėtina, kad ratuko formos verpstuke (kapas 8 (1992)) šeivai naudota *Phragmites australis* (paprastoji nendrė) arba *Schoenoplectus lacustris* (ežero pakrantės viksva). Rato formos kabutyje šeivai panaudotas iki šiol Lietuvoje nerastas ir oficialiai neužfiksuotas vandens augalas. Nors ratuko svoris 12,4 gramų ir jis galėjo atlikti verpimo funkciją, tačiau mažai tikėtina, kad šią darbinę funkciją galėtų atlikti vandens augalas (3 pav.). Kape 68 (2001) rastas karolis TM 521 (pagal Tempelmann-Mączyńska 1985) sveria tik 7,48 gramų, o tai per mažas svoris verpstukui, kad jis galėtų būti naudojamas realiame gyvenime verpiant. Tačiau karolio viduje

rasta, tikėtina, iš liepos medžio (*Tilia cordata*) išdrožta šeiva rodo, kad dirbinys buvo naudotas kaip verpstukas, bet simboline prasme – anapilyje, kur svoris nėra labai svarbus. Kaip atskleidžia rašytiniai šaltiniai ir archeologinė medžiaga iš Europos, verpimo tradicijos buvo svarbios kasdieniame gyvenime ir laidojimo papročiuose. Verpimas buvo reikšmingas kasdienėje praktikoje, taigi jo idėja galėjo būti perkelta į pomirtinį gyvenimą. Todėl įmanoma prielaida, kad verpimo įrankiai gali turėti tam tikrą svarbią mitologinę reikšmę. Verpimas ir audimas glaudžiai susiję su likimu, o liepos medis – su deive Laima, kur abu atsiskleidžia per tris mitinius kodus: likimą, laimę ir gimimą. Artimiausios analogijos rato formos kabučiui (Lazdininkų-Kalnalaukio atveju – verpstukui) žinomos iš Vielbarko kultūros ir turėtų būti importas iš šio kultūrinio arealo (1, 8 pav.). Karoliui-verpstukui, rastam kape 68 (2001), analogų žinoma iš Nemuno žemupio, Vidurio Lietuvos ir Sembos-Notangos bei Vielbarko kultūrų.

Tuo tarpu Tautų kraustymosi laikotarpio Plinkaigalio kapinyne (Kėdainių rajone), kape 115, ir Vecaucės Losbergų (Vecauces Losbergi, Duobelės r., Latvija) kapinyne atsitiktinai rasti vario lydinio verpstukai su 8 stipinėliais ir stebulėmis yra verpimo įrankiai (1, 6.1 pav.). Minima, kad Plinkaigalio verpstuke buvo rastas nedidelis nenustatytos rūšies medžio fragmentas (neišliko). Tikėtina, kad abu Tautų kraustymosi laikotarpio verpstukai gaminti vietoje, galbūt net toje pačioje dirbtuvėje. Suprantama, išskirtinės formos dirbiniai, skirti verpti, išlaiko simbolinę gyvenimo trukmės reikšmę.