

LUDWIKA JOŃCZYK

Faculty of Archaeology, University of Warsaw
 ludwika.sawicka@uw.edu.pl
 ORCID 0000-0003-0036-3998

KAROL ŻOŁĘDZIOWSKI

State Archaeological Museum in Warsaw
 karol.zoledziowski@gmail.com
 ORCID 0000-0003-4580-5622

ELITE BURDEN. *TOTENKRONE*-TYPE NECKLACES FROM THE 'MOSIĘŻYSKO' CEMETERY IN SZURPIŁY

ABSTRACT

The paper discusses necklaces from the Mosiężysko cemetery in the settlement complex in Szurpiły (Suwałki District). All of them represent the *Totenkrone* type, characteristic of the Pruthenian lands. The stylistic features,

spatial distribution within the Pruthenian lands as well as in other parts of Europe, way of manufacture, purpose and chronology of these necklaces are discussed.

Keywords: Mosiężysko cemetery, Szurpiły, Totenkrone, Pruthenia

Necklaces from Szurpiły

The vast settlement complex in Szurpiły (pow. Suwałki / Suwałki District) is no question a place of elite nature. This centre flourished in the 9th–13th centuries, a period that is considered the Early Middle Ages in this area (Fig. 1). A mighty stronghold, surrounded with three rings of ramparts, and its accompanying settlements are impressive with regard to the extent of the premises and the complex engineering works that took place during the construction of this centre. This complex also yielded an enormous number of finds, including many imported and unique artefacts.¹

Among the archaeological sites in Szurpiły there is a flat cremation cemetery (Fig. 1: 2, marked with the red circle). The site was discovered in 2008 during a field survey with metal detectors. An unusual concentration of metal finds was found at that time, including many pieces of necklaces. A concentration of finds of necklace terminals was one of the reasons behind the decision to open a trench in this place several months thereafter. The site was excavated in 2008–2011, and it was deter-

mined to be a cemetery. This place is known locally as 'Mosiężysko' ('Brass Ground') and, true to that name, ca. 3,500 metal artefacts were discovered there.² No grave assemblages were recorded, and all grave goods with burnt human bones were scattered within the humus layer. It seems that the bodies were burnt in the cemetery area and left on the surface. All of the finds (ornaments, dress accessories, tools, weapons, horseman's equipment and pottery) were badly destroyed by cutting and breaking, and burned. Based on the C14 dating of five pieces of burned human bones, as well as on the stylistic and chronological analysis of metal objects, the cemetery is dated to the 12th–13th centuries.³

The most numerous group among the discovered finds are necklace fragments whose bands are twisted from three bronze wires. Fourteen fragments of necklace terminals were found altogether, including nine bar-shaped (Pl. 1: 1–9) and five oval ones (Pl. 1: 10–12). Inside one of fragmentarily preserved artefacts there are impressions of bronze wires of the band (Pl. 1: 11; Fig. 2). Dimensions of oval terminals in the discussed

¹ Engel 2020; Jończyk, Gołębiowska-Tobiasz 2021; Żołądzowski *et al.* 2021.

² Jończyk 2015, 235–239.

³ For more about the site see Jończyk 2022.

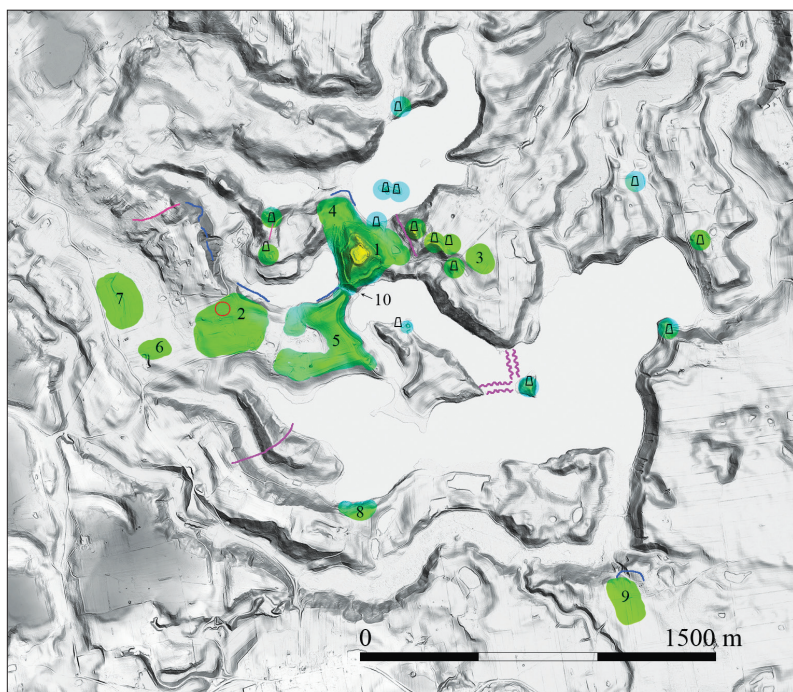


Fig. 1. Sites dated to the Early Middle Ages in the Szurpily settlement complex. The Mosiężysko cemetery is marked with a red circle, dykes are marked with purple zigzag lines, intentionally steepened slopes are marked with blue lines. Watchtower mounds are marked with trapeziums. 1 – ‘Góra Zamkowa’ (‘Castle Hill’) hillfort; 2 – Mosiężysko settlement and cemetery; 3–9 – settlements; 10 – canal between the Kluczysko Lake and the Jodel Bay (image by L. Jończyk, based on Engel 2020, tab. I with additions).

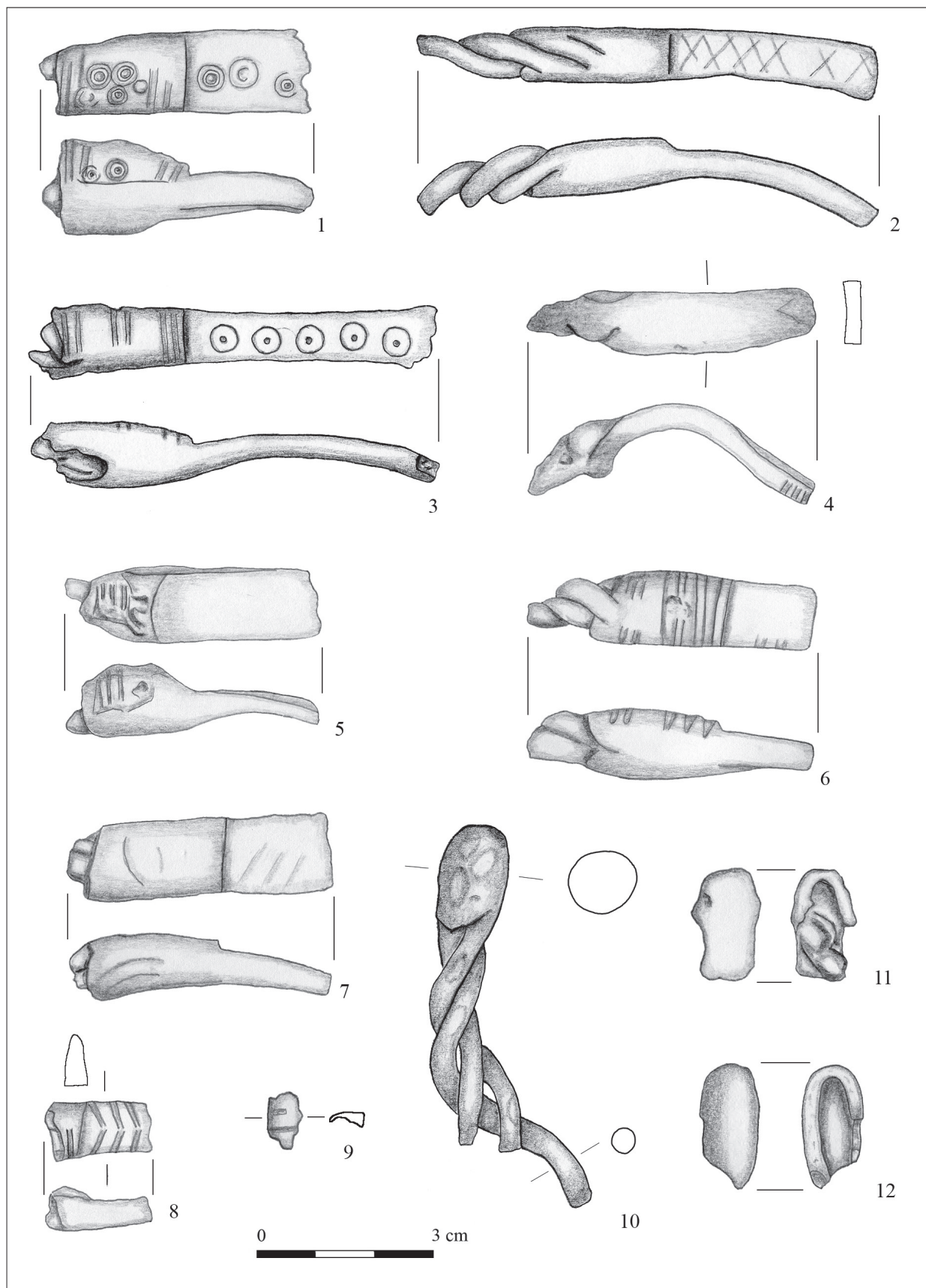


Fig. 2. Microscopic photo of wire imprints inside necklace terminal (image by K. Żołędziowski).

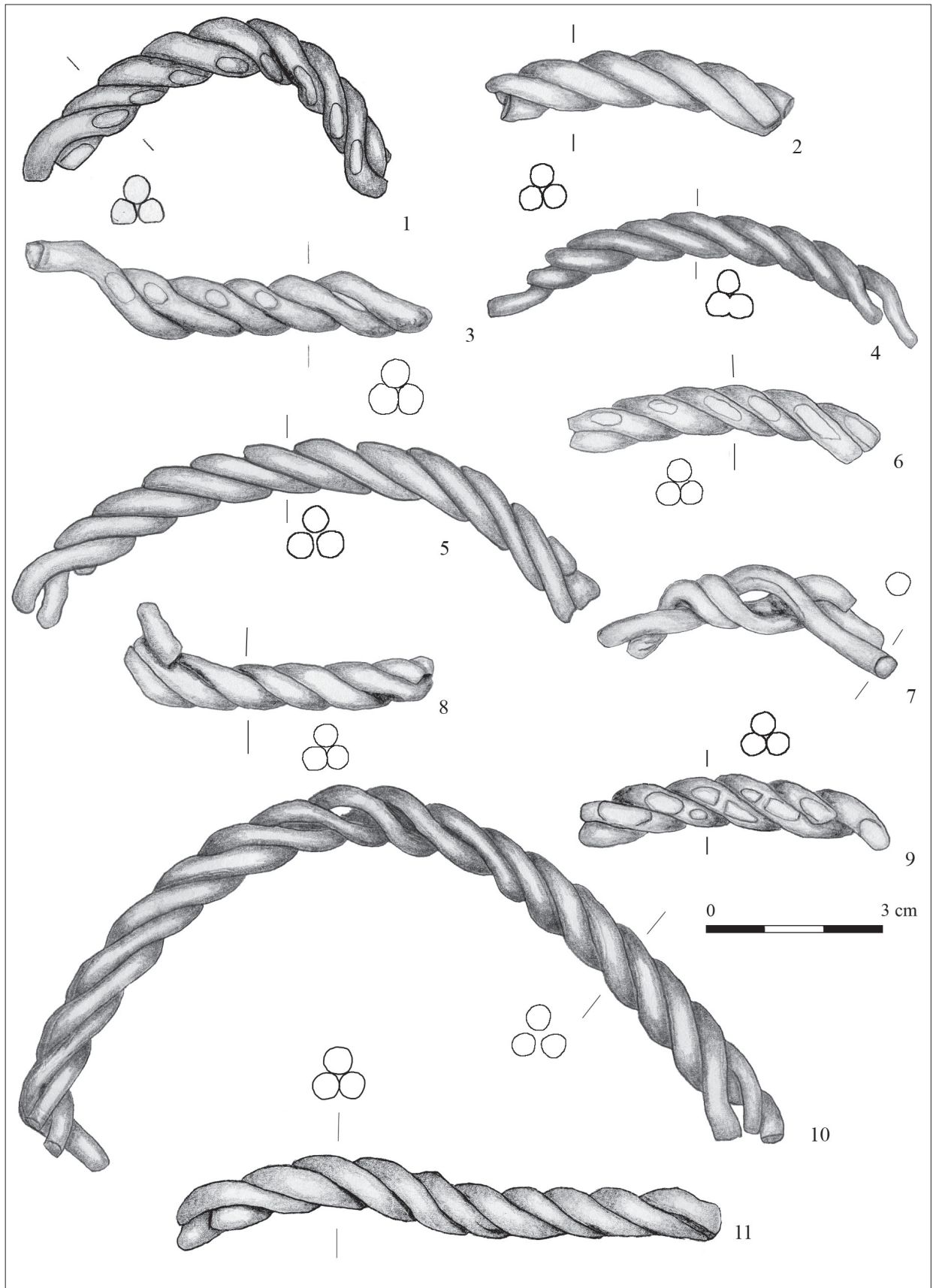
material are pretty standardized: ca. 2 cm in length and 1 cm in diameter. Bar-shaped terminals are composed of two parts: a base that is round in cross-section and was fastened onto the band, and a small bar that is rectangular in cross-section at the end of the terminal. When seen from above, these bars are rectangular or tongue-shaped. Three relatively well-preserved terminals of this kind are provided with bars which are 3.5–4 cm long and 0.7–1 cm wide (Pl. 1: 2–4). The widths of terminals which survived in a worse condition are greater and they oscillate between 1.2 and 1.4 cm (Pl. 1: 5–7). While oval terminals in the discussed assemblage are always plain, flat parts of bar-shaped terminals are often ornamented with

punched dots or incisions. The latter were sometimes also used as ornaments of bases of such terminals. Five finds of this type were found in the course of excavation works, while the remaining nine were discovered during field surveys (Fig. 3).

Another group of necklaces that was found in high numbers at the site are band fragments (Pl. 2). 110 band fragments that were twisted from three bronze wires were found altogether, including 33 within the trench. These are fragments with standardized diameters. Within the group of relatively well-preserved finds, 82% were in the range of 7–10 mm, 7% had diameters of 6–7 mm, while 8% were in the range of 11–12 mm. There are considerable differences concerning the fragments' length. The smallest find was merely 5 mm long while the longest one was 13.25 cm long. Tiny finds which do not exceed 2 cm comprise 17% of the entire assemblage. There is a clear preponderance of finds which are 2–4 cm long, and such artefacts account for slightly more than a half (52%) of the assemblage. Larger finds are rarer: 18% are 4–6 cm long, 8% oscillate between 6 and 8 cm, and only three artefacts are longer (8–13 cm). All the fragments were cut off or broken off. Traces of both of these methods of destruction were identified during microscopic analysis. Almost all finds bear traces of contact with high temperature of various intensity (they are partially or completely melted), and in three cases there were two fragments that were melted together. In a few other cases it can be seen that the twist lost its compactness and individual wires became separated (Pl. 2: 7, 10). In the case of 21 fragments only two out of the original three



Pl. 1. Necklace terminals.



Pl. 2. Band fragments.

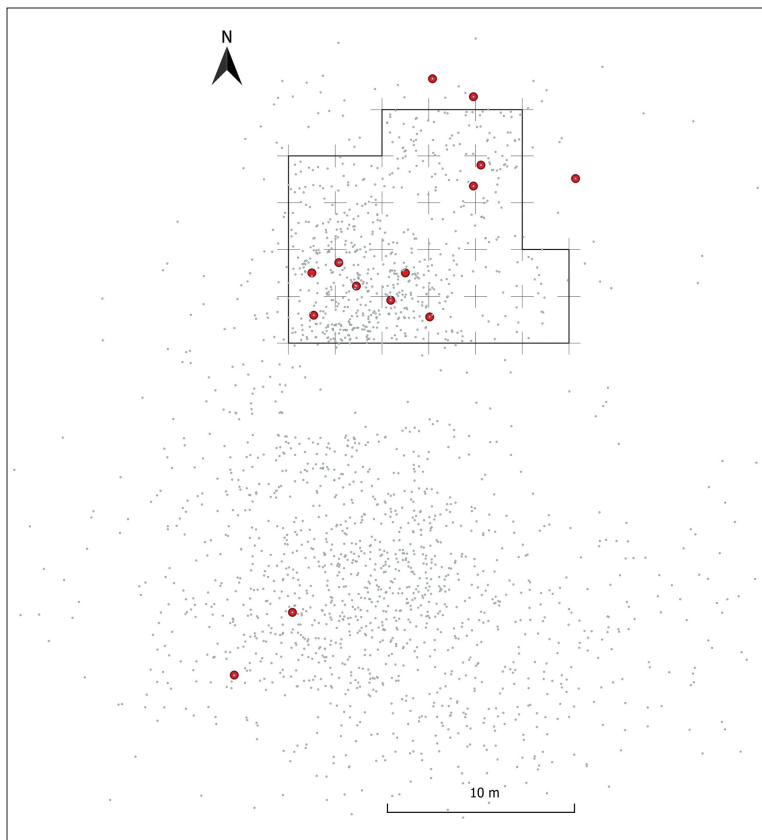


Fig. 3. Distribution of terminals of *Totenkrone*-type necklaces against the background of finds with 3D location within the cemetery (image by L. Jończyk).



Fig. 4. Microscopic photo of traces of hammering of the necklace's plan (image by K. Żółdziowski).

wires in the twist survived. Thirteen fragments bear traces of hammering of the necklace's plan (Pl. 2: 1, 3, 6, 9; Fig. 4). The find-places of band fragments at the site suggest their homogeneous distribution (Fig. 5).

The largest group of necklace parts are fragments of twisted bronze wires (Fig. 6). It is also the most numerous category of finds from Mosiężysko in general.

1,749 such fragments were found altogether, including 848 within the trench. Their diameters are standardized: in 65% cases it is 4–4.5 mm, and in 16% cases the diameters are 5–5.5 mm. Narrower artefacts are clearly more sporadic: in 11% cases the diameters are 3–3.5 mm, and ten fragments fall within the range of 2–2.5 mm. The number of wires with larger diameters is 29, and in a majority of cases the increased diameter is a result of contact with high temperature. Analogously to band fragments, individual wires were also cut off or broken off. Concerning their length, the greatest number of finds are between 10.5 and 20 mm long (57%). Slightly shorter (5–10 mm) and slightly longer (20.5–30 mm) finds comprise 19% and 18% of the assemblage, respectively. Only 4% of wires were 31–40 mm long. Twelve finds were shorter than 5 mm, including the two shortest ones, which were 0.9 mm long. Only nine wires were longer than 41 mm, the longest one being 68 mm long. As in the case of band fragments, the wires are also evenly distributed on the site's surface (Fig. 7). A trace left by a failed attempt at cutting through was noticed on one fragment. Two wires were additionally ornamented with incisions (Fig. 6: 3), and 328 (18%) bore traces of hammering of the necklace's plan (Fig. 6: 1, 2).

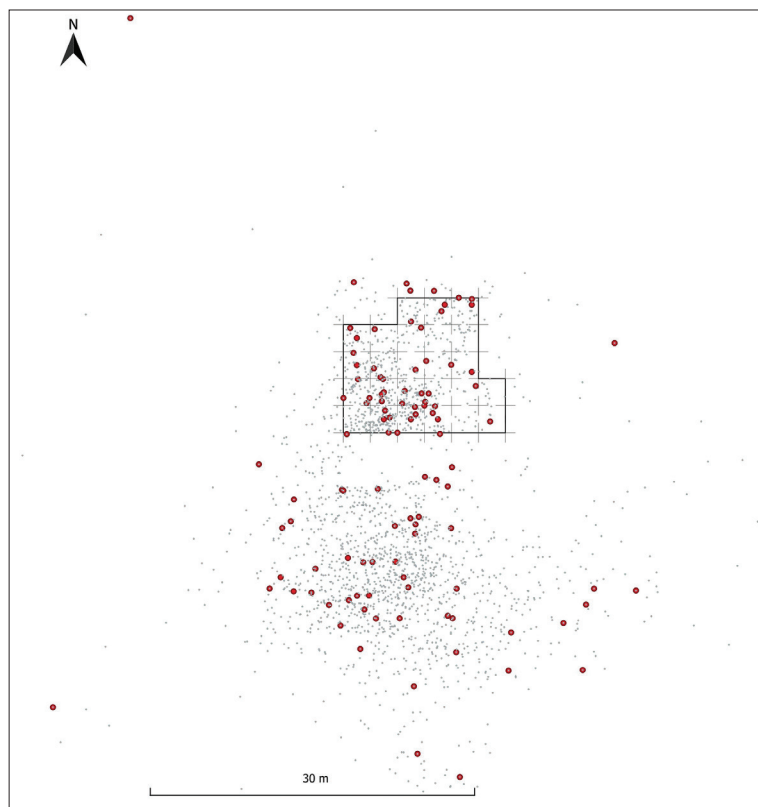


Fig. 5. Distribution of necklace band fragments against the background of finds with 3D location within the cemetery (image by L. Jończyk).

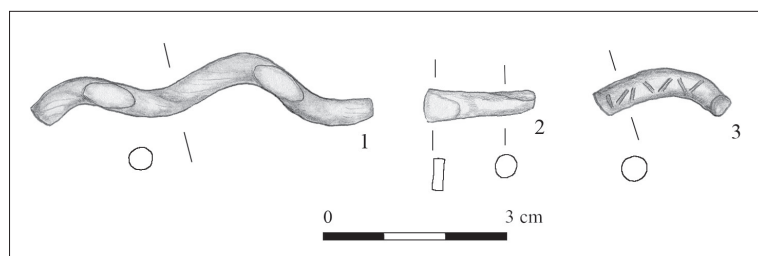


Fig. 6. Wire fragments from untwined necklaces (image by L. Jończyk).

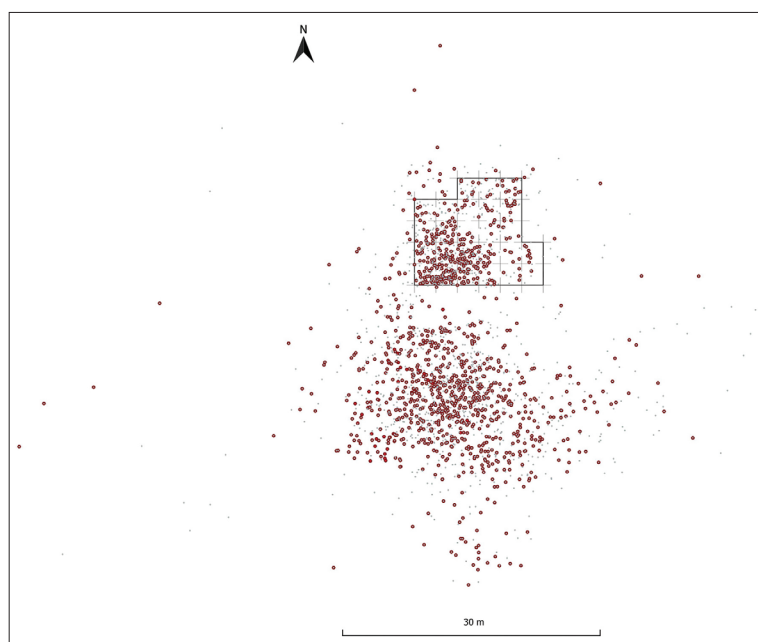


Fig. 7. Distribution of fragments of twisted wires against the background of finds with 3D location within the cemetery (image by L. Jończyk).

Way of manufacture

On the basis of the gathered finds it is possible to draw credible conclusions on the technology of manufacture of such ornaments. The basis probably consisted of cast rods. By means of drawing the rods through a drawing die, a wire with a round cross-section and a diameter of ca. 3–4 mm was obtained. The use of this process is testified to by lengthwise grooves that can be seen on a great number of wires and that are characteristic of this technology (Figs 6: 1; 8, 9).⁴ Such traces could be macroscopically identified on merely two artefacts, while in the remaining cases they could only be observed microscopically. Experiments that were carried out demonstrated that in order to produce a necklace with seven coils it was necessary to use three wires which were ca. 5 m long. They were annealed in order to soften them and were then twisted around their axis.⁵ Due to a relatively large diameter of the wires, this procedure required firm grip and considerable strength. It is not very probable that pincers that are widely known from early mediaeval blacksmithing and goldsmithing workshops could be used for this purpose. Pincers could perform well for twisting shorter segments of thin wires, where such great strength was not required.⁶ Regrettably, written sources dealing with old goldsmithing techniques do not contain much data on how such works were carried out. In the course of experimental work it turned out that two wooden planks that were ca. 1 m long were both the most effective and the simplest solution. Openings were drilled

in them mid-length; the wire could be put through them and its terminals could be bent. Two persons are necessary for the manufacture of a necklace with the use of such planks. One person gradually twists the wires by means of turning the plank, while the other holds the necklace's end and strains the twisted band, thus securing even twist (Fig. 10).⁷ As mentioned above, the band fragments that were discovered at the site bear numerous traces of hammering and flattening (Figs 4; 6: 1, 2). Some of these procedures can be perhaps related to an attempt at levelling the twist's unevenness.

The analysis of the necklaces' terminals demonstrated that they were cast directly onto the band. This is implied by wire impressions that can be seen on the internal sides of broken fragments of terminals (Pl. 1: 11, Fig. 2). The lost-wax technology may have been used for this purpose.⁸ Wire ends were covered with wax that was then formed to the required shape. A layer of leaned clay was put on such a model and an inlet was left in it. After the mould had been dried and fired, it was filled with molten metal, which filled spaces between individual wires, thus securing a tight connection between the band and the cast terminal (Fig. 9). The terminal that was formed in such a way was processed by grinding, so that the final shape could be obtained. Then, the terminal was ornamented using dyes or by means of incising.

Four fragments of necklaces underwent analyses of their chemical composition using the SEM-EDX method. The analyses were carried out by Dr Ewelina Miśta-Jakubowska from the National Centre of Nuclear



Fig. 8. Microscopic photo of traces of wire drawing on draw plate (image by K. Żołędziowski).

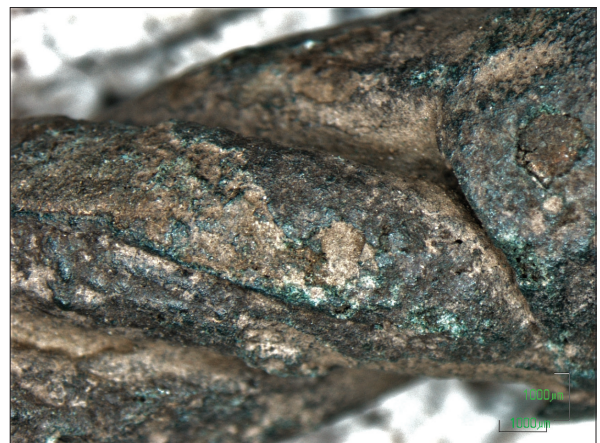


Fig. 9. Microscopic photo of a joint between a band ending and a necklace terminal. Traces of wire drawing on draw plate are also visible (image by K. Żołędziowski).

⁴ Whitfield 1990, 24–25; Żołędziowski 2013, 77.

⁵ Dobrzański 2008, 97, 190; Jopkiewicz, Kubica 1982, 14–22.

⁶ Ohlhaver 1939, 55–67; Heindel 1993, 364–365; Zemitis 2015, 135–136; Anteins 1960, 21, 32.

⁷ Żołędziowski 2018, 219.

⁸ Strobin, Żołędziowski 2021, 122.



Fig. 10. Experimental twisting of necklace band using wooden planks (image by K. Żołędziowski).

Research in Świerk (Tab. 1). All the examined artefacts were made of multi-component alloys of copper with heterogeneous composition, which may imply the use of scrap metal. A necklace fragment with the inventory no. 4202/11 is an especially interesting example (Pl. 1: 10).

In this case, the composition of two out of three wires and that of the oval terminal were analyzed (Tab. 1: 1–3). The analysis demonstrated that each of these parts was made of raw material from different remeltings. Differences in the alloy composition are so great that they also translate into differences in colours of individual parts of the necklace that could be seen with the naked eye. What is more, the alloy that was used for the terminal was composed of 66% lead and merely 14% copper. A question must be asked whether this was an intentional procedure applied by the craftsman who wanted to obtain an additional artistic effect in the form of intertwined wires of different colours. Alternatively, it can also be attributed to problems with raw materials faced by the workshop where such ornaments were manufactured. Bearing in mind the high content of lead which had a negative impact on the ductility of the processed wires, it seems more probable to relate this phenomenon to problems with supply of good quality raw material. The remaining three fragments (Tab. 1: 4–6) that were analyzed were made of homogeneous material with a high content of copper.

Tab. 1. Results of analyses of the chemical composition of necklace fragments from the Mosiężysko cemetery (E. Mišta-Jakubowska).

	Artefact	Cu	Sn	Zn	Pb	As	Ag	Fe	Bi	Ni	Total
1.	necklace terminal, no. 4202/11	14,14	2,00	1,26	66,44	7,66	–	2,64	5,86	–	100,00
2.	band fragment I, no. 4202/11	88,32	2,10	1,69	3,55	2,04	0,35	0,77	0,82	0,35	100,00
3.	band fragment II, no. 4202/11	76,79	9,60	2,24	7,09	1,89	–	1,16	1,23	–	100,00
4.	band fragment, no. 30/08	87,37	3,62	4,73	3,09	0,15	0,18	0,24	0,45	0,18	100,00
5.	necklace terminal, no. 1150/09	91,27	1,67	2,54	2,55	0,67	–	0,67	0,48	0,16	100,00
6.	necklace terminal no. 55/08	91,76	3,18	2,81	0,53	–	0,36	0,22	0,98	0,17	100,00

Totenkron-type necklaces⁹

The artefacts that were discussed above are fragments of *Totenkron*-type necklaces. These, as mentioned above, are the most numerous category of finds from Mosiężysko. Their total number is 1,888 and their to-

tal weight is 3,563.8 g. They constitute 53% of all special finds. The term '*Totenkron*-type necklaces' refers to large, spiral and multi-coil necklaces whose bands were twisted from three bronze wires.¹⁰ The coil diameter is larger in the lower part and smaller in the upper one. Therefore, such necklaces have a somewhat conical shape

⁹ We are very grateful to Mirosław Hoffmann and Kacper Martyka from Museum of Warmia and Masuria in Olsztyn and to Povilas Blaževičius and Gytis Grižas from the National

Museum of Lithuania for the possibility to study necklaces kept in these museums.

¹⁰ Bogucki 2001, 35.



Fig. 11. *Totenkrone*-type necklace in the collection of the Prussia Sammlung (Prussian Collection) of the Museum of Pre- and Early History in Berlin (image by L. Jończyk).

in the lateral view (Fig. 11). They are provided with very remarkable terminals: one is oval and is located in the lower part of the necklace, while the other is bar-shaped and can be found in the necklace's upper part. Both were sometimes ornamented with punched dots, incisions or engraved lines; however, bar-shaped terminals were ornamented much more often. The name 'Totenkrone', initially in the form 'corona funebris', appeared in the early 18th century, when the first recorded discoveries of ornaments of this kind were made.¹¹

It is difficult to assess the number of the necklaces that were deposited in Mosiężysko. Eight fragments of bar-shaped terminals mark the minimum number (Pl. 1: 1–8), while the ninth one (Pl. 1: 9) is so small that it may have been part of one of the aforementioned eight. The weights of ten entirely preserved finds of this type are known. They oscillate between 1,060 and 2,050 g, with the average weight at 1,476 g.¹² Comparing this with the weight of all the necklace fragments from Mosiężysko, it can be concluded that the fragments that were discovered at the site constitute a small fraction (about 24%) of the minimum number of eight artefacts that were deposited here. Even if it is assumed that all lumps of molten bronze come from necklaces only, this share will increase to merely 40%. There are no grounds to determine now whether this is a result of insufficient recognition of the site or of the fact that the necklaces were already incomplete at the time of their deposition in the cemetery.

Totenkrone-type necklaces are a Pruthenian variant of an ornament that was very popular among all Balt and some Finno-Ugric peoples. The highest number of finds from Lithuania and Latvia are artefacts that were made in an identical manner. On the other hand, these were single-coil and ended with loops. Multi-coil necklaces with loops first appeared upon the Lower Neman and from this territory they spread to Courland (especially its northern, Latvian part) and to Pruthenia, where the *Totenkrone* type originated. What made it different from other Baltic multi-coil necklaces were cast terminals and the narrowing of the entire ornament's diameter toward the top.¹³

According to a list published by Harri Moora, in the pre-war collection of the Prussia Museum in Königsberg there were finds from the following localities: Auglitten (Kr. Bartenstein), Gerdauen (Kr. Gerdauen), Klein Dexen (Kr. Pr. Eylau), Kleinhof-Tapiau (Kr. Wehlau), Liebstadt (Kr. Mohrunen), Liekeim (Kr. Bartenstein), Löbertshof (Kr. Labiau), Medenau (Kr. Fischhausen), Mülsen (Kr. Fischhausen), Pobethen (Kr. Fischhausen), Powunden (Kr. Pr. Holland), Dagutschen (Kr. Goldap), Staatzen (Kr. Treuburg), Syndau¹⁴ (Kr. Fischhausen), Unterplehnen (Kr. Rastenburg), Szittkehmen (Kr. Goldap), Zohpen (Kr. Wehlau) and seven from unknown places within the borders of Ostpreußen.¹⁵ Today, it is impossible to verify whether all these necklaces in fact had characteristic terminals. However, the cases for which more detailed data or artefact images are known

¹¹ Rhode 1728, 309–311.

¹² We know the weights of eight finds which are in the collection of the Prussia Sammlung: Gerdauen PM Pr 12864: 1,060 g; Unterplehnen PM Pr 12570: 1,075 g; Unterplehnen PM Pr 11143: 1,191 g; Pr 6640: 1,521 g; Gerdauen PM Pr 21127: 1,560 g; Pr 6638: 1,581 g; Gerdauen PM Pr 12933: 1,679 g; Gerdauen PM Pr 21126: 2,050 g as well as the weight of a necklace from

Otmuchów: 1,850 g (Richter 1931, 242) and a necklace from grave 65 in Równina Dolna (in Museum of Warmia and Masuria): 1.2 kg.

¹³ Moora 1939; Tõnisson 1974, 148; Šnore 1996, 118.

¹⁴ Find now kept in Museum of Warmia and Masuria.

¹⁵ Moora 1939, 234.

confirm a hypothesis that the finds mentioned by Moora belonged to the Pruthenian *Totenkron*e type. This researcher was not familiar with a band fragment with an oval end from Sorthenen (Kr. Fischhausen), kept today in Museum of Warmia and Masuria (cat. no. 674/72)¹⁶ and finds kept in other museums than the Königsberg one: a distorted necklace found in Otmuchów¹⁷ (Nysa District) or a find of unknown provenance, now stored in the District Museum in Toruń.¹⁸ After WWII new fragments and entire artefacts of ornaments of this type were discovered in Równina Dolna¹⁹ (Kętrzyn District), in the stronghold in Jegliniec (Suwałki District), in the settlement of Targowisko in Szurpiły which neighbours the Mosiężysko cemetery, as well as in cemeteries in Krukówek (Suwałki District), Cigoniškiai (raj. Alytus) and Vampenieši II in the island of Dole (nov. Salaspils).²⁰ A stray find was discovered lately on the building site in Lidzbark Warmiński (Lidzbark Warmiński District).²¹ It has 6 coils and a bar-shaped end.

The oval terminals of the aforementioned necklaces are similar. They are generally not decorated and an ornament can be seen only on two artefacts from Gerdaun

which are now in the Prussia Sammlung.²² On the first find there is an ornament of oblique incisions, while the other is decorated with punched dots (finds no. V, 474, 9003a). More differences can be seen among bar-shaped terminals. Their common trait is a round cross-section of the base and a remarkable bend of the bar, which can be seen in the lateral view and which continues the curvature of the coil. When seen from above, these terminals are long and either oval-ended (these pieces are also termed tongue-shaped terminals) or pointed. In two cases (both from Szurpiły, one from the discussed cemetery and the other from its vicinity) the terminals are rectangular (Pl. 1: 2, Fig. 12: 2). The necklace from Vampenieši II is equipped with a trapezoid terminal²³ (Fig. 12: 1). This part of necklaces is usually ornamented with punched dots, incisions or a combination of both these methods. So far, plain artefacts have solely been known from Szurpiły (Fig. 12: 3).

In literature it is possible to find information on finds of *Totenkron*e-type necklaces in other places, too. Concerning a necklace from Garbno²⁴ (Kętrzyn District), there is only a late 19th century mention that is difficult to

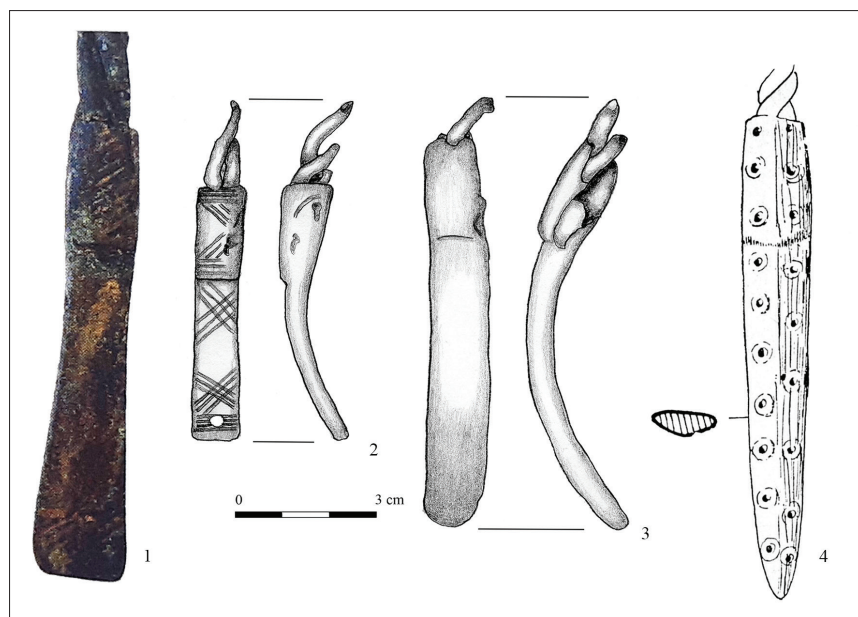


Fig. 12. Various kinds of terminals of *Totenkron*e-type necklaces: 1 – Vampenieši II, 2–3 – Szurpiły, 4 – Równina Dolna (image by L. Jończyk: 1 after Spirģis 2008, 77, fig. 118; 4 after Odoj 1958, pl. XXIII: 2).

¹⁶ Before 1945 finds from Sorthenen were kept in Prussia Museum. It is difficult to explain the lack of information about this find in Harri Moora's paper. Perhaps the necklace was found after the visit of the Estonian researcher in Königsberg.

¹⁷ Richter 1931.

¹⁸ Bokiniec, Uziembło 1999, 217.

¹⁹ Before WWII this site was known under the name Unterplehnen and was subject to examinations.

²⁰ Odoj 1956; 1958; Spirģis 2008, 277, Fig. 118; Žemantauskaitė, Fediajevas 2018; Engel, Siemaszko 2019, 306.

²¹ Find kept in the Museum of Warmia and Masuria.

²² Pr 21126, Pr 21127. All references to the Prussia Sammlung concern an on-line database, available at <https://recherche.smb.museum/>.

²³ We consider this a find of the *Totenkron*e and not the Kievan variant (dealt with below), due to the length of the terminal and the oval shape of its base.

²⁴ Bogucki 2001, 39.

unequivocally interpret without an illustration or a more detailed description. A mention of loop-shaped terminals of finds from Alt Wehlau (ray. Gvardeysk) excludes them from the *Totenkron*e type.²⁵ The same concerns the necklace from Dąbrowa (Bartoszyce District), which also has loop-shaped terminals.²⁶ Doubts are also provoked by the identification of a find from Porębek (Kętrzyn District) as a *Totenkron*e terminal.²⁷ The artefact from Porębek is significantly smaller and narrower (it is ca. 5 mm wide, while the standard width of terminals is about 1 cm). It was made from a flat-convex 1.5 mm thick metal sheet and is equipped with 2 openings. This has no analogues among the discussed type of ornaments. What also calls for verification is a frequently mentioned necklace from the locality of Chojna (Rawicz District). Information on the discovery of a *Totenkron*e artefact in this place was given in a paper by Jerzy Antoniewicz, but with no reference to a source.²⁸ Then, this supposition became part of the academic discourse.²⁹ Jerzy Antoniewicz discussed the grounds behind it in another publication, with a reference to a paper by Zdzisław Rajewski.³⁰ Rajewski's source of information was the catalogue of an exhibition in the Kaiser Friedrich-Museum in Poznań. This catalogue contains a description of an ornament from grave 6 in the Lusatian Culture cemetery in the locality of Chojno (not: Chojna), Rawicz District. This ornament is a necklace made from bronze wire with joint hook-shaped terminals which was discovered in an assemblage from the turn of the Bronze Age and the Early Iron Age.³¹ Therefore, it is not a *Totenkron*e-type artefact.

Six necklaces that are very similar to the *Totenkron*e type were found in the territory of Kievan Rus'. Two are known from the cemetery in Ostriv (ray. Rokitne), two from Kiev³² and one each from the vicinity of Kanev (ray. Kanev) and from an unknown locality, perhaps from the vicinity of Trostyanets' (ray. Kanev).³³ These are also multi-coil ornaments, whose bands were made from two or three bronze wires; however, their terminals are somewhat different. The main difference consists in the form of the base of the bar-shaped terminal. In this group, the terminal's base is angular. Additionally, only in the case of one artefact the coils' diameter decreases toward

the top, while the coils of the remaining necklaces are of even diameters. Furthermore, the form of the bar-shaped terminals of the Kievan variant also differs from that of typical *Totenkron*e examples: they are shorter, rectangular (the pieces from Ostriv, the vicinity of Trostyanets' and Kiev), trapezoid (the piece from the vicinity of Kanev), or resemble a fishtail (the other piece from Ostriv). The terminals are ornamented with punched dots, incisions and geometric decorations. All these artefacts, except for the find from Kiev, were also equipped with an opening. This trait, in turn, is exceptional among Pruthenian artefacts (only one find of this kind is known from Szurpiły – Fig. 12: 2). In this group, it is only in the case of the necklace from the vicinity of Kanev that both terminals survived. The other terminal is not oval (as in the case of *Totenkron*e necklaces), but loop-shaped. A stylistic affinity of the necklaces from Ukraine and the classic *Totenkron*e artefacts is beyond doubt. On the other hand, there are notable differences, which have already been stressed by Ukrainian researchers.³⁴ These differences do not allow for the Ukrainian finds to be classified into one type.

It is very possible that pieces of a Kievan-variant necklace were found at the cemetery in Nendriniai (raj. Marijampolė),³⁵ where many horse graves, four human graves and a considerable number of stray finds were excavated. Based on the artefacts, the site can be dated to the Migration Period and the Early Middle Ages (ca. 10th–11th century). One of the stray finds is a fragment of a bar-shaped necklace terminal with an angular base (Fig. 13: 1). Another object from Nendriniai is a coupler (Fig. 13: 2), similar to couplers on the Kievan-variant necklaces from Ostriv, Kiev and from the unknown locality as well as to the coupler on the band fragment from Żytkiejmy (Gołdap District), which is the only currently known coupler on a classic *Totenkron*e necklace.³⁶ Although the object from Nendriniai is slightly melted, a characteristic cylinder with bronze wires inside can be recognized.

On the map depicting the spatial distribution of the discussed ornaments there is a clear concentration between the Great Masurian Lakes and the Neman (Fig. 14: 2, 3, 5, 7, 19, 21, 25). According to the

²⁵ Cf. Voluev 1999, 398; Bogucki 2001, 35.

²⁶ Bogucki 2001, 37.

²⁷ Wadył 2020, 184, pl. 1e.

²⁸ Antoniewicz 1958, 153.

²⁹ Bogucki 2001, 37; Engel 2020, 167.

³⁰ Antoniewicz 1955, 259, note 112; Rajewski 1937, 32.

³¹ Blume 1909, 125–126.

³² In earlier literature one of the Kiev finds (published with an image) was classified into the Pruthenian *Totenkron*e type, in spite of stylistic differences (Antoniewicz 1958, 153; Bogucki 2001, 38).

³³ Sluchaynyya nakhodki i priobreteniya 1909, 124–125, fig. 177; Rybakov 1948, fig. 87; Baranov, Ivakin 2020, fig. 18: 1; Osypenko, Hrytsyk 2020; Dyachenko 2021, 65, fig. 3: 1, 2.

³⁴ Osypenko, Hrytsyk 2020, 345.

³⁵ The site was only curly mentioned in literature (Merkevičius 1968). The finds are kept in the National Museum of Lithuania.

³⁶ Karger 1958, 397, fig. 90; Engel 2020, 324, fig. 150; Osypenko, Hrytsyk 2020, 342, fig. 1: 2b, 2d, 343, fig. 1b, 2a, 3a; Dyachenko 2021, 66, figs 3: 1, 2.



Fig. 13. Two pieces of the Kievan-variant necklace from Nendriniai (image by L. Jończyk).

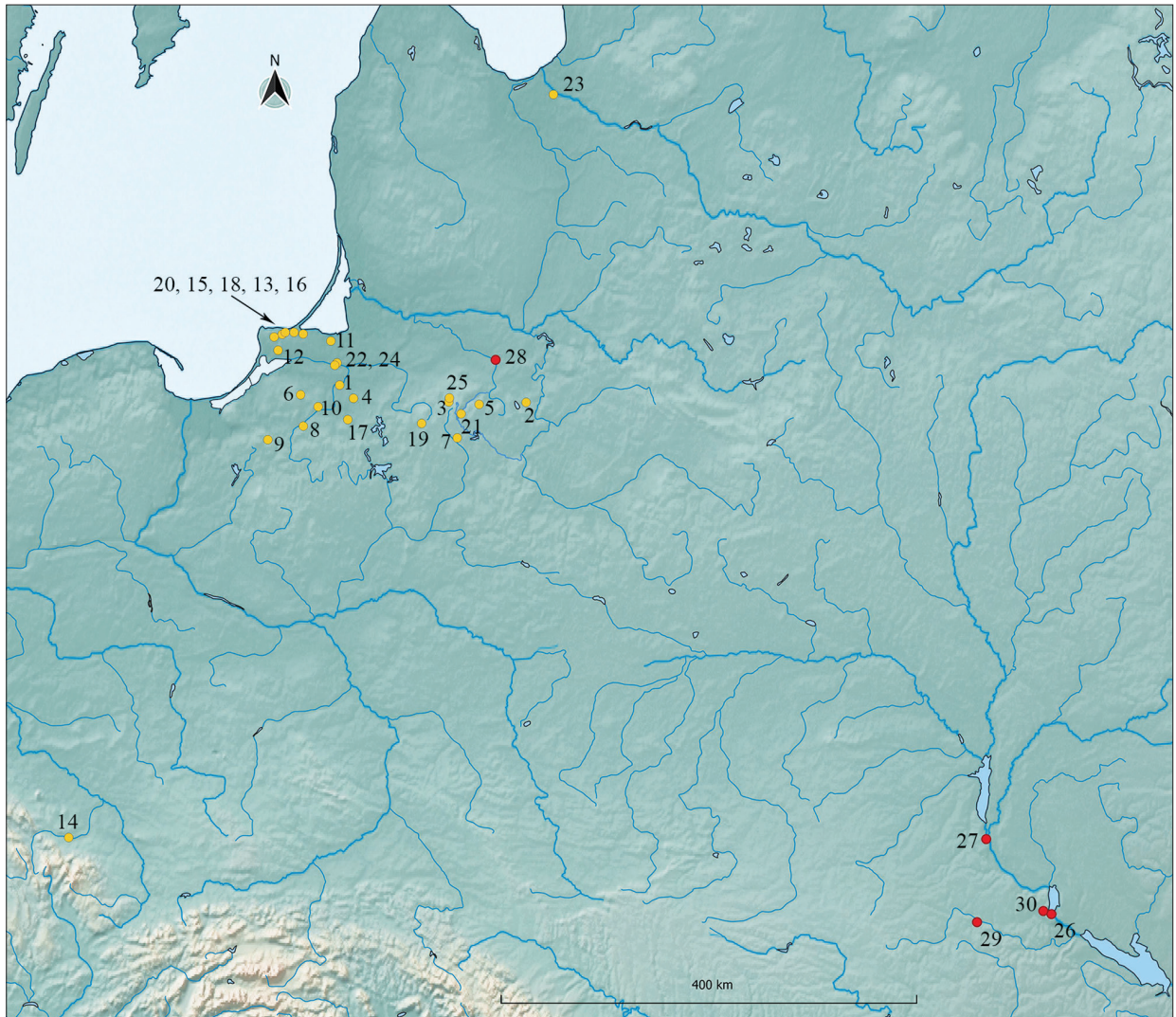


Fig. 14. Distribution of *Totenkrone*-type (yellow dots) and Kievan-variant necklaces (red dots): 1 – Auglitten, 2 – Cigoniškiai, 3 – Dagucie, 4 – Gerdauen, 5 – Jegliniec, 6 – Klein Dexen, 7 – Krukówek, 8 – Lidzbark Warmiński, 9 – Liebstadt, 10 – Liekeim, 11 – Löbertshof, 12 – Medenau, 13 – Mülsen, 14 – Otmuchów, 15 – Pobethen, 16 – Powunden, 17 – Równina Dolna, 18 – Sorthenen, 19 – Stacze, 20 – Syndau, 21 – Szurpily, 22 – Tapiau, 23 – Vampenieši, 24 – Zohpen, 25 – Żytkiejmy, 26 – Kaniów, 27 – Kiev, 28 – Nendriniai, 29 – Ostriv, 30 – Trostyanets’ (image by L. Jończyk).

historical sources, in 13th century these lands were inhabited by the Yatvings. In this area *Totenkrone* is the only type of necklaces known from the Early Middle Ages. To the west of this territory, these ornaments are also popular at Sambian sites and along the Łyna, but they are not the only necklace type there. Individual finds from distant regions (Otmuchów and Vampenieši, Fig. 14: 14, 23) should be considered imports from the Pruthenian lands. Necklaces of the Kievan variant form a compact group, both with regard to stylistic traits and spatial distribution – with the one exception in Nendriniai (Fig. 14: 26–30).

Despite the numerous finds of the discussed necklaces, it is difficult to draw conclusions concerning their purpose and chronology. This is due to the fact that the majority of the artefacts are stray finds. Concerning artefacts from presently known grave contexts, such finds were discovered only in Zohpen, in three burials in Równina Dolna, in the course of examinations led by Romuald Odoj (two stray finds are known from pre-WWII works), and at Vampenieši II. Although grave assemblages from Gerdauen were also discovered to feature similar necklaces, the author describing them uses a general term 'Broncespiralring' and gives the number of coils, while omitting the crucial description of terminals.³⁷ We know that among the finds from Gerdauen there were *Totenkrone*-type necklaces as well as those which ended with loops,³⁸ since artefacts of both types have survived in the Prussia Sammlung.³⁹ The number of the necklaces found in Gerdauen was very high: 17 were unearthed in graves,⁴⁰ and at least 14 found their way to the Prussia Museum as stray finds, not to mention other necklaces that survived in fragments.⁴¹ Harri Moora said that 14 necklaces from Gerdauen belonged to the *Totenkrone* type; regrettably, we do not know which of the aforementioned ones were meant.

A woman with a *Totenkrone*-type necklace, an ornamental iron sheet, a ring and a bracelet was buried in grave 158 in Zohpen.⁴² On the basis of observations made by Artur Hennig, it is possible to assume that the necklaces (of both types) found at Gerdauen were in all probability also parts of women's furnishings. On the other hand, it cannot be excluded that men wearing such necklaces were likewise buried there in individual cases.

This conclusion was drawn on the basis of co-occurring finds, as in none of the three possible men's graves the skeletons were preserved well enough to render sex assessment possible.⁴³ This observation is confirmed by burials from Równina Dolna. In this case, a necklace in grave 29 occurred together with a necklace of glass beads, two rings, a horseshoe-shaped fibula with figure-eight terminals, a knife and two bracteates. In grave 65 such a necklace was found with an earring, a ring and a horseshoe-shaped fibula with figure-eight terminals.⁴⁴ On the basis of their furnishings, these burials can also be considered women's. The furnishings of burial 43, where, apart from a necklace, a horseshoe-shaped fibula with figure-eight terminals and remains of at least two bracteates were found, are not unambiguous.⁴⁵ However, the presence of the fibula of the same kind as in the two aforementioned graves seems to confirm an assumption of a female attribution of *Totenkrone*-type necklaces. A woman was in all probability also interred in grave 57 at Vampenieši II.

A necklace from Liekeim was perhaps found in a man's grave. This artefact was handed to the collection of the Prussia Gesellschaft in Königsberg in late 1876 as a gift from a landowner Steppuhn.⁴⁶ In the spring of 1877, the same donor granted a sword to the Gesellschaft, claiming that it had been discovered 'in the immediate vicinity' of a skeleton on whose neck the aforementioned necklace had been found.⁴⁷ On this basis, it is not possible to conclude that we are dealing with one and the same grave assemblage. However, such a possibility can be taken into consideration.

The scant data on find contexts of *Totenkrone*-type necklaces is also a serious impediment in establishing their chronology. The earliest known find was discovered in the destroyed grave 57 at Vampenieši II. Apart from the necklace, it only contained a pendant-chain holder. On the basis of the latter find the assemblage was dated to the second half of the 11th or the 12th century.⁴⁸ Necklace fragments from the stronghold in Jegliniec were found in an assemblage of bronze ornaments from the 12th century.⁴⁹ Graves 29 and 43 from Równina Dolna are reliable markers, as they contained bracteates that were minted from ca. 1290 to 1410.⁵⁰ Coins from the years 1352–1413 were also found at Gerdauen.⁵¹ Together with all other

³⁷ Hennig 1879, 308–313.

³⁸ Hennig 1879, 315.

³⁹ Pr 12863–12865, 12933, 12934, 12937, 12960, 12969, 12971, 21126, 21227.

⁴⁰ Hennig 1879, 315.

⁴¹ Steffenhagen 1867, 88; Bujack 1877c, 647; 1889, 284–285; 1891a, 19; 1891b, 4.

⁴² Heym 1938, 110.

⁴³ Hennig 1879, 315–316.

⁴⁴ Odoj 1958, 129, 140.

⁴⁵ Odoj 1958, 134.

⁴⁶ Bujack 1877a, 186.

⁴⁷ Bujack 1877b, 499.

⁴⁸ Spīrgis 2008, 277.

⁴⁹ Engel 2020, 167.

⁵⁰ Gupieniec 1958, 157–159; Bogucki 2001, 35.

⁵¹ Bogucki 2001, 36.

finds that were acquired there, this defines the chronology of the site as the 14th century. The case of Zohpen is analogous, as the group of inhumation graves, including grave 158 with the *Totenkron*-type necklace, was dated to the 14th century ('Stufe I') on the basis of bracteates that were found in one of these graves.⁵² A similar chronology ('Ordenszeit') was proposed by Harri Moora for the necklaces he discussed.⁵³

It is possible that the chronology of necklaces of the Kievan variant is earlier, although this group does not contain too many reliable markers, either. The only premise allowing one to define the period of their use are the necklaces from Ostriv. Even though they were not dated in a precise manner, in their case it is possible to rely on a relatively narrow chronology of the site, which is dated to the first half of the 11th century.⁵⁴ This could putatively imply that it is in Rus' that prototypes of necklaces of this kind should be searched for. However, such an assumption is disproved by the necklaces' stylistic traits, which are very typical of Balts and Baltic Finno-Ugrians. In fact, these traits were so radically alien to Slavs that the necklace from Kiev, which was the earliest discovery of this variant, was initially believed to be a semi-product that was prepared by the goldsmith for the purpose of manufacture of 'normal' necklaces.⁵⁵ The finds from Nendriniai can also be dated to a similar period (ca. 10th–11th centuries).

This notable chronological discrepancy is in all probability due to reasons other than a difference in the period when the necklaces were used. In the light of the most recent state of research, the highest number of *Totenkron*-type necklaces are known from the territory between the Great Masurian Lakes and the Neman. As mentioned above, they are the only type of necklaces in this area. In cemeteries that have been examined in the recent years (Mosiężysko, Krukówek) they are a dominant category of finds, although we find their fragments only, due to the local funeral rites. What is more, it is difficult to isolate grave assemblages here and part of these finds can be only generally dated on the basis of the general chronology of the site. These finds are still being processed and there are no summarizing observations. The chronology of Mosiężysko is defined as the 12th–13th centuries, while Krukówek is dated to the 10th–13th centuries.⁵⁶ The same applies to pre-WWII discoveries (Degucie, Żytkiejmy and Stacze, mentioned as: Dagutschen, Szittkehmen and Staatzen by Harri Moora), which can be only generally dated to the period between the 11th and 13th centuries on the basis of all finds that are known from these sites. Therefore, it cannot be

excluded that the finds in question were in use in this region as early as in the 11th century. What prevents us from indicating the moment of their appearance is the local funeral rite and the resulting state of research. This problem disappeared after the Pruthenian lands were conquered by the Teutonic Order and the Pruthenians adopted inhumation burial rites. After this change took place, necklaces commenced to be deposited intact and in compact assemblages. Therefore, the highest number of finds with known context and easily identifiable chronology actually come from the 14th century.

On the basis of this scant data it is possible to carefully propose that the shape of necklace terminals was a trait that was subject to changes over time. The earliest artefacts are equipped with rectangular or trapezoid terminals (Vampenieši II and the representatives of the Kievan variant), while the latest ones are acutely chamfered (Równina Dolna). There is no data that would allow for even an approximate establishment of the chronology of tongue-shaped terminals. It can only be supposed that these were in vogue in the period between the remaining two types.

It is remarkable that such necklaces are most often found in fragments. In the case of cremation cemeteries this can be explained by the funeral rites that were in use. However, a similar phenomenon was also observed in inhumation graves. What can be found there are entire necklaces, but also incomplete ones, with one terminal having been cut off. In graves 29 and 43 at Równina Dolna there were two necklaces without bar-shaped terminals. The first one survived in the form of seven coils and the upper terminal was broken off. The other one was composed of merely three coils, and one of the band ends was broken off and filed off smooth.⁵⁷ The same concerns the necklace from Lidzbark Warmiński, on which the broken end is also filed off smooth. This procedure may imply a further use of the necklace after it was divided. Analogously, among the surviving necklaces from Gerdaun there were four entirely preserved and five that survived partially, not to mention numerous smaller band fragments. Different numbers of necklace coils prevent us from determining how large the missing parts of these ornaments are. It cannot be said, either, whether it was only the terminal that was cut off or whether it also applied to the adjoining parts of the band. The fact that fragments of *Totenkron* necklaces, be it terminals alone or bands, are often found in settlement contexts implies that the latter possibility is more probable. It is difficult to define the aim of such actions. On the other

⁵² Heym 1938, 110–112.

⁵³ Moora 1939, 234.

⁵⁴ Dyachenko 2021, 60.

⁵⁵ Rybakov 1948, 331; Karger 1958, 396.

⁵⁶ Engel, Siemaszko 2019, 307.

⁵⁷ Odoj 1958, 129, 134.

hand, as was already mentioned above, part of necklaces bear traits of joining separate bands with the use of characteristic couplers. It is impossible now to determine whether this was a way to repair an accidentally damaged ornament or perhaps a part that had been previously cut off for some reason was fastened again. The considerable frequency of these items' fragmentary survival has long puzzled researchers. It was actually the first discoverers of such ornaments that paid attention to numerous finds of fragments of such necklaces and tried to explain the phenomenon of fragmentation.⁵⁸

The discussed necklaces were elite ornaments, which is demonstrated by the sheer value of the raw material, although they were attributes of the upper middle class (using modern terminology) rather than of aristocracy. As many other luxurious artefacts, they were very impractical. Experiments have confirmed the intuitive opinions that an ornament of this type rendered daily activities, and even the simplest actions, quite difficult. What was, then, the basic role of such necklaces? There is no doubt that they were markers of prestige and wealth. Today, it is difficult to say in what circumstances they were worn, apart from being deposited into graves. The fact that subsequent parts were being cut off may imply that they were considered some sort of capital. Similar

practices are mentioned in the narrative by Aḥmad ibn Faḍlān ibn al-‘Abbās ibn Rāšid ibn Ḥammād, who discussed customs of the Rus' population related to jewellery of similar kind:

Around their necks they [women – L.J., K.Ż.] wear bands of gold and silver. Whenever a man's wealth reaches ten thousand dirhams, he has a band made for his wife; if it reaches twenty thousand dirhams, he has two bands made for her – for every ten thousand more, he gives another band to his wife. Sometimes one woman may wear many bands around her neck.⁵⁹

This observation made by the Arab traveller comes from the 10th century. No *Totenkrone*-type necklaces are known from that time, and in the light of the available data such ornaments may have appeared about a hundred years thereafter. However, the very idea that jewellery in the Early Middle Ages may have been used for wealth storing seems very probable. On the other hand, further in-depth research is needed to unequivocally demonstrate that the Pruthenians perceived their remarkable multi-coil necklaces in the same manner. This research must be combined with complex statistical processing of the discussed finds, especially those discovered in settlements.

Bibliography:

- Anteins A. 1960 Dzelzs un tērauda izstrādājumu struktūras īpašības un izgatavošanas tehnoloģija senajā Latvijā (līdz 13 gs.), *Archeoloģija un etnogrāfija* 2, 3–60.
- Antoniewicz J. 1955 Niektóre dowody kontaktów słowiańsko-pruskich w okresie wczesnośredniowiecznym w świetle źródeł archeologicznych, *Wiadomości Archeologiczne* 22, 233–277.
- Antoniewicz J. 1958 Prusowie we wczesnym średniowieczu i zarys ich kultury materialnej. (in:) G. Labuda (ed.), *Pomorze Średniowieczne*, Warszawa, 121–159.
- Baranov V.I., Ivakin V.H. 2020 Pokhovał'ni kompleksi zi zbroyeyu mohyl'nyka Ostriv (za materialamy arkeolohichnykh doslidzhen' 2017–2019 rr.), *Arkeolohiya i davnya istoriya Ukrainy* 35, 300–320.
- Blume E. 1909 *Ausstellung im Kaiser Friedrich-Museum Vor- und Frühgeschichtliche Altertümer aus dem Gebiet der Provinz Posen*, Posen.
- Bogucki M. 2001 Średniowieczne naszyjniki pruskie typu „Totenkrona”, (in:) W. Nowakowski, A. Szela (eds), *Officina archaeologica optima. Studia ofiarowane Jerzemu Okuliczowi-Kozarynowi w siedemdziesiątą rocznicę urodzin*, Warszawa, 35–40.
- Bokiniec E., Uziębło R. 1999 Zabytki z okresów wpływów rzymskich i średniowiecza z ziem pruskich w zbiorach Oddziału Archeologii Muzeum Okręgowego w Toruniu, (in:) M. Hoffmann, J. Sobieraj (eds), *Archeologia ziem pruskich. Nieznane zbiory i materiały archiwalne*, Olsztyn, 213–223.
- Bujack G. 1877a Alterthumsgesellschaft Prussia, *Altpreußische Monatsschrift* 14, 176–187.
- Bujack G. 1877b Alterthumsgesellschaft Prussia, *Altpreußische Monatsschrift* 14, 488–499.
- Bujack G. 1877c Sitzungsbericht der Altertumsgesellschaft Prussia, *Altpreußische Monatsschrift* 14, 640–650.

⁵⁸ Helwing 1717, 91–92.

⁵⁹ Montgomery 2000, 6–7 (for a Polish translation, see Kmietowicz *et al.* 1985, 110).

- Bujack G. 1889 Accessionen des Prussia-Museums pro 1888, *Prussia* 14, 260–299.
- Bujack G. 1891a Accessionen des Prussia-Museums pro 1890, *Prussia* 16, 8–40.
- Bujack G. 1891b Jahresbericht pro 1890, *Prussia* 16, 1–7.
- Dyachenko D.H. 2021 Balts'ka zoomorfna bronzova plastyka v pokhovaľnyy obryadovosti mohyl'nyka Ostriv, (in:) *Materialy Naukovoyi arkeolohichnoyi onlyayn-konferentsiyi 'Vid yazychnistva do khristiyanstva: relihijni viruvannya rann'oseredn'ovichnoho naseleenny Seredn'oho Podniprov'ya' (Vyshhorod, 21 hrudnya 2020 r.)*, Vyshhorod–Kyiv, 60–67.
- Dobrzański L.A. 2008 *Metaloznawstwo opisowe stopów metali nieżelaznych*, Gliwice.
- Engel M. 2020 *Jaćwieskie ośrodki grodowe*, Warszawa.
- Engel M., Siemaszko J. 2019 Jaćwieskie cmentarzysko ciałopalne w Krukówku, pow. suwalski. Okoliczności odkrycia i opis znalezisk, *Studia Archaeologica Sudauica* 2, 299–309.
- Gupieniec A. 1958 Monety znalezione na cmentarzysku średniowiecznym w miejscowości Równina Dolna, pow. Kętrzyn, *Rocznik Olsztyński* 1, 157–170.
- Heindel I. 1993 Werkzeuge zur Metallbearbeitung des 7./8. bis 12./13. Jahrhunderts zwischen Elbe/Saale und Bug, *Zeitschrift für Archäologie* 27, 337–379.
- Helwing G.A. 1717 *Lithographia Angerburgica*, Königsberg.
- Hennig A. 1879 Das Gräberfeld bei Gerdaunen, Vortrag gehalten in einer Sitzung der Alterthumsgesellschaft Prussia, *Zeitschrift für Ethnologie* 11, 303–323.
- Heym H. 1938 *Das Gräberfeld Zohpen*, PhD dissertation, Archaeological Museum in Poznań Library.
- Jończyk L. 2015 W królestwie Pikula. Z badań nad obrzędkiem pogrzebowym wczesnośredniowiecznej Jaćwieży, (in:) S. Wadył, M. Karczewski, M. Hoffmann (eds), *Materiały do Archeologii Warmii i Mazur* 1, Warszawa–Białystok, 235–244.
- Jończyk L. 2022 *Mosiężysko. Wczesnośredniowieczne stanowisko w Szurpiałach, woj. podlaskie. Źródła, analizy, interpretacje*, PhD dissertation, Faculty of Archaeology Library, University of Warsaw.
- Jończyk L., Gołębiowska-Tobiasz A. 2021 *Zbrojni kupcy z Szurpiał. Na szlaku ze Skandynawii do Bułgarii Nadwożańskiej*, Warszawa.
- Jopkiewicz M., Kubica J. 1982 *Metale szlachetne. Towaroznawstwo*, Warszawa.
- Karger M.K. 1958 *Drevniy Kiyev*, Moskva–Leningrad.
- Kmietowicz A., Kmietowicz F., Lewicki T. 1985 *Źródła arabskie do dziejów Słowiańszczyzny* 3, Wrocław.
- Merkevičius A. 1968 Raskopki mogil'nika v der. Nyandrinyai (Kapsukskiy r-n), *Archeologiniai tyrinėjimai Lietuvoje 1966-1967 m.*, 72–76.
- Montgomery J.E. 2000 Ibn Faḍlān and the Rūsiyyah, *Journal of Arabic and Islamic Studies* 3, 1–25.
- Moor H. 1939 Eine memalländische Halsringform in Estland, *Prussia* 33, 231–235.
- Odoj R. 1956 Sprawozdanie z prac wykopaliskowych w miejscowości Równina Dolna, pow. Kętrzyn, *Wiadomości Archeologiczne* 23, 177–196.
- Odoj R. 1958 Sprawozdanie z prac wykopaliskowych, przeprowadzonych w Równinie Dolnej, pow. Kętrzyn w 1956 i 1957 r., *Rocznik Olsztyński* 1, 117–156.
- Ohlhaver H. 1939 *Der germanische Schmied und seine Werkzeug*, Leipzig.
- Osypenko M.S., Hrytsyk Y.O. 2020 Shyyni hryvny typu 'Totenkronē' u zibranni Natsional'noho muzeyu istoriyi Ukrainy, *Arkeolohiya i davnya istoriya Ukrainy* 35, 340–348.
- Rajewski Z. 1937 Wielkopolskie cmentarzyska rządowe okresu wczesnodziejowego, *Przegląd Archeologiczny* 6, 28–85.
- Rhode J.J. 1728 Kurze Erklärung der Cronen-Ringe und anderer Preußischen Altertümer, die man in den Gräben zuweilen findet, *Erleutertes Preußen* 4, 309–312.
- Richter J. 1931 Der Bronzehelm von Ottmachau, *Altshlesien* 3, 242–244.
- Rybakov B.A. 1948 *Remeslo drevney Rusi*, Moskva.
- Sluchaynyya nakhodki i priobreteniya. 1909 *Otchet Imperatorskoy Arkheologicheskoy Komissii za 1906 god*, 117–134.

- Šnore E. 1996 Daugavas Libieši Doles salā, *Arheoloģija un etnogrāfija* 18, 111–130.
- Spirģis R. 2008, *Bruņrupuču saktas ar krūšu važiņrotām un libiešu kultūras attīstība Daugavas lejtecē 10. – 13. gadsimtā*, Rīga.
- Steffenhagen E. 1867 Alterthumsgesellschaft Prussia, *Altpreußische Monatsschrift* 4, 87–88.
- Strobin J., Żołędziowski K. 2021 *Wytwórczość metaloplastyczna z osady w Janowie Pomorskim. Wyniki specjalistycznych badań artefaktów z metali kolorowych i szlachetnych pozyskanych w sezonach badawczych 1984–1991 oraz 2000–2008*. *Studia nad Truso* 4, Elbląg.
- Tõnisson E. 1974 *Die Gauja-Liven und ihre materielle Kultur (11. Jh. – Anfang 13. Jhs.)*, Tallinn.
- Voluev A. 1999 Alt-Wehlau – „pogańskie” cmentarzysko na obszarze chrześcijańskich Prus, w świetle badań archeologicznych, (in:) M. Hoffmann, J. Sobieraj (eds), *Archeologia ziem pruskich. Nieznane zbiory i materiały archiwalne*, Olsztyn, 397–400.
- Wadył S. 2020 Wallewona Finally Found? The Stronghold in Porębek in Light of the Latest Excavations, (in:) A. Dobrosielska, A. Pluskowski, S. Szczepański (eds), *Homini, qui in honore fuit. Księga pamiątkowa poświęcona śp. Profesorowi Grzegorzowi Białuńskiemu*, Olsztyn, 165–192.
- Whitfield N. 1990 Round Wire in the Early Middle Ages, *Jewellery Studies* 4, 13–28.
- Žemantauskaitė M., Fediajevas O. 2018 Žvalgymai Cigoniškiuose, *Archeologiniai tyrinėjimai Lietuvoje 2017 m.*, 591–597.
- Zemītis G. 2015 *Baltic and Baltic-Finnic Antiquities in the Collection of Turaida Museum Reserve. The 3rd Millennium BC – the 1st Half of 13th Century. Catalogue*, Turaida.
- Żołędziowski K. 2013 Zabytki ze stopów miedzi, srebra i cyny, (in:) J. Kalaga (ed.), *Sutiejsk. Gród pogranicza polsko-ruskiego w X–XIII w. Studium interdyscyplinarne*, Warszawa–Pętkowice, 76–83.
- Żołędziowski K. 2018 Metalurgia kolorowa Jaćwieży na tle znalezisk z rejonu Morza Bałtyckiego, (in:) S. Wadył, M. Karczewski, M. Hoffman (eds), *Materiały do archeologii Warmii i Mazur 2*, Warszawa–Białystok–Olsztyn, 213–226.
- Żołędziowski K., Miśta-Jakubowska E., Czech-Błońska R. 2021 Sokoły, złoto i alchemiczne manuskrypty, czyli rzecz o pożytkach płynących ze współpracy archeologa, konserwatora i chemika, (in:) K. Wiślocki (ed.), *Zachowanie i konserwacja zbiorów muzealnych*, Poznań–Szreniawa, 67–85.