

SPRAWOZDANIA ARCHEOLOGICZNE

INSTYTUT ARCHEOLOGII I ETNOLOGII POLSKIEJ AKADEMII NAUK

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**SPRAWOZDANIA
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INSTYTUT ARCHEOLOGII I ETNOLOGII
POLSKIEJ AKADEMII NAUK

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KRAKÓW 2019

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EDITORIAL

Sprawozdania Archeologiczne is a journal published regularly by the Kraków Branch of the Institute of Archeology and Ethnology of the Polish Academy of Sciences since 1955. For many years, important source studies were published, mainly concerning archaeological discoveries from Central Europe. From 2004 to 2018, the editor of the journal was Sławomir Kadrow. Under his leadership, *Sprawozdania Archeologiczne* began to play an even more important role in the scientific community. The decision to publish materials only in English had a positive impact on the internationalization of the publication. The authors of many articles were researchers from outside Poland. A lot of analytical and cross-sectional studies have found place in the journal. Thanks to this, *Sprawozdania Archeologiczne* have become a known and well-rated brand in the international archaeological society.

This 71th issue of the journal is dedicated to Professor Sławomir Kadrow, thanking him for the enormous contribution of work and for managing the editorial team for the last 15 years.

ARTICLES

Vitalii Rud*, Olha Zaitseva**, Robert Hofmann***,
Anna Rauba-Bukowska****, Viktor Kosakivskyi*****

UNIQUE POTTERY KILN CONSTRUCTION? THE INTERPRETATION OF MASSIVE CLAY OBJECTS FROM THE TROSTIANCHYK SITE OF THE TRYPIILLIA CULTURE

ABSTRACT

Rud V., Zaitseva O., Hofmann R., Rauba-Bukowska A., Kosakivskyi V. 2019. Unique pottery kiln construction? The interpretation of massive clay objects from the Trostianchyk site of the Trypillia culture. *Sprawozdania Archeologiczne* 71, 11-39.

The article considers the characteristics of truncated-pyramidal and discal type clay objects that were found in pit 1 at the Trostianchyk site (Vinnytsia oblast, Ukraine) of BII Trypillia stage. The context, location and chronology of these artifacts are characterized. On the basis of ethnographic evidence, the interpretation of the clay objects as movable constructive elements of a pottery kiln is given. We assume that such kilns are the archaic link in the evolution of ceramic firing devices. They preceded the multi-channel kilns that have been known in Cucuteni-Trypillia Cultural Complex since the end of V millennium BC.

Keywords: Cucuteni-Trypillia Cultural Complex, Ukraine, Trypillia BII, massive clay objects, pottery kiln
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1. INTRODUCTION

Ten years ago, a new period of studying Cucuteni-Trypillia Cultural Complex (CTCC) began. It started in 2009 with field research using modern geophysical equipment on the Prut-Dnister region (Okiul Alb, Koban etc.) and Southern Buh left bank settlements (Nebelivka) (Rassmann *et al.* 2016; Hale 2010; Chapman *et al.* 2014a). Due to successful cooperation between Ukraine, Moldova, Romania, Great Britain, Germany and Poland, geophysical plans of a large amount of CTCC settlements were acquired, and previously unknown objects were discovered that change our knowledge about different aspects of the lives of CTCC people (Chapman *et al.* 2014b; Rassmann *et al.* 2014; Dębiec *et al.* 2014; Müller and Videiko 2016; Hofmann *et al.* 2016; Rud *et al.* 2016; Țerna *et al.* 2016). One of the real breakthroughs was the discovery of previously unknown multi-channel kilns originally examined as the result of a geophysical survey at the Talianky settlement in 2013 (Kruts *et al.* 2015; Korvin-Piotrovskiy *et al.* 2016; Țerna *et al.* 2017). Further investigations have shown the existence of such kilns on the CTCC territory from the Prut River to the left bank of the Southern Buh (Videiko 2019).

In 2015, test excavations of the BII Trypillia stage were performed at the Trostianchyk settlement by the East Podillia Archaeological Expedition (EPAE) of the Institute of Archaeology (IA) of NAS of Ukraine. Three objects were examined completely and one partially. Pit 1 of trench 1 contained massive clay objects, which have no direct analogies at sites of the CTCC. They were interpreted as the remains of archaic kilns. Preliminary publication of the artifacts' context has already been made (Rud 2016). Due to cooperation between EPAE IA NASU (V. Rud) and the Graduate School "Human Development in Landscapes" of Kiel University (R. Ohlrau), geophysical survey was performed in 2016 (Rud *et al.* 2016). The Sensys MAGNETO® MX V3 system with eight inductional gradiometers FGM650/3 was used. A series of radiocarbon dates were examined from objects investigated in 2015. Magnetic examination and radiocarbon dating were provided in the frame of the CRC 1266 "Scales of Transformations" and the sub-project D1 "Population agglomerations at Tripolye-Cucuteni mega-sites".

2. SITE, MATERIALS AND METHODS

2.1. Site

2.1.1. Geographical and cultural position

The Trostianchyk settlement (48°31'44.2"N 29°20'50.8"E) is located to the west of Trostianchyk village in Trostianets Raion, Vinnytsia Oblast, Ukraine. It occupies the cape of the plateau, created by the bend of the Nedotica riverbed (Fig. 1-2), 3.2 km to the west

of the point where it falls into Southern Buh River. The cape is located on the left coast of the river and has a triangular form, stretched in a north-south axis. The highest northern part of the settlement is 25 m above the water level, while the lowest southern portion is 16 m above. Most of the territory is located on the flat, slightly steep surface. The height difference from the north to the south is 9 m, from the west to the east in the main part of the settlement it is no more than 4 m, but on the hills, where settlement layer is located, the decrease is more rapid.

From the west, northwest and northeast, the settlement is surrounded by a shallow valley. From the south and southeast, there are steep slopes, which go down to the valley and riverbed. As of today their incline in different parts is 30-50°. In the southeastern part of the cape there is a narrow section of the slope that is 3-25°.



Fig. 1. Magnetic plan of the Trostianchyk site superimposed on a Google satellite image. UTM coordinate system (zone 35N) and WGS 84 ellipsoid. Geophysical survey after R. Ohlrau, modified by R. Hofmann

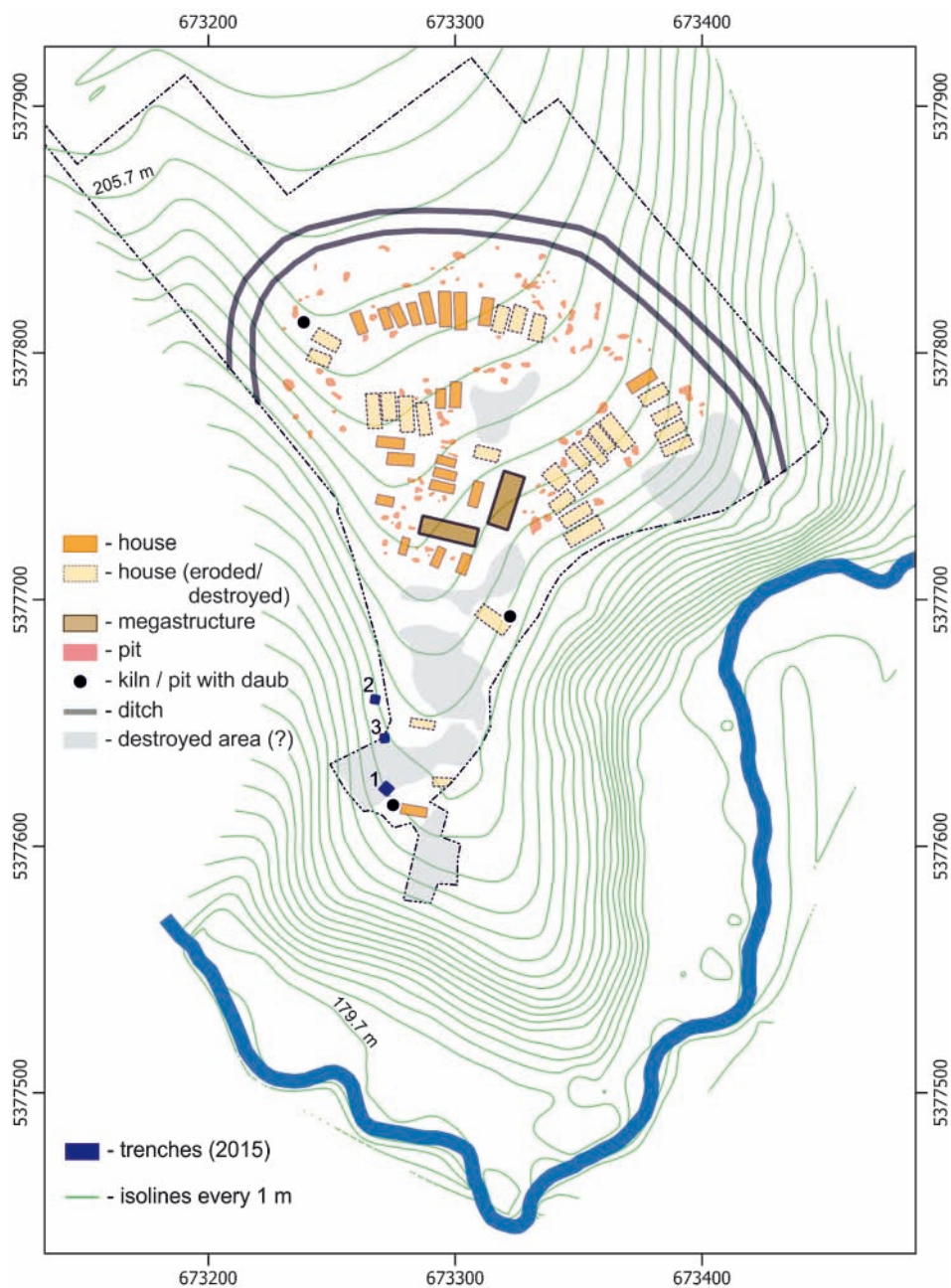


Fig. 2. Digital elevation model of the Trostianchyk site combined with interpreted magnetic features. UTM coordinate system (zone 35N) and WGS 84 ellipsoid. Elevation model after O. Manigda, magnetic features interpretation after R. Ohlrau, modified by V. Rud

2.1.2. Site structure

Magnetic survey was conducted on an area of 4.2 ha (Fig. 1). The anomalies of potential archaeological objects are located in a square of 3.0 ha. Considering the unsurveyed area on the edge of the cape, the size of the site must expand for 0.24 ha to 3.24 ha.

The magnetic anomalies (Fig. 2) of the Trostianchyk settlement were divided into the following categories:

- 24 rectangular anomalies of ruins of burnt clay houses;
- 26 rectangular anomalies of houses that were a) destroyed by slight fire, b) have another type of construction or c) eroded;
- 2 rectangular anomalies of unique buildings – a so-called “megastructure” (cf. Hofmann *et al.* 2019);
- 104 anomalies of pits of different shapes;
- 3 round anomalies with high magnetization, which might represent a) kilns or b) pits filled with daub;
- 2 linear anomalies of ditches, which partly outline the settlement territory.

At the northern, northwestern and northeastern parts of the Trostianchyk archaeological plan, we notice two parallel linear anomalies of presumable ditches, arranged semicircularly, which enclose the site area. The width of the anomalies amounts to 1.5–2.0 m, and the length of each is approximately 317 m. The distance between them varies at different spots from 5.8 to 7.3 m.

Four different arrangements of houses and pits are observed: 1. a long, curved row running parallel to the ditches; 2. several short rows of dwellings; 3. stand-alone houses; 4. groups of pits that are distant from the buildings.

Type 1, described above, is represented at the site by the outer semicircular row, 180 m long. It runs parallel to the ditches, outlining the site. The buildings are set with their ends to the ditches, and there is a gap in the north-eastern part of the row. The gap is 40 m long and is occupied by the anomalies of pit objects. Aside from that, numerous pits are located between the gable ends of the buildings and the inner ditch. Rarely, pits are located between the buildings or at their gable ends, pointed toward the center of the settlement.

The next approach to site planning (type 2 above) is the arrangement of buildings in small straight rows, which include 3–6 buildings. One such row (with five buildings) in the eastern part of the settlement runs radial to the outer semicircle. It surrounds the unbuilt territory (“plaza”; Ohlrau 2019) opposite to megastructure No 2. Two more short rows of three and six houses, to the west and east from megastructure No 2, are parallel to outer semicircle. Two rows, each having three buildings, run parallel to the megastructures. The pits near these rows are both located near the ends of the buildings and their sides.

The third strategy of building on the settlement territory is the arrangement of stand-alone houses, which are not parts of rows. Such houses are located near the megastructures and to the south of them. For instance, the location of the objects on the narrow,

southern part of the cape is interesting. There are only four buildings, which are very distant from each other. Near two of these buildings, anomalies were found, which probably are kilns or pits filled with daub. The geophysics research also shows a large number of anomalies that are difficult to interpret on this square of 0.5 ha. This space is marked as “damaged” (Fig. 2). At first glance, these, as well as two others in the central and eastern parts of the site, look like areas of moved (damaged, destroyed or excavated) cultural layers, especially when compared to geomagnetic plans of other settlements. As an example, on the plans of Maidanetske (Rassmann *et al.* 2014, fig. 22a), Talianky (Rassmann *et al.* 2014, fig. 9A; 12) and Petreni (Rassmann *et al.* 2016, fig. 9) the locations of excavated objects are clearly seen. In this case, it is important to say that at Trostianchyk, the excavations were conducted on an area of no less than 300 m² at the end of the 1980s (Tsvek 2006, 47). However, the exact coordinates of the excavations are unknown to us.

From the other point of view, sectors of the Trostianchyk site, which we marked as “damaged”, resemble territories with large numbers of pits of different shapes and sizes. This theory is confirmed by the excavations of 2015, conducted in the southwestern outskirts of the settlement (Fig. 2) (Rud 2016). Three pits were excavated (trenches 1, 2, 3; Fig. 2), the contents of which showed no signs of damage or destruction. However, this may only apply to those objects that were excavated. The preservation of other anomalies\ objects on “damaged” territories is unknown.

The last direction in the strategy of territory development of the settlement (type 4 above) is the placement of pit groups at a distance from the buildings. Therefore, any attempt to connect a group of pits with a particular building would fail. We find such groups on the western outskirts of the settlement, to the north of megastructure No 2, between houses of the outer semicircle, and between it and inner ditch.

The square of the building anomalies is 23.1-100.2 m². Two much larger buildings are considered as “megastructures” representing some kind of integrative architecture or assembly houses (cf. Hofmann *et al.* 2019). They are located in the central part of the settlement. The first of them, No 1 (south, 175.5 m²), is oriented along an east-northeast – west-southwest axis. Since it consists of a series of small amorphous anomalies, it might alternatively represent the remains of several normal dwellings arranged in a short row. Megastructure No 2 is located to the northeast and perpendicular to the first such structure. It is created by a clear anomaly on its entire square of 194.9 m². Part of the settlement (approximately 55 x 20 m) to the northeast of the building’s end is free from magnetic anomalies.

Three round anomalies, which we initially interpreted as kilns or pits filled with daub are located on the settlement. The first of them is located in the northwestern part of the settlement. The second is situated southeast of the central part of the site. The third is in the southern part of the site. The first and third anomalies are located at the ends of the buildings, 2.0-2.5 m away from them. The second one is close to the long north side.

Aside from the mentioned anomalies, several other objects exist that are similar in shape and size but with much lower magnetization. The presence of both kilns and pits

filled with daub makes it difficult to interpret round anomalies with high magnetization. Two similar objects were excavated in Maidanetske in 2013 (Müller and Videiko 2016, 79–86, fig. 6, 12; Müller *et al.* 2017). Pit 2 (trench 2; Fig. 2), which was completely filled with daub, was also excavated in Trostianchyk in 2015 (Rud 2016).

2.2. Materials

Only a small number of settlements of the Trypillia BII stage are known in the area of the south forest-steppe zone in the Southern Buh and Dnister interfluvium, and even less of them have been excavated so far (Rud 2018, fig. 2). Most of them are known from field-walking surveys (Rud 2018, 26–37). In Trostianchyk, excavations were conducted at the end of the 1980s (Tsvek 2006, 47). However, the results of this work were never fully published, and as of 2015, we did not know the storage location of the excavated artifacts. Therefore, to obtain material for clarifying the relative chronology of the region in the BII Trypillia stage, the site was newly examined. The survey showed that in the last decade of the Soviet era, the Trostianchyk settlement was planted with an orchard, which was uprooted several years ago. As a result of this activity, the cultural layer of the settlement is damaged; therefore, the urgency of the excavations has increased, becoming rather rescue excavations.

Pit 1 was unearthed in trench 1 (4 × 4 m), which is located in the southwestern outskirts of the settlement (Fig. 2), where the flat plateau joins the slope of an adjacent valley. The inclination of the surface at the location of the feature is 5–10°. According to the geomagnetic plan, pit 1 is situated at the edge of the area and marked as “damaged”. Three metres to the southeast of it, a rounded anomaly is located, which most likely represents a kiln or a pit filled with daub (Fig. 2).

2.3. Methods

Various arguments are decisive for the interpretation of the clay objects under examination as elements of pottery kilns. Basic criteria for the assessment of the objects in question are their shape, size, and macroscopically visible technical properties. Additionally, for two of the objects, microscopic examinations were performed by means of thin section microscopy. Sample 13 originated from the internal part of a truncated-pyramidal type object and sample 14 is a piece of a discal-type object. Furthermore, the firing temperature was estimated based on thermally induced changes in the clay matrix of the samples.

Seven pottery fragments from other objects of the Trostianchyk site (excavated in 2017) were also examined for comparison. Thin sections were used to examine the samples under a transmitted light polarising microscope. Petrographic descriptions were made, and the contents of such components as minerals and aggregates (>0.05 mm), with their mineral composition, grain sizes, and roundness parameters, were determined.

Table 1. Trostianchyk pit 1 ¹⁴C dates after Müller et al. in prep.

Sample name	Laboratory no.	¹⁴ C age (BP)	Deviation	N (%)	C (%)	col (%)	Level	Grid	Trench no.	Material	Taxon	Description	Calibration (68,2 %)	Calibration (95,4 %)
Trostianchyk 1	Poz-87488	5145	35	1,5	4,1	0,5	5 (-0,82 m)	B	1	bone	<i>Bos taurus</i>	Pit 1 filling	3991BC (55,8%) 3942BC; 3856BC (5,7%) 3844BC; 3836BC (6,7%) 3821BC	4041BC (7,7%) 4013BC; 4003BC (62,8%) 3927BC; 3877BC (24,9%) 3805BC
Trostianchyk 2	Poz-87489	5120	35	1,0	3,3	1,8	3 (-0,4-0,6 m)	A	1	bone	<i>Bos taurus</i>	Pit 1 filling	3972BC (32,5%) 3937BC; 3862BC (35,7%) 3812BC	3986BC (47,5%) 3895BC; 3881BC (47,9%) 3800BC
Trostianchyk 3	Poz-87490	5170	35	2,5	7,3	5,7	7 (-1,2-1,25 m)	A	1	bone	<i>Bos taurus</i> or <i>Equus ferus</i> (?)	Pit 1 filling	4037BC (14,6%) 4021BC; 3995BC (53,6%) 3957BC	4046BC (91,6%) 3941BC; 3856BC (3,8%) 3819BC

In addition to the consideration of the physical properties of the objects themselves, the context of the find and the composition of the assemblage within the pit were included into the investigation as independent criteria. This makes it possible to assess the depositional conditions and circumstances.

Ethnographic analogies provide information about the potential usage of the clay truncated-pyramidal objects from Trostianchyk.

The local identity of the settlement was determined on the basis of a comparison of the found pottery with the published collections of pottery from other settlements. Before that, a formal typology of vessels was made. It was based on the experience of predecessors (Ryzhov 1999; Ovchynnykov 2014, 71-96, 143-145). At the top of our classification are technological groups. We divided pottery into sub-groups on the basis of the surface decoration of the vessels. Further statistical calculations were made, taking into account the shape and ornamentation of each fragment that was reconstructed (Ryzhov 1999, 29).

From pit 1 in Trostianchyk, three bone samples from different layers were successfully radiometrically dated in the Poznań Radiocarbon Laboratory (Table 1) (Müller *et al.* in prep.). Calibration and Bayesian modelling of these dates was performed using the software OxCal v. 4.3.2 (Bronk Ramsey 2009; Reimer *et al.* 2013).

3. RESULTS

3.1. Pit 1 stratigraphy and features

Geological stratigraphy within the trench 1 (Fig. 3: 2) is as follows: down to a depth of 0.34/0.42, a layer of black and grey Chornozem is located, which covers grey and yellow loam. The loam lasts down to a depth of 1.1/1.41 m. Below, yellow loess is found.

The borders of pit 1 (Fig. 3: 1) were found at a depth of 0.3 m in the eastern part of the trench. Borders of the filling were completely visible at a depth of 0.5 m. The maximum depth of the pit from the modern surface is 1.49 m. From the Trypillia surface, the pit presumably was 1.04-1.16 m deep. It has an oval form, with dimensions of 3.70 × 2.85 m, and it is stretched along a northeast – northwest axis (Fig. 3: 1). Its section has a funnel shape (Fig. 3: 2).

The stratigraphy (Fig. 3: 2) within the pit is as follows: layer 1, 0-0.34/0.42 m – Chornozem with small pieces of burnt clay and ceramics; layer 2A, 0.34/0.42-0.63/0.74 m – dark, compact pit filling with grey shades, which includes massive clay objects, ceramic fragments, stones, animal bones, *Unio* shells, tools, fragments of burnt clay. Layer 2B, 0.63/0.74-0.97/1.16 m – dark, with grey shades, and containing more massive clay objects compared to layer 2A. Layer 3, 0.97/1.16-1.12/1.49 m – black, with a small amount of ash and clay crumbs.

After the pit was dug, it was filled with ash and clay crumbs. These materials form the lowest layer (3). Later, massive truncated-pyramidal and discal-type clay objects were

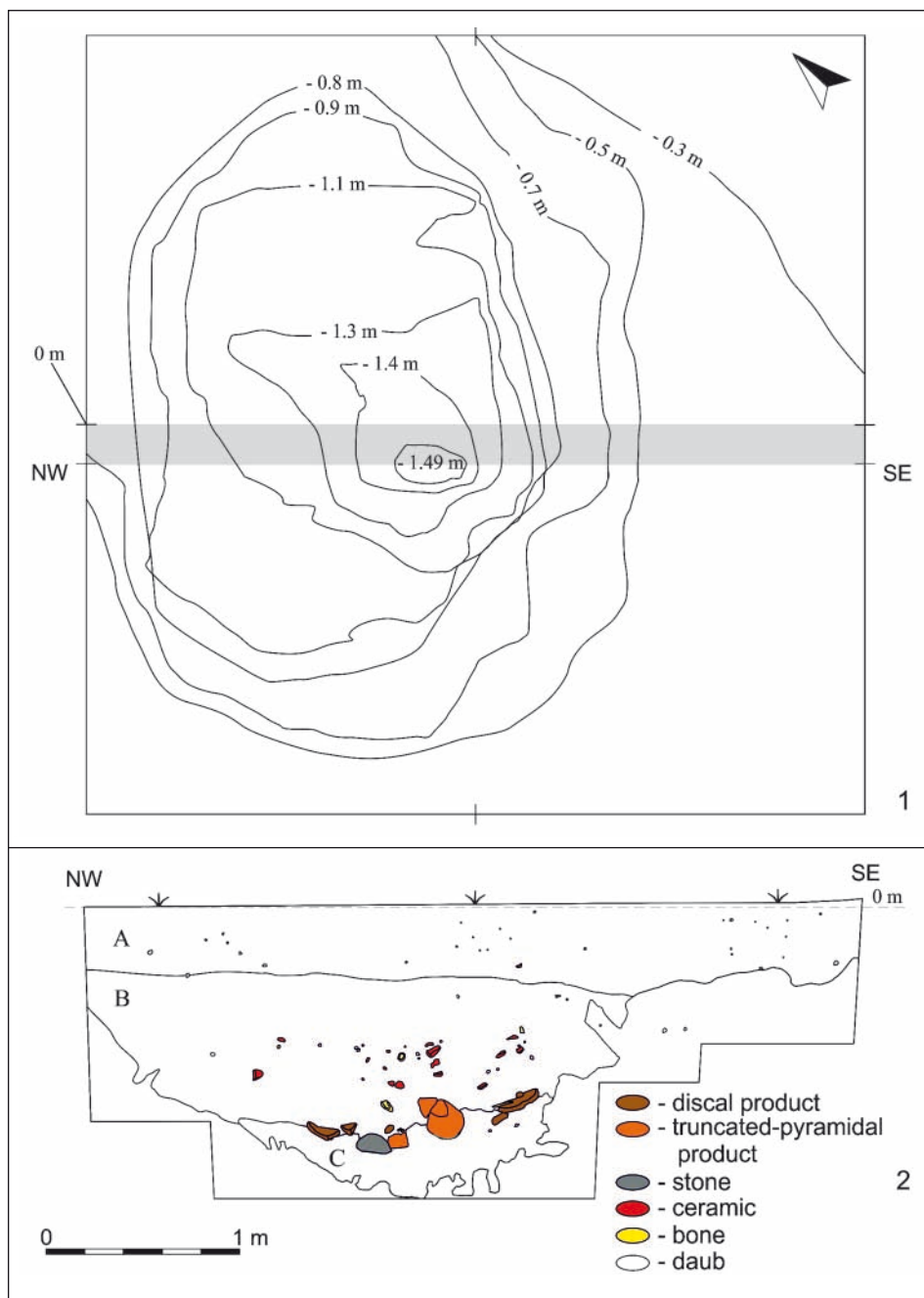


Fig. 3. Plan (1) and section (2) of pit 1 from Trostianchyk. In the section: A – layer 1; B – layers 2A and 2B; C – layer 3. Drawn by V. Rud

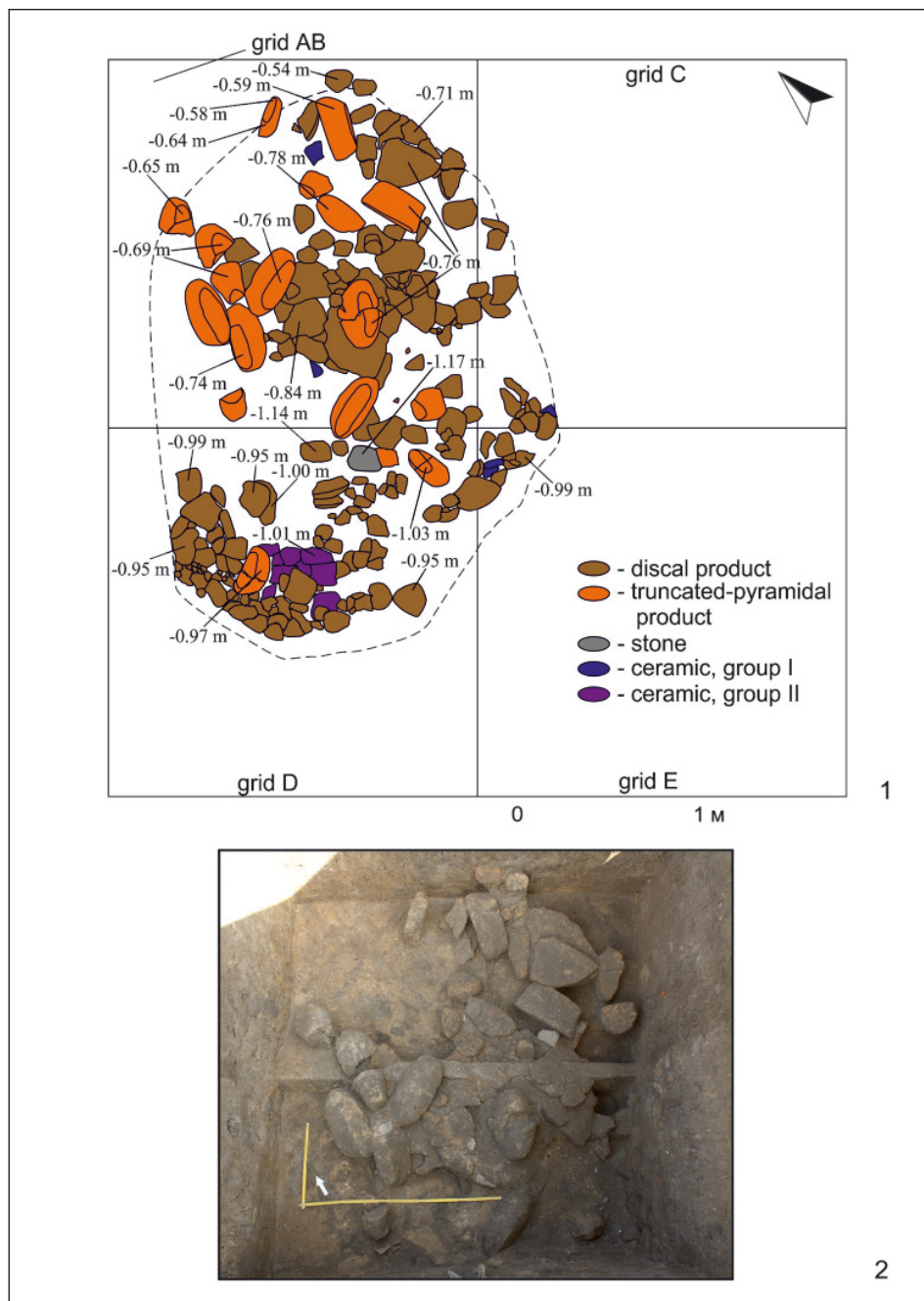


Fig. 4. Plan (1) of the fill of pit 1 at the level of massive clay objects and photo (2) of the arrangement of clay objects in square AB of pit 1 from Trostianchyk. Drawn by V. Rud

dumped, as well as a burnt piece of granite stone (layer 2B). Most of them are located at a depth of 0.7–1.15 m. On the slope walls of the pit, such objects can be found up to 0.54–0.69 m. Discal-type objects were dumped first, as truncated-pyramidal objects are above them. The concentration of the objects around the pit varies (Fig. 4). Large numbers of strongly fragmented clay disks can be seen in the western, central and eastern parts of the pit. Truncated-pyramidal objects are seen in the central and northwestern parts of the pit. In some spots, clay fragment layers are 0.3 m thick. In the western part of the pit, a fragment of a large “kitchen” pot was dumped, along with massive clay objects, found among fragments of discal-type objects. Above the massive clay objects, the pit is filled (layer 2A) with a strongly fragmented inventory, most likely domestic garbage.

3.2. Pit chronology

3.2.1. Relative chronology

The complex of pottery from pit 1 is divided into two technological groups. Group I includes so-called “table” ceramics (Fig. 5; 6) – different vessels (120 items), most of which are made of strongly silted clay and fired under oxidising conditions. Based on the surface decoration, we divide the first group into three sub-groups: the first one has painted ornaments, the second – deepened ornaments and the third includes undecorated vessels with slipware surfaces.

The pottery of group I is made of both iron-rich, reddish clay types and whitish, kaolinite ones. Most of the pottery is covered with pinkish white slipware. Some fragments are with orange engobe, which is typical for objects made of kaolinite clay.

The ornaments of the first sub-group (Fig. 5: 1, 3–12, 15–19; 6: 1–18) are painted a monochromatic dark brown (black). Only some fragments show bichromatic ornaments: the dark brown is primary and white is secondary.

We can conclude that petrographically examined vessels of sub-groups I.1 (4 items) and I.2 (1 item) were fired in oxidising conditions, in temperatures of up to ca. 800–850°C.

The pottery of sub-group I.1 is represented by eight morphological forms as well as miniature vessels (2.50%) (Fig. 5: 15). Truncated-conic bowls (12.5%) (Fig. 5: 5, 7) are decorated with comet-like (1 item) and figure-eight (11 items) schemes. Semi-spherical bowls (22.5%) (Fig. 5: 1, 3, 4, 6) also are decorated with comet-like (1 item) and figure-eight (22 items) schemes, and also with concentric circles (1 item). Small goblets (22.5%) (Fig. 5: 8–12) are painted with face-like motifs (11 items) and festoons (1 item). Big goblets (8.33%) (Fig. 5: 16–19) are painted with metopes (1 item) and face-like schemes (2 items). Craters (8.34%) (Fig. 6: 1–5) are ornamented with meander schemes (7 items), and there are also lids (1.67 %) (Fig. 6: 12), amphoras (1.67%) (Fig. 6: 14), thin-throated biconic vessels (4.17%) (Fig. 6: 6–8) and binocular-like vessels (0.83%) (Fig. 6: 17–18).

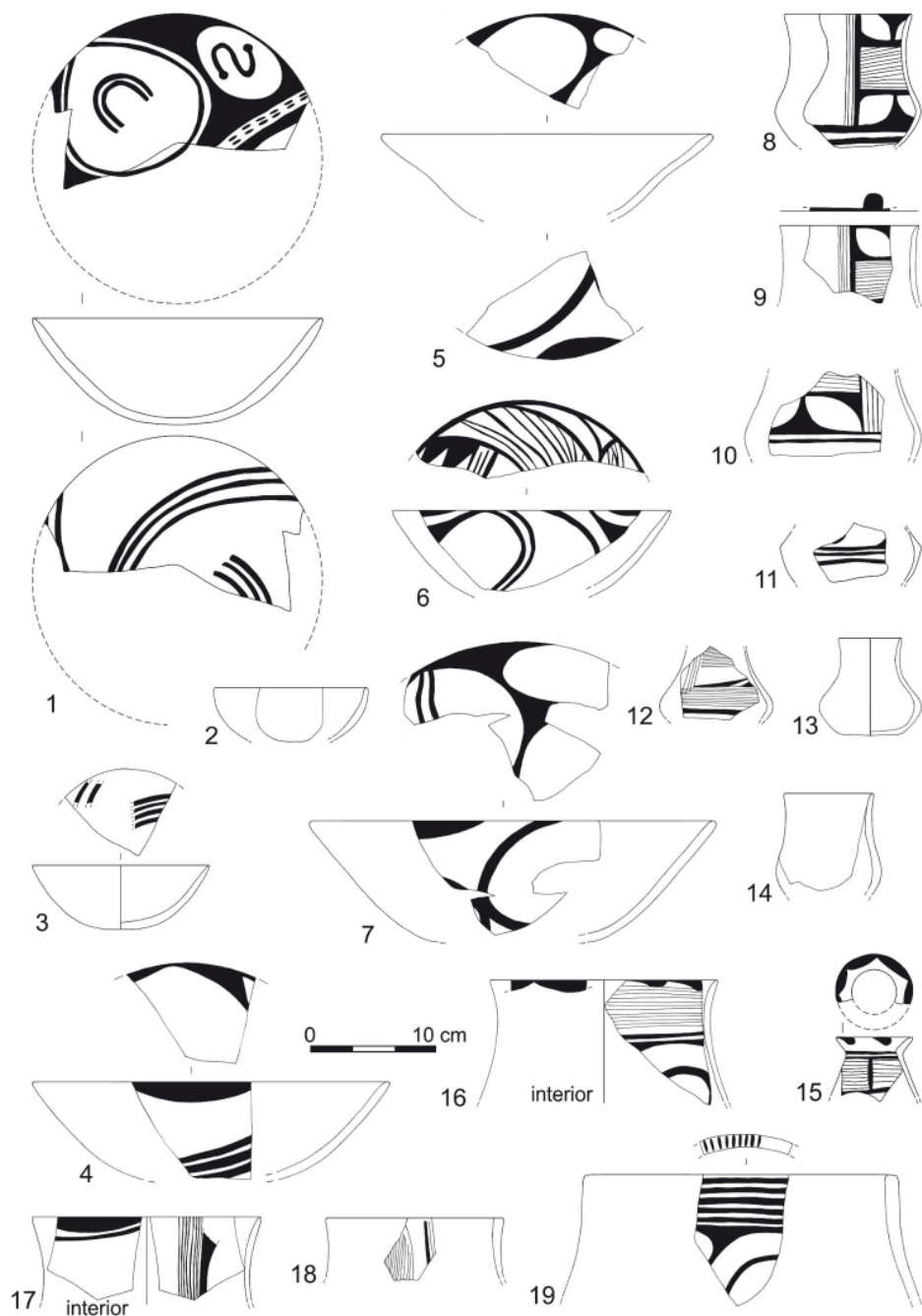


Fig. 5. Pottery of subgroups I.1 (1, 3-12, 15-19) and I.3 (2, 13, 14) from the Trostianchyk site (excavations 2015). Drawn by V. Rud and V. Kosakivskyi

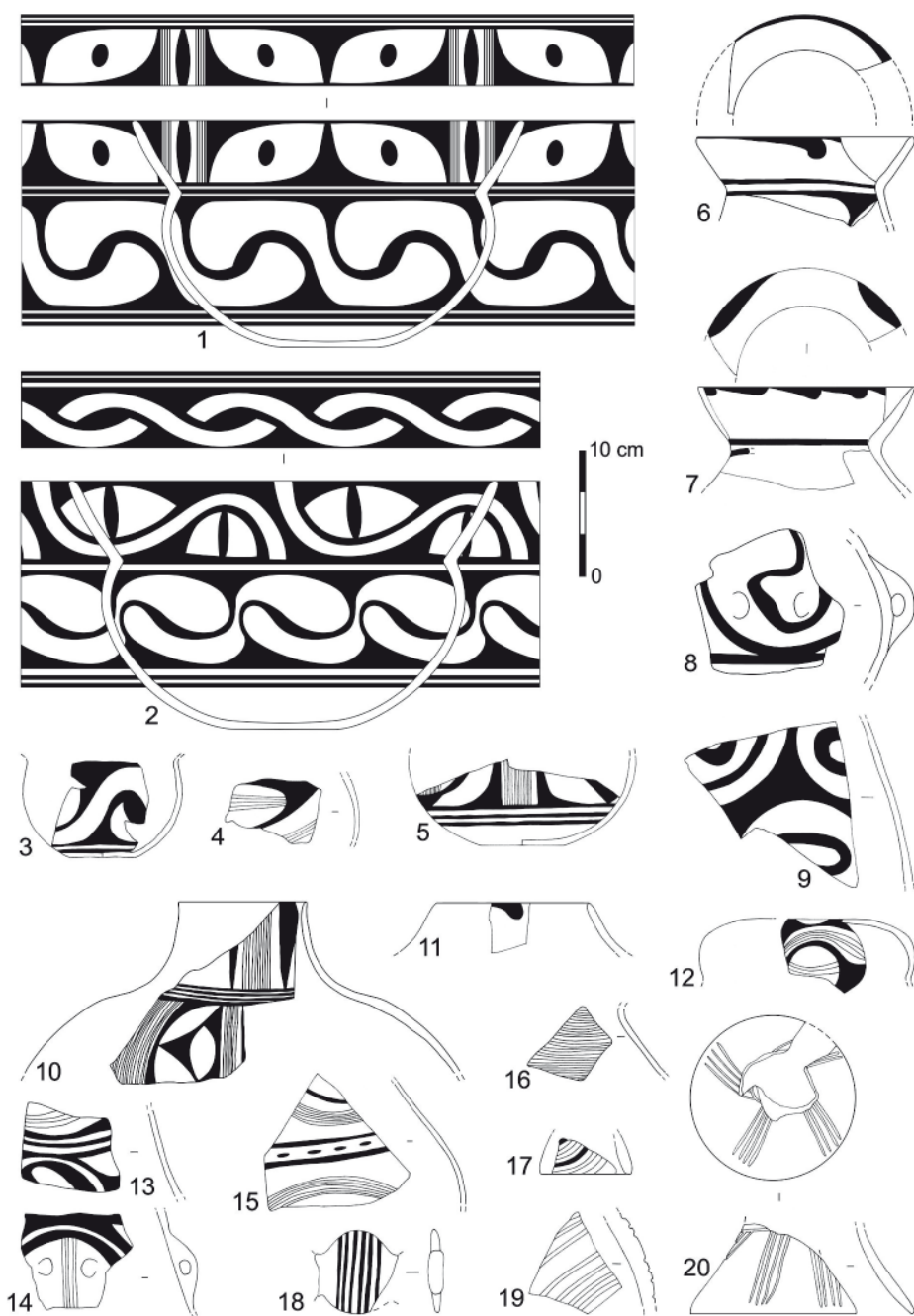


Fig. 6. Pottery of subgroups I.1 (1-18) and I.2 (19, 20) from the Trostianchyk site (excavations 2015).
 Drawn by V. Rud and V. Kosakivskyi

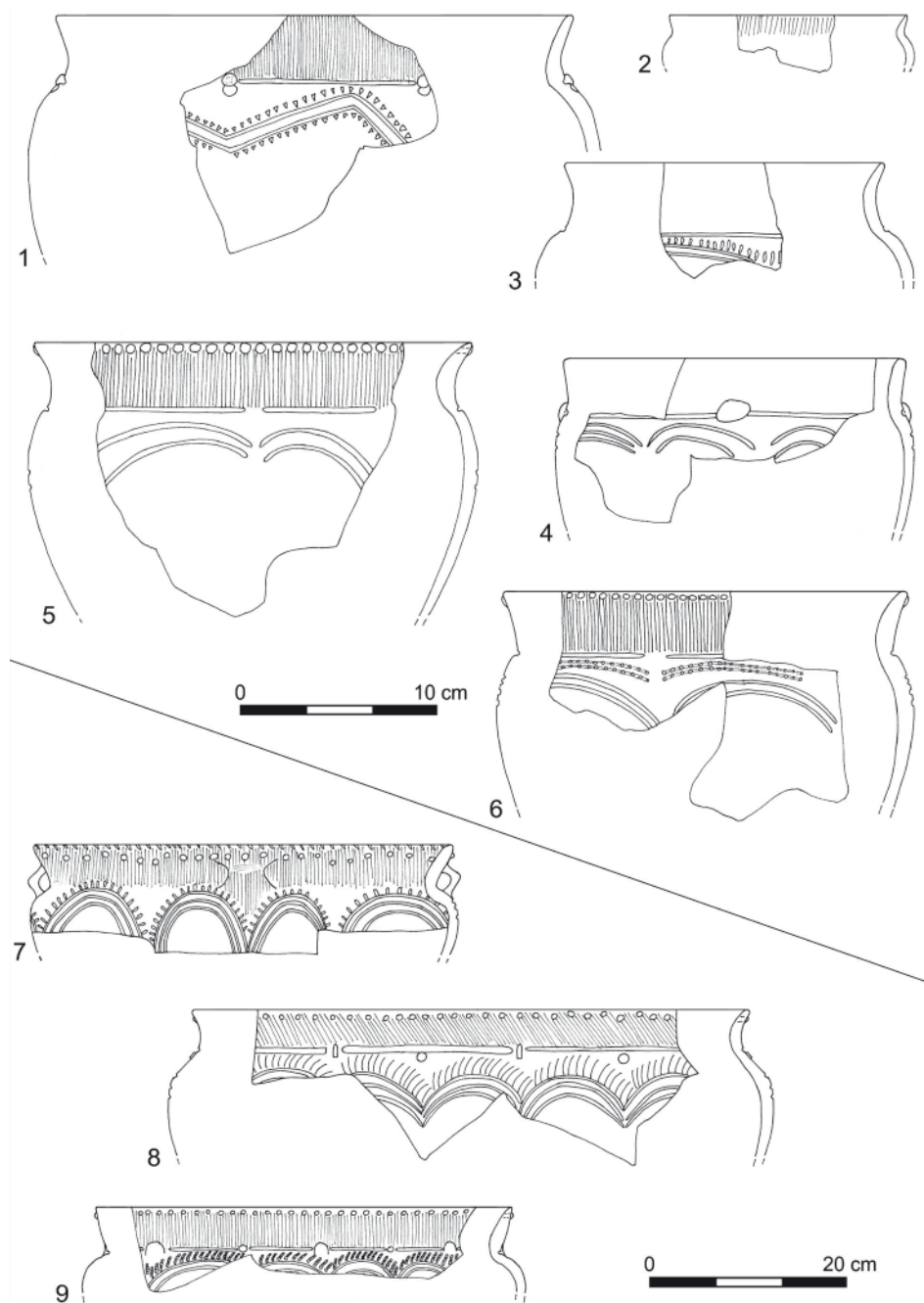


Fig. 7. Pottery of group II from the Trostianchyk site (excavations 2015).
 Drawn by V. Rud and V. Kosakivskyi

The sub-group I.2 is represented only by pear-like vessels (0.83%) (Fig. 6: 19). The pottery of sub-group I.3 has three forms: truncated-conic (8.33%) and semi-spherical (4.17%) bowls (Fig. 5: 2), small goblets (0.83%) (Fig. 5: 13-14) and craters (0.83%). The Trostianchyk site also has pear-like vessels (Fig. 6: 10-11) of sub-group I.1, as well as lids and binocular-like vessels (Fig. 6: 20) of sub-group I.2.

The pottery of technological group II includes so-called “kitchen” ceramics (30 items) (Fig. 7), which consist of vessels made of clay with a large admixture of powdered shells and sometimes rock pieces. Vessels of group II (2 items were examined) were fired under reducing conditions in the fairly low firing temperature of ca. 800°C.

This group of vessels either has relief ornaments (sub-group 1) or has non-ornamented surfaces (sub-group 2). The pottery of the group has two forms: pots (96.67%) (Fig. 7) and miniature vessels (3.33%). The settlement also has semi-spherical bowls of group II.

On the basis of the typological characteristics of the ceramic materials, we consider that the settlement belongs to the second phase of development of the Rakovets group – type Mereshovka-Chetetsuie III (by S. Ryzhov; Ryzhov 1993, 91, 92; 2003, 31-32) of the Trypillia BII stage. Such ceramic complexes are known to have a significant number of settlements in the Dnister, Prut and Southern Buh areas, among them Mereshovka-Chetetsuie III (Sorokin 1983), Brynzeni VIII (Țerna and Heghea 2017, 306-308, figs. 8, 9), Bryhydivka (Ryzhov 1993, 89-90), Berezhova – Bereh I (Korvin-Piotrovskiy and Husiev 2000, 37-39), Studenytsia – Lanok (Ryzhov 2003a), Moshanets (Tkachuk and Shevchuk 2007), Busha (Kosakivskyi and Rud 2010, 181-183, 185-188), and Voloshkove 1 and 3 (Chernovol *et al.* 2012, 35-36, figs. 1-10).

3.2.2. Absolute chronology

Three successive stages of the pit filling were dated, although the lowest infilling layer was excluded from this due to a lack of datable sample material. Sample Poz-87490 was associated with the massive clay objects in the middle-lower part of the pit at the border between layers 3 and 2B. The sample Poz-87488 is related to an event of pottery infilling in layer 2A. The sample Poz-87489 dates the upper part of layer 2A.

The modelling of these dates resulted in a very robust model with the high overall probability of 153.2. According to this model, the backfilling of the pit took place over a relatively short period between 4017–3959 and 3974–3900 BCE (68.2%), or between 4172–3947 and 3983–3721 BCE (95.4%). The highest dating probability falls in the narrow range of only 20 years between 3970 and 3950 BCE (Fig. 8).

Summarizing the results obtained from trench 1, the backfilling of pit 1 from Trostianchyk took place, with the ‘highest’ dating probability, during the first half of the 40th century BCE. Considering a more reliable dating range of 68.2% probability, a longer, 200-year use of the site from the middle of the 41st until the end of the 40th century is possible. The 2 sigma dating range falls between about 4170 and 3730 BCE.

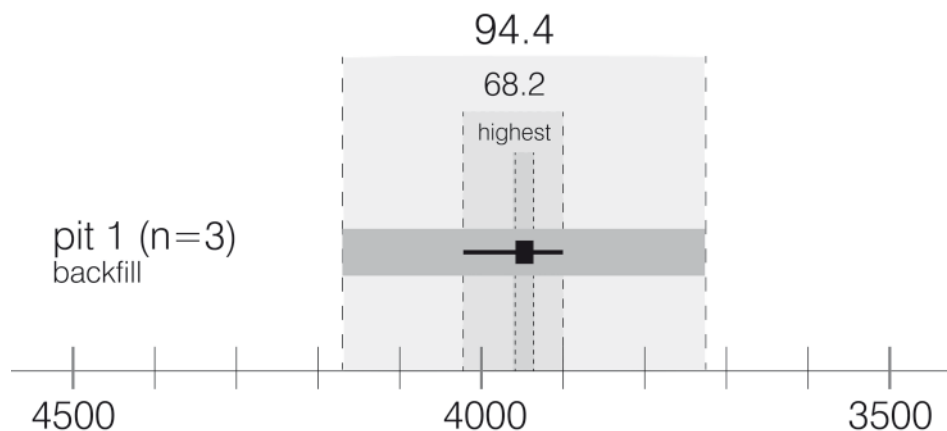


Fig. 8. Probability distributions of radiocarbon dates from pit 1 of the Trostianchyk site according to Bayesian modelling in OxCal. Drawn by R. Hofmann

Other dated contexts from Trostianchyk show, in the case of pit 2 and trench 4, similar narrow dating results falling in the first half of the 40th century (Müller *et al.* in prep.). In contrast, the highest dating probability of pit 3 and trench 6 might indicate a significantly longer dating range of the settlement between the last decades of the 41st century and about 3800 BCE. However, in the case of the latter two contexts, the quality of the models might be influenced by the fact that in each case only two 14C dates are available.

3.3. Finds

3.3.1. Massive clay objects

3.3.1.1. Truncated-pyramidal type

Truncated-pyramidal type objects found in pit 1 (Fig. 9; 10; 11: 1-7) resemble a trapezoid in cross section, and are semi-oval on the base. Outside, they are slightly flat. The base is not flat. It was formed on a non-flat surface (ground or clay base), previously covered by cereal chaff, according to a number of imprints. Most of the objects were made of one piece of clay. Three of them (No 1, 2 and 5) were formed in two stages: first, the base was modeled, and then the upper part was added. Artifact No 16 was formed in at least three stages, according to layers of clay which separate in joints.

Microscopic observation shows that the truncated-pyramidal type object and the discal-type object were produced of loess-like raw material with deliberate sand admixtures. The sand admixtures reached proportions of ca. 5-10%, with grains of ca. 0.1-0.3 mm.

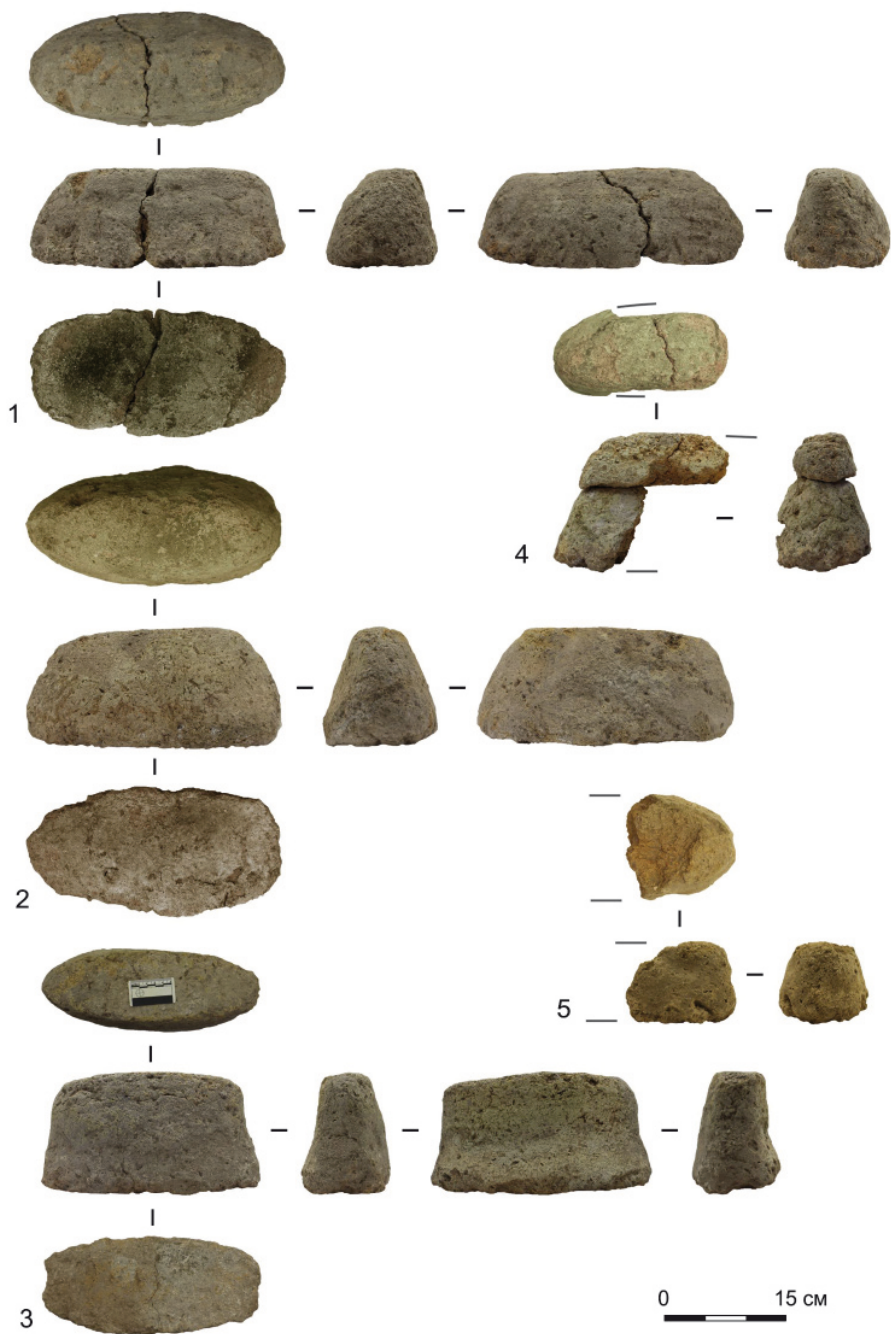


Fig. 9. Massive truncated-pyramidal clay objects, pit 1, Trostianchyk.
Photo by V. Rud, modified by V. Rud and Ye. Sliesariiev



Fig. 10. Massive truncated-pyramidal clay objects, pit 1, Trostianchyk.
Photo by V. Rud, modified by V. Rud and Ye. Sliesariiev

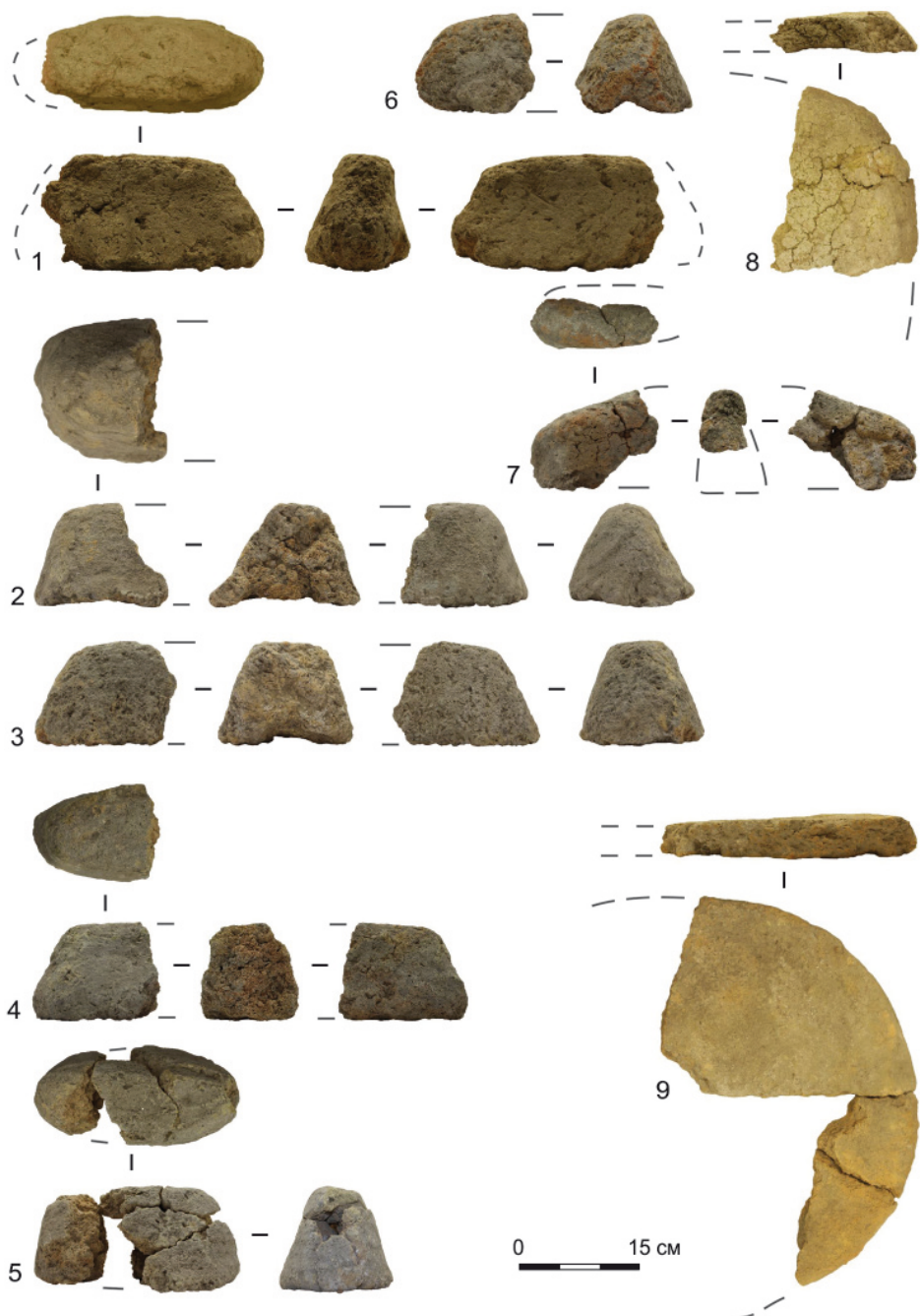


Fig. 11. Massive truncated-pyramidal clay objects (1-7) and discal-type objects (8-9), pit 1, Trostianchyk.
Photo by V. Rud, modified by V. Rud and Ye. Sliesariiev

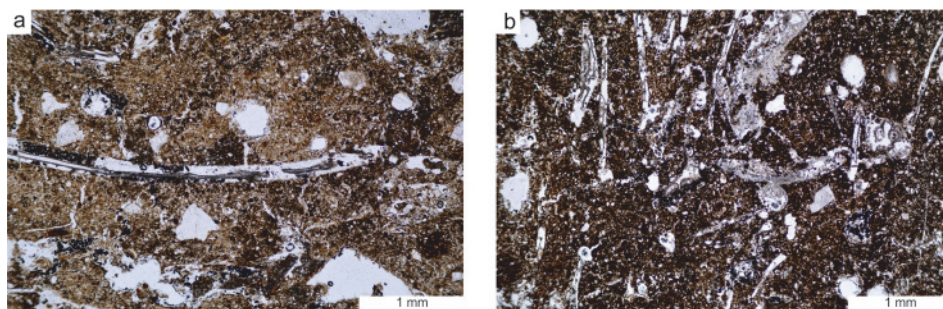


Fig. 12. Microphotographs of thin sections of daub samples; a – sample 13 (truncated-pyramidal object), porous, loess-like raw material with remains of organic material (plant), a few grains of quartz are visible, PPL; b – sample 14 (discal-type object), porous, loess-like raw material with remains of organic material (plant), a few grains of quartz are visible, PPL. Photo by A. Rauba-Bukowska

Samples contain coarse, poorly rounded crystalline grains, and a higher content of carbonate components, eg. micrite clasts (Fig. 12). Some concentrations of probably secondary calcite were also visible along the plant tissues and in holes remaining after such tissues had been destroyed. The clay mass of the raw material was isotropic (in the initial phase of vitrification), which suggested a firing temperature of ca. 850°C.

S. A. Gorbanenko examined the surfaces of the objects and their broken edges, and discovered pellicles of plant origin and their imprints as well as imprints of straws up to 5.0-7.0 cm long. All pellicle imprints belong to *Hordeum vulgare*. We have the admixtures of the results of plant processing to the clay mass of the objects (Rud 2016, 74).

The top and the sides of the objects have been fired to a dark-green color. The inner side of the objects is burnt to a dark-orange color. The bases (lower part) of most of the objects have the same color. The black color of the clay (a sign of burning without air access) is seen in the center of the side facing down. This dark layer is usually no more than 1.0 cm thick.

At the end of one of the artifacts, a human arm print was left. It appeared before the firing. Therefore, the object could have been formed and then moved to the place of its usage. Or, during the final stage of manufacture, the master decided to move it. Judging by the fact that prints were left on one side only, the object was moved vertically, using one arm.

The size, the level of preservation and the mass of truncated-pyramidal type massive clay objects are presented in Table 2. Only two of the objects were found whole (No 2 and No 3), and two more (No 5 and No 12) were restored completely. Their weight is 6.9-7.5 kg. Artifacts No 4, 9 and 14 are preserved at 80-90%, the rest – less than 70%. The high fragmentation of the objects is probably caused by mechanical damage from dumping them into the pit. The poorly preserved objects have fallen to pieces, and their fragments are impossible to find among amorphous parts of burnt clay.

Table 2. Dimensions, the level of preservation and the mass of truncated-pyramidal type clay products

No	Level of preservation	Size				Mass (kg)	Figure
		Length (cm)	Wideness (cm)		Highness (cm)		
			of foundation	of top			
1	fragment (~25%)	-	14.0	7.8	18.7	2.8	9:4
2	whole	34.5	15.5	9.0	18.5	7.5	9:3
3	whole	36.7	18.3	8.7	15.8	6.9	9:2
4	fragment (~90%)	34.0	16.0	8.8	14.5	5.1	10:2
5	whole (restored)	38.6	20.5	7.5	14.8	7.2	10:1
6	fragment (~35%)	-	13.0	6.8	14.0	2.6	11:4
7	fragment (~20%)	-	14.5	-	-	1.9	9:5
8	fragment (~40%)	-	17.5	7.5	13.4	3.0	11:3
9	fragment (~90%)	36.0	19.5	8.5	14.5	7.1	10:3
10	fragment (~40%)	-	21.3	6.0	15.5	3.3	11:2
11	fragment (~70%)	-	15.0	7.0	15.5	4.6	10:4
12	whole (restored)	38.7	19.3	6.8	13.2	7.0	9:1
13	fragment (~65%)	32.0	18.0	7.5	14.0	4.2	11:5
14	fragment (~80%)	-	16.3	8.0	16.0	5.5	11:1
15	fragment (~20%)	-	-	-	14.3	1.9	11:6
16	fragment (~15%)	-	-	-	-	1.3	11:7

3.3.1.1. Discal type

Discal type objects (Fig. 11: 8-9) from pit 1 have formed edges, have a round or oval form, and some fragments have a diameter of 0.45-0.53 m and are 3.5-5.0 cm thick. They are made of a similar, plant-tempered clay mass as the truncated-pyramidal type objects, and were produced with the same technology. The color of the objects varies from orange to dark green. In some objects the colors are equal, while in the others one color surpasses another, which indicates firing with different temperatures.

3.3.2. Other artefacts

The majority of artifacts come from layer 2A, which covers the massive clay objects. It largely consists of separate fragments (1043 items from the pit) of “table” and “kitchen” vessels. The number of fragmented animal bones is fewer. According to the preliminary conclusion of Ye. Yanish and M. Kublii, the species composition, strongly fragmented bones and presence of traces of external influence on the bones provide evidence that the osteological material from pit 1 belongs to kitchen remains.



Fig. 13. *Unio* shell tools for vessel decoration from pit 1, Trostianchyk
Photo by O. Zaitseva, modified by V. Rud and Ye. Sliesariiev

Small pieces of burnt clay were found (maximum size $5.0 \times 4.0 \times 4.0$ cm), both with plant admixture and without. The former are parts of some clay structures with the usage of wood. The latter are obviously parts of the installations with flat surface. Also in the filing of this layer of the pit, we find both complete and fragmented examples of *Unio* shells (33 items). There is also a small amount of zoomorphic figurines (7 items), miniature vessels (2 items), ceramic cones (2 items), flint tools and flakes, and complete and fragmented examples of processed tools for vessel decoration, made of *Unio* shells (Fig. 13). Most likely, the tools of *Unio* that were found were used on the surfaces of the “kitchen” vessels.

4. DISCUSSION

4.1. Analogies in CTCC

The authors are unaware of any direct analogies of the truncated-pyramidal objects from pit 1 in CTCC. However, one similar object was found in house complex “2” at Maidanetske in 1988. This object is also made of clay with plant admixture and has the same form. Its height and base diameter is 0.20 m. On top it has two modeled “horns”. It is assumed that this object was used as a stand (Shmaglii and Videiko 1988, 8, fig. 24: 1-3). A number of such “horned” objects have been found in the settlements of the Cucuteni culture area (Bodesti, Poduri, etc.) and are called “bucraniums” (Preoteasa 2012).

In recent years, a possible functional usage of discal-type objects was suggested. Discal-type objects found in Nebelivka, Stolniceni and other sites were identified as round clay slabs used as removable channel coverings (Burdo and Videiko 2016, 97-98, fig. 5: 6, 7; Korvin-Piotrovskiy *et al.* 2016, 243-245; Țerna *et al.* 2017, 310, fig. 7: 3). It is assumed that the clay slabs protected the vessels from fire, and also were racks for these vessels.

4.2. Ethnographic Analogies

Between 1990-1993, a group of archaeologists performed an ethnographic expedition to Tarasara village in western India (Bhagat Kar *et al.* 1993). The purpose of the expedition was to seek out and document local traditions of ceramic production, which could help to reconstruct the techniques of ceramic production of the Harrapan culture.

In Tarasara village, the ceramics are fired in round ovens (Fig. 14) with diameters of approximately 2.70 m and brick walls 0.85 m high. The walls of the oven have eight firing channels 0.33 m high and 0.20 m wide (Bhagat Kar *et al.* 1993, 158-159). Before firing the objects, the bottom of the oven is covered with 25 stands. They are formed on a potter's wheel, and have the form of a hollow cylinder with a diameter of 0.14 m. The stands are placed in three circles, so that none of them blocks the insertion of the fuel inside the oven's chamber. The first circle has 13 racks, the second – eight, and the third (central) – only four. Each cylinder supports one vessel, and the edges of neighboring vessels do not touch each other.

The oven is loaded with closed-form vessels up to a height of 0.30 m above the walls. After that, the oven cell is closed by different vessels called *tavdi* – circular, middle-sized clay objects used for baking bread. The *tavdi* are put upside-down in order to close the oven chamber completely. Small holes are plugged with ceramic fragments, which are always kept near the oven. Fragments of the vessels are put beside the objects while loading the oven in order to keep the required level of heat.

The mobile stands for the vessels are what interest us in the given ethnographic description Indian ovens. We assume that the truncated-pyramidal clay objects from pit 1 in Trostianchyk had the same purpose.

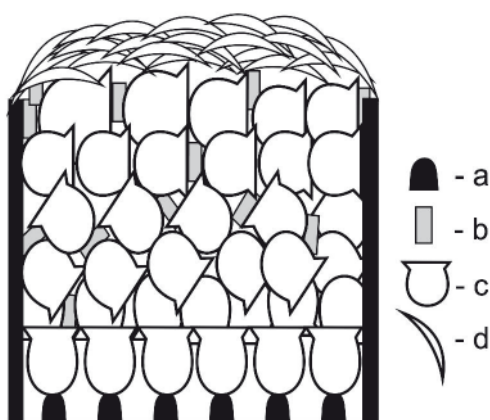


Fig. 14. Schematic representation of an ethnographic pottery kiln, India, early 90s.: a – clay stands; b – sherds; c – vessels; d – tavdi. After Bhagat Kar 1993, fig. 11; modified by O. Zaitseva

During further analysis of the inventory of pit 1, the question about the usage of discal-type objects becomes important.

Considering ethnographic information described above, there can be another version of the usage of such objects in ancient times. They could have been used for the final sealing of the furnace once it was loaded with the vessels. Arranged in several layers, such objects would provide the required amount of heat inside the oven. Also, they could have been used in addition to ceramic fragments for covering the holes. In this case, the walls of the furnace must have been vertical with a movable roof, created by clay disks. This allows for the quick loading and unloading of the chamber, without ruining parts of the construction. It is possible that the oven had no permanent walls, and that stability was provided by clay disks and/or ceramic fragments placed above the objects that were to be fired.

5. CONCLUSIONS

We assume that the massive clay objects from pit 1 of the CTCC Trostianchyk settlement are construction elements of an early pottery kiln. In our view, these truncated-pyramidal clay objects were used as movable stands to separate the goods (vessels) being fired from the fuel. Perhaps a stone that was found in the pit on the same level as the massive clay objects was used as a kind of stand. The discal-type clay objects were most likely placed above the stands. According to present analogies from Nebelivka and Stolniceni, they were used as a grate. According to the size of the discal-type objects, the truncated-pyramidal stands could be placed up to 0.40 m apart, but the scheme of their placement on the surface is not clear. According to the firing temperature of the pottery, a kiln with massive clay products could be used for firing both groups of vessels found in Trostianchyk.

Therefore, we have indirect information about the double chamber kiln with vertical construction found at the Trostianchyk site, which belongs to the Mereshovka-Chetetsuie III type of the Rakovets local group of Trypillia BII. Absolute dates indicate that the massive clay objects were put in the pit before the 40th century BC. Thus, the kiln was used in the last century of the V millennium BC.

Multichannel kilns functioned in the CTCC environment between 4100-3360 BC (Videiko 2019, 858). The oldest one is from Ostroh – Zeman of the Trypillia BII stage (Pozikhovskiy 2016), which, according to M. Videiko, belongs to the early stages of development of the Shypyntsi group (Videiko 2019, 858). Settlements of the Mereshovka-Chetetsuie III type preceded Shypyntsi sites chronologically (Ryzhov 2003b, 142; Ryzhov 2007, 452, 457). Therefore, the kiln with the use of movable structural elements from Trostianchyk is evidence of the existence of an archaic link in the evolution of ceramic firing devices in the environment of ancient farmers in Southeastern Europe.

The analysis of the site structure and topographic specifics indicates that the ceramics were fired on the edge of the settlement, which points to the fact that it was dangerous. The

same picture occurs in smaller settlements that existed later (Zhvanets; Movsha 1971). Although at the big settlements (Nebelivka, Maidanetske, Talianky, Dobrovody, Stolnicheni, Viitivka) (Videiko *et al.* 2015, 150-155; Rassmann *et al.* 2014, fig. 9a, 33a; Korvin-Piotrovskiy *et al.* 2016, fig. 30; Terna *et al.* 2016, 45; Rud *et al.* 2018, 14), the kilns are located in different parts of the sites, they are still distant from the buildings. Also, the kiln at Trostianchyk is located in a part of the site that is convenient for using the upward-directed wind at the edge of the slope.

The processes of forming and decorating the ceramic objects at the Trostianchyk site probably took place outside the main part of the settlement – close to pit 1, which is supported by the existence of *Unio* shell tools for vessel decoration at this location (layer 2A). The stratigraphically higher location of such artifacts in respect to the massive clay objects points to their younger age. This means that the pottery they were used for was made after moving the massive clay objects to the pit.

The logical explanation for the dumping of massive clay objects into the kiln is their loss of necessary technical characteristics. However, while some truncated-pyramidal objects were damaged when they were dumped into the pit, several were found unharmed, which means they were still fully functional.

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Dariusz Król*

IS IT A LONG OR SHORT-DURATION PHENOMENON? EXISTENCE OF FUNNEL BEAKER CULTURE SOCIETIES IN THE RZESZÓW FOOTHILLS IN THE CONTEXT OF THE CURRENT SET OF RADIOCARBON DATING MODELS

ABSTRACT

Król D. 2019. Is it a long or short-duration phenomenon? Existence of Funnel Beaker culture societies in the Rzeszów Foothills in the context of the current set of radiocarbon dating models. *Sprawozdania Archeologiczne* 71, 41-63.

In recent years, a considerable number of radiocarbon dates have been obtained from Funnel Beaker culture sites of various functions, located in the eastern part of the Rzeszów Foothills. In a group of a few dozen dates, there are some that suggest, on the basis of the probability distribution, that representatives of communities of this culture might have been present on the area ca. 3900-3800 BC. However, such dating may be disputable. Attempts in recent years to confront such early dates with contextual ceramic materials have not provided satisfactory answers to this question. This paper is focused on an assessment of the potential of absolute chronology determinations and their analytic values. After eliminating all questionable dates, statistic simulations of the chronology of the local Funnel Beaker culture have been made. The results obtained suggest that this phenomenon might have been more short-lived than so far believed.

Keywords: chronology, Funnel Beaker culture, radiocarbon dating, Bayesian method, kernel density estimation method

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INTRODUCTION

For many years, the question of the chronology of Funnel Beaker Culture (abbr. FBC) settlement in Subcarpathia has been discussed exclusively on the basis of the typology and style of local pottery, by referring it *per analogiam* to various phases of the southeastern group of this culture (Czopek and Kadrow 1987; Zych 2008; Nowak 2009; Dzierżanowska *et al.* 2010). The situation changed considerably with an inflow of new evidence – radiocarbon dates from FBC settlements and cemeteries obtained during rescue excavations prior to the construction of the A4 highway in the Rzeszów Foothills (Mazurek *et al.* 2013; Rybicka *et al.* 2014; Król *et al.* 2014; Dębiec *et al.* 2015; Sznajdrowska 2016; Rybicka 2016; Rybicka *et al.* 2017), as well as later investigations (Rogozński 2014; Sieradzka and Glowacz 2017; Król 2018). As a result of an increasing empirical database of ^{14}C dates and typologically and stylistically diverse pottery groups, new proposals of the chronology of the FBC on loess areas of the Rzeszów Foothills have been put forward especially with regard to its earliest manifestations, including the concept of dating its first appearance to ca. 3800-3700 BC (Rybicka 2016; cf. Sznajdrowska 2016; Król 2018), and even to ca. 3900-3800 BC (Rogozński 2014). As a result, the earliest development of the local FBC settlement network has been shifted back by around 100-250 years (cf. Nowak 2009).

According to observations presented above, local FBC groups appear in new chronological, spatial and cultural positions, different than those of groups of that culture in Lesser Poland, the Lublin region, and western Ukraine. Furthermore, the loess areas of the Rzeszów Foothills should be firmly encompassed by the discussion on the origin of the FBC phenomenon on the Polish-Ukrainian Carpathian foreland (cf. Rybicka 2017). The question, however, is whether proposals to move back the beginning of the FBC on our territories of interest based on absolute dates especially placing the initial stage prior to 3800 BC are really justifiable. Are the available ^{14}C dates reliable?

It is necessary to evaluate critically the true analytical potential of available radiocarbon dates. Such an approach entails selecting chronometric units obtained from organic substances. These substances, because of their unfavorable attributes, are prone to a high risk of laboratory errors, beginning with sample isolation and preparation. Therefore, in this research, several chronological models of the FBC phenomenon on loess areas of the Rzeszów Foothills will be created, with application of statistical methods: *The Bayesian Approach* (Buck *et al.* 1996; Buck 1999) and *Kernel Density Estimation* (abbr. KDE; Bronk Ramsey 2017). To obtain this objective, tools of OxCal v4.3.2 (Bronk Ramsey 2017) with calibration curve: 5 IntCal 13 (Reimer *et al.* 2013) will be utilized.

THE DATA SET AND ITS QUALITY

Discussions on the use of radiocarbon dates for determining a more or less exact age of homogenous assemblages (pits, graves and their inventories) or – more generally – the construction of new or the detailing of old chronological schemes, appear constantly in Polish archaeological literature (Kadrow 1991; 1994; Czebreszuk and Szmyt 2001; Bronicki *et al.* 2003; 2004; Koško and Szmyt 2006; 2007ab; Włodarczak 2006; 2013; Domańska and Rzepecki 2008; Nowak 2009; 2017; Kukawka 2010; Pelisiak and Rybicka 2013; Rzepecki 2014; Grygiel 2008; 2016; Kukawka *et al.* 2016; Kruk *et al.* 2018).

There exist several substantial problems in absolute dating. They are related to field exploration, laboratory and post-laboratory stages, and interpretation. The most important is pre-laboratory handling, because at this stage the substance to be dated is chosen (in the contextual and qualitative sense). Even if we assume an ideal selection of the organic substance, sample preparation and laboratory analysis, we still face one problem. No matter what chemical standards of sample preparation and which measurement techniques are adopted (LSC or AMS), the calendar ages (with application of the AMS technique, the minimum uncertainty range is ± 20 or ± 30 years) and the results after calibration are being framed into bigger or smaller probability ranges, or several such ranges (Goslar and Walanus 2009). In other words, even with the best possible set of absolute dates we obtain only a theoretical chronological outline of the examined prehistoric events.

In the case of the Rzeszów Foothills we have in hand 26 radiocarbon dates from 10 functionally diversified FBC sites. They are: Pawłosiów, site 52 (7 samples); Skołoszów, site 31 (4); Skołoszów, site 7 (3); Chłopice, site 11 (2); Mirocin, site 27 (2); Skołoszów, site 16 (2); Rozbórz, site 28 (2); Szczytna, site 6 (2); Szczytna, site 5 (1); and Jankowice (1; Table 1). Dates come from: charcoal (8 cases), carbon deposit (6), charcoal separated from potsherds (3), animal bones (3), wood (2), undetermined vegetal vestiges (2), human bone, and organic coating. Samples have been collected from various contexts: settlement features (23 cases), cultural accumulation layer (2), and burial (Table 1).

The quality of some samples and/or their contextual background may be disputable, although these doubts are not necessarily confirmed in laboratory assessments and post-laboratory simulations and interpretations. Notable, for example, is the poor state of preservation of collagen (2.3% and 3%) in animal bone samples from settlement pit 3/2015 in Chłopice, site 11, and the relatively high collagen level (6.4%) of human bones from grave 1227 from Skołoszów, site 7 (Table 1). However, this does not disqualify ^{14}C results from these samples (cf. Goslar and Walanus 2009). Additionally, their classic ceramic context is acceptable (Rybicka *et al.* 2017; Król 2018).

Besides dates from bone samples, which come from relatively short-living beings, the majority of absolute dates from the Rzeszów Foothills have been obtained from charcoal. Although charcoal samples do not create laboratory problems (Goslar and Walanus 2009), the obtained dates can be misleading due to the so-called old-wood effect and/or risks

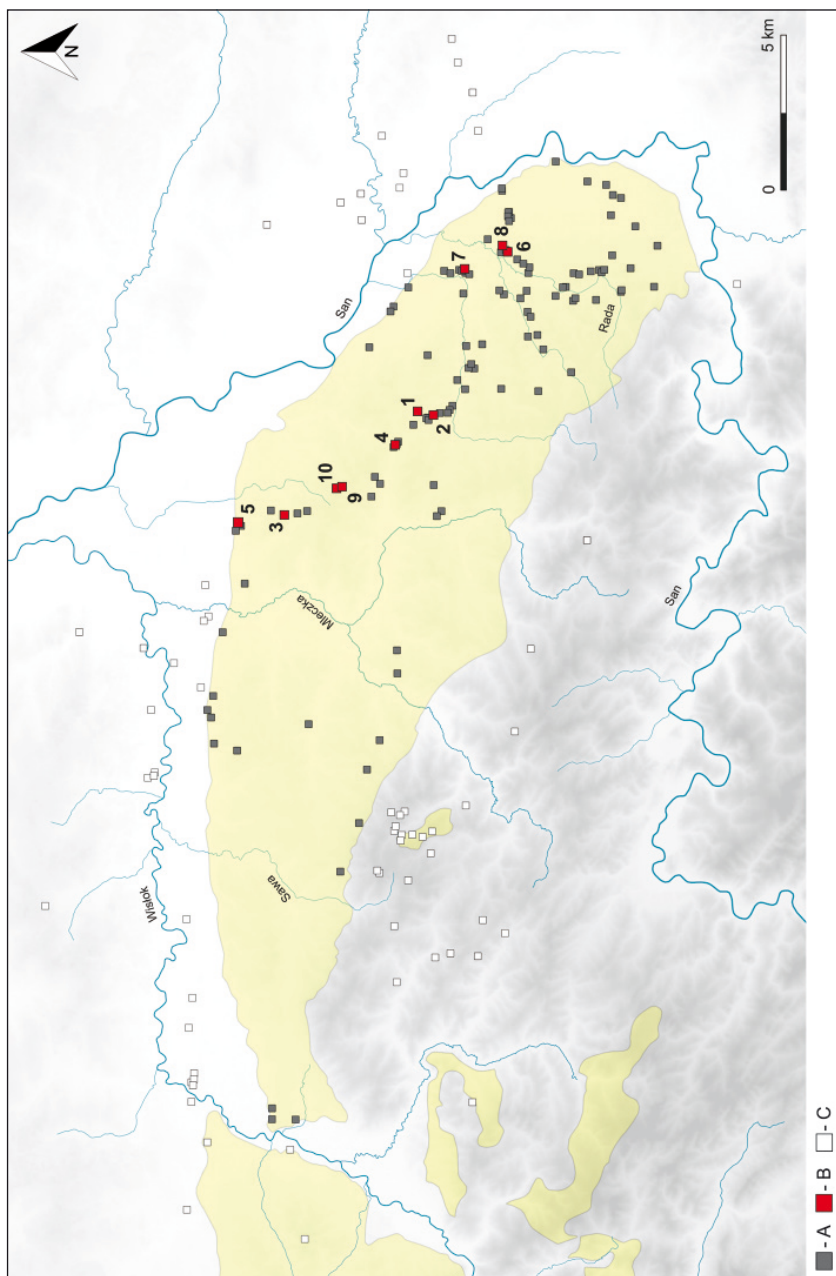


Fig. 1. FBC sites in the Rzeszów Foothills and neighboring zones.

A – sites on studied area, B – radiocarbon dated sites (numbers according to Table 1), C – other sites. Drawn by D. Król

Table 1. List of radiocarbon dates of FBC sites in the Rzeszów Foothills

No.	Site	Context	Sample details	Lab. code	BP	BC 95,4%	References
1	Chłopice 11 settlement	pit 3/2015	animal bone/ 1% N, 4,2% C, 2,6% coll.	Poz-100648	4625±30	3513-3350	Król 2018
		pit 3/2015	animal bone/ 0,7% N, 4% C, 3% coll.	Poz-100647	4600±40	3517-3118	
2	Jankowice 9 settlement	pit 202	animal bone	MKL-1617	4830±70	3770-3370	Dębiec <i>et al.</i> 2015
3	Mirosin 27 settlement	pit 41	charcoal	Poz-54047	4955±35	3798-3653	Sznajdrowska 2016
		pit 41	vegetal vestige	Poz-82264	4920±40	3780-3641	
4	Pawłosiów 52 settlement	pit 171	carbon deposit	Poz-42295	4810±40	3693-3518	Rybicka <i>et al.</i> 2014
		pit 1665	vegetal vestige in sherd/0.3 mg	Poz-42294	4780±60	3660-3375	
		pit 23	charcoal	Poz-42296	4765±35	3640-3382	
		pit 1140	carbon deposit	Poz-47396	4730±40	3636-3376	
		pit 2079	organic coating	Poz-42291	4655±35	3620-3361	
		pit 229	carbon deposit	Poz-42300	4650±35	3520-3360	
		pit 1568	carbon deposit	Poz-42301	4510±35	3356-3096	

Table 1 cont. List of radiocarbon dates of FBC sites in the Rzeszów Foothills

No.	Site	Context	Sample details	Lab. code	BP	BC 95.4%	References
5	Rozbórz 28 bog deposit	pit 3834	wood	MKL-1770	4780±50	3654-3378	Mazurek <i>et al.</i> 2013
		pit 3834	wood	MKL-1769	4760±70	3656-3370	
6	Skoloszów 7 non-megalithic cemetery	posthole 626	charcoal	Poz-45530	4800±35	3651-3521	Król <i>et al.</i> 2014
		ditch 644	charcoal	Poz-46077	4775±30	3642-3387	
		grave 1233	human bone/ 0,6% N, 5% C, 6,4% coll.	Poz-82441	4675±35	3625-3366	Rybicka <i>et al.</i> 2017
7	Skoloszów 16 settlement	pit 5/2017	charcoal	Poz-100857	4765±35	3640-3382	Król 2018
		pit 6/2017	charcoal	Poz-100856	4680±35	3625-3366	Król 2018
8	Skoloszów 31 settlement	cultural layer	carbon in sherd	Poz-64321	5240±40	4228-3968	Rogozński 2014
		cultural layer	carbon in sherd	Poz-64320	5150±40	4043-3804	
		pit 3	charcoal	Poz-82330	4745±35	3636-3380	Sieradzka and Głowacz 2017
		pit 3	charcoal	Poz-82442	4720±40	3634-3374	
9	Szczytna 5 settlement	pit 323	carbon deposit	Poz-57508	4700±35	3631-3371	Rybicka 2016
10	Szczytna 6 settlement	pit 220	carbon in sherd	Poz-57507	5020±35	3943-3710	Rybicka 2016
		pit 306	carbon deposit	Poz-57506	4805±35	3654-3521	

involved in dating from tree cores (Warner 1990; cf. Palincas 2017) or secondary depositions of charcoal (e.g. Pelisiak and Rybicka 2013). In the first case, this means that the radiocarbon age of charcoal deposited in indisputable homogenous ceramic contexts may be older than this context by a few hundred years (depending on the tree species). This is already a well-known fact in the literature (e.g. Nowak 2009).

If we take into account that the radiocarbon dates from loess areas of the Rzeszów Foothills lack information on the tree species of charcoal samples (Table 1), their real value may be disputable. This is especially true with regard to the above questions related to the chronology of the earliest manifestations of settlement activities of FBC people on the area in question. This is well illustrated by pit 41 in Mirocin, site 27, which received an early date: Poz-54047 4955±35 BP (Table 1). We know that the sample was collected from the bottom part of the pit, yet the tree species of the analyzed charcoal sample is unknown (Sznajdrowska 2016). This fact cannot be overlooked, as in the fill of the pit, there were remains of relatively short-lived birch, but also of oak (Lityńska-Zajac 2016). The expected life-span of the latter is among the longest of European trees (e.g. Palincas 2017). There is one more sample dated from the same pit (41): Poz-82264 4920±40 BP (Table 1), also without reference to tree species. Moreover, their context is less reliable (Sznajdrowska 2016). We cannot, on this ground, disqualify the dates mentioned above as useless, especially since the pottery assemblage from Mirocin contains, apart from the so-called classic elements, more archaic elements (Sznajdrowska 2016). If we do this based on the absence of species determination, we should do the same with all dates of that kind. Certainly, this would be hardly acceptable.

The case of dates obtained from charcoal extracted from pottery mass is different. In relation to loess areas of the Rzeszów Foothills it is especially significant, because such dates, together with other elements, constitute the basis of the concept of the early penetration of FBC groups into this region (Rogoziński 2014; cf. Rybicka 2016). A hypothetical chronological shift of this event to the first centuries of the 4th millennium BC is based mainly on two very early absolute dates from Skołoszów, site 31: Poz-64321 5240±40 BP and Poz-64320 5150±40 BP (Fig. 2; Table 1), and on a simplified pottery typology and style at this site (Rogoziński 2014; Rybicka 2016; 2017; cf. Sieradzka and Głowacz 2017). The above dates are not only the earliest in the area of interest and count among the earliest from all of southeastern Poland (Włodarczak 2006; Nowak 2009). Close to them is another "Subcarpathian" date from Szczytna, site 6: Poz-57507 5020±35 BP (Table 1; Fig. 2). The fact that three of four dates are older than 5000 years BP should not be overlooked.

The dating of organic substances identified in pottery contexts is not new in archaeology (Hedges *et al.* 1992). For example, it was applied during research on FBC settlement on the so-called Prokopiak Hill in Opatowice (Kovaljuch and Skripkin 2007; Koško and Szmyt 2006; 2007a; 2007b). While radiocarbon chronometry based on such substances as carbonaceous residue or food vestiges tends to yield good results as a rule (e.g. Berstan *et al.* 2008), problems may appear with charcoal from pottery mass. There might have been

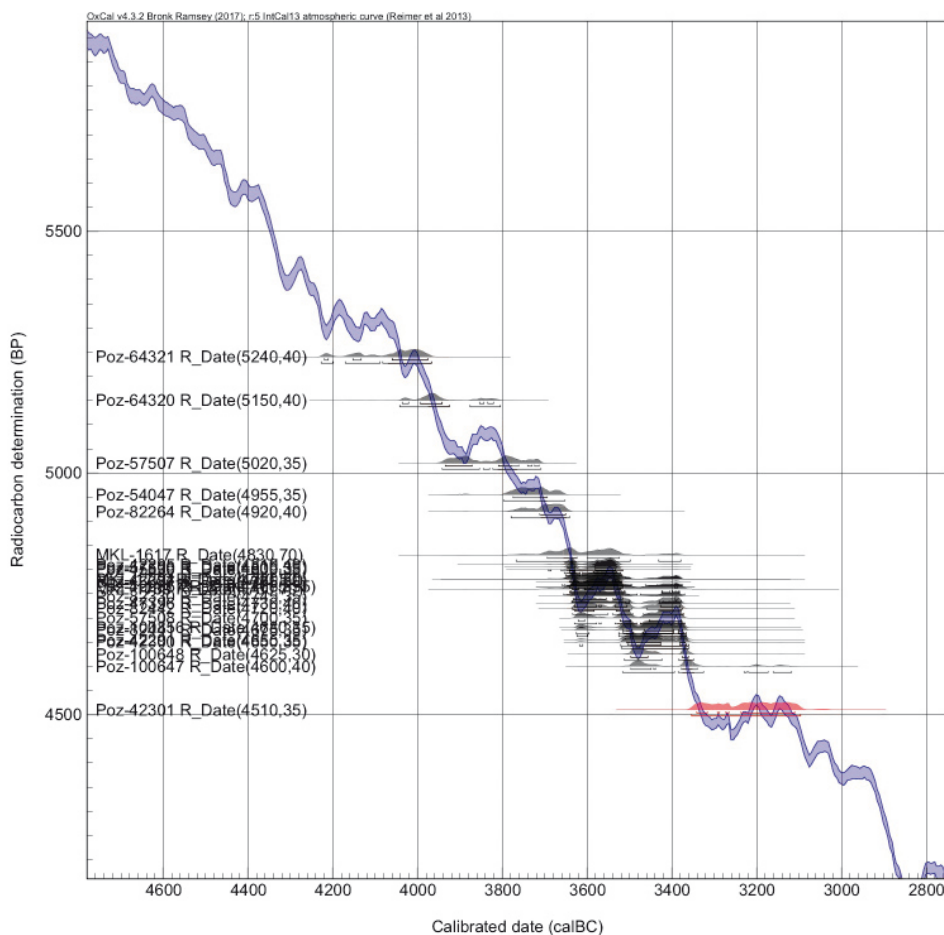


Fig. 2. Non-modelled ^{14}C designations on the calibration curve. Edited by D. Król

an intrusion in raw potter's paste of an element of humic acid, which also affects vessels or their fragments during their time in a humus layer (Hedges *et al.* 1992; cf. Kovaljuch and Skripkin 2007). Charcoal from paste used in pottery production may yield dates too old, while charcoal from humus – too young (Goslar *et al.* 2013).

According to Reports of the Poznań Radiocarbon Laboratory nos. 7654/13 and 8694/14 both ceramic samples from Skołoszów, site 31, and a sample from Szczytna, site 6, were prepared with hydrofluoric acid (HF). This acid is used for washing out the humic acid (Hedges *et al.* 1992; Goslar *et al.* 2013). Hydrofluoric acid was applied in an attempt to solve the dating problems of the FBC pottery from Opatowice in Kuyavia. Initial AMS ^{14}C

dates obtained without use of HF were younger than expected. As a result of testing various HF saturation levels (0.2%, 5%, and 70%), optimal results were obtained (Goslar *et al.* 2013). It was observed that the higher the HF saturation, the more effectively humic acid is removed; however, charcoal from raw paste is also being mobilized (Goslar *et al.* 2013). Obviously, this can result in obtaining dates older than the age of the pottery itself. If HF was used in the case of pottery from Skołoszów, site 31, and Szczytina, site 6, and the expected age was unknown, we should cautiously ask if the obtained results were not influenced by excessively high HF saturation and the charcoal mobilization mentioned above.

Let us look at the question from the point of view of *stricte* archaeological evidences. As discussed above, the early chronology for the settlement in Skołoszów, site 31, has so far been attributed to a simplified style of pottery from the vast cultural layer. It has been compared with the early lowland materials of Podgaj-Przybranówek in Kuyavia and those from quasi-lowlands of the Gnojno type in Lesser Poland (Rogoziański 2014; Rybicka 2016; Sieradzka and Głowacz 2017). Inferring *per analogiam*, it was to some degree explicable. Moreover, recently published research on the lowland settlement in Smólsk, site 2/10, near Brześć Kujawski, corroborated such reasoning. The pottery from Smólsk was similar to that from Skołoszów, site 31, while radiocarbon dates suggested that the settlement in question might have begun before 3800 BC (Grygiel 2016). Is it justified to assume a similar chronology for the settlement in Skołoszów, site 31? The presence of pottery typologically and stylistically spare relative to the classic phase of the southeastern group of the FBC is apparently not a sufficient reason to accept very controversial radiocarbon dates. Contradictory to it are two much younger dates from charcoal from pit 3 (Table 1). The style of pottery from that pit only slightly differs from the pottery in the cultural layer (Sieradzka and Głowacz 2017). Therefore, it cannot be excluded that the settlement in Skołoszów, site 31, should be perceived as an intermediate stage of retardation or a poly-linear development of the FBC, rather than as a model of the early settlement intrusion of that culture on the eastern loess areas of the Rzeszów Foothills, between 3900-3800 BC or 3800-3700 BC. Problems of this kind are nothing new in relation to the whole extent of the FBC. In the literature, there are reported difficulties in determining the chronology of specific pottery decoration (cf. Papiernik and Rybicka 2002; Kukawka *et al.* 2016), as well as a possible stylistic conservatism (Hawinskyj *et al.* 2013; Rybicka 2016).

The observations presented above controvert the use of both early indicators for determining the chronology of the settlement in Skołoszów, site 31, and as the basis for constructing chronological models of FBC development throughout the entire Rzeszów Foothills region. This is also true in relation to the early date from Szczytina, site 6. The consequences of this are much bigger than constraining the life-span of the discussed phenomenon. They beg the question of why, in Skołoszów, site 31, there appeared pottery of a reduced style, atypical for the developed stage of the southeastern group of the FBC (cf. Kadrow 2009). Is it really the result of the aforementioned retardation and/or poly-linear development of the FBC, or perhaps connected to a still unknown (alternative?) function of that site?

As a final consideration of the analytical value of ^{14}C evidence, we should mention a relatively young date: Poz-42301 4510 ± 35 BP, obtained from carbonaceous residue on a vessel from pit 1568 in Pawłosiów, site 52 (Table 1). The location of this date on a vast *plateau* of the calibration curve during the period ca. 3350–3100/3000 BC (Fig. 2) creates difficulties in determining its probability level (Goslar and Walanus 2009). In this situation it is difficult to decide what stage it refers to. In this case, the dilemma cannot be resolved with reference to pottery from the pit. Its typological-stylistic characteristics cannot be clearly linked with either the (late?) classic or the youngest FBC stage, poorly recognized and insufficiently described from the area of our study (Rybicka *et al.* 2014; Rybicka 2016). However, from other areas of the settlement in Pawłosiów, site 52, there are known some infrequent materials featuring Baden and Late Tripolye elements (Rybicka 2016; 2017).

MODELS

Nowadays we cannot expect satisfactory answers to questions related to the possible multidirectional development of the FBC in the Rzeszów Foothills (cf. Rybicka 2016). This problem can be only acknowledged and underscored. In contrast to the better-recognized milieux of that culture, such as the eastern group (Kuyavia) and the southeastern group (generally Lesser Poland), research on local FBC communities on the Rzeszów-Przemysł loess areas is much less advanced. There are still very few statistically valid assemblages to be compared among one another, and to be combined with numerous (and representative) absolute dates in order to construct vertical and horizontal development schemes of local FBC groups. But even the availability of such assemblages would not guarantee that our schemes would be adequately trustworthy. Examples from Kuyavia and Lesser Poland indicate that changes in typological-stylistic patterns within this cultural phenomenon are very complex, and development schemes presented so far are disputable (e.g. Kośko 1981; Kruk and Milisauskas 1983; Kukawka 1997; 2001; Papiernik and Rybicka 2002; Rzepecki 2004; 2014; Włodarczak 2006; Nowak 2009; Grygiel 2016). This problem has been also reported in relation to the Rzeszów Foothills (Rybicka 2016; 2017).

Due to the inadequate database from the Rzeszów Foothills, it is difficult to build more complex statistical models of chronological sequences, combining typological-stylistic elements of pottery, its stratigraphic context and radiocarbon dates (cf. Włodarczak 2006; Kukawka *et al.* 2016). It is possible, however, by critically reviewing (and eliminating) all doubtful absolute dates, to refine and narrow radiometric frames of the discussed phenomenon with the use of Bayes' theorem and KDE. By applying these methods we can construct models with higher precision than by summing up all probabilities ^{14}C designations, where the generated distribution is a simple superposition of calibrated distributions (cf. Bronk Ramsey 2017). It should be noted that the proposed models do not reflect “closed

situations,” such as those encountered on settlement and funerary sites, and tested as such (e.g. Rzepecki 2014; Grygiel 2016; Kruk *et al.* 2018). These models do not show the static, fixed chronological frames of completely explored materials, but rather the dynamically constructed (as opposed to constituted) chronological frames of the continuous, ongoing exploration of materials.

Non-Model (Sum)

The set of 26 absolute dates from the Rzeszów Foothills includes various values (Table 1). At least three dates should be excluded from the construction of chronological models of the local FBC. Taking them into account in a simple summation of probabilities would generate unacceptable time spans of 4221-3111 BC (68.2%) and 4229-3097 BC (95.4%), covering extreme periods of 1110 and 1132 years. With exclusion of these three controversial dates from pottery — those from Skołoszów, site 31, and Szczytna, site 6 — the time spans are restricted to 3775-3111 BC (68.2%) and 3798-3097 BC (95.4%), i.e. to 644 and 701 years. Although still quite broad, we can correct such results by appropriate statistical modeling. Below, there are six chronological simulations of the FBC settlement on loess areas of the Rzeszów Foothills (I, Ib, II, IIb, III, and IIIb).

Model I (Phase)

This is a constant, single-phase model, in which the set of radiocarbon dates is treated as coming from a single FBC Phase, extending between the Start FBC Boundary and the End FBC Boundary. The model is based on *Agreement Indices* of the entire set, as well as individual designations and Convergence, where *Individual Agreement Indices* A_{model} (*Model agreement index*) and A_{overall} (*Individual agreement index*) should be at least 60%, and Indicator C (*Convergence integral*), useful in analyses of extreme values — 95% at least. This model, built on the basis of 23 converted ^{14}C designations, complies with statistical essentials. Values of agreement indicators for the whole formation are: $A_{\text{model}} = 93.3\%$ and $A_{\text{overall}} = 94.4\%$ (Fig. 3). In individually assessed designations the unacceptable values ($A \geq 60\%$, $C \geq 95\%$) are absent. Remarkable are the relatively low values of coefficient A from dates from Mirocin, site 27, pit 41 (Poz-54047 4995 $\pm$ 35 BP; $A = 76.5\%$), and from Pawłosiów, site 52, pit 1568 (Poz-42301 4510 $\pm$ 35 BP; $A = 68.8\%$); coefficient C of the latter date: $C = 95.0\%$ (Fig. 2). The start boundary of the generated model I is: 3716-3666 BC (68.2%) and 3764-3654 BC (95.4%), mean 3701 BC and median 3696 BC. The end boundary is: 3356-3301 BC (62.8%) and 3479-3256 BC (95.4%) $\rightarrow$ 3479-3397 BC (11.2%) and 3373-3256 BC (84.2%), mean 3338 BC and median 3333 BC. The modelled duration of the formation (FBC Span) is 306-376 years (68.2%) and 185-424 years (95.4%) $\rightarrow$ 185-269 years (13.0%) and 288-424 years (82.4%), mean 332 years and median 337 years (Table 2). Such frames are considerably closer than those resulting from the summation of probabilities of absolute dates.

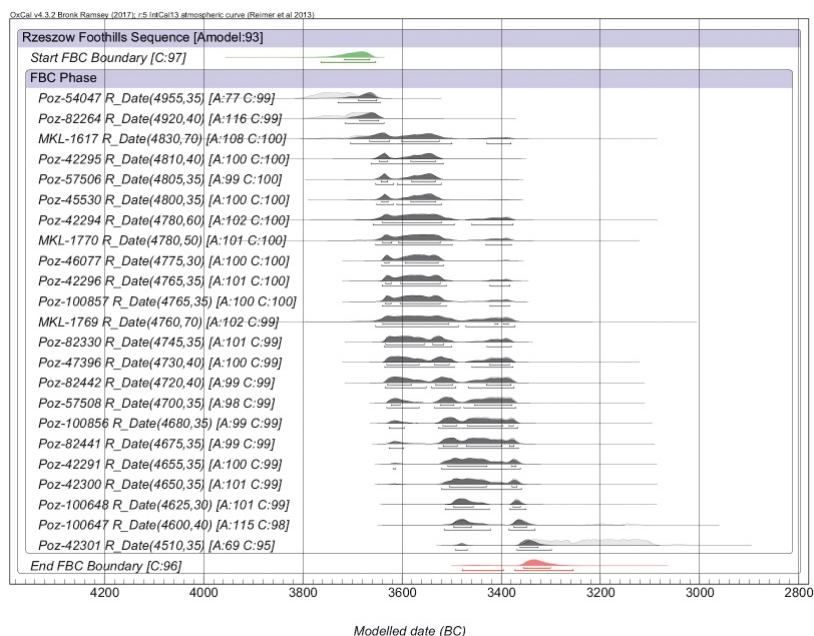


Fig. 3. Model I (Phase). Probability distribution. Edited by D. Król

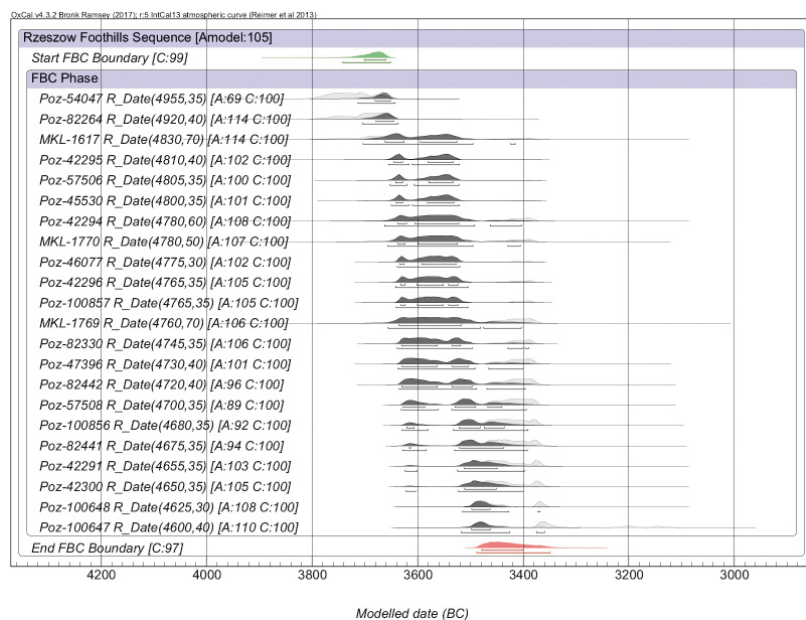


Fig. 4. Model Ib (Phase). Probability distribution. Edited by D. Król

Model Ib (Phase)

Due to the low indicator C from the date Poz-42301 4510 ± 35 BP, another model (or rather sub-model of model I) has been generated. Considering the minimal value of this indicator—despite the absence of objective arguments for doubting the quality of the date in question—we can attempt to generate a simplified model (Ib) without this chronometric unit, which is statistically more consistent than model I: $A_{\text{model}} = 105.4\%$, $A_{\text{overall}} = 105.3\%$ (Fig. 4). Moreover, there are not any unacceptable individual dates. However, indicator A decreases considerably in comparison to the date from Mirocin, site 27, pit 41: Poz-54047 4995 ± 35 BP ($A = 68.8\%$). Indicator C values are fully acceptable – not lower than 98.8%. The start boundary of model Ib is located in a relatively narrow span: 3702-3661 BC (68.2%) and 3743-3652 BC (95.4%), mean 3689 BC and median 3684 BC. The end boundary is also narrow: 3479-3401 BC (62.8%) and 3489-3350 BC (95.4%), mean 3426 BC and median 3433 BC. The modelled duration of this formation is 183-270 years (68.2%) and 168-327 years (95.4%), mean 240 years and median 234 years. These spans are different from those already presented – they restrict the duration of the FBC population on loess areas of the Rzeszów Foothills to about 10-15 generations.

Model II (Tau_Boundary)

If models I and Ib have been generated on the basis of the presupposition of a uniform event distribution, model II has the character of an exponential distribution. Models of this kind have already been presented by M. Nowak (2009). Such a model assumes a constant increase of events (^{14}C dates) until the optimum is reached, i.e. maximal density of their summed probabilities (Nowak 2009). The mean of the summed probabilities of 23 radiocarbon dates from the Rzeszów Foothills is 3350 BC (R_Simulate: 4718 ± 61 BP). To create such a model, five absolute designations with values below 4657 BP were omitted (see Table 1). As a result, a model of moderate statistical significance was obtained: $A_{\text{model}} = 95.9\%$, $A_{\text{overall}} = 88.4\%$ (Fig. 5). Remarkable are the unacceptably low indicators A of individual dates from Skołoszów, site 16, pit 6/2017: Poz-100856 4680 ± 35 ($A = 54.0\%$), and from Skołoszów, site 7, grave 1233: Poz-82411 4675 ± 35 ($A = 49.3\%$). They do not disqualify the whole formation, but decrease its significance. The start boundary of the generated model is: 3621-3571 BC (68.2%) and 3639-3547 BC (95.4%), mean 3595 BC and median 3596 BC. The end boundary is: 3579-3495 BC (68.2%) → 3579-3548 BC (28.6%) and 3525-3495 BC (39.6%) and 3597-3488 BC (95.4%), mean 3536 BC and median 3531 BC. The modelled duration of the event in question can be estimated as 112-221 years (68.2%) and 76-266 years (95.4%), with mean 172 years (Table 2).

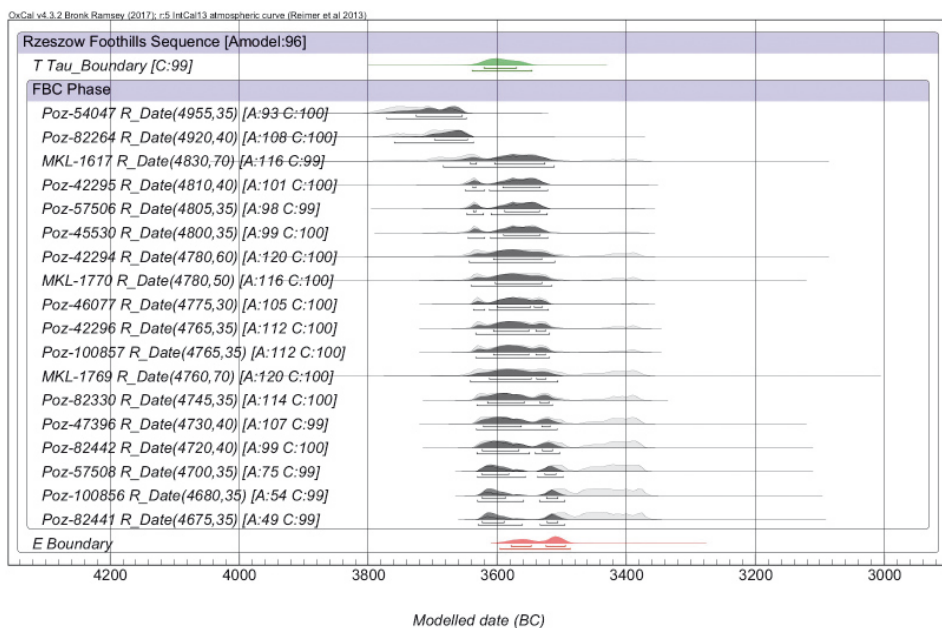


Fig. 5. Model II (Tau_Boundary). Probability distribution. Edited by D. Król

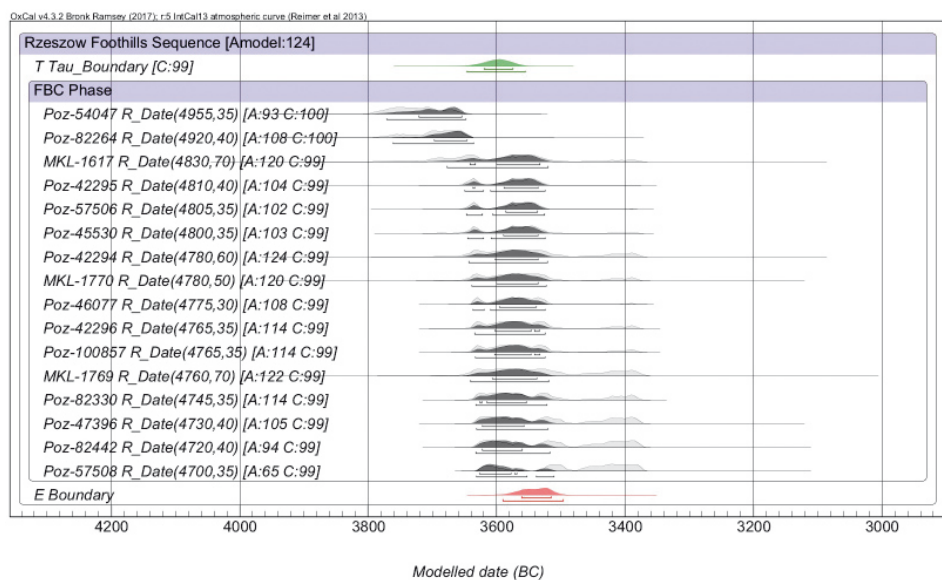


Fig. 6. Model IIb (Tau_Boundary). Probability distribution. Edited by D. Król

Model IIb (Tau_Boundary)

Values of indicators A below 60% of two radiocarbon dates in model II suggest constructing one more model (sub-model), even though the quality of these dates cannot be objectively denied. In the new model (IIb), significance indicators are very high: $A_{\text{model}} = 124.3\%$, $A_{\text{overall}} = 124.0\%$ (Fig. 6). In such a construction there are no deviating indicators, although indicator A of the date from Szczytna, site 5, pit 323: Poz-57508 4700 ± 35 , is relatively low ($A = 64.6\%$). The start boundary of the model is: 3620-3575 BC (68.2%) and 3646-3556 BC (95.4%), mean 3600 BC and median 3599 BC. Values of the end boundary are: 3562-3516 BC (68.2%) and 3591-3497 BC (95.4%), mean 3542 BC and median 3541 BC. The estimated durations of the model are 118-207 years and 83-254 years mean 165 years and median 164 years (Table 2).

Model III (KDE)

The reduction of chronological dispersion resulting from the summation of all probabilities of ^{14}C dates can also be achieved with the use of KDE tools. They not only allow for correction of the standard sums, but they also eliminate perturbations in Bayes models (Bronk Ramsey 2017). To generate model III, the parameters *kernel* and *factor* should be set (by default N[0.1] and U [0.1]). As a result, the obtained model has relatively high significance indicators: $A_{\text{model}} = 102.9\%$, $A_{\text{overall}} = 102.8\%$ (Fig. 7, 8). There are no deviating indicators, although the younger date from Pawłosiów, site 52, pit 1568: Poz-42301 4510 ± 35 BP, has a „traditionally” low value of indicator A ($A = 72.5\%$). The sum of probabilities of the modelled absolute designations is located in spans: 3716-3319 BC (68.2%) and 3763-3266 BC (95.4%), mean 3546 BC and median 3547 BC. The estimated duration of probabilities of this model is: 317-414 years (68.2%) and 209-459 years (95.4%), mean 354 years and median 359 years (Table 2). In modeling with the KDE technique, start and end boundaries are not estimated. Attempts to combine Bayes and KDE models may falsify the results (Bronk Ramsey 2017).

Model IIIb (KDE)

As in the case of models I and II, we can omit the „weakest” individual value generated in model II – Poz-42301 4510 ± 35 BP. The generated „sub-model” is interesting. It has high probability levels: $A_{\text{model}} = 109.9\%$, $A_{\text{overall}} = 108.8\%$ (Fig. 9, 10) with an absence of low A and C values reflecting individual events. The boundaries are: 3713-3450 BC (68.2%) and 3761-3347 BC (95.4%), mean 3546 BC and median 3547 BC. The duration of the modelled formation is estimated to be 223-31 years (68.2%) and 182-381 years (95.4%), mean and median 279 years (Table 2).

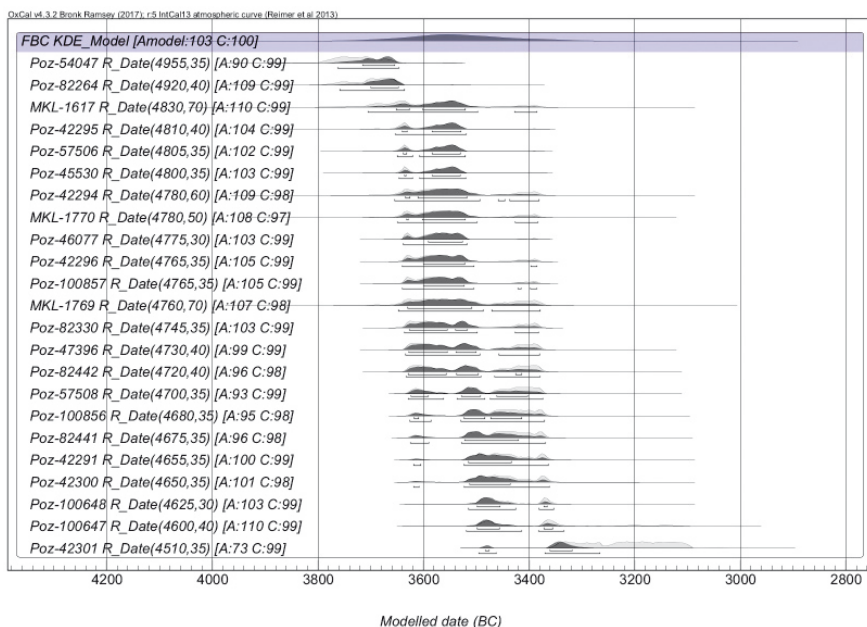


Fig. 7. Model III (KDE). Probability distribution. Edited by D. Król

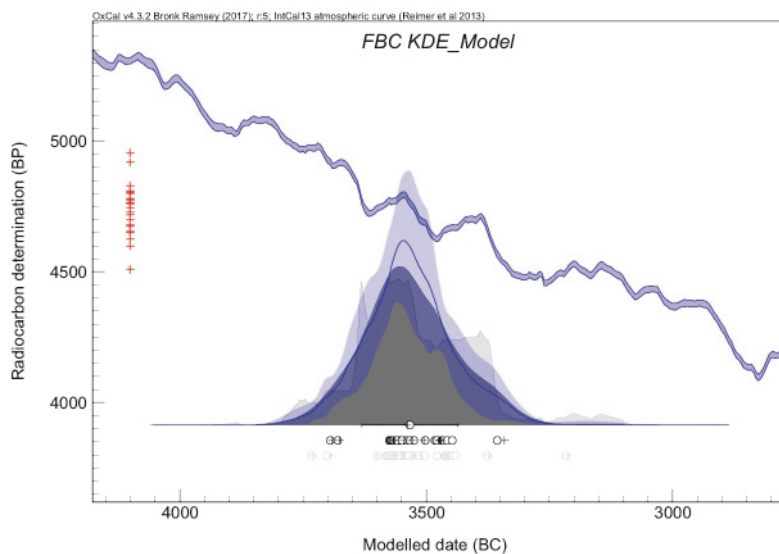


Fig. 8. Model III (KDE). Probability distribution. Dark grey – estimated KDE distribution; blue line and light blue band – mean ± 1 sigma of snapshots of KDE distribution; light gray – basic summation on non-modelled ^{14}C dates. Edited by D. Król

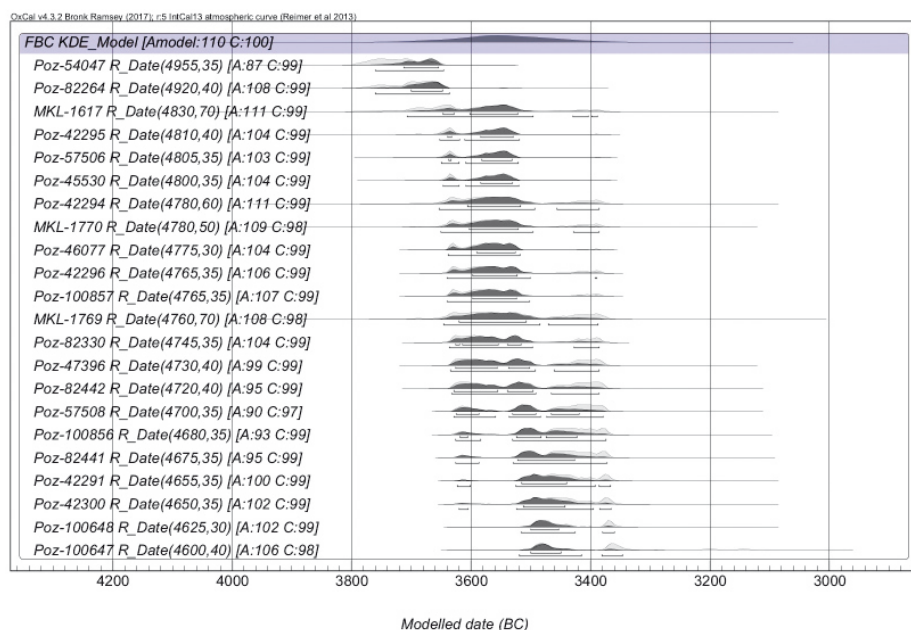


Fig. 9. Model IIIb (KDE). Probability distribution. Edited by D. Król

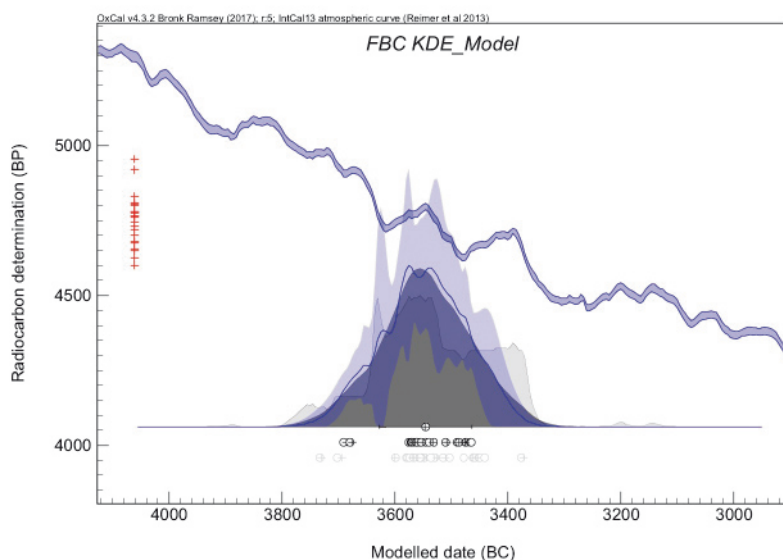


Fig. 10. Model IIIb (KDE). Probability distribution. Dark grey – estimated KDE distribution; blue line and light blue band – mean ± 1 sigma snapshot of KDE distribution; light grey – basic summation of all probabilities of ^{14}C dates. Edited by D. Król

Table 2. Comparison of the values of FBC settlement models in the Rzeszów Foothills

	Non-model (SUM)	Model I (PHASE)	Model Ib (PHASE)	Model II (TB)	Model IIb (TB)	Model III (KDE)	Model IIIb (KDE)
Quantity	23	23	22	18	16	23	22
Spread 68.2%	3775-3111	3689-3327	3682-3463	3726-3507	3722-3569	3716-3319	3713-3450
Spread 95.4%	3798-3097	3730-3300	3714-3360	3772-3496	3772-3512	3763-3266	3761-3347
→ diff. 68.2%	664	362	219	219	153	397	263
→ diff. 95.4%	701	430	354	276	260	497	414
Start_B 68.2%	-	3716-3666	3702-3611	3621-3571	3620-3575	-	-
Start_B 95.4%	-	3764-3654	3743-3652	3639-3547	3646-3556	-	-
→ mean	-	3701	3689	3595	3600	-	-
→ median	-	3696	3684	3596	3599	-	-
End_B 68.2%	-	3356-3301	3479-3401	3579-3495	3562-3516	-	-
End_B 95.4%	-	3479-3256	3489-3350	3597-3488	3591-3497	-	-
→ mean	-	3338	3426	3536	3542	-	-
→ median	-	3333	3433	3531	3541	-	-
Span 68.2%	-	306-376	183-270	112-221	118-207	317-414	223-331
Span 95.4%	-	185-424	168-327	76-266	83-254	209-459	182-381
→ mean	-	332	240	172	165	354	279
→ median	-	337	234	172	164	359	279

SUMMARY AND CONCLUSIONS

Results of the Bayes and KDE simulations present a few different scenarios of the functioning of FBC communities on the loess areas of the Rzeszów Foothills (Table 2). No matter which method is adopted, the estimated values differ from the standard summation of probabilities of radiocarbon dates. Generally, the models indicate that the beginning of FBC settlement on the area in question cannot be placed before about 3740 BC, but probably in the period about 3730-3700 BC. It declined not later than about 3250 BC, probably close to 3430-3300 BC. Therefore, the duration of the entire settlement period was no longer than 400 years, possibly about 300-350 years. Models Ia and IIIa, which do not take into account the date from Pawłosiów, site 52: Poz-42401 4510 $\pm$ 35 BP, delimit this period even more – to about 230-280 years.

For the purposes of the research objectives outlined at the beginning of the paper, the presented statistical facts seem to be significant. They indicate that FBC settlement on the Rzeszów Foothills was of a shorter duration than the superficial interpretation of absolute and relative chronological indicators may suggest (cf. the case of Skołoszów, site 31). Conclusions drawn from the presented analyses should be verified by thorough studying of FBC settlement-cultural development, including sites with ceramic assemblages of the most archaic and most recent styles.

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THE DEAD DON'T BURY THEMSELVES: REFLECTIONS ON ATYPICAL BURIAL ARRANGEMENTS AND GENDER IN MIERZANOWICE CULTURE CEMETERIES

ABSTRACT

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Many archaeological and bioarchaeological studies of the past – and too many in the present day – have confined their investigations of gender to an assumed male/female, man/woman binary. Many Early Bronze Age cemeteries in Central Europe offer the possibility of going beyond the binary, thanks to their richly and complexly gendered burial practices. In this study, 12 burials from three Mierzanowice culture cemeteries in Poland are investigated bioarchaeologically. These burials are of particular interest because each one in its own way deviates from the typical manifestations of gender in the mortuary practices of this time. Questions are raised, and potential implications are discussed relating to conceptions of gender in these Early Bronze Age communities.

Keywords: Mierzanowice culture, Early Bronze Age, atypical burials, gender, bioarchaeology, osteoarchaeology

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INTRODUCTION

The Early Bronze Age saw the standardization of certain aspects of burial arrangements and orientations within various spheres of cultural contact throughout much of Central Europe. Influences from preceding cultural paradigms such as the Corded Ware and Bell Beaker phenomena were assimilated to varying degrees into unique regional

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expressions within the funerary sphere (Włodarczak 2017). Characteristics of burials that were typically standardized included the axis of the body with respect to cardinal directions, the side of the body on which the deceased was placed, the direction of the face of the individual, and the suite of appropriate grave goods. For Únětice culture (UC) burials, the axis differed regionally, but on the territory of modern-day Poland, it was typically N/S (Sosna 2007; Vandkilde 2007; Pokutta 2013; Czebreszuk 2013); for groups of the Circum-Carpathian Epi-Corded culture Circle (ECC), including Mierzanowice culture (MC) communities, the directional axis was usually E/W (Kadrow 1994; Kadrow and Machnik 1997; Marková and Ilon 2013).

An important distinction between these paradigms, however, is that the axis of the body appears to be a strongly gendered symbol in ECC regions, but not among UC groups. At Únětice culture cemeteries in Poland, for example, most individuals in flat graves are laid on their right sides, with their heads to the south, feet to the north, facing east (Czebreszuk 2013; Pokutta 2013); some UC groups in Slovakia seem to follow directional and gendered aspects of ECC burials (Marková and Ilon 2013). In Epi-Corded cemeteries, males and females are almost always buried in mirror-opposite positions: they lie on different sides (or at least with legs and head turned to different sides), with their heads to opposite ends of the compass, yet on the same axis. Throughout much of the ECC region, including among MC communities, males are on their right sides with their heads to the west and feet to the east, and females are on their left sides with their heads to the east and feet to the west (Kadrow 1994; Kadrow and Machnik 1997; Czebreszuk 2013; Marková and Ilon 2013). In fact, this type of mirror-opposite, *seemingly* sex-based schema holds throughout a large portion of the Carpathian Basin (O'Shea 1996; Marková and Ilon 2013), and among what Helle Vandkilde (2007) calls the Danubian cultures. There are some regional differences with regard to which sides and directions are assigned to males versus females, but the symbolism of both side and direction seems to have a gendered aspect throughout most of these territories.

Given the truism that “the dead don’t bury themselves”, and taking into account that mirror-opposite sex- (or gender-) based arrangements held in this region from approximately 2800/2700 BCE to around 1600 BCE (in Lesser Poland, in any case) (Kadrow and Machnik 1997; Włodarczak 2017), one can assume that such burial characteristics are rooted in a deep ideology with certain conceptions of gender, and that, taphonomy aside, no aspect of the arrangement of a burial was “accidental”. For this reason, I believe it to be particularly informative to look at what might be called “atypical” burial orientations, or “exceptions to the rule”. Accordingly, in this paper, a dozen such burials from three MC cemeteries in Lesser Poland are examined – some for the first time. The goal is to examine the specifics of each case as well as any generalities, and to begin a conversation about how bioarchaeological approaches might help to shed light on conceptions of gender in Early Bronze Age Central Europe.

THEORETICAL CONSIDERATIONS REGARDING SEX AND GENDER

Sex and gender are still often conflated, or at least not properly differentiated in archaeological literature. For this reason, it is necessary to begin with the basic distinctions between the two. At the most fundamental level of the term, sex is the biological state of an individual as pertains to their primary and secondary sexual organs and characteristics. Gender, on the other hand, is the set of social meanings, values, and expectations placed on categories of sex.

The concept of gender as something related to, but distinct from biological sex, has been in existence since at least 1955, made explicit by psychologist and sexologist John Money (Money 1955; Haig 2004). By the 1980s, considerable numbers of feminist scholars had adopted and expounded upon the concept of gender (Haig 2004). Perhaps the most common understanding of gender in its earliest usage in archaeology and bioarchaeology was as the sum of *social* conventions and expectations for behavior, personality, and performance based on biological sex; in other words, sex is biological and gender is cultural (e.g., Armelagos 1998; Johnson 2011). More recently, scholars such as Pamela Geller (2008; 2017) have called for bioarchaeologists to resist foisting the “presentist” schema of male/female, man/woman on the societies of the past that we study.

In fact, the ubiquity and antiquity of gender variants beyond the binary is well established. Herodotus mentions a category of “effeminate” men, “afflicted... with a feminizing disease”, among the Scythians, called “Enarees”, at least some of whom were soothsayers (Herodotus 2014, I:105, IV:67). Serena Nanda (2014) documents many historic and ethno-historic examples of gender variants, including Navajo *nádleeḥ*, Mohave *alyha* and *hwame*, Indian *hijras* and *sâdhins*, and Albanian *burneshas*. Often called “sworn virgins”, *burneshas* have been reported among Albanian and western Balkan pastoralist populations since at least the 19th century. These biological females become gendered men, socially – often to fill the roles of sons in a family without suitable male heirs. They embody this new role through clothing, behavior, speech, and are afforded privileges typically reserved for biological males. Although everyone knows that they are not biologically males, they are generally treated as social men throughout their societies (Nanda 2014).

Regardless of the biological sex of these individuals, their gender variance is generally not recognized as a complete transition from man to woman, or vice versa, but rather as a different status altogether. Often, this involved being seen as having qualities of both men and women, or of being biologically one sex while taking on the gender typically associated with the other sex. In all of these examples, one of the defining characteristics of a gender variant is engaging in labor that is typically reserved for the opposite sex. The degree to which a gender variant would be allowed to participate in all social roles and enjoy all social privileges of the opposite sex/gender varied across cultures. One would expect the same would be true of how they were treated in death. As a case in point, René

Grémeaux (1996) documents the funeral of one *burnesha* who was afforded the customary masculine ceremonial clothing for their burial, but was not given the traditional male funerary lamentation.

BIOARCHAEOLOGICAL APPROACHES TO GENDER

Gender is a complex phenomenon that arises out of the social categorization of biological differences, the imbuelement of those categories with meaning, the definition of socially sanctioned roles associated with each category, and the performance and contestation of those roles by individuals (Butler 2006; Nanda 2014). And as gender is performed, practiced, and embodied throughout one's life, patterns of osteological "sedimentation" of biomechanical stresses and bodily modifications associated with these performances can be sought (Sofaer 2006).

In the pursuit of information on gender in past societies, bioarchaeologists have variously looked at musculoskeletal stress indicators, pathological markers on bone, and traces of blunt- or sharp-force trauma. Such approaches have been used in studies that have been suggestive of gendered differences in labor practices (e.g., Milner and Larsen 1991; Robb 1997; Larsen 1998; Lorkiewicz 2011). Additionally, a large bioarchaeological literature exists regarding differential disease risk (e.g., Bird and Rieker 2008; Grauer and Stuart-Macadam 1998; Koziol 2012; Martin 1997) and exposure to violent trauma (e.g., Martin 1997; Robb 1997; Walker 1997; Grauer and Stuart-Macadam 1998; Koziol 2012; Tung 2012) based on salient social categories such as sex, gender, age, and occupation.

There have been relatively few bioarchaeological studies to address non-binary gender categories, but a couple are worth noting. Over a decade prior to Pamela Geller's appeal to bioarchaeologists, Hollimon (1996) used data on gendered patterns of degenerative joint disease and of grave goods, along with anthropologically estimated biological sex to infer the possible existence of "two-spirit" burials in a Chumash population. There are also notable studies pertaining to the possibility of gender variant burials in Early Bronze Age Europe. Sosna and colleagues (2008), for example, used a resampling approach at an Únětice cemetery in Rebešovice, Czechia, to demonstrate the near parity of treatments of males and females in terms of overall wealth and emphasis given to burials. More relevant for this paper, however, is their brief discussion of an individual of indeterminate sex, who exhibits both typically masculine and feminine burial characteristics. They entertain the possibility of a "gender transformer" (Sosna *et al.* 2008, 352), but claim that an elite female with masculine traits attached to her position is more likely.

At least one study has used ancient DNA to examine the concordance between "archaeologically" sexed individuals (using burial orientation and grave goods) and their genetic sex according to the presence or absence of the SRY gene. In this study, Michaela Vaňharová and Eva Drozdová (2008) were able to extract DNA from 21 individuals, in-

cluding mostly juveniles and children. They found that, of 13 typically masculine burial configurations, there was one female of indeterminate age. More strikingly, of seven typically feminine burials, six were of biological males, including three young children and three individuals ranging between 15 and 22 years of age. Although they decline to speculate on the significance of this discordance, Jan Turek (2016) writes of the possibility that either the males buried in typically feminine arrangements may have been meant to be raised as (social) women, or on the other hand, they may not yet have undergone a rite of passage to attain full status as a man. As a final example, Porčić and Stafačević (2009), in their study of the Early Bronze Age cemetery at Mokrin in Serbia, used a cluster analysis of enthesal development to show that different labor divisions and practices interacted with sex and status, as indexed by grave goods. Approaches such as this, which take account of musculoskeletal stress indicators in a holistic sense, have the potential to be particularly informative about individuals buried in an “atypical” manner, and also about divisions of labor beyond the binary.

BACKGROUND OF REGION AND SITES IN CURRENT ANALYSIS

The burials examined in this paper come from cemeteries of the Mierzanowice culture in Lesser Poland. Generally, in this region, sites and cemeteries are located in the loess upland areas, although additional environments are exploited and settled increasingly in the later stages of the MC. The Mierzanowice culture can be dated to between 2400/2300 BCE and about 1600 BCE at the latest (Kadrow and Machnik 1997; Górski *et al.* 2013; Włodarczak 2017). The phenomenon is divided into Proto-Mierzanowice (~2400/2300–2200 BCE), Early Mierzanowice (~2200–2050 BCE), Classic (beginning around 2050), and Late (beginning between 1950/1750 and ending between 1950/1600, depending on the region and group) Phases (Kadrow and Machnik 1997; Włodarczak 2017). The Late Phase saw increasing regionalization of ceramic styles, diversification of settlement types and burial grounds, an increase in craft specialization, and a growing emphasis on the status of deceased individuals, as indicated by the uneven distribution of prestige goods in graves (Włodarczak 2017). However, the principal features of burial arrangements and orientations remained largely the same over the territory of MC groups in Lesser Poland. In particular, this includes the aforementioned gendered aspects relating to the placement of the body.

As previously discussed, at MC sites in Lesser Poland, the majority of burials tend to be oriented about an E/W axis (with a certain amount of angular variation around this axis) – males with their heads to the west, females with their heads to the east, in each case with the face directed to the south. As this arrangement would imply, males are typically buried on their right sides (or on their backs, with their legs and heads turned to the right) and females on their left sides. Although the sex of subadults cannot be reliably estimated,

their burials seem to follow a similar pattern. Out of 121 individuals from four MC cemeteries (Szarbia, Szarbia Zwierzyniecka, Żerniki Górne, Kichary Nowe) for whom burial orientations could be reliably ascertained, about 61% of subadults were buried W/E (head to the west), compared to 56.6% of adults, and 39% were buried E/W, compared with 41.7% of adults (the remaining 1.7% of adults were buried along a N/S axis).

There are at least three components of a burial that seem to be gendered: the primary axis of the body (including direction of the head and feet) and, to some extent, certain grave goods (see Summaries of atypical burials below) – but also, the side on which the deceased is buried. Most often, the side and the axis follow a normative pattern (W/E – R side; E/W – L side). However, in a minority of cases, individuals are buried facing north, which also means that the typical complement of axis and side is violated: for example, individuals buried W/E, but on their left side, or individuals buried E/W, but on their right side. The symbolic significance of this arrangement should not be taken for granted. It is possible that, since both axis and side are gendered, this combination of differently gendered components has a social significance regarding the status of the individuals. It is equally possible that it is rather the unorthodox positioning of the face to the north that takes precedence, and the side on which the body is laid is but a side effect. Either way, this phenomenon seems to happen at many MC cemeteries at small, but not insignificant frequencies. In Part I of his two-volume work on MC cemeteries of the Sandomierz Uplands, Jerzy Bąbel gives a tally, in Table 14, of the orientations of the faces of 169 individuals from seven sites (Bąbel 2013, 78). The table shows that 8/169 individuals, or about 4.73%, were buried facing north. Furthermore, I was able to calculate, using information from Kadrow and colleagues on the cemetery at Iwanowice, Babia Góra (Kadrow *et al.* 1992), that of 82 adults for whom sex, burial axis, and side could be reliably estimated, one (1.2%) was buried facing north (female; E/W – R). Similarly, one (3.8%) out of 26 subadults was buried facing north (W/E – L), for a total of 2/108, or about 1.9% of individuals for whom the necessary information could be estimated. It is worth noting that this subadult individual – actually a juvenile of about 17-18 years of age – was estimated to be male, and was lying in a double grave with another juvenile, estimated to be male; the two individuals appear to be facing one another.

In this paper, burials that are “atypical” in some aspect of the usual gendered signifiers are investigated from three cemeteries of the MC: Szarbia Zwierzyniecka, Żerniki Górne, and Szarbia (Koniusza commune). Excavations at Szarbia Zwierzyniecka (Skalbmierz commune, Kazimierza County, Świętokrzyskie Province) were carried out between 1980 and 1985, and were led by Barbara Baczyńska. The cemetery, which was the focus of the research, was located next to a settlement, and is estimated to have included approximately 540 graves in total. The excavated portion included 82 human burials. The cemetery appears to have functioned from the Classic through the Late Phase of the MC. Radio-carbon dates from both the settlement site and the cemetery indicate that the existence of the settlement complex was from about 2130-1664 BCE (Baczyńska 1994).

The cemetery at Żerniki Górne (Busko-Zdrój commune, Busko-Zdrój district, Świętokrzyskie Province) was a multi-period site (Corded Ware, Bell Beaker, Mierzanowice, Trzciniec) that was primarily excavated between 1965 and 1968 by Andrzej Kempisty (Kempisty 1978). In all, 39 burials of the MC were uncovered. Finally, the cemetery at Szarbia (Koniusza commune, Proszowice district, Lesser Poland Province) was excavated in the year 2000 by Barbara Baczyńska. In all, 44 graves of the Mierzanowice culture were discovered. As this was a rescue excavation, only the most endangered portion of the cemetery was excavated. The majority of the burials come from the Late Phase of the MC, with a small number coming from the later part of the Classic Phase (Baczyńska 2000a).

Two of the three sites have previously been investigated anthropologically to some degree. Szarbia Zwierzyniecka was analyzed by Elżbieta Haduch (1997). In her analysis, Haduch estimated the sex and age of the individuals as well as trauma and pathologies, such as *cribra orbitalia* (Haduch 1997; Gleń-Haduch *et al.* 1997). A large portion of the published anthropological monograph focused on morphological and craniometric aspects of the skeletons. The skeletons from Żerniki Górne were investigated by Andrzej Wierciński and Alina Wiercińska (Kempisty 1978). The primary analyses carried out seem to have been estimations of age and sex. A later study (Tomczyk *et al.* 2012) was carried out, looking at the frequency of linear enamel hypoplasia (LEH), but the article indicates that only the Corded Ware and Trzciniec burials were analyzed. No specific mention of MC individuals was made, although it is possible that they were subsumed into one or the other group. The Szarbia site (Koniusza commune) had not been previously analyzed by an anthropologist. The estimations and determinations (sex, age, pathology, trauma, entheses, etc.) used in the current paper are those carried out by the author (regardless of whether they were previously conducted) to ensure intraobserver consistency.

METHODS

Multiple anthropological methods were used in the estimation of the sex and age of individuals, and a composite result was obtained for each individual. For age estimation of adults, features of the pelvis were analyzed using the methods of Brooks and Suchey (1990), Todd (1920; 1921), and Lovejoy and colleagues (1985). Suture closure of the cranium was assessed per Meindl and Lovejoy (1985) and Buikstra and Ubelaker (1994). Where such methods were of little use due to lack of diagnostic features or taphonomy, dental attrition (Lovejoy 1985) was assessed. When possible, greater weight was given to indicators of the pelvic region for adults with fully fused epiphyses. Scheuer and Black (2000) and Buikstra and Ubelaker (1994) were used to estimate age for younger individuals based on long-bone fusion, and methods compiled in Bass (2005) and White and Folkens (2005) were used to estimate age based on stages of tooth development and eruption.

Estimation of sex was carried out using the heuristics detailed in Buikstra and Ubelaker (1994), including the characteristics of the ischio-pubic region as described by Phenice (1969). However, given the lack, or taphonomic degeneration of the ischio-pubic region for many individuals, as well as the subjective nature of categorical assessments of the greater sciatic notch (especially in cases of individuals who do not fall at the extremes), the multi-component method of Jaroslav Bruzek (2002) was also used. Where there was a slight disagreement between methods (e.g., probable male vs. male, or indeterminate vs. male), the more robust methods were given extra weight. However, in the case of extreme disparity in results or where a high degree of ambiguity existed, the sex was considered “indeterminate”.

This study also attempted to document, where possible, skeletal indicators of nutritional insufficiency (e.g., porotic hyperostosis, cribra orbitalia, rickets, scurvy), dental disease (e.g., caries, antemortem tooth loss, abscesses, linear enamel hypoplasia or LEH), infection (e.g., osteomyelitis, periostitis), and general indicators of health, such as adult stature, using the methods described in Ortner (2003), Ruff *et al.* (2012), Waldron (2009), Mann and Hunt (2005), and Buikstra and Ubelaker (1994). Individuals were also inspected for blunt force and sharp force trauma, including cranial depression fractures, radiating fractures, spiral fractures, parry fractures, cutmarks, and percussion marks, using the methods of Wedel and Galloway (2014).

Given the aforementioned significance of divisions of labor in social constructions of gender, indicators of musculoskeletal stress were also recorded. Here, musculoskeletal stress is used to signify any load or biomechanical demand placed upon the skeletal system. Markers of musculoskeletal stress that were used in this study were primarily osteoarthritic in nature (marginal osteophytes, eburnation, new bone formation, pitting), and were evaluated per Waldron (2009) and Mann and Hunt (2005). Elsewhere, I have attempted to reconstruct patterns of labor using enthesal robusticity, but results are beyond the scope of this paper and have been omitted.

SUMMARIES OF ATYPICAL BURIALS

The graves described below (summarized in Table 1) are all unusual in some typically gendered aspect of their burial regimes. Two of them are males (one probable male) buried in the gendered female orientation (E/W – L). One is an individual buried E/W – L, but with a masculine grave offering. Nine are buried on an east-west axis (some E/W, others W/E), but are facing north.

Grave goods at these cemeteries are found in burials of males, females, and children, and they appear to be gendered as well. By “gendered”, here, I mean that certain items are statistically more frequently associated with particular burial orientations, which are most often associated with a particular sex – though, importantly, not always. As Mike Parker

Table 1. Summarizing information for atypical burials. Abbreviations – M – male, PM – probable male, I – indeterminate sex, PF – probable female, F – female, UD – unable to determine, SA – subadult, J – juvenile, YA – young adult, MA – middle adult, OA – older adult, UA – unspecified adult, AMTL – antemortem tooth loss, OA – osteoarthritis, LEH – linear enamel hypoplasia

Site	Grave	Orientation	Side	Sex	Age	Grave Goods	Pathologies
Szarbia Zwierzyniecka	5/V	E/W	L	M	MA	ceramics, 70 faience beads, 30 shell beads, 2 bone pins	Spondylolysis in L4
Szarbia Zwierzyniecka	19/XI	E/W	L	PM?	MA/OA	3 bronze earrings, 5 faience beads, 10 shell beads, ceramic fragments, flint flakes	caries (1 tooth), AMTL (2 teeth)
Szarbia (Koniusza commune)	50	E/W	L	I (F?)	MA	125 shell beads, 1 arrowhead	OA on thoracic vertebra, abscess above M1?
Szarbia (Koniusza commune)	37	W/E	L	PF	MA	1 bronze ornament (<i>blaszka/okucie</i>), 1 bronze willow-leaf ornament, bone pin fragment	caries (1 tooth), OA on L5
Szarbia (Koniusza commune)	21	E/W	R	UD (F?)	YA	None	<i>cribra orbitalia</i> , LEH (9 teeth), OA on dens of C2
Szarbia Zwierzyniecka	3/III	E/W	R	UD (M?)	UA	50 shell beads, 1 faience bead, 1 bone divider, 1 clamshell disk (<i>tarczka</i>), flint flakes, ceramic fragments	Schmorl's node (1 vertebra)
Szarbia Zwierzyniecka	7/XI	E/W	R	UD	UA	42 shell beads, 19 bone beads, 6 faience beads, 1 clamshell divider, flint flakes, ceramic flakes	None
Szarbia (Koniusza commune)	35a	W/E	L	N/A	SA (1-3)	1 bronze earring, 1 bone pin	None
Szarbia Zwierzyniecka	1/III	E/W	R	N/A	SA (8-12)	7 faience beads, ceramic fragments, potsherds, bovine femur	<i>cribra orbitalia</i> , caries (1 tooth)
Szarbia (Koniusza commune)	26	W/E	R	N/A	SA (10-12)	numerous shell beads, 16 shell pendants, 1 bone pin	None
Szarbia (Koniusza commune)	26	E/W	R	PF?	J/YA (16-22)	shell beads, 13 faience beads, 3 animal-tooth pendants	caries (1 tooth), AMTL, (2 teeth)
Szarbia Zwierzyniecka	23/IX	E/W	R	M?	UA	clay pot, 1 faience bead?, fragments of boar-tusk pendant?	OA (5 vertebrae), OA (shoulder)
Szarbia Zwierzyniecka	23/IX	?	?	N/A	SA (2-4)	1 faience bead?, fragments of boar-tusk pendant?	None
Żemiki Góme	75	E/W	R	UD (M?)	UA	1 awl, 1 pendant (unspecified material)	perimortem ulnar and radial fractures
Żemiki Góme	75	?	?	N/A	SA (?)	None	None

Pearson points out, funerary practices, including bodily treatment, orientation, and adornment, create an “idealized representation – a ‘re-presenting’ of the individual by others...” (1999, 4). Although the clothing, adornments, and items given the deceased for burial may or may not have been owned or used by the dead during life, they capture some reality of the perception of the dead by the living. It is this idealized presentation that makes grave goods so informative about the social construction of gender in a society.

For many types of grave goods found at these cemeteries, there is more fluidity than might be indicated by the burial orientations. According to existing literature, items which are primarily reserved for male graves include stone battle axes, arrowheads and stone wrist guards, boar-tusk pendants, discs or badges (in the Polish literature, variously: *tarczki*, *blaszki*) made of bone or copper, and sometimes pins and antler artifacts. Predominantly female items include beads of bone and mussel shell (used in necklaces and other manner of jewelry), necklaces of animal teeth, copper or bronze spiral-shaped earrings, and needles (Baczyńska 1994; Kadrow 1994b; Kadrow and Machnik 1997). Although they are apparently more prevalent in female graves, beads of bone and mussel shell can be found in the graves of males as well.

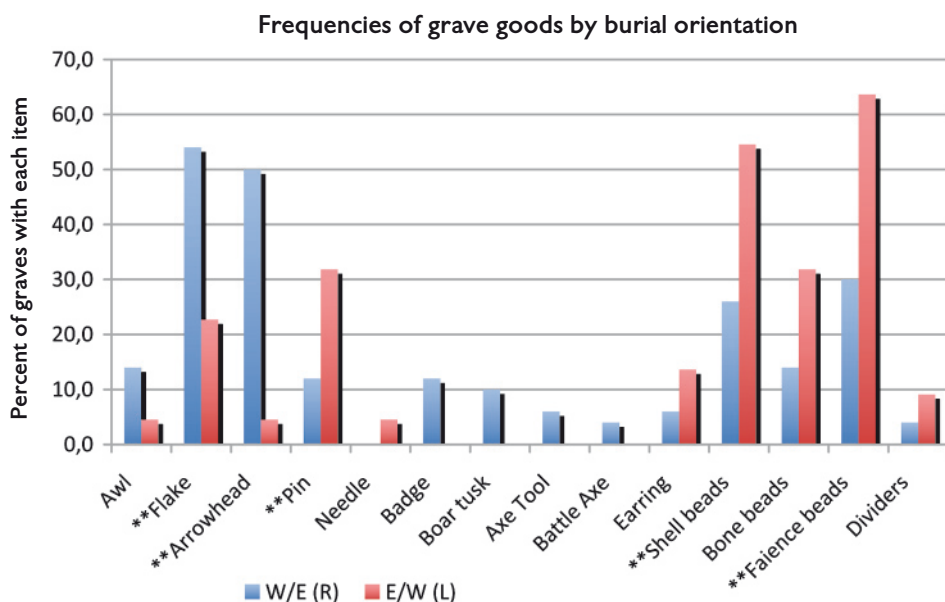


Fig. 1. Frequencies of grave goods by burial orientation. Percent of burials in “masculinized” and “feminized” orientations that include each type of grave good. A double asterisk (**) next to the grave good indicates a statistically significant difference in frequency between burial orientations. Abbreviations: W/E (R) – the “masculinized” burial orientation; head to the west, feet to the east, laid on or turned toward the right side of the body. E/W (L) – the “feminized” burial orientation; head to the east, feet to the west, laid on or turned toward the left side of the body. Edited by M. Toussaint

As part of the analysis for this paper, grave goods from the three cemeteries in question were divided into 25 categories and tallied based on whether they were found in burials of W/E – R oriented individuals or E/W – L alignments (for this part of the analysis, the north-facing burials were omitted). Most items could be found in either type of grave, but there were a handful found only in one orientation or another. Boar tusk pendants, stone “battle axes”, flint axe tools, and “badges” could only be found in the “masculinized” orientations. Needles (*igły*, in the Polish literature) were restricted to the “feminized” orientations, but it should be noted that out of 72 of the investigated graves, only one needle was found; moreover, it is not clear whether pins (*szpilki*), which are found in graves of both orientations, and needles (*igły*) are always clearly differentiated in the literature. Statistical analysis of the frequencies of each class of objects in the different orientations showed a significant difference in only five of the categories (Fig. 1): arrowheads and flint flakes (including items given variously as *odłupek*, *łuszczeń* in the Polish literature) were found significantly more often in W/E – R orientations, whereas pins, shell beads, and faience beads were found more frequently in E/W – L orientations (chi-square or Fisher's exact test, depending on the frequencies; $p < 0.05$).

Males or Probable Males in E/W – L orientations

Szarbia Zwierzyniecka: grave 5/V

The individual in grave 5/V is buried along an E/W axis, with their legs (and presumably their head) turned to the left, which is a typically “feminine” burial orientation. The lower half of the skeleton is in anatomical position, while the upper part has been secondarily displaced and mixed. The individual was buried in a Late Phase grave pit that was partially dug into a Classic Phase settlement pit (Baczyńska 1994). Grave goods include ceramics, 70 faience beads, 30 shell beads, and two bone pins. Although none of these are exclusively diagnostic of feminine graves, the complement of grave goods fits the feminine schema well. Elżbieta Haduch estimated the individual to be a male of age category *maturus/senilis*, approximately 50 years old (Baczyńska 1994; Haduch 1997). My assessment largely concurs; the individual is clearly male (based on pelvic morphology – the skull is missing), probably in the Middle Adult age category (35-49 years; Buikstra and Ubelaker 1994).

Due to the lack of a skull, many classic paleopathological indicators were not able to be assessed. However, out of 12 present vertebrae, no Schmorl's nodes were found, nor were any osteoarthritic changes noted. Neither was osteoarthritis noted in any of the major joint systems (shoulder, elbow, hip, knee). The only pathological change noted was spondylolysis in the fourth lumbar vertebra (L4). This was also noted by Haduch (1997), who additionally mentioned traces of spondyloarthrosis in thoracic vertebra 12 (T12) and L1 and L2. She connected these pathologies to scoliosis. According to the summaries of Waldron (2009) and Mann and Hunt (2005), the exact causes of spondylolysis are unknown, and may be congenital, stress-related, or both. However, these sources also state that bio-

mechanical stress is likely to play a part. This is a condition that seems to be acquired in childhood, and is more common in males than females.

Szarbia Zwierzyniecka: grave 19/XI

This individual was preserved in a highly fragmented state, and was also buried in the typically “feminine” orientation (E/W – L), based on the positions of the remaining bones (Baczyńska 1994). Haduch (1997) lists the individual as a female of age group *senilis*, more than 60 years old. In my analysis, I was unable to locate any diagnostic fragments of the pelvis, and based on a rather masculine skull (especially with mastoids, supraorbital margins, and nuchal crest scoring a 4 out of 5 on the scale given in Buikstra and Ubelaker 1994), I estimated the individual to be a “Probable Male”. Given the poor preservation of the exocranial surface, my age estimate of Middle or Older Adult was based on extreme tooth wear. One caveat with regard to sex estimation based solely on the skulls of older individuals is that traits of female skulls are known to masculinize somewhat with increasing age (Meindl *et al.* 1985). The individual was buried with three bronze earrings, five faience beads, 10 shell beads, ceramic fragments, and flint flakes. These grave goods mostly follow a typically “feminine” pattern, but it is worth noting that, although flint flakes are not exclusively “masculine” items, they are found statistically more often in W/E – R graves.

Due to missing skeletal elements and poor preservation, none of the osteoarthritic changes could be assessed. The one orbital present did not show signs of *cribra orbitalia*. Out of 16 present teeth, no linear enamel hypoplasia (LEH) and no abscesses were noted. However, one instance of caries and two instances of antemortem tooth loss (AMTL) were found.

(Possible) Female with masculine grave offering

Szarbia (Koniusza commune): grave 50

The individual in grave 50 was lying on their left side, head to the east, feet to the west – the prototypical “feminine” burial position. Found in the grave were 125 shell beads and one heart-shaped arrowhead, discovered under the left elbow of the individual (Baczyńska 2000b). The shell beads can, as mentioned previously, be found in both “masculine” and “feminine” grave orientations, but are more common in E/W – L arrangements. However, arrowheads are nearly exclusively found in W/E – R orientations. They form an essentially “masculinized” category of grave goods. There was no indication of sharp force trauma on this individual that would suggest the arrowhead was in the grave as a result of injury.

As for the sex of the individual, it is a rather complicated issue. On the one hand, the greater sciatic notch appears to score a 5 (female) on the 1-to-5 scale as presented in Buikstra and Ubelaker (1994). However, the picture is a bit more ambiguous using the methods laid out in Bruzek (2002). The shape and symmetry of the greater sciatic notch register as female, but both the preauricular sulcus and the composite arch register as male. The

preauricular sulcus is shallow, with an open circumference, which is given in Bruzek (2002) as being seen more frequently in males. Furthermore, the features of the skull are intermediately robust, most scoring a 3 on the 1-to-5 scale mentioned above, which is “indeterminate”. I estimated the individual to fall into the Middle Adult age category, perhaps between about 40 and 50 years of age, based primarily on vault fusion and tooth wear; the pubic symphysis was not preserved and the auricular surface was too taphonomically altered to assess with any degree of confidence.

Based on the available indicators, the individual seems to have enjoyed relative health in life. Out of 21 teeth present, there were no signs of caries or LEH. No AMTL was noted. There may have been an abscess into the left maxillary sinus above M¹, but taphonomic changes make it difficult to say definitively. No *cribra orbitalia* nor porotic hyperostosis were visible. Out of nine remaining vertebrae, no Schmorl's nodes were present, and only one thoracic vertebra showed slight signs of osteoarthritis (OA). Of the two major joint systems that were able to be analyzed (shoulder and hip), no OA was seen. Traces of trauma were also absent.

Single, adult burials facing north

Szarbia (Koniusza commune): grave 37

The individual in grave 37 was buried W/E, on their left side, facing north (Fig. 2). Analysis of diagnostic traits led to a biological categorization of the individual as a Probable Female. Both cranial and pelvic traits support this estimation. Anthropological analy-



Fig. 2. Grave 37, Szarbia (Koniusza commune). Probable Female, Middle Adult. Laid along a W/E axis, on left side of body, face looking north. Photo by P. Włodarczak

sis indicates that she was a Middle Adult (perhaps between 35 and 45 years of age). The individual was richly endowed with grave goods. Among the inventory of the grave were: a bronze adornment (*blaszka/okucie*) probably used as part of a belt, a bronze ring-like ornament with a willow-leaf motif, part of a bone pin, a fragment of a boar tusk pendant, a miscellaneous bone tool, two animal teeth, 275 shell beads, 51 shell dividers, 47 bone beads, and four faience beads (Baczyńska 2000b). As described above, boar tusk ornaments and items described as *blaszki* are usually found in “masculine” burial orientations. The other items are either not gender-specific, or are found more frequently in graves of “feminine” orientation.

Only two pathologies were noted on the skeleton. One out of 18 teeth presented with caries. Of the three vertebrae present, one (L5) showed signs of osteoarthritis. There were no traces of trauma on the skeleton.

Szarbia (Koniusza commune): grave 21

This individual was buried E/W, on their right side, facing north (Fig. 3; Baczyńska 2000b). Features of the skull are rather gracile. The pelvis is fragmented, making sex estimation difficult. The greater sciatic notch appears to register as a 2 or 3 on the 1-to-5 scale. Use of the methods described in Bruzek (2002) was largely rendered infeasible due to the



Fig. 3. Grave 21, Szarbia (Koniusza commune). Sex Indeterminate (possible female?), Young Adult. Laid along an E/W axis, on right side of body, face looking north. Photo by P. Włodarczak

state of preservation of the pelvis. As a whole, the skeleton appears more feminine than masculine, but based on the state of preservation, I am not comfortable making a strict anthropological determination. The individual appears to be a Young Adult (perhaps between 20-25/30) based primarily on tooth eruption and wear. No grave goods were found with this individual.

One of the orbits of the individual shows slight traces of *cribra orbitalia*. Of the 30 teeth present, none show signs of caries, but nine exhibit LEH. Neither AMTL nor abscesses are visible. There is no porotic hyperostosis, and none of the major joint systems show signs of osteoarthritis. The dens of C2, however, does show some traces of OA, particularly with the partial ossification of the apical odontoid ligament. There are no Schmorl's nodes present in any of the nine preserved vertebrae.

Szarbia Zwierzyniecka: grave 3/III

In grave 3/III, a fragmentarily preserved skeleton, secondarily disturbed, was found. On the basis of the lower limbs, which appear not to have been moved, the original position of the skeleton was thought to be E/W – R (Baczyńska 1994). Based on the fusion and size of the long bones, Haduch (1997) suggested that the individual was an adult male. I refrained from estimating sex, given the lack of diagnostic elements, but the individual was certainly an adult – though which stage of adulthood is unclear. The individual was buried with 50 shell beads, one faience bead, one bone divider, one clamshell disk/badge (*tarczka*), a lenticular flint knife, flint flakes, and fragments of ceramics. Again, the disk/badge seems to be rather firmly connected with a masculine presentation, as do the flint flakes, although they can be found in graves of “feminine” orientation as well. The shell and faience beads are found more often, but by no means exclusively, in E/W – L graves.

Only one tooth and one vertebra were present. The tooth showed no signs of either LEH or caries. The vertebra presented with a Schmorl's node, but no OA. The only joint that could be assessed was the shoulder, and no OA was found. Additionally, no traces of trauma were seen on the remains.

It is worth noting that Haduch (1997) also indicated the presence of two lumbar vertebrae and some fragments of forearm bones of a subadult. I did not make note of these in my assessment. Nonetheless, it should be considered that this may have been some form of a double burial (see below), but this is unclear.

Szarbia Zwierzyniecka: grave 7/XI

The highly fragmented skeleton in grave 7/XI was scattered throughout various levels of the excavated pit. Based on the positions of the tibiae at the lowest level of the pit (where the largest group of bones was found), it was estimated that the initial orientation of the body was E/W – R (Baczyńska 1994; Haduch 1997). It should be mentioned, however, that such an orientation is difficult to reconstruct in the illustration given, which appears to better correspond to a W/E – R orientation. There were no diagnostic elements available

to make an estimate of sex or age, except to say that the individual was certainly an adult. As for grave goods, they were similarly disbursed throughout different levels of the pit. Items in the grave included 42 shell beads, 19 bone beads, six faience beads, a divider made out of clamshell, flint flakes, and ceramic fragments.

Very little was available to assess for pathologies, particularly considering that no skull was present. No traces of OA were found on the articular surfaces of the tibiae. There was also no evidence of trauma on any preserved elements.

Single, Subadult Burials Facing North

Szarbia (Koniusza commune): grave 35a

In grave 35a, a highly fragmented and secondarily disturbed subadult skeleton was found. It was inferred that the initial position of the individual was W/E – L (Baczyńska 2000b). Additionally, a layer of residue from burning, mixed with loess, was discovered where the legs of the individual should be. Based on tooth eruption, the individual was between 1 and 3 years of age. The child was buried with one bronze earring and one bone pin. Interestingly, in the site report, Baczyńska (2000b) notes that the grave pit is undoubtedly too large for this individual; this raises the possibility that perhaps it was prepared with a double burial in mind – eventually.

Eight teeth were present, none of which showed signs of LEH or caries. No traces of *cribra orbitalia* or porotic hyperostosis were found, and no signs of trauma either.

Szarbia Zwierzyńska: grave 1/III

The skeleton in this grave was incomplete, and secondarily disturbed. Based on the position of the skull and the lower limb bones (which seem to be the only parts of the skeleton in the original position), the individual was laid on their right side, with their head to the east and feet to the west. The state of fusion of the various bones and the degree of tooth eruption indicate an age of approximately 8-12 years. This is in fairly close agreement with the age estimated by Haduch (1997): 12-14 years. The child in the grave was found with seven faience beads, ceramic fragments and potsherds, and the femur of a cow (Baczyńska 1994).

As for pathologies of the cranium, one of the orbits showed slight traces of *cribra orbitalia*. No porotic hyperostosis was found. Of 25 teeth, one was affected by caries, but none bore signs of LEH. No traces of trauma were found on the bones.

Double Burials, One Individual Facing North

Szarbia (Koniusza commune): grave 26

This is an interesting case of a double burial in which the deceased are aligned along the same axis, but different orientations. Individual I lay with their head to the west, feet

to the east, facing south. Individual II lay with their head to the east, feet to the west, facing north. Thus, they are both on their right sides. It should be noted, however, that both skeletons are incomplete and bones are secondarily disturbed. Of individual II, primarily the skull and upper and lower limb bones remain. In the site report, Baczyńska (2000b) notes that although it is difficult to say much about the original orientation of individual II, the position of the hands suggests that they were on their right side (and thus, facing north). Furthermore, it seems as though individual I was placed into the grave first, and later, individual II was moved into the same grave.

Near the head and neck of individual I, numerous shell beads, 16 shell pendants, and a bone pin were found. Additionally, more shell beads, 13 faience beads, and three animal-tooth pendants were found near the chest of individual II. Tooth eruption indicates that individual I is a subadult, between the ages of 10 and 12. Based on a combination of tooth eruption and tooth wear, individual II is either a Young Adult or juvenile, between 16 and 22 years of age. Since the pelvis is missing from individual II, sex estimation was based on the skull, which is fairly feminine in its diagnostic traits. Provisionally, it scores as a Probable Female.

Individual II, which is the north-facing individual, shows no signs of *cribra orbitalia* or of porotic hyperostosis. Out of 25 teeth present, no traces of LEH were found, but there was one case of caries. Surprisingly, given the young age of the individual, there were two cases of antemortem tooth loss (R and L P₂). Taking into account the age of the individual, and the fact that the missing teeth are on the same position on either side of the mandible, it is possible that the use of these teeth as tools to process material may have played a role in their loss. Unsurprisingly (again, given the young age), neither of the joint systems that were complete enough to investigate (elbow and knee) shows signs of OA. The individual also showed no traces of trauma.

Szarbia Zwierzyniecka: grave 23/IX

This is a burial of an adult and a young child. The adult is given in the literature as being a male of age *senilis*, greater than 60 years old (Baczyńska 1994; Haduch 1997). Unfortunately, by the time of my examination, some items appear to have been moved or misplaced; the skull of the adult was missing and there were two os coxae from different adults. However, both os coxae had masculine traits, so this appears to be a secure estimation. Given the situation, I was unable to confidently assess the age of the individual, but it is certain that he was an adult. Based on tooth eruption and the degree of formation of the crowns of the permanent dentition, the subadult was approximately between 2 and 4 years of age, which generally agrees with the estimate of Haduch (3-4 years).

The adult male was laid on an E/W axis, generally on his right side, facing north. The child appears to have been cradled by the man. It is not clear on which side the child was laid, but it seems that the head was next to the face of the man. A clay pot was placed below the feet of the man. There was also a faience bead near the ribs of the man (and presumably

the neck of the child); it is unclear to whom this belonged. There were also fragments of what appears to have been a single boar-tusk pendant (Baczyńska 1994).

Although the skull of the man was missing at the time of my analysis, four adult teeth were present, none of which showed signs of caries or LEH. Of the 13 vertebrae present, five (thoracic and lumbar) showed signs of OA, but no Schmorl's nodes. There were traces of slight OA in the shoulder, but not in any of the other major joint systems. The individual showed no signs of trauma. As for the child, the cranial vault was too poorly preserved to assess porotic hyperostosis, and no orbits were present to evaluate *cribra orbitalia*. No signs of caries or LEH were noted, and no traces of trauma were found.

Żerniki Górne: grave 75

In grave 75 was a badly preserved skeleton, which appeared to have originally been laid with the head to the east and feet to the west. The literature (Kempisty 1978) does not specify the side on which the individual was laid, but from the illustration, it appears to be the right side; therefore, they were probably facing north. This individual was certainly an adult, but not enough diagnostic fragments remained for me to make a confident age or sex estimation. However, in the literature, they are given as "...mężczyzn[a] (?) w wieku wczesny *maturus*..." (Kempisty 1978:141), or essentially, a Middle Adult male (with uncertainty as to the sex). There were also some bones present from a subadult (given in the literature as early *infans I*), but not enough for me to accurately assess the age. An awl was found near the tibiae of the adult, and some manner of pendant was located near the chest.

Very little was available for paleopathological analysis, and none was found on either skeleton. The single tooth present from the subadult displayed neither caries nor LEH. Both the right ulna and the right radius of the adult were fractured at the distal end. Furthermore, the fragments of these long bones that would be distal to the fracture itself are not present. The ulnar fracture appears to be perimortem, based on the margins and coloration of the fracture. It is more difficult to say with confidence the timing of the radial fracture, but it was certainly either perimortem or postmortem. Both fractures are complete, oblique fractures, and the ulnar fracture certainly appears to be intentional; it is neither in a location nor in a manner consistent with accidental or taphonomic breakage. The fracture appears to begin proximally on the posterior side of the ulna, and proceeds distally to the anterior side. The same is true on the radius.

DISCUSSION

In attempting to determine the significance of the north-facing burials, it is important to look for any patterns – for example, between sex and orientation, sex and grave goods, the range of ages, and the relative wealth of the graves as indexed by grave goods. Of the nine north-facing burials discussed above, it would seem that a wide range of ages is pre-

sent, from very young children to Middle Adult and possibly Old Adult. Furthermore, grave endowments range from no grave goods to quite richly adorned individuals. This latter point makes one possible explanation for these fairly “atypical” orientations far less likely: that is, the possibility that social pariahs were buried in such a manner. The individual in grave 37 at Szarbia, for example, could hardly be considered *persona non grata*, given the richness and variety of deposited grave goods. Neither are these individuals buried away from others or outside the main cemeteries. Another explanation that could be explored is that these individuals may be non-locals. Although this cannot be ruled out with the currently available evidence, the fact that – as discussed above – north-facing burials are not common practice in any of the contemporaneous archaeological cultures of Central Europe certainly precludes the notion of burying non-locals in the manner of their native traditions.

Looking at some of the patterns that do exist among these north-facing burials may shed some light on their potential significance. Among the nine individuals buried facing north, two are aligned W/E and seven are aligned E/W. Of those aligned W/E, one is a subadult and one is a female. As for those aligned E/W, one is a subadult, one is a male, one is, *provisionally*, a Probable Female (Szarbia, grave 26), and sex for the remaining four adults could not be confidently estimated. Furthermore, of the nine burials in question, three are confirmed double burials (Szarbia 26, Szarbia Zwierzyniecka 23/IX, Żerniki Górne 75), one was indicated to have contained some bones of a second, subadult individual by Haduch (1997; Szarbia Zwierzyniecka 3/III), and one may have been prepped for a double burial (Szarbia 35a). Interestingly, in all three of the confirmed double burials, plus the one possible double burial (Szarbia Zwierzyniecka 3/III), the north-facing individual was laid in the E/W – R orientation. Of those, two were given clearly “masculine” grave goods, and one was given an awl, which is found more frequently in W/E graves, although not to a statistically significant degree. The one individual of these that was not given “masculine” grave goods is the one provisionally estimated to be a Probable Female (though, it should be noted that the individual is rather young). It is also important to consider that in all of the double burials that contain a north-facing individual, that individual is an adult, and the other individual is a subadult.

None of this data can point definitively to a conclusion as to the significance of north-facing burials, but some very interesting possibilities are raised. Firstly, taking into account the above, plus looking at the south-facing burials previously discussed, one notices that – at least at these three sites – we have one (and possibly two) male(s) buried in the prototypically “feminine” orientation (E/W – L; Szarbia Zwierzyniecka 5/V, and maybe 19/XI), but we have no females buried in the prototypically “masculine” orientation. The south-facing female that was discussed is buried E/W – L, but was given an arrowhead. The rest of the females discussed are north-facing: one is aligned W/E and was given some “masculine” grave goods, and two other *potentially* female individuals are buried E/W (though it should be considered that they may, in fact, be males).

Of course, this is purely speculative, but taken together, this data *could* suggest that males could live socially as females under certain circumstances, in a more complete way than females could live socially as males. Perhaps females who took on “masculine” roles in life were buried on their left sides so as to acknowledge their biological sex, but aligned W/E to signify their social functions. As for males, in addition to the possibility of living completely as gendered females, they may have been able to “transition” later in life – perhaps after their prime reproductive years or their martial usefulness – for example, in taking on the role of a caretaker. In fact, Jan Turek (2017) elaborates on the case of an elderly man from a Corded Ware cemetery in Bohemia who was buried in the manner usually reserved for females, arguing that “...some aged men may have decided to ‘retire’ as women for symbolic and practical reasons” (Turek 2017, 353).

It is intriguing that, four of the six E/W aligned north-facing adult burials are double burials that include a subadult. In one of those (Szarbia 26), it seems likely that the two individuals could be siblings, since they are so young and so close in age (10-12 and 16-22). Perhaps the north-facing, older individual was a caretaker for their sibling. More puzzling are the two north-facing subadult burials. If the above speculation that females – regardless of age – could not *fully* live as social males is correct, the W/E aligned subadult burial (Szarbia 35a) may not be so anomalous, were the child shown to be female. The one subadult (8-12 years old) north-facing burial in an E/W alignment (Szarbia Zwierzyniecka 1/III) is more of a conundrum. However, the fact that many of the bones in this burial were secondarily displaced should also be considered.

CONCLUSION

Given the plethora of historical and ethnographic data on gender variants in nearly all parts of the world, such phenomena should not be overlooked in prehistoric archaeology. The social nature of gender certainly makes it more difficult to “excavate” traces of it prior to the written record. However, those researching the Final Neolithic and Early Bronze Age in Central Europe are fortunate that burial orientations and grave goods are often so clearly imbued with significance relating to gender. This presents the opportunity for archaeologists, anthropologists, and bioarchaeologists to work together to try to piece together some of these clues about how people lived and died, in order to provide solid evidence of gender constructs in the past, and thus avoid simply ignoring the topic altogether, or – on the other hand – merely offering pure “postmodern” speculation. Of course, we must always keep in mind that our present-day, culturally specific terms and constructs relating to gender and gender variants may not – and likely *did not* – apply identically in the distant past. Nonetheless, biological, behavioral, and cultural variation have always and will always exist in human societies, so we must resist foisting an *a priori* binary system of gender on prehistoric societies.

Much progress can be made in understanding gender in prehistoric societies by archaeologists, anthropologists, and bioarchaeologists. In the particular cases discussed in this paper, modern advances in ancient DNA technology can help to elucidate some of these questions. For example, we can look for evidence of the SRY gene to ascertain biological sex (though, admittedly, any intersex conditions would be more difficult to find). Furthermore, for the double burials, we may be able to determine, or at least narrow down, the type of familial relationship the individuals had, if any. Either way, this is a perfect time in the history of archaeology and bioarchaeology to begin to try to investigate some of these fascinating aspects of prehistoric societies.

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REGIONAL STRATEGY: SETTLEMENT STRUCTURE AND ECONOMIC POSSIBILITIES OF THE PRZEWORSK CULTURE IN THE NIEMCZA-STRZELIN HILLS AREA

ABSTRACT

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The Niemcza-Strzelin Hills area was settled by Przeworsk culture groups uninterruptedly since they first appeared in Lower Silesia in the 2nd century BC until the collapse of this society in the second half of the 5th century AD. The discussed region is a part of the larger Przeworsk settlement grouping known as the Bystrzyca-Oława area. The main goal of this work is to illustrate the network of sites, and to determine the settlement strategies employed here over the course of the development of the Przeworsk culture. GIS methods are applied in this work in order to investigate the relationship between the settlement structure and economic potential of this region.

Keywords: Przeworsk culture, prehistoric land-use, settlement strategy, GIS, landscape

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INTRODUCTION

Archaeological evidence shows that the Niemcza-Strzelin Hills area was invariably attractive for settlement throughout prehistory. During the process of the appearance of the Przeworsk culture population in Lower Silesia, this region was one of the first to be settled and domesticated, and one of the last to be forsaken. Good quality soils, a well-developed

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river network, the characteristic terrain, and the mineral abundance so typical for this area, create a foundation for sustainable settlement, which in the case of the Przeworsk culture lasted continuously over nearly seven centuries.

The main aim of this paper is to present settlement strategies that accompanied the development process in this region. A detailed settlement network for each chronological phase of the Przeworsk culture will be depicted, as well as its relationship with the environment and landscape. Another goal is to show the correspondence between the site network and the economic potential of the region, as well as to establish its economic basis. To achieve the research goals described above, GIS software and methods will be used.

Beyond addressing the objectives above, this research utilized new approaches to analyze old archaeological data in order to obtain information that could not previously be gathered without complicated mathematical calculations, and cannot be visualized by analogue map. The applied methodology imparts new quality data collected during the 20th and early 21st centuries.

MATERIALS AND METHODS

The archaeological sites investigated in this paper are located in the Niemcza-Strzelin Hills. The region in question is described as hummocky territory, located in the western part of the Sudeten Foreland, which is one of the physiographic macroregions of the Sudeten Mountains. Boundaries of this region are marked by so-called morphological thresholds: the northern Jordanów – Łągiewniki – Kondratowice – Biały Kościół line, the southern Otmuchów – Kamieniec Żąbkowicki line, the western Bielawa – Dobrocin – Jaźwina line, and the Krynka river, which is the boundary on the east (Migoń 2014, 2014a). The hills range in altitude from 350 to 472 meters above sea level, and are mostly composed of igneous and metamorphic rocks, where vertical intrusions of granite in the vicinity of Strzelin draw attention (Kondracki 2009, 218-219). Together, they form a small granite upland divided by wide valleys in long, parallel units (Stuczyński *et al.* 2004, 21). The topography is connected with a favorably extended river network.

This research focuses on society of the Przeworsk culture, which existed in this region from the 2nd century BC until the mid-5th century AD. The population living in the Niemcza-Strzelin Hills area is part of the biggest aggregation of this culture in Lower Silesia: the Bystrzyca-Oława area settlement grouping (Pazda 1980). Characteristic for this cluster is its occurrence on two different landscapes: a lowland part situated on the Wrocław Plain, and an upland part, located in the region discussed in this article.

The database for this paper is a selected catalogue of 622 archaeological sites acquired from AZP resources (Fig. 2). Each of the sites belongs to the Niemcza-Strzelin Hills area. Owing to the fact that terminology and categorisation in AZP data is ambiguous and carried out by multiple authors, a new categorization was implemented. Sites with a quantity

of pottery greater than 10 sherds – whether they were fully excavated, known from surface surveys, or simply archival, prewar sites – are acknowledged as settlements. Sites with fewer than 10 potsherds are known only from surface surveys. Those with a quantity of pottery between 10 and 6 sherds are classified as potential settlements. Settlement points are sites with between 2 and 5 sherds, whereas locations with only one potsherd are marked as settlement traces. Despite the inaccuracies inherent in trying to establish settlement site functions based only on material collected during surface surveys, AZP resources provide exceedingly valuable data about space in prehistory. The location of sites as far as this research is concerned has an imperative role in relation to their function. On that account, all traces of the existence of the Przeworsk culture in this region that have a precise placement were factored in. Furthermore, the catalogue of sites was complemented by mapping the locations of 5 quartzite and quartzite schist quarries, potential locations of the extraction of schist in the Late Iron Age (Lisowska 2017). Quartzite schists, especially quartzite-sericite ones, were used in tool production – mostly whetstone – and distributed throughout the whole Silesian region (Pazda and Sachanbiński 1991).

The analysis carried out below using GIS software also required data describing the geography of the region. A Digital Elevation Model as well as Land Cover, both acquired from the USGS site, were used. The river network was obtained via Open Street Map servers. The soil map and database were sourced from the Regional Surveying and Cartographic Documentation Centre in Wrocław. Contemporary environmental data cannot be viewed uncritically with regard to prehistoric settlement research. Throughout the history of agricultural land-use, soil cover has undergone many changes. In some areas, soils became overcropped, but it is very important to note at this point that manuring has been applied since the Neolithic, and has continued throughout prehistory (Dreslerová *et al.* 2013; Bell 1992; Bakels 1997; 2009). Modern soils, therefore, are the result of both their natural development as well as anthropogenic factors, which include degradation and manuring. Thus, there is no unambiguous data on the character of soil cover in prehistory. For the reasons set out above, some papers on the subject of paleoenvironment or agriculture in prehistory rely also on contemporary geographical resources. However, this paper also adopts the assumption that although there may have been local changes in climate and soil properties over the years, relative differences between broadly defined climate and main soil units would have remained the same (Dreslerová *et al.* 2013, 1991; Dreslerová *et al.* 2017, 516).

DATA ANALYSIS

Each archaeological site taken into consideration was digitalized, allowing for the possibility of carrying out analyses using Geographical Information Systems software. In the first step of the analysis, the sites were classified according to chronological phases. The



Fig. 1. Niemcza-Strzelin Hills extent, based on Kondracki (2009) after P. Migoń (2014).
Edited by the author

next step focused on the site distribution structure. This task was performed using the Average Nearest Neighbour algorithm, which indicates the degree to which settlement in the region takes a clustered or dispersed form. By applying this method, a definitive result is obtained. The compilation of these results for all chronological phases gives valuable insight into changes in the concentration and dispersion of settlement over time, without relying on the subjective evaluation of the researcher (Wheatley and Gillings 2002, 117). In the next stage of study, the density of settlement for each chronological phase was exami-

ned. For the fulfilment of this task, the Kernel Density function was used. In addition to the above analysis, the Median Center tool was used to designate the center for each investigated set of sites. This function aims to show changes in the general tendency of settlement network distribution. Comparison of the central points for each investigated phase allowed for the creation of a map of culminant centres in relation to time. The results of these analyses give a preliminary estimate of the settlement network of the Przeworsk culture in the following study. A key finding from the above is the existence of “settlement stabilizers” – significant locations in the settlement structure of the region, serving as the focus of attention of settlers over long periods of time. After the initial assessment of settlement structure, relationships between archaeological sites and their surroundings were investigated. A settlement-environment analysis was conducted with the aim of picking up certain repetitive patterns, showing villages built in select places, which provided optimal conditions according to the knowledge of the inhabitants. This step helped to establish patterns and settlement strategies of the Przeworsk culture communities in this region. Finally, Cost Distance, Least Cost Path and Viewshed analyses were conducted in an attempt to answer questions connected with the economy and land-use in the area of research. Potential locations of schist extraction were also incorporated into this last analysis.

RESULTS

As an introduction to the analysis, an integrated map for all Przeworsk Culture sites in the region was made. It shows that a significant concentration of settlement is strongly connected with the river network (Fig. 2). The first chronological-settlement map for the Pre-Roman Period was created. All sites with precise dating, as well as those generally described as “Pre-Roman,” were included (Fig. 3). The resulting map presents three explicit settlement concentrations: one in the area surrounding the Oleszna and Ślęza Rivers, another in the Mała Ślęza River basin, and a third located in the south among minor tributaries of the Oława River (Złotnik, Dopływ w Henrykowie, Czerna).

The second chronological-settlement map displays sites from the Early Roman Period. Only locations with precise dating from the beginning of the period up to 160 AD were taken into consideration. Sites with the general chronological description “Roman Period” were intentionally disregarded. Their multitude, as well as the considerably long timespan subsumed under the label “Roman Period” (without any further divisions), could disrupt and skew the settlement picture for this phase. The map thus obtained shows the further settlement of the northern areas mentioned above, as well as in the surroundings of the Złotnik River. Settlement in the whole region is reduced (Fig. 4). A settlement peak is visible in the Krynka River area, in comparison to the previous phase.

The next map concentrates on sites dated between 160 AD and 375 AD, which corresponds to the Late Roman Period. In this phase, significant settlement development and

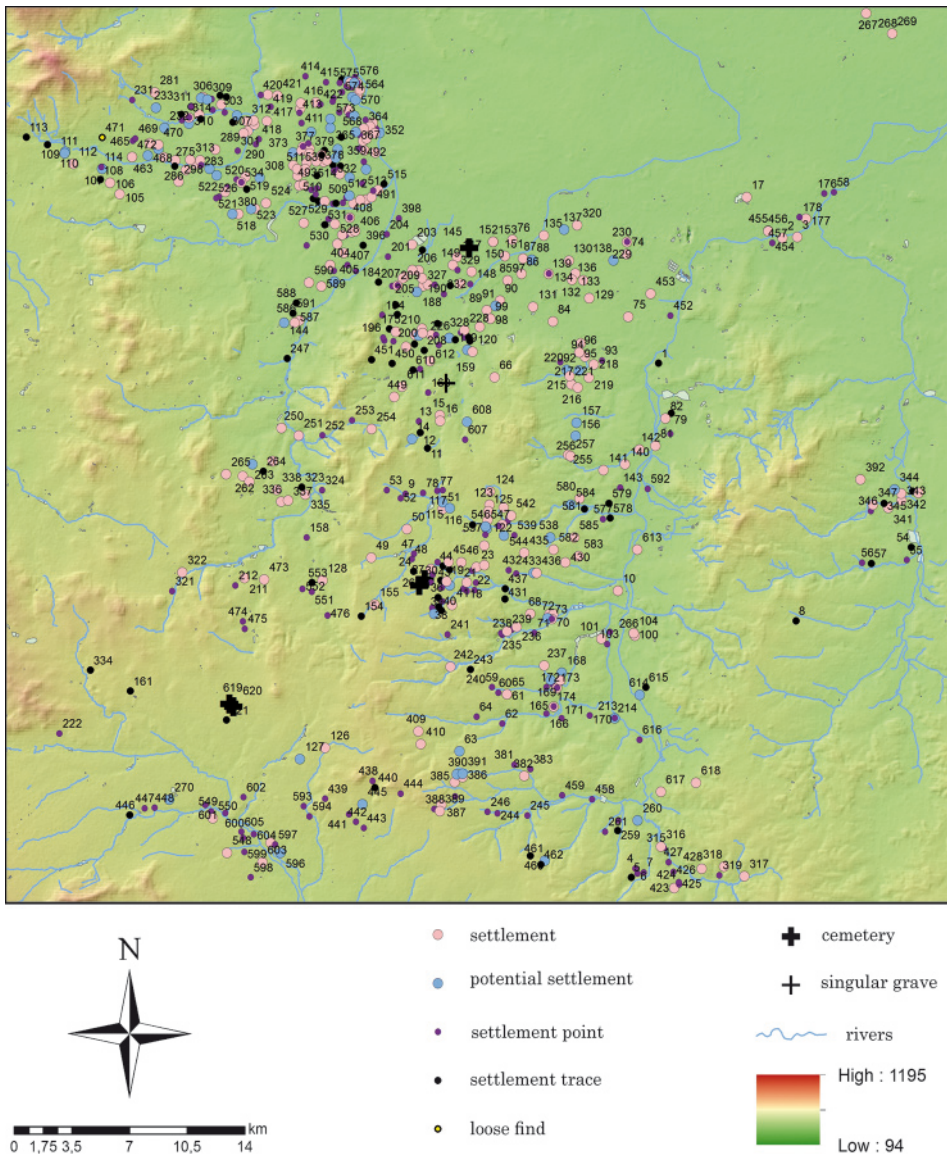


Fig. 2. Przeworsk culture sites within the Niemcza-Strzelin Hills area represented all chronological periods.

List of sites (* – site location collected from pre-war maps; lack in AZP data):

1 – Biały Kościół 8, 2 – Biedrzychów 1, 3 – Biedrzychów 2, 4 – Biernacice 8, 5 – Biernacice 4, 6 – Biernacice 6, 7 – Biernacice 7, 8 – Bożnowice 2, 9 – Brochocin 5, 10 – Brukalice 2, 11 – Błotnica 13, 12 – Błotnica 1, 13 – Błotnica 6, 14 – Błotnica 3, 15 – Błotnica 21, 16 – Błotnica 22, 17 – Chociwel 7, 18 – Cienkowice 16, 19 – Cienkowice 1, 20 – Cienkowice 11, 21 – Cienkowice 6, 22 – Cienkowice 15, 23 – Cienkowice 4, 24 – Cieptowody 8, 25 – Cieptowody 35, 26 – Cieptowody 6, 27 – Cieptowody 39, 28 – Cieptowody 34, 29 – Cieptowody 84, 30 – Cieptowody 69, 31 – Cieptowody 70, 32 – Cieptowody 73, 33 – Cieptowody 26, 34 – Cieptowody 27, 35 – Cieptowody 83, 36 – Cieptowody 7, 37 – Cieptowody 30, 38 – Cieptowody 82, 39 – Cieptowody 81, 40 – Cieptowody 80, 41 – Cieptowody

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93 – Gołostowice 11, 94 – Gołostowice 13, 95 – Gołostowice 8, 96 – Gołostowice 8/1, 97 – Gołostowice 2/1, 98 – Górka Sobocka 9, 99 – Górka Sobocka 9/1, 100 – Henryków 3, 101 – Henryków 8, 102 – Henryków 4, 103 – Henryków 7, 104 – Henryków 3/1, 105 – Jaźwina 18, 106 – Jaźwina 14, 107 – Jaźwina 16, 108 – Jaźwina 15, 109 – Jaźwina 25, 110 – Jaźwina 30, 111 – Jaźwina 31, 112 – Jaźwina 33, 113 – Jaźwina 44, 114 – Jaźwina 17, 115 – Jakubów 1, 116 – Jakubów 7, 117 – Jakubów 13, 118 – Janowiczki 2, 119 – Janowiczki 5, 120 – Janowiczki 3, 121 – Janówka 16, 122 – Janówka 18, 123 – Janówka 6, 124 – Janówka 7, 125 – Janówka 8, 126 – Jaworek 11, 127 – Jaworek 14, 128 – Karczowice 2, 129 – Karszów 20, 130 – Karszów 16, 131 – Karszów 5, 132 – Karszów 21, 133 – Karszów 17, 134 – Karszów 3, 135 – Karszów 15, 136 – Karszów 18, 137 – Karszów 2, 138 – Karszów 8, 139 – Karszów 3/1, 140 – Kazanów 8, 141 – Kazanów 12, 142 – Kazanów 7, 143 – Kazanów 5, 144 – Kietlin 6, 145 – Kondratowice 3, 146 – Kondratowice 10, 147 – Kondratowice 2, 148 – Kondratowice 9, 149 – Kondratowice 8, 150 – Kondratowice 10, 151 – Kondratowice 4, 152 – Kondratowice 10/1, 153 – Kondratowice 10/2, 154 – Kobyła Głowa 7, 155 – Kobyła Głowa 3, 156 – Komorowice 6, 157 – Komorowice 5, 158 – Koźnice 1, 159 – Kowalskie 1, 160 – Kowalskie 16, 161 – Koziniec 4, 162 – Krzelków 4, 163 – Krzelków 9, 164 – Krzelków 8, 165 – Krzelków 13, 166 – Krzelków 12, 167 – Krzelków 5, 168 – Krzelków 11, 169 – Krzelków 10, 170 – Krzelków 17, 171 – Krzelków 20, 172 – Krzelków 24, 173 – Krzelków 8/1, 174 – Krzelków 13/1, 175 – Krzepice 27, 176 – Krzepice 4, 177 – Krzepice 6, 178 – Krzepice 5, 179 – Księginice Wielkie 80, 180 – Księginice Wielkie 71, 181 – Księginice Wielkie 81, 182 – Księginice Wielkie 49, 183 – Księginice Wielkie 24, 184 – Księginice Wielkie 59, 185 – Księginice Wielkie 48, 186 – Księginice Wielkie 52, 187 – Księginice Wielkie 55, 188 – Księginice Wielkie 56, 189 – Księginice Wielkie 18, 190 – Księginice Wielkie 54, 191 – 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Oleszna 54, 285 – Oleszna 57, 286 – Oleszna 52, 287 – Oleszna 11, 288 – Oleszna 92, 289 – Oleszna 31, 290 – Oleszna 48, 291 – Oleszna 63, 292 – Oleszna 43, 293 – Oleszna 25, 294 – Oleszna 45, 295 – Oleszna 44, 296 – Oleszna 86, 297 – Oleszna 81, 298 – Oleszna 33, 299 – Oleszna 77, 300 – Oleszna 88, 301 – Oleszna 84, 302 – Oleszna 91, 303 – Oleszna 90, 304 – Oleszna 78, 305 – Oleszna 65, 306 – Oleszna 40, 307 – Oleszna 5, 308 – Oleszna 67, 309 – Oleszna 97, 310 – Oleszna 18, 311 – Oleszna 23/1, 312 – Oleszna 20/1, 313 – Oleszna 87/1, 314 – Oleszna 18/1, 315 – Osina Mała 2, 316 – Osina Mała 1, 317 – Osina Wielka 2, 318 – Osina Wielka 5, 319 – Osina Wielka 1, 320 – Piotrowice 6, 321 – Piława Górna 3, 322 – Piława Górna 1, 323 – Podlesie 4, 324 – Podlesie 12, 325 – Prusy 1, 326 – Prusy 19, 327 – Prusy 16, 328 – Prusy 26, 329 – Prusy 20, 330 – Prusy 27, 331 – Prusy 28, 332 – Prusy 30, 333 – Prusy 31, 334 – Przedborowa 1, 335 – Przerzecznym Zdrój 2, 336 – Przerzecznym Zdrój 3, 337 – Przerzecznym Zdrój 13, 338 – Przerzecznym Zdrój 4, 339 – Przeworno 11, 340 –

Przeworno 20, 341 – Przeworno 3, 342 – Przeworno 7, 343 – Przeworno 10, 344 – Przeworno 25, 345 – Przeworno 18, 346 – Przeworno 6, 347 – Przeworno 5, 348 – Radzików 63, 349 – Radzików 83, 350 – Radzików 62, 351 – Radzików 61, 352 – Radzików 64, 353 – Radzików 20, 354 – Radzików 60, 355 – Radzików 31, 356 – Radzików 9, 357 – Radzików 13, 358 – Radzików 17, 359 – Radzików 42, 360 – Radzików 12, 361 – Radzików 15, 362 – Radzików 57, 363 – Radzików 56, 364 – Radzików 14, 365 – Radzików 67, 366 – Radzików 65, 367 – Radzików 26, 368 – Radzików 19, 369 – Radzików 27, 370 – Radzików 53, 371 – Radzików 48, 372 – Radzików 49, 373 – Radzików 46, 374 – Radzików 47, 375 – Radzików 44, 376 – Radzików 55, 377 – Radzików 19/1, 378 – Radzików 44/1, 379 – Radzików 55/1, 380 – Ratajno 3, 381 – Rososznicza 13, 382 – Rososznicza 9, 383 – Rososznicza 79, 384 – Rososznicza 14, 385 – Rososznicza 24, 386 – Rososznicza 30, 387 – Rososznicza 33, 388 – Rososznicza 32, 389 – Rososznicza 31, 390 – Rososznicza 41, 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17, 540 – Targowica 10, 541 – Targowica 9, 542 – Targowica 27, 543 – Targowica 8, 544 – Targowica 18, 545 – Targowica 28, 546 – Targowica 23, 547 – Targowica 23/1, 548 – Tarnów 10, 549 – Tarnów 17, 550 – Tarnów 18, 551 – Tomice 3, 552 – Tomice 2, 553 – Tomice 1, 554 – Trzebnik 3, 555 – Trzebnik 26, 556 – Trzebnik 28, 557 – Trzebnik 2, 558 – Trzebnik 24, 559 – Trzebnik 25, 560 – Trzebnik 12, 561 – Trzebnik 19, 562 – Trzebnik 27, 563 – Trzebnik 6, 564 – Trzebnik 5, 565 – Trzebnik 1, 566 – Trzebnik 23, 567 – Trzebnik 7, 568 – Trzebnik 13, 569 – Trzebnik 22, 570 – Trzebnik 20, 571 – Trzebnik 21, 572 – Trzebnik 4, 573 – Trzebnik 10, 574 – Trzebnik 8, 575 – Trzebnik 3/1, 576 – Trzebnik 26/1, 577 – Wadochowice 6, 578 – Wadochowice 10, 579 – Wadochowice 8, 580 – Wilamowice 7, 581 – Wilamowice 3, 582 – Wilamowice 14, 583 – Wilamowice 12, 584 – Wilamowice 5, 585 – Wilamowice 10, 586 – Wilków Wielki 15, 587 – Wilków Wielki 16, 588 – Wilków Wielki 6, 589 – Wilków Wielki 7, 590 – Wilków Wielki 13, 591 – Wilków Wielki 17, 592 – Witostowice 7, 593 – Ząbkowice Śląskie 1, 594 – Ząbkowice Śląskie 3, 595 – Ząbkowice Śląskie 45, 596 – Ząbkowice Śląskie 50, 597 – Ząbkowice Śląskie 66, 598 – Ząbkowice Śląskie 67, 599 – Ząbkowice Śląskie 68, 600 – Ząbkowice Śląskie 70, 601 – Ząbkowice Śląskie 23, 602 – Ząbkowice Śląskie 27, 603 – Ząbkowice Śląskie 44, 604 – Ząbkowice Śląskie 48, 605 – Ząbkowice Śląskie 54, 606 – Ząbkowice Śląskie 69, 607 – Zarzycza 8, 608 – Zarzycza 18, 609 – Żelowice 28, 610 – Żelowice 5, 611 – Żelowice 7, 612 – Żelowice 6, 613 – Ziębice 3, 614 – Ziębice 1, 615 – Ziębice 6, 616 – Ziębice 9, 617 – Ziębice 12, 618 – Ziębice 25, 619 – Zwrócona 1, 620 – Zwrócona 2, 621 – Zwrócona 4, 622 – Rososznicza 21*

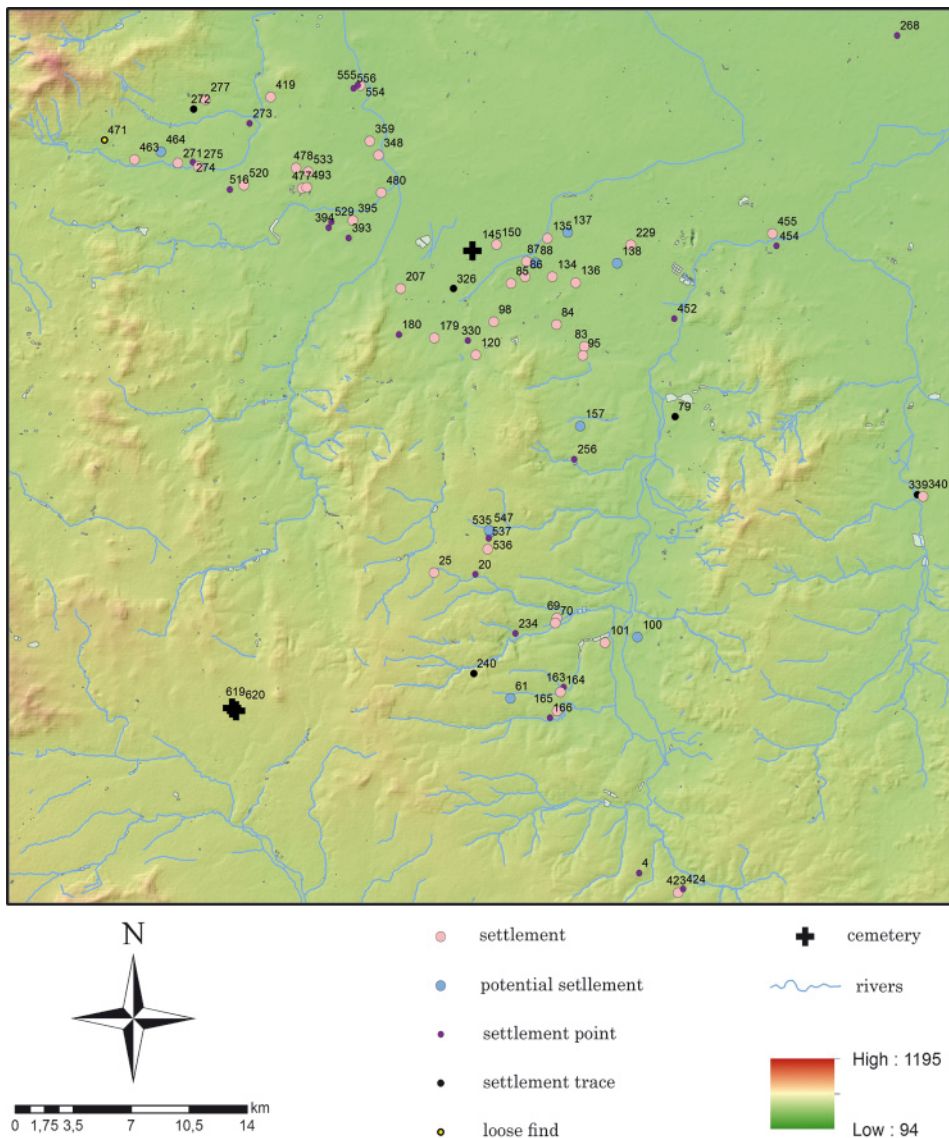


Fig. 3. Przeworsk culture sites within the Niemcza-Strzelin Hills area in the Pre-Roman Period

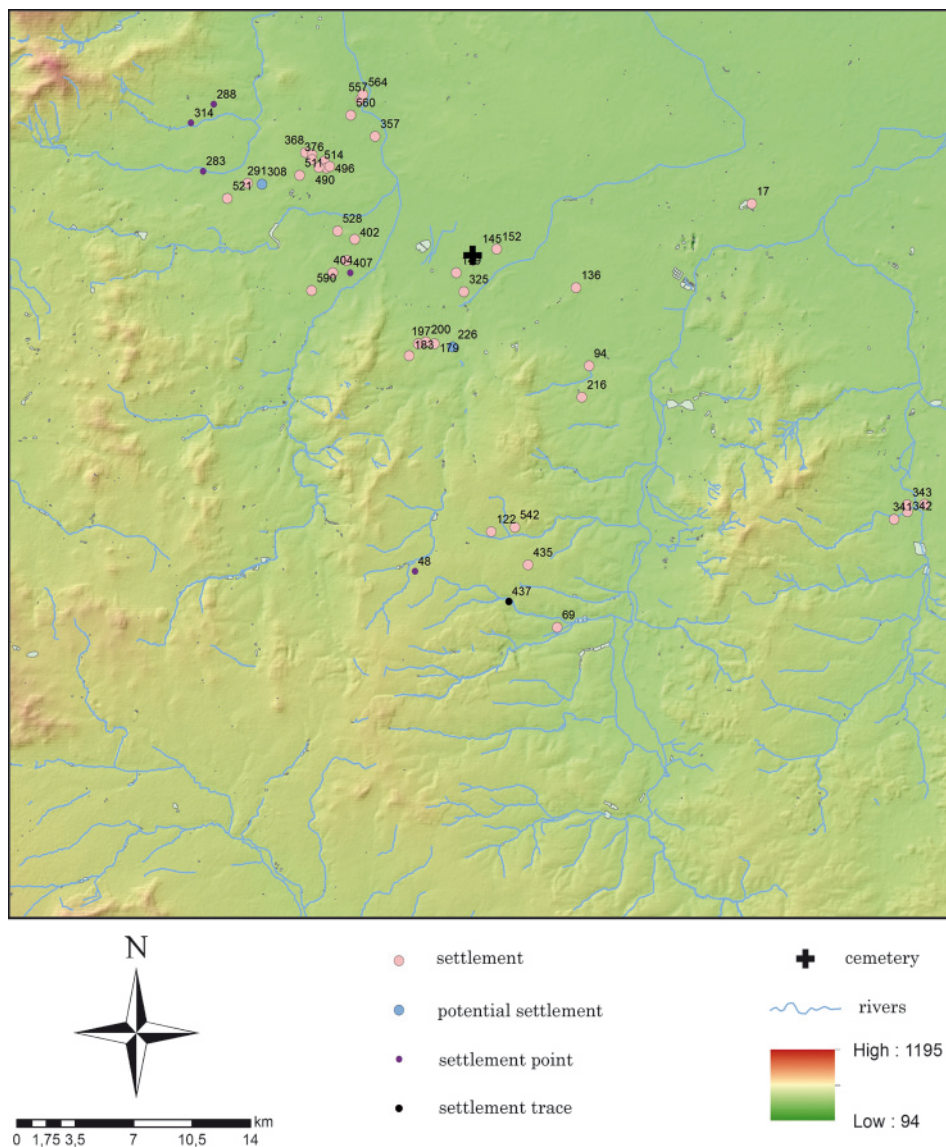


Fig. 4. Przeworsk culture sites within the Niemcza-Strzelin Hills area in the Early Roman Period

expansion is visible both in the northern and southern parts of the region. The great density of settlement in the Ślęza and Mała Ślęza River basins is striking (Fig. 5). New settlement appears across the Oława river, and there is a further development of previous settlement along the Oława tributaries and those far south. New material appears in the Budzówka River basin and by the neighboring Zatoka Creek. This grouping is also the most southern part of this settlement region.

The fourth map is comprised of all sites dating to the Migration Period, including those with precise dating and those with only general dating (Fig. 6). Here, the first significant degradation of settlement is conspicuous. Over half of the sites disappear from the region. Nevertheless, there is no collapse of settlement structures. The northern groups remain, even though these were the ones affected by the greatest attrition. Considerable development is observed in the Oława River basin. An accumulation of compact settlement is also visible in the area of the Krynka River basin and the upper Oława River basin right before the Krynka estuary. Development is also present in Budzówka River basin.

For the above sets of settlements, the Average Nearest Neighbour analysis was carried out. Its aim was to evaluate in an objective way the structure of site distribution. For all phases, the algorithm confirmed clustered settlement, whilst ensuring that there is less than a 1% likelihood that this clustered pattern could be the result of random chance (Fig. 7).

In the next stage of analysis, the density of the settlement network was examined. The results show the migration of settlement density from north to south over time (Fig. 8). During almost the entire duration of the Przeworsk culture, the tendency toward accumulation of sites in the areas of the Ślęza and Mała Ślęza River basins is visible. The second of these rivers, especially in its upper run, increases significantly in importance in the Late Roman Period. Density analysis shows that in the Migration Period, settlement concentrates in the Oława River basin, while a drastic decline of settlement is seen around the Mała Ślęza. The area around the left tributaries of the Oława River, between the river itself and the Szklarski Massif, shows a particularly high density of settlement at this time.

The above analyses were supplemented by the designation of central points for each of the discussed phases (Fig. 9). The results show how the central point of settlement shifts in the landscape across the timeline, visibly migrating from north to south. This analysis additionally underscores the previously-mentioned domination of the Oława River basin in the Migration Period, in comparison to the Mała Ślęza, which was so well settled and developed in the Late Roman Period.

To gain a better understanding of the settlement network, another step was added to the analysis, in which so-called settlement stabilizers were identified. According to the adopted criteria, a stabilizer is a settlement in continuous existence through a minimum of 4 phases. The resulting map shows 10 locations, 9 of which probably were inhabited continuously for 4 phases; the tenth may have been inhabited throughout 6 phases — the entire duration of the Przeworsk culture (Fig. 10). Two concentrations of settlements can be

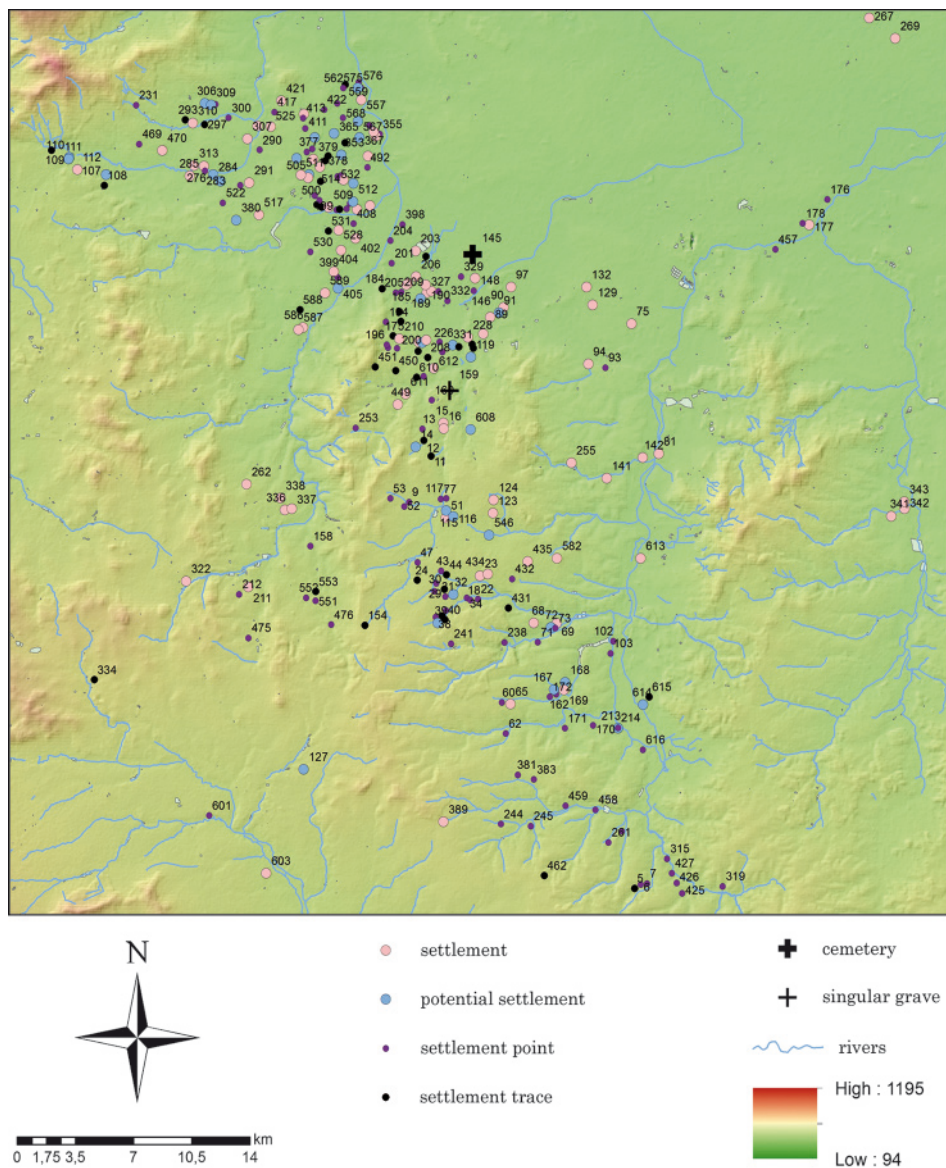


Fig. 5. Przeworsk culture sites within the Niemcza-Strzelin Hills area in the Late Roman Period

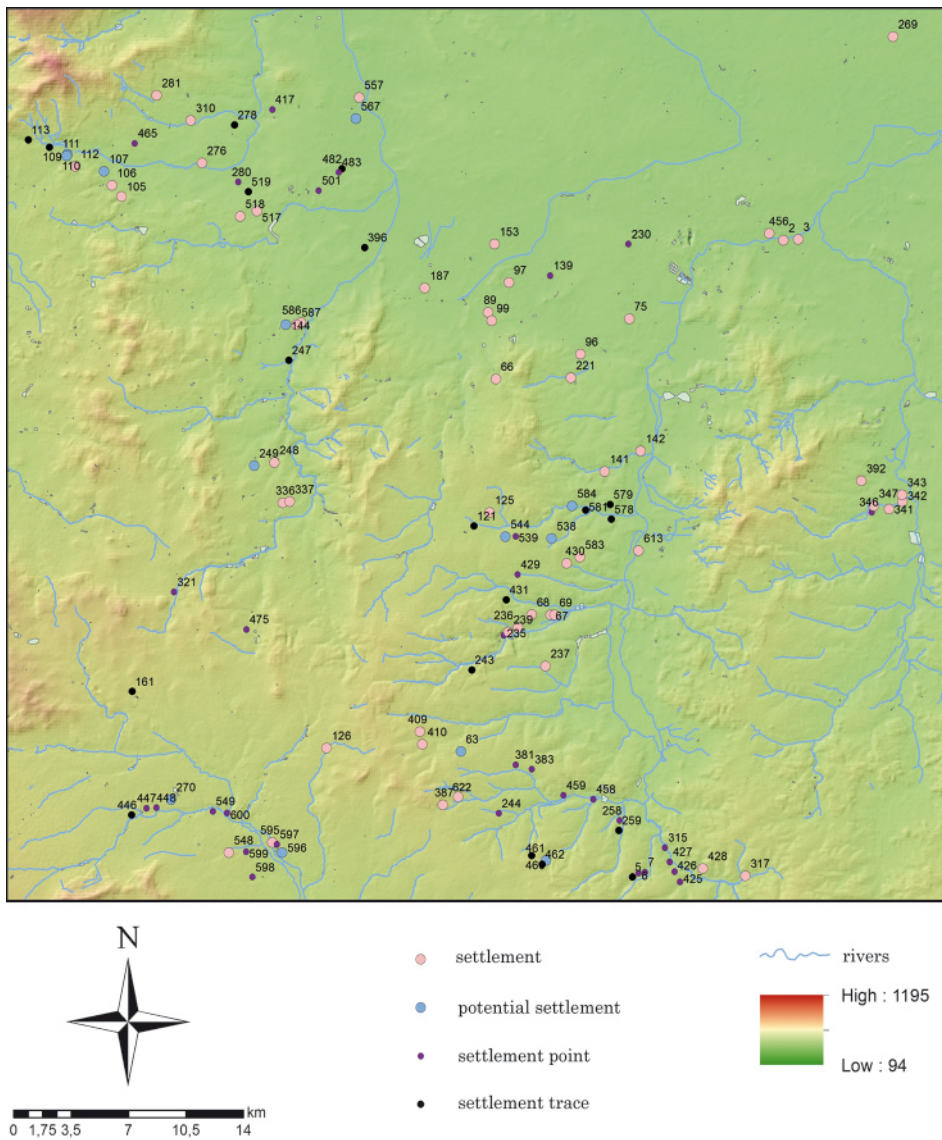


Fig. 6. Przeworsk culture sites within the Niemcza-Strzelin Hills area in the Migration Period

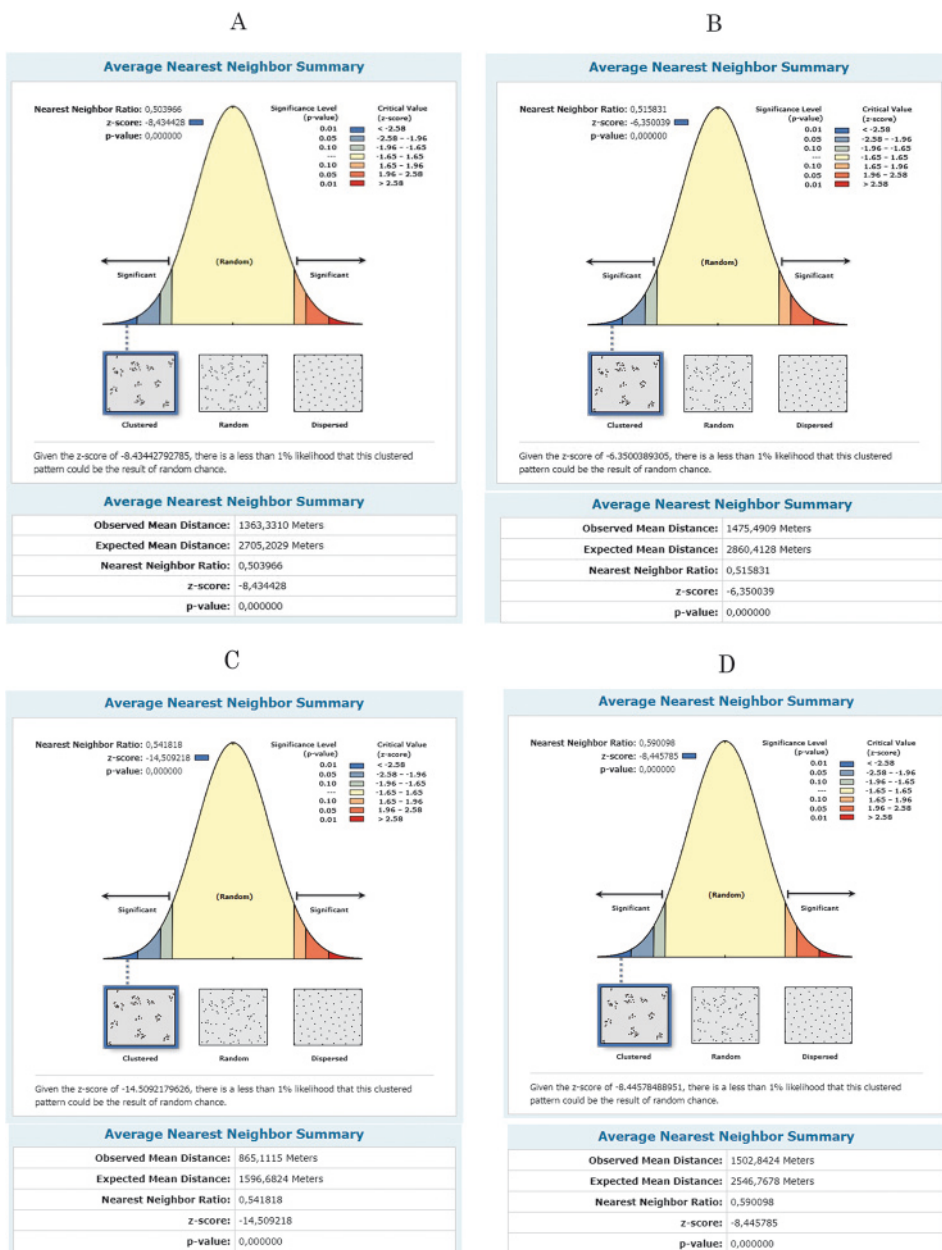


Fig. 7. Average Neighbour reports for each individual chronological period;
A – Pre-Roman Period, B – Early Roman Period, C – Late Roman Period, D – Migration Period

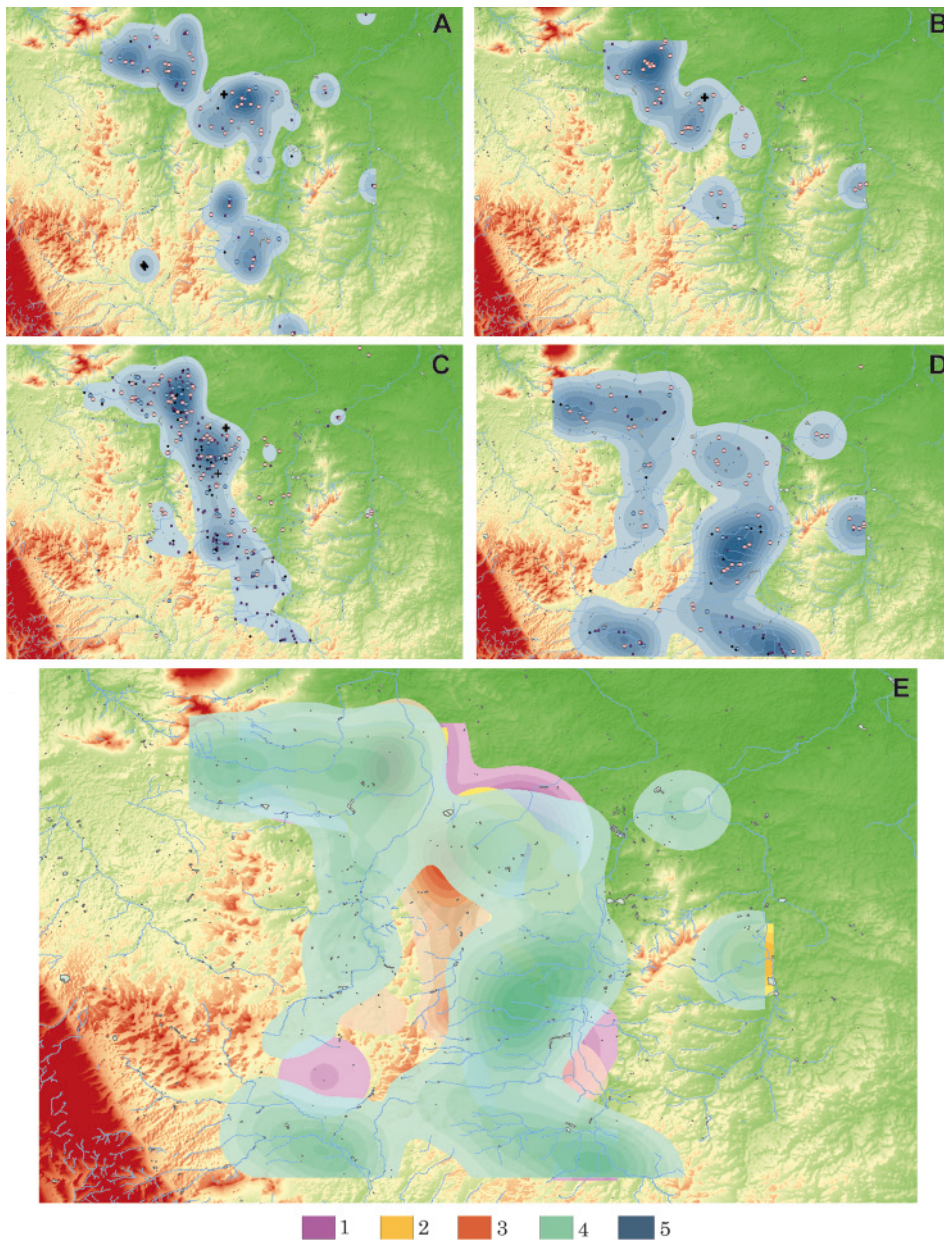


Fig. 8. Kernel Density analysis results for each individual chronological period, and aggregate map; A – Pre-Roman Period, B – Early Roman Period, C – Late Roman Period, D – Migration Period, E – mosaic of settlement density for all periods; For picture E: 1 – settlement density in Pre-Roman Period, 2 – settlement density in Early Roman Period, 3 – settlement density in Late Roman Period, 4 – settlement density in Migration Period; For pictures A, B, C, D: 5 – settlement density for individual periods

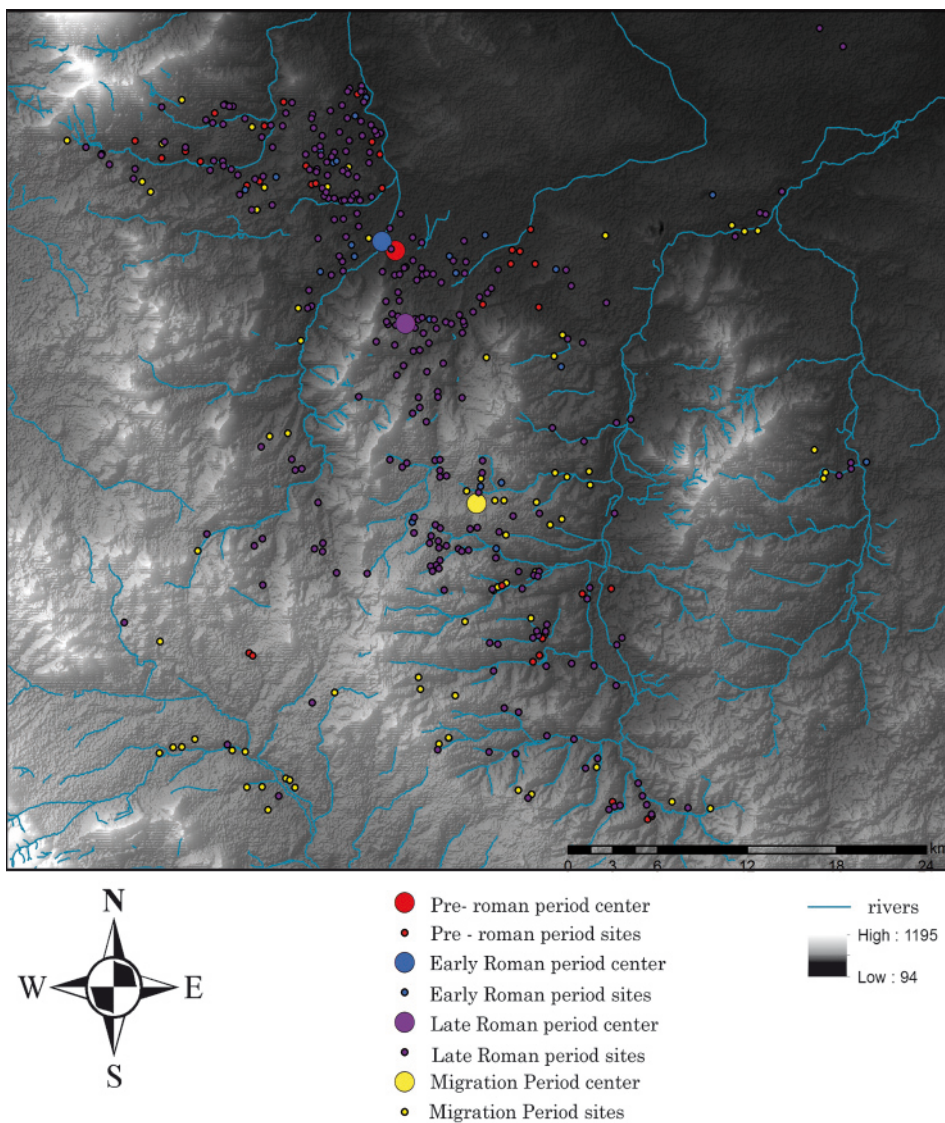


Fig. 9. Median Center analysis results for each individual chronological period of the Przeworsk culture

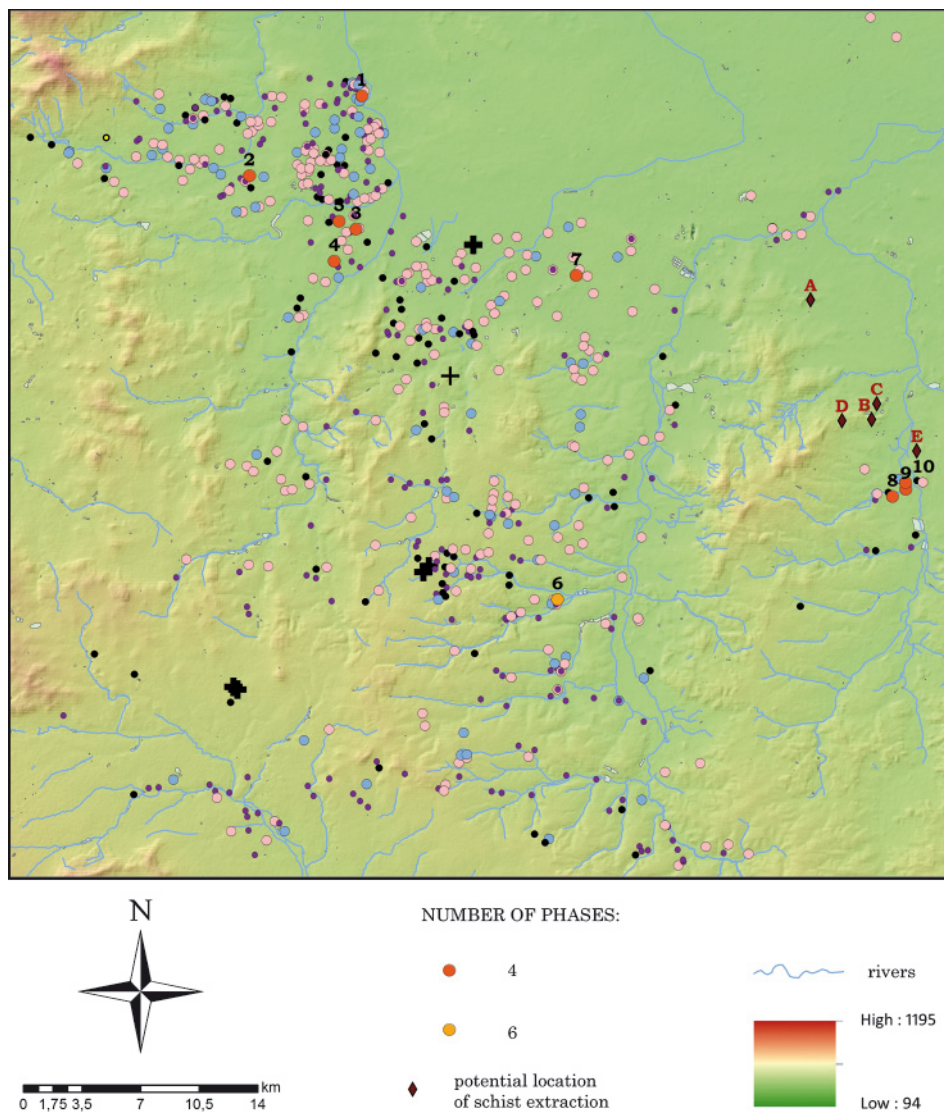


Fig. 10. Distribution of settlement stabilizers against the background of Przeworsk Culture settlement in the Niemcza-Strzelin Hills area and potential locations of schist extraction; 1 – Trzebnik, stan. 86-27/148/2, 2 – Oleszna, stan. 86-26/130/63, 3 – Sienice, stan. 87-27/15/4, 4 – Sienice, stan. 87-27/17/6, 5 – Łagiewniki stan. 87-27/4/16, 6 – Czesławice stan. 89-28/75/8, 7 – Karszów stan. 87-28/67/18, 8 – Przeworno, stan. 89-30/3/3, 9 – Przeworno, stan. 89-30/5/7, 10 – Przeworno, stan. 89-30/8/10; A – quartzite quarry in Kuropatnik, B – quartzite schist quarry next to Goethe’s crag and tail, C – quartzite schist quarry in Jegłowa, D – quartzite quarry in Krowiniec, E – quartzite quarry on Kryształowa Mountain

seen: one is connected with the north-western part of the region, essentially coinciding with the Śleza River basin; the second corresponds to the potential location of a schist extraction area in the Krynka River basin. Stabilizer 6: Czesławice 8 is located in the south, at the confluence of the Złotnik and Cienkówka Rivers.

Additional analyses were carried out with regard to which environmental conditions were preferred. The relationships between sites and environmental features such as slope aspect, hillside slope, absolute altitude, water source, and type of soils were investigated. Some preferences in the selection of settlement locations are visible. For the Pre-Roman Period, locations with southeasterly and easterly aspects predominate. In the Early Roman Period, settlements located on an easterly aspect are the most numerous, and following closely behind are those with north and northeasterly aspects. A similar situation is visible in the Late Roman Period, where settlement focuses on sites with easterly aspect slopes, while a secondary role is taken by northeasterly and southeasterly aspects. The biggest change is visible in settlement patterns during the Migration Period, where the majority of sites are found in locations with north and northeasterly aspects, followed by those with easterly aspects. With regard to hillside slope, the value is standardized throughout the existence of the Przeworsk culture, never exceeding 2° (Table 1). Turning to the relation between settlement and absolute altitude, for the Pre-Roman, Early and Late Roman Periods, the majority of settlements were built in the range of 154-193 meters above the sea level. Here also, the pattern is disrupted during the Migration Period, where the majority of settlements are located in the range of 220-237 meters above the sea level. The distance of sites from water sources is variable. The greatest distance, 700 meters, was measured for the Pre-Roman Period. In the next phases, this value fluctuates around 600 meters. It should be pointed out that this analysis was performed based on contemporary river networks. Prehistoric water resources might have been more diverse (currently non-existing lakes, for example the Strzelin Lake Region, creeks, rivers spurs; Fig. 11-14).

Based on soil data analysis, it could be said that the population of this region made full use of the potential of regional soils, settling first of all on good and very good classes of soils. According to the analysis, the leading role belongs to black earths and cambisols. In the Pre-Roman period, settlement was focused in areas of black earths; cambisols were used as well, but less frequently. During the Early Roman Period, cambisols and black earths are still the preeminent soils used, but they are used equally at this time. The Late Roman Period is characterized by a substantial increase in the use of cambisols in relation to black earths. In the Migration Period, the vast majority of settlement sites are located on cambisols, and in second place are black earths. Only singular sites are located on types of soil other than those mentioned above.

This analysis was also conducted for all settlements marked as stabilizers. A large majority of them are located on black-earth areas. Singular sites are located in areas with cambisols and their sub-types. Single-phase sites were investigated as well, which showed a similar tendency as the multi-phase settlements of the Late Roman and Migration Periods.

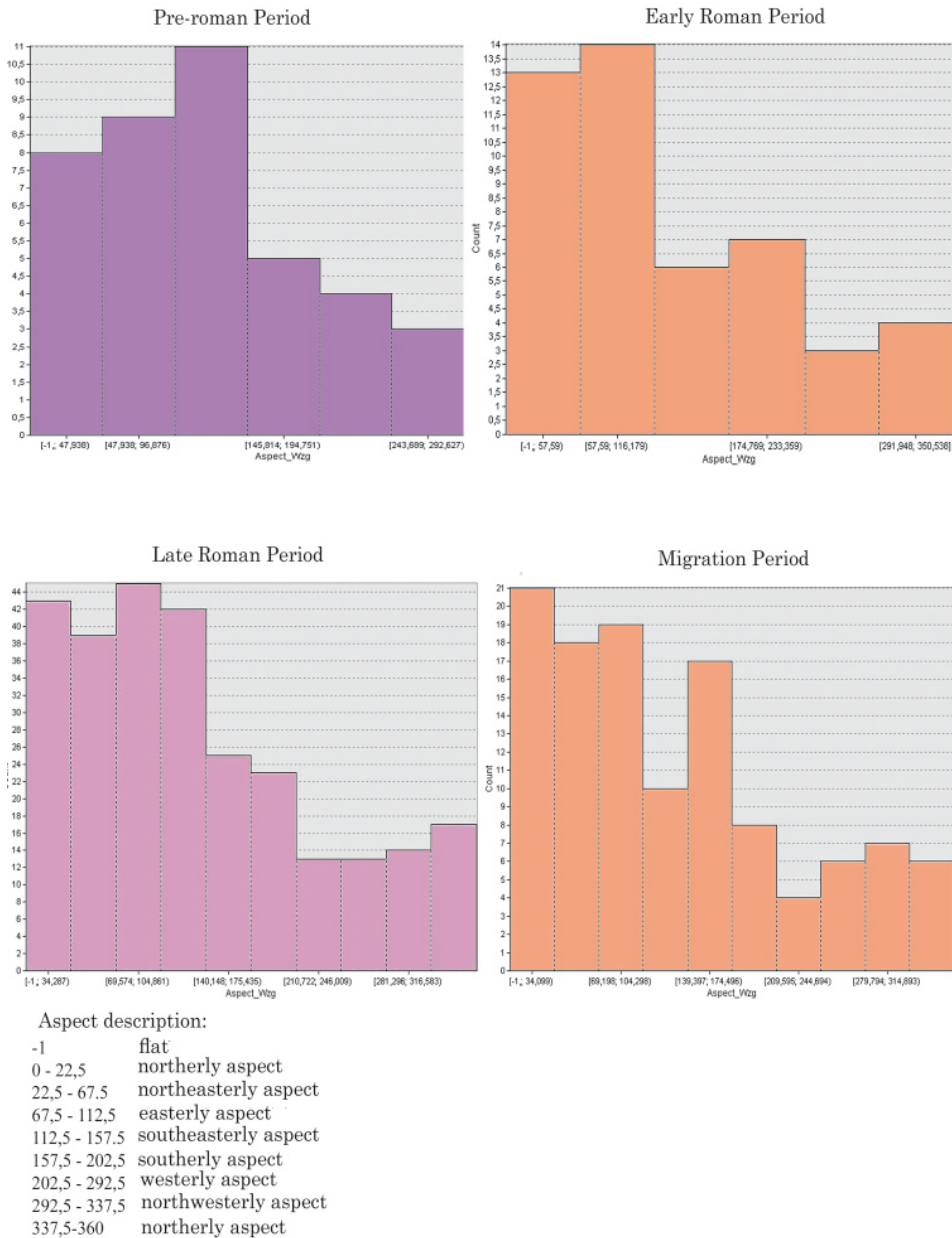


Fig. 11. Distribution of sites according to slope aspect

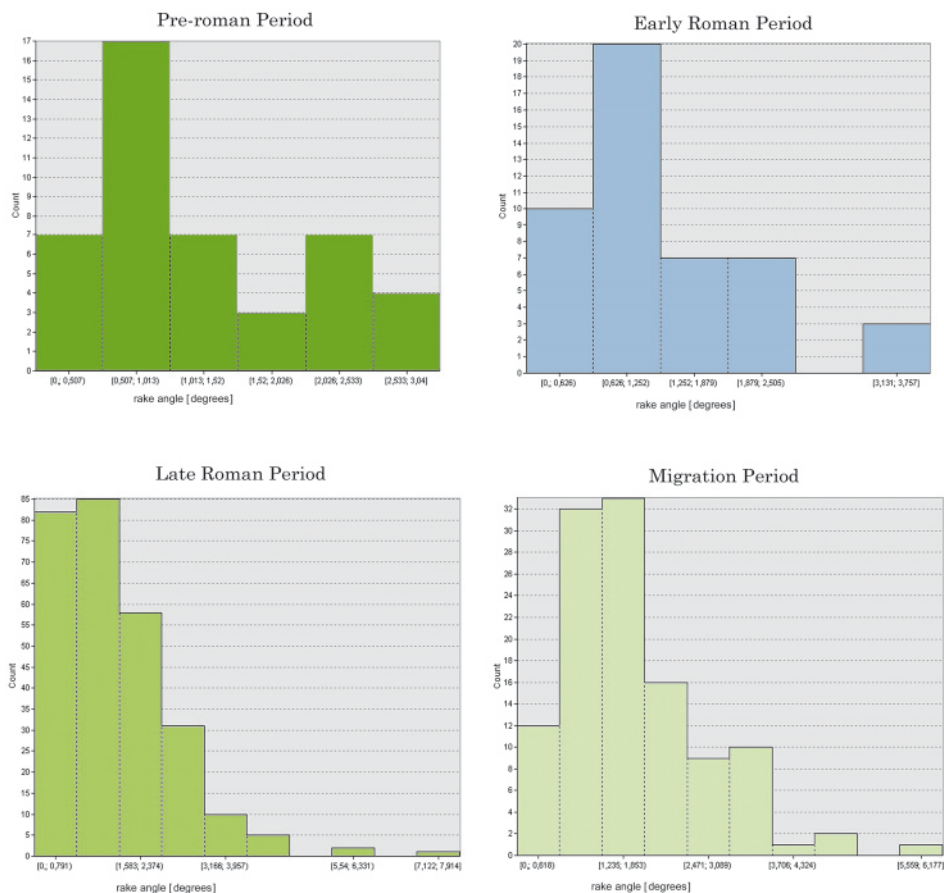


Fig. 12. Distribution of sites according to hillside slope. Description in the table (Table 1)

Table 1. Hillside slope description. Based on Lemkowska (2012a)

Rake angle [°]	Description	Construction fitness	Danger of erosion
<2°	Flat terrain	Beneficial	Infinitesimal
2-3°	Very mild slopes	Beneficial	Low
3-6°	Mild slopes	Medium beneficial	Medium
6°-10°	Medium slopes	Unfavorable	High
10-15°	Medium steep slopes	Unfavorable	Very high
15-20°	Very steep slopes	Unfavorable	Very high
20-30°	Sheer slopes	Unfavorable	Very high

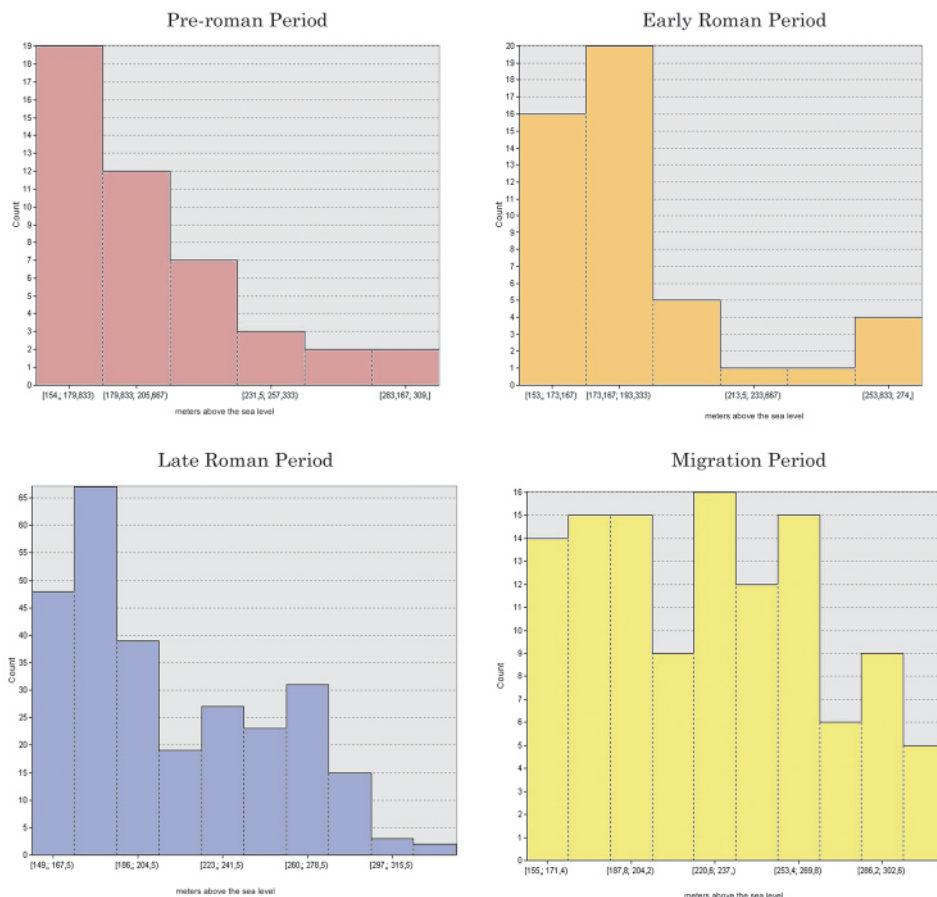


Fig. 13. Distribution of sites according to absolute altitude

Cambisols are the predominant soil types found in settlement areas, with black earths following in second place (Fig. 15).

Based on this part of the analysis, it can be concluded that in the first phase of settlement, when it was not so extensive, soils of the best quality – the black earths – were used. In the Early Roman Period, settlement was slightly reduced, but new locations continued to appear on new terrain, which is probably the reason for the parity in ranking between black earths and cambisols during this phase. The major increase in the use of cambisols in the Late Roman Period is most likely connected with the population peak at this time. Settlement development on a big scale and the settling of new areas – still with good quality soils – is characteristic for this period. A similar situation is observed during the Migration

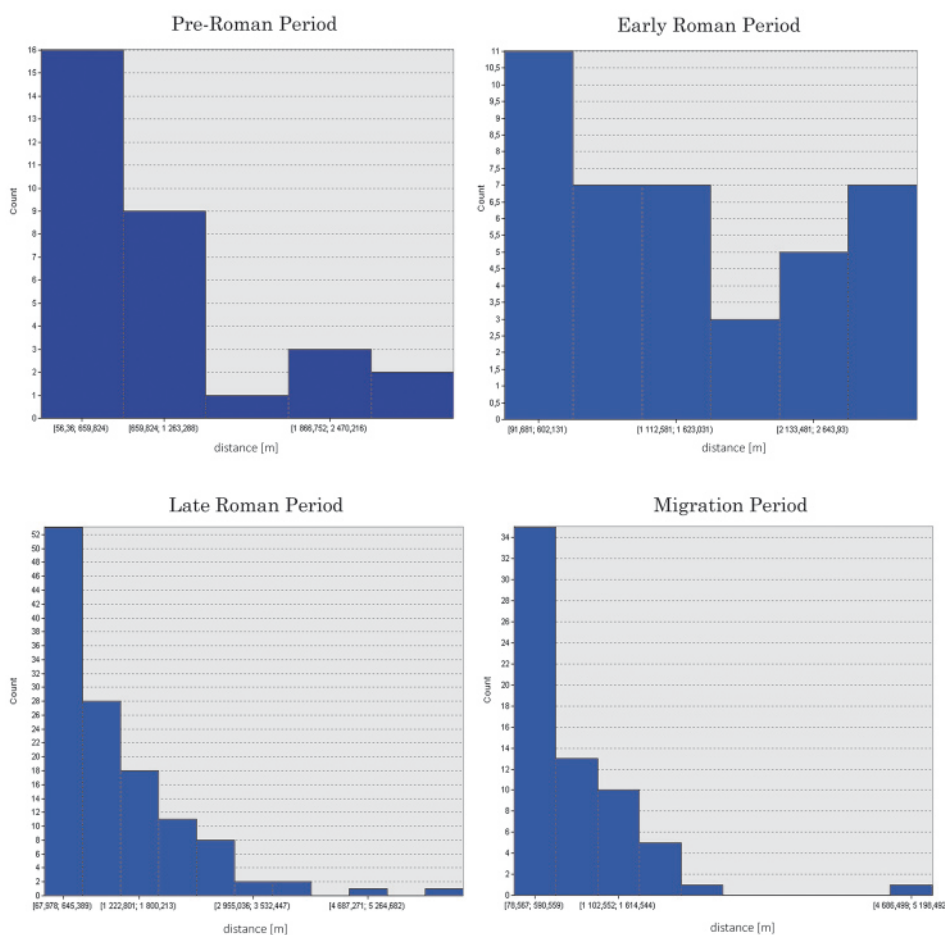


Fig. 14. Distribution of sites according to water source

Period. It can be said that in relation to the previous phases, the smallest number of sites were located on soils other than cambisols and black earths during this period.

It is important to note that this pattern of settlement structure in relation to soil type is conditioned by the prevalence of cambisols relative to black earths in the region; the more settlement, the greater the contribution of cambisols, as those are the soils more available, common, numerous in the region.

It should be said that in the early phases of Przeworsk culture development (Pre-Roman and Early Roman Periods), high-class and good-class wheat soil complexes were the majority of those used. A similar situation applies to stabilizers, where the high-class wheat soil complex predominates, because all such sites were founded in the early phases. In the

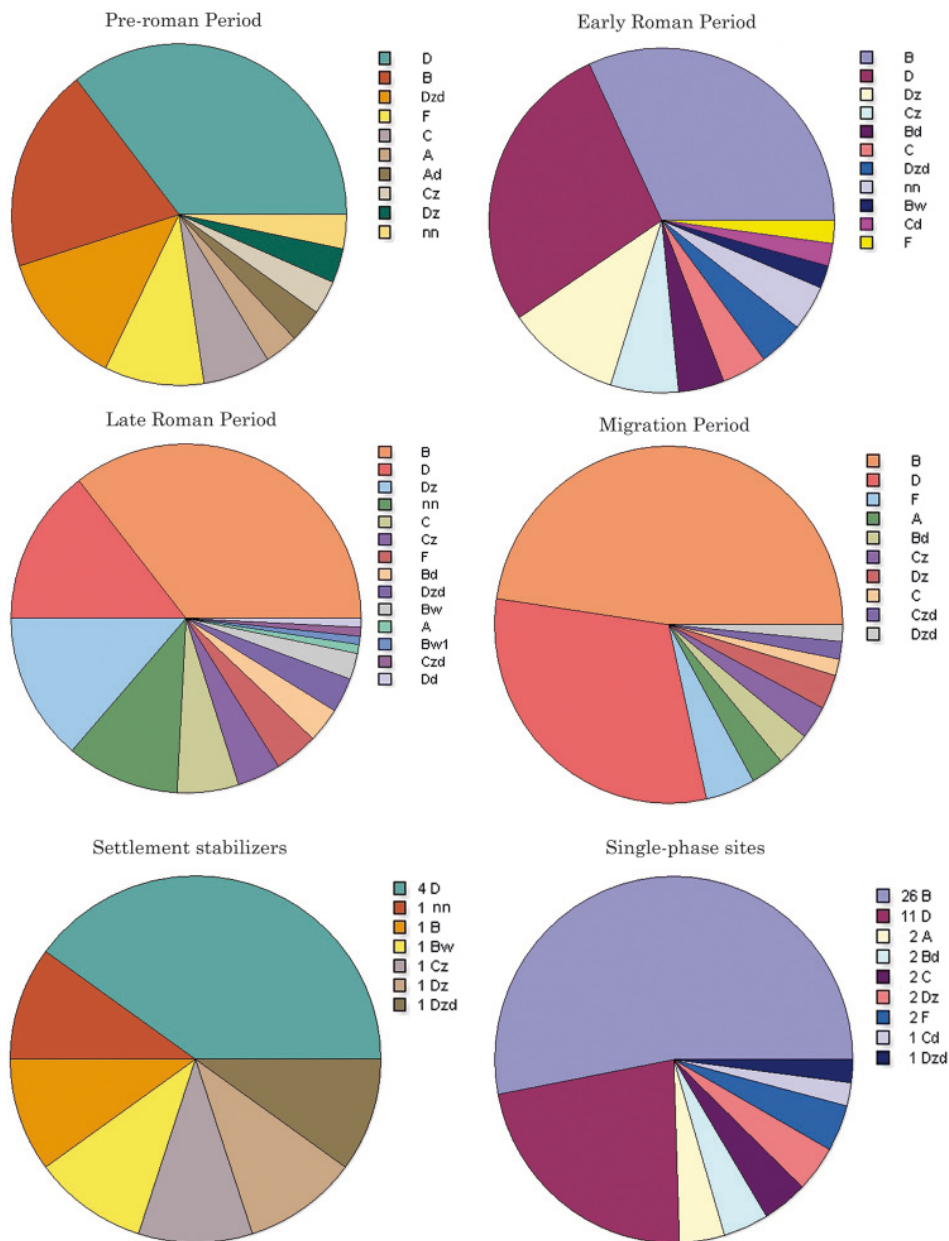


Fig. 15. Distribution of sites according to type of soils. List of the soil symbols with description (based on Lemkowska 2012): A – podzolic and clay-illuvial soils, Ad – deluvial podzolic and clay-illuvial soils, B – typical cambisols, Bd – deluvial cambisols, Bw – acid cambisols, C – typical chernozems, Cd – deluvial chernozems, Cz – degraded chernozems, Czd – deluvial degraded chernozems, D – typical black earths, Dd – deluvial black earths, Dz – degraded black earths, Dzdz – degraded deluvial black earths, F – alluvial soils, nn – no data

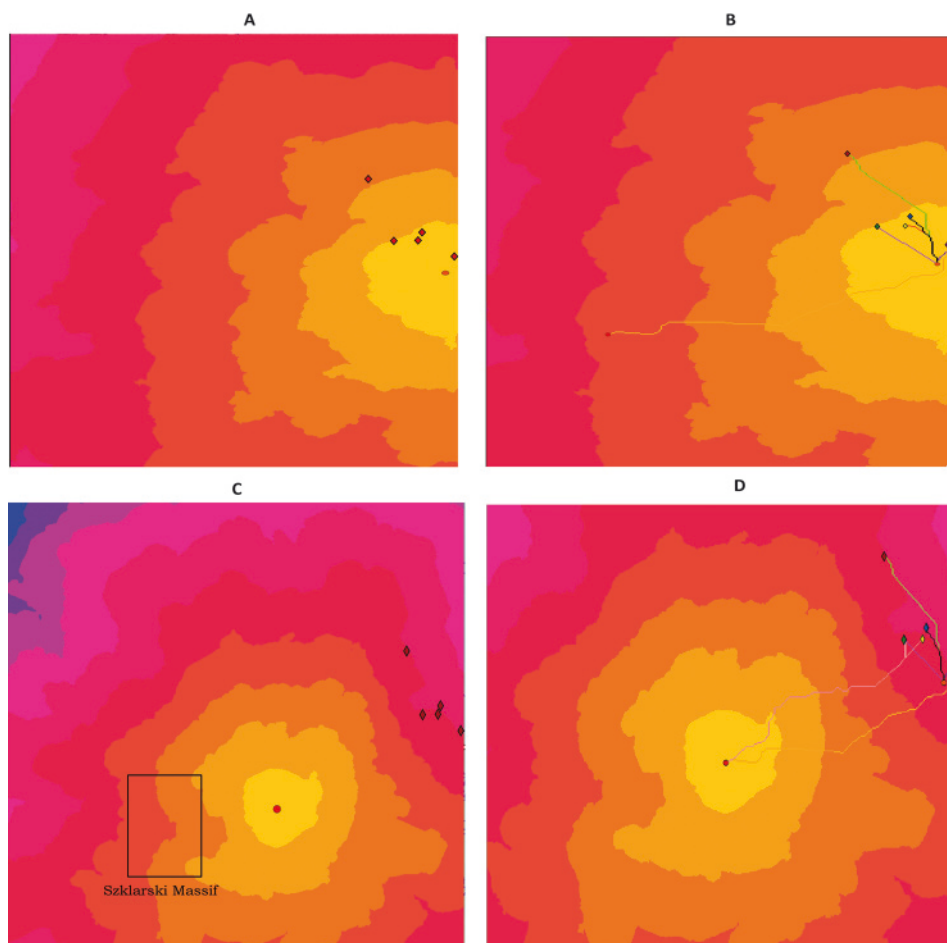


Fig. 16. Cost Distance analysis results for chosen settlement stabilizers;
A – B – stabilizer 10; C – D – stabilizer 6

Late Roman Period, sites located on flawed-class wheat soil, good-class rye soil and poor-quality rye soil complexes appear; no earlier Przeworsk settlements have been recorded on these soil types in the region. This tendency persists in the Migration Period, where the majority of sites occur on good-quality wheat soil complexes, and occasionally on good-quality rye soils as well. The fact that these are modern classifications notwithstanding, these patterns quite likely reflect real changes that took place in the Central European Lowlands in the Late Roman Period. Rye began to be cultivated eagerly. Changes in agriculture were preceded by population growth, dated to the B2 – C1a phases, which contri-

buted to the use of poorer-quality soils (Godłowski 1985; Żygadło 2011, 182). The increasing popularity of rye cultivation can be linked to improvements made in the construction of plowing equipment, since it required deeper ploughing than other types of cereals (Żygadło 2011, 182). An example of an iron coulter is known from the archival site of Rososznica 21, located in the southern part of the region in question, dated to the Migration Period (Bohr 2014; Żygadło 2011; Nowothenig 1939).

In the next stage of research, Cost Distance analysis was carried out for two chosen settlement stabilizers (6 and 10), which demonstrate the strongest probability of relations with other economic domains, apart from agriculture. The aim of this analysis is to estimate the effort (or “cost”) required to reach other locations from the points in question (Fig. 16). Results A and B are related to stabilizer 10. It is clearly shown that 4 potential locations of schist extraction are situated in places where the effort required to reach them is the lowest. The most isolated and furthest to the north of these 4 locations is associated with a higher, but still reasonable cost. The same analysis carried out for stabilizer 6 (results C and D) shows that the actual cost to reach these potential locations of schist extraction from this point is very high, and therefore economically unwise. The Szklarski Massif is much better situated relative to stabilizer 6, as the effort required to reach it is only moderately difficult.

As a next step, Least Cost Path analysis was carried out. The main question raised at this point was: could the exploration of raw lithic materials be connected with nearby settlements? Additionally, which of the potential locations of schist extraction would be the most likely to be exploited? According to the results, it can be concluded that schist extraction would only have been pursued by the group of settlements located in close proximity to its occurrence (Fig. 17). It is worth pointing out that this small unit includes 3 stabilizers, located very near to one another. This group is very isolated from the main settlement body extending to the west from Gromnik Ridge, which is the highest rock formation of the Niemcza-Strzelin Hills. The most likely location of schist extraction based on this analysis could be (in order of least to greatest effort): quarries E, B, C and possibly D. Concerning the exploration of schist material from quarry E, the river crossing should be taken into account. Indeed, all settlement stabilizers are located on the western bank of the Krynka River. There is a strong probability of schist extraction from three further quarries. Access to them is not limited by any geographical barriers.

The last set of results concerns Viewshed analysis. Two analyses were carried out with two different tools. The first of them was applied only to two selected stabilizers (6, 10), whereas the second one investigated all ten. The aim of the first analysis was to estimate what was within sight of the stabilizers. Initially, an unlimited view was used as a parameter, and then in next step, the field of view was limited to 5 kilometers, which represents the average range of human vision. The results show that the potential locations of schist extraction were very well visible for settlers in the Krynka River basin (Fig. 18). For stabilizer 10, the highly visible quarries were B and D when the analysis was conducted using

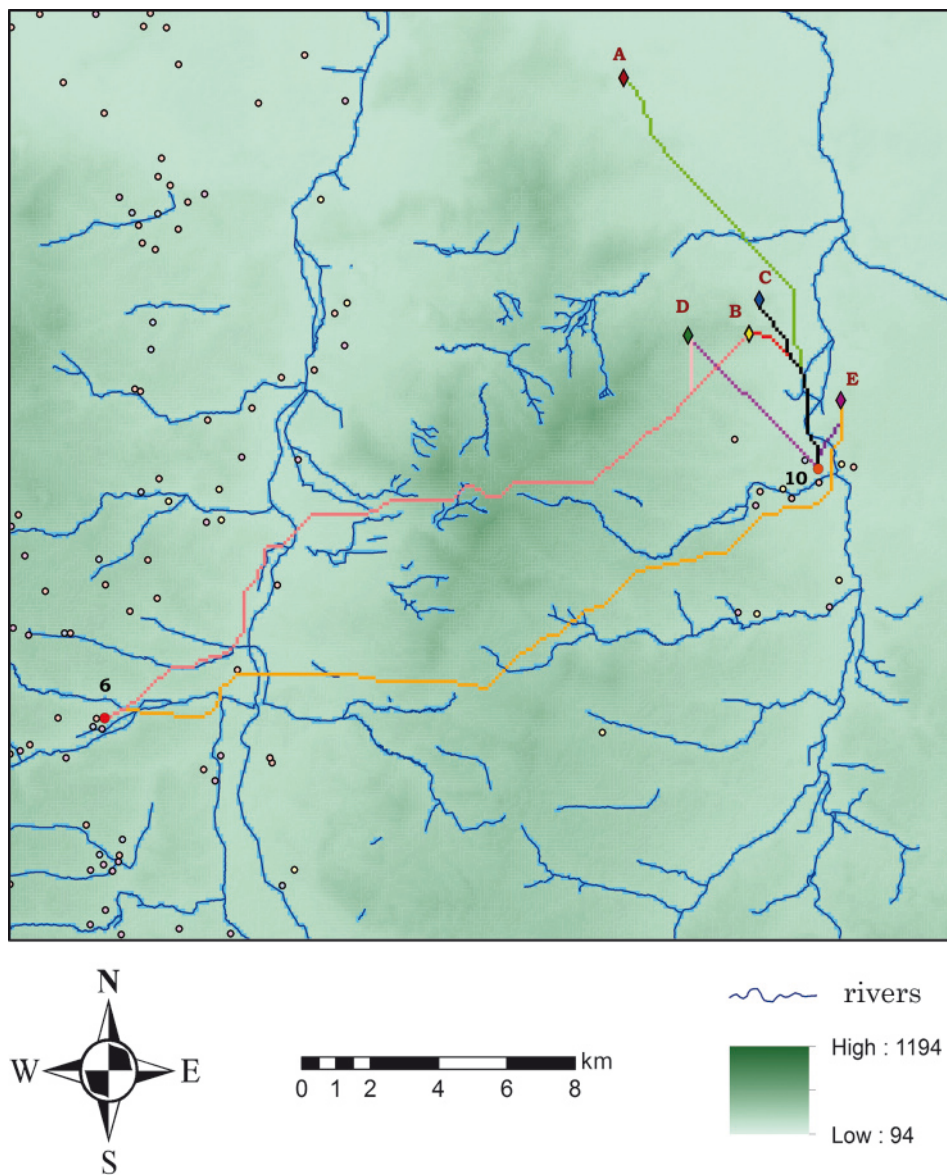


Fig. 17. Least Cost Path analysis results for chosen settlement stabilizers 6 and 10 according to potential locations of extraction of schist A, B, C, D, E

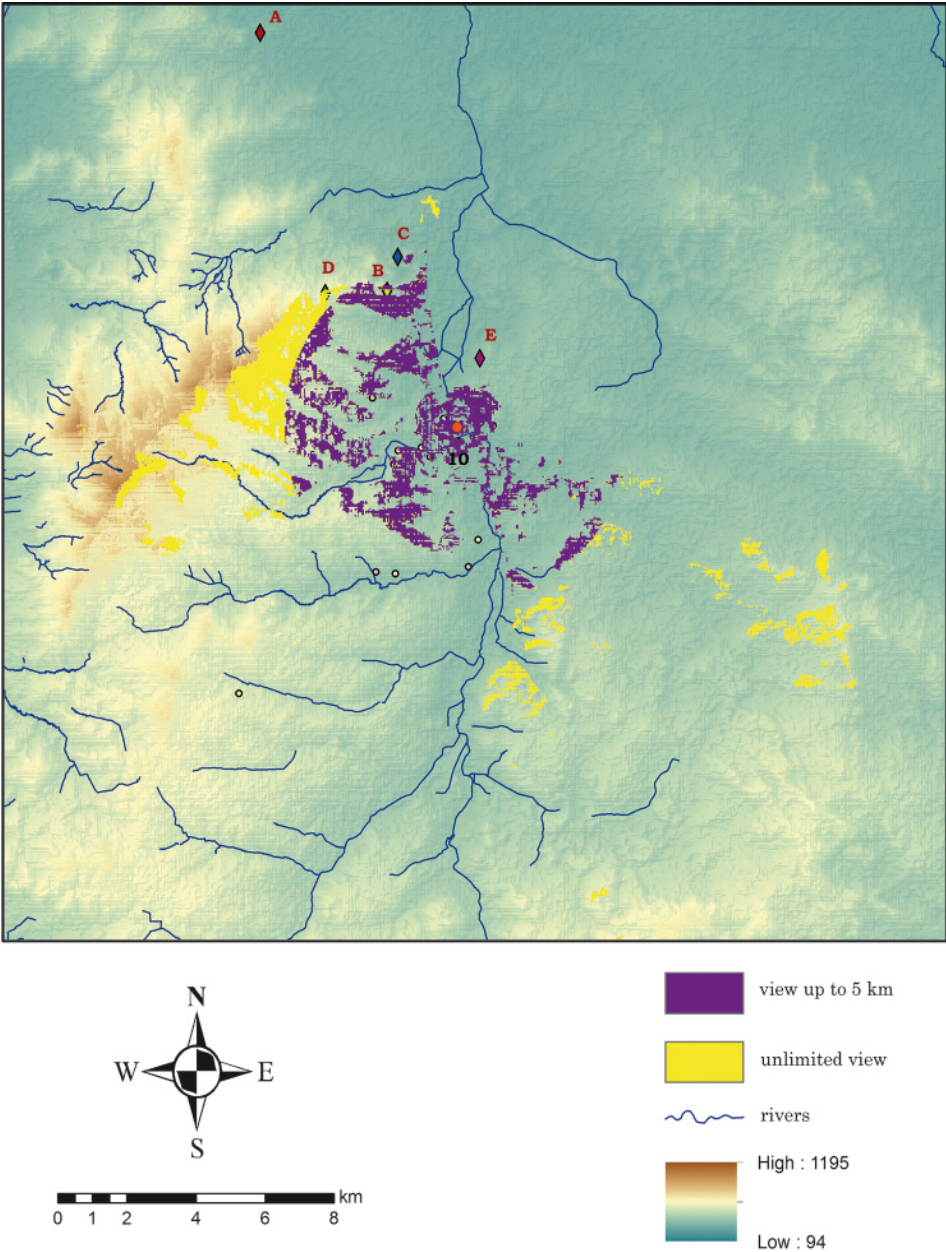


Fig. 18. Viewshed analysis results for settlement stabilizer 10

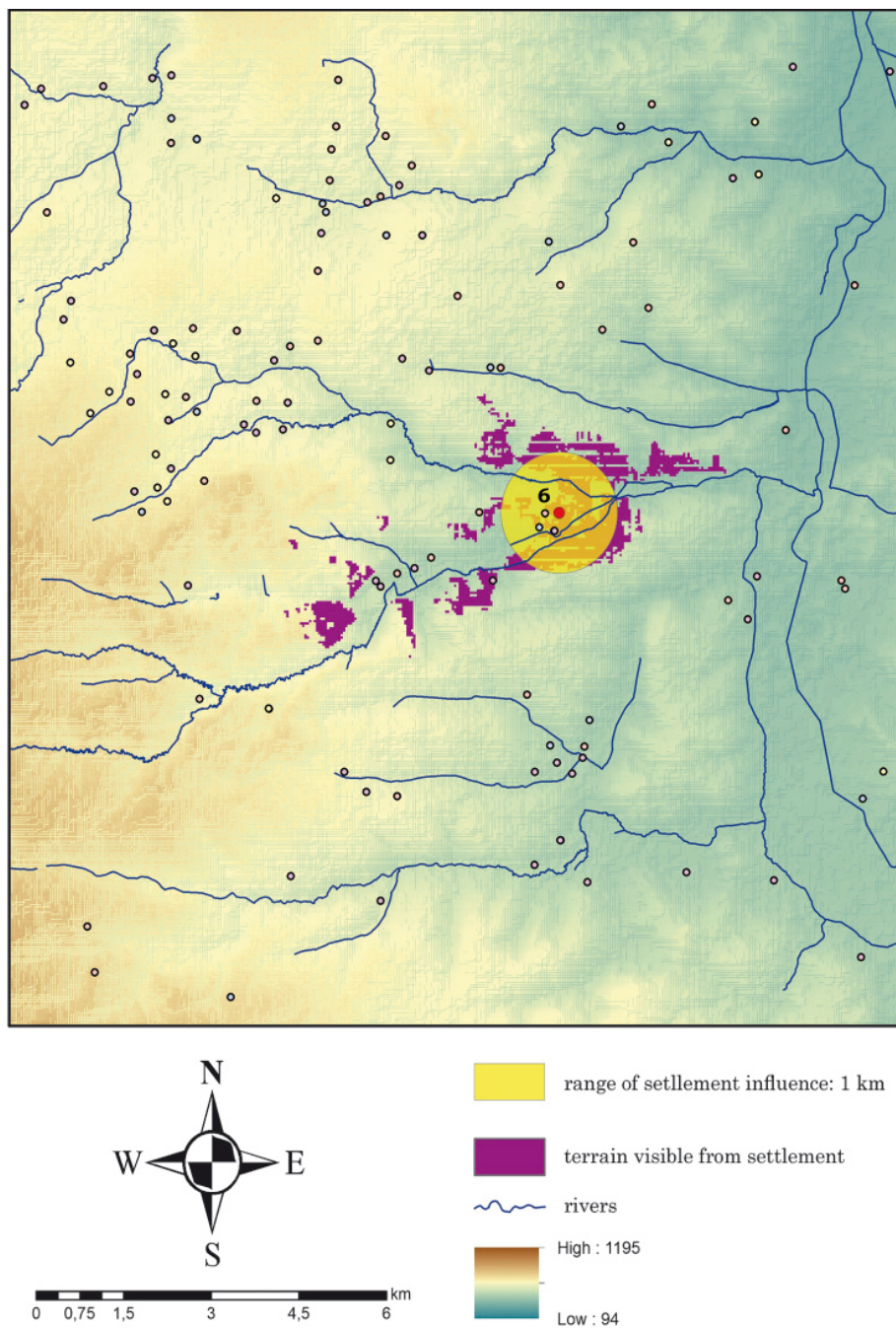


Fig. 19. Viewshed analysis results for settlement stabilizer 6

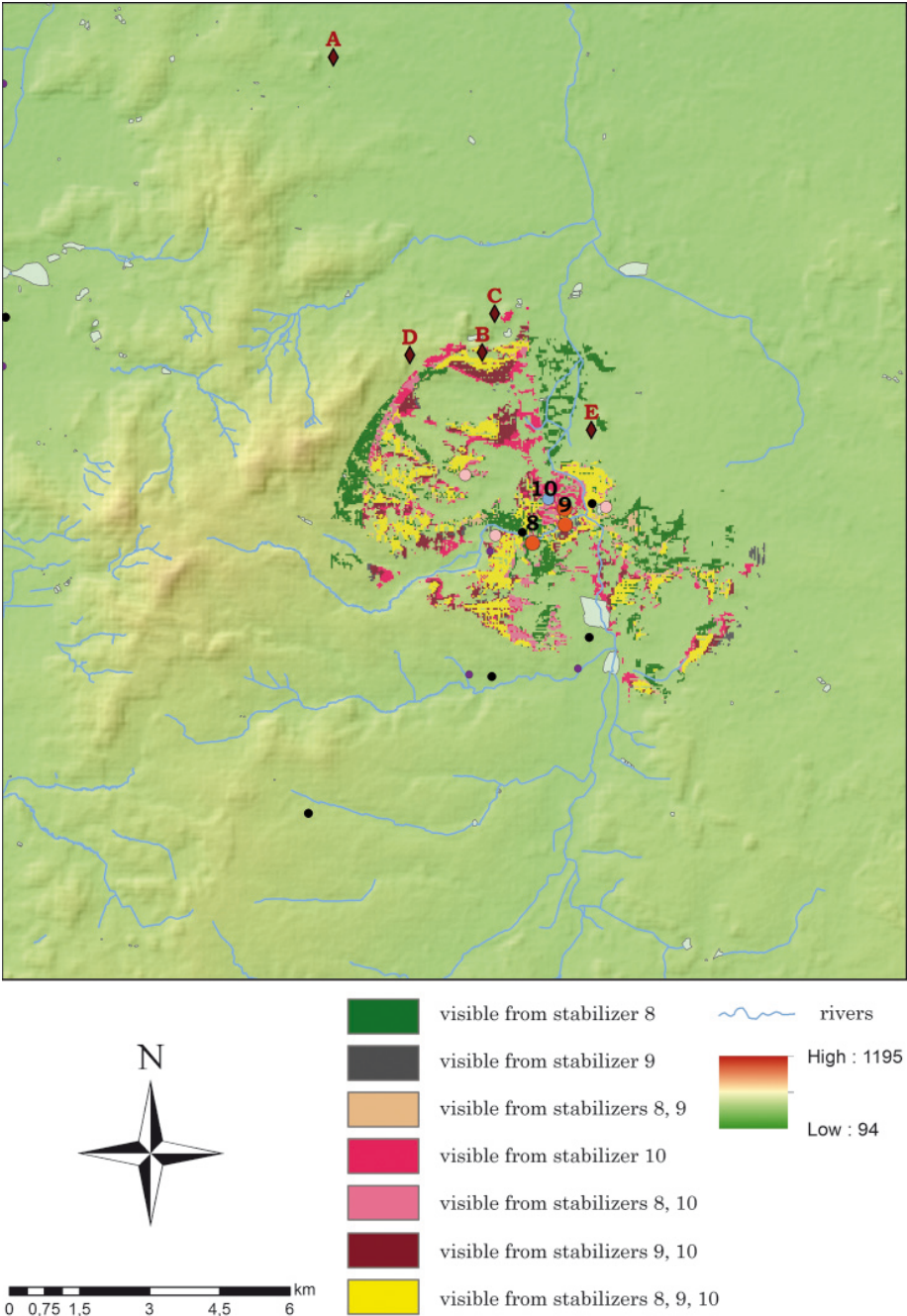


Fig. 20. Viewshed analysis results for settlement stabilizers located near potential locations of schist extraction

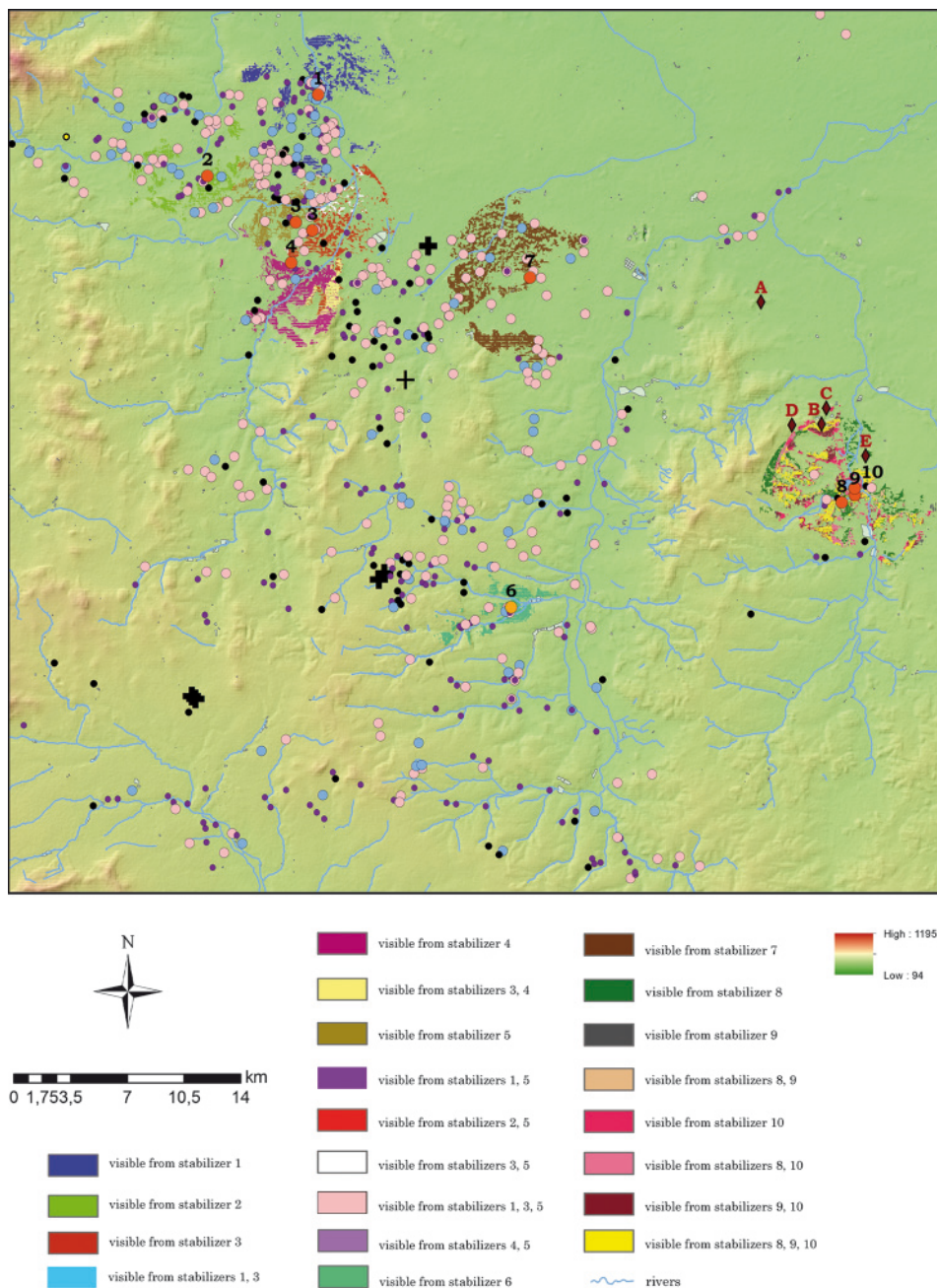


Fig. 21. Viewshed analysis results for every settlement stabilizer occurring in the Niemcza-Strzelin Hills area

the “unlimited view” parameter, and only B after applying the five-kilometer cap. Quarry C occurs on the edge of the range of visibility. The results concerning stabilizer 6 are particularly noteworthy (Fig. 19). It must be said that the most well visible area from this point is the Złotnik River basin. This is a very unique outcome, different from any other. Using an additional buffer of a 1 km radius around the settlement additionally shows the connection of the settlement with the area of two rivers’ confluence.

The second method, which allows one to determine the viewshed for any of multiple, user-defined observer points (“who can see what”) – as well as their overlap – was conducted for all ten stabilizers. An excerpt of this map was generated especially for the area of the quarries, showing the viewshed from all three stabilizers that existed in this area (Fig. 20). Results show that the most well visible quarry for all settlements in the Krynk River basin is quarry B. Analyzing the results for stabilizers located in the northwestern area, it may be said that many of them could see one another (Fig. 21). Sections of some rivers also remain within their range of sight. The viewshed from these locations is not focused on specific elements in space, apart from the very dense settlement of the surrounding area.

DISCUSSION

The above analysis shows some results worthy of discussion. One of the most important is the puzzling location of stabilizer 6 (Czesławice, 8). It is apparent that this site was located favorably to the Oława river basin, having the confluence of two of its tributaries within range of sight. In the early phases, the explicit separation of this area is visible. It is worth mentioning that the Szklarski Massif is situated nearby to the site (10 kilometers in a straight line). The Złotnik River runs through the immediate vicinity of the settlement, connecting it with the Szklarski Massif. The serpentine-rich massif of Szklary is located in the Niemcza area, about 6 kilometers to the north of Ząbkowice Śląskie. The majority of serpentinitic waste from this massif contains nickel (Sachanbiński 2014, 90). In lateritic nickel ores, platinum group metals were found, as well as gold in above-average quantities (Sachanbiński and Łazarienkov 1994; Oberc-Dziedzic and Madej 2014). Native gold occurs in Szklary in the form of clods ranging from a few μm to 0,2 mm (Michalik 2002; Sachanbiński 2014). Gemstones, such as chrysoprase, opal, and jasper are also found in the Szklarski Massif (Oberc-Dziedzic and Madej 2014, 71-81). Native silver has been found in lateritic cambisols as well (Sachanbiński, 2014). Perhaps it is not without reason that the name of the river is called the “Złotnik” (“Goldsmith,” in English). Inhabitants of this area did not need to be familiar with all advantages of the Szklarski Massif, but it should be considered probable that some economic activity may have taken place there. It is possible that the Złotnik River was a trade link, and the settlement itself had commercial importance. In any case, the above analysis confirms that the confluence of the Złotnik and Cienkówka Rivers is in the direct neighborhood and viewshed of the settlement, meaning

that these waterways could be easily controlled by its inhabitants. The Złotnik River basin is particularly visible from the settlement, thus distinguishing this site from other stabilizers. In the Late Roman period, the empty spaces between the northern areas and the southern settlements are filled by new settlement groups, concentrating mostly in the Mała Ślęza River basin, which also runs to the area of the Szklarski Massif. The Mała Ślęza, Złotnik and Cienkówka Rivers all originate from the same area.

Another interesting observation that pertains to the whole area in question is the almost complete lack of iron smelting sites. Among all investigated locations, bloomery slag was found in only three of them. It may be that this is a confirmation of committed economic relationships with settlements in the Wrocław Plain, where iron metallurgy is well developed. Both areas are parts of the same settlement grouping. It is worth pointing out that the numerous whetstones found at settlements in the Plain – made from schist obtained in the Przeworno-Krzywina area – are indisputable indicators of trade (Pazda and Sachanbiński 1991). It is conceivable that in addition to schist from the Krynka River area, materials from the Szklarski Massif were also on the market.

The isolated settlement complex, in close proximity to quartz and schist quarries, is also of interest. As previously mentioned, evidence of trade connections with the furthest reaches of the Bystrzyca-Oława region, as well as whole of Silesia, is well known and represented by whetstones (Pazda and Sachanbiński 1991; Lisowska, 2017). It is curious, however, that there is a lack of any archaeological data about the use of valuable local resources by the Przeworsk culture in this region, aside from quartz or schist (Pazda and Sachanbiński 1991; Lisowska 2017). The analysis shows that stabilizer 10 (Przeworno 10) is in the direct neighborhood of Kryształowa Mountain, which, as its name indicates, is a source of mountain crystal – in addition to quartz. Furthermore, stabilizer 10 is located even closer to the well-recognized marble quarries at Przeworno, situated on the other side of the river (Lisowska 2017). To date, there is no evidence for the exploitation of either marble or mountain crystal by the Przeworsk culture, despite the fact that it is known that these materials were highly desired in the Roman Empire. Perhaps the current picture is a result of the state of research. This question could be clarified by systematic excavations, which have never been carried out in the Przeworno area. Another reason for this situation may lie in the oversight of some information during previous archaeological research. Based on the current data, it cannot be stated conclusively whether the use of the aforementioned materials took place, but it can be said that long-term, settled populations of this area had those resources in their own back yard.

In conjunction with the above, there is the question of the significance of the rivers. In terms of prehistoric economy, rivers cannot be treated as boundaries or impediments on the road to reach economically important places. Situations in which rivers have served as “prehistoric highways” have been well documented by archeological data. In regard to the Przeworno 10 site, the river was probably helpful in reaching the schist quarries further north, as well as the closest quarry on the other side of the river, which probably was con-

nected with river crossing. Taking into account these circumstances, rivers in the above analyses were treated as neutral factors. It is impossible to say unequivocally whether they were boundaries, or on the contrary allowed quicker access to certain points. However, considering the particularities of the Przeworsk culture, it might be said that in most cases, rivers had roles in facilitating transport, communication, and trade.

CONCLUSIONS

In summary, settlement of the Niemcza-Strzelin Hills area increased gradually and changed in character with time. Throughout the duration of the Przeworsk culture, especially in its heyday, settlement of this region was strongly connected to the river network. Settlement tended toward linear patterns along the rivers. A significant proportion of settlement stabilizers are located close to either river estuaries or their confluences. Good examples of this situation are settlements Czesławice 8 and Przeworno 10, most likely connected with trade. Settlement in the Niemcza-Strzelin Hills area shows movement from north to south. Of significant importance were the Ślęza and Mała Ślęza Rivers, particularly in early phases of development, with the notable preeminence of the latter in the Late Roman Period. In the Migration Period, settlement is collapsed in this area, and emphasis shifts to the Oława River instead, which takes on the main role.

Some settlement patterns were observed, which were based on conscious choices about optimal locations in the environment. This phenomenon also applies to single-phase settlements, which means that their placement was not a case of coincidence; their collapse was likely not connected with agricultural factors, but social ones, and the quicker tempo of their collapse was likewise most probably connected with reasons other than agricultural ones (most of them appear in the Late Roman Period, and are connected with demographic development). The majority of settlements featured an easterly aspect, a slope of not more than 2°, and were situated either on black earths or cambisols, never more than 1 kilometer from a water source.

Due to its wealth of geologic formations as well as high quality soils, this region would have appeared to be economically desirable. In reference to the general conclusion about economy and land-use, it can be stated beyond any doubt that schist extraction took place only in the vicinity of settlement groupings located nearby its outcrops. Schist could be transported upriver to the north, where the largest quantities of whetstones were found on settlement sites. It could account for some part of the trade with communities of the Wrocław Plain, for example in exchange for iron. It is not out of the question that the use of other regional minerals and rocks, mainly from the Szklarski Masiff, took place. The economic engine for the whole region was agriculture and animal husbandry, which is supported by the fact that the majority of settlements were located in areas that were environmentally optimal for these purposes. The population of this region seems to use the whole palette of available high- and good-quality soils.

Przeworsk culture settlement as developed in the Niemcza-Strzelin region gives the appearance of a well-functioning organism, for which rivers seem to be the *sine qua non* of economic activity. The above analyses demonstrate and confirm at the same time, that the region in question is part of a bigger settlement structure, which is economically connected.

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Kalina Skóra*

LIEGT DA DER HUND BEGRABEN? AN ASPECT OF POST-FUNERARY INTRUSIONS FROM THE WIELBARK CULTURE CEMETERY IN CZARNÓWKO IN POMERANIA

ABSTRACT

Skóra K. 2019. *Liegt da der Hund begraben?* An aspect of post-funerary intrusions from the Wielbark culture cemetery in Czarnówko in Pomerania. *Sprawozdania Archeologiczne* 71, 125-153.

In comparison with other Wielbark culture necropolises, the cemetery in Czarnówko is remarkable not only due to its size, but also because of a very high percentage of disturbed graves. It is estimated that nearly 90% of inhumation grave pits were disturbed in antiquity. This paper deals with the practice of deposition of a dog's body into a grave in the course of post-funerary intrusion. This habit is unknown in other cemeteries of the Wielbark culture. Bones of the animal underwent examinations using absolute dating methods. Possible reasons behind the deposition of the animal in the trench are discussed with reference to similar discoveries from the Central European Barbaricum in the Roman Period. The role of the dog in funerary rites in antiquity is stressed.

Keywords: Czarnówko, Wielbark culture, Roman Period, dog, grave opening, funeral rites, post-funerary intrusion

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INTRODUCTION

The Wielbark culture cemetery in Czarnówko is located in northern Poland, about 25 km from the shoreline of the Baltic Sea. It is the largest necropolis of this culture (research is ongoing) and was in use until phase C1b of the Roman Period (Schuster 2014;

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Krzysiak and Andrzejowski 2015, 10). People arriving from Scandinavia during the Migration Period also selected this site as the place of rest for their deceased (Schuster 2015). The cemetery stands out in terms of the richness of grave furnishings in the burials of local elites. With regard to their lavishness, these graves are comparable with elite graves from the Early Roman Period (Lubieszewo grave horizon) and the Late Roman Period (Hassleben-Leuna-Zakrzów grave horizon). Some of these are also comparable to the so-called royal grave in Mušov in Moravia, which is dated to the second half of the 2nd c. (phase B2/C1 – see, e.g., Mączyńska and Rudnicka 2004; Tejral 2004; Schuster 2014). However, this parallel is not completely apt as in the past the graves from Czarnówko were disturbed with trenches, which are usually referred to as robbery trenches in the literature. Traces of such post-funerary intrusions were revealed in 90% of the inhumation graves. In spite of the fact that in the course of such intrusions the dead were actually deprived of part of their grave furnishings, it does not seem proper to use the term plundering or robbing in order to explain all actions that took place within grave pits after burial (Schuster 2018, 27-33; Skóra 2018).

RUDIMENTS OF CHRONOLOGY OF GRAVE OPENINGS IN THE CEMETERY AT CZARNÓWKO

One of the keys to determining the possible motives of persons who disturbed graves is to identify the time of the intrusion. In view of the lack of exact temporal indicators of such actions, one makes use of less precise premises, which nevertheless allow for the proposition of a general chronology. If skeletal remains are well-preserved, their arrangement in the grave enables us to ascertain whether the intrusion took place before bodily decomposition, during decomposition, or after skeletonisation. Regrettably, human bones at Czarnówko are either poorly preserved or completely decomposed (cf. Roźnowski and Cymek 2015). It is therefore generally difficult to identify the period of time between burial and the reopening of a grave on the basis of a skeleton's arrangement. Most often recorded in the pits of inhumation graves are the remains of skulls, teeth and small fragments of long bones that owe their preservation to the preservational properties of metal artefacts near them. Although entirely preserved skeletons are absent, observed arrangements of skeletal material unequivocally demonstrate that bones were moved in the course of reopening graves, which therefore most often took place after the decomposition of the body. No finds that could be related to those originally involved in the burial have been found in the trenches. Such artefacts would enable us to identify the cultural identity of such persons and the time of intrusion (on such a possibility cf., e.g. Kümmel 2009, 147-149; Lau and Pieta 2017). On the other hand, abandoned parts of grave furnishings are sometimes found in the trenches. Discoveries of organic remains are exceptional and their presence in a trench is clearly of secondary nature. An example of this comes from feature 1271, in



Fig. 1. Czarnówko, Grave 1271. Feature disturbed by a trench: from the top to the bottom part.
Photo by A. Krzysiak

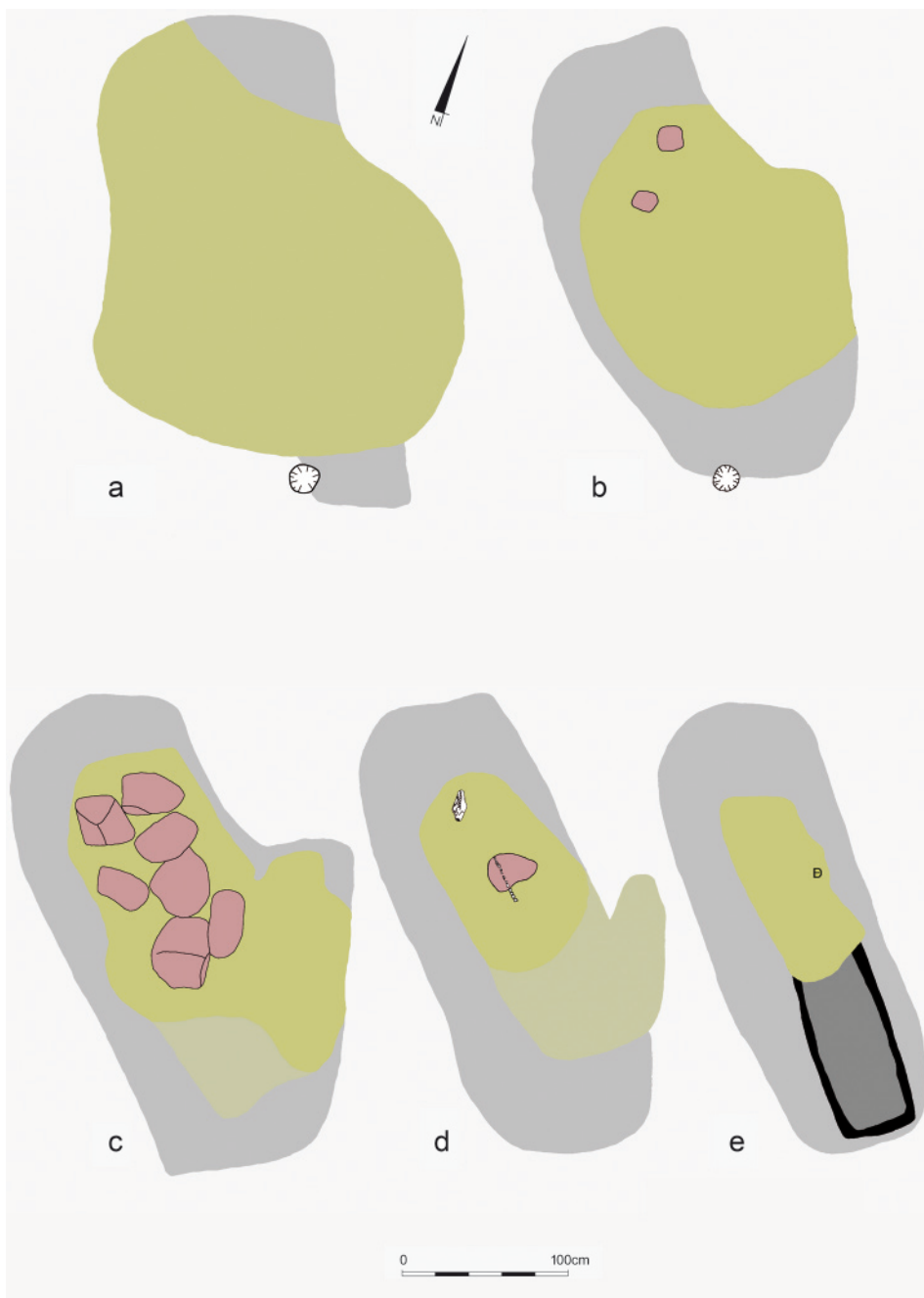


Fig. 2. Czarnówko, Grave 1271. a – outline of the grave at the level of discovery; b – 30 cm; c – 55 cm; d – 95 cm; e – 105 cm. Drawn by K. Skóra

which a the skeleton of a dog was found (Fig. 1). It should be added here that the remains of a European pond tortoise were found in another grave at Czarnówko. They were located in the trench at the level above the skeleton (Makowiecki 2015, 140). It is assumed that its presence in this location is a result of its having been shifted from the bottom of the grave pit rather than finding its way there in the course of the reopening of the grave (information provided by A. Krzysiak). Thus, the cemeteries in Czarnówko and in Gródek nad Bugiem, site 1C, seem to be similar with regard to the share of animal species in funeral rites (cf. Szynklar 1989; Rogatko 1991, 166; Kokowski 1993).

GRAVE 1271

Inhumation grave 1271 was discovered in the northern part of the necropolis. Its ceiling was disturbed by the trench along nearly its entire surface (Fig. 2). Traces of post-funerary intrusion can be seen to the same degree in subsequent levels of the burial. About 30 cm below the top, the oval trench narrowed. It encompassed the central part of the eastern zone of the grave, where it continued down to the level of a log coffin (Fig. 2). At a depth of 30 cm isolated stones were found. These were part of a fill of boulders (d=30-50 cm) that were thrown into the trench. A vertebra of a dog was recorded on a stone located next to the bottom of the trench, which destroyed the northern part of the coffin. The skull and other parts of the skeleton were deposited in anatomical order beyond the stone. The dead animal and the stones were in all probability thrown into the grave at the same time. Under the boulders and the below dog skeleton, at a depth of c. 100 cm from the top, the trench narrowed further. Its extent encompassed solely the section of the log in which the upper part of the deceased person's body should be located. However, skeletal remains were not found, which is quite typical in this cemetery. On the other hand, a semicircular iron buckle was found in the centre of the trench near its eastern wall. This was the only remaining item of the original grave furnishings, about which it is difficult to say more. The discovered fragment of the belt may suggest that the buried person was male, but this is not sufficient evidence to say anything conclusively.

A basic chronological indicator which allows us to date the feature is the iron buckle, of Type D1 according to R. Madyda-Legutko (1987). Its frame is semicircular and it is rectangular in cross-section. The prong of the buckle is straight (Fig. 3). Belt parts of this kind are generally not very sensitive chronologically; they are quite common in the Roman Period, especially in the first two centuries AD, i.e., in phases B1-B2/C1 (Madyda-Legutko 1987, 24-26). In the Wielbark culture, individual artefacts occur in assemblages dated to phase B1, and they are more common in the developed stage of phase B2. In the Late Roman Period they become rare again (Madyda-Legutko 1987, 25). Graves neighbouring feature 1271 can increase the precision of this dating to a small extent only. Some of these were also disturbed with trenches, while others are burials of children with no furnishings

(which was either an original state or a result of “robbery”). Artefacts revealed in the neighbouring features, that is, a Type B S-shaped clasp and Type A V 128 and A V 148 fibulae suggest that burials in this part of the cemetery took place in the late stage of phase B2. It is therefore probable that grave 1271 can also be dated to this period.

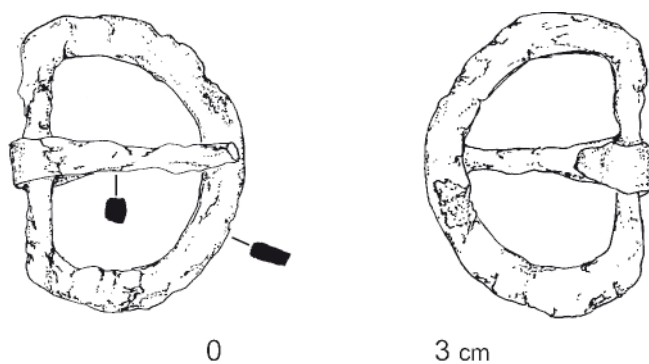


Fig. 3. Czarnówko, Grave 1271. Iron buckle. Drawn by A. Krzysiak



Fig. 4. Czarnówko, Grave 1271 – arrangement of the dog's skeleton in the trench. Photo by A. Krzysiak

ARCHAEOZOOLOGICAL ASSESSMENT

The dog skeleton discovered in the grave was in poor condition, and some bones had completely decomposed (Fig. 4). It can be supposed that the bones that were preserved were covered by the stones in the trench and thus protected from humic acids, which are responsible for the decomposition of organic materials. Among the identified bones were the skull, both mandibles, cervical vertebrae (I and II), lumbar vertebrae and bones of the pelvic girdle (Fig. 5). On the basis of tooth wear and an *ante mortem* loss of one tooth, Daniel Makowiecki (2015, 139-140) proposed that the dog may have been 8-10 years old at the time of death. Its advanced age is also demonstrated by the fact that the lumbar vertebrae are ankylosed. No traces suggesting that the dog was killed were identified on the skeleton. Of course, their absence does not exclude such a possibility. The advanced age of the dog can indirectly imply its natural death. It is worth mentioning that analyses of the age of dogs from early medieval Germanic cemeteries, for example, demonstrate that most of them were less than 5 years old. This could suggest that their death was not a result of natural factors (Prummel 1992, 151-152).

CHRONOLOGY OF THE TIME OF INTRUSION

In view of the absence of surviving human bones, the only archaeological indicator which allows for a general estimation of the time of intrusion is the state of preservation of the log coffin and the degree to which it was damaged when the grave was reopened. The northern part of the coffin was damaged by the trench while the southern part remained untouched. Such a state of preservation of the log suggests that the period of time that passed since the burial was long enough to weaken the hardness and integrity of wood in the coffin walls. Thus, it disintegrated when the grave was dug up. On the basis of contemporary observations, this time can only be approximately estimated to be about 20-35 years. In fact, the rate of decomposition of the body and the wood depends on a number of different factors, both case-specific and external (cf. Skóra 2017, with further reading, cf., e.g., Ferreira and Cunha 2013). Regrettably, it proved impossible to identify the species of wood that was used for the coffin.

It should also be stated that the time interval between the burial and the opening of the grave was in all probability not very long. Trenches were located very precisely within grave pits, which means that no more than a couple of decades passed, and above-ground markers, such as earthworks and stone and wood constructions, must have been in a good condition. We also know that the opening of numerous graves at Czarnówko probably occurred before the decomposition of log coffins, as in numerous cases the degree of their integrity was very high. In spite of the fact that the graves were dug up, the coffins remained undamaged. In grave R300, for example, post-funerary manipulations took place



Fig. 5. Grave 1271 – fragment of the dog's skull. Photo by J. Słomska

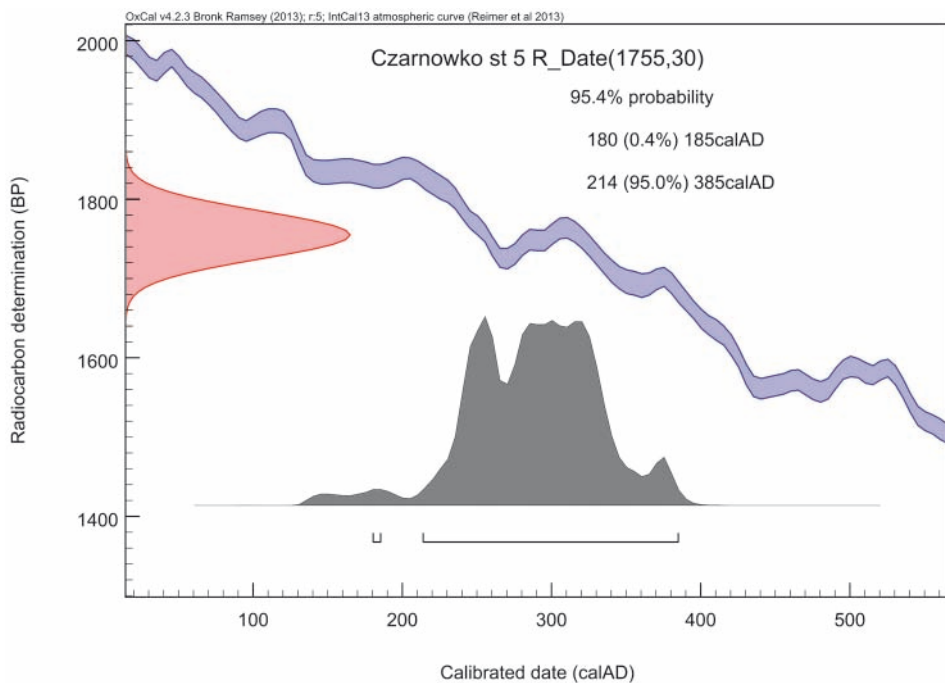


Fig. 6. Results of ^{14}C dating of the dog's skeletal remains (Poznań Radiocarbon Laboratory – lab. no. Poz-103003)

when the log was in such good condition that a stone stela which was thrown into the pit during the opening of the grave caused the coffin to break and the separated part to move. However, the log was not completely destroyed (Schuster 2018, table II).

In order to go beyond these general attempts at identifying the chronology of the grave opening, radiocarbon analyses were carried out on the remains of the dog that was thrown into the trench. Analyses of one of the animal's vertebrae was carried out in the Poznań Radiocarbon Laboratory. The analysed sample (lab. no. Poz-103003) yielded a date of 1755 ± 30 BP. After calibration, it provided a date between 214-385 AD with a probability of 95% (Fig. 6).

This means that the opening of the grave and the deposition of the dog's body took place between the final stage of phase C1a of the Roman Period and the Migration Period – that is, phase D. The end of use of the necropolis at Czarnówko falls within phase C1b, prior to 260/270 AD. Therefore, two hypotheses can be proposed: 1) grave 1271 was disturbed while burials were still taking place at Czarnówko, 2) the opening took place after the necropolis had been abandoned.

Assuming that the grave came into being in the late stage of phase B2, the time elapsed between burial and the reopening of the grave (214, as indicated by the first date from the range provided by the radiocarbon dating) would be at most 60 years, but it is also possible that the grave may have been opened soon after the burial. Longer intervals between burial and reopening are possible, however, taking into account the earlier possible dates for the grave and the younger end of the radiocarbon range for the dog vertebra.

Bearing in mind the fact that in the cemetery at Czarnówko there are examples of graves with traces of intrusions which took place relatively soon after the burial, the first of the discussed options, i.e., the short time interval, is certainly possible. As stated above, however, the state of preservation of the coffin suggests an interval of a couple of decades (two or three?).

DOG REMAINS IN OTHER NECROPOLES OF THE CIRCLE OF GOTHIC CULTURES

A case which would be analogous to that identified at Czarnówko in grave 1271 was not found in any other cemetery of the Wielbark culture. Dog remains are not recorded in so-called secondary or "robbery" trenches, which disturb pits of inhumation graves. On the other hand, a couple of cases in which bones of other animals were recorded are known. Regrettably, only in one case is species identification possible. At Waplewo, Olsztyn district, a cattle tooth was found between stones at the top of a trench that disturbed an inhumation grave of a child (7-8 years) (Mazur 2012, 159; Skóra and Troszczyńska 2012, 149, fig. 5). At Pruszcz Gdański, site 7, stones and animal bones were thrown into the trench in grave 96. The grave is dated to phase B2, and it was disturbed after decomposition of the

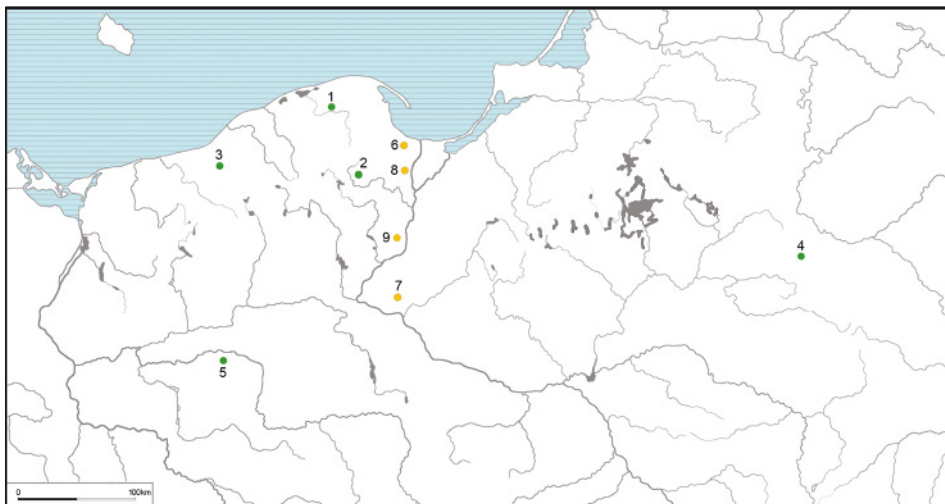


Fig. 7. Dog remains discovered in cemeteries (green) and settlements (yellow) of the Wielbark culture: 1 – Czarnówko; 2 – Chwarzno; 3 – Grzybnica; 4 – Jasionowa Dolina; 5 – Słopotowo; 6 – Pruszcz Gdański; 7 – Rogowo; 8 – Stanisławie; 9 – Warlubie. Drawn by K. Skóra

body (the skeleton was not in anatomical order; the skull was located 70 cm above the limbs and was placed vertically and turned to the east; the mandible was located separately at some distance). The deceased was a woman aged 25-35 (Gładkowska-Rzeczycka *et al.* 2003, table 2). According to M. Tuszyńska (1995, 217), these actions were related to robbery or were some sort of magical rites. Thus, the deposition of stones and animal bones in the trench is a characteristic this case has in common with the burial at Czarnówko. Animal bones were also discovered in another two graves at Pruszcz Gdański, site 7, but in a different context (information from M. Tuszyńska from the Archaeological Museum in Gdańsk, 9 November 2018). In addition, it is worth mentioning that several animal bones (cattle, pig, goose) were discovered in the “robbery” trench dug into inhumation grave 177 from the cemetery of the Przeworsk culture at Karczyn/Witowy, site 22/22 (Bednarczyk and Romańska 2015, 18; Makowiecki *et al.* 2015, table 1, 207; Pospieszny and Bełka 2015, 181).

Generally, the share of animals in burial rites of the Wielbark culture is nonetheless minimal as compared, e.g., to the Masłomęcz Group (Nadachowski and Wolsan 1989; Kokowski 2007, 146), the Chernyakhov-Sântana de Mureș culture (Rogatko 1991, 153-155; Hopkalo and Rudych 2017), or the neighbouring Przeworsk culture (among others, Węgrzynowicz 1982, 224-227; Andrałojć 1986; Makiewicz 1987; Dąbrowska 1997, 112-113, table 3; Kuziak 2009, 78, 79, fig. 2). This holds true for dog bones as well, which are only sporadically found in cemeteries (Fig. 7): between the stones of a mound covering (Mound 12 – Jasionowa Dolina – Jaskanis 2012, 76, 212-213, table 1), in a channel-like feature

(mandible of a 2-4 year old dog in Pit 534 in Slopanowo), from stone wreath I (bones of the skull, the mandible, a metacarpus and a phalanx of a dog greater than 2 years of age – Chwarzno, Kaszuby Lake district, Gałęzowska 2007, 184, table 4). Additionally, a fragment of a talus of a dog, together with remains of a goat/sheep and of a bird were found together with bones of an adult individual in a pit burial (*Knochenhäufchen*) located near stone 1, which formed part of circle IV at Grzybnica (Hahuła and Wołągiewicz 2001, 53, plate VIII). All this demonstrates that the dog played a certain role in the funeral rites of the Wielbark culture. A few burials of this species were identified in settlements of the Wielbark culture (Rogowo, site 23, Lubicz commune, Kujawsko-Pomorskie province – Bokinić *et al.* 2012, 164; Makowiecki 2006, 71; Bokinić 2016, 17, 49, fig. C159; Pruszcz Gdański – Sobociński 1975, 517-525; Andrałojć 1986, catalogue, no. 71; Rogatko 1991, 179; Warlubie – <https://archeowiesci.pl/2011/01/29/wielbarska-osada-w-warlubiu>, access on 12 October 2018 and Stanisławie, site 37, Tczew commune, Pomorskie province – Makowiecki 2006, 71). Dog bones from Lipianki come from the Oksywie culture (Ostasz 2015, 58) and not the Wielbark culture part of the settlement (cf. Sielicka 2015, 165-166). Such discoveries are rare in comparison with the situation in the Przeworsk culture, and this fact is sometimes explained by unfavourable soil conditions in Pomerania (Makiewicz 2000, 222-223, fig. 35).

On the other hand, in the Masłomęcz Group, whose funeral ceremonies are remarkable for a great variety of rituals (Kokowski 2007, 134-140), one also records disturbances of inhumation graves with so-called secondary trenches. Sometimes, animal remains are found in them. However, it is often very difficult to identify relationships between such remains and the original human burial. This is due to the fact that bone remains are translocated from their original position as a result of the reopening of graves. Furthermore, human-animal burials, animal additions or admixtures, and even independent animal burials or partial graves are recorded. One of the more unconventional practices is the replacement of removed human bones with animal ones (cf. Rogatko 1991, 153, 162). It also occurs that skeletons of animals (but not of dogs) are discovered in the secondary trenches themselves. As noted by J. Rogatko, “complete or headless skeletons of animals were located on the bottom of the trench which disturbed the top (Masłomęcz, site 15, grave 132), the fill (Gródek nad Bugiem, site 1c, grave 50), or the bottom (Masłomęcz, site 15, grave 134) of human inhumation burials.” Trenches were usually located in the central parts of grave pits. Animal species found there included the European pond tortoise, sheep and pig (Rogatko 1991, 155, table 2). The earliest animal grave (the post-cranial skeleton of a sheep dug into grave 132 from Masłomęcz, site 15) could be dated to phase C2 of the Roman Period. The remaining animal burials, as well as the human-animal burials from Gródek nad Bugiem, site 1C, Masłomęcz, site 15, Moroczyn, site 25 and Werbkowice-Kotorów, are most probably related to phases C3-D (Rogatko 1991, 182).

It should be noted that in spite of the fact that numerous animal species were identified in cemeteries of the Masłomęcz Group, the remains of a dog were found only once. At

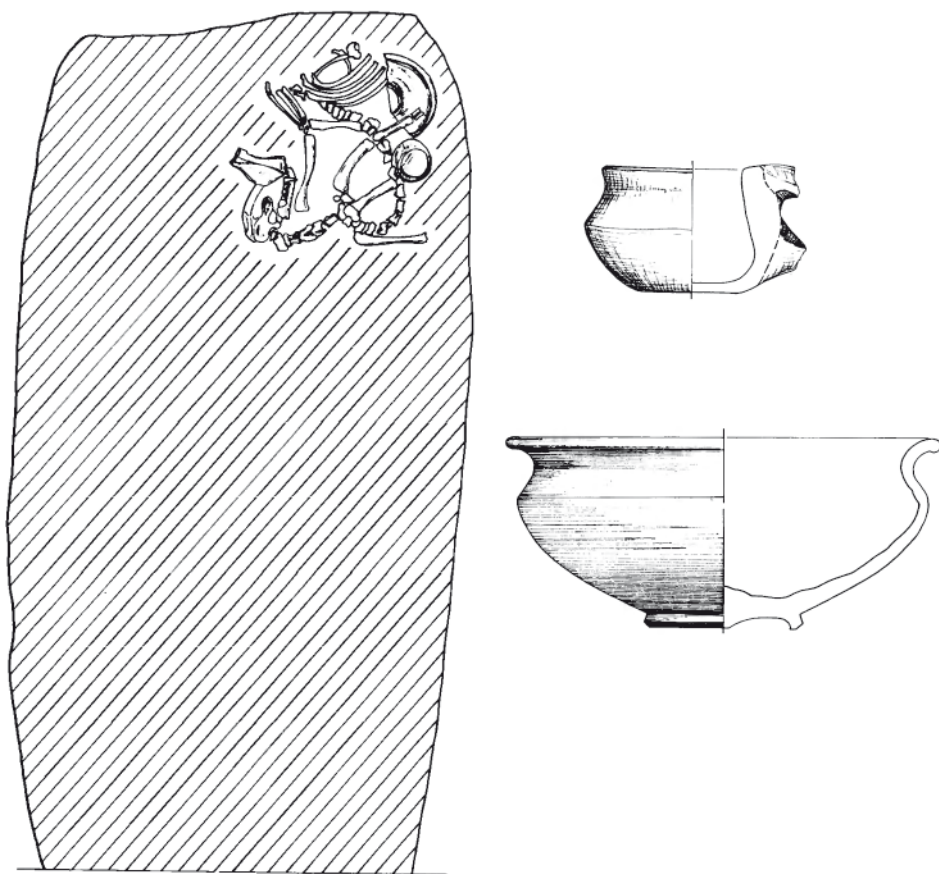


Fig. 8. Gródek nad Bugiem, Grave 103. After Kokowski 1993

Gródek nad Bugiem, site 1C, the canine skeleton was situated in feature 103 in the NE part of the pit. Next to it, there were two vessels (Fig. 8) (Kokowski 1993, 77-78, fig. 94, photos 158-160). The pit was similar to those of human graves with regard to its size.

The deposition of the dog's body in the trench of grave 1271 at Czarnówko is very loosely related to the aforementioned discoveries, which were in all probability a manifestation of cultural ideas of south-eastern provenance. Although chronologically the burial itself is too early in relation to these traditions, the so-called robbery trench itself could possibly be closer to them temporally.

The presence of the dog in burial rites is much more strongly pronounced in communities of the Chernyakhov-Sântana de Mureş Culture. Dogs accompany humans in burials, or are found in features located above human graves. Cases of independent animal burials

within necropolises are known as well (Petrauskas 2014; Hopkalo and Rudych 2017, 81-83). Such a tradition was also found among the Sarmatians and in Geto-Dacian cultures. Apart from the presence of dog remains in cemeteries, they are also recorded in settlements (Rogatko 1991, 177-178; Grumeza 2013; Istvánovits and Kulcsár 2015, 61-63). In no case does the evidence suggest that these animals were eaten. A narrative of Ammianus Marcellinus about the Goths (Thervingi) exchanging slaves for dogs in the time of famine (Amm. Marcell. XXXI, 4, 11) must be considered a peculiar case. There may be some truth to this assertion, but it calls for caution in its interpretation. Traces revealed on bones of these animals in Europe demonstrate the possibility of cynophagia in certain situations of crisis, e.g., during sieges of towns (cf., e.g., Makiewicz 2000, 219; Kajkowski 2015, 231; Sielicka 2015, 156-157), at the turn of winter and spring when food resources were running out, or for medicinal purposes (Zwolska 2014, 127-129).

An assessment of whether the animal was buried together with the dead person or was interred after the burial is important in determining whether it was intentionally killed. The disturbance of the grave by the trench and the resulting translocation of the contents of the grave pit renders an understanding of the chronology – and therefore interpretations of the deposition – difficult.

An interesting discovery was made at Velikaya Bugayevka (Kiyevskaya oblast', Ukraine): a cremation burial (burial 73) was deposited at the top of inhumation burial 74 (Fig. 9), above the chest of the dead. The inhumation burial was disturbed by a trench, and a dog's body was placed about 40 cm above the pelvis and femora (Petrauskas and Shishkin 2013, 36, figs. 28 and 113, tab. 9:73; Petrauskas 2014, 143). It is difficult to ascertain whether the deposition of the dog's body is causally related to the reopening of the grave or is an independent event. In my opinion, these actions took place after the

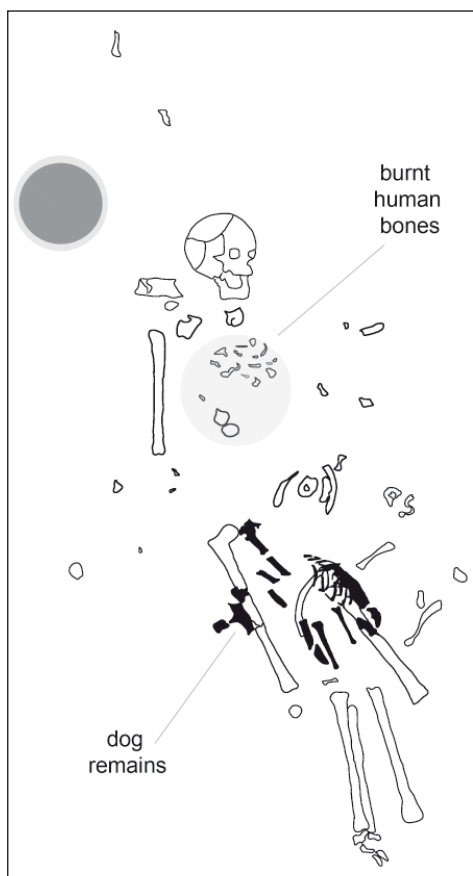


Fig. 9. Velikaya Bugayevka (Kiyevskaya oblast', Ukraine) – dog remains in the trench-disturbed inhumation, Grave 73. They are situated c. 40 cm above the pelvis and femora of the deceased.

After Petrauskas and Shishkin 2013.

Drawn by K. Skóra

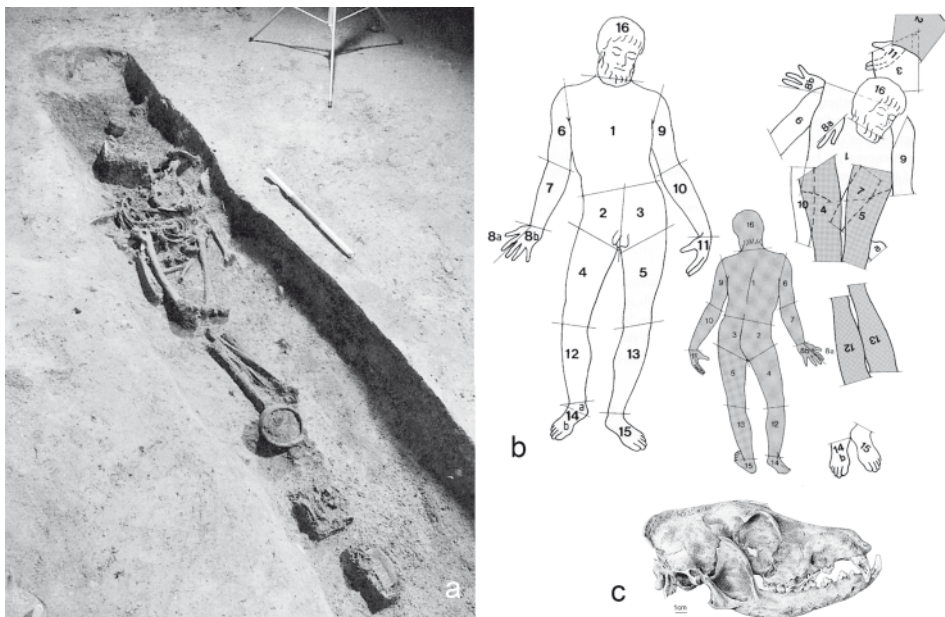


Fig. 10. Himlingøje (Zealand), Grave 1978-35. Dog skeleton on the coffin of the deceased, whose body was quartered (?) before burial. After Lund Hansen *et al.* 1995

skeletonisation of the body, which is implied by the arrangement of the skeleton. In some respect, this case is similar to the discovery from Czarnówko.

What is more, the incomplete skeleton of a dog was found in inhumation grave 30 at Chervone-2 (Ukraine), near mixed human bones. This burial was also disturbed by a trench, and the fact that the human bones were mixed indicates that the intrusion took place after the decomposition of the body. The dog's skeleton was deposited in the NW part of the pit, at its mid-depth (Shishkin and Petrauskas 2010; Petrauskas 2014, 143; as well as unpublished information provided by O. V. Petrauskas, 30 July 2018). It seems that the incompleteness of the animal's skeleton indicates that the dog's body found its way to the fill of the grave pit in connection with activities related to the first burial. The absence of some bones could therefore be caused by their disturbance when the feature was opened.

Apart from these two discoveries, which are somewhat analogous to the case of Czarnówko, other types of examples of the presence of dogs in funeral rites come only from the Chernyakhov-Sântana de Mureș Culture. At Lavrykivka (Poltavs'ka obl., Ukraine), the complete skeleton of a small dog was located near a pottery cluster close to the leg of a deceased woman (Suprunenko and Hopkalo 2014, 208, fig. 1). In grave 13 in the cemetery at Pereyaslav-Khmel'nytsky (Ukraine), a dog's skull was found. Furthermore, dog remains were found in feature 287 in the necropolis at Dănceni (Moldova). This feature is inter-

preted as a cenotaph. Remains of dogs are not always discovered directly in the grave pit. Sometimes they are located above the grave or in the barrow, as it is the case among the Sarmatians from the Carpathian Basin (Hopkalo and Rudych 2017, 81).

In the cemetery at Nejzac (Crimea), dogs accompanied the dead who were buried in cylindrical pits located in the peripheries of the cemetery (Khrapunov 2013, 192). In the cemetery at Olbia (Ukraine), a feature with the remains of three young dogs found in a layer of ash was interpreted as a sacrificial burial. Potsherds and burnt bones were also recorded in the pit (Hopalko and Rudych 2017, 81). Moreover, the skeletons of six dogs in anatomical position were found in grave 165 in Velikaya Bugayevka (Petrauskas and Shishkin 2013, 61). Traces of knife incisions were found on some bones (Zhuravlev 2013, 383). This discovery is considered as some kind of sacrifice or cult feature (Hopkalo and Rudych 2017, 83).

I do not know any instances of discoveries of dog remains in trenches disturbing Roman Period graves in Scandinavia, although a habit of common burials with humans was in use there (Gräslund 2014, 36-37). In Hammarby (Öland), inhumation grave 1/1954 (phase C1) in a stone chamber contained the skeleton of a dog (?) in its southern part. This area of the burial pit was intact, whereas the rest was plundered – human bones and burial equipment were mixed (Rasch 2001, 198, 222). The incomplete skeleton of a medium-size dog was discovered in a chamber grave in Ellekilde (Zealand), where a man who died as a result of combat trauma was buried. The fact that the animal's remains are not complete is the result of a *pars pro toto* rule in the opinion of R. Iversen (2011, 82, 109; 2014, 136-137). Additionally, only dentition from dogs was included in graves 30 and 100 from (Iversen 2011, 82).

The skeleton of a dog was found at the bottom of the coffin in grave 1978-35 in the cemetery from the Younger Roman Period in Himlingøje (Zealand) – Fig. 10. No archaeological traces demonstrating post-funerary intrusion were discovered in this grave. On the other hand, an anthropological assessment suggests that the partially decomposed body of a man (aged 18-25) was first quartered and then deposited into the grave. This is implied both by the non-anatomical arrangement of the skeleton and by cutmarks on pelvic and limb bones and perhaps on the shoulder blade (Lund Hansen *et al.* 1995, 125-127, 254-255, fig. 3:89-93).

DOG REMAINS IN SO-CALLED ROBBERY TRENCHES IN NECROPOLES OF OTHER CULTURES

The habit of depositing dead dogs in trenches that are classified as robbery trenches seems to be well established in European cemeteries from the first centuries of the second half of the first millennium AD. This is related to the growing role of the dog in funeral rites of societies of that time. Dog burials were practiced by the Thuringians, the Longobards,

the Franks, the Alamanni, and the Anglo-Saxons (c. 400-700 AD), as well as by the Saxons, the Frisians (c. 600-800 AC) and the Scandinavians (c. 600-1050 AD).

I also know of some graves with so-called robbery trenches in which dog remains were revealed. These discoveries are from Merovingian Period cemeteries located in the territory of present-day Germany, but chiefly from Longobard necropolises from the period preceding their migration to Italy, which is believed to have commenced on Easter in 568 (Mączyńska 2013, 242-243). Of significance for proposed interpretations are the presence of dogs as companions of the dead, and the occurrence of a “Grabraub” (grave robbery) plague (Klevnäs 2013, 7), which involved necropolises of western and central Europe at this time. Due to this, remains of dogs in robbery trenches are very often a result of the fact that graves were dug through by “plunderers”. In cases in which the reopening took place shortly after burial, any disturbance concerned the non-decomposed body of the animal, whereas if the intrusion took place after skeletonisation, we can observe a disturbed arrangement of animal bones and a translocation of parts of the skeleton within the pit and the trench. Sometimes the absence of some parts of the skeleton is noted. These parts were perhaps removed in the course of the intrusion.

Ménfőcsanak (Győr, Hungary) is believed to be an example of a cemetery where dog remains were recorded in the trench of an inhumation grave (Tomka 2005, 248). In grave 262 (6th c.), skeletons of two adult dogs buried with a deceased female were identified (Vaday 2015, 214). L. Bartosiewicz (2015, 255) assumes that these dogs were killed for the needs of the funeral ceremony, be it in order to manifest the status of the dead person or to be her companions in the voyage to the other world. An archaeozoological assessment did not show any traces of *perimortem* trauma. On the other hand, a number of pathological changes were found in the case of Individual B, which demonstrated its poor living conditions (Bartosiewicz 2015, 251, 255, fig. 3). One of the animals (Dog B) was placed in a niche in the course of the burial and thus remained *in situ* at the time of the intrusion. The arrangement of the other individual (Dog A) implies that its body was thrown again into the pit after the grave had been emptied. However, it is not clear where this dog was originally deposited. The arrangement of the body and the position of the dog demonstrate that the opening took place shortly after the burial (Bartosiewicz 2009, 161; Vaday 2015, 186-187, fig. 10.1-9, grave 262).

In the necropolis of Lužice (Moravia), dog remains were found in grave 96. They were originally located on the coffin lid of an older adult (*senilis*) male. As a result of the collapse of the coffin or its destruction, the dog's remains moved downward in the pit (Klanica and Klanicová 2011, 289-290, fig. 41). An analogous situation was found in the “plundered” grave 111 with a double burial of a man and a child. The caudal portion of the skeleton of a dog with its hind limbs directed upward was found in the central part of the trench above the coffin. The cranial portion of the skeleton was destroyed in the course of the robbery (Klanica and Klanicová 2011, 300, fig. 47). The aforementioned examples demonstrate that the animals were not deposited into the graves secondarily, but rather that their pre-

sence in the trenches resulted from the translocation of the original contents of the grave pit by the robbers. An analogous situation was found in Plotišť nad Labem in chamber grave I. In this case, the skeletons of five dogs and a child were translocated as a result of the collapse of the grave's structure when it was disturbed by a robbery trench (Rybová 1979, 467-472, fig. 84).

It seems that the situation discovered in the Baiovarian cemetery of Viecht-Unterfeld (Gde. Eching, Lkr. Landshut) is somewhat related to the case of Czarnówko (Dannhorn 1994, 295). Among nearly 300 features, grave 121 stands out with regard to its spatial arrangement. It was surrounded with a ditch and was originally covered with earthen mound. Next to a large grave pit, post-holes were discovered. These were remains of a wooden structure. Inside the pit, a "robbery" trench in the shape of a shaft leading directly to the coffin was revealed. The skeleton of a dog was discovered in the middle of the trench's depth, and below that lay the corpse of a fox. The animals had been decapitated before they were thrown into the pit. On the basis of grave furnishings, the burial can be dated to the second third of the 7th c. (Dannhorn 1992; 1994, 298). The deposition of the animals in the trench is interpreted as a manifestation of magical rituals undertaken by the robbers or as an attempt at placating the robbed dead by means of sacrificial rites (Dannhorn 1992, 133; 1994, 299-300). Decapitated bodies of dogs found in human burials are known from Viking Age cemeteries, often in so-called atypical burials (Gardela 2012, 19-22). This, however, fits within another sphere of meanings.

Other species of animals can also be found in trenches dug into graves in inhumation necropolises. Apart from the aforementioned fox, red deer antlers have been discovered in 6th c. Germanic cemeteries in the Czech Republic and Slovakia. For example, red deer antler was found in the trench of grave 45/1904 in the cemetery at Krainburg, in grave 5 at Prague-Kobylišy, and in grave 38 in the Avar cemetery at Kiskörös-Vágóhíd (Werner 1962, 88; Svoboda 1965, 259-260). J. Werner (1962, 88) classified these actions as "Geweihzauber", or sorcery with the use of antler. Such magic was supposedly used by early medieval grave-robbers. Antler may have also been among the original content of the grave pit, ending up in the trench as a result of translocation. This is certainly possible, as cases of covering the dead with Cervidae antler are known from necropolises of that time (e.g., a moose antler on the bodies of a pair of children – grave 45 from Holubice in Moravia, see Čížmář 2011, 182, plate 101:45).

THE ROLE OF DOGS IN FUNERAL RITES AND THE DISCOVERY FROM CZARNÓWKO

Dogs whose remains are discovered in human graves are generally perceived as gifts, guides to the otherworld, guardians of the dead or status symbols of the deceased person. This does not exclude an emotional relationship between the dead person and the animal

(Makiewicz 1987, 248; Prummel 1992, 151-152; Scheibner 2013, 80-81) or the existence of more profound symbolic meanings (cf. Gräslund 2004). One crucial step in ascertaining the meaning behind such customs is the identification of the manner of death of the dog, while its breed or size can help to define its function during its life (e.g., companion animal, protection against predators, participation in hunts).

There is no doubt with regard to the strong bonds between humans and dogs. These have consolidated steadily since domestication, when an ability to identify human emotions and behaviours developed as part of the behavioural traits of the animal (Lasota-Moskalewska 2005, 202). Perhaps as a result of this profound symbiosis and a high regard for certain traits of this species, dogs were considered to have healing properties belonging to the repertoire of homeopathic magic (Morawiecki 1996, 58-63, 77). A belief in the healing or protective power of medicines or apotropaics prepared from dogs (from specific parts of the body, internal organs or body fluids) was popular in antiquity and has survived in folk medicine until the present. Pups were believed to possess particularly strong healing properties (Scheibner 2013, 63-64). Images of dogs (e.g., depicted in mosaics) or vessels containing canine blood were sometimes buried under the threshold in order to protect a household against malicious spirits (Zwolska 2014, 57, 73, 99-100). Dogs were also “protagonists” of a drastic ritual known as *kynomartyrion* or “dog tortures”. It became widespread in the Greek world in antiquity. Its aim was to protect the community against the malicious spirits of people who died a violent or premature death, and its method was to strangle, stone or drown the animal (Zwolska 2014, 101-104). Generally, the role of the dog in ancient rituals, not only those of Mediterranean cultures, places it between a remedy for poor health via agrarian sacrifice and a means of repelling evil forces (Scheibner 2013, 75-76).

Although in the course of time, the dog became a symbol of fidelity and friendship and its position was sometimes even quasi-human, the attitude of humans toward dogs was not only positive. There was room for contemptuous treatment and extreme neglect (e.g., keeping dogs in miserable living conditions). This ambivalence was perhaps also rooted in cases of aggressive behaviour against humans.

Based on the presence of dog burials in particular locations within settlements of the Central European Barbaricum (e.g., household pits, pottery kilns or bloomery furnaces, households and post-holes), one first of all assumes their role as sacrifices, including foundation sacrifices, or guardians, e.g., of precious contents (among others, Beilke-Voigt 2007; Beneš and Nývltová Fišáková 2009, 532; Grünwald 2009, 253; Gralak 2012; Sielicka 2015, 154; Nohálová *et al.* 2016, 83-84).

Some discoveries from within settlements may be the results of actions belonging to the profanum sphere: an accident, individual relationships with the animal or removal of corpses of animals that died of sickness or old age. Obviously, it is not always possible to archaeologically assess the context of a discovery in a way that would unequivocally fit within the sacrum or profanum sphere (Šedo 2004, 473). It is emphasized that dog burials

should not be considered the aim of rituals, but rather a result of a series of cult and magical actions. Their presence among some sacrificial offerings discovered in bogs is a testimony to their sacral role (Jankuhn 1967, 124-125; Maringer 1981, 38, 39; Ørsnes 1988, 121-129; Makiewicz 2000, 226; Beilke-Voigt 2007, 241, 243; Gräslund 2014, 36). Dog bones or their complete skeletons are also recorded in wells, e.g., of the Przeworsk culture (Gralak 2012; Sielicka 2015, 156-157). What is more, they are not uncommon in similar contexts in other cultures or epochs (cf., e.g., Beilke-Voigt 2007, 201-203; Kajkowski 2015, 234). It is assumed that taking a well out of service meant that it should be filled up, and animal sacrifices were made in the course of such actions (Gralak 2012, 119). Such an activity is sometimes understood as a compensation sacrifice during the ritual of taking a feature out of service (cf. De Grossi Mazzorin and Minniti 2006, 64). Therefore, the dog was perhaps not only supposed to play a role in initiation or opening rites, but also in those of closing: taking buildings out of service, an abandonment of their previous function (e.g., as a dwelling, a workshop, or an agricultural structure). Of course, this role does not exclude a belief in the dog's ability to protect against evil spirits or misfortune. A sacrifice of the dog's life held the evil in its former place and guaranteed prosperity in the new one (cf. Šedo 2004, 475; Beneš and Nývltová Fišáková 2009, 523). It is also assumed that such actions may have been a *kind of „taboo” for the deceased's property* (Nohálová *et al.* 2016, 84). The dog was also a guardian of its dead owner or of their post-mortem property (Nohálová *et al.* 2016, 84).

Wells, fissures and openings in the ground were related to the *axis mundi* at the level of mythical imagination. These were perceived as mediation places, which were spaces of contact between various spheres: the terrestrial and the cosmic, the real world and the otherworld. According to T. Gralak (2012, 122, 123), a sacrifice of a dog made in such a place closed this axis of contact. Making a sacrifice could also mean a termination of the original function of a feature and its desacralisation. It is also assumed that the dog may have been a proxy sacrifice, made in the place of another animal that was more valuable from an economic point of view. It may have also been a substitute for a human sacrifice (Jankuhn 1967, 146; Beilke-Voigt 2007, 240, 243). “Evil” that was re-directed against the dog would have otherwise inflicted the community of the living. The animal sacrifice guaranteed purification (Beneš and Nývltová Fišáková 2009, 532).

A belief in the relationship between dogs and forces of chthonic nature, as exemplified in mythologies of both European societies (e.g., Greek, Roman, or Nordic) and non-European ones became a foundation for their magical properties. On the one hand, their chthonic association, and their use as sacrificial offerings to gods, and on the other hand, the daily role of dogs in human life and their advanced ability to socialize must have led to the interaction and intermingling of their roles (Morawiecki 1996, 69-77; Peters 1997, 511; Gräslund 2004, 170; Beilke-Voigt 2007, 240; De Grossi Mazzorin and Minniti 2006, 62; Zwolska 2014, 52-56; 87-94; Kajkowski 2015). Manfred Lurke (1983) stressed the double role of the dog in the religious dimension. As a representative of both culture and nature, good

and evil, this animal became not only a guardian of access to the otherworld (or a guide for passage between this world and the other); it also became a creature gifted with the prophetic ability of foretelling impending death, and a psychopomp, which led souls of the dead to the reality of the otherworld. Being a creature from a liminal zone, it guarded the established order and prevented opposite worlds from intermingling. Thus, this property of dogs is manifested in the act of placing the corpses of these animals within border zones (e.g., peripheries of settlements and necropolis) (Kajkowski 2015, 233).

In antiquity, dog sacrifices were perceived as purification rituals that averted crises of various nature (De Grosi Mazzorin and Minniti 2006, 63–64). Dogs were sacrificed to secure prosperity, but also to remove unfavourable consequences of events. By means of killing a dog, a “daemon” was being killed. Sacrifices offered to the goddess *Genita Mana* protected household members, especially children, against death (Morawiecki 1996, 68–70; Zwolska 2014, 96). An offering of a dog was also thought to secure prosperity in military activities (Zwolska 2014, 97). The Greek goddess Hekate was depicted with the head of a dog and in the company of dog-like daemons named Lamio, Gello and Empus. This goddess accompanied the souls of people who died a premature death and did not receive a proper burial (Mainoldi 1981).

The significant place of the dog in the religious practices of the North is testified to by Adam of Bremen and Thietmar of Merseburg, among others, who report on sacrifices of horses and cocks, as well (Gräslund 2004, 171–172). Gods who set out on a journey, mainly to the otherworld, meet dogs on their way, which guard access to the realm of the dead (Gardela 2012, 12–13). We also know of Odin’s wolves, devouring warriors who fell on the battlefield (Ślupecki 2003, 49; Gräslund 2004, 172). Garm is a dog howling near the cave of Gniphålan, which one must pass through in order to access Hel. Garm still has a role to fulfil during the Ragnarök, which is to fight against the god Tyr (poetic Edda: *Völuspá*, Strophes 44, 49, 58; Gardela 2012, 13). A barking dog, covered with blood, also appears near the gates of Hel (poetic Edda: *Baldur’s draumar*, Strophes 2–3). A.-S. Gräslund (2004, 173) believes that dog remains in funerary contexts should be discussed at the level of symbolic-mythological meanings and as being connected to the transition from life to death, rather than simply as companions of their owners or signs of their high social status. In general terms, a dog’s burial or the sacrifice of a dog is related to the idea of transitioning from one stage to another in many European cultures.

It is usually problematic to determine whether the deposition of a dog in a feature was actually synchronised with the cessation of use of this feature, or whether the dog’s corpse was simply disposed of opportunistically – that is, it was thrown into a feature that had long since been abandoned. This was certainly easier than digging a new pit. In order to answer this question, it is necessary each time to carefully examine the context of the discovery and to consider whether we are dealing with the removal of the corpse due to hygienic reasons or a burial-sacrifice should rather be taken into account (although these functions are not mutually exclusive).

CONCLUSIONS

Determining the significance of the actions that took place in the trench leading to the inhumation grave in Czarnówko is not easy, particularly given that the skeleton of the deceased person did not survive. It seems that considering the presence of the dog to be incidental would be the easiest explanation. However, on account of the context of this discovery and due to the peculiar ritual role of the dog in general, other interpretations can be supposed. The originators may have intended to place the dog's body and the stones in the trench in order to block the way back to the deceased person. Therefore, this act may have been some sort of self-protection against the reaction of the dead person, or protection for the community against a "Wiedergänger". Some Iron Age burials of dogs whose bodies are covered with stones are interpreted in such a manner (Scheibner 2013, 77, plate 7, chart 16). Looters, for example, protected themselves against the revenge of persons whose post-mortem rest they disturbed. In such an interpretation, trenches disturbing inhumation graves are not only a testimony to past looting (which is the simplest way of seeing this issue); they are also places in which ritual actions took place, or spaces of communication with the dead.

Remains of dogs in Wielbark culture cemeteries are few, and they are typically represented by fragments of the skeleton only. Sometimes, excavation reports do not provide data on whether bones were in contact with fire or on which skeletal elements were identified in a given feature (e.g., at Chwarzno these were the skull and limb bones – Gałęzowska 2007, table 4). Furthermore, we are offered no explanation of whether or how the animals were killed. On the other hand, in many cases the context of discoveries of dog remains in cemeteries – inside a wreath, in the stone covering of a mound, in a channel-like feature – demonstrates their ritual nature.

The presence of the dog in the trench, that is, in the pit which connected the world of the dead and the world of the living can be seen as the remnants of a chthonic ritual, or making a *do ut des* type sacrifice. In some societies, the very act of opening the ground often means gaining access to "chthonic forces which are indispensable in the ritual." These forces offer support in carrying out various sacrificial rituals and in communications between various realities. This, in itself, could be of use – for example, in soothsaying (cf., e.g., Słupecki 2017, 197).

Grave 1271 does not stand out against the background of other burials in the cemetery in Czarnówko with regard to its furnishings (although we know only of the artefacts which were left). The construction of the grave does not place the dead person in the group of representatives of local elites, either. It can be assumed that the person (or the memory of this person) was known to the group of people who disturbed the grave. The place of the deceased person in the community – which was a result of various factors, such as social role, function (e.g., in holding rituals), personality or physical traits, etc. – may have been related to this peculiar ritual. As the bones of the dead underwent a complete decomposition,

rendering it impossible to assess his or her biological condition, there is no reason to go any further in these considerations.

On the other hand, it cannot be excluded that this grave was randomly selected for the deposition of this kind of sacrifice. Thus, the sacrifice may have been related not only to this grave, but to the entire series of post-funerary practices that took place at Czarnówko. The degree of disturbance of this necropolis is very high and there are firm grounds to suppose that the intrusions that we call grave reopening (without any binding interpretations at this stage of research) took place throughout the entire duration of its use. In the case of this particular grave, the intrusion may well have taken place at the very end of use of the cemetery.

Certain questions in archaeology are doomed to remain without any unequivocal answer. Placing a sequence of past actions within a broad religious, social and customary system yields a result which may be very general and thus not always seen as satisfactory.

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Halina Dobrzańska*

BEYOND POTTERY KILNS

ABSTRACT

Dobrzańska H. 2019. Beyond pottery kilns. *Sprawozdania Archeologiczne* 71, 155-166.

There are 48 settlements containing the remains of pottery workshops from the area of the Przeworsk culture. It was here, from the end of the 2nd to the third quarter of the 5th century AD, that the wheel-made grey pottery was produced. As many as 13 of these sites were discovered in the Vistula valley, east of Kraków, in a settlement zone characterized by well-developed agriculture and non-agricultural production. The most important is the settlement in Zofipole, which provided the most valuable archaeological sources for the discussed topic.

This article attempts to explain the reasons for placing, in the chambers of pottery kilns, items that are agricultural tools or artifacts associated with bronze workshops. Intentionally buried objects are a material illustration of the perception of fire as a powerful transformational force, both in the physical and symbolic aspect. They also reveal unspecified forms of cooperation between farmers and craftsmen, and the latter with each other, including potters and bronze workers.

Keywords: Roman Period, Przeworsk culture, Zofipole settlement, pottery kilns, offerings

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INTRODUCTION

The most frequently discovered archaeological object indicating where pottery was made is the pottery kiln. Other parts of pottery workshops, such as cavities for storing or purifying clay, ceramics dryers or depots, as well as pottery tools, are rarely disclosed. From the area of *Barbaricum*, between the Rhine, the Don, the Baltic Sea and the Danube,

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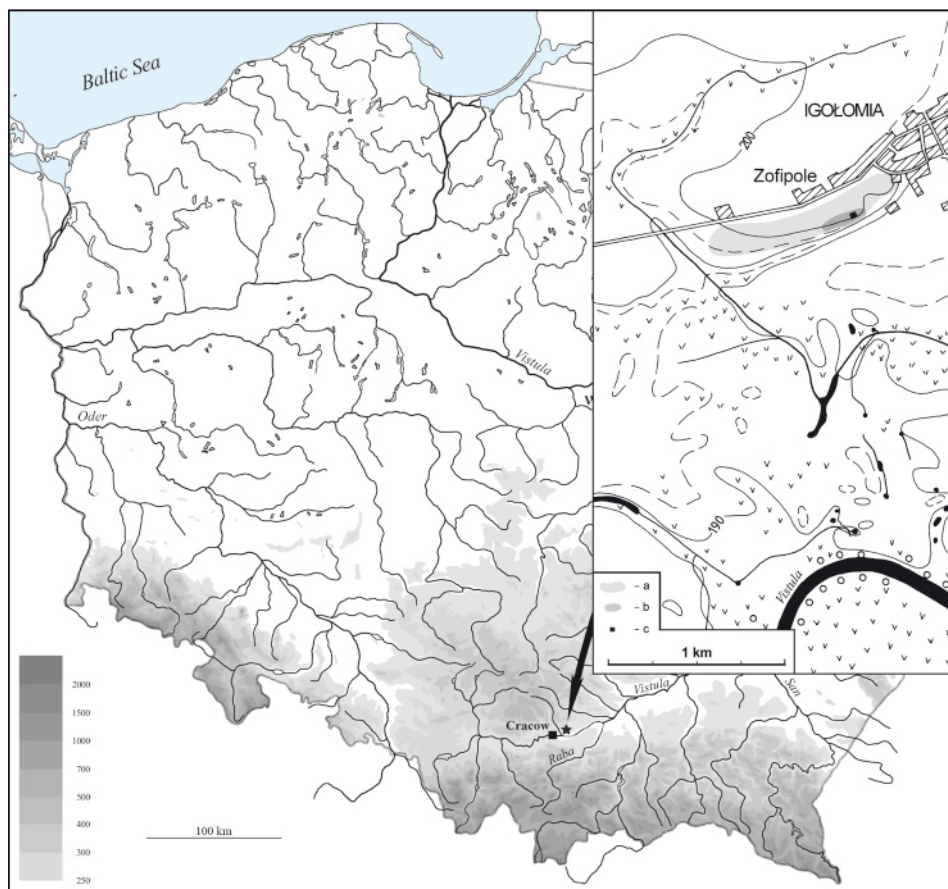


Fig. 1. Location of site 1 at Zofipole, Igołomia-Wawrzeńczyce commune, Małopolska province.
 a – distribution of archaeological material on the surface, b – production area of the settlement,
 c – Archaeological Reserve. Drawn by I. Jordan

we know of about 220 archaeological sites with remains of pottery workshops where, from the 2nd to the 5th century AD, wheel-made grey pottery was manufactured. Of these sites, as many as 48 come from the Przeworsk culture.

The objective of the archaeological examinations of the kilns used for firing ceramics is to get to know their construction, and also to obtain ceramic materials that are production waste, which in turn indicate the type of vessels produced. The other artifacts that accompany them are very rarely perceived in terms of their use as chronological indicators for the examined objects. The presence of other materials discovered in the kiln fills does not arouse any special interest, the reason being the frequent perception of the kiln, by archaeologists, as merely a garbage dump. Also, there is a lack of detailed observations regarding

the way the kiln and its stoke-hole fill up. Because of this, it is worth asking whether all items discovered in the kilns are there – either accidentally or intentionally – as objects thrown out because of their destruction or wear. If not, it is necessary to consider the reason for their presence in the firing chambers of pottery kilns. An attempt to clarify this issue is made in this article.

The data needed to carry out research on this subject come from objects discovered in the zone of intense settlement of the Przeworsk culture population, east of Kraków.

PRODUCTION OF POTTERY IN THE VISTULA VALLEY

We know of about 190 kilns from the area of the Przeworsk culture. As many as 138 of them were found on the 13 sites archaeologically examined in the settlement zone on the loess terrace of the left bank of the Vistula, located about 30 km east of Kraków. Individual objects were also discovered on the floodplain of the river. It should be emphasized that in

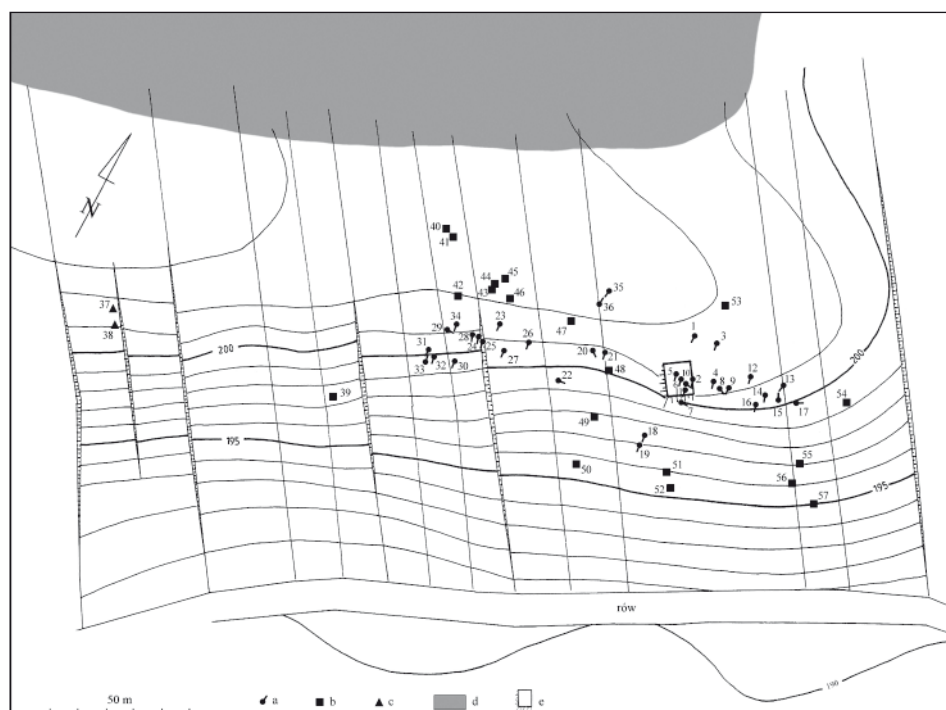


Fig. 2. Zofipole, site 1. Distribution of pottery kilns: a – excavated kilns; b – kilns, known only by geophysical prospecting, not excavated; c – kilns, identified as a result of archaeological survey; d – residential area; e – Archaeological Reserve. Drawn by I. Jordan, J. Ożóg

the Vistula valley, evidence of the production of wheel-made grey pottery has been found in almost every settlement (Dobrzańska 2013, fig. 2, table 1). In the discussed zone, 4 centers with numerous kilns (from 14 to 57) were in Zofipole, site 1; in Kraków-Pleszów, sites 17-20; in Kraków-Mogiła, site 59; and in Igołomia, site 1, which functioned from the end of the second century to the third quarter of the 4th century AD. Among these, the production center in Zofipole, where 57 pottery kilns were discovered, 36 of which were excavated, deserves special attention (Fig. 1.2).

The ceramic workshops form the production zone of the settlement and are located in the area of the loess edge of the terrace. They co-exist with the remains of workshops of bronze-workers, who produced gold ornaments. Craftsmen producing items using fire were working in this zone. These ceramics were produced in Zofipole for approx. 180 years. The oldest kilns date back to the beginning of the 3rd century AD; the youngest to the third quarter of the 4th century AD. The location of production enabled easy access to raw materials, such as river overbank flooding deposits and wood, in both cases coming from the Vistula flood plain (Dobrzańska and Kalicki 2004, 119, 120, fig. 4). The production area, located at the edge of the terrace, was separated from the residential part of the settlement, located on its flattening (Fig. 2).

Agriculture was the basic source of income for the population living on the Vistula River and its valley. The location of settlements on the border of two different ecosystems – loess terraces with fertile soils, and river floodplains with rich vegetation, especially forests – was favorable to the cultivation of land, animal breeding, hunting, fishing, gathering herbs, etc. (Dobrzańska and Kalicki 2004, 115-122).

Pottery kilns

All archaeologically examined kilns in Zofipole (36) are categorized as updraft kilns. They are vertical and double-chambered, and are built on a circular plan. This type of kiln was already known in Europe in the Eneolithic period. In the La Tène, Roman, and Migration periods, it is associated with the specialized production of wheel-made ceramics.

Both the poor state of preservation of the majority of kilns found in Zofipole, as well as the deficiencies in the documentation of old research on kilns, render a detailed description of the structures of all examined objects impossible. However, it can be concluded that at least 13 of them were almost completely sunken in the loess substrate (Fig. 3). The opposite of such a construction type are objects with an upper firing chamber built of clay on a wooden frame in the form of a basket. These were only partially sunken in the ground. In the case of as many as 16 kilns, the structure of which can be more precisely determined, the presence of a wall dividing the lower chamber and passing into the fire tunnel was found (Fig. 4 a).

The round oven floors, with diameters from 142 to 160 cm, indicate there were small differences in the size of the kilns. They were made from clay inside of the kilns, on a board

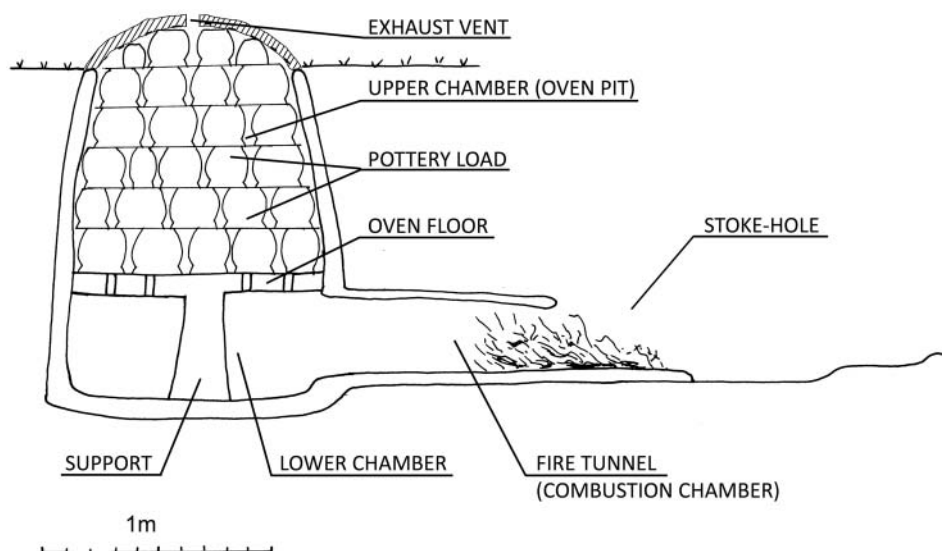


Fig. 3. Components of sunken pottery kiln. After V. Swan 1984, fig. II/IV completed, modified by J. Ożóg

made of wood and branches. The oven floors of kilns with upper chambers built on a wooden frame could be repaired, which prolonged their useful life. Ethnographic observations show that the oven floors of kilns with both chambers sunk into the ground could not be repaired. In such cases, the destruction of the oven floor, as a result of its burning, meant the end of use of the kiln. The grey ceramics from the Kraków region were. Both laboratory and experimental results indicate low firing temperatures, around 700°C (Dušek *et al.* 1986, 59–63; Goerlich *et al.* 2005).

The results of laboratory analyses of samples taken from the fills of two pottery kilns, which indicate a high homogeneity of these fills, are of significant importance for the issue discussed here. They give credence to the assumption that the chambers and fire tunnels were buried soon after the use of the kiln was discontinued (Dobrzańska 2008, 185; 2011, 264).

In the updraft kiln, “...the heat moves upward from the firebox (fire tunnel) through the setting and then is vented outward...” (Rice 1987, 159). The use of a perforated platform (oven floor) enabled the separation of the fuel from vessels, and as a consequence, also their separation from the direct flame and facilitated the distribution of the temperature in the kiln. Adjusting the air supply, and consequently also controlling the fire, made it possible to regulate the time and temperature of firing (Gheorghiu 2007, 32–33). It’s worth mentioning that among the unfavorable features of a vertical draft kiln is the difficulty in balancing the temperature of firing in its upper chamber. As noted by M. Cardew,

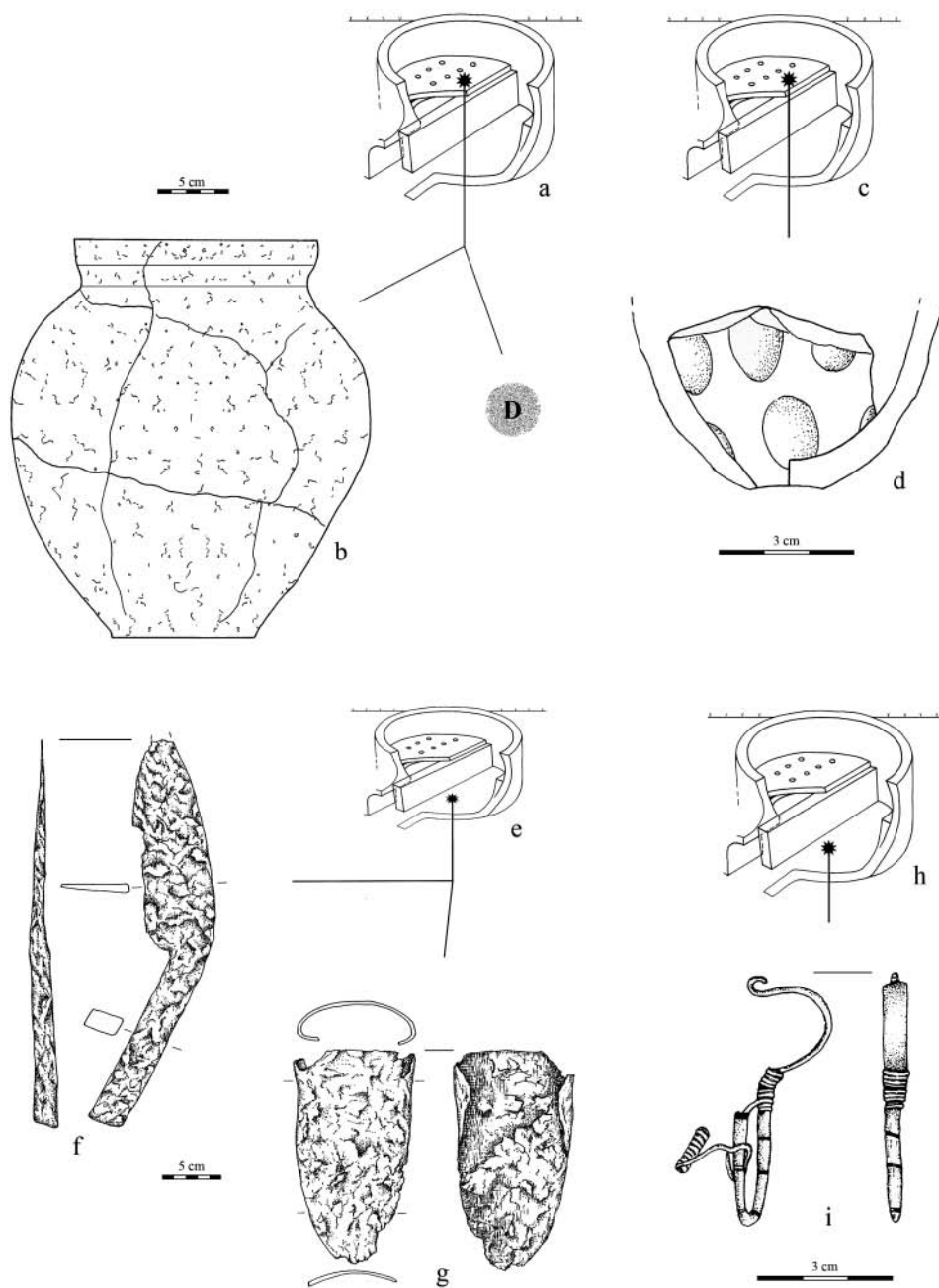


Fig. 4. Zofipole, site 1. Locations of items in kilns.

a – kiln 25; b – clay vessel; D – Hadrian denar; c – kiln 29; d – glass beaker; e – kiln 31; f-g – iron parts of wooden ard; h – kiln 35; i – bronze fibula. Drawn by J. Ożóg

“...the temperature distribution is very uneven, with areas of serious overfiring and under-firing...” (Cardew 1969, 179).

Several years of experimental research related to the construction of – and the firing of ceramics in updraft kilns were carried out in Vadastra village, Romania, by D. Gheorgiu. Supplemented with ethnographic studies, this research brought invaluable information to bear on explaining the essence of the functioning of this machine and its complexity.

In the work of this author, we find the following statement: “...I believe that the control of the machine (i.e. the controlled transformation of matter), the increase of the quality and quantity of the production of one individual, as well as the nocturnal activity of the kiln conferred to the pyrotechnologist a special prestige, probably with a magic role...” (Gheorghiu 2007, 42).

ITEMS DEPOSITED IN KILNS

Of the 36 kilns with various states of preservation excavated at Zofipole, 6 contained deposited items. The most spectacular artefact buried in an oven at Zofipole is the Hadrian denar, minted during the years between 134-138 AD (Kunisz 1985, cat. no. 332 / II, 258). It was placed in organic material that filled a discarded wheel-made pot, which had been deformed by high heat and deemed as production waste (Fig. 4 a, b, D). It was then placed on an unbroken oven floor, separating the two chambers of kiln 25. It was also observed that the kiln's fill was intact (Buratyński 1958, figs 8 and 9, 48; Dobrzańska 2000, 48). Denars from the 1st and the 2nd centuries AD were commonly used from the 2nd half of the 3rd to the first half of the 5th century AD (Godłowski 1970, 240). The coin in question could be used as raw material in the production of items made in the workshops of bronze jewelry, as suggested by the use of early Roman coins in similar studios from the neighboring settlement in Igołomia (Dobrzańska 1990b, 78). At the bottom of the lower chamber of kiln 35, near the fire tunnel, a small, cross-bow bronze fibula (AVI 162) was found; it had a spring wrapped on the leg, thus prepared for remelting in the crucible (Fig. 4 h, i). The whole set is dated to the C1a phase (Dobrzańska 2011, 267). Also found was a large piece of a Roman metal vessel was discovered in chamber of the kiln 1 (no exact location), and served as a metal scrap to be used in the process of production of other bronze items. Below the damaged oven floor of kiln 31, at the bottom of its lower chamber, iron parts of a wooden plough (Fig. 4 e-g) were also found, which, according to the chronology of this object, can be dated to phase C3 (Dobrzańska 2000, 48). E230 glass beaker (Fig. 4 c, d), discovered in the lower parts of kiln 29 (Rau 1972; Stawiarska 1999, 147-151), has a similar chronology. Its connection with the production of pottery is documented by a wheel-made clay vessel, which was found near kiln 29, and mimicks the form and decoration of the E230 glass beaker. Two grinding stones (similar to whetstones) found in the same related to the production of bronze objects (Dobrzańska 2000, 48, fig. 12: 7, 8) A cylindrical iron

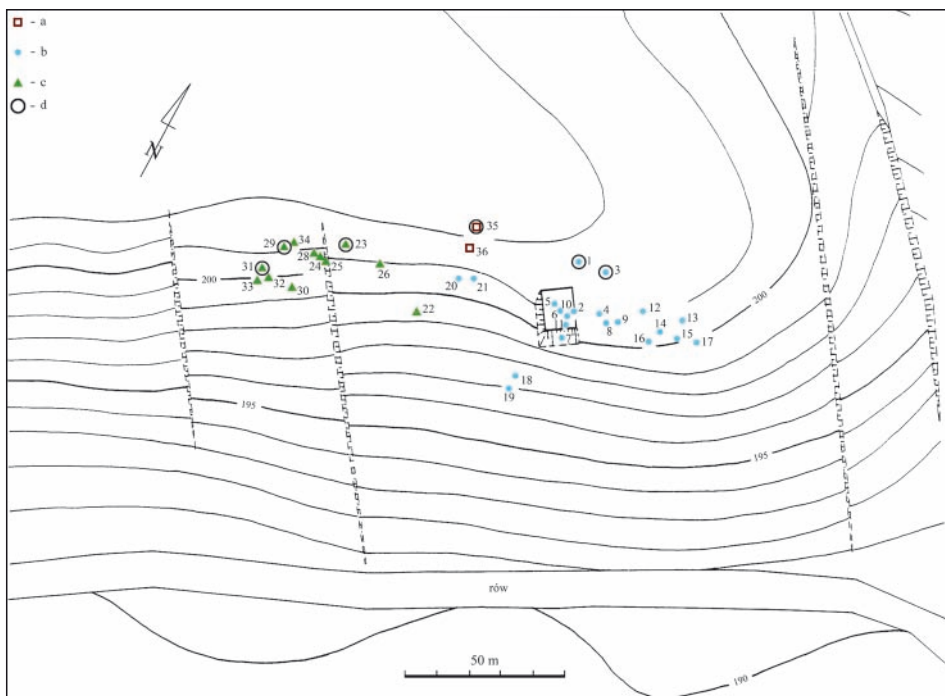


Fig. 5. Zofipole, site 1. Chronology of the kilns

a – phase C1a; b – phase C1b-C2; c – phase C3; d – kilns with “offerings”. Drawn by I. Jordan, J. Ożóg

padlock came from kiln chamber 13 has an analogy in the 70/55 building in Igołomia, associated with the activity of bronze-workers and dated to the C2-C2/C3 phase (Dobrzańska 1990a, pl XXVIII: 7; 1990b, 69, 70; 2000, fig. 12: 1).

In the chamber of kiln 3 in Zofipole, burned fruits of *Lithospermum arvense* L. (field gromwell) in the amount of 67 mm³ were found. This plant is a weed, known from six sites dating back to the Roman Period (Lityńska-Zajac 2005, 342; Lityńska and Wasylkowa 2005, 198, 246). In folk medicine, its diuretic effect is well known, and it is also used for menopause and in elderly people with atherosclerosis. Its roots contain a red pigment. Currently, its high nutritional properties are widely appreciated (atlasflory.type.pl/lithospermum_arvense.html).

This tradition of placing the items in pottery kilns is observed throughout the whole period of occupation of the Zofipole site (Fig. 5).

Also in nearby Igołomia, in the chamber of the 3/52 pottery kiln, the bronze fibula AVII of „Sarmatian type“ was discovered. In this area, there are also numerous remains of bronzeworks (Dobrzańska 1990a, pl. LXII: 1; 1990b, 64). At the site in Wawrzeńczyce (39 and 41), located 4 km Zofipole, 2 ingots of metal (tin?) were discovered in the explo-

red pottery kiln. They were in the form of irregular patches and were placed at the bottom of the lower kiln chamber and in the kiln fire tunnel (information from Dr. Krzysztof Tunia).

In Tropiszów, at a site about 3 km west of Zofipole, stove 4 was filled with bones of domestic animals that were not burnt. There were cattle skulls, as well as pig and goat bones. An iron sickle was placed on one of the skulls (Reyman 1936, 163-166, pl 28: 1).

The objects discussed above represent a large variety of manufactured products, both in terms of the material from which they were made, as well as the function they performed in the life of the inhabitants of the settlement. Their common feature is the use of fire for their production: iron elements of an ard, an iron sickle, a Roman denar in an clay vessel, bronze fibulae, a fragment of a bronze vessel, and ingots were found, as well as a fragment of a glass beaker. Burnt *Lithospermum arvense* L. fruits were also found. These objects also have in common their location at the bottom of the kiln chamber, or slightly higher, on the oven-floor, which is the place most vulnerable to destruction as a result of burnout. They were never found in the stoke holes. It should also be noted that kilns were backfilled after their productive use, which makes these units homogeneous.

DISCUSSION AND CONCLUSIONS

The observations above allow us to formulate a hypothesis about the intentional placement of the discussed items in the kilns after they used.

In attempting to explain the intentions behind the placement of these objects, it is worth referring to the rich cultural significance of concepts such as fire and kiln (Kowalski 1998, 371-380, 434-438). M. Eliade writes about the association of magic with technological excellence, the “secrets of the profession” of metallurgists, blacksmiths, and potters. The techniques they used had their origin and basis in the “mastery of fire”, the domain of shamans and sorcerers, before it became the “secret” of potters and later metallurgists, blacksmiths and other craftsmen. One of the many meanings of the kiln concerns the processes involved in transforming matter from one form into another (e.g., clay hardening), which gives it a symbolic function (Eliade 1988, 188; 1993, 104).

Kiln artifacts may have been “offerings” for limiting the risks associated with the bursting of vessels. This was also the goal of numerous magical procedures of folk potters, which did not take on a material form, but were reflected in the richness of beliefs and folklore (Czubala 1974; 1978). Buried items are also a material illustration of the perception of fire as a powerful transforming force, both physically and symbolically, by local producers.

The objects in question also reflect other types of activity of people living in Zofipole, namely the cultivation of land and the production of objects from non-ferrous metals. Using them as „offerings“, in the context discussed here, indicates a clear connection of

potters with these areas of production. While potters could participate in agricultural work, which is documented by numerous ethnographic data, the hypothetical combination of the production of vessels and the production of bronze objects, as for now, must remain in the sphere of discussion. It is highly probable that craftsmen working with non-ferrous metals used high temperatures, exceeding 1000°C in the fire tunnels of kilns (Dušek *et al.* 1986, 59-63), for melting the bronze scrap.

The results of research on the ceramic production centers in the Vistula valley, especially in Zofipole, indicate the seasonal character of this production, depending on their current needs. In Zofipole, the pottery was made for about 180 years, during which the continuity of some of the basic pottery forms, and of kiln construction, were maintained (Dobrzańska 2011, figs 10-12). Production skills were passed in the master-student relationship. A part of this tradition is also discussed in this article as the custom of placing "offerings" in kilns (where matter is transformed), and is directly related to the work of potters, and to a lesser extent, bronze-workers. Given the aforementioned multiplicity of meanings „kiln“ and „fire“, and especially their symbolism, it seems that we cannot take into account only the intent of production alone. The actual transformation of the matter placed in the kiln into a completely different kind of object is a representation of birth or initiation, which always require the experience of symbolic death (Kowalski 1998, 435).

The presence of the *Lithospermum arvese* L. plant in the kiln, which has pharmacological properties, may be related to therapeutic practices carried out by the potters. In folk pottery, clay treatments in the form of compresses in which other components, and the usage of clay solution in healing drinks, is noted (Czubala 1974, 198; 1984).

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FIELD SURVEY AND MATERIALS

Marcin Szeliga*, Anna Zakościelna**

TRANSCARPATHIAN INTERCULTURAL RELATIONSHIPS OF THE LBK COMMUNITIES FROM THE SANDOMIERZ SETTLEMENT CLUSTER IN THE LIGHT OF NEW FINDINGS

ABSTRACT

Szeliga M., Zakościelna A. 2019. Transcarpathian intercultural relationships of the LBK communities from the Sandomierz settlement cluster in the light of new findings. *Sprawozdania Archeologiczne* 71, 167-195.

The article is an attempt to characterize and assess the intensity of far-reaching, intercultural contacts of the LBK community from the Sandomierz Upland and its northern foreland with the Eastern Linear cultural groups from the northeastern part of the Carpathian Basin. The basis for these considerations was the discovery of diagnostic material (pottery, obsidian products) from the Sandomierz region – in particular, from one of the largest inventories of this type in the Vistula basin: the settlement site Tominy 6. Important data in this context were also provided by products made of Chocolate and Świeciechów flints from the Świętokrzyskie Mountains Region discovered within the Transcarpathian zone. The entire collection of findings reveals the previously unknown and very large-scale bilateral, intercultural relations between the LBK communities of the Sandomierz settlement cluster and the younger phase of Alföld-LBK groups, especially the Bükk culture, settled in eastern Slovakia, or more precisely in the Košice Valley and East-Slovak Lowland.

Keywords: LBK, Alföld-LBK, Bükk Culture, intercultural relationships, pottery, obsidian, Chocolate and Świeciechów flints

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INTRODUCTION

The permeation of Transcarpathian cultural interactions into areas located in the basins of the Vistula and Odra Rivers in the early Neolithic has been discussed in the literature on numerous occasions. Scholarly treatment of these interactions has ranged from cursory mentions or detailed source materials studies in publications about LBK sites (e.g. Kamińska 1964, 138-139; Milisauskas 1986, 36, 145-150; Kadrow 1990a, tab. 1; Czekaj-Zastawny 2014, 68-72; Sebők 2014; Pelisiak 2014, 118-120; Tunia 2016) to discussion in literature on more extensive regional studies (Kulczycka and Kozłowski 1960; Kaczanowska 1976; Grygiel 1978; 2001; Godłowska 1982; Kadrow 1990b; Michalak-Ścibior 1992; Kaczanowska, Godłowska 2009; Szeliga 2009; Furmanek 2010; Czekaj-Zastawny and Rauba-Bukowska 2014; Kozłowski *et al.* 2014; Dębiec 2015; Kabaciński *et al.* 2015). The basis for consideration in this respect was the presence in LBK inventories of: ceramics ornamented in a stylistic convention typical of the Alföld-LBK and Bükk cultures and, on the other hand, artefacts made of imported obsidian. By far, the largest concentration of this type of finds has been recorded at sites located in the southern areas of the LBK settlement, in particular in the Rzeszów-Przemyśl clusters of settlement (e.g. Kaczanowska and Godłowska 2009, fig. 1; Szeliga 2009, fig. 1-4). Despite the considerable frequency of the mentioned elements in these areas, their presence within particular inventories was limited to usually several and only sporadically more numerous (Czekaj-Zastawny 2014, 68; Sebők 2014, Abb. 19-20) fragments of vessels, decorated in Eastern Linear style (mainly that of the Bükk Culture) and a small amount of obsidian, which generally did not exceed a few percent of the collective raw material assemblages of which it was a part (e.g. Kozłowski 1970, tab. 1; Balcer 1983, tab. 4; Kaczanowska 1985, Abb. 22; Milisauskas 1986, 145; Kaczanowska *et al.* 1987, 95). Only some inventories known from the Rzeszów region differ in this respect, often revealing much higher shares of this raw material (Kulczycka-Leciejewiczowa 1979, tab. 5, fig. 26; Kadrow 1990a, fig. 24: a-e; 1990b, fig. 14b; Szeliga 2009, tab. 1).

ANALYSED AREA

In the Sandomierz Upland and its northern foreland, several dozen LBK sites are currently known, mainly concentrated within the central part of this mesoregion and in the areas extending along the edge of the Vistula valley (Fig. 1: C). The presence of the mentioned categories of findings in the local inventories was already noted a few decades ago, but until recently it was represented by a very small series of artefacts, acquired only on several such dated settlement sites (Podkowińska 1953, tabl. XVI: 6; Kamińska 1964, tabl. XI: 1-11; XXX: 1; Rauhut 1970, fig. 3; Kowalewska-Marszałek 1993, tab. VI; 1996, tabl. III: 1-4, 6; Michalak-Ścibior and Taras 1995, ryc. 27: 21; Kulczycka-Leciejewiczowa 1973, 83; 1979, tab. 5, fig. 26; 2008, ryc. 18: 10; 28: 22; 41: 21). This picture is undoubtedly

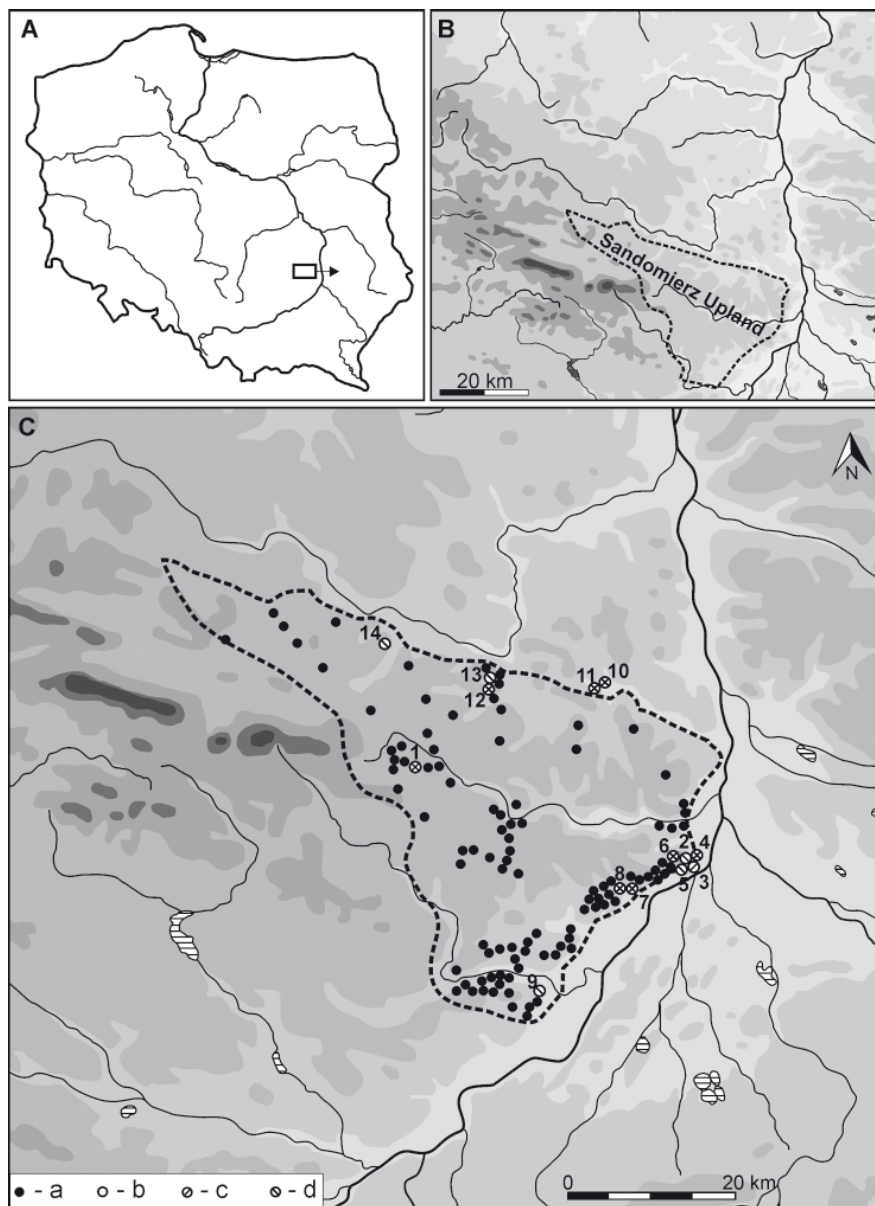


Fig. 1. Analysed area: A – general location; B – location and range of the Sandomierz Upland (by Kondracki 2002); C – location of the LBK sites within the Sandomierz Upland (after Czekaj-Zastawny 2008 with modifications): a – surface finds; b – excavated sites (1 – Jurkowice, site 1; 2 – Sandomierz, site 1; 3 – Sandomierz, site 3 (*Collegium Gostomianum*); 4 – Sandomierz, site 5 (*Żmigród*); 5 – Sandomierz, site 8 (*Krakówka*); 6 – Sandomierz, site 20 (*Kruków*); 7 – Złota, Grodzisko I site; 8 – Samborzec, site I; 9 – Trzebieśławice, site 1; 10 – Tominy, site 6; 11 – Tominy, site 12; 12 – Wólka Wojnowska, site 33; 13 – Jastków, site 46; 14 – Szewna, site 6); c – pottery of Eastern Linear groups; d – obsidian artefacts. Drawn by M. Szeliga

incomplete and, as it seems, understated, due to the small number of LBK sites excavated in this area (fig. 1: C). This is unequivocally confirmed by the results of excavations conducted in recent years within the northern part of the Sandomierz Upland. A particularly large collection of materials indicating intensive relations with the Eastern Linear cultural circle was acquired during the excavation research conducted at site no. 6 in Tominy (Ożarów municipality, Opatów district). The materials originating from this site will constitute an essential reference level during the considerations undertaken in this article.

LBK SETTLEMENT IN TOMINY

Site 6 in Tominy is situated within the northern foreland of the Sandomierz Upland, about 1 km northeast from the edge of its compact loess cover (Fig. 2: A). In terms of physical geography, this area is a part of the Ilża Foothills mesoregion (Kondracki 2002, fig. 38). The range of the site covers the culmination and gentle, southwestern slope of small sandy-clay promontory, located on the eastern edge of the valley of the so-called Wyzmontowski Stream, a small watercourse escaping into the valley of the Czyżówka River (Fig. 2: A).

Rescue excavations on the site were carried out between 2006 and 2017 and led to the identification of an area of over 1ha and to the discovery of rich relics of diverse human activity from the Middle Palaeolithic up to modern times (Szeliga and Zakościelna 2007; Szeliga 2008; Szeliga *et al.* 2018). The most intensive phase of settlement at the site was connected with the LBK and represented by dozens of features, including relics of at least two longhouses (Fig. 2: B). Within these features, a very rich inventory of various kinds of artefacts was discovered – especially flints, the collective material structure of which revealed a definitive preponderance of local Turonian flints (especially Świeciechów flint) over other kinds of raw materials (Szeliga 2018, fig. 2). Based on the structure and abundance of this flint inventory, the site was interpreted as the first LBK production settlement, centered on exploitation of the local deposits of Turonian flints (Szeliga 2014, 87–88). This assemblage reveals a very clear similarity to the structure of collections known from other flintworking settlements, such as those in Kraków-Olszanica and in Vedrovice-Zábrdovice (e.g. Lech 2008, fig. 26). This functional interpretation of settlement in Tominy is also very important in the context of the issues discussed in the present article.

Among the remaining findings from Tominy, the most numerous category was definitely that of ceramic materials, which at the moment are represented by a collection of several thousand fragments of vessels. The stylistic variation of pottery ornamentation ranges from the early stage of the music-note phase (phase NI) to the classical stage of the *Želiezovce* phase (phase ŽII). The most dominant group of ceramics are decorated in the style of the late music-note phase (phase NIII), as well as in the style distinctive for the transition stage, between the classical and late LBK phases (corresponding to the diagnostic ceramic materials of the NIII/ŽI phases; see Kadrow 1990a, 62; Dębiec 2015, 35–41).

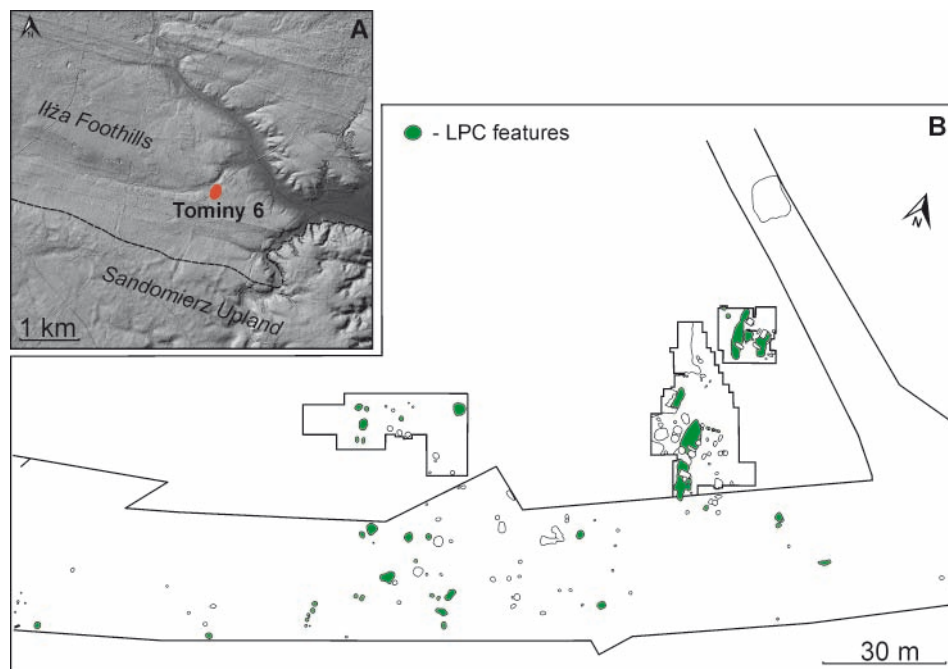


Fig. 2. LBK site no. 6 in Tominy: A – location of the site in relation to the northern edge of the loess cover of the Sandomierz Upland; B – area of site excavated in 2006-2017 and location of discovered LBK features.
Drawn by M. Szeliga

The results of previous radiocarbon analyses from Tominy suggest settlement occupation by LBK communities between at least 5100 and 4800/4700 BC (Szeliga 2017, 441-444). It should be emphasized that in the light of data regarding the LBK chronology in Central Europe (e.g. Dolukhanov *et al.* 2005, 1448), the upper caesura of the quoted time interval is quite controversial, especially considering the only radiocarbon determination obtained for the wood tar sample from feature no. 105 (Szeliga 2017, tab. 1, fig. 6: 2). Regardless, the stated time interval partially corresponds with the late stage of development of this culture in Central Europe, together with the late stage of the music-note phase and the *Želiezovce* phase of its development in southeastern Poland (Kulczycka-Leciejewiczowa 2008, 106-108; Czekań-Zastawny 2008, 116; 2014, 94, 104).

POTTERY FROM TOMINY

The existence of intense contacts between the inhabitants of the settlement in Tominy and the areas of the Carpathian Basin are indicated by a large set of obsidian artefacts, and a collection of ceramic materials ornamented in a style typical for the Eastern Linear cultural circle. Such pottery is represented in total by a collection of 87 fragments and – along

with the inventories from Brzezcie 17 (Czekaj-Zastawy 2014, 68) and Rzeszów 16 (Kadrow 1990a, tab. 1) – is one of the largest series of this type of finding currently known from the areas on the north side of the Carpathians. The variety of decorative motifs and techniques of their implementation bears the closest resemblance to the ornamentation style typical, first of all, for the Kapušany-Tiszadob group of the Alföld-LBK and the Bükk culture from eastern Slovakia and northeastern Hungary. The vast majority of such decorated ceramics (67 fragments) was discovered in the secondary bed, in the humus and deluvial layer, covering the majority of the site area (Szeliga and Zakościelna 2007, 11), and sporadically also in the fills of modern features. Only 20 pieces were discovered within the LBK features – as single artefacts (features no. 45, 50, 52, 53 and 94) or in a group of a maximum of 3 to 5 fragments (features no. 105, 107, 119, 164) jointly with the ceramics decorated mainly in the late music-note and/or early-*Želiezovce* style.

The first group of the discussed ceramics from Tominy includes the few fragments originating from various parts (mainly bodies) of very delicate, thin-walled vessels (mainly cups), presumably decorated on their entire surfaces with densely arranged, subtle engravings (Fig. 3: 1-11). These fragments reveal a large diversity of ornamental motifs typical for the Bükk culture, also within particular vessels. The preserved ornaments are represented by a variety of compositions of (usually co-occurring) straight, arched, wavy and zigzag incised lines (Fig. 3: 1-7, 9-11), and sometimes with the motif of an oblique grid (Fig. 3: 8). They find many exact analogies in the inventories of the pre-classical and classical phases of the Bükk culture (e.g. Aggtelek, Ardovo, Domica and Herman Ottó Caves, Borsod, Büdöspester, Hodejov, Košice part Šaca; see Tompa 1929, fig. III-V; Lichardus 1974; fig. 12: 1-6; 13: 1-6; Šiška 1999, fig. 2: 1-20).

Another group of findings includes the bottom parts of thin-walled vessels, ornamented with solid or dotted incised lines and combined techniques of rinsing and piercing placed just above the bottoms of the vessels in singular (Fig. 4: 5-7; 6: 11) or group (Fig. 4: 2-3, 8) arrangements. The bottom fragment of a thin-walled bowl discovered in feature No. 53 stands out among this category of ceramic finds; its decorations were made entirely of very delicate and thin dotted, incised lines (Fig. 4: 5). The bottom of the vessel was separated by a line, above which geometric patterns of straight and angular motifs – possibly including zigzags – were applied, though they are difficult to reconstruct. In turn, on the fragment from feature no. 52, the incised line was replaced with a row of quite deep, round pits, located on the edge of bottom (Fig. 4: 6). Similar compositions, in which ornamentation sequences were terminated above the bottoms of vessels or at their edges by ambient dotted lines or rows of punctures and pits, were also recorded on other fragments discovered outside features. In some cases they were accompanied by decorative layouts typical for LBK motifs, including various compositions of incised lines, supplemented with a few music-note pits located within the upper parts of the vessels (Fig. 4: 2, 4).

The termination of ornamental sequences above the bottoms of vessels by ambient incised lines, rows of punctured pits or incisions, placed on the bottom bend – as documented

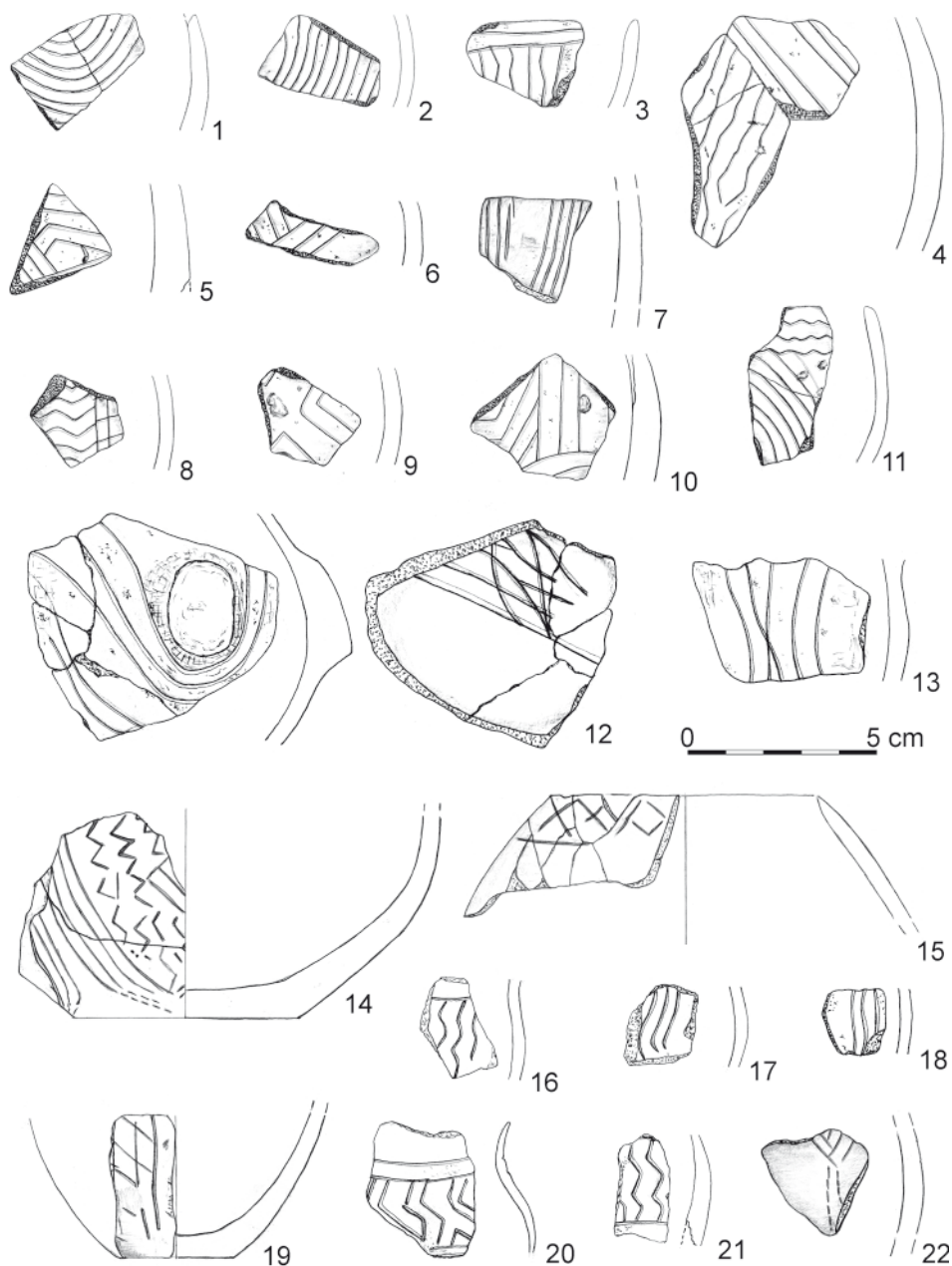


Fig. 3. Tominy, site no. 6: 1-22 – selection of ceramics decorated in the Eastern Linear style: 1, 5, 7, 9, 14-16, 19-22 – non-feature layers (14 – by Szeliga and Zakościelna 2007); 2, 8, 11 – feature no. 164; 3-4, 6, 10 – feature no. 119; 12-13, 18 – feature No. 105; 17 – feature no. 107. Drawn by K. Gawryjolek-Szeliga (1-13, 16-21), V. Zieliński (14-15, 19) and R. Joć (22)

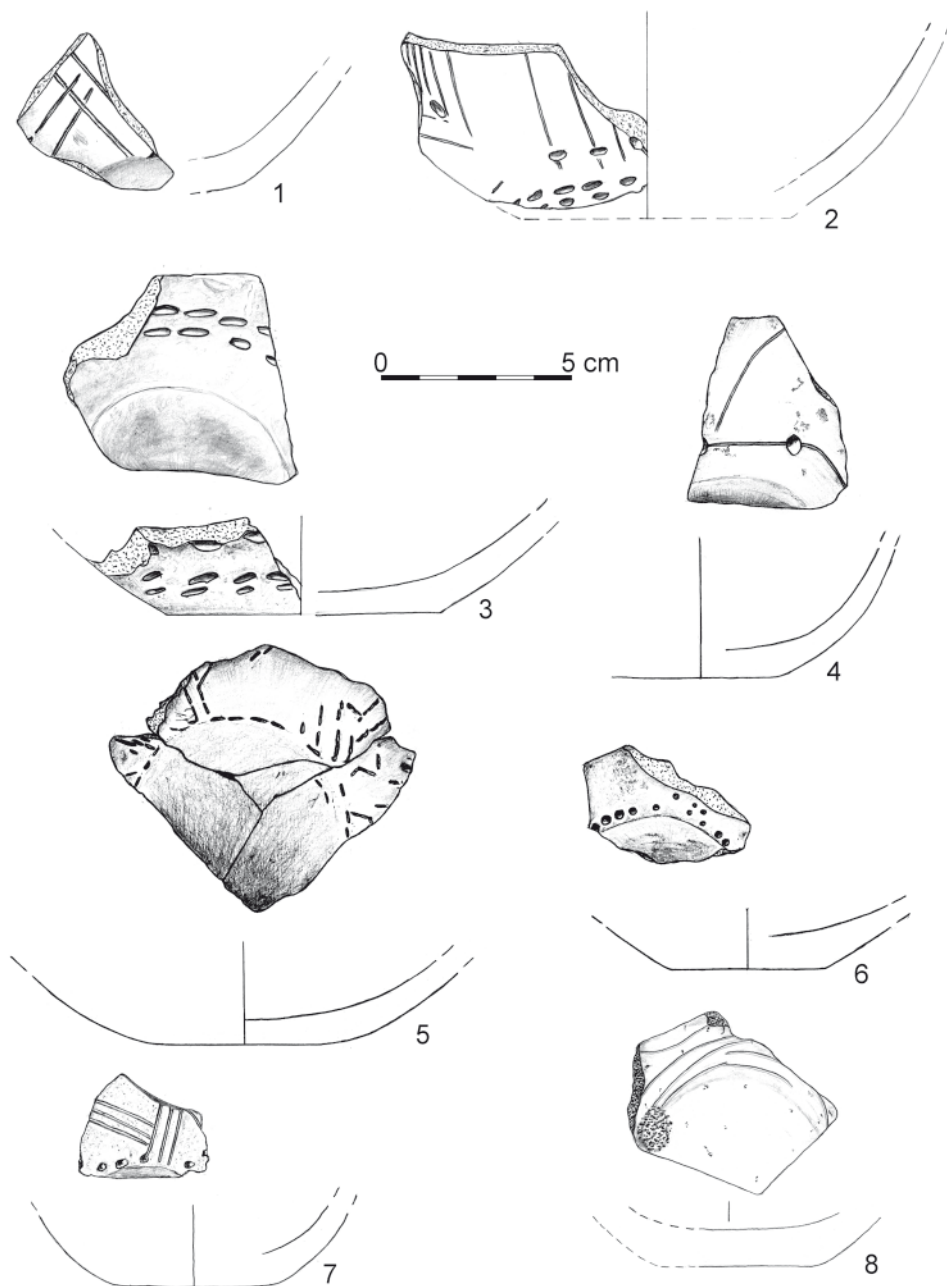


Fig. 4. Tominy, site No. 6: 1-18 – selection of ceramics decorated in the Eastern Linear style: 1-3, 7 – non-feature layers (2-3 – by Szeliga and Zakościelna 2007); 4 – feature no. 50; 5 – feature no. 53; 6 – feature no. 52; 8 – feature no. 119. Drawn by R. Joć (1, 3-6), W. Zieliński (2, 7) and K. Gawryjółek-Szeliga (2, 8)

in the Tominy collection – was a very characteristic way of composing decorations among the younger Eastern Linear groups. Ornamental examples analogous to the those from Tominy are known from numerous inventories of the Kapušany-Tiszadob and Raškovce groups (e.g. Lúčky-Pláne, Miskolc, Šarišské Michal'any, Smižany, Tiszavasvári – Keresztfal, Tiszavasvári – Paptelekhát; see Kalicz and Makkay 1977, fig. 35: 15-16; 60: 9; 79: 10; Šiška 1989, tab. 32: 10; 33: 15; 37: 9; Soják 1998, tab. 7: 6-8, 10; 8: 1, 6, 8), as well as from the pre-classical phase of the Bükk culture (e.g. Aggtelek, Ardovo Cave, Borsod, Búdöspester, Hnojné, Hodejov, Kopčany; see Tompa 1929, fig. III: 12, 16-17; XV: 5, 16, 22; Lichardus 1974, fig. 10: 10-12, 11: 6, 8; Šiška 1979, fig. III: 2, 7, 9-10, 15-16, 25-27; V: 18-19; VII: 15; VIII: 11-12; 1999, fig. 2: 8). In this cultural environment there are also numerous analogies to the other group of findings from Tominy, represented by fragments of the spouts of thin-walled vessels, decorated with various horizontal zigzag motifs. These motifs appear both in the form of single, continuous zigzag lines (Fig. 5: 6, 8-11, 15-17), as well as in the form of single, double or even triple zigzags composed of short, oblique incised lines (Fig. 5: 1-5, 7, 14; 6: 2). In some cases, horizontal zigzag motifs coexist with rows of dense and short, vertical incised lines located directly under the edge of the spout (Fig. 5: 6, 8), as well as horizontal, vertical or diagonal sequences of dotted lines, usually located below them (Fig. 5: 1, 6, 8-9; 6: 1), or with rows of punctures placed on the bodies of the vessels (Fig. 5: 7, 9, 11). As in the case of the previously discussed bottoms, each of the above decorative arrangements of sub-spout vessel parts are also very characteristic for the Eastern Linear groups, and analogous to numerous inventories of both the Kapušany-Tiszadob group and the Bükk culture (e.g. Aggtelek, Ardovo Cave, Bodrogkeresztúr, Boldogkövár-alja – Tekeres-patak, Borsod, Búdöspester, Kenézlő, Kopčany, Prešov-Šarišské Lúky, Smižany, Spišský Hrhov – Kaštieľ; see Tompa 1929, Taf. VI: 6-14; VIII: 1-2, 5, 14; XII: 20; XIX: 1; XXIX: 6; XXXIV: 15; Lichardus 1974, Taf. 8: 1-6; 10: 1-2, 11: 3-4; Kalicz and Makkay 1977, fig. 99: 1, 36, 41; 100: 1; Šiška 1979, fig. VII: 3-4, 7; VIII: 3; X: 1; XIII: 5; 1989, tab. 21: 3; 22: 4; 23: 8; Soják 1998, tab. 1: 5; 2: 2, 5, 7). The same can be said for the infrequent fragments decorated with horizontally or vertically oriented rows of punctures, placed usually between single incised lines (Fig. 6: 9, 11). Occasionally, rows of punctures create independent linear compositions on the bodies of the vessels (Fig. 6: 8, 10, 12, 14). There are numerous fragments of vessels decorated in a similar way known from the Kapušany-Tiszadob group and the Bükk Culture (e.g. Ardovo Cave, Borsod, Boldogkövár-alja – Tekeres-patak, Búdöspester, Čierne Pole, Gánovce, Spišská Nová Ves; see Tompa 1929, fig. III: 11, 13; IV: 17; VI: 23; VII: 7; Lichardus 1974, fig. 10: 10; Kalicz and Makkay 1977, fig. 99: 24, 38, 47; 100: 13-14; 111: 8, 10-12; Šiška 1979, fig. III: 2, 7, 9-10, 15-16, 25-27; Soják 1998, tab. 14: 5, 8; 24: 7-9, 13), as well as the inventories of the Szarvas Érpárt group (e.g. Szarvas-Érpárt, Tarnabod-Templomföld, Tiszavasvári-Paptelekhát; see Kalicz and Makkay 1977, fig. 185: 7-9, 42-44). On one of these types of body fragments, the ornament covered not only the outer but also the inner surface of the vessel (Fig. 6: 13), which is also a frequent manner of ornamentation in the Eastern Linear

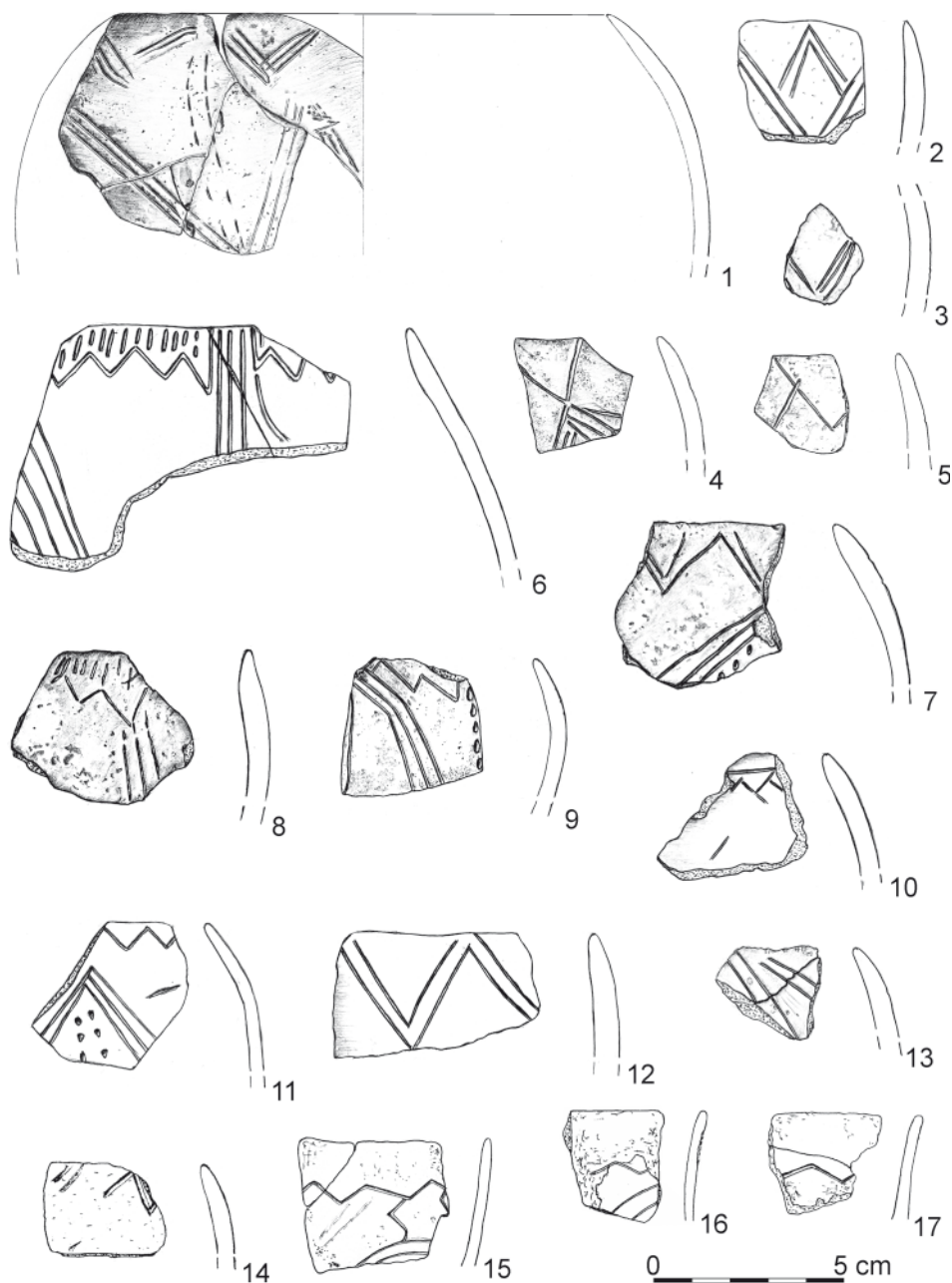


Fig. 5. Tominy, site no. 6: 1-17 – selection of ceramics decorated in the Eastern Linear style: 1 – feature no. 94 (after Szeliga 2008); 2-14, 17 – non-feature layers; 15 – feature no. 105 (by Szeliga 2017); 16 – feature no. 107. Drawn by R. Joć (1, 3-5, 7-9, 13), W. Zieliński (2, 6, 10, 14) and K. Gawryjotek-Szeliga (11-12, 15-17)

circle groups, including the Kapušany-Tiszadob group (e.g. Polgár-Kenderföldek; see Kalicz and Makkay 1977, fig. 90: 1-3).

In the context of the discussed issue, a similar, though quite peculiar example is the ornamentation of one of the partially reconstructed vessels, probably a cup. On this artefact, below the horizontal band of double incisions, encircled with single incised lines, a more complex vertical composition is visible, comprising on the one hand a triple row of punctures, and on the other, adjacent strips filled with alternating inclined, incised lines (Fig. 7). The occurrence of analogous bands of double incisions is quite common in inventories of the Kapušany-Tiszadob group (for example from the Miskolc, Prešov-Šarišské Lúky and Tiszavasvári – Keresztfal settlements; see Kalicz and Makkay 1977, fig. 31: 3, 5; 44: 4; Šiška 1989, tab. 23: 16; 25: 16). In turn, quite close analogies to the presented “her-ringbone” ornamental composition (very rare in the Tominy inventory; see Fig. 6: 13; 7), can be found among some fragments of vessels known from inventories of the Bükk culture (e.g. Borsod, Fuljanka, Kapušany, Smižany; see Tompa 1929, fig. III: 5; Šiška 1993, fig. 2: 6; 3: 13; Soják 1998, tab. 9: 4).

Another group of ornaments includes motifs of vertical zigzags (Fig. 3: 14, 20-21) or wavy lines (Fig. 3: 16-18) and an oblique chequered pattern (Fig. 3: 15, 19; 4: 1), located mainly on the bodies, and less frequently the spouts of thin-walled vessels. Very numerous analogies to these characteristic ornamental methods are known especially from inventories of the Kapušany-Tiszadob group (e.g. from Kenézlő, Miskolc, Prešov-Šarišské Lúky, Tiszadob-Ókenéz or Zemplinské Kopčany; see Kalicz and Makkay 1977, fig. 34: 1-2; 37: 1-3; Šiška 1989, fig. 23: 4, 7, 11; 24: 13, 17; 34: 6-7, 15). As it seems, this interpretation also concerns a fragment of a cup decorated with a motif of a closed oval field, made with an incised ornament (fig. 6: 16). Analogies to these decorative motifs, as well, are known from the inventories of the Kapušany-Tiszadob group (e.g. from Prešov-Šarišské Lúky or Miskolc; see Šiška 1989, fig. 22: 2; 25: 4; tab. 24: 4, 16; Kalicz and Makkay 1977, fig. 31: 23; 34: 5-9). Eastern Linear stylistic connotations cannot be entirely ruled out in the case of single fragments of bodies with knobs surrounded by a single incised line (Fig. 6: 17), as well as fragments of vessels decorated with a fairly simple composition consisting of a few crudely made incised lines, emphasizing the knobs located on the greatest body convexity (Fig. 1: 12). The relation between the first decorative motif with Eastern Linear circle influences was noted for the first time by Marta Godłowska (1982, 148), regarding this type of materials from Nowa Huta. Both decorative motifs are known from sites of the Kapušany-Tiszadob group and of the Bükk culture (e.g. from Aggtelek, Peder or Zemplínske Kopčany; see Tompa 1929, fig. XXIX: 3; Šiška 1989, fig. 28: 12, 32: 13).

The last group of ceramic findings includes the few fragments of cups decorated on their entire surfaces with small, conical knobs – that is, with a pseudo-barbotine ornament (Fig. 8: 1-5). In older literature, this type of ceramics was considered a characteristic element of the early stage of LBK development (e.g. Kulczycka-Leciejewiczowa 1979, 49-50). Among other things, materials from Tominy indicate a much longer chronology of this

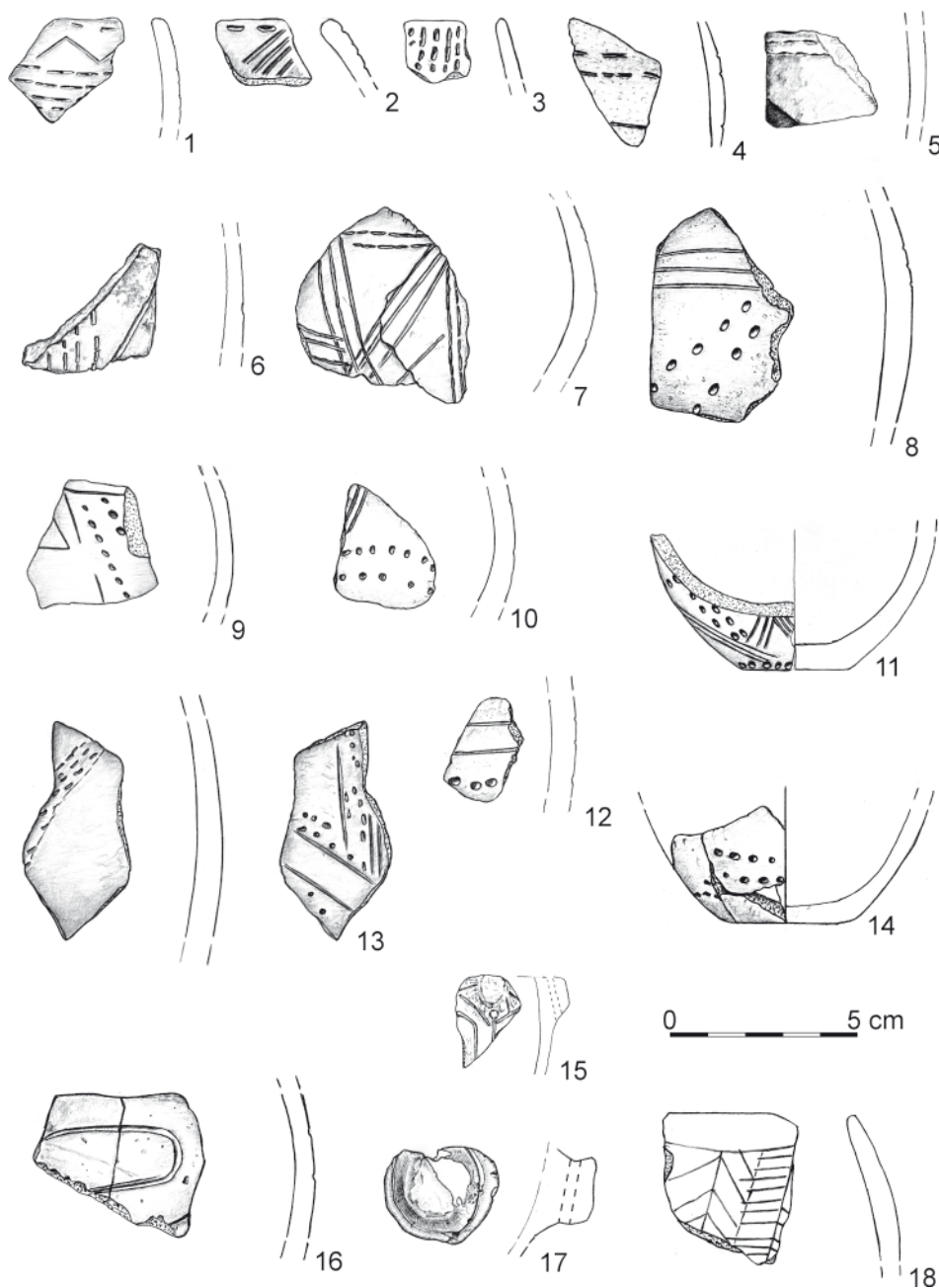


Fig. 6. Tominy, site no. 6: 1-18 – selection of ceramics decorated in the Eastern Linear style: 1 – feature no. 45; 2-14, 16-18 – non-feature layers (17 – by Szeliga 2008); 15 – feature no. 107. Drawn by R. Joć (1-2, 4-5, 12-14, 16), W. Zieliński (3, 10-11, 18) and K. Gawryjotek-Szeliga (6-9, 15, 17)

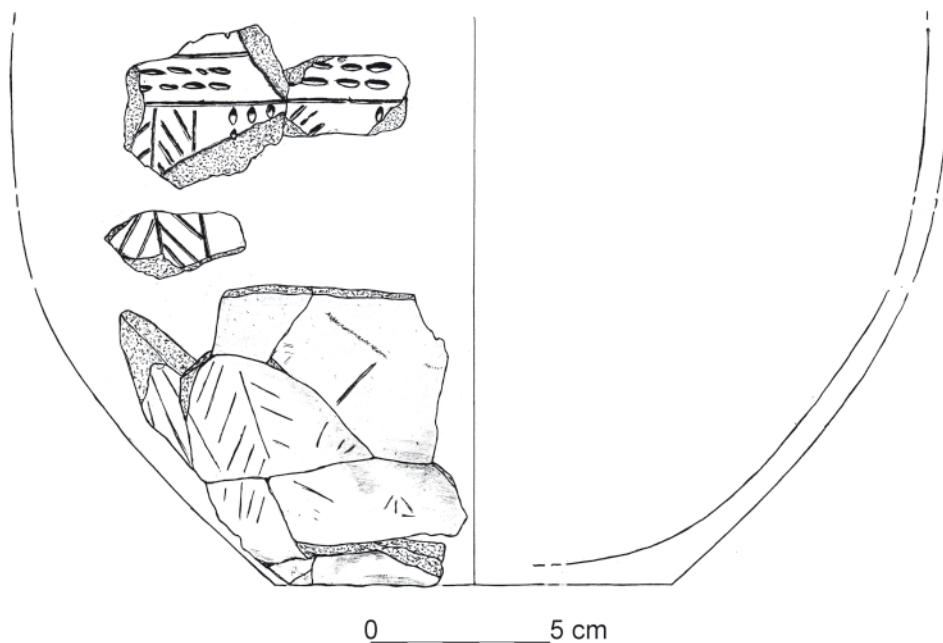


Fig. 7. Tominy, site no. 6: partially reconstructed vessel decorated in the Eastern Linear style, discovered outside the features. Drawn by W. Zieliński

type of decorations. Perhaps the same should also be considered with regard to the aforementioned influences of the Eastern Linear environment, as indicated by similar findings from sites of the Kapușany-Tiszadob group and Bükk culture (e.g. from Kapușany, Nagyecséd-Péterzug, Michalovce, Miskolc, Šarišské Michaľany, Tiszasas-Rév I; Váncsod; see Kalicz and Makkay 1977, fig. 2: 16; 36: 24; 120: 16; 148: 3; Šiška 1989, tab. 27: 10; 33: 6, 35: 12), as well as the Szakálhát group (Hódmezővásárhely – Szakálhát; see Kalicz and Makkay 1977, fig. 160: 12). The range of co-occurrence of such vessels with the note pottery is very wide, as evidenced by, among others, findings from Moldova (e.g. from Denchen'; see Larina 1999, fig. 63: 14). Incidentally, they originate from sites where the presence of pottery decorated in the Eastern Linear style was also found. (Larina 1999, fig. 74: 2; 76: 2: 80:1)

The briefly described collection of pottery from Tominy is supplemented by the much smaller series of ceramic findings acquired at other sites of the Sandomierz cluster of LBK settlement (fig. 1: C), or more precisely from Samborzec, site no. I (Kulczycka and Kozłowski 1960, fig. 5; Kamieńska 1964, tabl. XI: 1-11; XXX: 1; Kulczycka-Leciejewiczowa 2008, fig. 18: 10; 28: 22; 41: 21), Sandomierz, *Kruków* site (Michalak-Ścibior and Taras 1995, fig. 27: 21), Sandomierz, *Collegium Gostomianum* site (Kowalewska-Marszałek 1996, tabl. III: 1-4,

6), Złota, *Grodzisko I* site (Podkowińska 1953, tabl. XVI: 6; Rauhut 1970, fig. 3) and Jurkowice, site no. 1 (Podkowińska 1959, tabl. II: 5; VI: 1, fig. 8: a). In addition, this list should be supplemented with an indeterminate number of vessel fragments obtained from recently excavated sites in Szewna (site no. 6), Wólka Wojnowska (site no. 33) and Tominy (site no. 12), located at the northern edge of the Sandomierz Upland. These materials have not been published yet and are currently being developed, but on the basis of verbal information from the authors of the research, it is known that in all cases there are very few fragments of the vessels.

Compared to the collection from site 6 in Tominy, the presented findings reveal a much smaller diversity of the motifs characteristic of the Eastern Linear provenance. They are dominated by a variety of wavy and zigzag motifs, as well as straight or arched compositions of densely arranged incised lines (Fig. 9), revealing the greatest resemblance to the

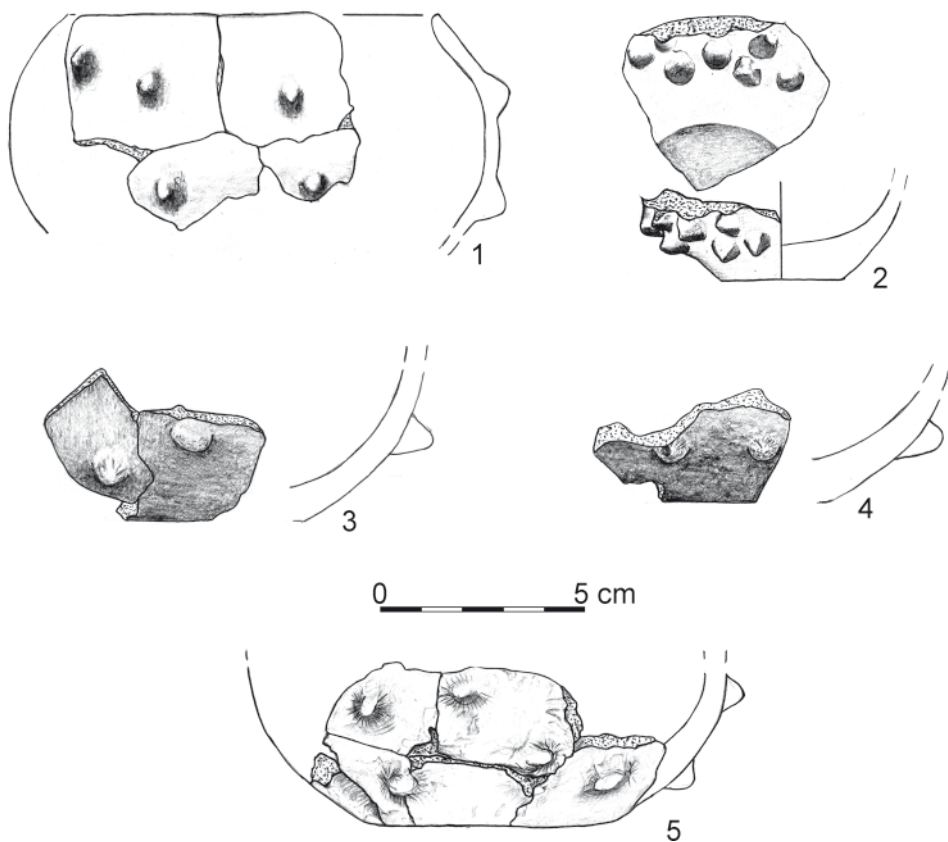


Fig. 8. Tominy, site no. 6: 1-5 – selection of vessel fragments with a pseudo-barbotine ornament from non-feature layers. Drawn by W. Zieliński (1-2, 5) and R. Joć (3-4)

ornamentation typical for the pre-classical and classical phase of the Bükk culture. The exception is a fragment of a vessel spout from Jurkowice (fig. 9: 1), having close analogies in the inventories of the Kapušany-Tiszadob group (e.g. Prešov-Šarišské Lúky, Tiszavasvári-Paptelekhát; see Kalicz and Makkay 1977, fig. 70: 8; Šiška 1989, fig. 25: 11.). This also applies in the case of shards with the ornament of wavy lines from Samborzec (Fig. 9: 10, 12, 15).

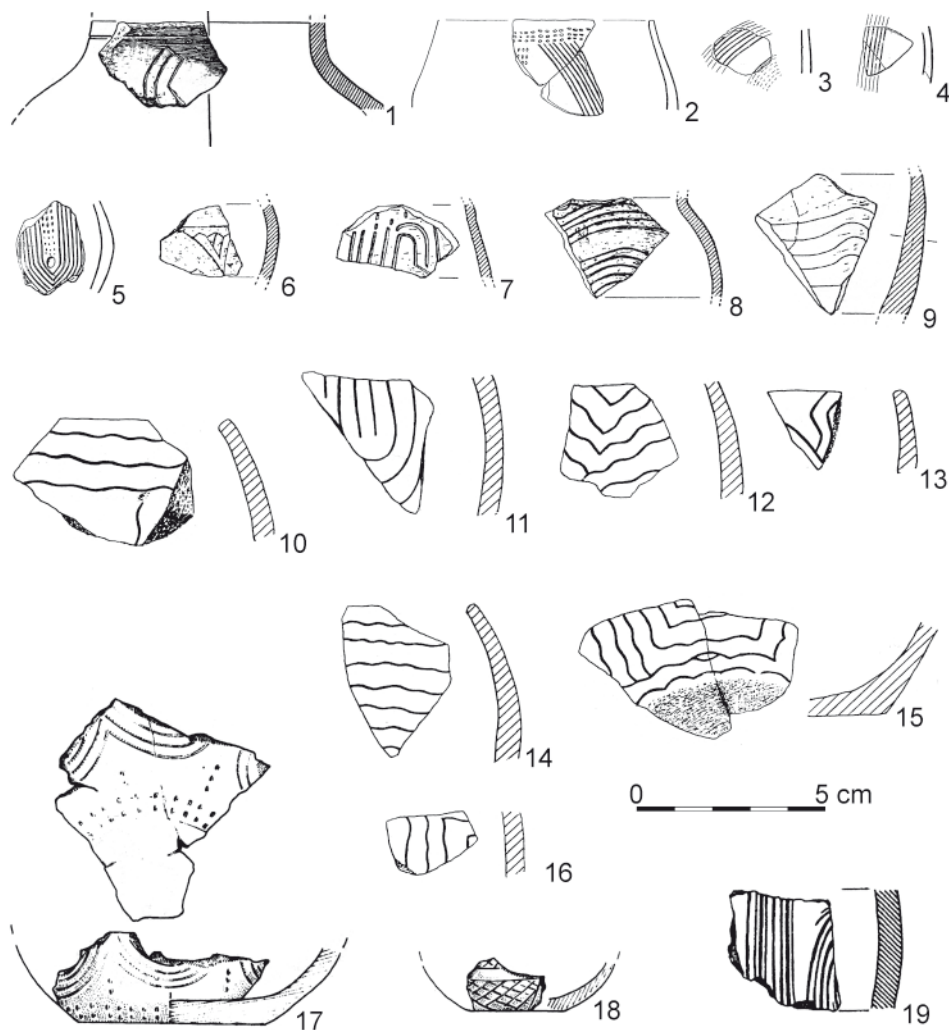


Fig. 9. Selection of ceramics decorated in the Eastern Linear style from the Sandomierz Upland LBK sites: 1 – Jurkowice, site 1 (after Podkowińska 1959); 2-5 – Złota, Grodzisko, site I (after Rauhut 1970); 6-9 – Sandomierz, site 3 – *Collegium Gostomianum* (after Kowalewska-Marszałek 1996); 10-18 – Samborzec, site I (after Kulczycka and Kozłowski 1960 and Kulczycka-Leciejewiczowa 2008); 19 – Sandomierz, site 20 – *Kruków* (after Michałak-Ścibior and Taras 1995)

THE PROBLEM OF THE ORIGIN OF CERAMICS

Among the ceramic findings decorated in a manner characteristic for Eastern Linear groups, the presence of both fragments of vessels imported from Carpathian areas, as well as numerous local imitations created in the environment of music-note and *Želiezovce* LBK phases is pointed out in the literature (e.g. Kadrow and Rauba-Bukowska 2016, 66). The imported nature of some of the findings is indicated by their stylistic and aesthetic premises (e.g. Godłowska 1982, tabl. II: 23-24; Kaczanowska and Godłowska 2009, fig. 3: 3; 4: 4, 9-10; Tunia 2016, fig. 11-12), and especially the results of a few mineralogical and petrographic analyses made for pottery samples obtained on the settlements excavated in Lesser Poland (Kozłowski *et al.* 2014, 67-71; Rauba-Bukowska 2014, 462-463). The presented findings, originating from the Sandomierz cluster of LBK settlement, do not provide an unambiguous answer to the question of whether they can be interpreted as imports or only local imitations of the Eastern Linear decorative methods. At the macroscopic level, the vast majority of the Tominy findings do not reveal any distinct technological differences in relation to the remaining LBK ceramics collections. In terms of their quality and accuracy of performance, some of the recorded ornaments clearly diverge from their Carpathian prototypes (e.g. Fig. 3: 12-15; 4: 8; 5: 7), which may indicate their local production. On some fragments, the presence of ornamental motifs typical for LBK and Eastern Linear groups was also recorded. Among them are a small number of fragments of vessels, the bottoms of which were surrounded by a single row or double rows of solid or dotted incised lines, and the bodies were decorated in the convention typical for the music-note style (Fig. 4: 2, 4).

The observations made on the collection from Tominy seem to reveal the clear preponderance of imitations of the Eastern Linear decorative style, as opposed to fragments of imported vessels. The possible presence of ceramic imports can be indicated, to the greatest extent, by a few fragments of thin-walled vessels, differing from the local LBK ceramics in terms of their production technology (lack of intentional temper) and their method of surface finishing (sometimes precise polish), as well as the quality and regularity of their decoration (sometimes very delicate, subtle incised lines). However, the question of the correct interpretation of the presented ceramic materials is still open. Perhaps it will be possible to resolve it by specific specialized, mineralogical and chemical analyses, the implementation of which is planned for the near future.

OBSIDIAN

The second category of findings indicating contacts between the Sandomierz region LBK community and the Carpathian regions includes obsidian products. Their presence was recorded within the vast majority of excavated sites of this culture, and generally those with ceramics referring to the Eastern Linear style (Fig. 1: C). However, the number of

obsidian products within particular sites is generally very small and ranges from one (Jurkowice 1; see Podkowińska 1959, tabl. I: 1) to a maximum of a dozen (e.g. Sandomierz, site *Żmigród*; see Kowalewska-Marszałek 1993, tab. I) pieces. At the moment, the largest collection of obsidian artefacts was obtained at site 6 in Tominy and includes a total number of 118 pieces. Only 23 of them were discovered in the LBK features. The remaining ones were found within non-feature layers, as well as in the fillings of younger objects, related to the Bronze and Iron Age settlements. Despite this quite numerous series of findings, the share of obsidian in the collective raw material structure of feature materials has been estimated at less than 1% (Szeliga 2018, fig. 2), which indicates its minimal, and practically irrelevant, importance in the processing and production of tools. This low content corresponds to the frequencies of this raw material in most LBK inventories known from western Lesser Poland and Podkarpacie (e.g. Balcer 1983, tab. 4; Kozłowski 1985, 56-60; Milisauskas 1986, 145; Kaczanowska *et al.* 1987, 95; Kadrow 1997, fig. 18; Wilczyński 2014, 500). Only the shares recorded within certain sites known from the Rzeszów and Przemyśl regions diverge from these general trends (e.g. Kozłowski 1970, tab. I; Kulczycka-Leciejewiczowa 1979, tab. 5, ryc. 26; Kaczanowska 1985, Abb. 22; Kadrow 1990a, fig. 24: a-e; 1990b, fig. 14: b; Pelisiak 2014, tab. 14). This applies to inventories from both the music-note and the *Želiezovce* phase.

As regards the origin of the obsidian raw material known from the LBK sites in the Upper Vistula basin, the few previous analyses done have indicated the inflow of both the Slovak variety, Carpathian 1, and the Hungarian variety, Carpathian 2 (Milisauskas 1983, 172; 1986, 145, table 92). In the case of the Sandomierz region, only the Carpathian 1 variety was revealed by the analysis of the few obsidian artefacts from Tominy made by Prof. Maciej Pawlikowski. This suggests the relationship of the raw material with its outcrops located in the Slanské Hills and the Zemplén Mountains (Pawlikowski 2006). This is confirmed in an indirect way by the Prompt Gamma Activation Analysis (PGAA) conducted for the series of obsidian artefacts originating from Tominy (Z. Kasztovszky's analysis, in preparation), as well as from two LBK sites of Greater Poland (Kowalewko, site 14, Oborniki district) and Podkarpacie (Rudna Wielka, site 5, Rzeszów district), which identified its origin in an outcrop from a region close to Cejkov and Kašov in eastern Slovakia (Kabaciński *et al.* 2015, 10-12). This corresponds with the most recent assertions of A. Přichystal and P. Škrdla, indicating the location of the main Carpathian obsidian prehistoric outcrop in the area between Brehov, Cejkov and Zemplén (Přichystal and Škrdla 2014, 224). The dominant role of the *Carpathian 1* obsidian variety in the Neolithic, and at the same time the slightly lower importance of obsidian originating from outcrops in the Tokaj region (*Carpathian 2*), is also indicated by the results of geochemical analyses of a series of artefacts from LBK and STK sites from the Czech Republic (Burgert *et al.* 2016, 234).

The diversity of available obsidian finds allows us to assume an inflow of obsidian into the Sandomierz cluster of LBK settlements, at least in the form of pre-prepared blade cores. An example of this can be found in a single platform blade core with a circumferential flaking face and a carefully prepared striking platform found in Tominy (Szeliga 2009,

tabl. I: 6). Despite many attempts, no refittings have been obtained with the remaining obsidian products discovered at the site. This allows us to assume with a high probability that this piece arrived in the settlement in Tominy in that form. However, the lack of obsidian concretions within the LBK inventories from the Sandomierz Upland does not preclude the possibility of an influx of obsidian in this form as well. It is indirectly indicated, on the one hand, by finds from not-so-distant clusters of LBK settlement in western Lesser Poland and Podkarpacie (e.g. Kozłowski 1970, 89; 1974, 9; Kaczanowska 1971, 14; 1985, 65; Kadrow 1990a, 49), and on the other hand, by the presence of completely cortex blades and flakes, and the state of preservation of some of the blade cores (Michalak-Ścibior 1992, fig. 8: 16; Szeliga 2009, 298, tabl. II: 8).

The concretions and cores were subjected to basic processing on site, focused primarily on the production of small-sized blades (Kozłowski 1970, 79-81; Balcer 1983, 70; Szeliga 2009, 292-294). This is indicated by the collective morphological structure of the Tominy inventory. The blank blades are a dominant category within it, which is represented primarily by various fragments, and to a much lesser extent, by whole pieces. This suggests that at least some of the blades were intentionally broken, analogously to the case of blades obtained from flint cores (e.g. Kaczanowska 1971, 11; Balcer 1983, 74). The entirely preserved blades are usually small and only occasionally longer than 40 mm. This corresponds closely with data from other LBK sites of southern and southeastern Poland (e.g. Kaczanowska 1971, 14; Milisauskas 1983, 172; 1986, 145; Pelisiak 2014, 118-119). The second largest group of finds are flakes and chips, mostly remnants of various repairs or preparatory works undertaken on blade cores, and only sporadically intentionally obtained blanks, acquired only during the secondary exploitation of blade cores (Szeliga 2009, 294). Blades, and sometimes also flakes, were only sporadically transformed into morphological tools. In the collection from Tominy, 15 retouched tool forms were recorded, represented mainly by retouched blades, endscrapers and truncated pieces, and to a much lesser extent by retouched flakes and a single perforator (Szeliga 2009, tabl. III: 5-6, 9-13, 18). Paradoxically, this is a very large series of such products in comparison with other LBK sites from the areas on the north side of the Carpathians, where retouched tools are usually represented by a maximum of several pieces (e.g. Balcer 1983, 70; Kadrow 1990a, fig. 26: a; Gruszczyńska 1992, 123; Pelisiak 2014, tab. 14-15; Wilczyński 2014, 500), and very rarely by more numerous collections (Milisauskas 1986, tab. 93-94).

FLINTS FROM THE ŚWIĘTOKRZYSKIE MOUNTAINS REGION

At present, obsidian products round off the list of finds of Carpathian provenance known from the area of the Sandomierz cluster of LBK settlement. However, this is not the only proof of intense contact between the local music-note and *Želiezovce*-phase LBK communities with the Transcarpathian groups of the Eastern Linear cultural circle. This is

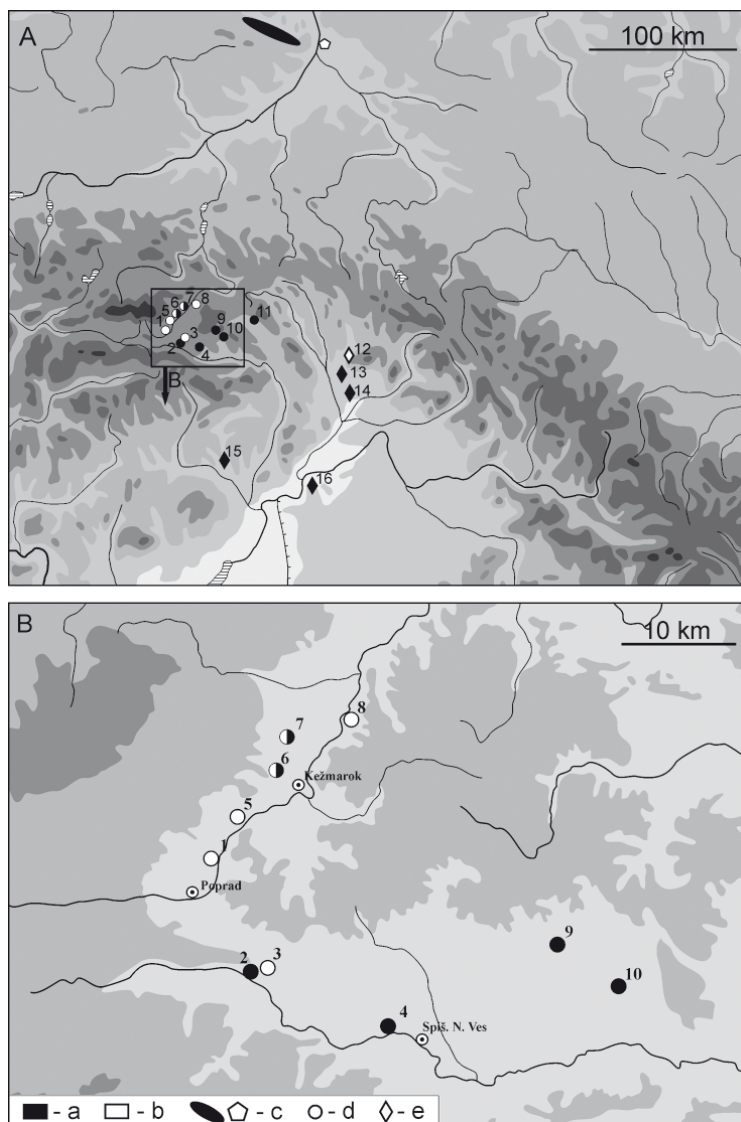


Fig. 10. Dispersion of artefacts made of flints from the Świętokrzyskie Mountain Region in E Slovakia and NE Hungary (A) and within the Spiš region (B): a – chocolate flint; b – Świeciechów flint; c – outcrops of both flint raw materials; d-e – archaeological sites (d – LBK, e – Alföld-LBK and Bükk cultures): 1 – Poprad-Matejovce, *Nad kopčekom I* site; 2 – Spišský Štiavnik, *Sedliská I* site; 3 – Spišský Štiavnik, *Nad rybníkom* site; 4 – Spišská Nová Ves/ Smižany, *Smižanska roveň* site; 5 – Veľká Lomnica, *Na Kopci* site, (*Šibeničná Hora*); 6 – Strané Pod Tatrami, *Pod Kamenným vrchom I* site; 7 – Rakúsy/Spišská Belá, *Kahlenberg (Stirn)* site; 8 – Križová Ves, *Družstevné lúky* site; 9 – Jablonov, *Rybník* site; 10 – Žehra, *Hlinky I* site; 11 – Šarišské Michal'any; 12 – Humenné, *Pod Sokolom* site; 13 – Moravany; 14 – Male Raškovce; 15 – Borsod-Edeleny; 16 – Balsa-Fecskepart. After Kaczanowska 1985; Kaczanowska et al. 1993; Biró 1998; Soják 1999; 2000a, 2000b; 2001; 2003; Kaczanowska et al. 2002; Kaczanowska and Kozłowski 2002

clearly indicated, albeit in an indirect way, by artefacts made of flints from the Świętokrzyskie Mountains Region discovered in eastern Slovakia and northeastern Hungary. Currently, at least a dozen sites are known in this region, where the presence of Chocolate or Świeciechów flint products were recorded, both in the context of LBK ceramics as well as ceramics from groups of the Eastern Linear cultural circle (Fig. 10: A-B).

The region of the highest concentration of this type of find is the area of Spiš. At least ten LBK sites are known from this area, on which products made of both mentioned raw materials were obtained (Fig. 10: A). Only a small fraction of them were discovered during archaeological excavations, while the vast majority were collected during surface surveys conducted in recent years by F. Javorski and M. Soják in the Poprad, Kežmarok, Spišská Nová Ves i Levoča districts (Fig. 10: B). Despite this, the relation between particular sites and the LBK is not in doubt. This is indicated by both the morphological and metric features of the distinct products, as well as the accompanying ceramic materials. At the majority of the sites, ceramic imports of the Kapušany-Tiszadob group and the Bükk culture were present, in addition to the dominant ceramics decorated in the music-note and (to a lesser degree) *Želiezovce* styles (e.g. Soják 1998, 111-115; 2000a, 252-261).

Four sites located in the eastern part of Slovakia and the northern part of Hungary, within the settlement zones of the Alföld-LBK and the Bükk culture, complete the list of discussed Carpathian discoveries (Fig. 10: A). A few collections of Świeciechów and Chocolate flint products – containing from 1 to a maximum of several pieces – were obtained from particular Slovak-Hungarian sites of various archaeological cultures. The total share of both types of flint in the collective raw material structures of particular inventories has never exceeded 3% (Soják 1999, tab. 1; 2000a, 211). This indicates the minimal, and virtually irrelevant, importance of both raw materials in the local processing and production of tools. Within the Spiš cluster of LBK settlement, Jurassic-Cracow flint is the preferred material for basic production. This is very well illustrated by the inventory from Strané pod Tatrami, where the total share of this raw material was estimated at over 70% (Soják 1999, 96-97, tab. 1). On the other hand, in the areas occupied by the Eastern Linear groups (for example at the site in Humenne), local raw materials, especially obsidian, cherts and sometimes radiolarites, are the dominant materials of production (e.g. Kaczanowska 1985, 47; Kozłowski 1989, tab. 1, 8). In addition to the minimum percent frequency, in the discussed areas a current findings of Świeciechów and Chocolate flints revealed a very small degree of morphological diversity, limited almost exclusively to blades, flakes and retouched tool forms (Kaczanowska *et al.* 1993, fig. 9: 4; Biró 1998, 38, 49; Soják 1999, fig. 1: 17, 27; 5: 230; 6: 231; 2000a, 252-261, tabl. LIV: 14; LVI: 1; LVIII: 15, 30; LX: 8; Kaczanowska and Kozłowski 2002, Pl. 4: 16; Kaczanowska *et al.* 2002, tabl. V: 3).

Obviously, the presence of Chocolate and Świeciechów flint products in eastern Slovakia and northeastern Hungary does not prove the existence of direct contact between

local communities and communities of the Sandomierz LBK groups who are settled near outcrops of both these raw materials. The current understanding of the distribution of both types of flints in the early Neolithic suggests that the inflow of products made of these materials to the Carpathian areas was mediated by much closer LBK settlement regions. A leading role was probably played by the communities of the Rzeszów cluster. Previous data indicate that these communities were the most important (and the only ones in SE Poland) direct recipients of flint raw materials from the Świętokrzyskie Mountains Region, (especially Świeciechów flint), as well as intermediaries who controlled their redistribution to more distant areas, including Transcarpathian ones (Szeliga 2014, 97-98, fig. 8). This also applies to the inflow of Carpathian obsidian to the northern foreland of the Carpathians. In the case of this raw material, the Rzeszów cluster of the LBK is also the zone of its most intense inflow, while at the same time it is the primary hub for the further distribution of this flint to more distant areas in the upper and middle Vistula basin (Szeliga 2009, 305). The issue of the possible role of the Spiš LBK community in the distribution of the Chocolate and Świeciechów flints into the areas of Eastern Linear settlement in the Eastern Slovak Lowland on the one hand, and in the distribution of obsidian to the Podkarpacie area on the other hand, is obviously open, but nevertheless seems to be minor compared to dominant role of the Rzeszów region.

Recognition of the Rzeszów LBK cluster as the (intermediary) origin of the raw materials from the Świętokrzyskie Mountains Region discovered at Transcarpathian sites is most probable in the light of the current state of research, both in relation to the Spiš area and the Eastern Slovak Lowland. However, the main and stimulating role in the distribution system of Świętokrzyskie Mountain flints was played by the communities of the Sandomierz cluster, or more precisely the communities inhabiting the northern part of the Sandomierz Upland, and especially the areas of its northern foreland. This is indicated by the presence in these areas of production centres, similar to the settlement in Tominy, which are situated in the direct vicinity of the outcrops, and by the processing of local raw materials (especially Turonian flints) on a mass scale, not seen anywhere else (Szeliga 2014, 97-98; 2018, 378-381). These communities played a dominant role in the distribution of all possible production surpluses (among others: pre-cores, cores, blades or tools) to groups inhabiting clusters more distant from the outcrops – mainly, but not only, to the aforementioned Rzeszów cluster (Szeliga 2014, 97). At the same time, the north-Sandomierz LBK cluster was in a very high position as part of an extensive system of territorial distribution of flint and obsidian raw materials, functioning from the music-note phase on both sides of the Carpathians, and based on exchange conducted within a few basic intermediary stages (e.g. Lech 2003, fig. 5-6). This position is very clearly confirmed, on the one hand, by the largest concentration of obsidian artefacts, as well as potential imports and stylistic imitations of Eastern Linear ceramics at Tominy, and on the other hand, by their widespread, though not so numerous occurrence in the other sites of this region (Fig. 1: C).

CONCLUSIONS

The data provided above allow us to make a few of the most important conclusions on the interregional and intercultural contacts of the Sandomierz cluster of LBK settlement with the groups of the Eastern Linear cultural circle:

Products made of Carpathian obsidian and/or ceramics bearing ornamentation styles typical for the Eastern Linear cultural groups have been found at nearly all currently excavated LBK settlements from the Sandomierz Upland and its northern foreland (fig. 1: C). At the moment, the highest concentration of both these categories of findings has been recorded at the settlement in Tominy. Diversification of the ornamentation style on ceramic materials from the Sandomierz cluster of settlement allows for their connection with a relatively narrow horizon of the Eastern Linear influences, running – as it seems – with varying intensity within two consecutive stages. The older, initial episode – correlated with the NII and NIII phases of local LBK stylistic development – included fairly weak influences of the Alföld-LBK younger phase, or more precisely the Kapușany-Tiszadob and Raškovce groups, manifesting in the small amounts of obsidian inflow and the presence of a few, unambiguous stylistic references in the ornamentation of vessels. This stage is most clearly visible in the case of finds from Jurkowice (Fig. 9: 1), and to a much lesser extent, from Samborzec (fig. 9: 10, 12, 15). Significant intensification of contacts with the Transcarpathian zone took place from the turn of the music-note and *Želiezovce* phases (NIII-ŽI) and in the early and classical *Želiezovce* phases (ŽI-IIa), relating with the Bükk culture pre-classical and classical phases (A/B and B according to Lichardus 1974). The vast majority of finds of Transcarpathian provenance at Tominy, as well as at other LBK sites in the Sandomierz region, is related with this stage. This identification corresponds very well with the assessments made for the remaining areas of southern and southeastern Poland (e.g. Kadrow 1990a, 61-63, fig. 26: c; 1990b, fig. 14; Czekaj-Zastawny 2014, 100; Kozłowski *et al.* 2014, 70-72; Sebők 2014, 80).

Regardless of the different dynamics of the Transcarpathian influences over the LBK development, the scope of the diversity of Eastern Linear ornamental motifs from the Sandomierz sites enables us to identify their “starting area” primarily with the areas of eastern Slovakia, or more precisely the Košice Valley and the Eastern Slovak Lowland. Such identification, of course, does not exclude the possibility of impacts of other Eastern Linear cultural groups from the northeastern part of the Carpathian Basin, as postulated for other LBK clusters in the upper Vistula basin. (e.g. Esztár, Szakálhát, Szamos, Szarvas-Érpart, Szilmeg; see Zakościelna 1988, 9, fig. 2; Kadrow 1990a, 62-63; 1990b, 55-56; Kozłowski *et al.* 2014, 71; Sebők 2014, 80-81). At the moment, however, the analysis of the diagnostic materials from the sites in the Sandomierz region justifies linking the main zone of impact primarily to the above-mentioned lowland areas of eastern Slovakia. This interpretation remains in line with previous suggestions for materials from western Lesser Poland, including those from Brzezie or the Nowa Huta region (Godłowska 1982, 148; Czekaj-

Zastawny 2014, 72). This is also confirmed by the results of the latest PGAA obsidian analyses (Kabaciński *et al.* 2015, fig. 3), as well as by the pattern of dispersion of products of Chocolate and Świeciechów flints in the northeastern part of the Carpathian Basin (Fig. 10: A).

The presence of vessel fragments imported from the Carpathian area among the discussed ceramic materials cannot be excluded. This applies above all to the forms clearly deviating, in terms of the production manner and the style of decorating, from the local LBK ceramics. We are optimistic that this problem may be solved through the use of detailed chemical and mineralogical analyses of in the near future. Irrespective of this, some of the presented ceramic materials are probably “only” local imitations of the Eastern Linear ornamentation style. This applies in particular to the sherds ornamented with motifs typical of both cultural circles (Fig. 4: 2, 4), as well as those ornamented in a much less careful manner in relation to analogous prototypes from “genetic” areas, and at the same technologically identical to the local LBK ceramics (e.g. Fig. 3: 12-15). However, this is only a general and subjective evaluation of the available materials. The presence of potential vessel ornamentation imitations in the Tominy collection may indicate a more complex nature of Transcarpathian intercultural relations, taking place in the music-note and *Želiezovce* phases of the LBK development. Bearing in mind the relatively dominant role of women in vessel production, as suggested for non-literate societies (e.g. Vincentelli 2000, 170-175), the occurrence of Eastern Linear motifs in the LBK decoration style may indicate the presence of individuals (especially women) from the northeastern part of the Carpathian Basin, as a result of migration and/or marriage exchange. M. Furmanek (2010, 192) also drew attention to the possibility of such an interpretation based on the analysis of ceramic materials from site no. 17 in Dzielnica. Regardless of this, the number and diversity of presented finds indicates the existence of strong and lasting cultural ties between the communities of the Sandomierz LBK cluster and the Eastern Linear communities at the turn of the 6th and 5th millennia BC. These interactions and interregional contacts were bilateral in nature, running under a system of far-reaching and multi-stage distributions of goods, functioning from the music-note phase in vast areas on both sides of the Carpathians, including southeastern Poland and neighbouring areas. An overriding and inspiring role in these relations was played by production centres concentrated in the vicinity of outcrops of raw materials (Chocolate flint and Świeciechów flint within the northeastern margin of the Świętokrzyskie Mountains, as well as *Carpathian 1* obsidian in the area of Kašov-Cejkov-Brehov-Zemplin), simultaneously with the great importance of LBK settlement clusters located between them (especially clusters near Rzeszów and in Spiš).

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HOARD OF LONG FLINT BLADES FROM THE WODZISŁAW HUMMOCK, LESSER POLAND

ABSTRACT

Libera J., Mączyński P., Polit B., Zakościelna A. 2019. Hoard of long flint blades from the Wodzisław Hummock, Lesser Poland. *Sprawozdania Archeologiczne* 71, 197-218.

The subject of this article is a hoard of Volhynian flint blades discovered in Świątniki. The collection encompasses 12 macrolithic Volhynian flint blades. The blades cannot be refitted together. The morphological and technological features of the blades suggest that they were produced with the use of indirect percussion or the lever pressure technique. The traceological analysis did not reveal any utilization patterns. Only slight polishing traces were recorded, perhaps resulting from keeping/transporting the blades in a wrapping made of light material. The makers of the blades should be associated with the populations of the Trypilian, Lublin-Volhynian, or Funnel Beaker culture, which does not indicate unequivocally the cultural attribution of the hoard.

Keywords: macrolithic blades, Volhynian flint, technique, technology, hoard, Eneolithic

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INTRODUCTION

In 1955, the collection of the National Museum in Kielce was enriched with 12 Volhynian flint blades, which had been discovered during field work (?) by an inhabitant of the village of Świątniki (Wodzisław municipality, Jędrzejów district) in 1953 (Fig. 1). All the blades appear in the inventory ledger of the museum under the reference MNKi/A/433/1-12. The artefacts were handed over by Jan Gurba, the then inspector-expert (conservator) of archaeological artefacts, on behalf of the Ministry of culture and Art for the Kielce and Lublin province. Along with the artefacts, a notice, bearing reference no. K.l.d. Zd. 4-5/48, was sent. The missive cannot be found in either the museum or in the Regional Conservation Office in Kielce. Jan Gurba (1953, 34) published a short note on the finding in the *Discoveries* section of the journal *Z otchłani wieków*. Consequently, information concerning the finding has been present in archaeological literature since the mid-1950's, but it has been limited to mentions in various papers discussing the topic of hoards/deposits (e.g. Balcer 1975, 232; Libera and Zakościelna 2010, table 2). Nevertheless, the blades have never been described in detail or published. They remained in the museum storage for several decades.

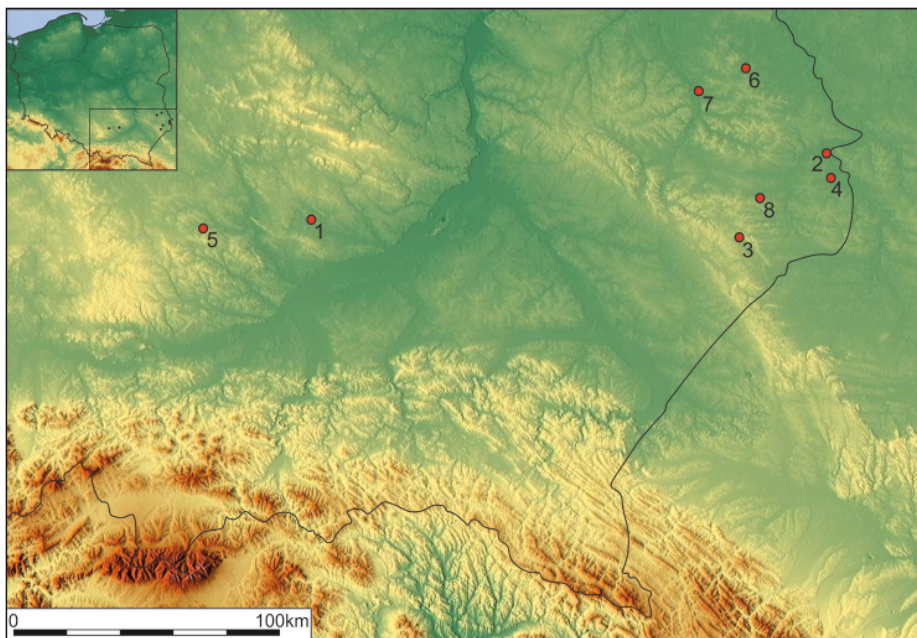


Fig. 1. Deposits containing long flint blades made of Volhynian flint or tools made on such blades (along with other artefacts) from Lesser Poland: 1 – Balice; 2 – Gródek (2 collections); 3 – Rogoźno; 4 – Szychowice; 5 – Świątniki; 6 – Weremowice; 7 – Wincentów; 8 – Zubowice (?)
(Libera, Zakościelna 2010 with authors' changes)

OVERVIEW OF THE MATERIAL

1. Blade with negative scars on the dorsal surface; regularly outlined lateral edges, cortical distal end of convergent character, slightly chipped; at nearly a quarter of the length from the butt, a secondary crest was made; a 20 mm bend is present in the mesial portion; triangular cross-section; gabled butt bearing several negative scars; abraded butt edge; trimming negatives; striking angle slightly below 90°; bulb not distinctly arched and with concentrically arranged bulb scars; unintentional segmental micro-retouch of one of the edges; dimensions: 179 × 26 × 10 mm; metric category: 66 (cf. Dzieduszycka-Machnikowa and Lech 1976, 31-33); weight: 47 gm; Volhynian flint, vitreous, homogeneous, dark steel-grey. Inventory number: MNKi/A/433/1 (Fig. 2: 1, 2).

2. Blade with negative scars on the dorsal surface; irregularly outlined lateral edges gradually narrowing to a convergent, slightly chipped distal end of partly cortical character; a 13 mm bend is present in the mesial portion; trapezoidal cross-section; flat, faceted butt; abraded butt edge; trimming negatives; striking angle of 90°; moderately prominent bulb with concentrically arranged bulb scars; dimensions: 140 × 28 × 6 mm; metric category: 65; weight: 24 gm; Volhynian flint, homogeneous, dark steel-grey, vitreous, merging into matte, striped, light steel-grey. Inventory number: MNKi/A/433/2 (Fig. 2: 3, 4).

3. Blade with negative scars on the dorsal surface; regularly outlined lateral edges; fragment of cortical surface in the mesial portion; distal end chipped; a 21 mm bend is present in the mesial portion; triangular/trapezoidal cross-section; gabled, faceted butt bearing two negative scars; abraded butt edge; trimming negatives; striking angle slightly below 90°; lip below the butt; moderately prominent bulb; unintentional segmental micro-retouch of one of the edges on the ventral side; dimensions: 172 × 30 × 10 mm; metric category: 66; weight: 47 gm; Volhynian flint, vitreous, dark steel-grey, with brighter spots. Inventory number: MNKi/A/433/3 (Fig. 3: 1, 2).

4. Blade with one cortical surface; one of the edges irregularly outlined; convergent distal end slightly chipped, with opposing microblade negatives; a 13 mm bend is present in the distal portion; triangular cross-section; flat butt bearing two negative scars; abraded butt edge; trimming negatives; striking angle slightly below 90°; lip below the butt; moderately prominent bulb; dimensions: 160 × 34 × 9 mm; metric category: 75; weight: 41 gm; Volhynian flint, vitreous, homogeneous, dark steel-grey. Inventory number: MNKi/A/433/4 (Fig. 3: 3, 4).

5. Blade with one cortical side; lateral edges irregularly outlined; convergent distal end; a 23 mm bend is present in the distal portion; triangular cross-section; gabled, faceted butt bearing two negative scars; trimming negatives; striking angle slightly below 90°; lip below the butt; clearly arched bulb; unintentional segmental retouch on the dorsal and ventral surface; dimensions: 177 × 31 × 9 mm; metric category: 76; weight: 44 gm; Volhynian flint, vitreous, dark steel-grey with brighter spots. Inventory number: MNKi/A/433/9 (Fig. 4: 1, 2).

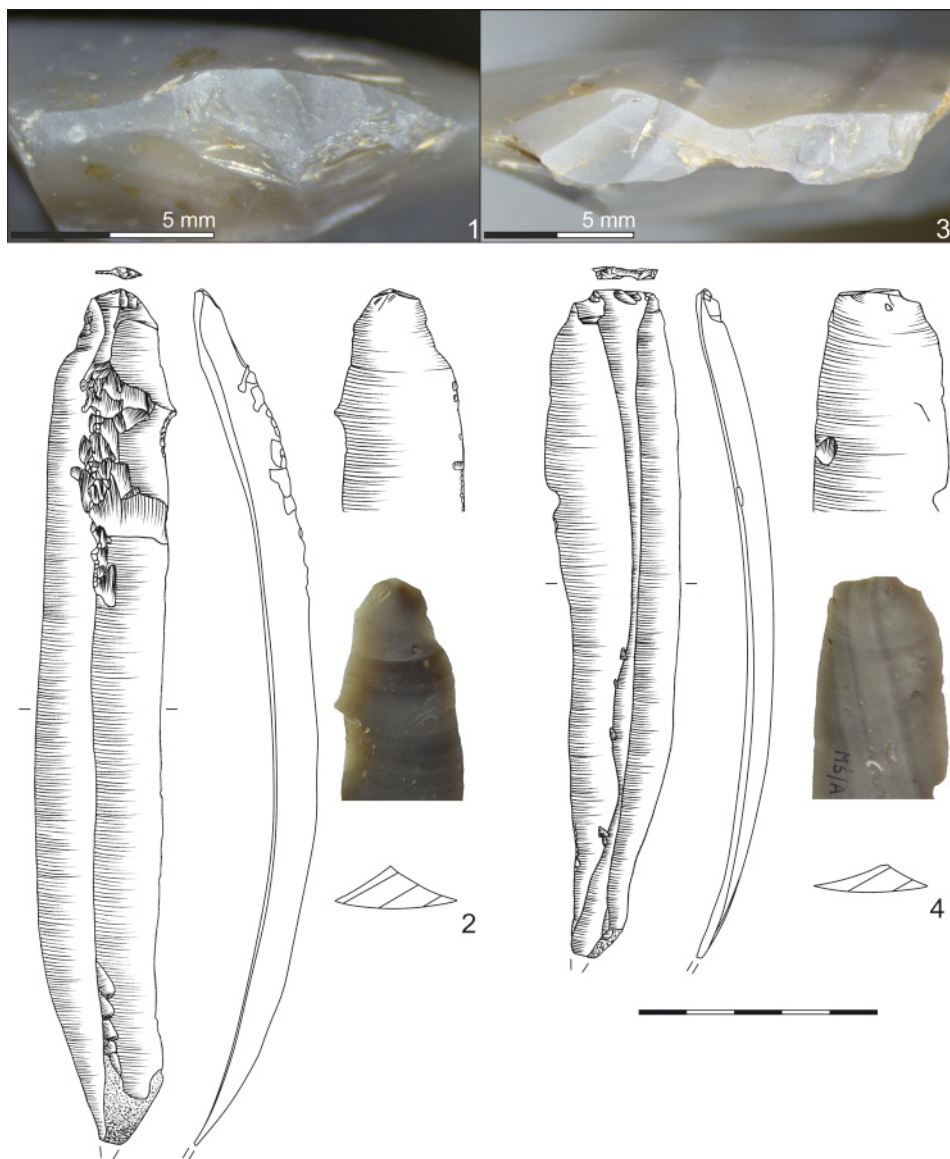


Fig. 2. Świątniki, Jędrzejów district.
 1, 2 – Flint blade no. MNKi/A/433/1. 3, 4 – Flint blade no. MNKi/A/433/2.
 Drawn by P. Mączyński, photo by P. Mączyński, B. Polit

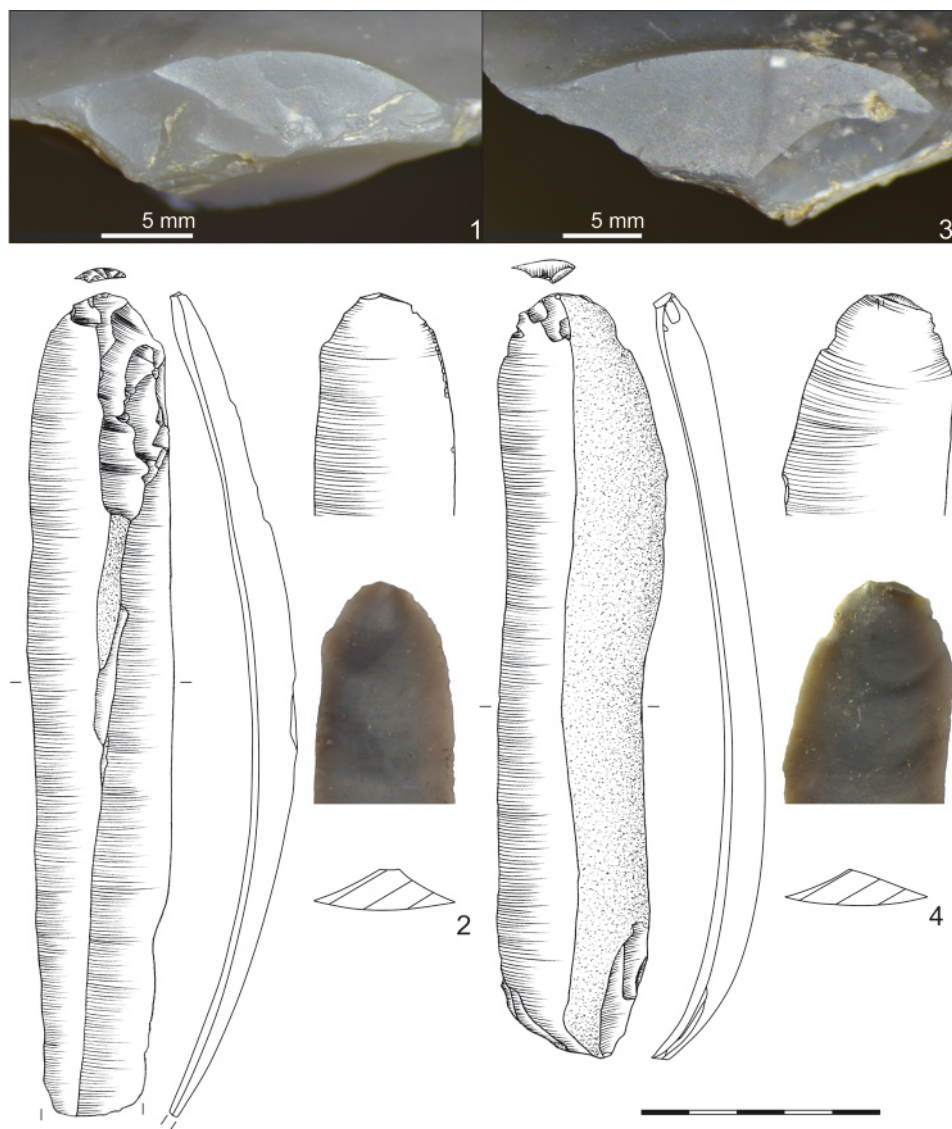


Fig. 3. Świątniki, Jędrzejów district.
 1, 2 – Flint blade no. MNKi/A/433/3; 3, 4 – Flint blade no. MNKi/A/433/4.
 Drawn by P. Mączyński, photo by P. Mączyński, B. Polit

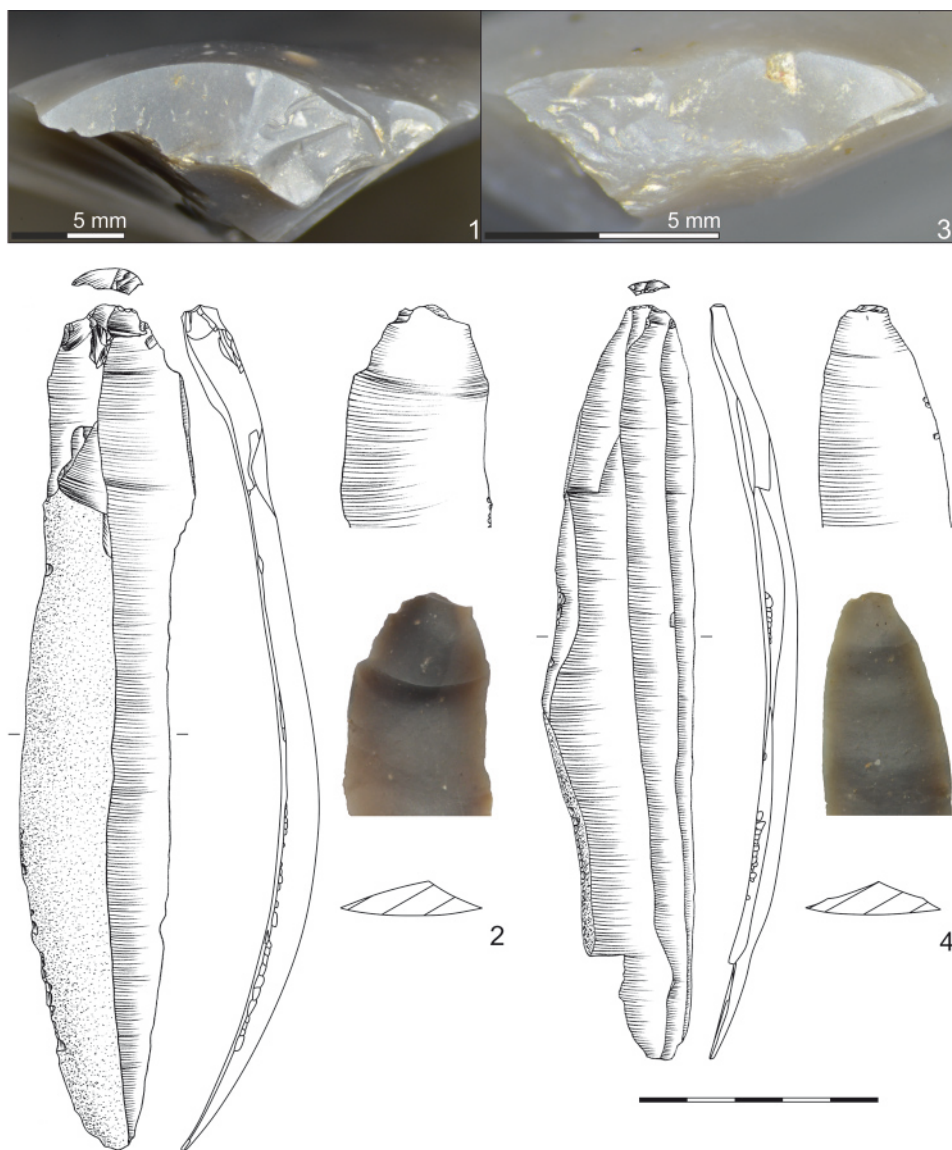


Fig. 4. Świątniki, Jędrzejów district.

1, 2 – Flint blade no. MNKi/A/433/9; 3, 4 – Flint blade no. MNKi/A/433/5.

Drawn by P. Mączyński, photo by P. Mączyński, B. Polit

6. Blade with negative scars on the dorsal surface; one of the lateral edges is irregularly outlined and partly cortical; convergent distal end slightly chipped; a 13 mm bend is present in the mesial portion; polygonal cross-section; gabled, faceted butt; abraded butt edge; trimming negatives; striking angle slightly below 90°; subtle lip below the butt; moderately prominent bulb; unintentional segmental retouch of one of the edges on the dorsal side; dimensions: 158 × 31 × 8 mm; metric category: 75; weight: 33 gm; Volhynian flint, vitreous, dark steel-grey, with brighter spots. Inventory number: MNKi/A/433/5 (Fig. 4: 3, 4).

7. Secondary crested blade, partly cortical; one of the lateral edges irregularly outlined; convergent distal end of cortical character, slightly chipped; a 27 mm bend is present in the mesial portion; polygonal cross-section; gabled, faceted butt; abraded butt edge; trimming negatives; slightly obtuse striking angle; lip below the butt; clearly arched bulb with a bulb scar; dimensions: 189 × 38 × 10 mm; metric category: 85; weight: 70 gm; Volhynian flint, vitreous, dark steel-grey with brighter spots. Inventory number: MNKi/A/433/10 (Fig. 5: 1, 2).

8. Blade with one cortical side; one of the edges irregularly outlined; convergent distal end; a 13 mm bend is present in the mesial portion; trapezoidal cross-section; flat butt bearing a single negative scar; crushing of the butt edge; striking angle slightly below 90°; subtle lip below the butt; moderately prominent bulb with a bulb scar in the form of a tear-shaped quasi-negative scar; dimensions: 137 × 31 × 7 mm; metric category: 74; weight: 33 gm; Volhynian flint, vitreous, homogeneous, dark steel-grey. Inventory number: MNKi/A/433/6 (Fig. 5: 3, 4).

9. Blade with negative scars on the dorsal surface; one of the edges irregularly outlined; convergent distal end of cortical character; a 27 mm bend is present in the distal portion; trapezoidal cross-section; flat, faceted butt bearing a single negative scar; abraded butt edge; trimming negatives; striking angle slightly below 90°; moderately prominent bulb with a tear-shaped quasi-negative scar; unintentional segmental retouch of one of the edges on the dorsal part; dimensions: 198 × 31 × 8 mm; metric category: 76; weight: 51 gm; Volhynian flint, vitreous, dark steel-grey with brighter spots. Inventory number: MNKi/A/433/11 (Fig. 6: 1, 2).

10. Blade with negative scars on the dorsal surface; regularly outlined lateral edges, convergent distal end slightly chipped; a 12 mm bend is present in the mesial portion; trapezoidal cross-section; gabled, faceted butt bearing two negative scars; trimmed/abraded butt edge; acute striking angle; lip below the butt; moderately prominent bulb; dimensions: 163 × 29 × 8 mm; metric category: 66; weight: 37 gm; Volhynian flint, dark steel-grey, vitreous, merging into matte, striped, bright steel-grey. Inventory number: MNKi/A/433/7 (Fig. 6: 3, 4).

11. Blade with negative scars on the dorsal surface; regularly outlined lateral edges; broken off distal end of unspecified type; a 20 mm bend is present in the mesial portion; triangular cross-section; gabled, faceted butt bearing two negative scars; trimming negatives;

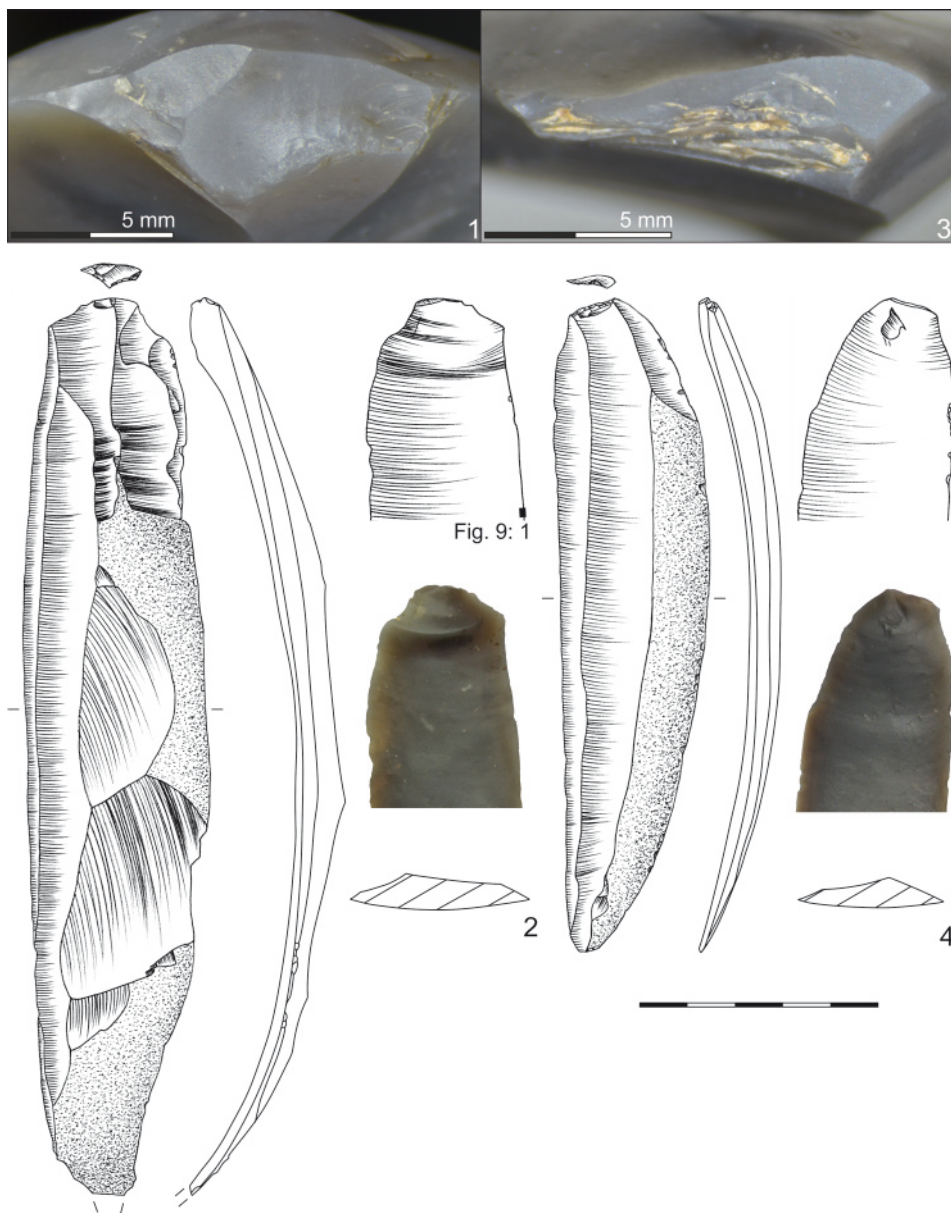


Fig. 5. Świątniki, Jędrzejów district.
 1, 2 – Flint blade no. MNKi/A/433/10; 3, 4 – Flint blade no. MNKi/A/433/6.
 Drawn by P. Mączyński, photo by P. Mączyński, B. Polit

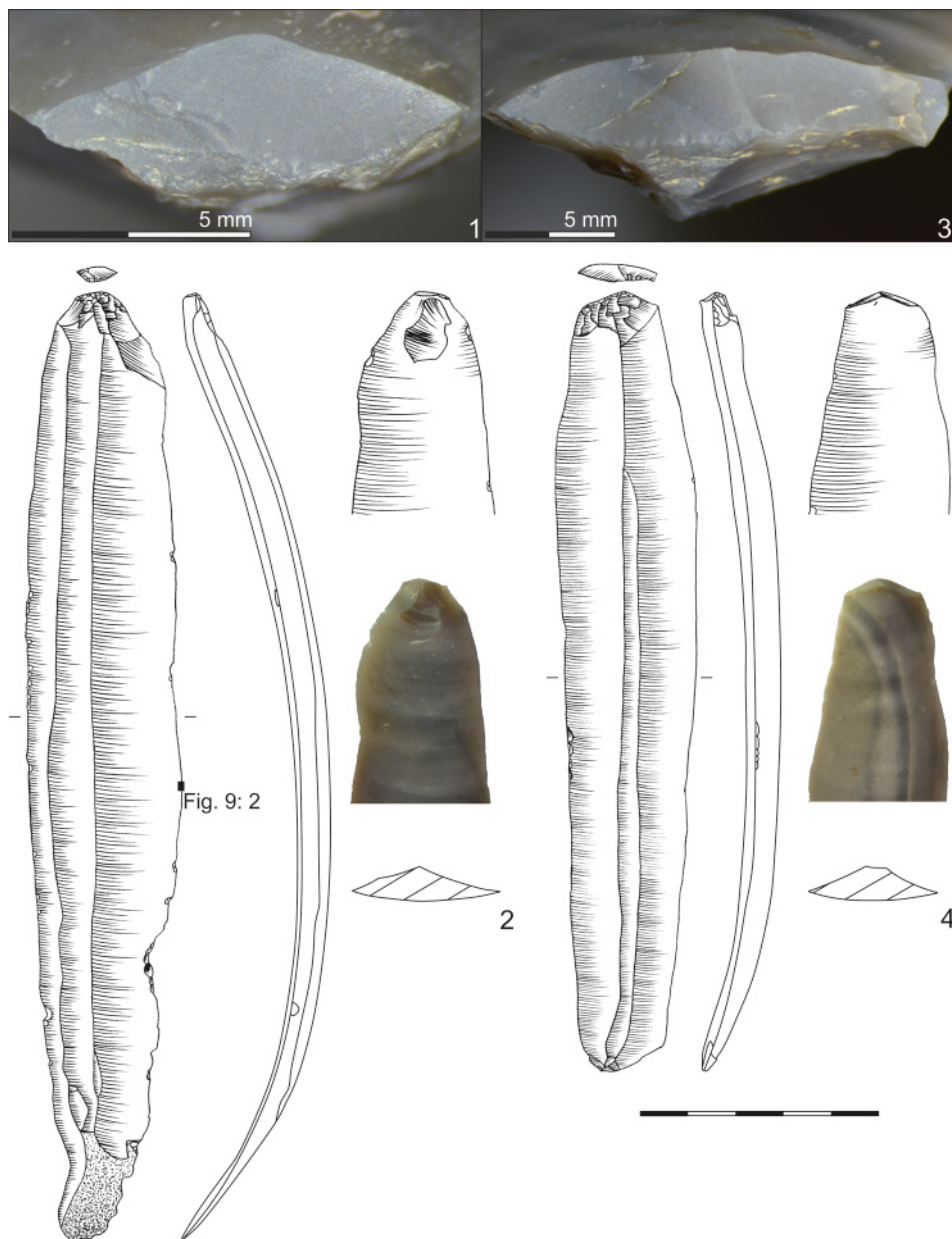


Fig. 6. Świątniki, Jędrzejów district.

1, 2 – Flint blade no. MNKi/A/433/11; 3, 4 – Flint blade no. MNKi/A/433/7.

Drawn by P. Mączyński, photo by P. Mączyński, B. Polit

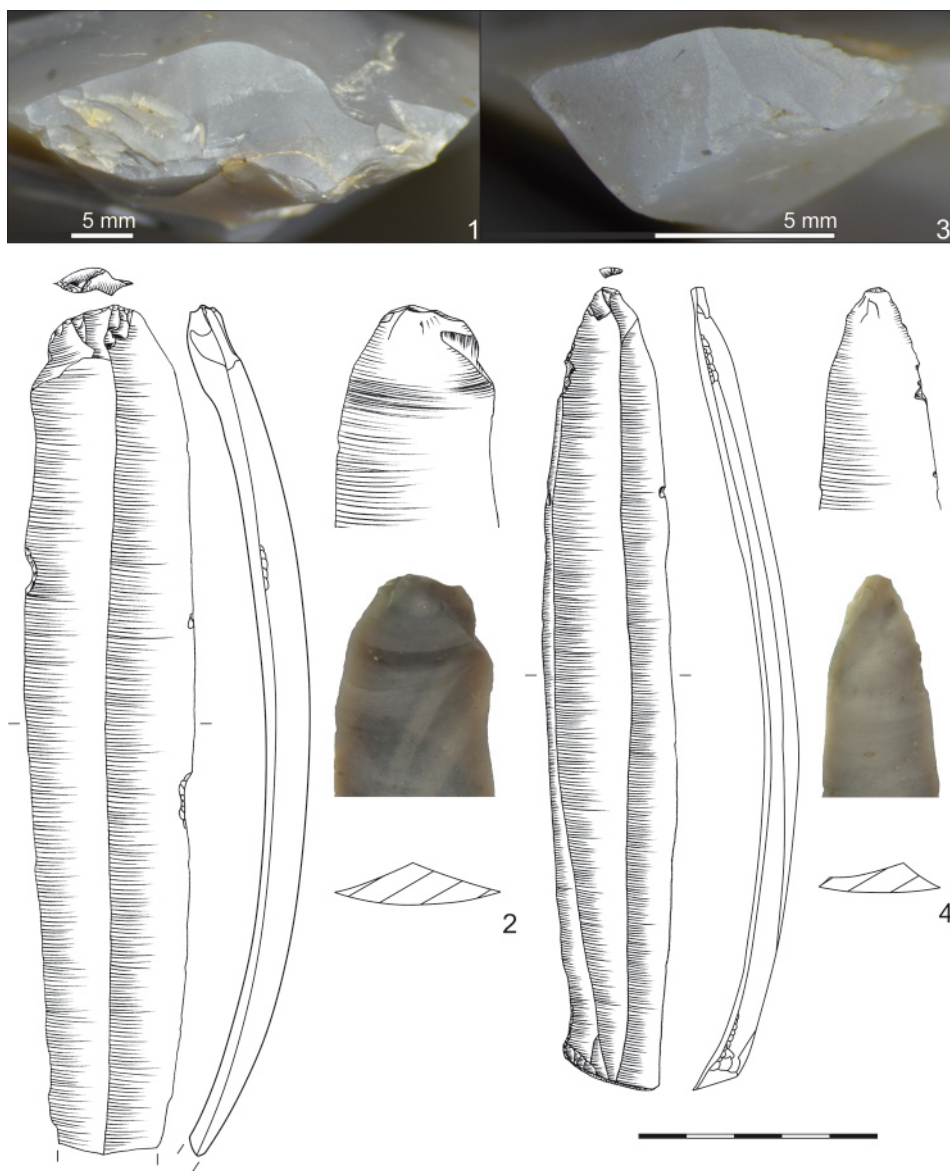


Fig. 7. Świątniki, Jędrzejów district.
 1, 2 – Flint blade no. MNKi/A/433/12; 3, 4 – Flint blade no. MNKi/A/433/8.
 Drawn by P. Mączyński, photo by P. Mączyński, B. Polit

obtuse striking angle; lip below the butt; clearly arched bulb with a bulb scar; unintentional segmental micro-retouch of both edges on the dorsal part; dimensions: $179 \times 35 \times 10$ mm; metric category: 76; weight: 64 gm; Volhynian flint, vitreous, dark steel-grey, merging into striped, bright steel-gray. Inventory number: MNKi/A/433/12 (Fig. 7: 1, 2).

12. Blade with negative scars on the dorsal surface; regularly outlined lateral edges; slanting distal end of cortical character; a 17 mm bend is present in the mesial portion; trapezoidal cross-section; gabled, faceted butt; abraded butt edge; trimming negatives; striking angle slightly below 90° ; lip below the butt; moderately prominent bulb with concentrically arranged bulb scars; dimensions: $168 \times 26 \times 7$ mm; metric category: 66; weight: 37 gm; Volhynian flint, vitreous, dark steel-grey with brighter spots. Inventory number: MNKi/A/433/8 (Fig. 7: 3, 4).

MORPHOMETRIC ANALYSIS

The blades are very well preserved. Furthermore, they are not covered with patina. The distal end of only one specimen (no. 11) is visibly broken off. The distal ends of six others are slightly chipped (nos. 1, 3, 4, 6, 7, 10). As experiments have shown, this type of damage can be the result of detaching blades from the core (Pelegrin 2006, fig. 2).

The discussed blades have very regular shapes. A remarkable repeatability of morphometric features also characterizes the collection. In the descriptions of particular specimens, we paid attention to the irregular outline of usually a single edge, but this means only slight undulation or convexity, mainly in artefacts having one cortical side (nos. 4, 5, 7, 8). Such blade shapes result from broadening the striking surface to the cortical sides bearing slight irregularities of different kinds, which did not affect the blade detachment effectivity, so there was no need to remove them during core shaping. Considerable portions of some blades have edges parallel to the axis and to ventral ridges, and their masses are evenly distributed: they are thicker in the butt-bulb area and gradually get thinner towards the distal end. In the side view, they all are bent: nine specimens in the mesial part, and the rest in the distal portion. The bends are various: slight ones of 12-13 mm in the mesial portion (nos. 2, 10, 6, 8) and less frequently in the distal portion (no. 4), average ones of 17 mm in the distal portion (no. 12), sharp ones of 20-23 mm in the mesial (nos. 1, 5, 11) or in the distal portion (no. 3), and even very sharp bends of 27 mm in the mesial (no. 10) or in the distal portion (no. 9).

The dorsal surfaces of only two specimens are completely covered with negative scars (nos. 10, 11); three blades are covered with cortex on one side (nos. 4, 5, 8), and two others bear vestigial cortex: on one side (no. 6) and in the mesial portion (no. 3); three specimens have cortical distal ends (nos. 1, 9, 12). The collection also includes a partly cortical secondary crested blade (no. 7) and a blade with negative scars on the dorsal surface (bearing a segmental secondary crest in the butt-bulb area: made on the core, probably in order to

Table 1. Morphometric characteristics of the blades from the Świątniki hoard
(maximum sizes were measured; M – mesial bend; DE – distal bend)

No.	Débitage taxon	Length	Width	Thickness	Metric category	Height of the bend (mm)	Weight (grammes)	Cross-section	Remarks	Fig.
1	with negative scars on the dorsal surface and with a cortical distal end	179	26	10	66	20 – M	47	triangular	segmental micro-retouch of the right edge, unintentional traces of wrapping (?)	2: 1
2	with one cortical side	140	28	6	65	13 – M	24	trapezoidal		2: 2
3	with negative scars on the dorsal surface and with cortex in the mesial portion	172	30	10	66	21 – D	47	triangular/ trapezoidal	traces of wrapping (?)	3: 1
4	with one cortical side	160	34	9	75	13 – D	41	triangular	segmental micro-retouch on the dorsal surface, unintentional	3: 2
5	with one cortical side	177	31	9	76	23 – D	44	triangular	segmental micro-retouch on the dorsal and the ventral surface, unintentional	4: 1
6	with negative scars on the dorsal surface	158	31	8	75	13 – M	33	polygonal	segmental retouch of one egde on the dorsal surface, unintentional traces of wrapping (?)	4: 2
7	secondary crested blade; partly cortical	189	38	10	85	27 – M	70	polygonal	traces of wrapping (?)	5: 1; 9: 1
8	with one cortical side	137	31	7	74	13 – M	33	trapezoidal	traces of wrapping (?)	5: 2
9	with negative scars on the dorsal surface and with a cortical distal end	198	31	8	76	27 – M	51	trapezoidal	segmental micro-retouch of one egde on the dorsal surface, unintentional traces of wrapping (?)	6: 1; 9: 2
10	with negative scars on the dorsal surface	163	29	8	66	12 – M	37	trapezoidal	traces of wrapping (?)	6: 2
11	with negative scars on the dorsal surface	179	35	10	76	20 – M	64	triangular	traces of wrapping (?)	7: 1
12	with negative scars on the dorsal surface and with a cortical distal end	168	26	7	66	17 – D	37	trapezoidal	traces of wrapping (?)	7: 2
minimum		137	26	6			24			
maximum		198	38	10			70			
average		168,3	30,8	8,5			44			
standard deviation		18,12	3,53	1,38			13,11			



Fig. 8. Colour diversity of Volhynian flint based on the example of the materials from Świątniki.
Photo by P. Mączyński

remove some irregularity of the structure). Their dorsal surfaces bear negative scars after the previous removal of two (nos. 1, 3, 4, 5, 8, 11), three (nos. 2, 9, 10, 12), or, exceptionally, four blades (no. 5). Thus, their cross-sections are triangular (4 specimens), triangular/trapezoidal (1 specimen), trapezoidal (5 specimens), or polygonal (1 specimen). Cracking ripples on the ventral surfaces are distinct only in the butt- bulb areas, as well as near the bent distal ends. They are not visible in other sections.

All the specimens bear in their butt-bulb sections traces of procedures preceding blade detachment: trimming, faceting, and abrading the edge of the striking platform. In the planar projection, the butts are mostly gabled (8 specimens), bearing two (4 specimens) or several negative scars (1 specimen) created with delicate blows struck from the direction of the striking surface. Occasionally, facets cover the whole butt surface (3 specimens). Four blades have flat butts with one (2 specimens) or two negative scars (1 specimen), whereas one specimen has a flat butt completely covered with facet negatives. In nine cases, a blade bears a subtle or a prominent lip below the butt. In most cases, the angles between the butt and ventral surfaces are c. 90°; however, in eight specimens, they are marginally less than 90°, while one is slightly obtuse, and two others are acute. The bulbs are of various types: from moderately prominent (7 specimens), through slightly arched (1 specimen), to distinctly arched (3 specimens). Traces, in the form of concentric lines, were recorded in five specimens (nos. 1, 2, 7, 11, 12), and in two cases they take the form of tear-shaped quasi-negative scars (nos. 8, 9). An important technological feature of the analysed blades is their width in the bulb area, always greater than the width of the butt.

The blades from Świątniki are macrolithic. Their length varies from 137 to 190 mm, their width from 26 to 38 mm, and their thickness from 6 to 10 mm. They represent three metric categories: 60, 70, and 80. In each category, they belong to classes five (65, 75, 85) and six (66, 76). They are also thin, which attests to their slenderness, or even considerable slenderness (Dzieduszycka-Machnikowa and Lech 1976, 31-33). The weight of particular specimens varies from 24 to 70 gm, and the entire collection weights 528 gm (Table 1).

The blades cannot be refitted together, although they represent similar raw material textures. A technical blade present in the collection (partly cortical secondary crested blade), as well as three specimens with single cortical sides, indicate an early exploitation stage of a single striking platform core with a convex striking surface, cortical sides and apex, and preserved scars of preparation. The homogeneous technological style of the analysed blades allows us to suspect that at least some of them come from a single core. Insignificant hue differences of the dark steel-grey colour, and the presence of spots and stripes in some specimens do not contradict this assumption. Such variations of siliceous mass are macroscopically observable in large Volhynian flint concretions (Fig. 8).

USE-WEAR ANALYSIS

The microscopic observations were conducted using two types of microscopes. In an early phase of the research, a Carl Zeiss Discovery V8 stereoscopic apparatus was used, providing actual magnification between 10x and 80x. The microscope was equipped with a dedicated source of cold LED light. The first stage of the research concerned searching for potential working edges (van Gijn 1989, 13). The next step was observing the artefacts with the use of a Meiji Techno MC-50T apparatus. It is a metallographic microscope that allows much greater magnifications (between 50x and 500x). At this stage of research, we focused on the observation of use-wear abrasions and traces in the form of lines.

Photographic documentation of the recorded patterns was also prepared. Prior to the analysis, in order to remove fingerprints, the flint artefacts were cleaned with acetone. The applied method of conducting microscopic observations does not deviate from general guidelines for such research (van Gijn 1989, 13; Korobkova 1999, 15; Osipowicz 2010, 24, 25). Also, the conceptual system and the terminology employed in the project were based on the nomenclature employed in archaeological literature (van Gijn 1989, 3-8, 16-20; Osipowicz 2010, 25-35 – further literature there). The primary goal of the research was the reconstruction of the manner of use of the blades from the hoard and the identification of the materials processed with them. The analyses also focused on identification of traces originating from the use of frames and wrappings/sheaths.

The analysed artefact group is characterised by a good state of preservation. The surfaces of certain specimens are only covered with bright post-depositional abrasions, penetrating or covering the flint. Additionally, the lateral edges of all the artefacts bear micro-

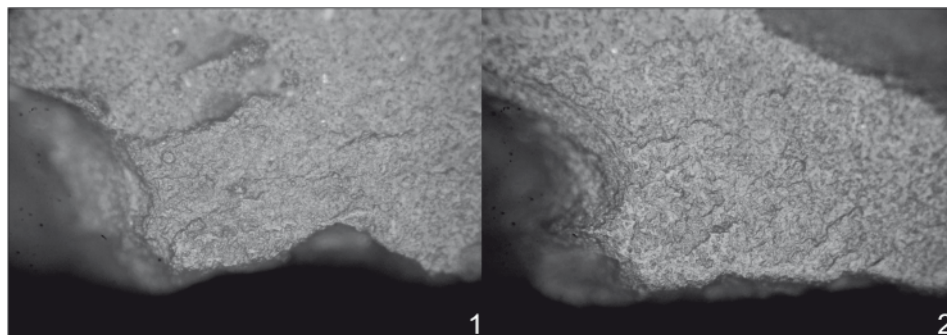


Fig. 9. 1, 2 – Microscopic photographs of use-wear traces observed on the surfaces of flint blades, resulting from keeping the items in wrappings? (1 – no. MNKi/A/433/10; 2 – no. MNKi/A/433/11). Photo by P. Mączyński (1, 2 – 200x magnification, 20x objective lens)

retouch that takes the form of continuous, or occasionally scattered, two-step or multi-step, steep chippings with step or feather terminations. The origin of the micro-retouch on the relatively delicate edges could also be associated with the considerable weight of the blades, which, through accidental pressure, could lead to creation of the chippings. It appears that such patterns are not of use-wear character. Most possibly, they were created accidentally, as a result of bumping against a hard surface, both in prehistory and during activities accompanying the storage of the artefacts in the museum collection.

The performed analysis made it possible to observe pale, indistinct polish on protruding points and lateral edges (Fig. 9: 1, 2) on most of the artefacts (Fig. 2: 2; 3: 2; 4: 4; 5: 2, 4; 6: 2, 4; 7: 2, 4). The patterns may indicate that the blades were kept in a soft material wrapping, e.g. during transport, in order to protect their delicate edges (cf. Rots 2010, pl. 90, 91). This hypothesis is plausible, taking into consideration the site of the discovery, 350 km in a straight line from the Volhynian flint deposits. The fact that all blades are entirely preserved, as well as that they bear abrasions, as mentioned above, makes us suspect that they were deposited in a wrapping or in an organic container and, in modern times, they were ploughed up together, in a single ridge/clod of earth. Usually, during casual discoveries, at least some of the artefacts are damaged, blades are broken, and some fragments are missing (Libera 1990, fig. 1: a-f; Zakościelna 1997, fig. 1, 2, 4, 5; Florek and Zakościelna 2003, fig. 3: 4, 6: 4, 8: 2; 9: 2, 3, 1, 3-5).

BLADE PRODUCTION TECHNIQUE

The above mentioned morphological and metrical features of the blades from Świątniki should indicate their manner of production. Two methods, distinguished in prehistoric materials, and experimentally tested, should be taken into consideration: the indirect per-



Fig. 10. Reconstruction of the process of blade production by indirect percussion.
Drawn by M. Synak,
based on Pelegrin 2012

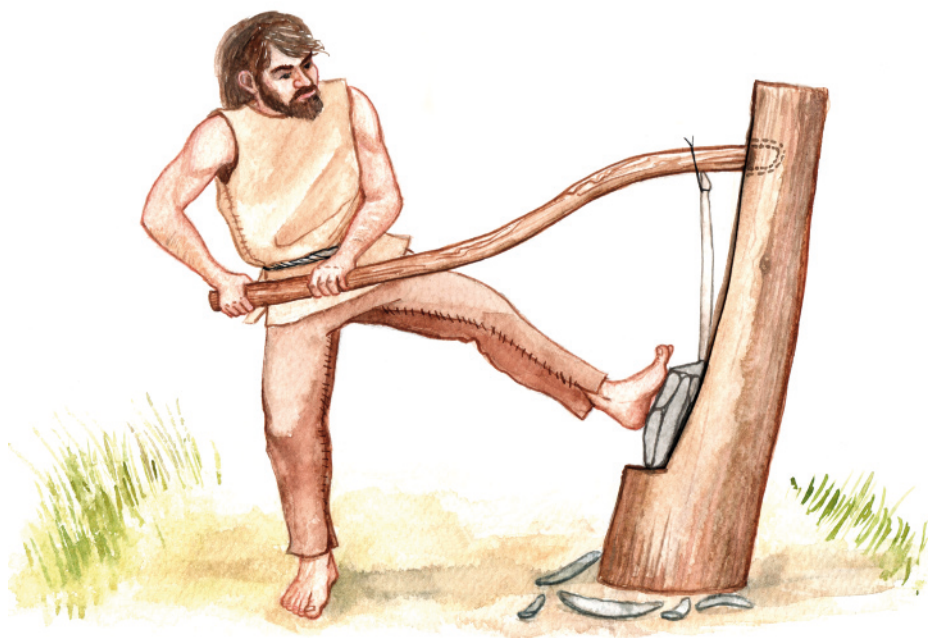


Fig. 11. Reconstruction of the process of pressure blade production with a lever.
Drawn by M. Synak, based on Pelegrin 2012, fig. 18.10

cussion (Fig. 10) and the lever pressure technique (Fig. 11). The question is challenging, because they both enable the production of macrolithic blades, although applying considerable pressure obviously gives longer blades, whose length extends 20, 30, or even 40 cm (Manolakis 2005, e.g. pl. 95: 1, 2; pl. 106: 1, 2; pl. 108: 1). Both techniques have been accurately described and discussed in archaeological literature, although attention has been also paid to considerable similarities between the morphological features of the blades obtained with the use of these two methods (Girâ 1997, 68-75; Migal 2002, 264; Pelegrin 2006, 39-47; Budziszewski and Gruzdź 2013, 167-169), which makes it difficult to come to a final conclusion, especially with regard to specimens whose length does not exceed 20 cm. Jacques Pelegrin (2006, 41, 42) even stated that the indirect percussion technique can give results very similar to those obtained by using the lever pressure method, and various positions of core stabilisation make it also possible to control the profile shapes of such blades. As experiments indicate, the following elements affect the similarities in morphological features: core shape (striking surface curvature) and the method of its stabilisation during blade production, the part of the striking platform to which force is applied (flat or convex: at the junction of two negative scars of platform preparation), and the use of a copper or antler intermediate punch – or in the case of the pressure method, the type of lever ending made of copper or antler (Migal 2002, 258; 2006, 391-395; Pelegrin 2006, 39-47).

Generally, it is thought that flint half-products obtained with the use of the indirect percussion technique are less regular, with regard to both the outline of their lateral edges and the irregular mass distribution (it can be greater in the distal portion than in the butt-bulb area – cf. Migal 2003, 60; Florek and Zakościelna 2003, fig. 3: 1, 4; 6: 1, 3, 9: 1; Pelegrin 2006, fig. 2). Attention is also paid to frequently appearing bends, occasionally very sharp, especially in the distal portions, and to the rather stumpy dimensions of the blades, which make them more massive than those obtained through lever pressure (Migal 2003, 60; Pelegrin 2006, 42; Budziszewski and Gruzdź 2013, 168). Nevertheless, these features (except the massiveness), especially in the case of specimens not longer than 20 cm, can characterise specimens produced with the use of both techniques (cf. Pelegrin 2006, fig. 1, 2).

Core shape, and, above all, the degree of the curvature of the striking surface influence the shape of blade profiles. If a flat, heart-shaped core is exploited with the use of a lever (Pelegrin 2002, fig. 2; Zakościelna 2018, fig. 3), the blades are nearly straight or slightly bent in the mesial, and, less frequently, in the distal portion. In the case of sub-conical cores (Zakościelna 1996, pl. XXV, XXVI: 4, XXIX: 1; Migal 2006, fig. 4, 5), the bend is much sharper and can move to the distal portion (Mączyński and Zakościelna 2017, fig. 2, 3).

Technological features of the butt-bulb area depend on the part of the striking platform to which force (strike or pressure) is applied. In cases in which an antler intermediate punch is used, the butt is planar, flat, bearing one or several negative scars (Pelegrin 2006, fig. 3: a). Nevertheless, if the strike force is transmitted to an intermediate punch having

a copper ending and the point of application is at the junction of two negative scars left after preparation of the striking platform, their shape can be gabled or approximately so (Pelegrin 2006, fig. 3: b). In both cases, the bulbs are generally somewhat large and arched, but flat, moderately prominent bulbs, nearly invisible in blade profiles, also occur (Pelegrin 2006, fig. 2, 3: a-K2.4, b-Cu8.3). In the case of lever pressure, if an antler ending was used and the force was applied to a flat surface of a striking platform, the blade butts are flat, bearing single negative scars, and bulbs are prominent, but shorter. Thus, features similar to those resulting from striking a flat platform with the use of an antler intermediate punch appear (Pelegrin 2006, fig. 3: c – cf. fig. 3: a). When a copper ending is employed, butts that are distinctly gabled in planar projection occur only when force is applied to a faceted striking platform or at the junction of ridges left by two negative scars. Regarding the lip, J. Pelegrin (2006, 42), based on the results of his experiments, stated that this feature appears after using a lever with an antler ending.

Coming back to the blades from Świątniki, it should be stated that most of their morphometric and technological features indicate that they were detached from the core with the use of considerable lever pressure. The only thing that differentiates them from blades obtained through this method (whose profiles are generally straight or slightly bent) is the sharp, or even very sharp bend of most of the analysed specimens, which is especially typical of products of the indirect strike method. Nevertheless, the bend, distinguishing the blades from Świątniki, could be the result of exploiting a sub-conical, and not a flat, heart-shaped core. Such cores employed in the production of macrolithic blades (often with conical apices) are known from Trypilian culture sites, above all from a workshop settlement in Bodoki, located directly on Volhynian flint deposits (Skakun 2004, fig. 3), whereas the finds from Polish territories are associated with the Lublin-Volhynian culture (Zakościelna 1996, pl. XXV, XXVI: 4, XXIX: 1).

Even if the question of the technique employed in the production of the blades from the Świątniki hoard is challenging, we can establish with greater certainty the raw material of which the lever ending, used in the detachment of particular specimens from the core, was made. Most of them bear a subtle lip (nos. 3-8, 10, 12) that co-occurs with a gabled butt, which indicates that an antler ending was used (cf. Pelegrin 2006, fig. 3: d). Other blades lack this feature. Additionally, if a copper ending is used, flat butts bear a characteristic crack in the form of a circle (or a partial circle), with a diameter of 2-3 mm. It appears that the mark is a result of the greater hardness of the copper ending (Pelegrin 2012, fig. 18.18; 19.19). Traces of this type have not been recorded in the collection from Świątniki.

CULTURAL ATTRIBUTION

The question of deposits/hoards of Volhynian flint long blades is inextricably connected with difficulties in the cultural identification of prehistoric artisans. Although it is possible for us to fairly accurately establish the time frame of blade macrolith production and

utilisation, limited to the Eneolithic, assigning them to a particular culture is very difficult, if not impossible. The metric and morphological characteristics, as well as the technological style of the blades, are not helpful in solving this problem. All the potential premises are indirect and not useful in this matter (Libera and Zakościelna 2011, 98, 99). In the case of the blades from Świątniki, we cannot employ one of the major indirect premises – that is, the location of the finding in a particular environment – because we do not know the exact site of the discovery (cf. Bronicki 1995; Florek and Zakościelna 2003, 58). The cultural attribution of long and macrolithic blades has been comprehensively reviewed (Migal 2002, 261; 2006, 287, 388; Florek and Zakościelna 2003, 55-59; Libera and Zakościelna 2011, 98, 99). Here, we will only state that at least three Eneolithic groups should be taken into consideration: the Trypilian, Lublin-Volhynian, and Funnel Beaker cultures, in which flint production underwent specialisation and whose artisans had the technology of blade macrolith production with the use of both the intermediate antler punch and the lever pressure. Moreover, the populations of the Trypilian and Lublin-Volhynian cultures had direct access to the Volhynian flint deposits, thus the blades from Świątniki should be associated with them. This fact is not, however, decisive concerning the cultural identification of the hoard. The set was discovered far from the territory of the Trypilian culture. In this regard, this culture should be excluded from consideration. There are also many indications that the Lublin-Volhynian culture population did not hoard half-products. Macrolithic blades have been discovered only in richly equipped male graves of this archaeological culture (Zakościelna 2008; 2010, 166, 167). Therefore, only the Funnel Beaker culture remains. Its people used to store flint products in hiding places within settlements (*vide* Gródek, site 1C – Libera 2003), as well as in isolated places, especially of aquatic or semi-aquatic character (Kadrow 1989; Bronicki 1993; Libera and Zakościelna 2011).

CONCLUSION

So far, 10 hoards of Volhynian flint macrolithic blades and blade tools have been recorded in the territory of Poland. Most of them are located in the Lublin region, in the interfluvium of the Wieprz and Bug Rivers (Libera and Zakościelna 2010, fig. 1, table 2). The deposits/hoards are linked with particular aspects of living in Eneolithic societies: raw material provisions, the establishment and maintenance of social bonds (including intercultural ones), ceremonial traditions, and the circulation of prestige items (Libera and Zakościelna 2011, 89, 102-104; Zakościelna and Libera 2013, 289, 290). They are evidence of strongly developed exchange contacts in the Eneolithic, governed by the rules of exchanging processed products, and not raw materials. The discovery from Świątniki, along with the 19th century find from Balice, is the only hoard of Volhynian flint macrolithic blades located in the left drainage basin of the Vistula River (Kaflińska 2006, fig. 13), in the Wodzisław Hummock (Świątniki) and in the Pińczów Hummock (Balice).

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SICKLES OF THE FUNNEL BEAKER CULTURE IN THE LIGHT OF USE-WEAR AND RESIDUE ANALYSIS

ABSTRACT

Kufel-Diakowska B., Miazga B., Łucejko J., Ribechini E., Li W. 2019. Sickles of the Funnel Beaker culture in the light of use-wear and residue analysis. *Sprawozdania Archeologiczne* 71, 219-242.

The aim of this paper is to present new data on the use of plants and on flint management by Funnel Beaker societies. Studies of usewear and residues on flint tools from the Polwica-Skrzypnik site complex located in SW Poland included microscopic analyses of traces, starch and phytoliths, and adhesives. According to the usewear analysis, most of the tools were used as sickle inserts. The production of sickles was mainly based on good-quality imported flint material, but local groups also supplemented their needs with local flint. The identified phytoliths can be assigned to the grass and sedge families Poaceae and Cyperaceae, respectively, and to the subfamily Panicoideae of Poaceae. Microscopic traces indicate that inserts were re-sharpened during use and recycled by modifying them into other morphological and functional tools, such as hide scrapers. FTIR and GC-MS analyses show that the resinous substance preserved on the surfaces of the flint tools is wood tar, obtained by a process of pyrolysis of the bark of Betulaceae trees.

Keywords: TRB, sickles, usewear, phytoliths, wood tar

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INTRODUCTION

The Funnel Beaker (TRB) cultural tradition developed in the 4th and 3rd millennia BC and covered the area from the present-day Netherlands, Denmark and southern Scandinavia, across Germany and Poland, to western Ukraine. It is characterised by a multifaceted economy combining elements of both producing and gathering food, but primarily based on farming and husbandry as the major subsistence strategies. The great diversity of the material culture is one of the consequences of the dispersion. It followed from the local cultural substrates, environmental conditions and raw material accessibility. However, some of the elements become standardized in this period, and this particularly concerns flint tools, such as sickle inserts. Sickles evolved in Central Europe from a Neolithic curved sickle with more than two small flint pieces inserted obliquely or an L-shaped sickle with one insert positioned at a low angle, to an Eneolithic sickle with one large blade inserted laterally. Maria Gurova (2014a; 2014b) describes this phenomenon as “a shift in sickle morphology and mode of use” in the 4th millennium BC, connecting with a new technology of blade production, based on high quality flints.

The presence of long blades, carefully selected and retouched, and often recycled also characterizes TRB lithic inventories from Poland (Balcer 1975; 1983; Ginter and Kozłowski 1990; Domańska 1995). Such good-quality products likely arrived via long-distance import. However, local production of flint tools, including sickle inserts, is also documented. M. Nowak (2017) points to the importance of erratic flint and the use of small blades and flakes, and a bipolar technique as well. TRB assemblages from Little Poland (Małopolska) and the Lublin region, with a macrolithic industry (Lech 1981; Balcer 2002; Libera and Zakościelna 2006) differ from those from the Kuyavia region, where a medium-sized blade technology predominates (Domańska 1995; Małecka-Kukawka 1992). This situation is due to access to many types of flint sources, differing in quality and the size of the flint nodules, including good-quality Chocolate and Świeciechów flint, extracted with mining methods.

SW Poland is an area located outside the outcrops of good-quality resources. TRB flint tool production is poorly recognised due to the scarcity of lithic materials (Romanow *et al.* 1973; Wojciechowski 1973; Lech 1997; Cholewa 1998). Over the last few decades, opinions on the small quantity of flint assemblages were dominated by the assertion that the Neolithic people had to import lithics from other territories (Lech 1986; Wojciechowski 1988; 2000). Currently, however, this phenomenon is linked with the state of field survey. The fact is that most of the Neolithic materials in this area are mixed and not easy to separate (see Lech 1997). As a consequence of contextual problems, some of the TRB flint artefacts could have been included in the assemblages of earlier cultural traditions. In particular, this applies to implements made locally from erratic flint acquired nearby the settlements.

In this paper, we would like to focus on TRB sickles. The main questions to consider are about the production and use of sickles, and how technical innovations influenced the

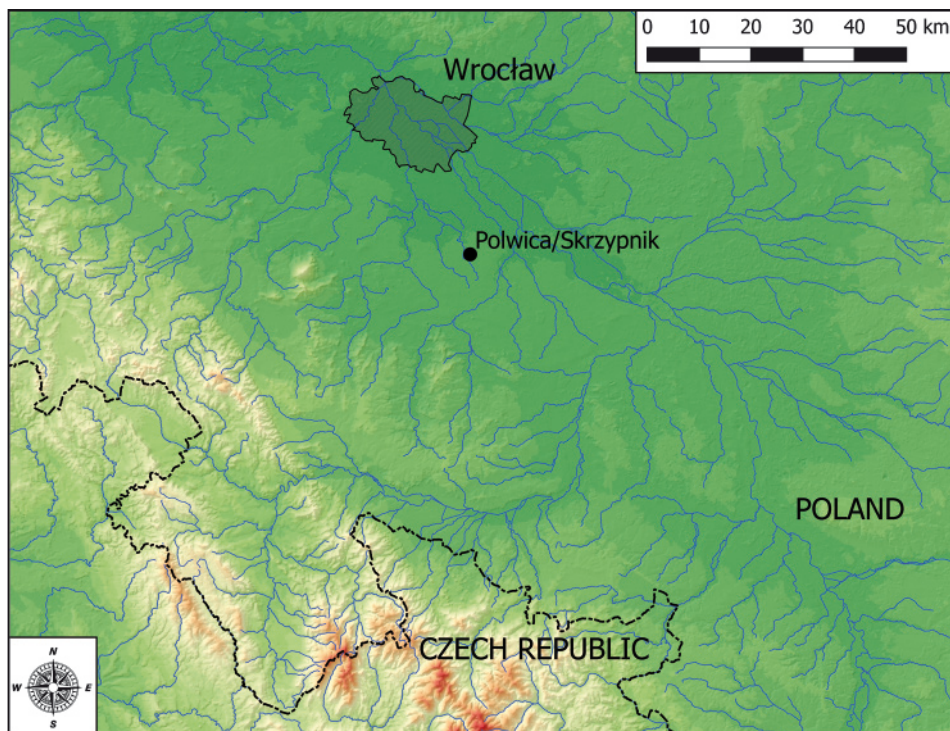


Fig. 1. Polwica-Skrzypnik site complex, SW Poland. Edited by P. Dulęba

general flint management strategies in the area of SW Poland. Was production based on local resources, or were the blanks imported from workshops located near the outcrops of better-quality flint materials? Can combined analytical methods of study tell us more about the use of sickles than we know from usewear traces alone? Can any differences in tool use be noted based on raw materials? Are there differences in post-use treatment between particular types of functional tools? We applied four methods of analysing traces and residues, which helped us to determine the functions of lithic implements and the hafting mode, as well as to improve our knowledge on plant exploitation in that time. Our studies are based on flint materials from the Polwica-Skrzypnik site complex in SW Poland. The assemblage is not numerous, but has great research value, because it includes tools with macroscopically visible residues — unique to the archaeological sites located in Poland. Lithic parts of sickles covered with glue, and complete, hafted tools composed of lithic inserts and organic handles belong to the most exclusive finds in Neolithic Europe (Vogt 1951; Georgiev 1961; Behm-Blanke 1963; Hayek *et al.* 1991; Anderson *et al.* 1992; Sauter *et al.* 2000; Bosch *et al.* 2006; Flors *et al.* 2012; Linton 2012).

THE POLWICA-SKRZYPNIK SITE COMPLEX

Polwica -Skrzypnik is a multicultural archaeological site complex in the Olawa district, SW Poland. It includes three sites previously identified as Polwica 4 and 5, and Skrzypnik 8 (Fig. 1). The site is located in the Wrocław Plain, on the slopes of a barely visible prominence, 145-150 m a.s.l. This area is covered by clay deposits of the Odra glacial period. In the northwest corner of the site complex there is a small depression formed as a result of glacial melting. The drainage system of this region is composed of the direct and indirect tributaries of the Oder, with Żuławka stream located about 1.2 km southwest of the site.

An archaeological rescue survey was carried out from 1997-2000 by the Archaeological Museum in Wrocław, under the supervision of Prof. B. Gediga from the Institute of Archaeology and Ethnology of the Polish Academy of Sciences, in advance of the A4 highway construction. The site yielded relics of settlement and sepulchral structures from the Neolithic, the Bronze Age, the Iron Age, the Migration Period and the Middle Ages (Dobrkowski *et al.* 2000; 2001).

The remains of the Neolithic settlement are distributed in the western part of the excavated area, which covered 26.400 sq m (Kulczycka-Leciejewiczowa and Noworyta 2009, Fig. 78). According to object-based chronology and radiocarbon dates (Table 1), the earliest finds come from the middle Neolithic and are identified with the Linear Pottery culture (LBK). Afterwards, this area was occupied by the societies of the Lengyel-Polgar culture (LPC), the Funnel Beaker culture (TRB) and the Globular Amphora culture (GAC). TRB is represented by 76 pits, as well as fragments of pottery and other finds retrieved from the cultural layers or pits of younger chronology. Functional interpretation of most of the site structures is complicated. Some of them are remnants of storage pits, houses and fireplaces. There is also a shallow pit of probably ritual function (Kulczycka-Leciejewiczowa and Noworyta 2009).

Imprints and charred remains of plants in daub from storage pits belong to emmer (*Triticum dicoccum*), einkorn (*Triticum monococcum*) and barley (*Hordeum vulgare*), as well as weeds, such as brome (*Bromus*), corn cockle (*Agrostemma githago*) and fat hen (*Chenopodium album*) (Lityńska-Zajac 2009a). Cereal processing is confirmed by 8 querns or quern fragments, and animal husbandry is documented by 450 fragments of cattle bones and less numerous bones of pig and sheep/goat (Krupska *et al.* 2009).

LITHIC MATERIALS

Amongst the rich collection of archaeological materials retrieved from the Polwica-Skrzypnik site complex, lithic tools are not numerous. They are represented by 48 specimens: 21 artefacts of the TRB, 17 artefacts of the GAC, 1 tool of the Unetice culture and 10 pieces of undetermined tradition. General results of the raw material and typo-techno-

Table 1. Polwica – Skrzypnik, SW Poland. Flint artefacts of the TRB (A, B, C – tools selected for the analysis; A – FTIR; B – GC-MS; C – starch and phytolith)

No.	Tool type	Pit no. 0 acc. Kulczycka- Leciejewiczowa, Noworyta 2009	Raw material	Pit function	Pit chronology	Working edge	Worked material	Hafting traces	Figure
1	endscraper	S8/2163	erratic flint	storage pit	Lusatian culture	left lateral and distal	cereals and hide	-	3:4
2	endscraper	S8/1812 (61)	erratic flint	pit-house?	TRB (4545-35 BP)	right lateral	cereals	hafting polish	3:5
3	retouched blade 1 (C)	S8/2106 (79)	erratic flint	ritual	TRB	right lateral	cereals	-	2:1
4	retouched blade 2	S8/2106 (79)	erratic flint	ritual	TRB	right lateral	cereals	hafting polish	2:2
5	retouched blade 3 (A)	S8/2106 (79)	erratic flint	ritual	TRB	right lateral	cereals	hafting residues	2:3
6	retouched blade 4	S8/2106 (79)	erratic flint	ritual	TRB	right lateral	cereals	-	2:4
7	retouched blade	S8/2038	erratic flint	pit-house?	Lusatian culture	left lateral	cereals	hafting residues?	2:5
8	retouched blade	S8/1657	erratic flint	undetermined	prehistory	right and left lateral	cereals	hafting polish	2:6
9	retouched blade	S8/cultural layer	erratic flint	cultural layer	-	right lateral	soft material	-	3:1
10	retouched blade (C)	P4/66 (26)	erratic flint	fireplace	TRB	right and left lateral	cereals	-	2:7
11	retouched blade	S8/1539	Volhynian flint	household?	Lusatian culture	right lateral	cereals	hafting polish	2:8
12	retouched blade	S8/2106e (79)	erratic flint	ritual	TRB	right lateral	cereals	-	2:10
13	retouched blade	P4/471	erratic flint	fireplace	Lusatian culture	left lateral	soft material	hafting polish	3:3

Table 1 cont. Polwica – Skrzypnik, SW Poland. Flint artefacts of the TRB (A, B, C – tools selected for the analysis: A – FTIR; B – GC-MS; C – starch and phytolith)

No.	Tool type	Pit no. 0 acc. Kulczycka- Leciejewiczowa, Noworyta 2009	Raw material	Pit function	Pit chronology	Working edge	Worked material	Hafting traces	Figure
14	retouched blade	P4/825 (34)	erratic flint	fireplace	TRB, LPC	left lateral	hard material	-	3:2
15	retouched blade	P4/100c	erratic flint	pit-house	Lusatian culture	right lateral	cereals	-	2:11
16	retouched blade (A,B,C)	S8/2169 (84)	erratic flint	well	GAC (3860±40 BP)	right lateral	cereals	hafting residues	2:9
17	arrowhead	P4/82 (18)	Volhynian flint	household?	TRB (4080±35BP)	-	no traces	-	3:6
18	blade	S8/1854 (68)	erratic flint	household?	TRB	-	no traces	-	-
19	splintered flake	S8/1812 (61)	erratic flint	pit-house?	TRB (4545±35 BP)	right lateral	cereals	-	3:7
20	splintered flake	S8/cultural layer	erratic flint	cultural layer	-	-	no traces	-	-
21	flake	S8/2163	erratic flint	storage pit	Lusatian culture	-	no traces	-	-

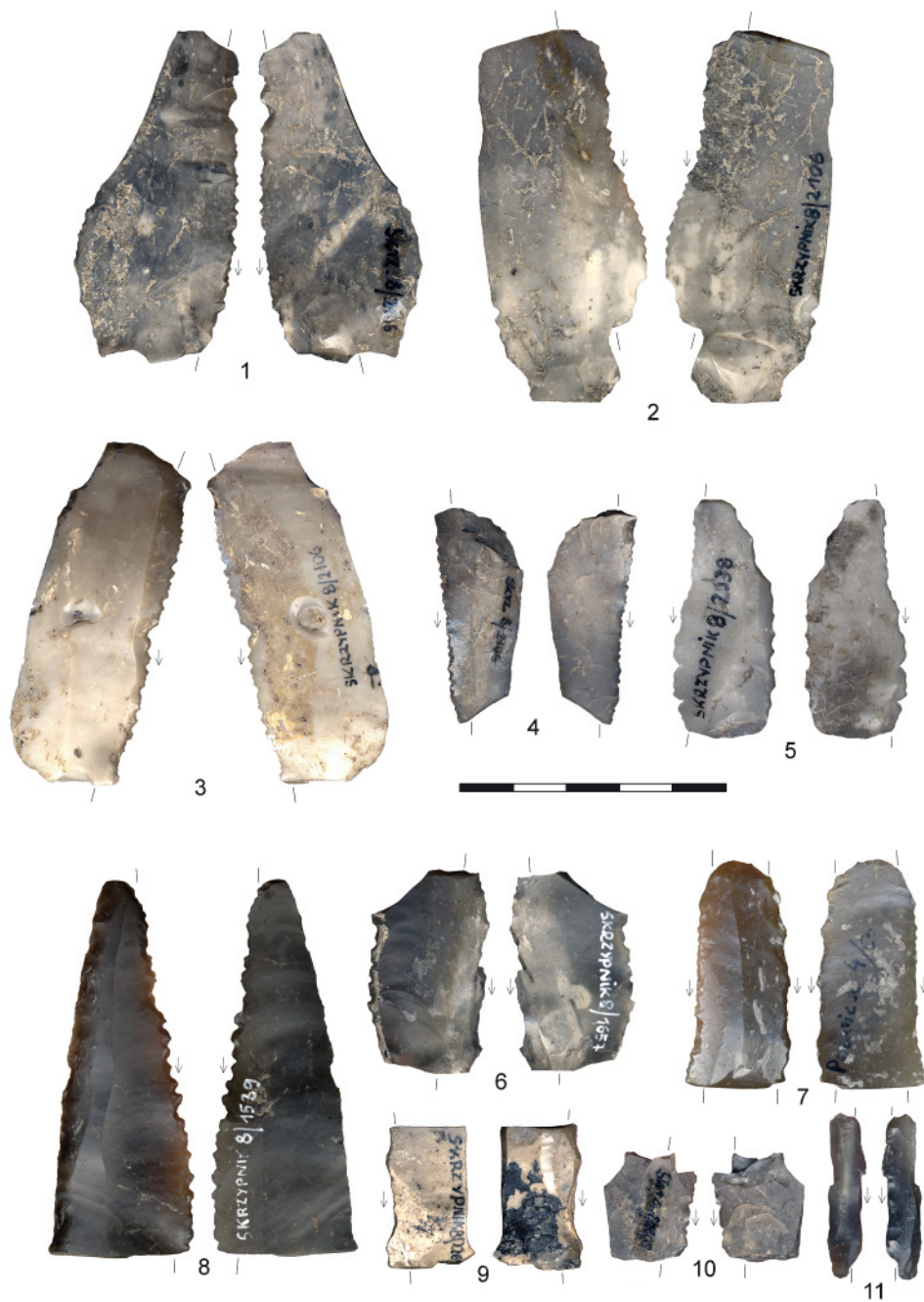


Fig. 2. Polwica-Skrzypnik, SW Poland. TRB flint tools: 1-11 – retouched blades. Dashed lines mark range of usewear traces, arrows show direction of movement. Photo by N. Lenkow

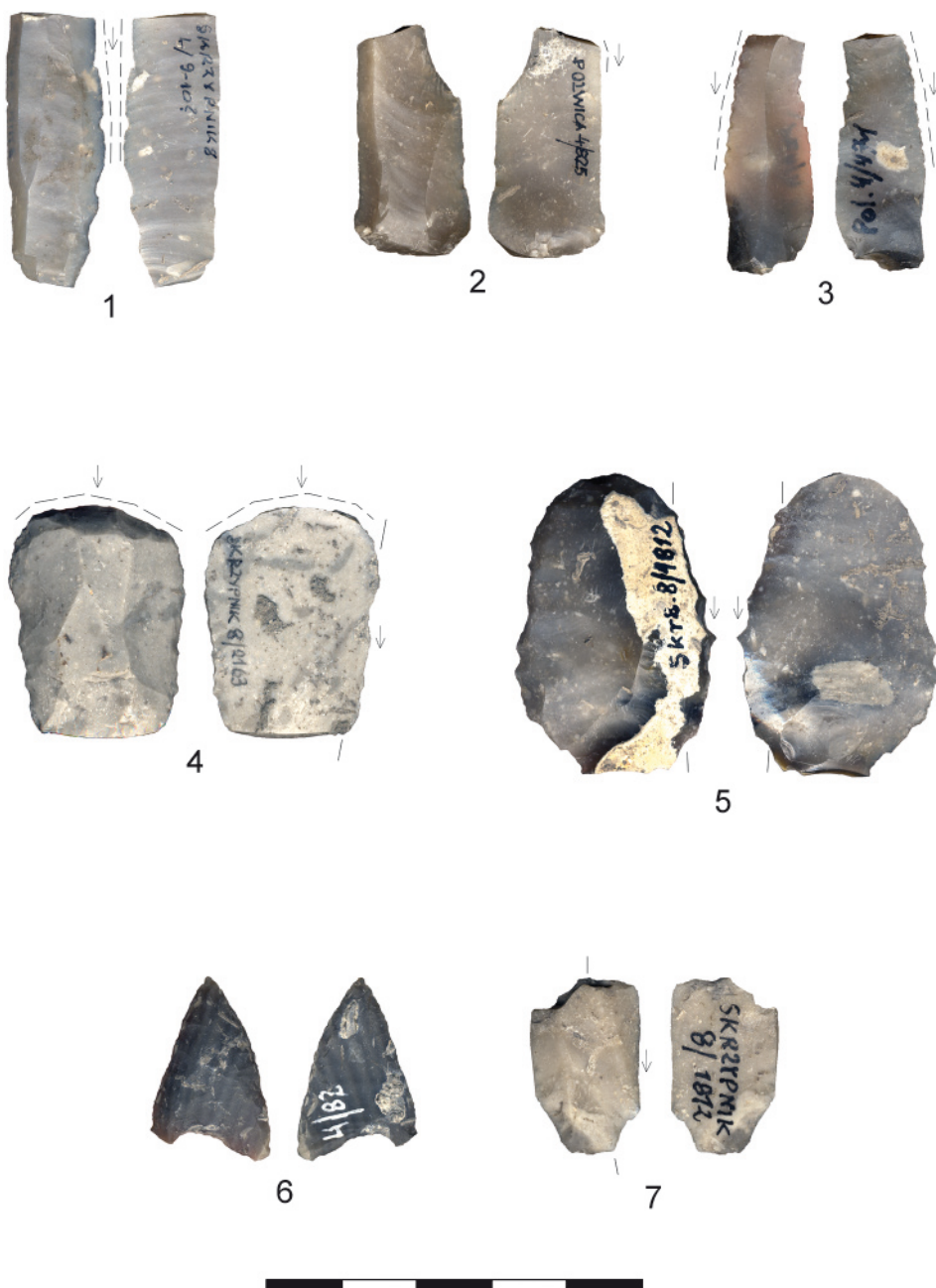


Fig. 3. Polwica-Skrzypnik, SW Poland. TRB flint tools: 1-3 – retouched blades; 4-5 – endscrapers; 6 – arrowhead; 7 – splintered flake. Dashed lines mark range of usewear traces, arrows show direction of movement. Photo by N. Lenkow

logical analyses of the tools have already been published (Bronowicki 2009). J. Bronowicki suggests that the majority of the TRB lithic tools were made from erratic flint, most probably in the workshops located on the Głubczyce Plain, ca. 120 km from the site. Two pieces (a retouched blade and an arrowhead) were made from Volhynian flint. The deposits of this good-quality raw material are located ca 500 km east from the site.

The manufacture of flint tools was based on blades detached from the single platform core. Two different kinds of blades were selected for retouching: long and wide blades, and middle-sized blades, both with straight profiles.

Most of the TRB flint assemblage is comprised of retouched tools, including 2 end-scrapers, 14 retouched blades and 1 arrowhead, followed by a small group of blanks: 1 blade and 3 flakes, including 2 splintered flakes (Table 1).

Retouched blades outnumber all the tools in this assemblage (Fig. 2:1-11; 3:1-3). There are unilateral and bilateral retouched blades, with a retouched distal part in two cases and a pointed distal part in one case. At least 6 of them were made from macrolithic blades (maximum length – 72 mm, maximum width – 27 mm). Their lateral edges were prepared by pronounced denticulated retouch, in contrast to the middle-sized blades with tiny, semi-abrupt retouch. None of the retouched blades were preserved in their complete form. Distal or both distal and proximal parts are missing in most cases, and four tools have their lateral parts broken off as well.

Endscrapers represent the secondary forms, modified from large retouched blades (Fig. 3:4-5). The heart-shaped arrowhead represents an asymmetric form. All the edges were modified with flat retouch on the dorsal side and semi-steep retouch on the ventral side (Fig. 3:6).

The chronological determination of the flint tools was based on morphometric and technological characteristics, as well as on contextual data. Ten artefacts come from pits with TRB pottery – a household, a pit-house, a ritual feature and a fireplace. One lithic implement was found in a pit containing pottery of the TRB mixed with potsherds of the LPC. Seven artefacts come from pits of younger chronology: storage pits, houses and a fireplace of the Lusatian culture (6 pieces), and a well of the GAC (1 piece). Additionally, 2 pieces were retrieved from the cultural layer in the southwestern part of the excavated area.

Negatives of two of the retouched blades are covered by a blackish substance. This fact was missed at the previous stage of analysis, and provides an opportunity for obtaining more information about the complex technology of tool production.

ANALYTICAL METHODS

All of the flint artefacts were subjected to usewear analysis to identify the functions of the tools and their relative length of use. We used a Nikon Eclipse LV100 (up to 400x) metallographic microscope and an Olympus SZX9 (up to 57x) stereomicroscope. Prior to

the microscopic observations, and after the extraction and preparation of the residue samples, flint artefacts were cleaned for two minutes in water in an ultrasonic tank. Usewear analyses were supported by experiments designed to demonstrate the efficiency of sickles with a single blade hafted laterally, and to examine the development of sickle gloss.

As both the cutting of cereals and of wild siliceous plants can produce plant polish of similar texture, three flint tools were selected for starch and phytolith analysis. These types of microresidues have been successfully extracted from different types of artefacts, including pottery (e.g. Saul *et al.* 2013), obsidian artefacts (e.g. Kealhofer *et al.* 1999), and grinding implements (e.g. García-Granero *et al.* 2016). However, the preservation of phytoliths is often affected by different environmental conditions (Madella and Lancelotti 2012). As phytolith analysis has not been applied to artefact studies in this research area, the feasibility of extracting phytoliths on flint tools is still uncertain. Therefore, we began with small number of TRB sickles from the Polwica-Skrzypnik site complex to assess the state of preservation of phytoliths. Two retouched blades that were analysed come from pits without any admixture of younger archaeological materials. They show the most intensive traces of use and are well preserved. A third sample was selected due to the macroresidues attached to its surface and its intensively worn-out working edge. We expected that these implements were in use for a relatively long time, which could have increased the chance of depositing microresidues. Phytoliths were extracted following the procedure outlined by Kealhofer *et al.* (1999) with slight modifications. Firstly, distilled water was used to rinse the flint tools in separate plastic beakers. The purpose of this procedure is to remove the adjacent soil on the artefacts. These “first wash” samples were collected for contamination control. Then “second wash” samples were collected after a ten-minute sonic cleaning of the artefacts. Phytoliths were separated using a heavy liquid LTM (lithium metatungstate) with a specific gravity of 2.35. After removal from the sediment matrix, the phytoliths were mounted on slides, viewed, counted and photographed at 400x magnification. Identification of phytoliths was undertaken when possible by the use of reference material at Leiden University, as well as published documents (e.g. Madella *et al.* 2005; Twiss 1992; Powers 1992; Mulholland and Rapp 1992; Piperno and Pearsall 1998).

Two flint tools with macroscopically visible blackish adhesives (Table 1, nos. 5 and 16) were selected for macroresidue analysis by Fourier Transform infrared spectroscopy (FT-IR) — a screening technique. Afterwards, a sample of the resinous substance from one of them (Table 1, no. 16) was subjected to gas chromatography coupled with mass spectrometry (GC-MS). This part of the analysis was focused on determining the type of adhesive used to attach flint inserts to hafts. The GC-MS procedure applied and the instrumentation used in this study have already been published by Łucejko and colleagues (Łucejko *et al.* 2017). FTIR was carried out with the use of the Thermo Nicolet 380 spectrometer with DTGS detector. A small amount (1 mg) of the sample was taken and mixed with spectral pure potassium bromide (sample: KBr 1:200) and was analysed as a micropellet. The FTIR absorbance spectrum was collected in the range between 4000 and 400 cm^{-1} , with a resolution of 2 cm^{-1} .

Due to the contextual problems at the site, it was necessary to confirm the Neolithic age of the macroresidue analysed by GC-MS. The chronology of the resinous substance was determined with the AMS radiocarbon dating method in the Poznań Radiocarbon Laboratory.

RESULTS

Traces of use

Most of the lithic implements exhibit very pronounced traces of use. This includes 14 retouched blades, 2 endscrapers and a splintered flake (Table 1). Harvesting implements outnumber all of the used tools in this group (Fig. 2:1-11; 3:4-5, 7). Traces of cutting domestic cereals are very uniform and do not differ between particular tools. The artefacts show an intense, well-developed gloss on one or two lateral edges. Smooth and bright polish forms a narrow, compact band along the edge, with continuous topography both on and near the highly rounded edge. Depressions, including comet-shaped pits, are very abundant and densely spread over the polished area. Striations are tiny, short and narrow, indicating the cutting of stalks rather in their middle or lower section (Fig. 4:1-6). Scars are not numerous and are barely visible due to preparation of the edges by denticulate retouch. Negatives of deliberate and use retouch are filled with polish. In a few cases, retouch scars removed portions of sickle gloss, which means that rounded, blunted edges were resharpened during use. In one case, after the right lateral edge was worn out, the opposite side was prepared for cutting activity (Fig. 2:7), and in other two cases distal parts were retouched (Fig. 3:4). Without exception, traces run parallel to the main axis. Gloss invasiveness rarely exceeded 0.5 cm and reached approximately 1 cm in the proximal parts of the two largest retouched blades. Traces indicate a long duration of use, and some of the edges are completely worn out. Hafting traces in the form of spots of polish or slight rounding and more continuous hafting polish, as well as residues of bitumen were recorded on seven tools.

As was mentioned, there are no completely preserved retouched blades in this assemblage. The relations between gloss and broken extremities indicate post-use destruction, thus there were no signs of the deliberate removal of proximal or distal parts of a blade. In most cases, post-depositional factors are responsible for the loss, which is not significant. There were also other reasons, related to the intentional modification of tools. Endscrapers exemplify well the preparation of new forms for performing different functions (Fig. 3:4-5). Sickle inserts made from large retouched blades were considerably shortened by retouching the distal parts of the tools. One of the resulting endscrapers was then used for scraping hide. In the five most damaged cases, dehafting or retooling could have been responsible for fragmentation (Fig. 2:6, 9, 10-11; 3:7).

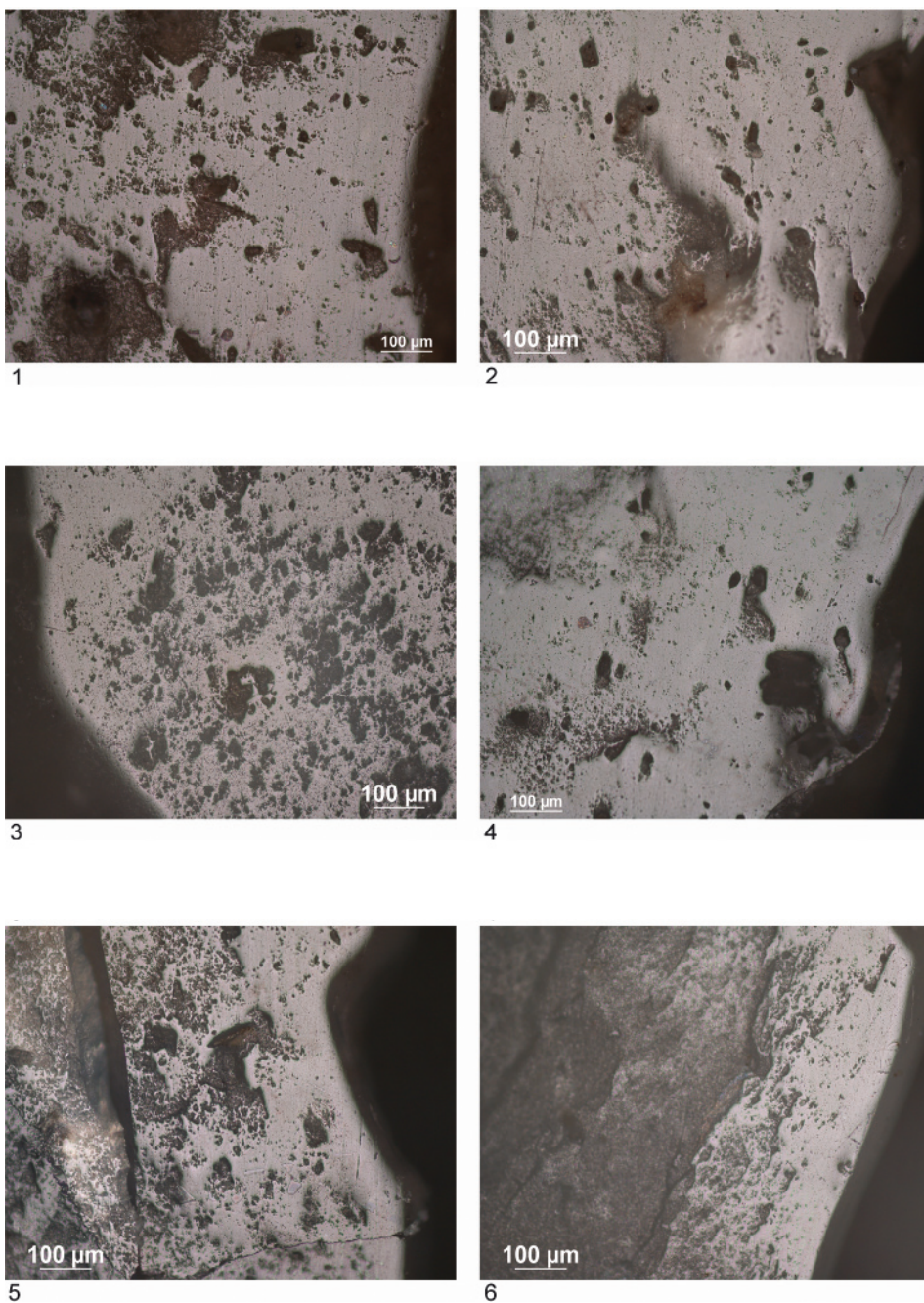


Fig. 4. Polwica-Skrzypnik, SW Poland. Sickle gloss on TRB flint tools. Photo by B. Kufel-Diakowska

Despite the fact that the artefacts with sickle gloss are not complete forms, we can see that sickle inserts were produced mainly from long and wide blades, on which the right, left or both lateral edges were modified by denticulate retouch. Nevertheless, the medium-sized blades were also retouched in a similar way and used for cutting cereals (Fig. 2:4-5).

Two retouched blades bear traces of cutting meat or fresh hide (Fig. 3:1, 3). The working edges of the tools are slightly rounded, with parallel, greasy polish on and near the edge. One retouched blade was used for working hard, most probably animal material (Fig. 3:2). Abrasive traces concentrate on a protruding edge on the distal part of the blade. All three tools were made from medium-sized blades of erratic flint. Intentional retouch is limited to the passive parts of the tools in two cases. In one case, the cutting edge was also prepared by tiny denticulate retouch, and hafting traces have been recorded in this example.

Starch and phytoliths

Phytoliths were successfully retrieved from all three tools subjected to such analysis. Normally, the “first wash” is supposed to remove the loose sediment on the tool, and the “second wash” will possibly provide residues that are related to tool use (Molino and Cuthrell 2011). In this study, phytoliths were not found in the “first wash” samples. In contrast, 12 phytoliths were recovered from the “second wash” samples. This result suggests that the recovered phytoliths originated from the artefacts rather than the adjacent soils. Most of the phytoliths were recovered from tool nos. 3 (n=2) and 10 (n=9) (Table 1). Only one phytolith was discovered on flint tool no. 16.

Four types of phytoliths were identified, including elongate-echinate, smooth elongate, long cell, and bilobate (Fig. 5). The two phytoliths discovered on flint no. 3 were identified as elongate-echinate long cell phytoliths from Poaceae (Fig. 5:a-b). The nine phytoliths discovered on flint tool no. 10 included one smooth elongate phytolith (Fig. 5:c), one unidentified oblong phytolith (Fig. 5:d), three long cell phytoliths from Poaceae or Cyperaceae (Fig. 5:e-g), and four bilobate phytoliths from subfamily Panicoideae of Poaceae (Fig. 5:h-j). One elongate-echinate phytolith was found on flint tool no. 16 (Fig. 5:k). Some of the discovered phytoliths appear damaged or partly dissolved (e.g. Fig. 5: a, f-j), suggesting the initial phytolith assemblage was affected during post-depositional processes.

Resinous substance

Two artefacts with sickle gloss display a blackish substance attached to the surfaces. The first one is most interesting due to the considerable amount of residue. It is a proximal fragment of the retouched blade, with its left part broken off and highly reflective sickle gloss on its right lateral edge. A thick layer of residue covers most of its dorsal surface (Fig. 2:9). Due to the younger context of deposition (a well of the GAC) and the fact that there are also probable wood tar pits from the Iron Age recorded at the other parts of the site



Fig. 5. Polwica-Skrzypnik, SWV Poland. Phytolith morphotypes found on the three flint tools. a, b – phytoliths from artefact Strz. 8/2016 (a – elongate echinate; b – weathered, possibly from elongate echinate); c to j – phytoliths from artefact Polwica 4/66 (c – smooth elongate; d: unidentified, possibly an oblong phytolith; e, f, g – long cell; h, i, j – bilobate); k – elongate echinate phytolith from artefact Skrzypnik 8/2169; the arrows point out damaged features on the phytoliths. Experiment: cutting reed with the replica of a plant-cutting tool (l). Photo by VV. Li

(T. Gralak, personal communication), the residue was subjected to C14 dating. The age of the resinous substance is dated to 4675 ± 35 BP (Poz-100277) (3525–3366 BC after calibration, using OxCal 4.3.2, Bronk Ramsey and Lee 2013) and correlates with the late phase of the TRB settlement in SW Poland (Kulczycka-Leciejewiczowa 1997; Dreczko 2017; 2018), although it is older than the radiocarbon dates from the animal bones at the Polwica-Skrzypnik site complex (Kulczycka-Leciejewiczowa and Noworyta 2009). Thus, the tool either found its way inside the well accidentally or was intentionally relocated from its original place of discard.

Infrared spectroscopy of the sample shows analytical signals for both organic and inorganic materials (Fig. 6:1). The main inorganic compound is located in the 1030 cm^{-1} region and is connected with silicates (Si-O band) from clay minerals (Luxan and Dorrego 1996). The other Si-O peaks from quartz are observed at: 795 , 778 , 694 and near 530 cm^{-1} (Shillito *et al.* 2009; Saikia and Parthasarathy, 2010). These inorganic signals are the consequence of contamination of the sample by clay and soil. For archaeometric identification, other peaks are more important. Absorptions due to the presence of uncharacteristic OH stretching vibrations were detected in the region around 3400 cm^{-1} (at 3428 cm^{-1}) and at 1242 cm^{-1} . The next significant signals were located in the range 2800 – 3000 cm^{-1} (peaks from carbon-hydrogen bands). The most important are peaks at 2923 and 2851 cm^{-1} , which are the stretching vibrations due to methyl ($-\text{CH}_3$) and methylene ($-\text{CH}_2$) groups in hydrocarbon skeletons.

Other bands in the spectrum are those in the region 1450 – 1380 cm^{-1} , due to the $-\text{CH}_2$ and $-\text{CH}_3$ bending vibrations (1383.9 and 1451.5 cm^{-1}). This indicates that the sample has both saturated (alkanes) and unsaturated (alkenes) hydrocarbons, as well as an aromatic structure (a signal at 1605 cm^{-1} and a very weak peak at 1487 cm^{-1}). The next identified peaks provide information about the other elements of the sample's structure. A stretching band of a carboxylic group at 1701 cm^{-1} and a methyl ester signal at 1733 cm^{-1} are present.

All identified analytical signals confirm plant material: wood tar or pitch, obtained from thermal processes of wood (Font *et al.* 2007; Łucejko *et al.* 2012). The presence of two peaks at 2922 and 2852 cm^{-1} suggest raw-materials of birch (Shillito *et al.* 2009), because of triterpenoids present in *Betula* bark (Orsini *et al.* 2015; Ribechini *et al.* 2015). The resinous products from the *Pinaceae* family were excluded (Colombini *et al.* 2005; Duce *et al.* 2015; Font *et al.* 2007; Izzo *et al.* 2013).

The GC-MS analysis of the same blackish substance allowed the establishment of its chemical composition (Fig. 6:3). Triterpenoids with a lupane skeleton, lup-2,20(29)-dien-28-ol, lupenone, lupeol (lup-20(29)-en-3 β -ol), lup-2,20(29)-diene, betulone (lup-20(29)en-3-one-28-ol) and betulin (lup-20(29)en-3 β ,28-diol), are the main constituents of the sample. In addition, a series of linear alcohols ranging from 16 to 22 carbon atoms, a series of linear carboxylic acid fatty acids ranging from 12 to 22 carbon atoms and a series of ω -hydroxycarboxylic fatty acids ranging from 16 to 22 carbon atoms are also present. The molecular profile determined by the GC-MS confirms unequivocally that the material on

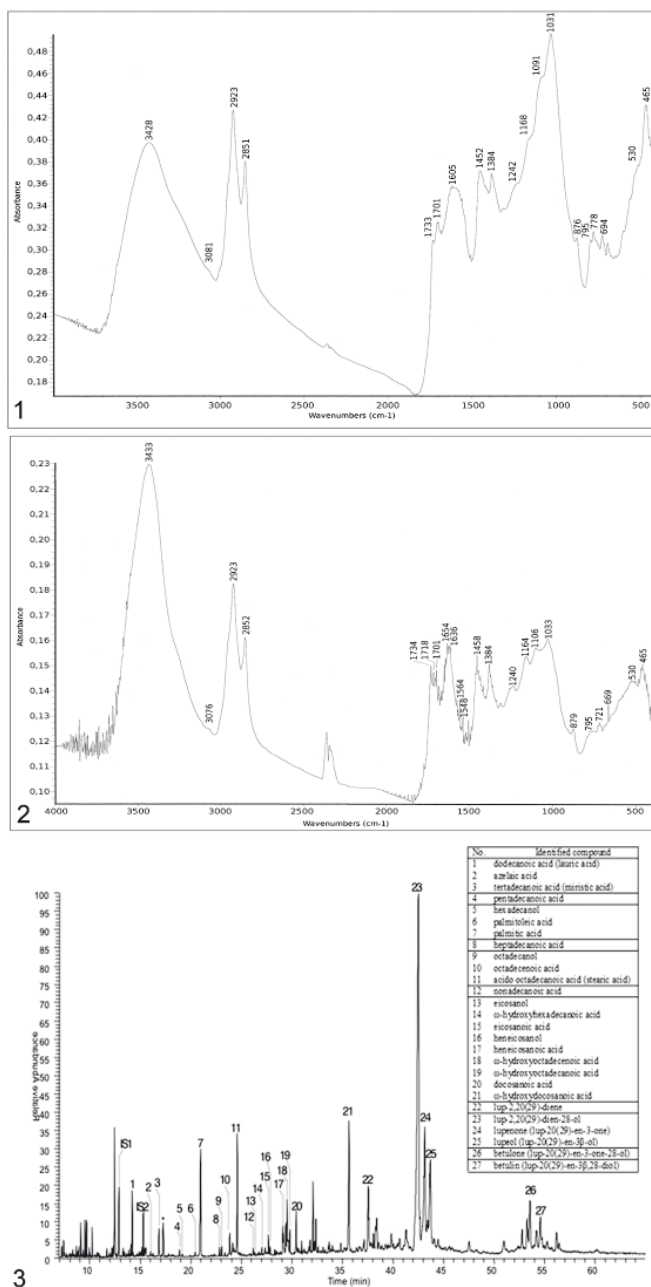


Fig. 6. Polwica-Skrzypnik, SW Poland. FTIR spectrum of black resinous sample extracted from flint tool nos. 16 (1) and 5 (2). Chromatogram obtained in the GC/MS analysis of the sample from flint tool no. 16 (3). Total ion current chromatogram of the resinous sample (the acidic and alcoholic species are present as TMS-derivatives). Labels refer to the table. Edited by B. Miazga, J. Łucejko

the flint tool is tar obtained by a pyrolysis-type process on bark of the *Betulaceae* family of trees, which includes birch (Colombini *et al.* 2006; Ribechini *et al.* 2011).

The second tool selected for the residue analysis was a slightly heated, completely re-touched blade, with semi-steep retouch on its distal end and denticulate retouch on its right lateral edge. There are vast patches and small spots of blackish adhesives on the left lateral edge and on fragments of the dorsal surface of the tool. Highly reflective sickle polish is visible on its right lateral edge (Fig. 3:3). The FTIR analyses of the black deposit on the flint tool were much more difficult due to the small amount of the residue on the object and its poor state of preservation. The extracted sample was less than 1 mg. The infrared spectrum (Fig. 6:2) is similar to that obtained for the previously described sample, and also suggests the organic character of this residuum. The most important analytical signals are: 2936.6 and 2852.5, and 1458 and 1338 cm^{-1} from methyl and methylene groups. The other signal belongs to aromatic structures (about 1600 cm^{-1}), a carboxylic group (1701 cm^{-1}) and esters (1734 cm^{-1}). All these peaks are characteristic for triterpenoid resins (Shilito *et al.* 2009), present in pitch and wood tar.

DISCUSSION

The results of the analysis direct our attention to four aspects of the research. First of all, the possible provenience of flint blades made from erratic raw material requires explanation. As written above, Bronowicki (2009) claims that flint nodules or blanks were imported from Upper Silesia, ca 120 km southeast of the site. This statement is not supported by the macroscopic characterisation of the implements. Moreover, Bronowicki himself, as well as other researchers, mentioned several times that erratic flint resources in the area of the Wrocław Plain are larger than was previously thought, with available flint nodules more than 10 cm in diameter (Bronowicki and Bobak 1999; Wiśniewski 2006). In the Polwica-Skrzypnik site complex, two different kinds of blades were selected for retouching: long, wide blades and middle-sized blades. The differences in metric characteristics are considerable, but not enough to suggest that the two groups of blanks were produced in workshops located next to different outcrops. We may only suppose that the required dimensions of large blades for sickles might have exceeded the capacity of local nodules, which were nonetheless appropriate for producing middle-sized blades. In this assemblage, there is only one cortex blade and no flakes or other waste products, but at the other TRB sites from the Wrocław Plain, local flint tool production is confirmed by the presence of small blades and flakes, as well as bipolar products (Romanow *et al.* 1973; Wojciechowski 1973; Lech 1997).

The next problem, which is integrally related to the first one, concerns the use of tools. We can see from this study that metric, technical and probably raw-material features were important factors in the production of tools of a particular function. Large blades made

from better-quality raw materials, including Volhynian flint, were modified by denticulate retouch and used for harvesting cereals. They were often resharpened in the course of field work or modified into another tool type, as noted in other regions as well (Balcer 1975; Małecka-Kukawka 2000). The scale of recycling of sickle insets was large compared to other tools. Sparsely retouched medium-sized blades made from erratic flint were used for working animal materials. This assemblage is an example of a dichotomy in flint-tool manufacturing: the production of large sickle inserts based on non-locally made blades, knapped in specialised flint workshops and modified with denticulate retouch; and probably local production of middle-sized blades used for domestic activities. The lack of large sickle inserts was complemented by locally produced blades of smaller dimensions. Two examples of medium-sized blades with denticulate retouch were used as sickle insets (Fig. 2:4-5). Such a manner of flint management is closer to that seen in Kuyavia, where people also had access to local erratic flint resources, and tried to establish some fraction of production independent from the import of Chocolate flint (Domańska 1995; Małecka-Kukawka 1992).

The presence of phytoliths is the third aspect of this research. It should be mentioned that such an analysis has not been preceded by similar study related to the residues on tools in Poland. Phytolith analysis showed a broader range of plant species cut with sickles than was previously revealed in palaeobotanical studies. In addition to phytoliths from Poaceae or Cyperaceae, phytoliths from subfamily Panicoideae of Poaceae were also recorded, which means that cereal cultivation near the Polwica-Skrzypnik site complex may also have included broomcorn millet (*Panicum miliaceum*), recorded at a few TRB sites so far (Lityńska-Zajac 2009b). The same sickles were probably used for harvesting cereals and wild siliceous plants, such as sedges or bulrush. Plants were cut together with culms, which is suggested by the texture of usewear traces and confirmed by additional data from daub with imprints and the charred remains of stems and straw (Krupska *et al.* 2009).

The last interesting aspect we would like to consider is the hafting mode of sickles. The fact that large blades were intensively recycled may suggest that sickles were made as composite tools at the site. Remains of tar made from the bark of *Betulaceae* trees via a process of pyrolysis were identified with the use of FTIR and GC/MS analysis. These are the first cases of flint tools with macroscopically visible adhesives, used to attach flint sickle inserts to handles, which have been confirmed at Neolithic sites in SW Poland. The locations of both usewear traces and the adhesive suggest that only the very edge was available for cutting plants, and the majority of a flint specimen was mounted in a haft. Certainly, the reconstruction of a complete sickle is not possible, because there are no hafts preserved at the TRB sites in this region. However, the most probable model of a TRB sickle from Polwica-Skrzypnik was a tool with one blade inserted laterally, mounted tightly with wood tar in an elongated or short wooden haft. Experiments conducted by one of the authors (B. K-D.), using both types of sickles, do not show any significant differences in efficiency or in the development of gloss on the cutting edge. A sickle with a short haft was slightly less effi-

cient than a sickle hafted in a long handle, but this opinion is only based on the subjective impressions of the experimenter and requires more independent experimental studies.

CONCLUSION

Our knowledge about the use of plants by societies identified with the Funnel Beaker culture in Poland is limited due to the scarcity of archaeobotanical data. Detailed studies of secondary sources such as traces and residues on agricultural tools bring valuable information to this area of study. We analysed twenty-one flint tools used and discarded by people identified with the TRB. Despite the small number of implements in the assemblage from the Polwica-Skrzypnik site complex, the artefacts demonstrated the potential to provide a more detailed understanding of the use of tools. Two different kinds of blades were selected for retouching: long, wide blades and medium-sized blades. Large blades made from better-quality raw materials, including Volhynian flint, were modified by denticulate retouch and used for harvesting cereals, while middle-sized blades were slightly retouched and used for other domestic activities, such as cutting soft animal materials. Phytolith analysis of three flint inserts with intense sickle gloss showed that the following plant families were cut with sickles: the Poaceae or Cyperaceae family, and subfamily Panicoideae of Poaceae. A blackish resinous substance, identified through the use of FTIR and GC/MS analyses as wood tar made from bark of *Betulaceae* trees, and previously considered as residue of a younger age, was demonstrated to be a Neolithic adhesive. Our results indicate that the combination of usewear studies along with residue analysis is a valuable tool for studying prehistoric material culture.

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THE ZŁOTA CULTURE GRAVE FROM ŚWIĘCICA, SITE 30, SANDOMIERZ DISTRICT

ABSTRACT

Bajka M., Sieradzka E. 2019. The Złota culture grave from Święcica, site 30, Sandomierz district. *Sprawozdania Archeologiczne* 71, 243-272.

The paper presents the results of research on a unique Złota culture niche grave discovered at site 30 in Święcica, Sandomierz district. The construction of the grave, as well as its inventory, bears multiple traces that could be linked to the tradition of the Globular Amphora culture. The structure, dated to the 1st half of the 3rd millennium BC, presents a rare example of funerary rituals using animal remains in the Złota culture, and sheds new light on the processes of origin of this community.

Keywords: Złota culture, Globular Amphora culture, niche grave, Late Neolithic, Lesser Poland

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1. INTRODUCTION

In April 2012, the Archaeology Department of the District Museum in Sandomierz received an anonymous note, informing of a recent discovery of human bones. The alleged incident took place during construction works in the village of Święcica, Obrazów commune, in the Sandomierz district. A few days later, having notified the Provincial Office of Monument Preservation in Kielce, Sandomierz Delegation, scholars conducted a field inspection. While on the site, researchers identified, and, subsequently, secured a damaged

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archaeological feature. Rescue excavations of the discovery were carried out in July 2012. The team, led by Monika Bajka, MA, from the District Museum in Sandomierz, consisted of three members: Emilia Andrzejczuk and Agnieszka Grzywacz, students from the Institute of Archaeology, Maria Curie-Skłodowska University in Lublin, and Mr. Jakub Sęczyk from Biała Podlaska (Bajka 2012).

The newly identified site no. 30 in Świącica (AZP 273/89-72) is located on the western outskirts of the village, in a locality called "Parcele" (Fig. 1). It occupies a slope of a loess-covered hill, gently slanting down towards the valley of the Dębianka stream, tributary of the Gorzyczanka River (Fig. 1). The altitude of the site measures about 225 m above sea level.

2. ARCHAEOLOGICAL FEATURES

In the course of the archaeological works in Świącica, site 30, two connected archaeological features – 1 and 1a – were unearthed (see below). Prior to the rescue excavations, they had been damaged during house construction on the parcel (Fig. 2). The southern edge of both of the archaeological features was destroyed during the construction of a block wall (Fig. 2). In addition, the southern part of the top of pit no. 1 was ruined, and its eastern margin was cut to a depth of 70-80 cm (Fig. 2). As a result of the surface levelling of the site, the remaining humus layer was only 10-15 cm thick (Fig. 2; see also Fig. 3, 4: a). Since the area available for archaeological excavation was quite limited, the dig was conducted in the easily accessible eastern part of feature 1 (Fig. 2). Near the outline of the destroyed edge of this feature, an unexcavated baulk was left, as requested by the owner of the parcel (Fig. 3, 5-7). With the works moving forward, the trench was subsequently expanded westward, to cover the full range of feature 1a (Fig. 2).

Feature 1

The ceiling of feature 1 was spotted directly below the humus layer (Fig. 4: a). Because of the fact that its upper part was significantly damaged (*see above*), only a rough outline of the top of the feature could be identified. The shape of the pit was probably close to oval or rectangular with rounded edges (Fig. 2). The dimensions of the preserved part are 245 cm (along the N-S axis) and 210 cm (W-E) (Fig. 2; see also Fig. 4: a). The infill of the pit was 68 cm deep, indicating that the floor must have laid about 100 cm below the approximate natural ground level (Fig. 4: a).

The profile of feature 1 was close to bowl-shaped, with an almost vertical northern wall and a flat bottom (Fig. 4: a). Its southern part was visibly more shallow than the northern one (Fig. 4: a). The infill of feature 1 was dark-brown with occasional lighter patches (Fig. 4: a; see also Fig. 5). Within the upper part of the pit, several small stones were uncovered.

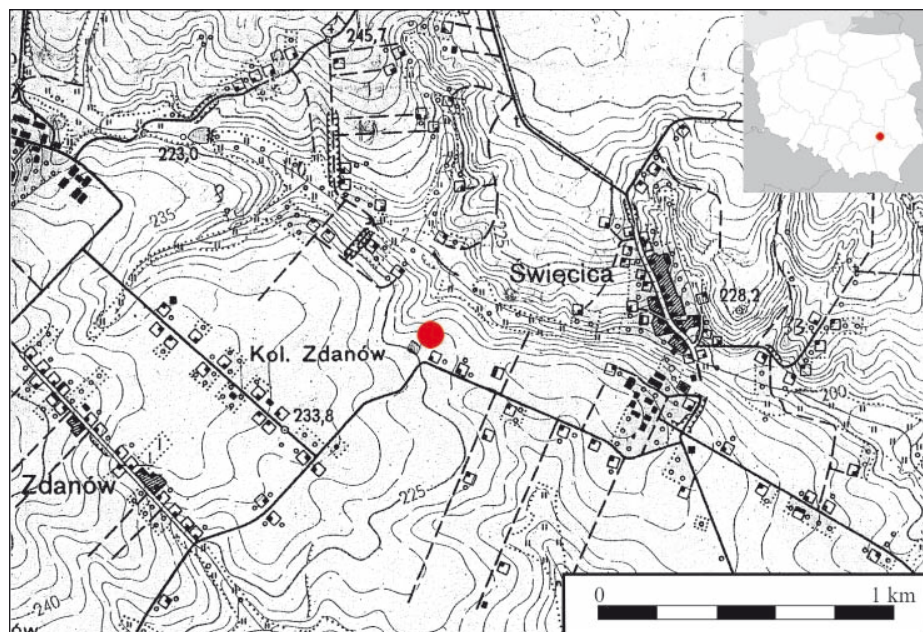


Fig. 1. Święcica, site 30, Sandomierz district. Location of the site. Modified by M. Bajka



Fig. 2. Święcica, site 30, Sandomierz district. Archaeological features on the excavation level of -20 (depth about 50 cm). Photo by M. Bajka

Table 1. Świącica, site 30, Sandomierz district. Specification of the animal remains from the features 1 and 1a (prepared by Daniel Makowiecki and Mirosława Zabilska-Kunek)

Feature	Excavation level/depth	Species	Elements	Number	Description
1	-50/80 cm	Cattle (<i>Bos taurus</i>)	Tarsus bone	1	
		Brown bear (<i>Ursus arctos</i>)	Metatarsal bones I-V	5	Left from the same individual, <i>Adultus/Maturus</i>
			Tarsus bones	3	
1a	-70/100 cm	Pig (<i>Sus scrofa</i>)	Mandible	1	Right, preserved nearly complete plus few bone fragments, a male aged 17-18 months (molar tooth M2 erupted, molar tooth M3 in maturation stage)
			Mandible	1	Left, preserved nearly complete, a male aged 17-18 months (molar tooth M2 erupted, molar tooth M3 in maturation stage); traces of strong surface weathering on the buccal side
			Lower canine	1	A male, tooth most likely from one of the mandibles
			Lower teeth	2	Permanent teeth: lower incisor tooth I ₁ erupted; lower incisor tooth I ₂ during an eruption; tooth from one of the mandibles
			Pelvic bone	1	Left, a bump non-connate

Table 2. Świącica, site 30, Sandomierz district. Measures of the metatarsus bones (*ossa metatarsalia*) of a brown bear (*Ursus arctos*) (prepared by Daniel D. Makowiecki)

Measure	Bone				
	I	II	III	IV	V
Greatest length (GL)	69,8	81,6	88,0	94,3	96,1
Breadth of proximal end (Bp)	23,0	16,2	18,7	17,1	25,3
Smallest breadth in medial part of diaphysis (SD)	10,5	12,4	12,4	14,2	12,9
Breadth of distal end (Bd)	19,4	21,0	20,8	21,2	22,8

The floor of the feature was covered by an orange layer of burnt loess soil, 2-3 cm thick (Fig. 8).

In horizontal projection on excavation level -50 (at a depth of about 80 cm, estimated from the approximate natural ground level), feature 1 was oval in shape, with axes measuring about 178 cm (N-S) and 166 cm (W-E) (Fig. 5). Near the northern edge of the pit, a few bigger stones were found deposited closely together (Fig. 5, 9). In the western part of the

Table 3. Świącica, site 30, Sandomierz district. Distribution of finds of shells a snail *Cepaea vindobonensis* in the infills of the features 1 and 1a (prepared by Zdzisław Bogucki)

Feature	Excavation level/depth	Number
1	30-68/60-100 cm	18
1a	60-80/90-110 cm	50
	80-115/110-145 cm	120

Table 4. Świącica, site 30, Sandomierz district. Radiocarbon dates of the feature 1a

No.	Sample	Measurement	Date	Probability 68.2%	Probability 95.4%	Notes
1	Left talus bone, individual no. 1	Poz-101614	4160±35 BP	2872 BC - 2848 BC (10.6%) 2813 BC - 2679 BC (57.6%)	2880 BC - 2829 BC (19.4%) 2823 BC - 2628 BC (76.0%)	2.4% N, 10.2% C, 6% coll
2	Right pig mandible	Poz-101615	4120±35	2858 BC - 2810 BC (20.9%) 2751 BC - 2722 BC (11.8%) 2700 BC - 2620 BC (35.6%)	2871 BC - 2801 BC (25.3%) 2780 BC - 2577 BC (70.1%)	1.6% N, 7.7% C, 1.5% coll

feature there was black-brown sediment with charcoal. Within this layer, bones of the left rear foot of a brown bear (*Ursus arctos*) were discovered, lying clearly in anatomical order (Fig. 9; see Tables 1, 2). On the same excavation level, a single fragment of a bovine (*Bos taurus*) tarsus bone was unearthed (Table 1).

The infill of feature 1 yielded no artefacts. In the lower part of the pit, starting from level -30 and beneath (at a depth of 60-100 cm from the approximate natural ground level), about 18 complete, but fragmented, snail shells (*Cepaea vindobonensis*) were discovered (Table 3).

Feature 1a

The uppermost part of feature 1a was initially visible as somewhat discoloured sediment on the western extension of feature 1 (see Fig. 2). The full range of the pit was only unearthed on excavation level -30 (Fig. 4: b). The profile of feature 1a was oval, with a clearly visible bow-shaped outline of the top (Fig. 4: b). The pit was dug into a natural loess layer (Fig. 4: b). The infill of the feature was up to 70-72 cm deep, meaning that its bottom lay probably about 110-115 cm from the natural ground level. The feature was filled with a quite homogeneous dark-brown layer (Fig. 4: b). In its upper part, however, there was some mixed, yellow-brown sediment, which could be interpreted as the remains of an ani-

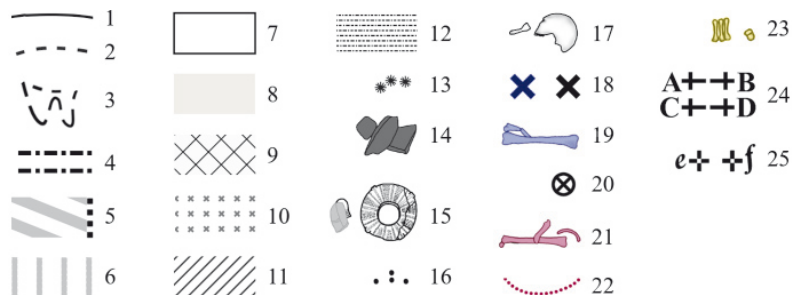


Fig. 3. Świącica, site 30, Sandomierz district. Key to figures 4-7: 1 – registered outlines of layers and features; 2 – hypothetical outlines of layers and features; 3 – bioturbation; 4 – outlines of the baulk; 5 – destroyed area; 6 – humus; 7 – yellow layer (loess); 8 – dark-brown layer; 9 – patchy brown-yellow layer; 10 – black-brown layer with charcoals; 11 – orange layer (charred loess); 12 – whitish layer (calcareous deposit); 13 – charcoals; 14 – stones; 15 – ceramic vessels; 16 – amber beads; 17 – bones; 18 – reconstructed original location of the skull of individual no. 1; 19 – bones of individual no. 1; 20 – location of the sacrum of individual no. 1 (under the stones); 21 – bones of individual no. 2; 22 – concentration of the bones of individual no. 2 (under the stones); 23 – animal bones; 24 – location of the western profiles of features 1 (A-B) and 1a (C-D); 25 – location of the reconstructed transversal profiles of features 1 and 1a (e-f).

Drawn by M. Bajka, E. Sieradzka

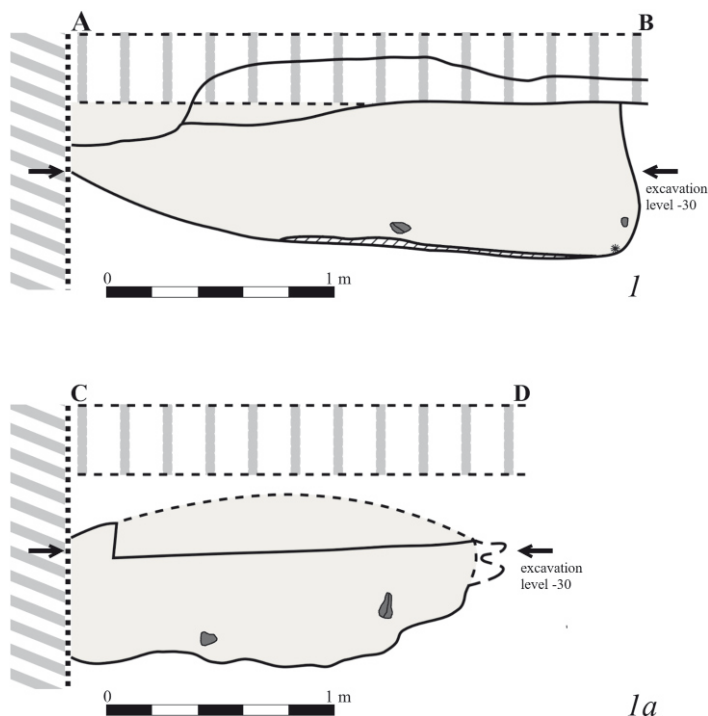


Fig. 4. Świącica, site 30, Sandomierz district. Eastern profiles of features 1 (a) and 1a (b).

Drawn by M. Bajka, E. Sieradzka

mal burrow (Fig. 5). Near the eastern edge of the pit, in the area adjacent to feature 1, several pebbles were found (Fig. 5).

Features 1 and 1a only divided into two separate pits at level -50 (Fig. 5). At this depth, feature 1a was nearly oval in shape, with the longer (W-E) axis measuring 230 cm, and the preserved part of the N-S axis measuring 180 cm (Fig. 5).

At the centre of the bottom of the feature, at level -70 (a depth of about 100 cm from the approximate natural ground level), there lay over a dozen stones of various sizes (Fig. 6; 10). In the western and central part of the pit, human bones were uncovered, belonging to two individuals: one of the age of *Maturus* (45-50 years), most likely a male; the other,

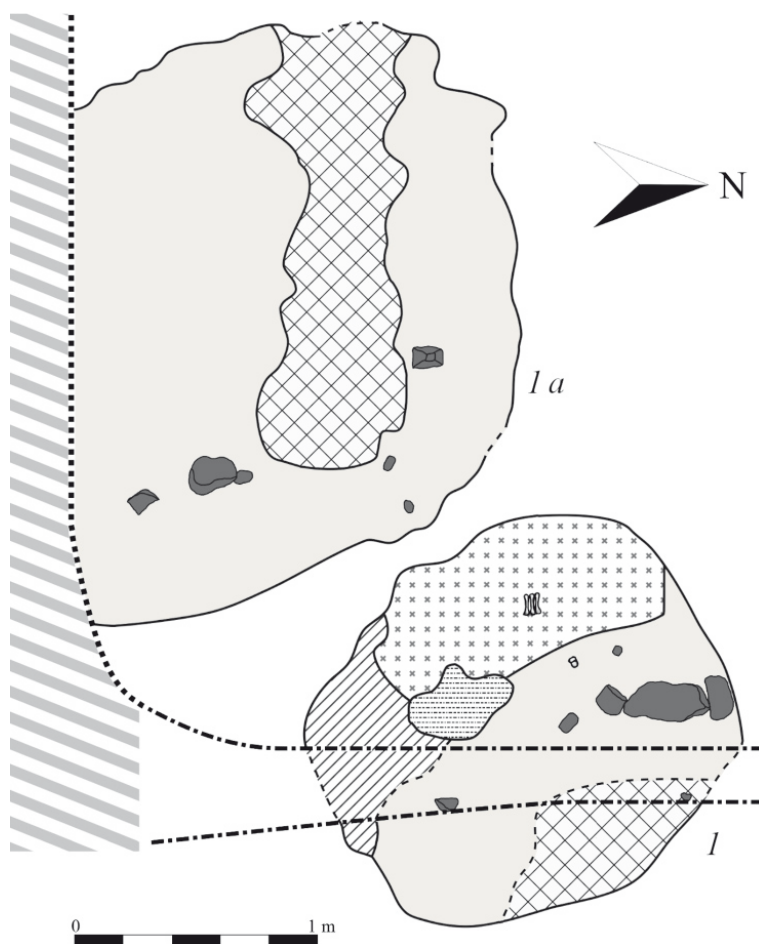


Fig. 5. Świącica, site 30, Sandomierz district. Horizontal plane of the features on the excavation level of -50 (depth about 80 cm). Drawn by M. Bajka, E. Sieradzka

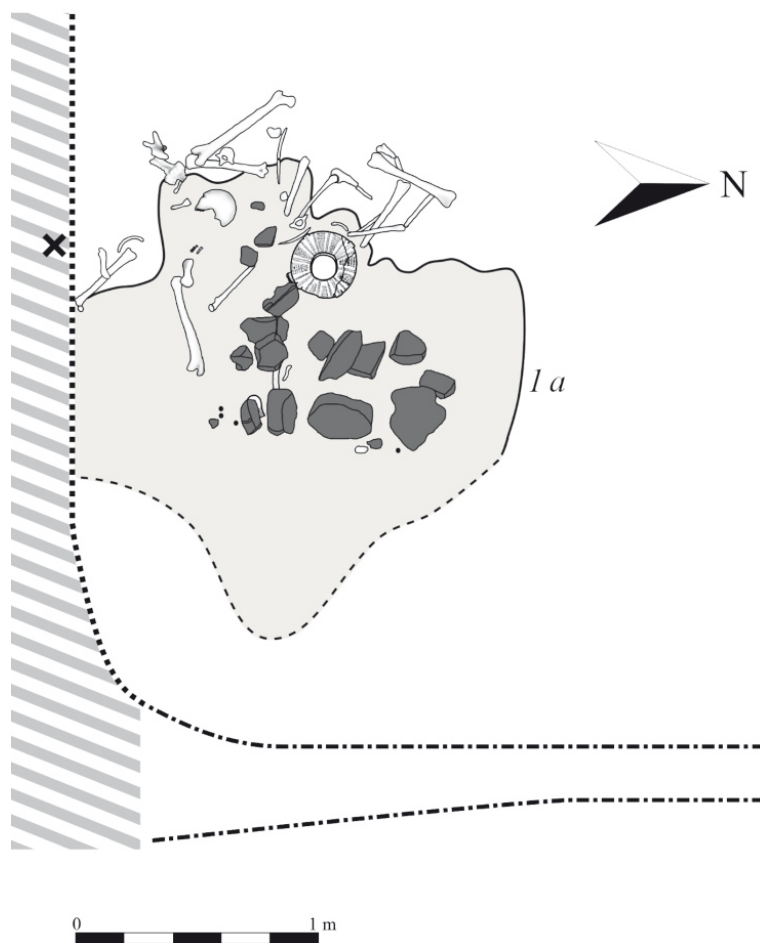


Fig. 6. Świącica, site 30, Sandomierz district. Horizontal plane of feature 1a on the excavation level of -70 (depth about 100 cm).

Drawn by M. Bajka, E. Sieradzka

a child of the age of *Infans I* (4-6 years) (Kozak-Zychman and Trzaska 2012). The human remains lay in a quite chaotic manner, not maintaining correct anatomical order (Fig. 6). Nearly all of the postcranial bones of the adult individual were distributed along the western edge of the feature (Fig. 7). His skull, located originally in the southern corner of the pit, had been removed by construction workers before the excavation (Fig. 7). The sacrum of the male was found in the middle of the grave, under one of the stones. In the western part of the feature, between the rubble and the bones of this individual, a large amphora was placed (1).

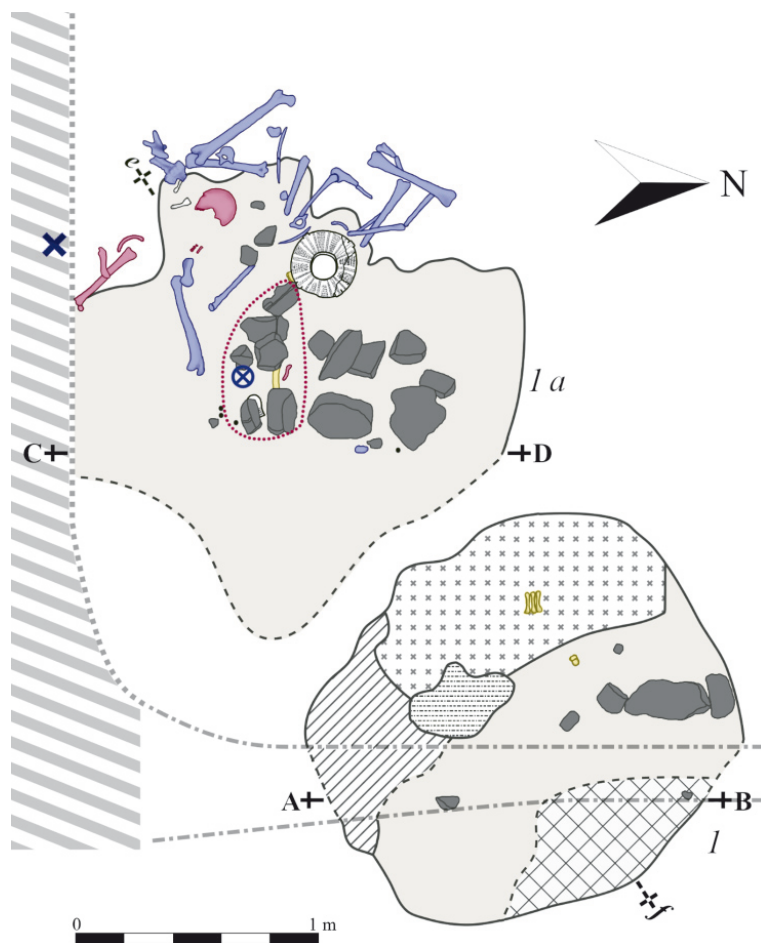


Fig. 7. Świącica, site 30, Sandomierz district. Location of the profiles and distribution of human and animal bones within the features (please note: feature 1 is shown on level -50, while feature 1a is on level -70).
Drawn by M. Bajka, E. Sieradzka

The skull, mandible, and a few long bones of the child were uncovered in the south-western corner of feature 1a, next to the remains of the adult individual (Fig. 7). The majority of the bones of the child were, however, located in the central part of the grave, gathered closely together, under the stones (Fig. 7). Near the remains of this individual, a petite beaker was found (2), accompanied by 3 amber beads. Another amber adornment was unearthed next to the stone concentration, about 60 cm to the north of the previous ones (Fig. 7) (3-6). Additionally, the mandible and a left pelvic bone of a pig (*Sus scrofa*) were discovered beneath the rubble (Table 1). Additional fragments of



Fig. 8. Świącica, site 30, Sandomierz district. Orange layer of charred loess soil on the bottom of feature 1a.
Photo by M. Bajka



Fig. 9. Świącica, site 30, Sandomierz district. Archaeological features on the excavation level of -50 (depth about 80 cm). Photo by M. Bajka

porcine mandible, most likely belonging to the same individual, were lying close to the amphora (Fig. 7).

Similarly to pit no. 1, a large amount of snail shells (*Cepaea vindobonensis*) were identified in the lower parts of the infill of feature 1a (Table 3). Excavation levels 60-80 yielded about 50 such specimens, while within the sediment from levels 80-115, more than 120 shells were found (Table 3).

Grave inventory

1. A four-handled amphora, with a rounded belly and a short, cylindrical neck, slightly narrowing towards the rim (Fig. 11: 6; 12). The maximum diameter of the belly is located midway up the vessel. The edge of the rim is slightly rounded. The handles are flat, about 3,0 cm in width, distributed almost symmetrically in the upper part of the belly. The base is nearly round, only slightly flattened. On the neck there are 3 bands of very fine cord impressions, and another 3 rows of large, arch-shape stamps, arranged such that their convex parts are directed upwards. The same pattern is placed at the base of the neck. The upper part of the belly is covered by a stamp ornament, consisting of vertical bands of rows of various imprints. The main band is composed of a total of 8 rows of rectangular stamps, whilst under every 4 rows there are 2 lines of small arches, with their convex parts directed upwards. Between every main band, 2 vertical lines of small arches are placed, analogous to those described above. A very similar pattern is recorded on the handles of the vessel, the only difference being a slightly greater distance between the rows.

In the ceramic paste of the vessel, an admixture of medium-sized, coarse-ground white and red stone was identified. The surfaces of the amphora are grey-brown, even, and smooth. The outer surface is slightly chipped. The vessel is almost completely preserved, lacking only a few pieces of the rim and the belly. Dimensions: height 21,4 cm, including the height of the neck (3,0 cm); maximum diameter 27,2 cm; rim diameter 12,4 cm; base diameter about 10,0 cm; mean wall thickness 0,6 cm.

2. Petite beaker, only partly preserved, with an oval belly and a short neck, broadening towards the rim, and slightly curved inwards (Fig. 11: 5; 13). The edge of the rim and the base of the vessel are slightly rounded. On the neck of the vessel there are 8 parallel cord impressions. On the base of the neck, a horizontal line of oval stamp impressions is located. The upper part of the belly is covered by a pattern consisting of vertical bands of rows of oval imprints, with 3 in each band. Between the bands there are unornamented spaces.

A very small amount of the admixture of medium-sized stone was identified in the ceramic paste of the vessel. The surfaces of the beaker are grey-brown and even. The vessel lacks a significant part of the base, belly, and neck area. Dimensions: height 8,3 cm, including the height of the neck (2,7 cm); maximum diameter 6,5 cm; rim diameter 5,7 cm; base diameter about 2,0 cm; mean wall thickness 0,6 cm.



Fig. 10. Świącica, site 30, Sandomierz district. Feature 1a on the excavation level of -70 (depth about 100 cm). Photo by M. Bajka

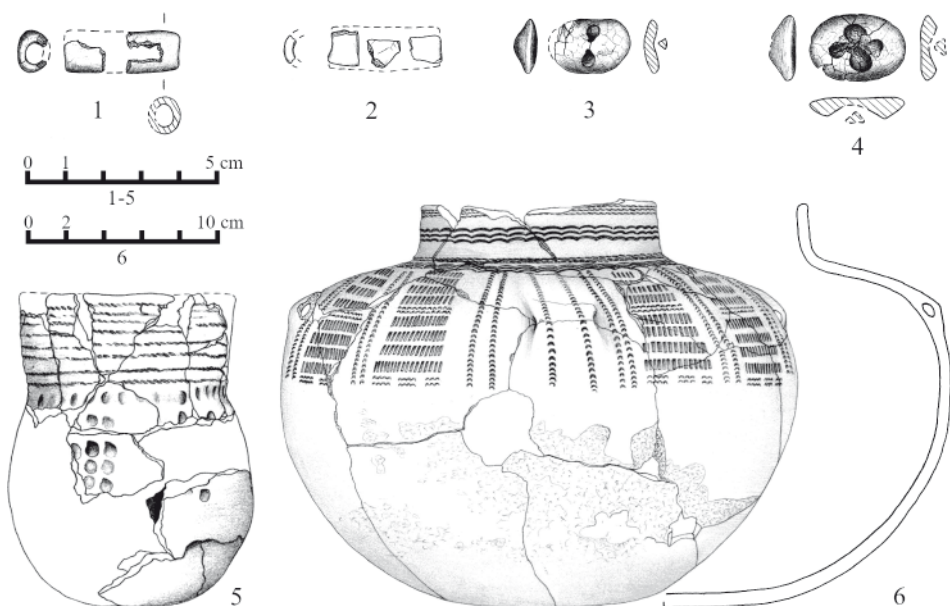


Fig. 11. Świącica, site 30, Sandomierz district. Grave inventory (1-4 – amber; 5, 6 – pottery). Drawn by M. Bajka



Fig. 12. Święcica, site 30, Sandomierz district. Amphora from the ZC grave. Photo by M. Bajka



Fig. 13. Święcica, site 30, Sandomierz district. Beaker from the ZC grave.
Photo by M. Bajka

3, 4. Two significantly damaged tubular amber beads, with cylindrical transverse cross sections and round vertical cross sections (Fig. 11: 1, 2). The adornments belong to type 1 AIa, according to the classification of such artefacts by Ryszard F. Mazurowski (1983, 23). Dimensions: maximum diameter 1,0-1,2 cm; diameter of the perforation 0,6 cm; reconstructed length about 3,0 cm.

5. A button-shaped amber bead with V-shaped perforation, preserved almost intact, with a slightly chipped edge (Fig. 11: 3). The specimen is oval in the horizontal plane and lenticular in profile, with its upper part slightly more convex (type 1 BIIa after Mazurowski 1983, 23). Dimensions: 2,2 x 1,5 cm; thickness 0,6 cm; diameter of the perforation 0,3-0,4 cm.

6. A button-shaped amber bead with two crossed, V-shaped perforations, preserved almost intact, with a slightly chipped area near the holes (Fig. 11: 4). The specimen is oval in the horizontal plane and convex in profile. The bead is an adapted type 1 BIIb after Mazurowski (1983, 23). Dimensions: 2,5 x 1,8 cm; thickness 0,7 cm; diameter of the perforation 0.4-0.5 cm.

3. ANALYSIS AND INTERPRETATION

Grave construction

The structure uncovered in Święcica consisted of two pits – the grave itself (feature 1a), and the adjoined feature no. 1. Sadly, during the excavation of the structure, it was not possible to take a transverse cross section of both features (see above), making a description of the exact relations between both parts of the grave rather problematic. Researchers managed, however, to document vertical profiles (N-S) of both pits (Fig. 4). Most importantly, while unearthing the maximum range of feature 1a, the distance between its top and several fixed points on excavation level -30 was being recorded. Consequently, by superimposing horizontal planes of the features, drawn every 10 or 20 cm, and supplementing them with the remaining documentation, we managed to reconstruct an approximate transverse profile (e-f) of the grave (Fig. 14: a; Fig. 5-7).

In the drawing (Fig. 14: a), the niche form of the analyzed grave is clearly visible. This type of grave construction was apparent even in the field, when archaeologists observed that there was a natural loess stratum between the humus layer and the top of feature 1a (Fig 4: b). The oval vertical profile of this pit matches grave niches (Fig 4: b). Meanwhile, as previously mentioned, feature 1 was identified directly below the humus (Fig 4: a). The latter pit could therefore be interpreted as an entrance to the niche (Fig. 14: a).

Moreover, a careful analysis of the documentation of the structures shows that the location where the grave was dug was most likely slanting (see Fig. 2). Measuring from the middle part of the western profile of feature 1, excavation level -30 was located 30 cm beneath the bottom of the humus layer, and about 40-55 cm from the preserved ground

level (fig 4: a, see also Fig. 14: a). Meanwhile, on the same excavation level, the north-western corner of feature 1a lay at a depth of 70 cm, 55 cm below the humus. Hence, we could suspect that originally the area above the grave was ascending in the direction from feature 1 to 1a. If we assume that the sloping was gradual, the angle of inclination of the hill must have measured about 9 degrees (Fig. 14: a).

The orientation of the grave structure from Święcica along the NE-SW axis corresponds to the direction of slanting of the area where the features were dug (Fig. 1, 5-7). Both pits were situated almost horizontally to each other (Fig. 14: a). However, because of the ascending of the slope, feature 1a was situated somewhat deeper than feature 1, located a little down the hill (Fig. 14: a). Such a manner of adopting a slope when building a niche grave has an excellent analogy in the form of grave 75 from the Złota culture (ZC) cemetery at the site Złota-“Nad Wawrem” (Fig. 14: b) (Krzak 1970, 89, fig. 73). In addition, graves no. 243 and 254 from the same site were dug in a slanting area (Krzak 1970, 138, fig. 123: a; 145, fig. 142). Sadly, due to the significant lack of documentation, we are not able to reconstruct their exact type of construction. However, it has been suggested that grave 254 could also have been a niche (Krzak 1976, 163).

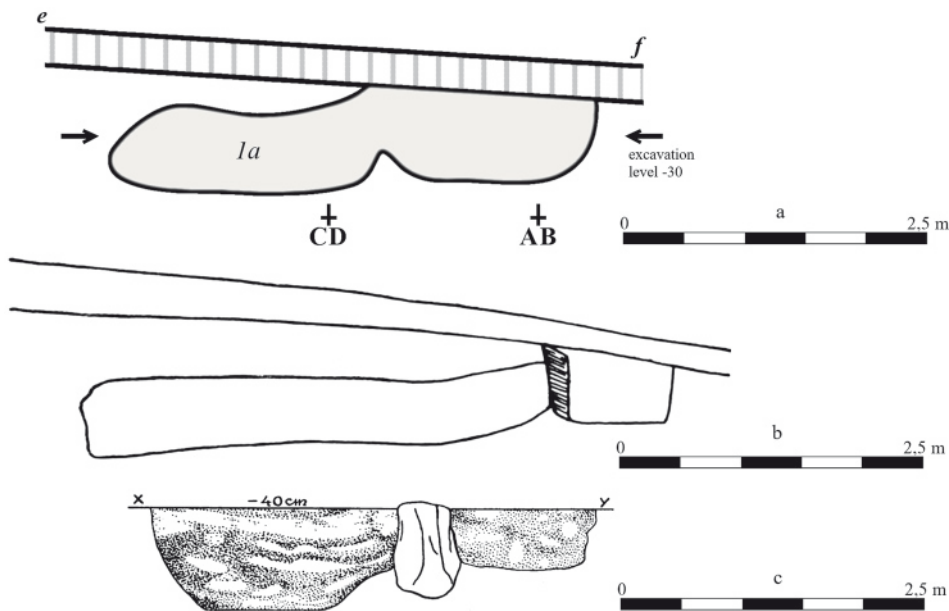


Fig. 14. Reconstructed transverse profile of the ZC grave from Święcica (a), compared to cross sections of selected niche graves of the ZC (b) and the CWC (c). Key: b – grave no. 75 from Złota-“Nad Wawrem”; after Krzak 1970, 89, fig. 73; c – grave no. 23 from Samborzec; after Kamieńska and Kulczycka-Leciejewiczowa 1970, 236, fig. 9. Drawn by M. Bajka, E. Sieradzka

Compared to other Late Neolithic graves from the Sandomierz Upland, the orientation of the structure from Świącica seems quite atypical. It has been observed that ZC graves were most often built along a NW-SE axis, with entrances situated to the south or south-east (Krzak 1976, 161-164; Witkowska 2013, 92). The same rules were recorded with regard to Corded Ware culture (CWC) niche graves from Lesser Poland (Włodarczak 2006, 57). On the other hand, Globular Amphora culture (GAC) graves were usually oriented along a W-E or NW-SE axis (see, e. g. Krzak 1972; 1977; Ścibior and Ścibior 1990; Pasternikiewicz 2017).

The sole ZC grave for which the orientation and location of an entrance is identical to that in Świącica is grave no. 1 from Książnice Wielkie, site 2, Busko-Zdrój district (Wilk 2013, 312-314). NE-SW oriented ZC graves were also investigated at Samborzec, site 1 (grave 2; Marciniak 1960, 73-77), Złota-“Nad Wawrem” (grave nos. 5, 10, and 37; Krzak 1970), and Złota-“Grodzisko I” (feature 141; Krzak 1961). Among those features, the position of an entrance shaft was recorded only in grave 2 from Samborzec, and it was situated southwest of the niche (Marciniak 1960, 74, fig. 2).

Comparing the structure from Świącica to the classification of niche grave constructions by Piotr Włodarczak (2006, 55), the form of the analyzed grave most resembles the so-called type C. Such features are characterized by a lack of very specific corridors between niches and entrance pits. Rather, their niches were situated simply on extensions of entrances (Fig. 14: c).

Typical CWC niche graves from Lesser Poland are structures of considerable size, usually about 200 cm deep, with entrances and niches situated diagonally to each other (e.g. Włodarczak 2006, 53-57). Only as an exception were there graves recorded with an almost horizontal layout of features, such as grave no. 23 from Samborzec (Kamińska and Kulczycka-Leciejewiczowa 1970) (Fig. 14: c). It is the variant of CWC niche graves that seems to be mirrored by the structure from Świącica (Fig. 14: a), as well as the previously mentioned ZC grave no. 75 from the site of Złota-“Nad Wawrem” (Fig. 14: b).

Compared to other type C niche graves, some construction details of the analyzed feature from Świącica seem to be quite unusual. First of all, there is no clear evidence of a permanent partition of features 1 and 1a (c.f. Fig. 14: b, c). Numerous small stones recovered in the adjoining part of the pits did not form a durable structure separating both features (Fig. 4-6). However, we should bear in mind that such construction built from rubble could easily have been ruined, for example by rainwater running down the hill and entering the grave. Neither was a stone partition recorded in the case of ZC grave no. 10 from Wilczyce, Sandomierz district (Florek and Zakościelna 2005). This grave resembles the structure from Świącica with regard to the horizontal layout of the niche and the entrance. On the other hand, between the two features of the Wilczyce grave, a short corridor was unearthed (niche grave type A; see Florek and Zakościelna 2005, 46, fig. 3: B).

What is also striking about the structure from Świącica is the existence of clearly atypical proportions between the niche and the entrance pit. Despite the fact that the top

outlines of features 1 and 1a were significantly disturbed, we could suspect that they were originally somewhat close in size (Fig. 4-6; 14: a). In contrast, ZC niche grave entrance pits were always distinctively smaller than the niches themselves, with diameters typically measuring about 100-130 cm (Witkowska 2013, 95; Wilk 2013).

Feature 1

The unusually large size of the entrance pit of the niche from Świącica could be explained by the fact that it was designed not only to simply provide access to the grave, but also as a space where specific rituals could be performed. We could presume that such practices may have been taking place based on traces of fire and animal remains identified on the bottom of the pit (Fig. 5). While in ZC graves partly burnt human bones have already been detected several times (Wilk *et al.* 2011), there was so far no direct evidence of using fire inside the niches. In the ZC cemetery in Książnice, in addition to 4 graves, two ZC furnace features were discovered (Wilk *et al.* 2011). It has been suggested that charring of human remains could have been performed in these specific pits. Subsequently, burnt bones must have been transferred back to the niches (Wilk *et al.* 2011, 42).

Since human remains from Świącica bear no macroscopically identifiable traces of fire (see above), we cannot confirm that feature 1 was used in a similar fashion to the furnaces from Książnice. On the other hand, hearths located inside graves or within cemeteries are a very common trait of the Globular Amphora culture (GAC). Traces of fire near entrances to GAC stone cist graves were discovered in the case of Nakonowo, Włocławek district (Sobczyk 2000, 9-10), as well as in Złotowo, Szubin district (Tetzlaff 1963, fig. 1). In grave no. VIII from site 78 in Sandomierz, just outside a rectangular stone structure enclosing human burials, a heap of charcoals, an amphora, two pig or boar mandibles, and other animal bones were discovered (Ścibior and Ścibior 1990, 181, 183). Very frequent traces of fire were also identified in two GAC cemeteries located not far from Świącica – Polanów Złocki (traditionally site Złota-“Gajowizna”) (Krzak 1977), and Mierzanowice (Bąbel 1979).

Moreover, depositing animal remains directly on a layer of charcoals or charred sediment seems to be a relatively common practice in GAC funeral features (see catalogue published by Wilk *et al.* 2011, 44-45). Usually in such cases, animal bones were found lying out of anatomical order, which led to their interpretation as relics of ritual consumption (e.g. Szmyt 1996, 180). However, inside feature 1 from Świącica, beside a single fragment of a bovine tarsus bone, archaeologists unearthed the remains of the left rear paw of a brown bear, consisting of a complete set of metatarsals and 3 of the 5 smaller, irregular tarsus bones forming the arch of the foot (Table 1, 2). The bones belonged to an adult or, more likely, a mature individual, as we inferred based on slight degenerative lesions visible on the diaphyses of the metatarsal bones, in the area next to the proximal epiphyses (Fig. 15). Taking into account average measurements of metatarsal bones of modern brown bears, it seems possible that the individual from Świącica was a male (Baryshnikov and Puzachenko 2017).



Fig. 15. Święcica, site 30, Sandomierz district. Metatarsal bones of a brown bear (*Ursus arctos*). View from the dorsal surface (a) and the plantar surface (b). Photo by E. Sieradzka

As far as we are aware, there are no identified *Ursus arctos* remains from the ZC and CWC contexts from Lesser Poland (Włodarczak 2006; Witkowska 2013). A single bear phalanx was discovered in feature no. 3 from the GAC cemetery in Polanów Złocki (traditionally Złota-“Gajowizna”). It was interpreted as some kind of an addition to this mass animal grave pit, containing remains of at least a dozen individuals, mostly pigs (Krzak 1977, 19-20). Moreover, in an inventory of the GAC grave II from Suemcy, Baranivka district, there was a pendant made from an animal tooth, supposedly a bear canine (Levickiy 1929, 198). Finally, *Ursus arctos* remains have thus far been only rarely recognized within faunal assemblages from GAC settlement features (Makowiecki and Makowiecka 2000, 351, table 7; Stefaniak *et al.* 2017, 501).

It is worth emphasizing that the brown bear bones from Święcica were lying in anatomical position, suggesting that in this case, we may not have been dealing with post-consumption remains (see Fig. 8). If so, the bones should have been originally deposited in a chunk of meat, left for the dead as a kind of offering (cf. Makowiecki 2016, 77). Additionally, the observed lack of phalanges could indicate that the paw may have been skinned, since these bones are usually cut to some extent while performing the procedure (Kirkinen 2017).

In early modern Poland, cooked bear paws were regarded as a special treat of hunting-camp cuisine (e.g. Szyttler 1845, 9-12; Łoziński 1931, 132). On the other hand, in ethnographical records we could find numerous instances of various symbolic meanings borne by this specific part of a bear carcass. It was reported that in southern Fennoscandia, canine teeth, claws, penis bones, and paws were believed to be capable of healing, protecting cattle from predators, and finally transferring a bear's strength and senses (Kirkinen 2017, 3).

Amulets made from bear paws were a part of apotropaic magic of Siberian tribes (Losey *et al.* 2013, 90). In southern Finland, there is a single find interpreted as a building offering (Kirkinen 2017, 3). The great symbolic importance of animal paws among people of northern Eurasia is evidenced by a very specific funerary rite dated to the VII-XI centuries (Callmer 1994). In the Łland Islands and central Russia, researchers have identified a group of kurgans with cremation graves, inside of which were found clay paws, usually resembling those of a beaver or a brown bear (Callmer 1994). Those artefacts are most often deposited in the central part of a barrow, either on a layer of charcoal and calcined bones, or next to an urn containing a burial (Callmer 1994, 17).

Feature 1a

The shape and dimensions of the grave niche proper – feature 1a – do not diverge from the rather broad variation of forms of such features identified in the ZC milieu (e.g. Krzak 1961; 1970; 1976; Wilk 2014). The only deviation seems to be the stones, loosely deposited in the central part of the pit (Fig. 6). In contrast, pebbles found in a typical ZC niche are most likely to be arranged in a pavement covering the bottom of the grave (Witkowska 2013, 99-100; Wilk 2014). It is worth noting that the human and animal bones in feature 1a were discovered either in the western part of the niche, beyond the range of stones, or under them (Fig. 7). Hence, we could suspect that the pebbles were most likely laid in the grave following both the burial and the subsequent decomposition of the human remains.

If the rubble from feature 1a is not debris from a possible structure sealing the entrance to the niche (see above), we should remember that the idea of using stones in a similar manner inside graves is not unknown among GAC customs. For example, in grave no. 127 from Mierzanowice, human bones as well as grave inventory have been identified on and beneath a stone paving on the bottom of the feature (Bąbel 1979, 69). We should also mention grave no. 2 from Małoszywka, Płock district, where over a dozen pebbles were found covering the charred skeleton of a child of the age of *Infans I* (Kempisty 1964, 392).

Double graves, containing the remains of an adult and a child, have been observed in cemeteries of many Late Neolithic communities. This category of graves is well described in the Lesser Poland CWC (Włodarczak 2006, 66; and table 18, p. 65). In the ZC, two individuals of the exact age as those discovered in Świącica were identified only in grave no. 3 from the cemetery of Złota-“Nad Wawrem” (Krzak 1970, 22). An example of such a grave from the GAC milieu is the aforementioned grave no. 2 from Małoszywka (Kempisty 1964, 389-393).

With two vessels and four amber beads, the grave from Świącica could be placed among the more poorly equipped ZC graves (Witkowska 2013, 116). It is worth noting the lack of such specific ZC vessel types as bowls, vases or cups (Witkowska 2013, 117-118). On the other hand, the set consisting of an amphora and a beaker resembles grave inventories of the CWC in Lesser Poland. Among all CWC graves equipped with two vessels, the discussed types were those most frequently found together (Włodarczak 2006, 70).

The amphora from Świącica could be assigned to type IVc in the classification scheme of ZC vessels produced by Barbara Witkowska (2013, 29). This class of pots is characterized by a low and very broad belly, with the maximum diameter located midway up their height. ZC specimens of matching proportions have been discovered in grave no. 2 from the Książnice cemetery (Wilk 2013, fig. 22: 4), and in settlement pit no. 219 from the site Złota-“Nad Wawrem” (Krzak 1976, 77, fig. 29: f).

With regard to large, four-handled ZC amphoras, scholars unanimously agree that they must have been developed from the so-called “Kuiavian amphoras” of the GAC (e.g. Wilk 2013, 323; Witkowska 2013, 28). Comparing the amphora from Świącica to the typological scheme of GAC pottery, as detailed by Marzena Szmyt, it would be classified under type V BIII11aa (Szmyt 1996, 31). However, no vessel of this exact shape has thus far been obtained from confirmed GAC features. The specimen from Świącica closely resembles an amphora recovered from a construction heap in the course of rescue excavations of site 78 in Sandomierz (Ścibior and Ścibior 1990, 191, fig. 29: a). While the find is traditionally linked to the GAC, graves of both the GAC and ZC were discovered at this cemetery (Ścibior and Ścibior 1990).

Alternating bands of cord impressions and rows of arch-shaped stamps on the neck of the analyzed amphora (Fig. 11: 6) seem to rather deviate from the rules of ZC ornamentation. In this culture, necks of “post-Kuiavian” amphoras are almost always decorated with cord impressions only, often arranged in horizontal or wavy lines (e.g. Krzak 1970; 1976; Wilk 2013). On the other hand, various stamp ornaments, sometimes combined with cord impressions, are more characteristic for the GAC pottery style. Amphoras from the aforementioned site 78 in Sandomierz are a rare departure from such standards, visibly resembling typical ZC decoration (Ścibior and Ścibior 1990). An ornamentation pattern using cord impressions and large, arch-shaped stamps, matching those on the vessel from Świącica, was found on an amphora from a GAC stone cist grave found in Rudno, Parczew district (Ścibior 1986, 116, fig. 6: 1).

The decoration of the belly of the analyzed amphora also resembles rather the GAC pottery style. Vertical bands consisting of rows of rectangular and arch-shaped stamps are very characteristic for GAC materials from the eastern part of the central group (Nosek 1967), as well as the Volhynia area in the eastern group of this culture (Szmyt 1999). It seems that ZC communities, in a way, “inherited” this manner of decorating the bellies of large, four-handled amphoras (e.g. Krzak 1961; 1970; 1976). A nearly identical ornamentation pattern was identified on the previously mentioned amphora type IVc from grave no. 2 at Książnice (Wilk 2013, fig. 22: 4).

With a poorly distinguished, short, and cylindrical neck, the proportions of the petite beaker found in the grave from Świącica loosely correspond to beakers typical for the oldest A-horizon of the CWC (Fig. 11: 5; cf. Włodarczak 2006, 11; see also Witkowska 2013, 35). A very diagnostic component seems to be the lack of a long, funnel-shaped neck, which is regarded as one of the characteristic features of many younger types of CWC and ZC

beakers. Moreover, the profile of the analyzed specimen resembles beaker-shaped GAC vessels, typical for the Masuria, Mazovia, Podlasie, and Lesser Poland regions, as well as the Lublin area of the central group of the GAC (Nosek 1967). Necks of such vases typically measure less than $1/3$ or $1/4$ of the vessel's height (Nosek 1967).

The decoration of the neck of the analyzed beaker, consisting of horizontal cord impressions, underlined by a row of oval stamps, seems to be quite common for similar vessels from the ZC, GAC, and CWC contexts (e.g. Nosek 1967; Krzak 1976; Włodarczak 2006). On the other hand, vertical bands of oval imprints have so far been identified only on the sole petite beaker from grave no. III/15 from the ZC cemetery of Złota-“Grodzisko I” (Krzak 1976, 123, fig. 52: c). In the GAC, a very similar pattern was only sometimes used in order to decorate the bellies of amphoras (e.g. vessel from grave no. 7 from Klementowice, site 4; Puławy district; Halicki 1970, 310, fig. 11: g).

The grave from Świącica yielded only 4 amber beads – 2 tubular and 2 oval button-shaped specimens (Fig. 11: 1-4). It is worth noticing a lack of quadrangular button-shaped beads, which are a very specific type of amber adornment found almost exclusively in ZC graves (Mazurowski 1983, 27-28; cf. Witkowska 2013, 83-84). In this culture, I A1a and 1BIIa-b type beads have only occasionally been identified, usually as part of complex amber necklaces (Mazurowski 1983, 74, table 14).

We should also mention the relatively large diameter of the oval amber buttons discovered in Świącica, measuring more than 2 cm (Fig. 11: 1-4). According to Mazurowski's evaluations, the size of this type of bead from ZC contexts rarely exceeds 1-2 cm (Mazurowski 1983, 71). Hence, the dimensions of amber beads from Świącica match slightly larger adornments typically identified in GAC features. In the Sandomierz Upland, tubular and oval specimens were discovered in GAC graves in Chwałki (Nosek 1967, 192), Grójec (Krzak 1972, 344, fig. 4: f), and grave no. 220 from Mierzanowice (Bąbel 1979, 71, fig. 10: e). In addition, amber beads were also a part of the inventories of grave nos. 9 and 30 from Polanów (“Złota-Gajowizna”) (Krzak 1977, 27; 52).

Among the grave offerings from Świącica, a few pig bones were identified: a pelvic bone and the mandible of a male, possibly belonging to the same individual (pers. comm. by Daniel Makowiecki and Mirosława Zabilska-Kunek) (Table 1). So far, animal remains have been unearthed in ZC graves only on very rare occasions. A number of animal bones were found in grave nos. 6 (60), 13 (190), 55 (448), and 57 (436) from Złota-“Grodzisko I”, as well as nos. 4, 76, and 235 from Złota-“Nad Wawrem” (Krzak 1976, 177; Witkowska 2013, 83). Furthermore, within the infills of graves 1-3 from Książnice, researchers discovered teeth and bone fragments belonging to cattle, pigs, and goats or sheep (Makowicz-Polisztot 2013). There is also the unique ZC grave from Sandomierz-Mały Rynek, containing a skeleton and the mandible of a pig (pers. comm. by Monika Bajka and Marek Florek).

On the other hand, animal remains seem to play a very important role in GAC funerary rites (e.g. Nosek 1967, 275; Szmyt 1996, 178-179, table 28; 1999, 32, table 3). Pig mandibles are common finds in graves of all GAC territorial groups. Since this part of a pig carcass



Fig. 16. Świącica, site 30, Sandomierz district. Shells of the snail *Cepaea vindobonensis* from feature 1a. Photo by M. Bajka

does not have significant consumption value, it has been suggested that the practice of burying it with the dead most likely bore a symbolic meaning (Makowiecki and Makowiecka 2008, 377; Makowiecki *et al.* 2014, 231). The presence of a porcine pelvic bone suggests that, originally, a portion of meat may have been deposited in the grave. The tradition of equipping the dead with food could be also linked to the GAC (e.g. Nosek 1967; Krzak 1977; Szmyt 1996; 1999).

If we assume that farrowing of Neolithic pigs occurred between February and April, like contemporary wild boars, then the slaughter of the individual whose remains were found in the grave from Świącica must have taken place in one of the summer months (pers. comm. by Daniel Makowiecki). Pigs found in the GAC grave from Chodzież, Chodzież district, were possibly butchered in the same season (Makowiecki and Makowiecka 2008). Similarly, in the case of a male individual placed in a GAC grave in Kowal, Włocławek district, it has been suggested that slaughtering may have occurred between late spring and summer (Makowiecki *et al.* 2014).

Finally, we should briefly comment on the occurrence of the shells of the snail *Cepaea vindobonensis* identified in the lower parts of features 1 and 1a from Świącica (Table 3) (Fig. 16). This species lives in dry, exposed, and sunny environments, and is typically spotted in steppe-like xerothermic grasslands (Barga-Więclawska and Jedynak 2014, 298). The collection from Świącica is the second confirmed case of *Cepaea vindobonensis* shells from Late Neolithic contexts in the Sandomierz Upland. Within settlement pits of the GAC settlement in Krzczonowice, among other molluscs, there were identified in total 8 specimens of the aforementioned species (Barga-Więclawska and Jedynak 2014). Compared to Krzczonowice, the snail shell assemblage from Świącica is vastly more abundant and strikingly uniform.

4. CHRONOLOGY

Two radiocarbon dates were obtained from the structure at Święcica (Table 4). The samples were the talus bone of an adult individual and a pig mandible, both taken from the bottom of feature 1a (Fig. 7). The resulting dates, $4\,160 \pm 35$ BP and $4\,120 \pm 35$ BP (Table 4), correspond closely to each other (Fig. 17). Sadly, the measurements calibrate to a plateau on the curve covering most of the 3rd millennium BC (Fig. 17).

Radiocarbon dates for the analyzed grave match the date obtained ($4\,165 \pm 35$ BP) for the early ZC grave from Wilczyce in the Sandomierz Upland (Florek and Zakościelna 2005; Włodarczak 2013, 375). As discussed above, the grave construction from Wilczyce loosely resembles the structure from Święcica (Florek and Zakościelna 2005; 46, fig. 3: B). However, despite the parallel chronology, similar layout of features, and relatively close distance between these two graves, their inventories show a clear discrepancy (cf. Florek and Zakościelna 2005; 51, fig. 7; 53, fig. 8). Instead, the amphora from Święcica seems to be rather affiliated with a vessel from Książnice, located in the Nida Basin, far on the western edge of the ZC territory (Wilk 2013). Taking into account the uncalibrated chronology only, the Książnice cemetery, dated about $4\,200$ BP, would be just slightly earlier than both the Święcica and Wilczyce graves (Wilk 2013).

We could not broach the topic of the earliest niche graves in Lesser Poland without discussing the chronology of such features in the CWC milieu. While the initial ZC stage is often synchronized with the earliest A-horizon of the CWC (e.g. Włodarczak 2006, 129), or even regarded as slightly older than the dawn of this culture (e.g. Witkowska 2013, 154–157), the first appearance of niche graves marks the beginning of phase II of Lesser Poland CWC (e.g. Włodarczak 2006, 98–99). The CWC niches, dated not earlier than $2\,700$ BC, would thus be younger than the first such structures in the ZC (Włodarczak 2006, 126, fig. 54). However, it is worth noting that radiocarbon dates obtained for some complexes representing the CWC phase II turned out to be very similar to the ones for the Święcica structure. We should mention that this is the case with the CWC grave no. 23 from Samborzec, already given as an example of a niche grave with a profile similar to that in Święcica (Fig. 14: c) (Kamieńska and Kulczycka-Leciejewiczowa 1970). The radiocarbon date obtained for this grave, $4\,160 \pm 50$ BP, matches closely the absolute chronology of the analyzed features (c.f. Włodarczak 2006, 125, table 35).

Perhaps it would be best to discuss this issue in the context of the theory of Stanisław Wilk regarding the origins of ZC niche graves (Wilk 2014). In opposition to commonly accepted views of an eastern provenance of such features, tracing them to a late and post-Trypillia culture background, Wilk analyzed the local roots of niche graves. According to Wilk's evaluations, many ZC niches often have attributes resembling GAC graves, including their internal organization and the practice of covering the bottom of a grave pit with a stone paving (Wilk 2014, 185). Moreover, the lining of niche walls with stones, as observed in a few ZC graves, could be closely linked to the GAC grave constructions (Nosek

1967). It is worth noting that such a construction was discovered in one of the niche graves from Książnice (Wilk 2013, fig. 29).

Since the GAC features of the grave from Świącica seem to be even more evident than in the case of Książnice (see above), according to Wilk's theory, it should be regarded as one of the oldest ZC complexes. Instead, radiocarbon dates for the analyzed complex are very similar to ones obtained for the Książnice and Wilczyce graves, all characterized already by predominantly very distinctive ZC traits (Florek and Zakościelna 2005; Wilk 2013).

In attempting to explain this situation, first and foremost, we should bear in mind the previously mentioned plateau on the radiocarbon calibration curve, covering the entire timespan of the ZC and the early stages of the CWC (Reimer *et al.* 2013). Consequently, correlation of the chronology of the complexes of these two cultures must be based on a comparative analysis of the style of artefacts, most often concerning pottery (e.g. Krzak 1976; Włodarczak 2006, 129; Witkowska 2013, 154-157). Sadly, still very few radiocarbon dates for GAC assemblages in Lesser Poland cannot be used as reliable reference to the GAC traces identified in the ZC graves (e.g. Szmyt 1999, 76-77; Witkowska 2013, 147-148).

In relation to the theories of Wilk just discussed above, the commonly accepted ZC periodization scheme suggests that the general course of changes in the material culture

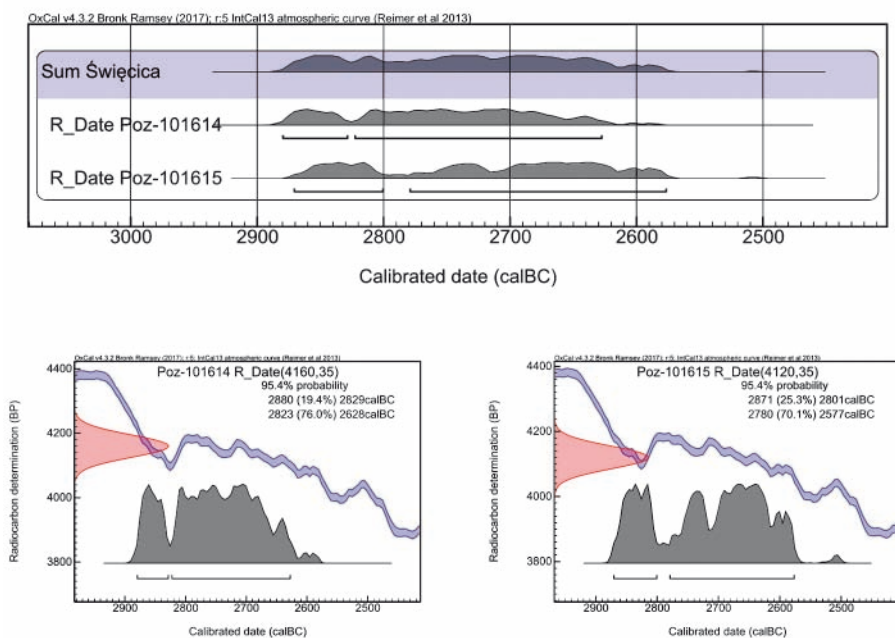


Fig. 17. Świącica, site 30, Sandomierz district. Calibration of the radiocarbon dates of feature 1a

would be abandoning initial GAC-like features, and gradually replacing them in the course of developing specific ZC elements (Ścibior 1991, 68-71; Wilk 2013; Witkowska 2013; cf. Wilk 2014). Consequently, in the case of the Świącica grave, numerous GAC reminiscences combined with a relative scarceness of clear CWC traits (see above), confirm once more the rather early chronological position of the structure (cf. Witkowska 2013, 133-136). Bearing in mind that the absolute chronology of the ZC cemetery in Książnice was established to be 2900-2830 BC (Wilk 2013, 335), we would suggest that the most probable chronology of the analyzed grave from Świącica could be the first peak shown in the calibration graphs of both radiocarbon dates obtained for the feature, which would be about 2880-2800 BC (Fig. 17).

5. CONCLUSION

The specifics of the structure from Świącica seem to lie in the integration of a ZC niche type of grave construction with multiple elements whose direct equivalents could be found only in the GAC milieu. Distinctive traces of the latter culture may be identified in various aspects of the layout of the grave, funerary rites, and selection of grave goods. So far, clear instances of the continuation of the GAC tradition have been identified only when it comes to rather secondary construction details of ZC graves (Wilk 2013; 2014). Thus, Świącica makes the first ZC structure where the keeping of GAC customs has manifested itself so evidently.

The most striking detail about the analyzed grave is the entrance pit to the niche. On the bottom of feature 1 there was unearthed a charred layer, on which were laid a single cattle bone and the paw of a brown bear (Table 1, 2). The latter find is completely unique when it comes to Late Neolithic funerary features. Since in this period of time remains of domesticated animals clearly prevail in both graves and various ritual deposits (Nosek 1967; Krzak 1977; Szmyt 1996), the discovery from Świącica provides new insight into the spiritual sphere of Late Neolithic communities of Lesser Poland.

Radiocarbon dates for the analyzed grave may appear a little bit younger that could have been expected based on comparative analyses (Fig. 17). However, the measurements confirm the attribution of the grave from Świącica to the earliest stage of the ZC, among such well-known finds as graves from Książnice (Wilk 2013) and Wilczyce (Florek and Zakościelna 2005). The observed differences between those complexes may reflect the initial multiformity in the period of formation of the ZC phenomenon (cf. Witkowska 2013).

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THE PRESUMED EARLY BRONZE AGE GRAVE FROM THE RADOM PLAIN

ABSTRACT

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In the area of Mokrzec village, human bones were accidentally discovered, along with the following accompanying artefacts: a small cup, products made of copper – a bracelet, the blade of a dagger, five chapes, a bone awl, flint tools and flakes. It is probably a grave from the beginning of the Bronze Age, which can be related to the early phase of the Mierzanowice culture. The inventory of the grave indicates the importance and status of the buried man.

Keywords: grave, Mierzanowice culture, ceramic cup, bronze bracelet, bronze dagger, bone awl, flint tools

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PLACE AND CIRCUMSTANCES OF THE DISCOVERY, HISTORY OF RESEARCH

The discovery of archaeological artefacts was made in 1994 on a gravel-sandy hill, located south of the western border of Mokrzec village, Przysucha district, Masovian province. The hill has been fallow for many years, with numerous traces of sand and gravel exploitation in the form of quarries. This is the highest elevation in the area, about 9 m above the surroundings. The hill is bordered by meadows to the west and south, growing in the valley of an unnamed stream, a right-bank tributary of the Wiązownica River, flowing from west to east, to the south of the site. In the southeastern direction, the slope falls gently towards the Wiązownica Valley.

While excavating the layer of sand, human bones were revealed. They were located in the western section of the excavation, at a depth of about 1,0-1,2 m from the surface, in the layers of coarse sand and gravel. The discovery was reported to the police station in Potworów on March 31, 1994. The next day, at the recommendation of the District Prosecutor's Office in Przysucha, the place of discovery was inspected. The sand dump where the human bones were found was searched. Large fragments of the skull, small fragments of the mandible, long bones, fragments of the sacrum, pelvis, vertebral bodies, bones of the shoulders, collarbone, wrist bones and tarsus, small bones of the hands and feet and fragments of the ribs were found. In addition to the bones, metal objects were collected as material evidence: an oval-rolled metal rod, four arched plates and a blade with four rivets at the base. The objects were covered with a greenish patina and green discolouration was recorded on the bones.

After collecting the material evidence, the District Public Prosecutor's Office in Przysucha issued a decision to appoint an expert to investigate the human remains discovered in Mokrzec. Roman Fundowicz, a medical doctor and specialist in pathomorphology from the Department of Pathomorphology of the Radom Health Care Centre took charge of this matter. As a result of the inspection, it was established that the bones and metal objects were archaeological findings. With the consent of the District Public Prosecutor's Office in Przysucha, artefacts and human remains were transferred to the archaeological department of the Radom District Museum.

Further work at the site of discovery was carried out by museum employees. The excavation was meticulously searched, and the rubble within a few meters from the place indicated by the discoverers was explored. Further flint products and blanks, as well as fragments of the vessel, bone and metal objects were obtained. Surface surveys were carried out in the vicinity of the site, which revealed mainly the relics of a Funnel Beaker culture settlement. However, no traces of settlement contemporary to the burial in question were recorded.

Human bones and artefacts obtained from the quarry section are stored in the collection of the Jacek Malczewski Museum in Radom (inv. no. MOR/A/1444). The discovery

has not been included in the wider scientific circulation so far, because it is mentioned only in local publications (Twardowski 2000, Cieślak-Kopyt *et al.* 2004, 96-97). Authors describing the discovery had no doubts that a grave was uncovered in Mokrzec. It was considered that in the richly equipped grave, a warrior – a person of great importance and rank, was buried at the turn of the Neolithic and Early Bronze Age. This episode was related to “the Chłopice-Veselé culture from the south” (Cieślak-Kopyt *et al.* 2004, 96-97).

PRESENTATION AND INITIAL INTERPRETATION OF SOURCES

The full inventory of artefacts made of various materials, alleged as burial equipment from Mokrzec, is as follows: clay – a vessel; metal – a bracelet, a dagger, 5 band chapes; bone – an awl; flint: 2 scrapers, an arrowhead, 9 flakes including one retouched piece. The material composition analysis of metal objects was made by Marcin Biborski.

1. Cup – small, wholly intact, with no visible curves. A conical neck with a thickened lip, slightly leaned out with a kind of “overlap”. A bulbous body with the greatest convexity placed below half the height of the vessel. The bottom is poorly defined. Quite solid, banded, non-decorated handle connects the lip with the body at the area of greatest convexity. The surface of the vessel is decorated by cord imprint: the neck with three groups of triple, horizontal imprints, and the body with four groups of double, vertical imprints, 2-2.5 cm long. The thread of which the cord used for decoration was made was about 1 mm thick. Dimensions: height – 8 cm, diameter of the mouth – 10 cm, diameter of greatest convexity on the body – 12 cm, bottom diameter – about 5 cm. Walls in grey-brown colour. Both surfaces are smooth, but with no traces of polishing. In the ceramic material, a temper of sand and small amount of white, crushed stone is visible (Fig. 1; 2).

2. Bracelet – made of a thick rod, with an oval cross-section in the body portion and a round cross-section at the tapering ends. The end parts are overlapping and straight. The artefact is not ornamented. In several places on the surface, mechanical damages of post-depositional nature are visible. Within these damages, a dark green (noble) or bright green (malicious) patina accumulated. The majority of the bracelet surface (undamaged parts) is not covered by patina at all. Dimensions: external diameter 9.2×8 cm, internal (light) – 6.8×6.3 cm. Rod thickness: within the body 1.5×1.2 cm, at the end – 0.9 cm; weight 2550 g (Fig. 3; 4).

3. Dagger blade with a semi-circular plate at the handle. The handle, which did not preserve, was fastened to the blade with five rivets, of which four were preserved. The rivets, in the form of short rods, 0.8-1.0 cm long, have a circular cross-section (diameter of 1.5 mm) and are not hammered at the ends. On the short blade, the fuller is poorly visible. The artefact bears the traces of numerous damages, especially within the converging point and lateral edges. These damages could have occurred during the use of the dagger, or the time of post-depositional processes. The entire artefact is covered with a noble patina.



Fig. 1. Mokrzec, Przysucha district. Clay mug. Photo by M. Piotrowski

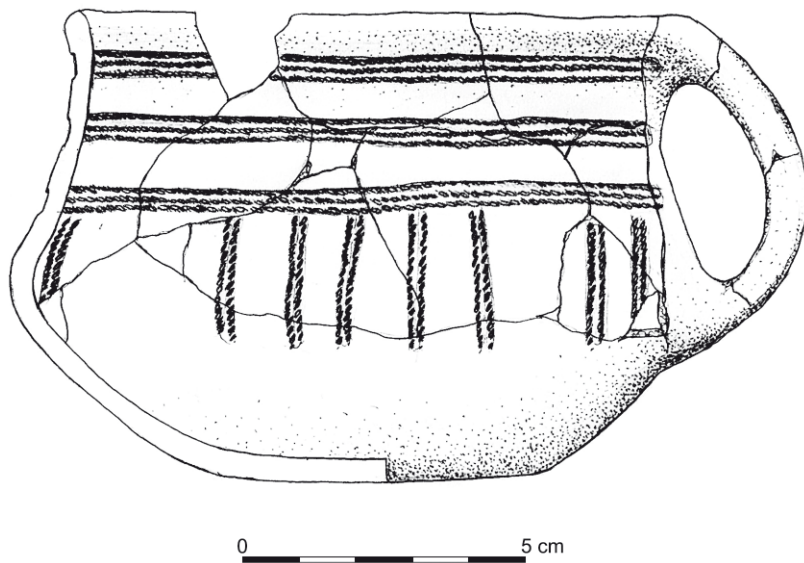


Fig. 2. Mokrzec, Przysucha district. Clay mug. Drawn by W. Zieliński



Fig. 3. Mokrzec, Przysucha district.
Copper bracelet. Photo by M. Piotrowski

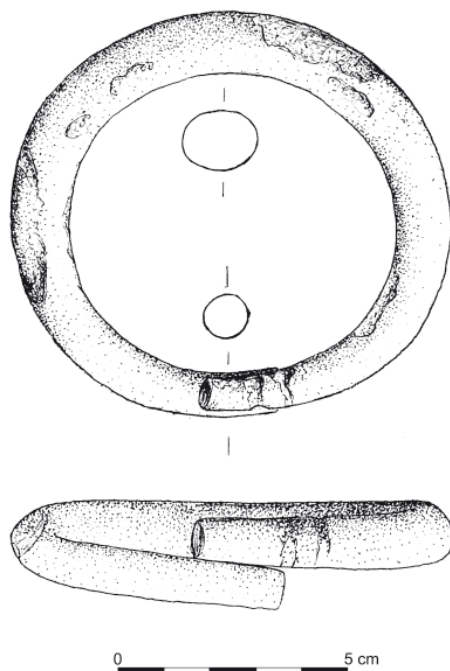


Fig. 4. Mokrzec, Przysucha district. Copper bracelet.
Drawn by W. Zieliński



Fig. 5. Mokrzec, Przysucha district.
Copper dagger blade. Photo by M. Piotrowski

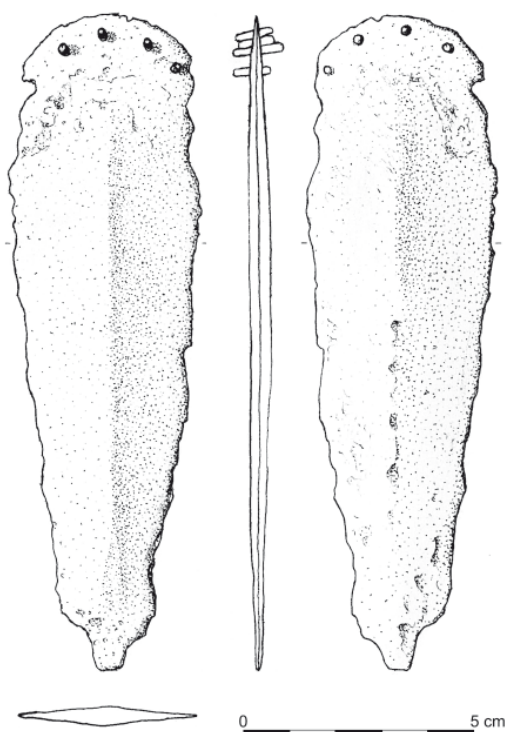


Fig. 6. Mokrzec, Przysucha district.
Copper dagger blade. Drawn by W. Zieliński

Preserved dimensions: length 13,8 cm, width of the handle base 3.5 cm; weight 43.1 g (Fig. 5; 6).

4. Five arched chape bands – with folded ends covered by dark green noble patina. All bear traces of damage. Originally they had similar dimensions: the length of the arch about 10 cm, the “string” length from 5.3 to 7 cm, width about 0,5 cm, thickness about 0.1 cm; weight of particular elements: 1.3-2.1-8.8-2.6-1.9 g (Fig. 7: 1a-5a; 7: 1b-5b).

5. Awl – longitudinal, flat-convex, with a hole in one end (round in plan, hourglass-shaped in cross-section). The opposite end is rounded. The bone is from an indeterminate species in a grey-yellow colour. On one of the front surfaces, just below the hole, traces of green copper salts have been preserved. Dimensions: length 14,8 cm, width under the hole 1.5 cm, at the opposite end – 0.8 cm, thickness from 0.5 to 0.8 cm; hole diameter 0.4 cm; weight 14.3 g (Fig. 8; 9).

6. Scraper – longitudinal concave/convex, topped with a rounded narrow distal end, formed by a single-serial, semi-abrupt inverse retouch, with a narrow base formed by obverse abrupt retouch. Both the distal end and the base were intensively used, which in both cases resulted in gaps recorded on the positive side and “rounding” on some sections. On both edges a segmented truncation is visible (use-wear traces?). The scraper was made of a massive scar blade-flake, slightly twisted and raised in the apical part. It is almost entirely covered with a whitish patina on both sides. The surfaces without patina are similar to Volhynian flint. On the upper side, micro-layers of clay are visible. Dimensions: length 84 mm, width 36 mm, thickness 9 mm; weight 41,7 g (Fig. 10: 1; 11: 1).

7. Scraper – longitudinal, doubly convex, topped with a wide and rounded distal end, formed by a single-serial, semi-abrupt retouch on the top side, with a narrow, oblique base formed by semi-abrupt retouch on the positive side. On both sides, gaps (use-wear traces?) are visible. The scraper was made of a twisted cortex blade-flake, slightly raised in the middle section. Macroscopic micro-traces were not recorded. It is made of Volhynian flint, and only the underside is covered by patina. Dimensions: length 87 mm, width 30 mm, thickness 8 mm; weight 37.1 g (Fig. 10: 2; 11: 2).

8. Arrowhead – slim, triangle, formed by a bifacial retouch, with an arched base with slightly asymmetrical wings. Made of erratic flint (?) with patina on one side. Dimensions: length 23 mm, width 13 mm, thickness 3 mm; weight 5 g (Fig. 10: 3; 11: 3).

9 – Retouched flake – scared, with partially preserved cortex. Its rhomboid shape was obtained by breaking off the opposite edges. The converging two edges were partially retouched by low-angle retouch (in the image of handle); the opposite, slightly arched edges were micro-retouched (distal end?). Made of Volhynian (?) flint, no patina. Dimensions: length 33 mm, width 20 mm, thickness 3 mm; weight 2.2 g (Fig. 12: 7; 13: 7).

10 – Six flakes – scared, small and medium ones (preserved fragmentarily), originating from flake cores with altered orientation (multidirectional scars, including opposite ones) – not forming refittings. Four of them are slightly bent in the middle section, the remaining ones are straight. Butts of four specimens were formed, in two cases faceted, in

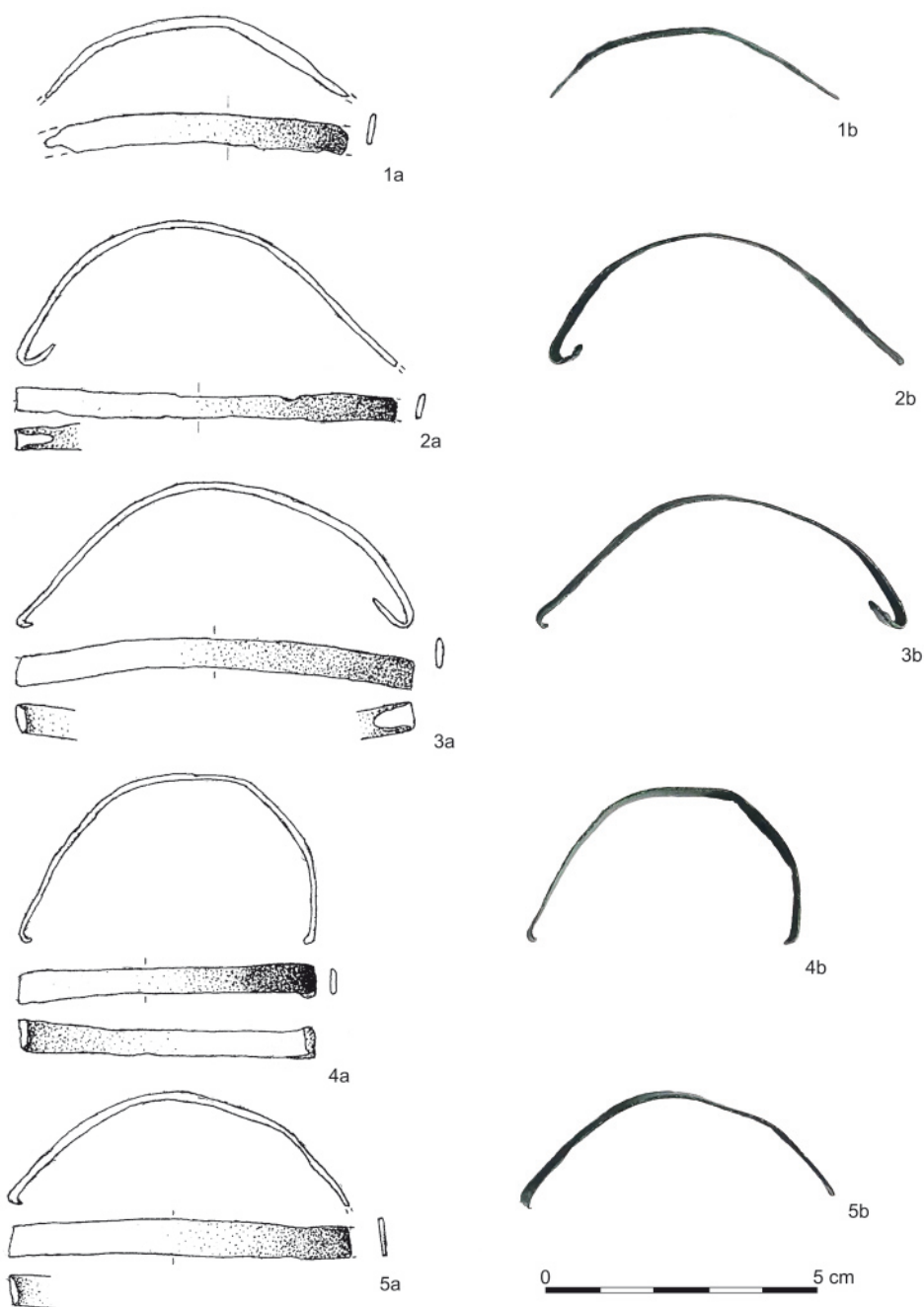


Fig. 7. Mokrzec, Przysucha district. Copper bands: 1-5
 Drawn by W. Zieliński, photo by M. Piotrowski



Fig. 8. Mokrzec, Przysucha district.
Bone awl-fabricator: Photo by M. Piotrowski



Fig. 9. Mokrzec, Przysucha district.
Bone awl-fabricator: Drawn by W. Zieliński



Fig. 10. Mokrzec, Przysucha district. Flint products: sidescrapers – 1, 2; arrowhead – 3. Photo by M. Piotrowski

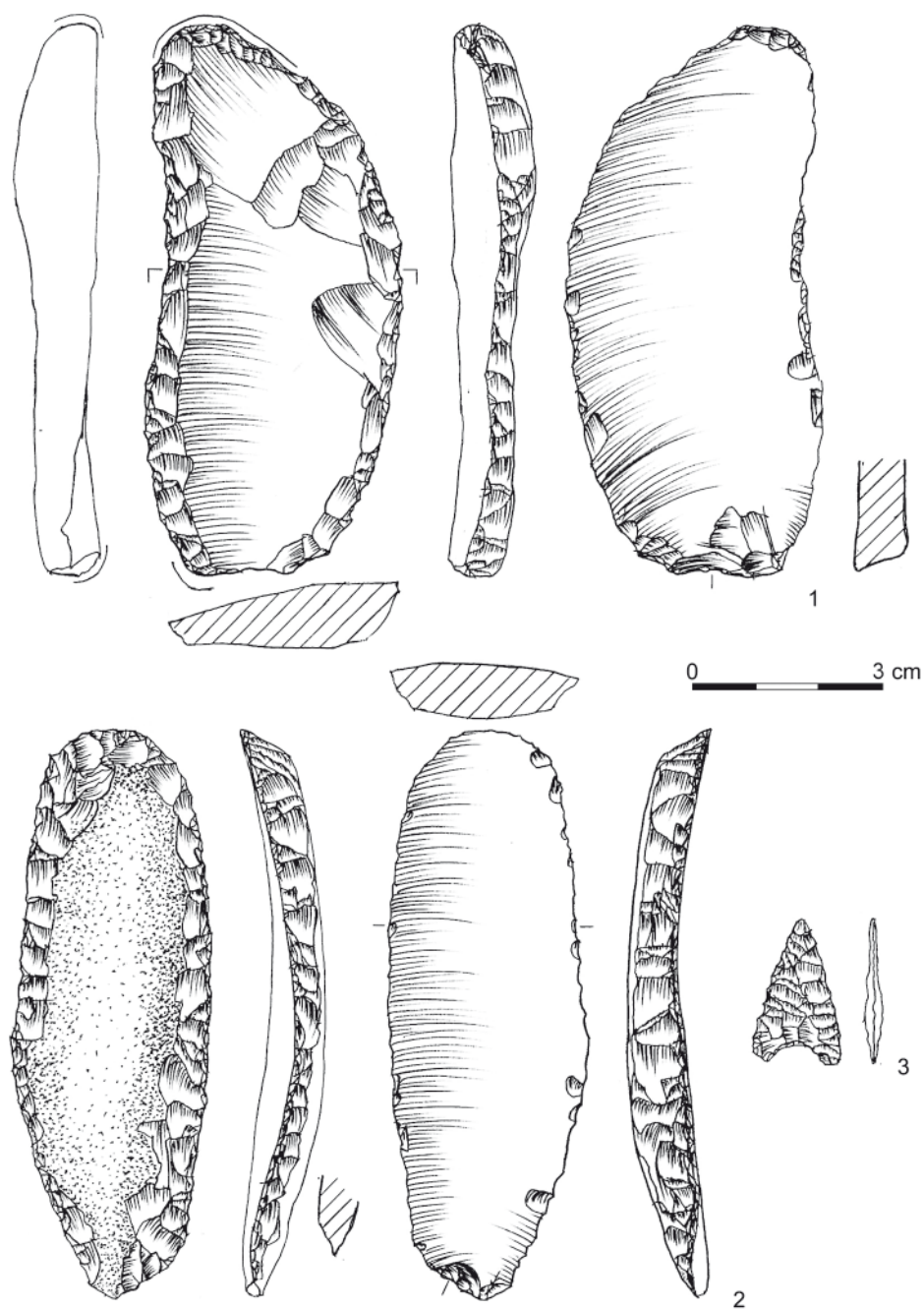


Fig. 11. Mokrzec, Przysucha district. Flint products: sidescrapers – 1, 2; arrowhead – 3. Drawn by J. Libera

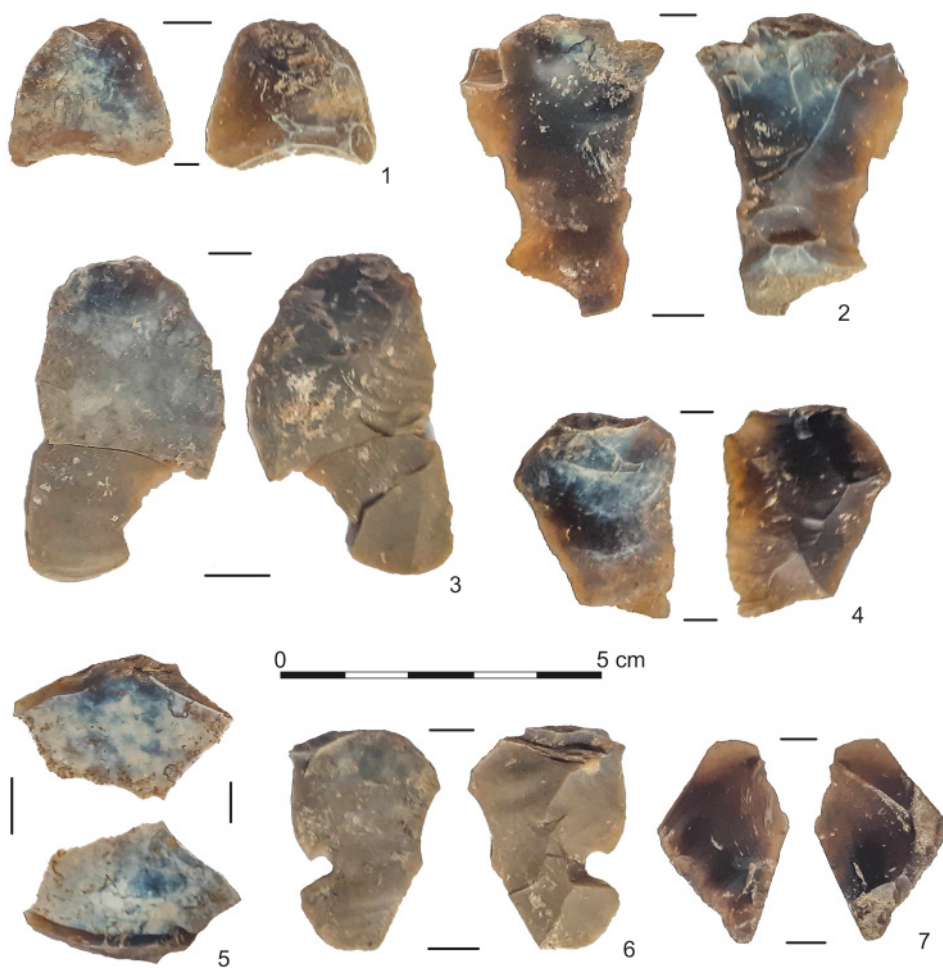


Fig. 12. Mokrzec, Przysucha district. Flint flakes: 1-7. Photo by M. Piotrowski

two other – edged. Some of them bear traces of platform edge trimming. Polygonal in cross-section. Three specimens have broken sides. Three preserved fragmentarily. Cretaceous flint (Volhynian?) – on one or both sides covered by white-blue patina. Dimensions (6 specimens): length 20-48 mm, width 23-34 mm, thickness 4-5 mm; weight: 2.9-2.5-3.4-4.6-5.7 g (Fig. 12: 1-6; 13: 1-6).

There is no question that, from the formal point of view, the vessel from Mokrzec corresponds to certain cups assigned by Sławomir Kadrow and Jan Machnik to the proto-Mierzanowice phase, type A and in particular type B, occurring in two varieties (1997, fig. 5). The cup described above can be related with two findings. The first one originates from

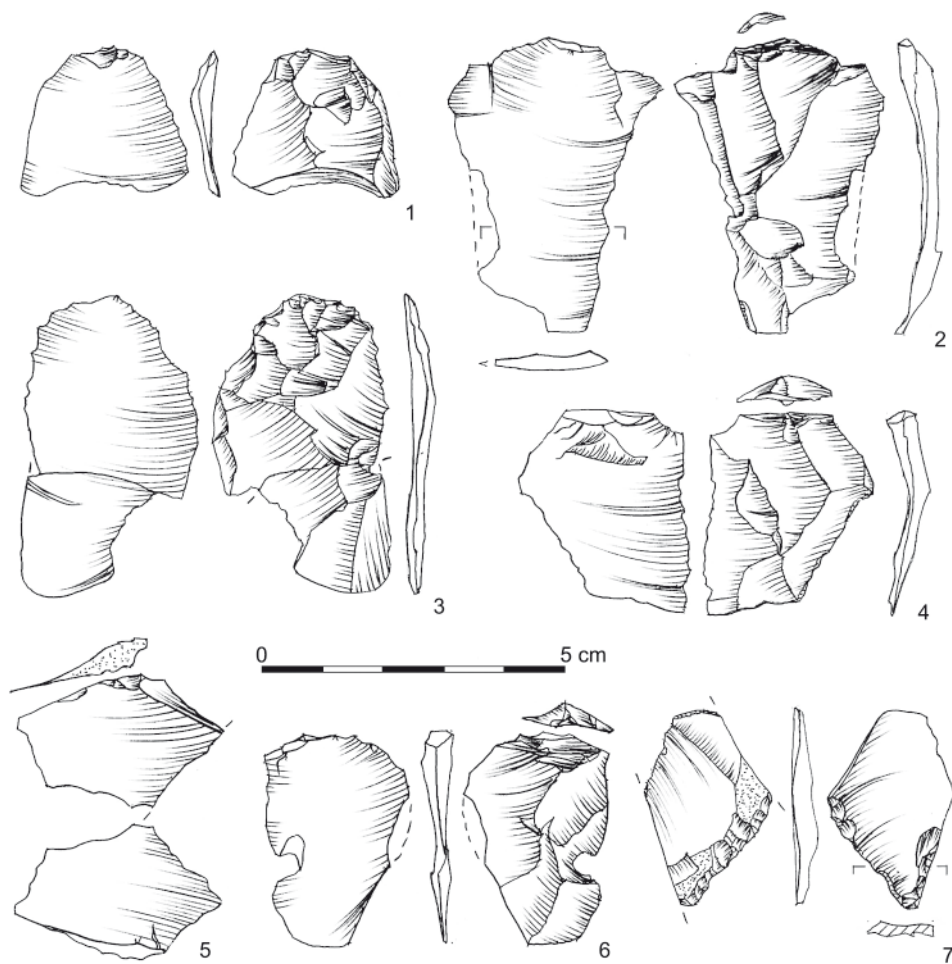


Fig. 13. Mokrzec, Przysucha district. Flint flakes: 1-7. Drawn by J. Libera

grave no. 59 in Żerniki Górne (Kempisty 1978, 138, fig. 179: 1), the second from the grave from Starachowice-Wierzbnik (Sawicka 1925, 296, fig. 1). Cups from Mokrzec, Żerniki Górne and Starachowice-Wierzbnik are characterized by their similarity in certain morphology features, such as: a conical neck, topped with a slightly thickened edge (“overlap”), a bulbous body with a low-formed area of greatest convexity. The cups in question, while similar in shape, differ in decoration. The specimen from Mokrzec does not have exact equivalents in Polish lands, but cups from the upper Dniester area are similar to it, e.g. a vessel from Kryłos (Sveshnikov 1974, 49, fig. 1: 1; Machnik 1987, fig. 27: 31) and Torczyn (Kadrow and Machnik 1997, fig. 59: 9). Analogies with regard to ornamentation

can also be found in the find from grave no. 4769 at site 5 in Modlnica (Włodarczak *et al.* 2011, 405, fig. 56: 1). Triple, horizontal cord imprints should be related with the proto- and early-Mierzanowice phases. They occur mainly on cups and jugs (Kadrow and Machnik 1997, 16–18, fig. 2, 3). In the case of vertical imprints on Mierzanowice ceramics, it is considered that they are “not diagnostic” (Górski 2011, 467).

All metal artefacts were made of copper. In the Circum-Carpathian Epi-Corded Ware culture circle, it was the basic material used primarily to make jewellery, and less frequently weapons and tools (see: Kempisty 1982, 69–75). The occurrence of copper bracelets in graves from the early phase of the Mierzanowice culture is a unique phenomenon. A massive bracelet with overlapping ends, found in Mokrzec, has no counterpart in this environment. It is a bit similar to some bracelets from the western part of Poland, which was under the influence of the Únětice metallurgical centre (see: Blajer 1990, Tab. VIII: 4, XLIV: 2); where, however, the dominant material used was bronze. Among the copper bracelets found in the post-Corded Ware *milieu* north of the Carpathians, massive specimens made of round or square rods are known. Examples are found among materials from outside Poland, such as an open bracelet made of a round rod with thinning ends from the cemetery of the Nitra group in Branč, Slovakia (Machnik 1982, fig. 7: 38), and a specimen made of a rectangular rod from the Slatinice cemetery near Olomouc (Šmíd 2006, 25, tab. VII: 10/1). A bracelet was also discovered in burial mound no. VII in Balice, western Ukraine, which was made of a round copper rod, tapered at the ends (Sveshnikov 1974, 50). It is also possible that it was an Early Bronze Age grave deposit, dug into the prior Corded Ware culture barrow (see: Jarosz and Machnik 2000, *passim*, fig. 4: c).

The copper dagger blade from Mokrzec does not have too many counterparts in the formations developing at the beginning of the Bronze Age. In the Polish lands, only one similar artefact was found, but without context or a specified location (Gedl 1980, 43, tab. 12: 84). In Slovakia, a similar copper and bronze specimen with five rivets were recorded in the Košťany and Hurbanovo groups (see: Vladár 1974, 30, 33, tab. 3:50, tab. 4: 79; Machnik 1982, fig. 8: 19). A destroyed dagger with a fuller formed analogically to the Mokrzec exemplar originates from the above-mentioned burial mound no. VII in Balice (see: Jarosz and Machnik 2000, fig. 4: d). A small specimen with three rivet holes (without a fuller) was also recorded in burial mound no. I in Sarniki. This item has been described as made of bronze (Sulimirski 1968, fig. 19: 23) or copper (Sveshnikov 1974, 46, fig. 10: 9). The proto-Mierzanowice phase in the southern part of Poland is represented by a highly damaged specimen with no visible rivet holes, discovered in grave no. 13 in Kraków-Nowa Huta, near Wanda Mound (Hachulska-Ledwos 1967, tab. II: 3; Kadrow and Machnik 1997, 25).

No single equivalent of five bands with bent, sharpened ends, dated back to the Early Bronze Age was found. Three artefacts, similar in appearance and made of a simple band, were found in grave no. 1 in Borek. These artifacts, displaced during post-depositional processes, could be belt chapes (Kłosińska 1997, 86, tab. XI: 1). Based on co-occurring

artefacts, these objects were dated to the turn of the older and middle period of the Bronze Age (ibid. 55).

The bone artefact described above has parallels among “awls” known also in the late Neolithic period, both in the terms of shape and dimensions. A dozen or so exemplars originate from the graves of Corded Ware culture (Włodarczak 2016, 37-38 and next – examples there). A single specimen was discovered among the inventories of Bell Beaker culture objects at Beradz – grave no. 5 – and Samborzec – grave no. III (Budziszewski and Włodarczak 2010, 61, tab. VI: 5-9, XIV: III7). Their presence was also recorded in the Early Bronze Age graves of the “Chłopice-Veselé group” – Veselé, grave no. 19 (Budinský-Krička 1965, tab. VI: 5) – and the early phase of the Nitra culture – Ludanice, grave no. 262/87 (Batora 1991, fig. 32: 30). Irrespective of their typological classification (as “fabricators-awls”), they could be designed to retouch flake and/or blade tools. Such an interpretation is supported by the typical context in which they are found – in men’s graves that are often equipped with arrowheads and small flake debitage – probably blanks for further arrowhead production. This corresponds well with the flint inventory from Mokrzec, although similar collections have not yet been found in burials of the Mierzanowice culture.

All flint objects originating from Mokrzec are among the forms recorded within the burial equipment of the late Neolithic and Early Bronze Age taxonomic units. Undoubtedly, the most numerous and most frequently recorded are arrowheads. Their various shapes and manners of production – edge, bifacial or mixed retouch – are often elements of one deposit. Their largest series for the Mierzanowice culture were published from three cemeteries of the Sandomierz Upland: Mierzanowice, Wojciechowice and Złota; they were recorded in 89 graves, which is more than 40% of all sepulchral features discovered there (Bąbel 2013, 111, tab. 42). Generally, they are triangular or of similar shape, formed by bifacial or edge retouch. The specimen recorded in the Mokrzec inventory – type II in the systematics of Wojciech Borkowski (1987, fig. 20) – often co-occurs with other “types/varieties” of burial equipment. Although the vast majority of burials analysed by Tomasz J. Bąbel (2013 – numerous examples there) originate from the late phase of the Mierzanowice culture, arrowheads similar to the specimen from Mokrzec were also found within features from the proto-Mierzanowice phase (see: Kadrow and Machnik 1997, fig 2-4). The dimensions of the analysed arrowhead are average in length (from 12 to 43 mm), width (from 8 to 27 mm) and thickness (from 2 to 4 mm) values, calculated for the aforementioned cemeteries (Bąbel 2013, 111, 114). Flakes or scaled flake blanks, usually thin and straight in profile, were used for production. In the four graves from Mierzanowice, seven blanks and initial forms of arrowheads have been preserved. Their metric parameters correspond to fully prepared products and are close to the flake obtained in Mokrzec.

Similarly to arrowheads, sidescrapers are also frequently part of the late Neolithic and Early Bronze Age burial equipment. They are of various sizes and shapes, made on medium-massive scar- or cortex-flakes, formed by one- or two-sided, regular, low-angle or abrupt retouch methods, sometimes occurring within one feature. Retouch often covers the distal

part of the artefact, as well, forming a rounded or straight outline. In the analysed inventory, there are two morphologically similar sidescrapers with arched distal ends. Both of them bear a micro-retouch of unknown genesis on their positive sides. The state of preservation of their negatives is comparable to the regular retouching of the upper side, which indicates the absence of accidental, contemporary striking. Regarding the negative specimen, we deal with a form that is partially rounded (as a result of an undefined operation) on the edges of the distal end and the body. No other macro-traces were observed on either exemplar. The dead of the Mierzanowice culture were equipped with this type of tool from the early to late stages of this culture development (i.a. Bąbel 2013 – numerous examples there).

ANTHROPOLOGICAL ANATOMICAL ANALYSIS

The purpose of analysing skeletal materials is to reconstruct and identify factors that determine living conditions (Buikstra and Ubelaker 1994; Kwiatkowska 2005). Archaeological methods enable us to reconstruct social, cultural and ecological environments – from customs and beliefs, through social hierarchy to management and interaction with the environment. On the other hand, anthropological anatomical analyses constitute the primary source of information about economic (type of diet, labour conditions), social (position of the deceased in the group's hierarchy) and sanitary (prevalence of contagious diseases) conditions (Staniowski *et al.* 2008). In order to determine the living and biological conditions of prehistoric populations, we use data pertaining to the lesions that appear on the bone material due to illness, as well as the results of macroscopic examinations of teeth and skeletal markers of physiological stress.

This paper presents an analysis of a single skeleton (MOR/A/1444) found in the town of Mokrzec, in the Równina Radomska mesoregion. The first stage of the analysis consisted of cleaning the skeleton and reconstructing its anthropological parameters. The sex of the individual was determined based on the morphology of the cranium and the pelvis in line with generally accepted and applied standards. The age at the moment of death was determined based on the advancement of cranial suture obliteration and the degree of tooth-crown abrasion (Piontek 1985; Buikstra and Ubelaker 1994; Steckel *et al.* 2006).

Description of the cranium

The cranium is not well preserved and shows extensive damage (Fig. 14). The only fully preserved part of the cranium is the calvaria. The temporal bone, occipital bone and parietal bone show characteristic discolouration resulting from contact with copper jewellery. The preserved bones of the viscerocranium include partially damaged zygomatic bones, nasal bones, maxillary bones (right and left bones broken off at M1) and the mandible.



Fig. 14. Mokrzec, Przysucha district. Cranium (left-side view). Photo by K. Szostek

The state of preservation of the cranium can thus be described as calva with the mandible (Ca+m).

The neurocranium is characterised by massive bones, of great definition and length (cranial index: 71.1). In *norma verticalis*, the cranium has an oval shape (*ovoides*). The wide forehead (forehead-width index: 72.2) is strongly sloped in the upper part of the temporal squama, only slightly arched. The glabella is pronounced and the brow ridges are strongly developed. The sutures do not show obliteration on the outside surface of the cranium, however inside the skull the initial phase of closure was observed in section S_3 of the sagittal suture.

The preserved fragments of the viscerocranium attest to weak prognathism and a rather massive face. The zygomatic arches are characterised by substantial massiveness. The nose was relatively narrow and highly protruding. The mandible is characterised by a massive structure; it is well defined with a high body.

The dentition is almost complete and the teeth are very well preserved. The material included some loose teeth: the right maxillary cuspid and the right mandibular lateral incisor as well as the left mandibular second molar. The dentition is moderately abraded ($1-2^\circ$), first molars slightly more abraded ($2+^\circ$), although with the age of the subject determined at around 30 years, the abrasion may be deemed pronounced and most probably resulting from the consumption of food with high enamel abrasion properties (chewing hard foods).

The dentition shows enamel hypoplasia lines resulting from a non-specific stressor affecting the body. Linear enamel hypoplasia is visible on both maxillary incisors and both maxillary first bicuspid. Due to the fact that the occlusal surface of the teeth is abraded, the age at which the hypoplasia lines appeared was reconstructed based on regression equations applied in order to calculate the duration of the stressor's influence on the body, which ultimately resulted in hypoplasia. In the case of both incisors, the onset of LEH (Goodman and Rose 1990; Ritzman *et al.* 2008) was determined at 2.75 years ($-(0.625 \times 5.2) + 6.0$), and in the case of the bicuspid, the onset of LEH was determined at 3.6 years ($-(0.494 \times 4.8) + 6.0$). This indicates that stressors, such as a disease or weaning, occurred when the subject was around 3 years old and probably lasted for nearly 150 days.

Description of postcrania

The incomplete postcranial skeleton is characterised by a massive build and great definition. The preserved vertebrae include: a fragment of the atlas, remains of 3 thoracic vertebrae (fragments of vertebral bodies, superior and inferior articular processes), remains of 4 lumbar vertebrae, 2 unidentified vertebral bodies and numerous bone shards. The sacrum had sustained great damage (the posterior was relatively better preserved). The material includes 2 of the left and 7 of the right ribs. The well-defined clavicles are characterised by lateral ends with pronounced conoid tubercles.

The left humerus is greatly damaged (fragment of the shaft and head of the humerus); however, the shaft and inferior epiphysis (pronounced trochlea and massive medial condyle) of the right humerus are preserved. The superior epiphysis, shaft and inferior epiphysis of the right ulna are relatively well preserved, but only the shaft and superior epiphysis of the left ulna are preserved. The proximal end of the left radius is damaged, but the right radius is completely preserved. The preserved bones of the hand include both capitate, lunate and scaphoid bones, the left triquetral bone, the left hamate bone, 7 metacarpals, 5 proximal phalanges and 1 distal phalanx. The shafts and epiphyses of the long bones of the upper limb (also hand bones) feature characteristic greenish colouration, resulting from contact with copper jewellery.

The pelvis is partly damaged. However, the preserved fragments allow us to conclude that it was narrow and long, the wings were positioned more vertically and the acetabulum was large (diameter: 56 mm). The greater sciatic notch is relatively deep and narrow, with a lack of *sulcus preauricularis*, and the iliac crest is only slightly curved.

The long bones of the lower limbs are well preserved. The right femur and the better-preserved left femur have pronounced trochanters, a pronounced intertrochanteric crest, and moderately marked gluteal tuberosities.

The material includes only the right patella. The tibiae are massive and well defined, with distinctly marked tuberosities and pronounced anterior borders. The fibulae are damaged; only the shaft of the left fibula is well preserved (the head and lateral malleolus

are missing), and the only preserved parts of the right fibula are the shaft and inferior epiphysis. The bones of the feet include both calcanei, talus bones and navicular bones, as well as 7 metatarsal bones, 5 proximal phalanges and 1 distal phalanx.

Non-metric traits of the cranium

The epigenetic traits of the subject were analysed. These are hereditary traits, which can be modified by the environment. They are useful in the determination of the mechanics governing the genetic and evolutionary changes of the human species. They occur in the course of normal development and should not be attributed to the effects of a disease on the human body (Berry and Berry 1967; Czarnetzky 1972; Hauser and De Stefano 1989).

The craniological material was determined to include: bilaterally – *Ossa intersuturarum suturae lambdoideae*, *Foramen mentale*; on the right side – *Sulcus supraorbitalis* (supra-orbital notches), *Foramen mastoideum extrasuturale* (foramen of the mastoid process positioned extrasuturally); and on the left side – *Foramen zygomaticofaciale ab-sens* (lack of the zygomaticofacial foramen).

Living height of the body

The results included in Table 1 were obtained based on the measurements of individual sections of the humerus, the tibia and the femur (Steele and McKern 1969). With the application of regression equations, the obtained values allowed us to reconstruct the height of the body in relation to individual bones. The arithmetical mean was then calculated, which determined the final estimated height of the individual's body.

Table 1. Mokrzec, Przysucha district. Reconstructed height (cm)

Grave	Mokrzec				
Sex	M				
Bone	Right humerus	Tibia		Femur	
		Right	Left	Right	Left
Measurement	S3: 17.3 S4: 2.4 S5: 2.6	S1: 4.6 S2: 7.8 S3: 17.4 S4: 10.2 S5: 1.9	S1: 4.8 S2: 7.7 S3: 17.5 S4: 10.1 S5: 1.9	S1: 8.5 S2: 26.9 S3: 9.4 S4: 3.7	S1: 8.4 S2: 27.1 S3: 9.0 S4: 3.8
Estimated height based on the measurement of individual bones	176	183	184	173	173
Reconstructed living height of the individual	177.8				

Functional and pathological changes of the skeleton

The markers of physiological stress discovered on the bone material proved to be helpful in the evaluation of the individual's living conditions. One such marker observed in the analysed material is the occurrence of pathological changes in the upper part of the orbit (*cribra orbitalia*). The prevalence of this type of change is found in conjunction with various types of anaemia that are caused by iron deficiency as well as deficiency of other micronutrients, such as magnesium or chlorine. Perhaps the *cribra orbitalia* is connected to deficiency of folic acid, parasitological infection, malaria or inherited anaemia, such as thalassemia (Gleń-Haduch *et al.* 1997; Bergman 1988). Low-level *cribra orbitalia* (2° – Hengen 1971; Steckel *et al.* 2006) occurred in the roof of the right and left orbit of a warrior discovered in the village of Mokrzec (Fig. 15). Moreover, porous lesions were also recorded in the analysed material on the humerus and femur. These are located near the transition of the neck of the bone into the head. The character and origin of the lesions is similar to *cribra orbitalia* (Lewis 2017).

Skeletal indicators of physical activity are indicators of the stress put on the musculoskeletal system by everyday physical activities (Myszka 2007). They occur when a strenuous physical activity is often or moderately repeated, and they may be pathological depending on the level of stress. The degree of these indicators depends not only on the frequency and



Fig. 15. Mokrzec, Przysucha district. Right orbit (*cribra orbitalia*).
Photo by K. Szostek



Fig. 16. Mokrzec, Przysucha district. Left calcaneus (enthesophytes).
Photo by K. Szostek

force of the stressor, but also on the concurrence of other pathologies and ailments. The lesions intensify with age, and manifest different specificity depending on the sex of the individual (Haduch *et al.* 2010). Enthesophytes – ossification on the calcaneal tuberosity – were detected in the analysed material at the attachment of the calcaneal tendon (Fig. 16).

Excessive and prolonged mechanical stress on the spine, as well as overlapping micro-injuries, may cause degenerative lesions. Schmorl's nodes, which appear due to damage to the intervertebral disc resulting in a so-called intravertebral disc herniation, constitute one of the most common manifestations of such stress (Głądykowska-Rzeczycka 1989; Aufderheide and Rodriguez-Martin 1998; Ortner 2003). The remains of the examined subject contained a Schmorl's node on the superior surface of the preserved fragment of the body of the 12th thoracic vertebra (Th 12).

The anthropological analysis of the sex and age of the individual indicates that the remains belonged to a man, approximately 30 years of age (*adultus*), of a massive built, with a considerable body height of nearly 180 cm.

DISCUSSION

The described artefacts can be related to the beginnings of the Bronze Age. Due to the circumstances of the discovery, there is some uncertainty as to whether all of them belonged to the equipment of a single burial. However, there is some evidence to suggest that it could have been a burial complex. The authors of the study, introducing the discoveries from Mokrzec into scientific circulation, count on an open discussion on that issue. Among not the few, so-called model grave complexes recorded in southern Poland, Moravia and Western Ukraine from the beginning of the Bronze Age (see: Kadrow and Machnik 1997, 15-17, fig. 1), it is difficult to find any equivalent to the alleged tomb of Mokrzec. The latter stands out with regard to its special wealth, especially when it comes to metal grave equipment.

The place of discovery has been studied extremely accurately on two occasions: first, to gather any evidence of a crime, and then to save as many artefacts as possible. The inspection, as well as the exploration of the site, was carried out by Wojciech Twardowski, an employee of the Radom Museum, known for his meticulousness and archaeological passion. Traces of copper salts on the bones were recorded, which allowed us to connect the discovered metals with burial relics. These stains, which were the most intense on the wrists, the right arm and the right side of the skull (Fig. 17), allowed us to recreate the burial

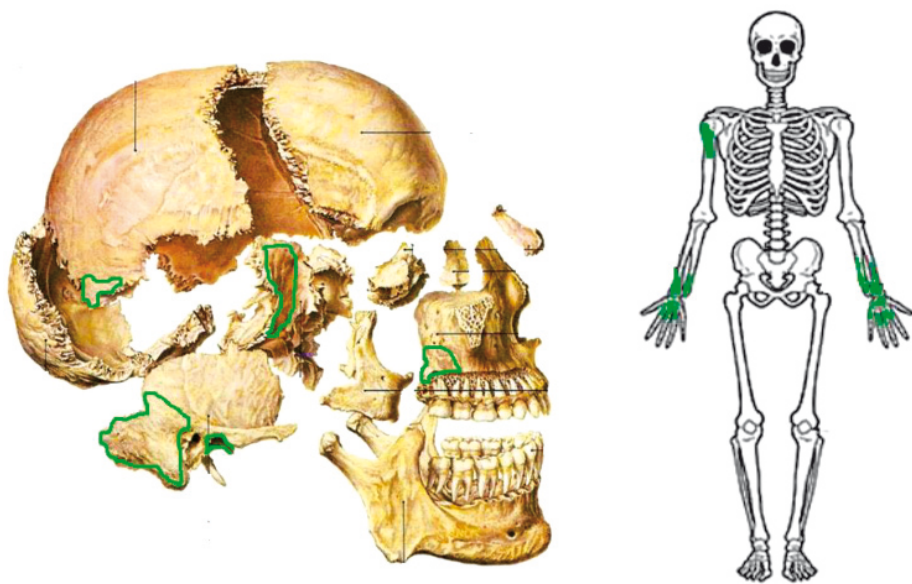


Fig. 17. Traces of copper salts identified on the skull and on the post-cranial skeleton from Mokrzec.
Drawn by K. Szostek

arrangement to some extent. It seems that there was a bracelet on one of the wrists. The copper salts stained the other wrist, the right arm, and the right side of the facial skeleton. This means that the hands were folded and placed near the shoulder and skull. The man from Mokrzec probably lay on his right side (according to the canon prevailing in the Mierzanowice *milieu* – Kadrow 2001, 120). The other artefacts were probably placed with the dead: the vessel, dagger, bone fabricator-awl, and the flint products and blanks. Traces of copper salts preserved on the bone item were probably a result of contact with the dagger or chape bands.

Inspection of some of the metal artefacts allowed the following conclusions. On the surface of the semicircular plate of the dagger handle from Mokrzec, the noble patina preserved the outline of the handle's shape. The small length of the preserved rivets suggests that the thickness of the handle could not be great. It was probably made of some organic material. It could be wooden or bone (antler), with a semicircular cut-out at the place of attachment.

The use of the five bands with bent and sharpened ends is difficult to evaluate unequivocally. It seems that they could have been used to give structure and support to some useful object, e.g. to strengthen the scabbard of the dagger (they "fit" to the width of the dagger). It cannot be ruled out that they were part of a container for storing a dagger, bone tool and flint products. At the same time, the characteristic sharpened ends stand out, which could be hooks fastening the bands on an organic material, reflecting its shape.

All metal items were made of copper. The analysis of the material composition reveals considerable similarity, which suggests with caution that the artefacts were made of raw material originating from a single source or were produced in one metallurgical workshop. It was an arsenic copper: bracelet – 96.24% Cu / 1.478% As; dagger blade – 96.55% Cu / 0.8489% As; bands – 96.42% Cu / 0.4434% As, with some share of phosphorus (0.8514%, 0.7237%, 1.2750% respectively) and small share of other elements (Tab. 2). Their compositions differ from products discovered in the Mierzanowice culture settlements at sites in Iwanowice "Babia Góra II", Mierzanowice II and Strzyżów (see: Hensel 1992). Arsenic copper was widely used in large areas of Eastern and Central Europe (Kadrow 2001, 104). Copper products from Mokrzec were not durable, as evidenced by their damage. Copper contamination with arsenic (above 0.3%) significantly reduced the strength index of this metal (see: Hensel 1982, 157).

The findings from Mokrzec can be related with the early phase of the Mierzanowice culture. The presence of the clay mug and the copper dagger blade in the inventory has parallels in some complexes from the Circum-Carpathian Epi-Corded Ware culture circle. In southern Poland, they are related to the proto-Mierzanowice phase (see: Kadrow and Machnik 1997, 13-28). On the other hand, the sidescrapers, arrowhead and flakes present in the flint inventory are forms with a much longer chronology, used up to the late phase of this taxonomic unit (see: Bąbel 2013 – numerous examples there). Radiocarbon dating of bone material from Mokrzec tightens the above observations, and with a probability of

Table 2. Mokrzec, Przysucha district. Metallographic analysis of the copper raw material used in production of the bracelet, dagger and bands from Mokrzec (by M. Biborski from the Institute of Archaeology, Jagiellonian University)

Z	Symbol	Element	Concentration / Abs. Error			band	
			bracelet	dagger blade			
13	Al	Aluminum	0.0510%	0.0340%	0.2790%	0.1570%	0.04000%
14	Si	Silicon	0.2720%	0.0180%	0.4330%	0.0180%	0.02200%
15	P	Phosphorus	>0.8514%	0.0091%	>0.7237%	0.0083%	0.0120%
16	S	Sulfur	0.02056%	0.00025%	0.0250%	0.00024%	0.00031%
22	Ti	Titanium	<0.0020%	(0.0)%	<0.0020%	(0.0)%	(0.0)
23	V	Vanadium	<0.0015%	(0.0)%	<0.0015%	(0.0)%	(0.0)
24	Cr	Chromium	<0.0015%	(0.0)%	<0.0015%	(0.0)%	(0.0)
25	Mn	Manganese	<0.0010%	(0.0)%	<0.0010%	(0.0)%	(0.0)
26	Fe	Iron	0.0135%	0.0039%	0.0121%	0.0039%	0.0039%
27	Co	Cobalt	<0.0003%	(0.0)%	<0.0003%	(0.0)%	(0.0)
28	Ni	Nickel	<0.0001%	(0.0)%	<0.0001%	(0.0)%	(0.0)
29	Cu	Copper	>96.24%	0.1200%	>96.55%	0.1200%	0.1200%
30	Zn	Zinc	<0.0001%	(0.0)%	<0.0001%	(0.0)%	(0.0)
33	As	Arsenic	>1.4780%	0.0070%	>0.8489%	0.0058%	0.0041%
41	Nb	Niobium	<0.0001%	(0.0)%	0.0034%	0.0015%	0.0022%
42	Mo	Molybdenum	0.0106%	0.0043%	0.0212%	0.0040%	0.0056*
47	Ag	Silver	0.0112%	0.0010%	0.0403%	0.0014%	0.0011%
48	Cd	Cadmium	<0.00007%	(0.0)%	0.00022%	0.00022%	(0.0)
50	Sn	Tin	<0.0001%	(0.0)%	<0.0001%	(0.0)%	(0.0)
51	Sb	Antimony	0.00234%	0.00071%	0.00504%	0.00091%	0.00099%
74	W	Tungsten	<0.0002%	(0.0)%	<0.0002%	(0.0)%	(0.0)
79	Au	Gold	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
82	Pb	Lead	<0.0002%	(0.0)%	<0.0002%	(0.0)%	(0.0)
Sum of concentration			99.00%	99.99%	99.00%	99.00%	

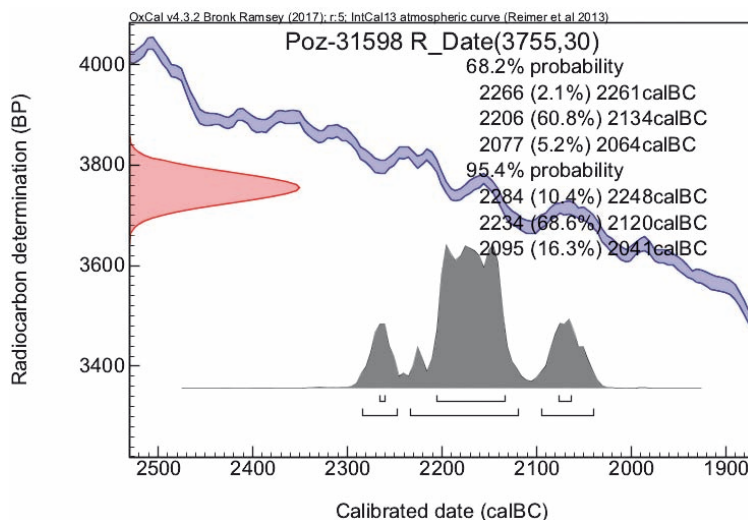


Fig. 18. Radiocarbon dating of the sample obtained from human bone from Mokrzec and the graphical probability distribution of the radiocarbon marking (calibrated with the use of OxCal v3.10 Bronk Ramsey 2005 software)

60.8% indicates the range of years between 2206 and 2134 BC (31598: 3755±55 BP) (Fig. 18). This corresponds to the first half of the early phase of the Mierzanowice culture (Kadrow and Machnik 1997, 29).

This burial undoubtedly stands out due to the presence of metal objects among the grave equipment. Based on the “point system”, which is used to assess the wealth of grave equipment, this grave, with a value of 27 points, belongs in the category of rich graves (see: Kadrow and Machnikowie 1992, 66-67, 69). Undoubtedly, this speaks for the special position of the buried man. It is possible that in the Early Bronze Age, adult men buried in richly equipped graves enjoyed authority and held leadership positions during their lifetimes (Kadrow and Machnikowie 1992, 89; Kadrow 1995, 99-101).

Finally, it is worth noting that the tomb from Mokrzec is currently the northernmost grave of the proto-Mierzanowice phase. The nearest contemporary sepulchral objects are Starachowice-Wierzbnik, located about 50 km away – a grave containing a cremation burial, a mug, 9 arrowheads and a stone axe (Sawicka 1925; Kadrow and Machnik 1997, 17) – and another, destroyed object from Radom-Malczów, containing only flint artefacts – a Czerniczyn-Torczyn type leaf-point, a bilateral sidescraper and a flake-firestriker (Twardowski 1977, 109; Bargiel and Libera 2006, fig. 11). The described sites open a new perspective for research on the presence of early post-Corded Ware elements north of the Świętokrzyskie Mountains.

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PREHISTORIC DEFENSIVE STRUCTURES IN THE SZRENIAWA VALLEY

ABSTRACT

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This paper presents the results of the non-invasive search for defensive settlements from the Neolithic and Bronze Age periods in the Szreniawa valley and in its closest upland area (Proszowice Plateau and the Miechów Upland). This investigation was carried out in 2018 by archaeologists gathered in the "Stater" Association of Field Archaeologists and was funded by the Ministry of Culture and National Heritage. During this study geomagnetic tests and surveying were carried out on 18 sites, which were selected on the basis of satellite image analysis. The total investigated area covered 40 hectares. Spatial analysis of the artefacts compared with the course of magnetic anomalies allowed the determination of the chronology of the investigated settlements. The outcome of this project points to the presence of at least 15 well-documented prehistoric defensive settlements of various types found on 10 archaeological sites. The discovered settlements can be attributed to the Lublin-Volhynian, Funnel Beaker-Baden, Trzciniec and Lusatian cultures.

Keywords: Neolithic, Bronze Age, fortified settlement, enclosures, magnetic investigations

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1. INTRODUCTION

The Nida Basin macroregion is part of the Małopolska (=Lesser Poland) Upland located in the western part of the historical Małopolska province. The majority of the macroregion is covered by a fertile patch of loess, which encouraged and facilitated extremely intense settlement starting from the very beginning of the Neolithic period, and making that area exceptionally rich in prehistoric finds. Additionally, large valleys, steep slopes and remarkable promontories supplied the prehistoric societies with many potential places of defensive advantage. The Nida Basin is drained by the Nida, Szreniawa and Nidzica Rivers, which are Vistula tributaries (Fig. 1). This study focused on the Szreniawa valley. It starts near Wolbrom in the Olkusz Upland, but the majority of its eighty-kilometre course is in the Miechów Upland and Proszowice Plateau. Although the valley was repeatedly surveyed, mainly due to the systematic action conducted by IHKM PAN (Institute of Material Culture History of the Polish Academy of Sciences; Kruk 1970; Rydzewski 1972), some data pointing to a presence of defensive structures in the region has been acquired only recently. This study was an initial survey at the Funnel Beaker-Baden culture settlement feature in Gniazdowice in the Proszowice district (Przybyła *et al.* 2015) and at the Trzciniec culture settlement feature in Ciborowice in the Proszowice district (site investigated under the National Science Centre grant realized by Institute of Archaeology of Jagiellonian University in co-operation with M. Przybyła). It should be emphasised that both sites show alternate concepts of landscape management. The first of them is located on an outstanding, naturally fortified promontory on the edge of the upland, while the second one lies on a flat promontory of terraces, which slope steeply to the bottom of the river valley.

These new findings made the Szreniawa valley and its direct upland a test area to verify the thesis that, contrary to current opinions in the subject literature (e.g., Nowak 2009, 173), prehistoric defensive settlements in southern Poland are not rare phenomena, but a permanent, widely present element of settlement networks. The proposed tool to verify this thesis was comprehensive geophysical testing and surveying. The potential of non-invasive investigation has been proved recently in the area of the Dobużek Scarp (Chmielewski *et al.* 2015), in Silesia (Furmanek 2017; Furmanek and Wroniecki 2017) and in the northern Nida region (Wroniecki 2016) where the use of aerial photography and magnetometry method allows for the identification of prehistoric defensive settlements.

The program of non-invasive research, including geophysical investigation and surveying, was carried out by the Association of Field Archaeologists STATER with the participation of archaeologists from Jagiellonian University and the Archaeological Museum in Kraków as part of the project "Prehistoric fortified sites in the Szreniawa valley". It was co-financed by the Ministry of Culture and National Heritage under the program "Cultural Heritage", priority "Protection of archaeological monuments", of the National Heritage Institute (project no. 108560/18).



Fig. 1. Location of the examined sites in the Szreniawa valley (western and eastern part). Drawn by M. Podsiadło, M. M. Przybyła

2. RESEARCH METHODOLOGY

Magnetic investigation was selected as the main element of the project. It allowed for the fastest and the fullest coverage of large spaces; additionally, it was suitable to discover linear anomalies like ditches, trenches and moats (David *et al.* 2008, 16-21). Magnetic measurements were made using a fluxgate magnetometer (gradientmeter, Misiewicz 2006, 74-98) 4.032 DLG by Foerster Ferrex, equipped with two probes with a resolution of 0.2 nT. Measuring lines were spaced 1 m. apart. The number of measurements per 1 square meter was 10. The data was collected in bidirectional mode. The obtained results are presented on magnetic maps developed in the Terra Surveyor 3.0.29.3 program. Geodetic and magnetic data were integrated in the QGIS program.

The first step was to analyse the available databases of satellite images (mainly Google Earth Pro and geoportal.gov.pl) of the Szreniawa valley. This allowed the selection of about 30 interesting locations, characterized by visible linear soil and vegetative markers (Okupny 1998, 237). These sites were tested by magnetic investigation. In the case of linear anomalies discovered, detailed surveys with the help of GPS receivers were conducted. Moreover, in most cases digital terrain models were made using ISOK data. The Lidar Point Cloud was reclassified and triangulated to a 0.5 m raster, and then analysed to search for remnants of potential prehistoric landforms and visualized using the SAGA GIS, QGIS and Relief Visualization Toolbox (RVT) software.

During the project, magnetic investigations were carried out on 18 sites, over a total area of 40 hectares. These resulted in the discovery of at least 15 defensive structures of various types at 10 sites. On the next 3 sites weakly readable potential structures were identified. Most of them group into three well-readable, chronological and cultural horizons.

The following abbreviations representing different cultural entities are used throughout the text: Linear Pottery culture (LBK), Lengyel-Polgár cycle (L-PC), Pleszów-Modlnica group (P-MG), Lublin-Volhynian culture (L-VC), Wyciąże-Złotniki group (W-ZG), Funnel Beaker culture (FBC), Funnel Beaker-Baden culture (FB-BC), Corded Ware culture (CWC), Mierzanowice culture (MC), Trzciniec culture (TC), Lusatian culture (LC), Przeworsk culture (PC).

3. THE FIELD INVESTIGATIONS

The scope of this paper concerns only the sites where the magnetic anomalies revealing ditches or palisades can be clearly interpreted as prehistoric. For instance, in case of the Łękawa site in the Kazimierza Wielka district, the result of the investigation is ambiguous, and reveals probably 20th century trenches. In many sites, such as Jaksice 6 and Przesławice 1 in the Miechów district, Chorążycza 2 and Piotrkowice Wielkie 1 in the Proszowice district,

Orłów 4 in the Kraków district or Wierchowiska 4 in the Olkusz district, despite test investigations, no linear anomalies were found.

3.1. Biskupice, Miechów district, site 14-17 (AZP 96-57/142-145).

This site is located on a large triangular promontory at the confluence of the Szreniawa and the Cicha Rivers. Two linear structures were identified. The first positive anomaly is interpreted as a ditch (Fig. 2: feature 1). It cuts off the southern part of the promontory. Magnetic research covered about 60% of its length; however, the remaining part is clearly visible on satellite images, so reconstruction of the entire feature is possible. In the central part, the ditch covers the greater portion of the plateau. To the west, it passes to a natural ravine leading to the Szreniawa valley, and to the east the ditch reaches the Cicha riverbed. The fortified structure has an area of 15 ha and measures 570×320 m. The observed anomaly (Fig. 2: feature 1) is continuous (disregarding disturbances caused by the presence of a closed depression); however, in the central part, a gap of a few meters – possibly the gateway passage – is visible. This may be confirmed by a circular spatial arrangement (Fig. 2: feature 3) with a diameter of almost 50 m, clearly visible on the inner side of the ditch and adjacent to the hypothetical passage. A second linear anomaly was partially

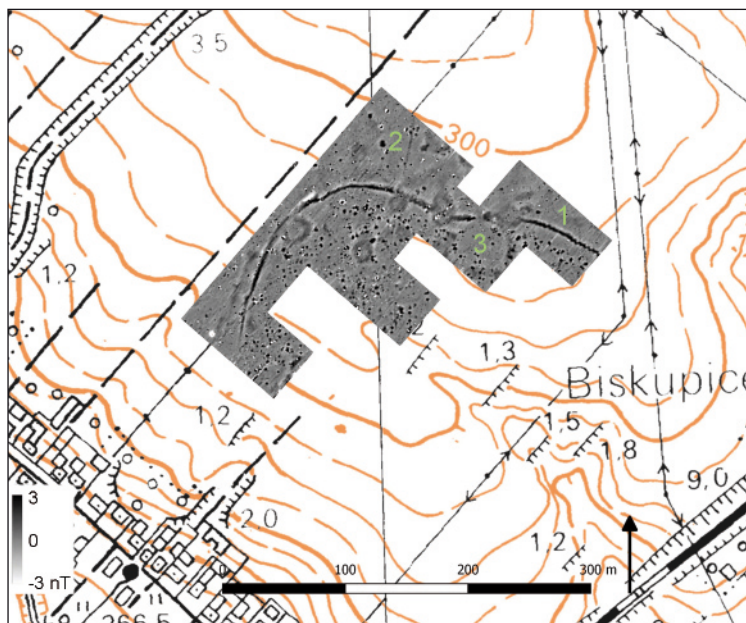


Fig. 2. Biskupice, Miechów district, site 14-17. The magnetic map in greyscale imposed on a topographic map. The green numbers indicate anomalies discussed in the text. Drawn by M. Podsiadło, M. M. Przybyła

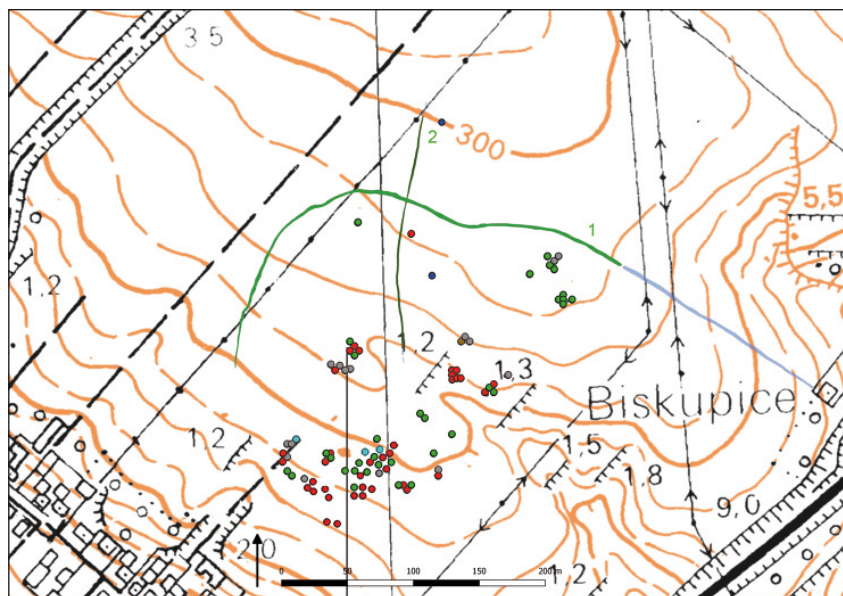


Fig. 3. Biskupice, Miechów district, site 14-17. The course of archaeological features on a topographic map: green – archaeological features discovered as magnetic anomalies, blue – archaeological features visible on satellite images. The dots indicate the distribution of artefacts: red – Trzciniec culture, green – Lublin-Volhynian culture, gray – prehistoric times. Drawn by M. Podsiadło, M. M. Przybyła

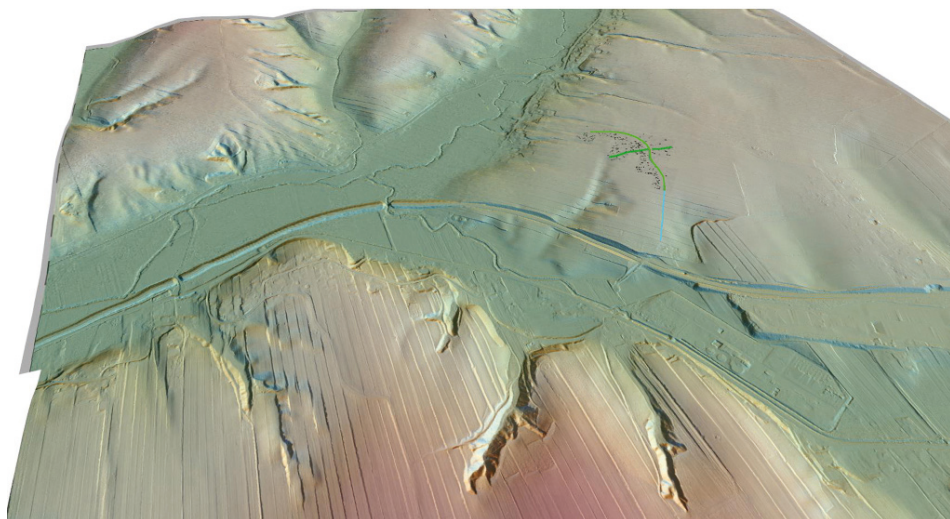


Fig. 4. Biskupice, Miechów district, site 14-17. Digital terrain model with course of archaeological features. Drawn by D. Stefański

examined – about 180 m. It is also interpreted as a ditch (Fig. 2: feature 2). It is narrower and shallower or less well-preserved than feature 1. At present, it is impossible to determine its full course. Possibly, it cut off only a part of the southeastern slope of the promontory. Numerous positive point anomalies are interpreted as archaeological features. They concentrate in the area surrounded by feature 1, which indicates their chronological and functional relationship. Importantly, there is also a zone without anomalies. It is about 15-20 m wide, running along the inner side of the ditch, and it can be interpreted as the rampart area.

During the survey, 83 artefacts, mostly potsherds, were acquired. They can be dated respectively to the Neolithic period – the late phase of L-VC (26 potsherds); the Bronze and early Iron Age – the classic phase of TC (35 potsherds), single LC potsherd; and prehistoric times (21 potsherds). The spatial distribution of artefacts (Fig. 3) shows their correlation with both defensive structures. L-VC artefacts are present all over the site, but they concentrate in its eastern part, coinciding with the area surrounded by feature 2. TC artefacts, although more numerous, were accumulated mostly in a smaller area in the western part of the promontory.

Summing up, it should be stated that relics of two defensive structures were recognized at the site (Fig. 4). The older structure was dated to the late phase of the Eneolithic L-VC (Zakościelna 2006, 80), and is located on the eastern slope of the promontory, facing the river, whereas, the younger one dates to the classic phase of TC, representing the A2b period of the Bronze Age (Górski 1997, 14).

3.2. Górka Stogniowska, Proszowice district, site 4 (AZP 100-60/11)

The site is situated on a flat promontory at the confluence of the Szreniawa and Jagielnica Rivers. Magnetic measurements (Fig. 5) revealed the existence of numerous anomalies interpreted as archaeological features, including three linear positive anomalies interpreted as ditches (Fig. 6: features 1-3; 7). The first ditch has an arched course and cuts off a southwestern part of the promontory. Unfortunately, recognition of its northern part is no longer possible due to the existing housing development there. The readability of the anomaly was quite good in its western part, but worse in the eastern part. A complete reconnaissance of the settlement is not possible, but assuming that the ditch in its northern part turns gradually towards the Szreniawa, it would enclose an area of about 10 ha. Only small sections of features 2 and 3 have been recognized. They are probably elements of one fortification system, as evidenced by their parallel course. It can be presumed that they surround the culmination, creating an oval structure of over a dozen hectares.

Over the course of the survey, 79 artefacts, mostly potsherds, were acquired. They can be dated respectively to the Neolithic period – LBK (10 potsherds) and the Bronze and early Iron Age periods – TC (28 potsherds), LC (1 potsherd). Additionally, numerous ma-

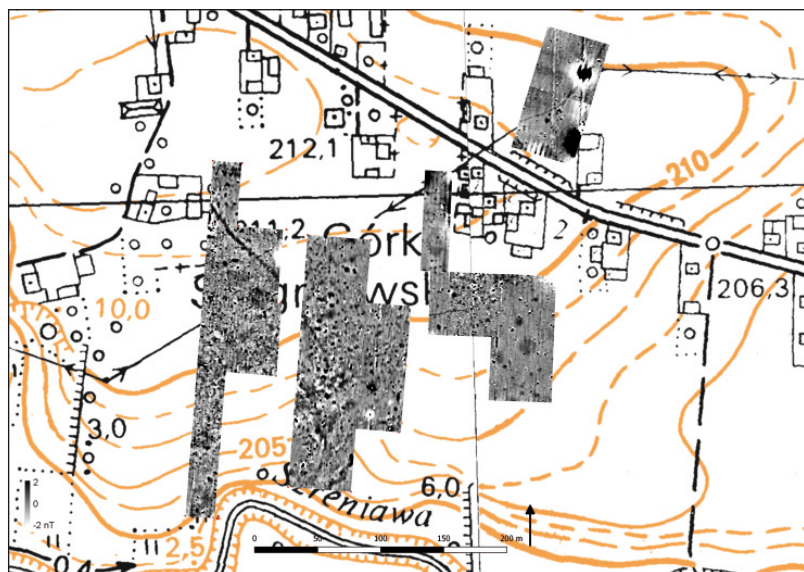


Fig. 5. Górk Stogniowska, Proszowice district, site 4. Magnetic map in greyscale imposed on a topographic map. Drawn by M. Podsiadło, M. M. Przybyła

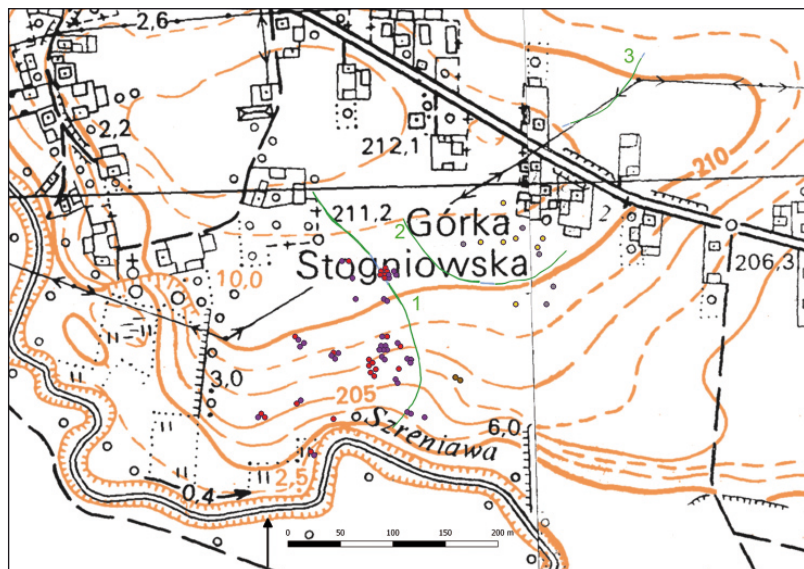


Fig. 6. Górk Stogniowska. Proszowice district, site 4. The course of archaeological features marked on a topographic map. The green numbers indicate anomalies discussed in the text. The dots indicate the distribution of artefacts: red – Trzciniec culture, violet – Przeworsk culture, yellow – Linear Pottery culture. Drawn by M. Podsiadło, M. M. Przybyła

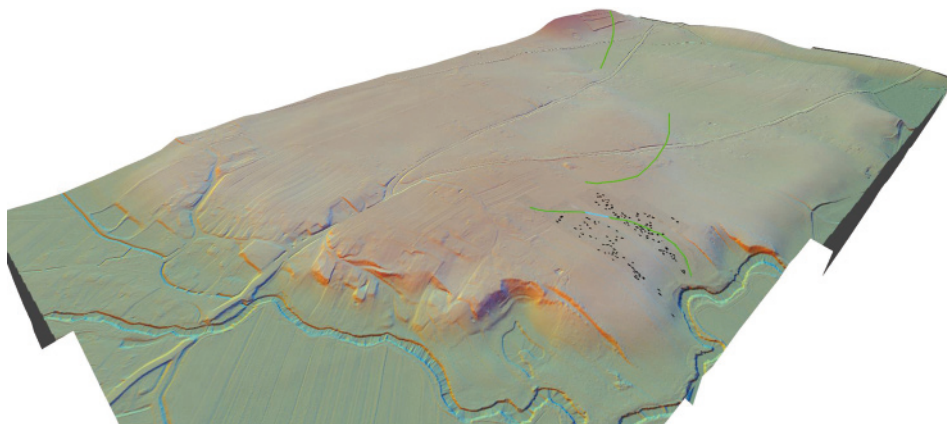


Fig. 7. Górk Stogniowska. Proszowice district, site 4. Digital terrain model with course of archaeological features (vertical scale x5). Drawn by D. Stefański

terials can be dated to the younger phase of the Roman period. Spatial analysis of the artefacts shows that the TC correlates with the area surrounded by feature 1 (Fig. 6), which links it with this cultural unit. In the case of features 2 and 3, the situation is unclear. Admittedly, only artefacts of LBK were acquired from that the area, however, further investigation is required to determine the chronology of that establishment.

3.3. Kępa, Kraków district, site 2 (AZP 99-58/79)

The site is located on an elevation at the edge of the Szreniawa valley. The settlement is situated on a slope having the desired southern exposure. It is enclosed from the north by the river, and from the south by a steep, high slope. The magnetic investigation and the analysis of satellite images (Fig. 8; 10) revealed a long ditch (ca. 1 km). The area enclosed by the ditch presently covers 22 ha. However, considering the apparent shift of the riverbed, it was slightly smaller in the past.

During the survey, 299 artefacts, mostly potsherds, were acquired (Fig. 9). They can be dated respectively to the Neolithic period – unspecified (24 potsherds), LBK (3 potsherds) and CWC (1 potsherd); the Bronze and early Iron Age period – the classic phase of TC (77 potsherds), LC (72 potsherds) and unspecified (81 potsherds); the younger pre-Roman period – PC (6 potsherds); and prehistoric times (35 potsherds).

The TC artefacts are characterized by an even distribution throughout the site, which links it with the defensive feature (Fig. 9). Also, the characteristic of this fortification system is analogous to other large settlements related to the TC, such as Słonowice.



Fig. 8. Kępa, Słomniki district, site 2. Magnetic map in greyscale imposed on a satellite map. Red arrows indicate the soil markers revealing an archaeological feature. Edited by M. Podsiadło, M. M. Przybyła

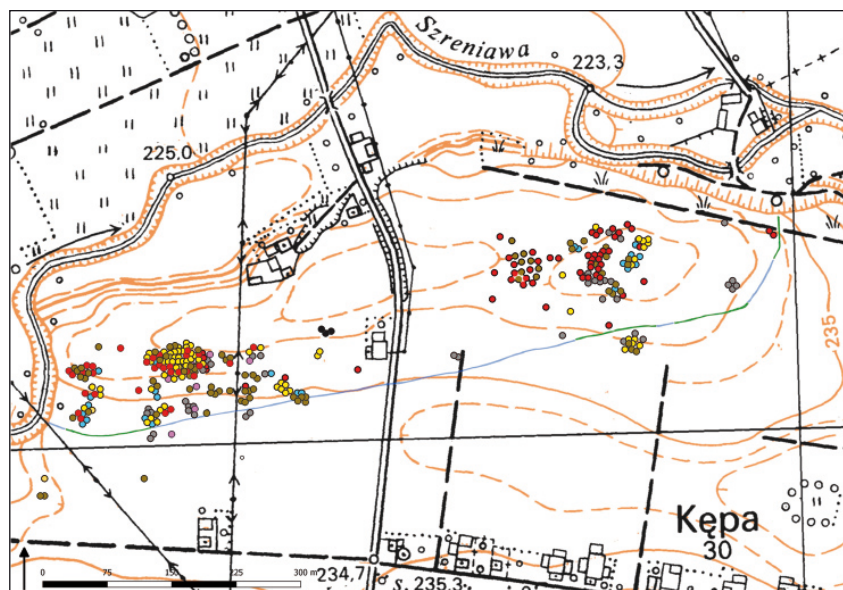


Fig. 9. Kępa, Słomniki district, site 2. The course of archaeological features on a topographic map: green – archaeological features discovered as magnetic anomalies, blue – archaeological features visible on satellite images. The dots indicate the distribution of artefacts: black – Linear Pottery culture, blue – Neolithic, red – Trzciniec culture, green – Lublin-Volhynian culture, yellow – Bronze Age, brown – Lusatian culture, violet – Przeworsk culture. Drawn by M. Podsiadło, M. M. Przybyła

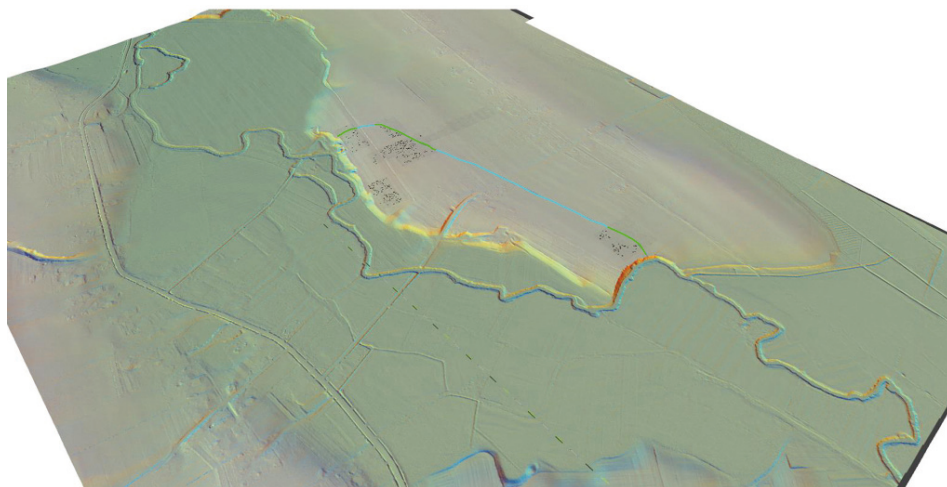


Fig. 10. Kępa, Słomniki district, site 2. Digital terrain model with course of archaeological features (vertical scale $\times 5$). Drawn by D. Stefański

3.4. Malkowice, Proszowice district, site 7-8 ("Góra Grodziska"; AZP 100-63/42, 43)

The site is situated on a conspicuous promontory – the Grodziska Hill – rising over 60 m above the bottom of the river valley. It is in a place of strategic importance – at the junction of the Szreniawa and Vistula Rivers. Investigation points to at least two independent systems of defensive settlements (Fig. 11-13). The largest one covers the entire area of Grodziska Hill. A ditch is marked by a poorly readable positive magnetic anomaly (Fig. 11; 12: feature 1) that runs diagonally across the eastern slope of the hill; it begins in a natural canyon, passes the culmination of the hill and then, at the top of the northern slope, it turns west where it becomes less readable. It splits into two parallel features (1 and 1a), which connect below the summit of Grodziska Hill and head towards the steep slope in the west. That ditch encloses an area of 4.2 ha, measuring 330×180 m.

The system of ditches is located at the culmination of the hill. It encloses a much smaller area of ca. 1.5 ha, which measures about 160×140 m. It consists of a single ditch (Fig. 12: feature 2) separating a small space at the edge of the escarpment, and two parallel ditches (Fig. 12: features 3 and 4) encompassing the peak of Grodziska Hill. On the top of Grodziska Hill one more structure is visible. It is a sequence of small point anomalies (Fig. 12: feature 5), which can be interpreted as an oval palisade surrounding an area of less than 1 ha. It is quite readable in its western and southern parts, but on the northeast side the anomalies are no longer visible. This is probably due to the strong soil erosion at this loca-

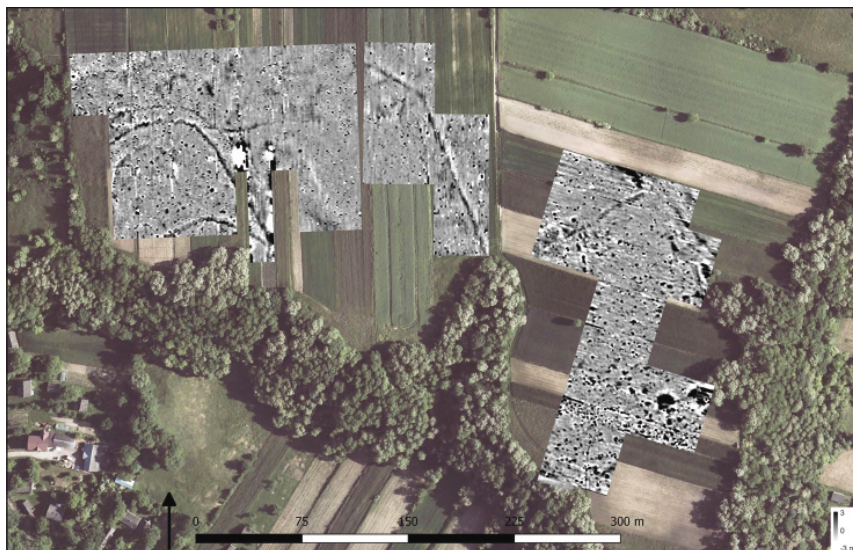


Fig. 11. Malkowice, site 7-8 ("Grodziska Hill") and Siedliska, site 1 in the Koszyce district. Magnetic map in greyscale imposed on a satellite map. Edited by M. Podsiadło, M. M. Przybyła

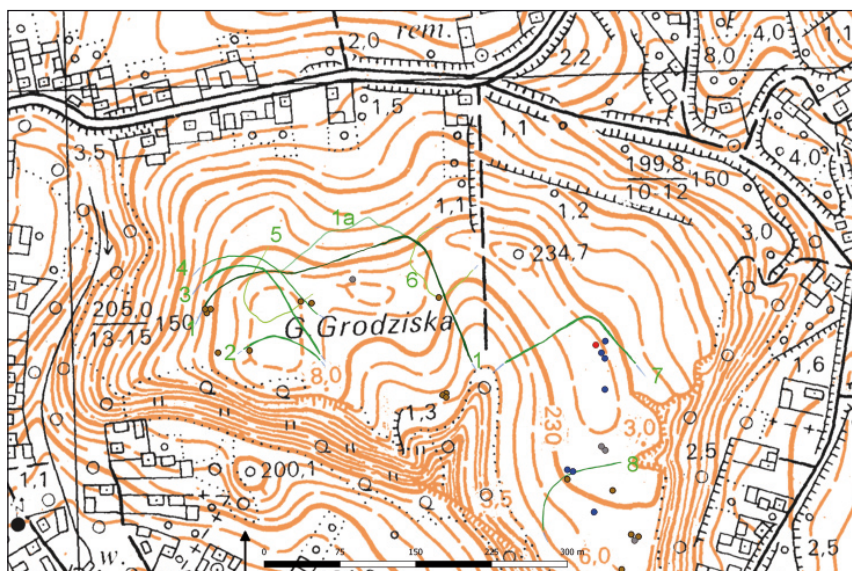


Fig. 12. Malkowice, site 7-8 ("Grodziska Hill") and Siedliska, site 1 in the Koszyce district. The course of archaeological features marked on a topographic map. The green numbers indicate anomalies discussed in the text. The dots indicate the distribution of artefacts: brown – Lusitanian culture, blue – Lengyel-Polgar Cycle, gray colour – prehistoric times. Drawn by M. Podsiadło, M. M. Przybyła

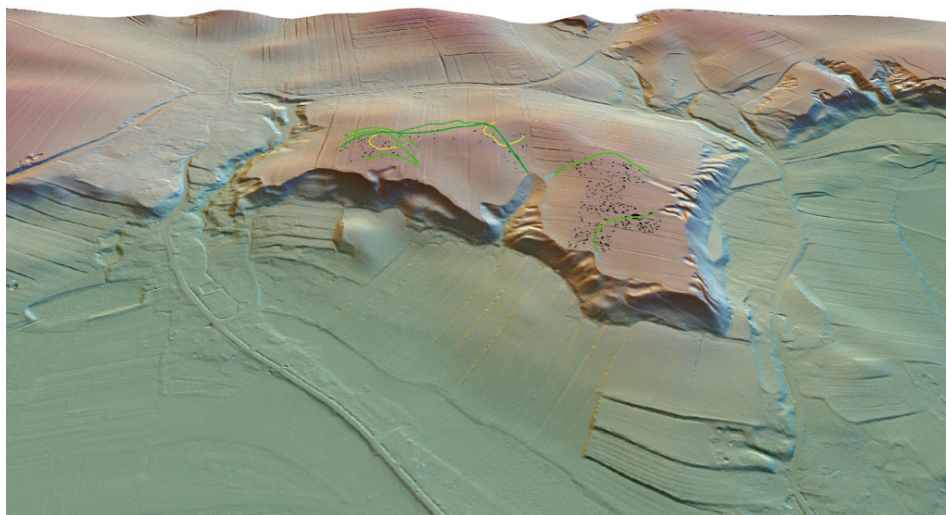


Fig. 13. Malkowice site 7-8 ("Grodziska Hill") and Siedliska, site 1 in the Koszyce district. Digital terrain model with course of archaeological features. Drawn by D. Stefański

tion. Finally, in the northern part of the eastern slope, there is another similar structure (Fig. 12: feature 6), which can be also interpreted as a palisade.

Despite repeated surveying, only 11 potsherds and one uncharacteristic lithic made from Jurassic flint were acquired. The potsherds can be dated to the classic (VBA-HaC) or the younger phase (HaD-LtA) of the LC, and it is assumed that this dates the largest defensive settlement. It is worth noting that in the northern part of the site a few potsherds of the LC were also discovered during the former AZP survey (Frankowicz-Szpunar *et al.* 2006).

Unfortunately, no artefacts were linked with a feature located at the culmination of the hill. An analogous feature, also undated, was recognized in Obrażejowice in the Proszowice district (Wroniecki *et al.* 2016). However, some analogies can be made with LBK settlements (Podborský and Kovárník 2006, fig. 4.2: 1, 8) or others that are known from the Bernburg and Michelsberg cultures and the late (Baalberg) phase of the FBC (*ibidem* fig. 4.4: 3; Gojda 2006, fig. 2.1; 2.2: 3; Šmíd 2017, fig. 21). Alternatively, many defensive structures consisting of multiple parallel ditches have been attributed to the late phase of the L-VC and the W-ZG. This is the case at Mikulin in the Tomaszów district, where multiple ditches have been found (Chmielewski *et al.* 2015), at "Grodzisko" (Sałacińska and Zakościelna 2007) and at Sandomierz-Wzgórze Zawichojskie (Kowalewska-Marszałek 2017). Surrounded by multiplied ditches, a W-ZG settlement was identified also at Podłęże in the Wieliczka district (Nowak *et al.* 2008), and at Pielgrzymowice in the Kraków district (site investigated by M. Kuś).

The last issue is dating the two palisades discovered. They interfere with the LC fortification, as well as with the triple ditch feature. It cannot be ruled out that they represent a settlement of Neolithic communities, like P-MG, which sporadically used to construct palisades (Zakrzowiec in the Wieliczka district; Jarosz *et al.* 2012, fig. 7). They can also be associated with the LC of the early Iron Age in Kraków-Bieżanów 15 site (Przybyła 2017, fig. 11).

3.5. Malkowice, Proszowice district, site 1 (AZP 100-63/6)

The site is located on a promontory adjacent to the eastern side of Grodziska Hill in Malkowice. The eastern slopes of the promontory descend directly to the Vistula valley, and the western slopes descend into Grodziska Hill (Fig. 11-13). The promontory has a tongue shape. The southern slopes are very steep becoming less inclined towards the northern part. The magnetogram revealed two positive linear anomalies (Fig. 11). The first one (Fig. 12: feature 7) runs through the culmination and is extended by two canyons cutting the eastern and western slopes of the promontory. The area of that structure is 3.6 ha. It measures 290 × 190 m.

Another positive linear anomaly (Fig. 12: feature 8) is less readable. It is in the southern part of the promontory, cutting off its final part, which has the steepest slopes. The course of the anomaly is semi-circular. In its northern part, the anomaly reaches the natural canyon that cuts the eastern slope of the promontory. In the southern part it reaches the edge of the river embankment. This ditch is much narrower than the previous one. Its size suggests it is a palisade groove. The area enclosed by the ditch has an area of 1.3 ha and measures 130 × 115 m. Within both ditches, numerous anomalies were identified: positive point anomalies – cavities, and inverted dipole anomalies interpreted as kilns or furnaces (Fig. 11).

During the survey, only 16 artefacts – potsherds and a single flint artefact – were found. They can be dated respectively to the Neolithic period – L-PC (6 potsherds), the Bronze Age and early Iron Age – MC (1 potsherd), LC (6 potsherds), and prehistoric times (3 potsherds).

Diagnostic data was provided by the spatial analysis of the artefacts (Fig. 12). LC artefacts occurred only in the southern part of the promontory, in the area surrounded by palisades (feature 8). In contrast, L-PC artefacts were found on the whole surface of the hill, up to feature 7. Therefore, it can be concluded that the larger structure was built by the population of the unspecified group of the Danubian cycle, most probably P-MG or L-VC.

3.6. Muniaczkowice, Proszowice district, site 1 (AZP 99-59/37)

The site is located on a highly exposed promontory. Its western part is delimited by the Szreniawa valley. The southern and western slopes are relatively steep. The northern one is less inclined. To the east, the promontory connects with the edge of the upland. During investigation, two independent fortification systems, revealed as a structure of positive

linear anomalies, were discovered (Fig. 14-16). The first anomaly is interpreted as a ditch (Fig. 15: feature 1). It cuts off the most exposed portion of the promontory (the western settlement) at its narrowest part. It starts from the Szreniawa valley, then goes north, surrounding the promontory, and then turns east along the northern slope of the hill. The anomaly is not equally well readable everywhere, as it almost disappears at the culmination. This is probably due to strong erosion in this location. Another ditch (Fig. 15: feature 3) runs parallel with the northern part of feature 1 and is possibly another element of the same fortification system. The additional fortifications on the northern slope seems justified by gentle slope, depriving the settlement of its natural defensive qualities.

A second ditch (Fig. 15: feature 2) encloses the eastern settlement, which is located on an elevation within the plateau, above the edge of the Szreniawa valley. In contrast to feature 1, it forms an oval structure. Unfortunately, it was not possible to carry out research on the entire course. The part located east of the modern road, in particular, was almost completely inaccessible to magnetic investigations. Also, the anomaly was not equally well readable throughout its course. The values of the anomaly were relatively low, which may indicate a significant degree of damage to the ditch.

Another ditch is in the middle part of the site (Fig. 15: feature 4). It has a semi-circular course. Its size points to a palisade groove structure. It crosses feature 1. Its arms are directed towards the eastern settlement. This may mean that both features – 2 and 4 – belong to the same fortification system. Magnetic investigations revealed numerous point



Fig. 14. Muniaczkowice, Koniusza district, site 1. Magnetic map in greyscale imposed on a satellite map.
Edited by M. Podsiadło, M. M. Przybyła

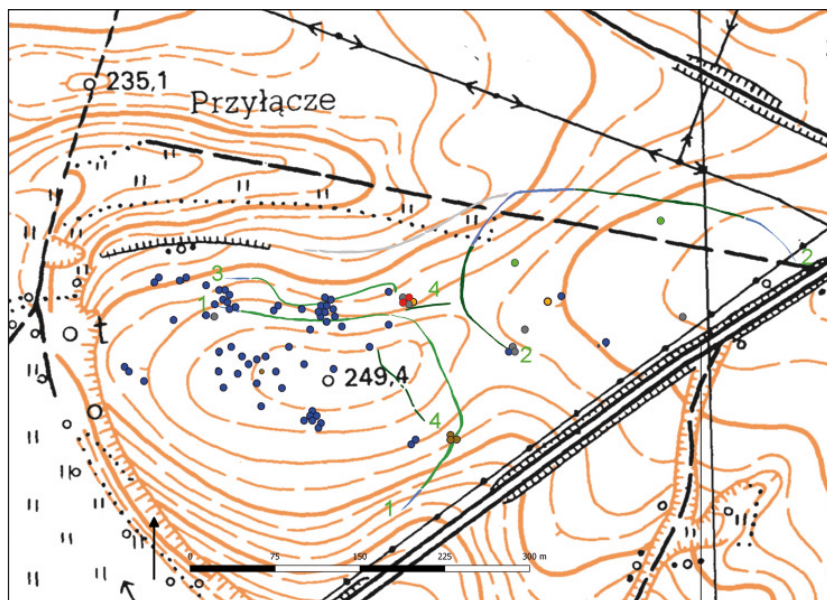


Fig. 15. Muniaczkowice, Koniusza district, site 1. The course of archaeological features on a topographic map: green – archaeological features discovered as magnetic anomalies, blue – archaeological features visible on satellite images. The dots indicate the distribution of artefacts: blue – Funnel Beaker culture, red – Trzciniec culture, green – Mierzanowice culture, yellow – Bronze Age, brown – Lusatian culture, grey – prehistoric times. Drawn by M. Podsiadło, M. M. Przybyła

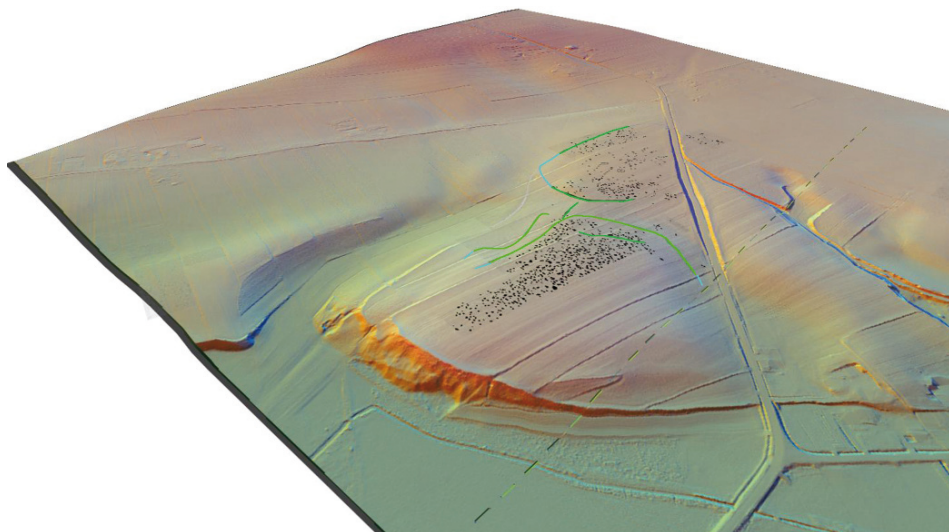


Fig. 16. Muniaczkowice, Koniusza district, site 1. Digital terrain model with course of archaeological features. Drawn by D. Stefański

positive anomalies. They group very clearly within both foundations. In the case of the western settlement, their spatial distribution is chaotic. In the case of the eastern settlement, they seem to be organized into linear systems, possibly connected with buildings constructed with large posts. The western settlement has an area of 7 ha. It stretches along a W-E axis and measures 360×220 m. However, the size of the eastern settlement cannot be accurately estimated due to its incomplete identification. If feature 2 surrounds the culmination similarly as in the western part, the area of the eastern settlement should cover an area of about 8 ha, and should measure 400×270 m. If ditch 4 is considered to be a part of that settlement, the area could reach 12 ha and could measure 500×350 m.

During the survey, numbered artefacts were collected (Fig. 15). In the western settlement, Neolithic artefacts prevailed, including FBC potsherds (59 potsherds) – mostly FB-BC (Bronocice IV-V phase, Włodarczak 2006) – and 4 battle-axes. In addition, a single potsherd of the TC and 4 potsherds of the LC dated to the Bronze Age and early Iron Age periods were found. In the eastern settlement, artefacts were less numerous, and included potsherds and lithics from the FBC (2 potsherds), MC (2 potsherds), TC (3 potsherds), and prehistoric times (5 potsherds). The presence of MC artefacts is noteworthy. One of them is a lenticular axe made of chert. The second is a small potsherd decorated with pseudo-textile imprints, which is characteristic of the Giebułtów group of the MC (Kadrow and Machnik 1997, 116).

Summing up the results of the investigation, the western settlement should be dated to the FB-BC. The eastern settlement may be dated to the Bronze Age, perhaps the TC. Although the TC artefacts were found outside of feature 2 (but within feature 4), other findings support that interpretation. The first argument for this interpretation is the sub-structuring of the complex (features 2 and 4). Similar organization of a TC settlement is documented in Ciborowice, where the fortified centrum of the settlement is extended by two “suburbs” surrounded by palisades. A similar, multipart settlement of the TC is documented in Słonowice (Herbich and Tunia 2009). Alternatively, it is also possible to date it to the late phase of the MC. Defensive settlements of the MC surrounded by an oval ditch were discovered at Sadowie in the Kraków district (unpublished data from an ongoing investigation carried out by M. Przybyła) and at Kraków-Pleszów (Madej 1998). It is also possible that both systems of fortification were not contemporary, but were linked with the FBC. This is the case in Bronocice, where two chronologically different defensive settlements were identified: the first dated to Bronocice phase IV, the second to Bronocice phase V (Kruk and Milisauskas 1999, 173-175).

3.7. Opatkowice Proszowice district, site 2 („Ogrodziska”; AZP 99-60/45)

The site is in the central, most elevated part of the longitudinal hump between the Szreniawa and Ścieklec valleys. It is surrounded by a small, unnamed stream from the north. The site was selected because of its name, “Ogrodziska”, which means “stronghold”.

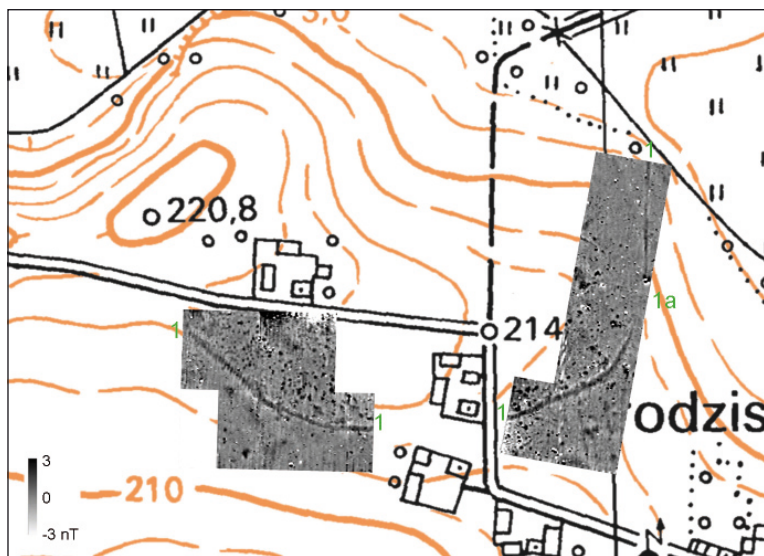


Fig. 17. Opatkowice, Proszowice district, site 2 („Ogrodziska”). Magnetic map in greyscale imposed on a topographic map. The green numbers indicate anomalies discussed in the text.
Drawn by M. Podsiadło, M. M. Przybyła

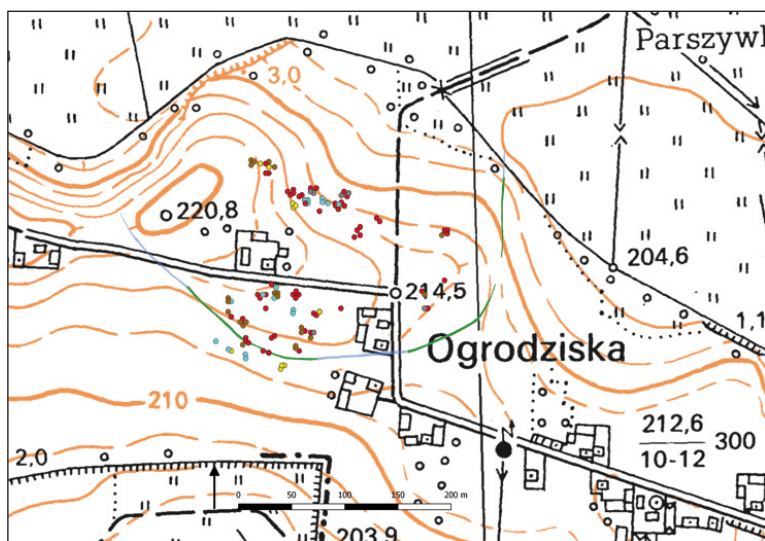


Fig. 18. Opatkowice, Proszowice district, site 2 („Ogrodziska”). The course of archaeological features on a topographic map: green – archaeological features discovered as magnetic anomalies, blue – archaeological features visible on satellite images. The dots indicate the distribution of artefacts: blue – Neolithic, red – Trzciniec culture, yellow – Bronze Age, brown – Lusatian culture, grey – prehistoric times.
Drawn by M. Podsiadło, M. M. Przybyła

The analysis of satellite images revealed clearly visible soil markers, indicating the presence of a ditch surrounding the south and east elevation on which the settlement was placed. As a result of the magnetic investigations, a linear anomaly (Fig. 17: feature 1) and numerous point positive anomalies were discovered. Most of the archaeological features grouped within the area are surrounded by a ditch, which supports the thesis of their contemporaneity. Despite the relatively small range of magnetic tests, the entire establishment was successfully identified. The southern, southeastern and southwestern sides were enclosed by a single ditch. A gap in the eastern part of its course (feature 1a) may indicate an entrance to the settlement. The northern, northeastern and northwestern sides were protected by a stream. The settlement in Ogrodziska has an exceptional predominant northern exposure, unfavourable from the point of view of insolation. Probably the natural defensive property of the place was its only advantage. The area of the settlement is 7.5 ha, and it measures 340×280 m (Fig. 17-19).

During the survey, 114 potsherds were acquired. They represent, respectively, the Neolithic period – probably the FBC (19 potsherds); the Bronze Age – the classic phase of the TC (46 potsherds), the LC (26 potsherds), and 13 potsherds of unspecified attribution; and prehistoric times (10 potsherds). Spatial analysis (Fig. 18) shows that the TC potsherds,

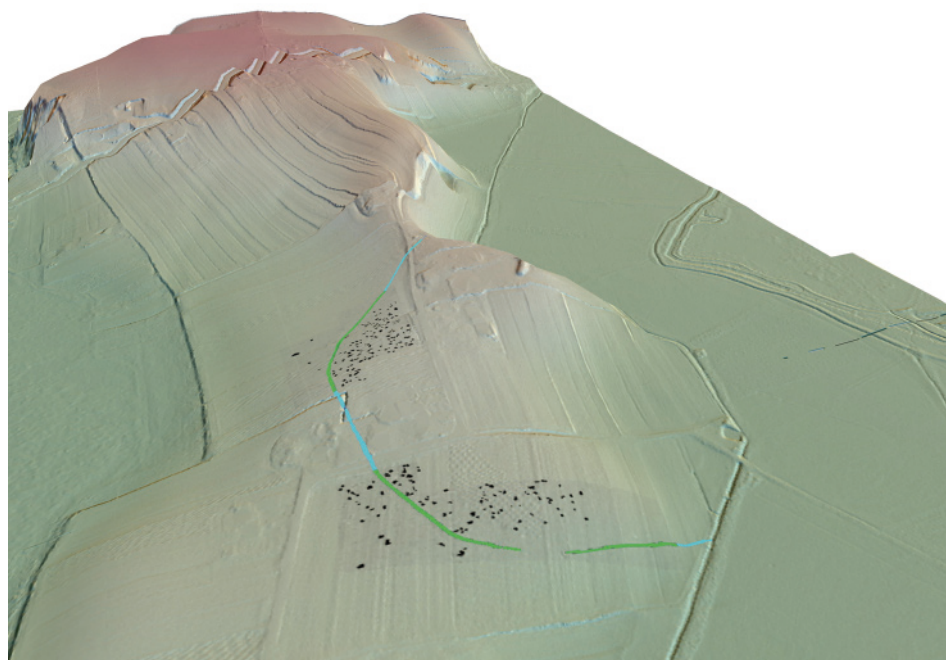


Fig. 19. Opatkowice, Proszowice district, site 2 („Ogrodziska”). Digital terrain model with course of archaeological features (vertical scale x5). Drawn by D. Stefański

unlike the LC and FBC artefacts, were concentrated within the fortifications. In addition, a certain amount of TC potsherds come exactly from the neighbourhood of the ditch. This allows us to date the defensive settlement on the Ogrodziska hill to the classic phase of the TC.

It is also worth noting that about 300 m to the west of the area being investigated archaeological features of the MC and TC were discovered (Górski 2001).

3.8. Opatkowice, Proszowice district, site 3 (AZP 99-60/46)

The site is located at the southern end of a vast promontory at the junction of the Szreniawa and Ścieklec valleys (Fig. 20-21). From the west side, it is flooded by water from the Ścieklec river. Analysis of satellite images revealed the existence of soil markers that could potentially be interpreted as ditches. Magnetic studies confirmed the presence of two linear anomalies (Fig. 20: features 1 and 2). Unfortunately, they were poorly readable. This is probably the result of significant land erosion and the presence of modern infrastructure, generating interference. However, similarly to the previously discussed case at



Fig. 20. Opatkowice, Proszowice district, site 3. Magnetic map in greyscale imposed on a topographic map. The green numbers indicate anomalies discussed in the text. Drawn by M. Podsiadło, M. M. Przybyła

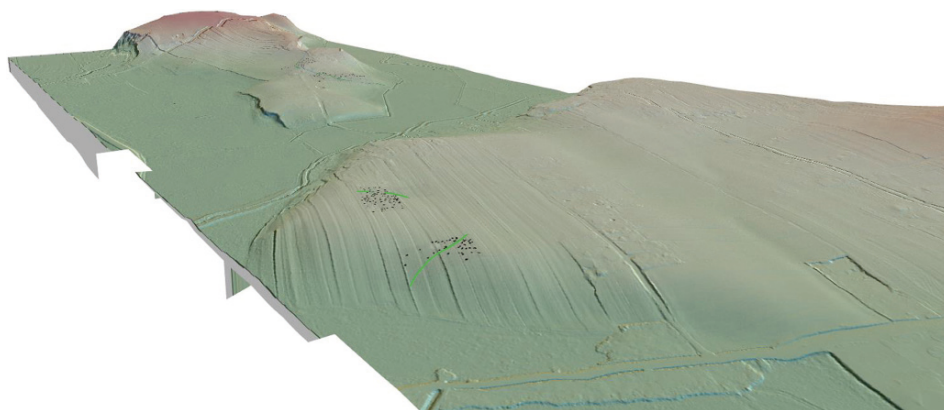


Fig. 21. Opatkowice, Proszowice district, site 3. Digital terrain model with course of archaeological features (vertical scale x5). Drawn by D. Stefański

Biskupice, it can be reconstructed as a defensive settlement, fortified by a single ditch with a horseshoe course. The approximate area of the settlement is 4-5 ha. The survey found only 17 artefacts. They can be dated to the Neolithic – probably FBC (5 potsherds); the Bronze Age – TC (6 potsherds), LC (1 potsherd); and prehistoric times.

3.9. Przesławice, Proszowice district, site 3 (AZP 99-59/27)

The site is located at the eastern end of the hilly upland extending along the southern edge of the Szreniawa valley. Analysis of satellite images revealed two systems of well-readable ditches adjacent to each other. These ditches were additionally documented by aerial photographs taken by Piotr Wroniecki in 2015-2016 (P. Wroniecki personal communication). Both features were almost entirely examined by magnetic methods (Fig. 22). The western linear anomaly (Fig. 23: feature 1) is interpreted as a ditch. It is very well readable on most of its course, except for the southeastern section, where it is probably eroded. The ditch forms an oval and surrounds the culmination of the terrain (Fig. 24). It is possible to identify 5 clearly visible gaps, of several meters each, which are interpreted as the entrances to the complex. A further two such elements can probably be identified in the poorly readable, southeastern part of the anomaly. Inside the foundation, there is another, very weak linear anomaly, interpreted as a ditch (Fig. 23: feature 2), running parallel to feature 1. Although its creation by natural processes cannot be excluded, it seems rather as an element of the fortification (shallower ditch?). Within the settlement, but also beyond its borders, numerous anomalies interpreted as archaeological features have been discovered. The settlement covers an area of 3.2 ha and it measures 280 × 160 m.

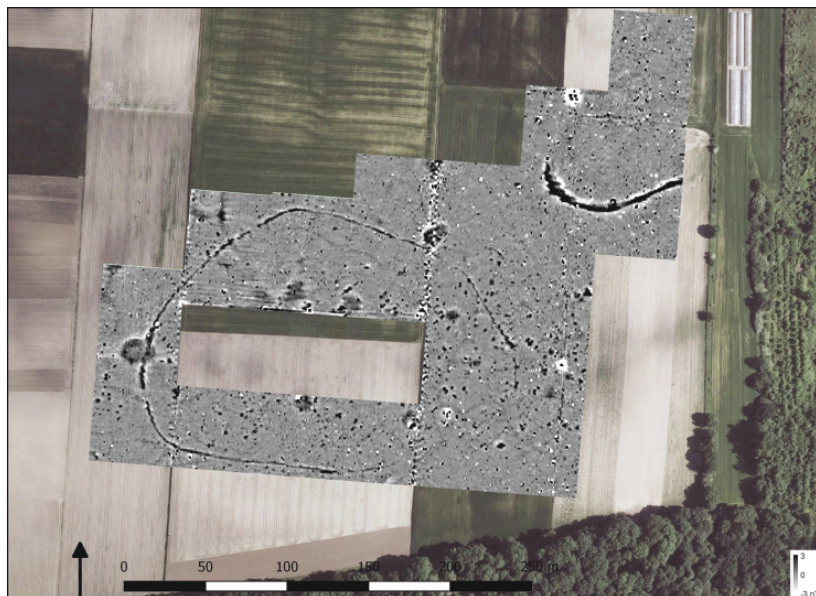


Fig. 22. Przysławice, Koniusza district, site 3. Magnetic map in greyscale imposed on a satellite map. Edited by M. Podsiadło, M. M. Przybyła

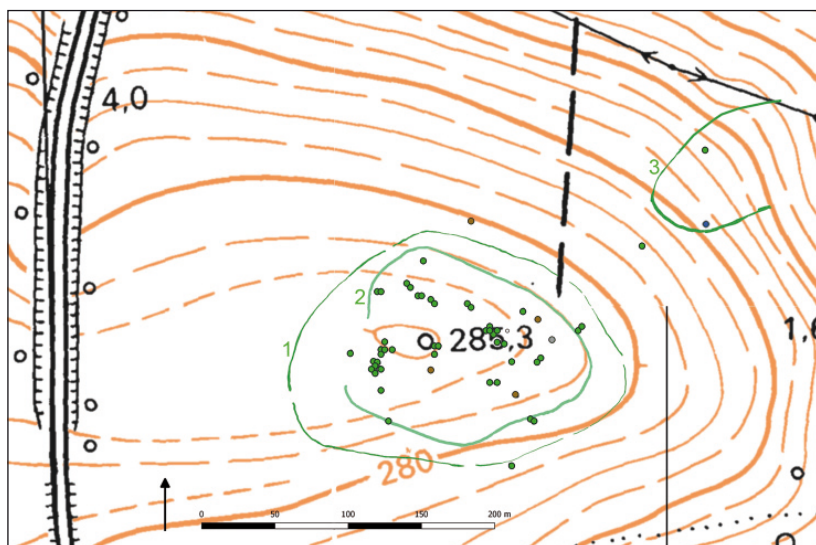


Fig. 23. Przysławice, Koniusza district, site 3. The course of archaeological features marked on a topographic map. The green numbers indicate anomalies discussed in the text. The dots indicate the distribution of artefacts: green – Lublin-Volhynian culture, brown – Lusatian culture, grey – prehistoric times, blue – late Middle Ages. Drawn by M. Podsiadło, M. M. Przybyła

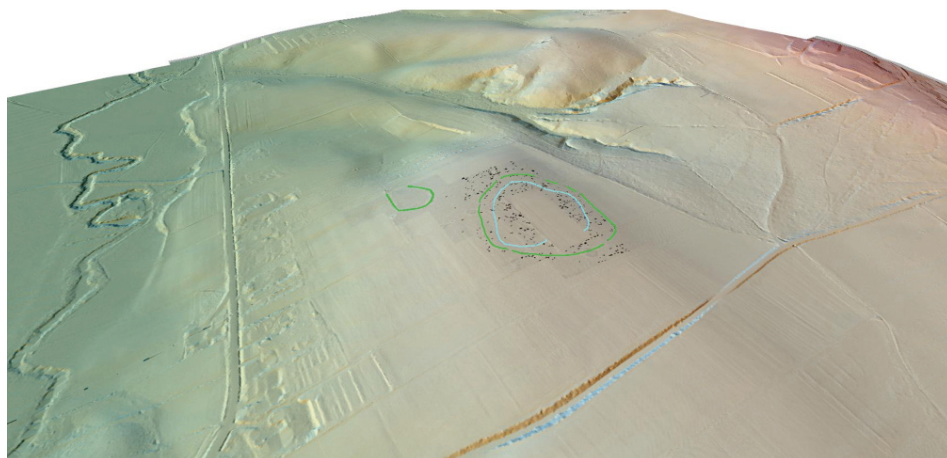


Fig. 24. Przestawice, Koniusza district, site 3. Digital terrain model with course of archaeological features.
Drawn by D. Stefański

The second foundation is marked by a linear anomaly interpreted as a ditch (Fig. 23: feature 3). Its location rather is unusual. It is in the middle part of the northeastern slope. There are no archaeological features within it.

During the survey, 32 potsherds of L-VC were discovered. The collection also includes a fragment of a stone axe, 2 potsherds from the LC and a fragment of late medieval ceramics. Almost all finds come from the area of the western settlement (Fig. 23), which allows it to be linked with the L-VC. Feature 3 is an atypical, rather non-residential construction. A single fragment of medieval ceramics, which was found in its neighbourhood, may link it with the Middle Ages.

3.10. Włostowice, Proszowice district, site 5 (AZP 100-62/44)

The site is situated on a very wide promontory over the northern side of the Szreniawa floodplain. The results of a magnetic investigation are incomplete, but the investigation revealed an interesting structure (Fig. 25). At the spot of a visible soil marker, a linear anomaly was found (Fig. 26: feature 1). Its character is, however, unclear. It has illegible boundaries and variable values on the magnetogram. It cannot be ruled out that it is of natural origin. On the other hand, its course, which leads across the base of the promontory and through the culmination of the area, points to a defensive function. This observation is supported by a very intense cluster of positive point anomalies interpreted as archaeological features in the central part of the promontory. Among them, one can distinguish a regular, rectangular structure measuring 40×7 m. (Fig. 26: feature 4). It is oriented approximately along a north-south axis. This structure can be interpreted with great

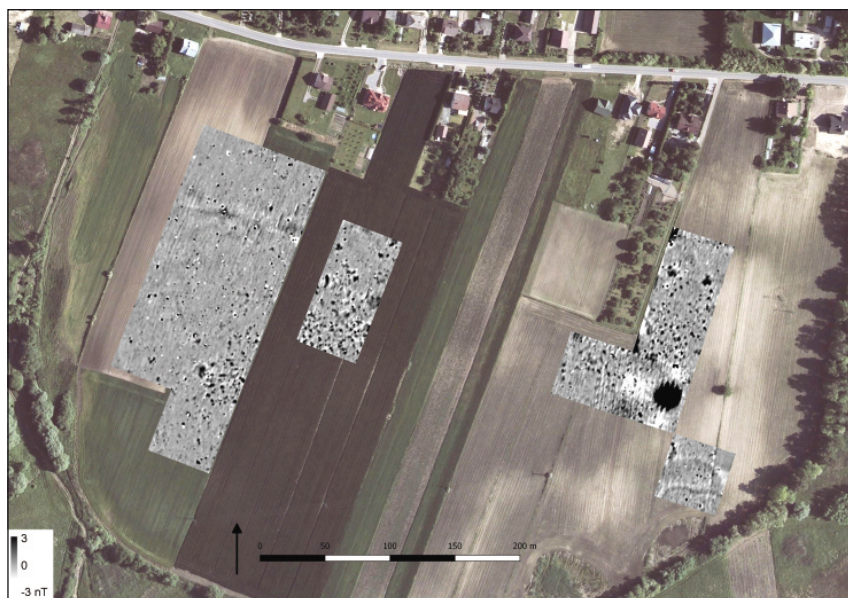


Fig. 25. Włostowice, Koszyce district, site 5. Magnetic map in greyscale imposed on the satellite map. Edited by M. Podsiadło, M. M. Przybyła

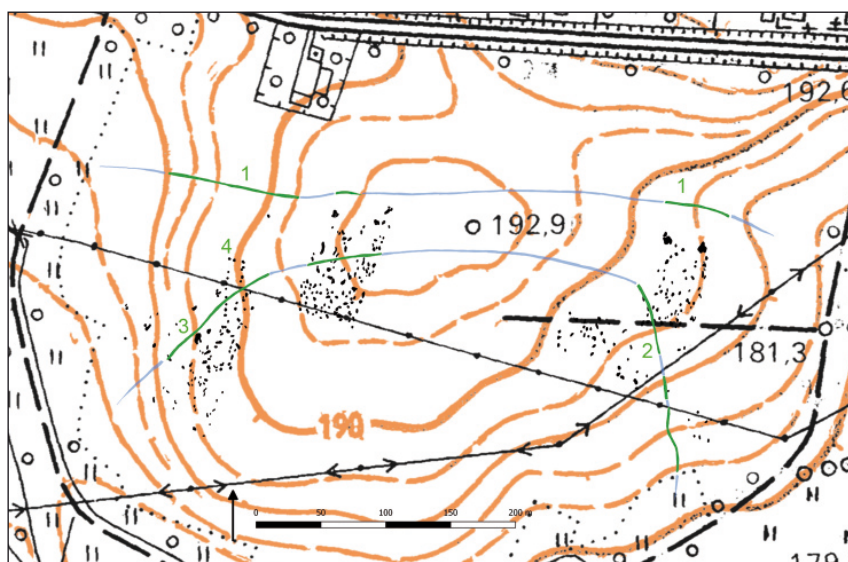


Fig. 26. Włostowice, Koszyce district, site 5. The course of archaeological features on a topographic map: green – archaeological features discovered as magnetic anomalies, blue – archaeological features visible on satellite images. Drawn by M. Podsiadło, M. M. Przybyła

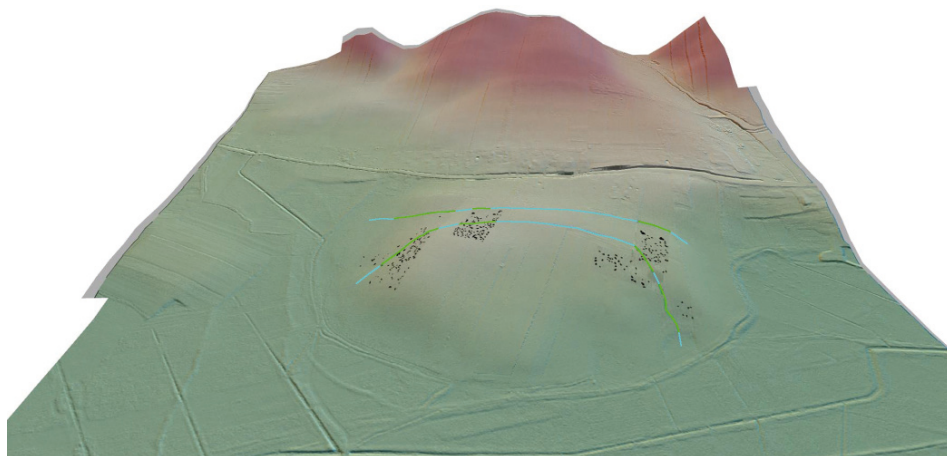


Fig. 27. Włostowice in the Koszyce district, site 5. Digital terrain model with course of archaeological features (vertical scale x5). Drawn by D. Stefański

certainly as a longhouse of the LBK, as it corresponds to the size, shape and orientation of large residential buildings of this cultural phenomenon known from Małopolska (Czekaj-Zastawny 2008, 39-42). Along the western border of the archaeological features runs another, very poorly readable, linear anomaly (Fig. 26: feature 3), which clearly cuts through the LBK longhouse. At the location of the soil marker there is another, very weak, linear anomaly visible (Fig. 26: feature 2). Unfortunately, it is located near a high voltage pole, which is a source of very strong disturbances. Additionally, its northern course was not investigated due to the presence of contemporary infrastructure.

Over the course of the survey, 107 artefacts, mostly potsherds, were acquired. They represent, respectively, the Neolithic period – 30 potsherds and a stone adze from the LBK, 21 other Neolithic potsherds (most probably FBC); the Bronze Age – TC (5 potsherds), LC (8 potsherds), unspecified (7 potsherds); and 11 potsherds dated to the younger pre-Roman period.

In conclusion, it should be stated that relics of multi-phase prehistoric settlement were recognized at the site (Fig. 27). The oldest LBK settlement was located in the central and western part of the promontory. Features 2 and 3 could be linked with the hypothetical fortification of the FBC settlement. That settlement covers about 6-7 ha, and measures 270 × 450 m. Settlements of the TC, LC and the younger pre-Roman period were recognized in the central and eastern part of the promontory. The character and chronology of feature 1 remain unknown. This ditch cuts off the entire area of the promontory, cutting into the bottom of the valley. It covers an area of about 15 ha and measures 560 × 300 m. Taking into account formal similarities, this structure may also be related to the FBC or alternatively to the TC.

4. THE CHRONOLOGY

The discovered defensive settlements can be grouped into three clearly defined, chronologically and culturally compacted horizons. It could be argued that these horizons also reflect other fortified prehistoric sites in western Małopolska. The exception to this rule is the defensive settlements of the LC, which appear to be continuous through the almost 1000 years of existence of that cultural phenomenon.

4.1. The late Lengyel-Polgár cycle horizon

In Małopolska, the late L-PC horizon includes W-ZG and the late, and perhaps classic phase of L-VC. It could be dated between 4100-3800 BC. The first of those entities is dated to 4300-3800 / 3750 BC (Nowak 2014, 252); however, the only published defensive settlement in Podłęże is relatively late, and its chronology was established at the beginning of the fourth millennium BC (Nowak *et al.* 2008, 103). In the case of the L-VC, according to the chronological framework proposed by A. Zakościelna (2006, 90), this period would correspond to phase II (i.e. classic phase: 4200/4000-3800 BC) and phase III (i.e. late phase: 3800-3400 BC). In another view, the chronology of phase III is set to the period between 4000-3800 BC (Chmielewski 2008). This range could be supported by the chronologies of the burial from Książnice (4050-3940 BC), the graves from the defensive settlement in Złota-Grodzisko (Wilk 2016, 21-22) and also the defensive settlements in Sandomierz-Wzgórze Zawichojkie (4026-3956 BC, Włodarczak 2017, 97) and in Bronocice (3913-3758 BC, Kruk *et al.* 2018, 70).

That horizon also relates to numerous other well-recognized defensive structures from Małopolska (Fig. 28). This is the case for the intensively excavated sites of the L-VC at Złota in the Sandomierz district (Sałacińska and Zakościelna 2007), at Sandomierz-Wzgórze Zawichojkie (Kowalewska-Marszałek 2017), at Bronocice in the Pińczów district (Kruk and Milisauskas 1981, 73), and of the W-ZG at Podłęże in the Wieliczka district (Nowak *et al.* 2008) and Pielgrzymowice in the Kraków district. This horizon also includes several new finds of the L-VC in eastern Małopolska, which were recognized during ongoing, mostly non-invasive research like Mikulin (Chmielewski *et al.* 2015). Finally, there is a certain number of ambiguously dated, poorly recognized sites known from archival research that can also be linked with this horizon (Nowak 2009, 172-173).

The new finds of the L-VC settlements in Biskupice and Przesławice (and probably also in Siedliska), recognized in the course of this project, provide more evidence to support a conclusion. Both of them are the most westerly located defensive settlements of the L-VC and among the most western settlements of the entire culture. The presence of these sites seems to be evidence of tension in inter-group relations and is caused, as the authors assume, by the westward movement of L-VC settlement in their late phase, and by their increasing control of loess areas in western Małopolska (Zakościelna 2006, 84).

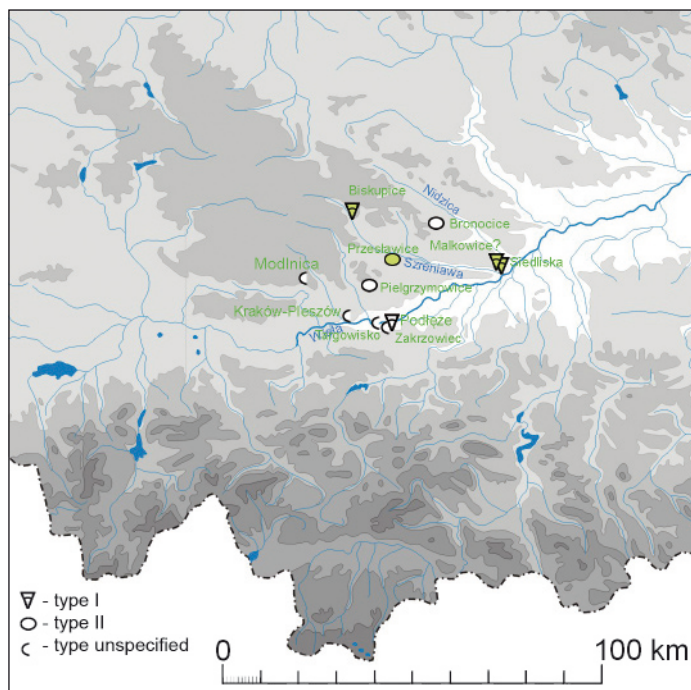


Fig. 28. The western part of Małopolska. Location of defensive settlements from Pleszów-Modlnica group, Lublin-Volhynian culture and Wyciąże-Złotniki group, yellow – sites discovered during the research.

Drawn by M. M. Przybyła

A separate topic is the presence of fortified settlements in the context of P-MG. They are represented by ditches and palisades discovered at Zakrzowiec in the Wieliczka district (Jarosz *et al.* 2012, fig. 7), Kraków-Pleszów (Godłowska 1976, 51), Modlnica in the Kraków district (Żurowski 1933) and probably at Targowisko in the Wieliczka district (Nowak 2009, 173). The P-MG communities were developing in the second half of the 5th millennium BC (Kaczanowska 2006, 52), which implies a possible overlap with the discussed phenomenon. In this light, the Siedliska site, which was investigated during the project and could be associated with the P-MG, may support such a hypothesis.

4.2. The Funnel Beaker-Baden culture horizon

At the end of the fourth millennium BC, in western Małopolska, important transformations of the settlement network took place. The existing FBC structure south of the Szreniawa River was disintegrated and replaced by the settlement of the allochthonous BC. North of the river, the development of the FBC still continued, strongly influenced by the Baden

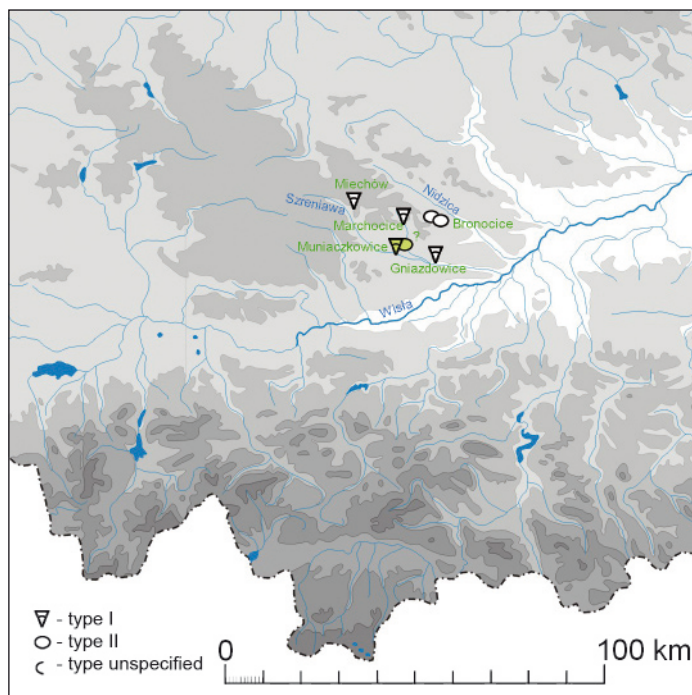


Fig. 29. The western part of Małopolska. Location of defensive settlements of Funnel Beaker-Baden culture. Yellow color – sites discovered during the Szańcza valley survey. Drawn by M. M. Przybyła

culture, leading to the specific form of the syncretic FB-BC (Kruk and Milisauskas 1999, 174; Zastawny 2008). This stage corresponds to the period of reduction and concentration of settlements. The previous stage – “central places period” or the classic phase – were characterized by numerous large settlements surrounded by a network of satellite sites. During the period of reduction and concentration, only a few, but very extensive, central settlements remained active, surrounded by smaller sites (Kruk and Milisauskas 1999, 135, 174). In contrast to the previously discussed settlements of the L-PC horizon, the defensive sites of the FB-BC phase are relatively less numerous, and are territorially restricted to the Nidzica basin and the northern part of the Szańcza basin. The chronology of that horizon is based on radiocarbon and stylistic dating of the Bronocice settlement in the Pińczów district, where the two youngest phases, i.e. BR IV and BR V (Kruk and Milisauskas 1983, 272), are connected with the FB-BC. In both phases ditches appeared, although their function in phase IV is debatable (Kruk and Milisauskas 1999, 175). Radiocarbon dates obtained for both phases set the ranges in 3350/3300 – 3200-3100 BC for BR IV and 3150/3100-2900-2800 BC for BR V (Kruk *et al.* 2018, 77). It allows the framing of the entire horizon between 3300-2800 BC. Apart from the settle-

ment at Bronocice, only three other sites belong to this horizon (Fig. 29). Two of them were investigated almost exclusively by non-invasive methods. This is the case for Gniazdowice in the Proszowice district (Przybyła *et al.* 2015), which is also located in the Szreniawa valley, and also for Marchocice in the Miechów district in the Ścieklec valley – the northern tributary of the Szreniawa (Dulęba *et al.* 2015), which according to the authors of this paper can be linked with the FBC. Another site is at Miechów in the Miechówka valley, which is also a tributary of the Szreniawa River (the site investigated by K. Peschel, A. Buszek, G. Pryc, M. Przybyła and I. Pieńkos). The western, and possibly also the eastern settlement at Muniaczkowice, which were tested during the project, significantly add to that list.

4.3. The Mierzanowice and Trzciniec cultures horizon

This horizon relates to two cultural units (Fig. 30) of different traditions, which were chronologically overlapping between 1800-1650 BC in the Małopolska loess area (Kadrow and Górski 2003, 94). The chronological framework for the horizon should be set between

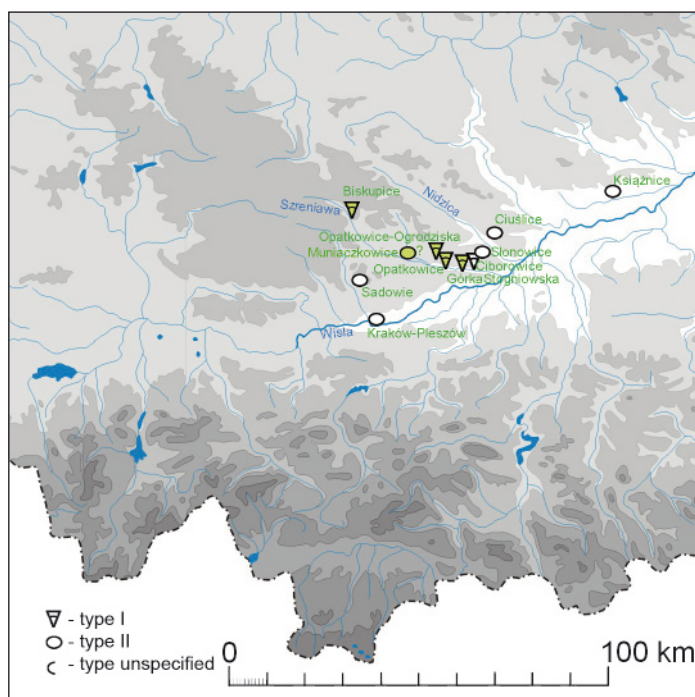


Fig. 30. The western part of Małopolska. Location of defensive settlements of Mierzanowice culture and Trzciniec culture. Yellow color – sites discovered during the Szreniawa valley survey. Drawn by M. M. Przybyła

2000-1400 BC. This corresponds to the A2 and B periods of the Bronze Age (*ibidem*, fig. 38). The oldest Mierzanowice culture defensive settlement in Książnice is dated to the early or the classic phase (Wilk 2014). The settlement of the Pleszów group of the MC in Trzcinica (Gancarski 1999a), which dates from 2100-2000 BC (Gancarski 1999b, 150), seems to occupy a similar position in the chronology. The younger defensive settlements are dated to the late phase of MC, that is, the period between 1800-1600 BC. This is the case for the eponymous site of the Pleszów group in Kraków-Pleszów (Madej 1998), and for Sadowie in the Kraków district (unpublished materials). One should also mention the site at Wojciechowice in the Opatów district, which was tested only by a small trench (Bąbel 2013, 42). Besides the defensive structures, ditches of unclear function are also known from Iwanowice in the Kraków district (Kadrow 1991, 25).

In the case of the Trzciniec culture, this horizon includes sites dated to its classic phase, which is its oldest phase recognized in western Małopolska. Worth mentioning is a huge settlement of over 20 hectares at Słonowice in the Kazimierza Wielka district (Herbich and Tunia 2009). A defensive ditch was also recognized at Samborzec in the Sandomierz district (Kamieńska 1966, 324-325, fig. 2). This is also the case for Ciuślice in the Kazimierza Wielka district, where a non-invasive investigation revealed a large foundation (Wroniecki *et al.* 2016), and for Ciborowice in the Proszowice district. During this project in the Szreniawa valley, another four sites were discovered: Kępa, Górka Stogniowska, Opatkowice-Ogrodziska and Biskupice. Possible traces of fortifications of the TC were also found at site 3 in Opatkowice. It could also be argued that the eastern settlement in Muniaczkowice may be associated with the discussed horizon.

The TC defensive settlements are remarkable for their size and for their dense patterning. On a short twenty-kilometre-long final section of the Szreniawa valley, at least 4 defensive settlements were discovered (Opatkowice-Ogrodziska, Górka Stogniowska and Ciborowice, and probably also in Opatkowice 3), spaced 2 to 4 km apart. The analysis of artefacts proves that they developed simultaneously in the classic phase of the TC. It seems that at least in the case of western Małopolska, defensive settlements were a common, and perhaps even the dominant, element of the settlement network of the TC.

4.4. The Lusatian culture

In the case of the defensive settlements of the Lusatian culture, it is not possible to assign a precise chronological horizon. In western Małopolska, they can be dated from the III period of the Bronze Age to the early La Tène Period (Fig. 31). The oldest fortified site was discovered in Wieliczka district Wieliczka, where the artefacts from the III BA were accompanied by a dagger dated to II BA (Fraś and Reguła 2001). Another site dated to III BA is known from Targowisko, Wieliczka district (Konieczny 2014, 113). Ditches are also known from the early phase of the Witów site, dated to III and IV BA (Bochnak 2004, 129, fig. 59; Gawlik and Godlewski 2010). A system of ditches, dated to IV-V BA,

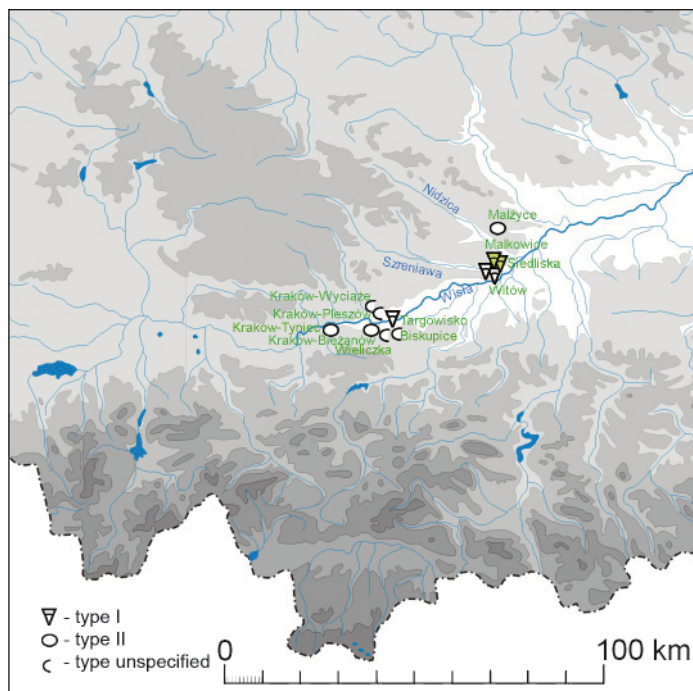


Fig. 31. The western part of Małopolska. Location of defensive settlements of Lusatian culture. Yellow color – sites discovered during the Szreniawa valley survey. Drawn by M. M. Przybyła

was found at Kraków-Pleszów (Kogus 1982, 336-339, fig. 1). Similar fortifications are also mentioned from Kraków-Wyciąże (Buratyński 1953, fig. 2). A circular palisade found at Kraków-Bieżanów (Przybyła 2017, 382) could be dated to the early Iron Age (HaC-D period). Non-invasive investigations carried out on a large fortified settlement at Malżyce, Kazimierza Wielka district, suggest the V BA-HaC period (Wroniecki 2016, 28). The youngest phase is marked by fortified settlements at Kraków-Tyniec and at Biskupice in the Wieliczka district, dated to the turn of the Hallstatt and La Tène periods (Gedl 1982, 27-29).

For this project, the most interesting LC settlement is the one from Witów, dated to the late Bronze Age and the Hallstatt period (Gawlik and Godlewski 2010, 333). This site seems to be a complementary site to Malkowice and Siedliska. The settlement in Witów is located on a conspicuous promontory at the south end of the Szreniawa valley *vis-à-vis* the Malkowice-Siedliska complex. The close proximity of these contemporaneous sites at this particular location suggests a complex fortified infrastructure, which seems to have controlled a strategically important place at the junction of the Szreniawa and Vistula Rivers.

5. SUMMARISING

The research confirms the thesis that the Szreniewa valley is an area of intense prehistoric settlement, which frequently included defensive settlements. Summing up previous results (Gniazdowice, Ciborowice and Witów) with the current investigation, the number of defensive settlements reaches 20, which is an exceptional record in Poland. The authors are convinced that the continuation of this work would allow the discovery of at least several other such sites. It may be argued that the many defensive features in the Szreniawa valley do not result from the unique character of the discussed region, but from systematic examination. Therefore, similar results could be achieved by investigating other loess areas of southern Poland. These new findings allow us to rethink the social and political organization of the cultural units in question. The construction of monumental fortifications, consisting of ditches, ramparts and palisades enclosing an area of several or even several dozen hectares, undoubtedly requires complex organization of work, perhaps even the existence of developed hierarchical structures. The construction of fortified settlements can also be a confirmation of the existence of political tensions or a different kind of crisis, for example increased competition over access to the exploitation of natural resources. It is striking that the appearance of defensive settlements took place during periods of cultural, and probably also political and ethnic change. Such is the case of the defensive settlements of the L-VC, which appeared in the period of its migration to, and settlement of the western part of the Małopolska loess area, and at the time of the emergence of the early stage of the FBC in the region. The horizon of fortified settlements of the FB-BC can be correlated with the appearance of the Transcarpathian Baden culture in the western part of Małopolska. It ends with the appearance of a nomadic population represented by the CWC (Kruk *et al.* 2018, 78). Defensive settlements in the MC-TC horizon could have had a “confrontational” character. They can be correlated with the disappearance of indigenous settlement of the MC and the emergence and development of the allochthonous TC, which came probably from central Poland.

Analysing the preferred landforms and the shapes of fortifications, one can indicate the basic types of defensive settlements in western Małopolska.

Type 1 – settlements in naturally defensive places, usually on triangular promontories flanked on two sides by a river bank, riverbed, or by natural moats, like the marshy bottom of a river valley. The fortifications consist of one or several (2-3 parallel) ditches, or palisades that usually cut off the head of the promontory. These were built using naturally suitable landforms – the largest sparring of a promontory (e.g., the western settlement in Muniaczkowice) or natural ravines and erosion cuts (e.g., Malkowice and Siedliska). This type of settlement was recognized at Biskupice, Górka Stogniowska, Malkowice and Siedliska, the western settlement in Muniaczkowice, Opatkowice-Ogrodziska, and hypothetical settlements in Opatkowice and Włostowice. These have analogies in other settle-

ments known from western Małopolska like Targowisko, Marchocice, Witów (both stages), Obrażejowice and Gniazdowice.

Type 2 – settlements established on exposed hills or slopes, provided with circular, all-round ditches, without the use of natural elements. This is the less common type of defensive architecture. It includes the eastern settlement in Muniaczkowice and in Przesławice. These have analogies in other settlements known from western Małopolska like Słonowice, Kraków-Bieżanów, Małżyce, Pielgrzymowice and Sadowie.

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Anna Lasota-Kuś*

CEMETERY AT OBRAŻEJOWICE, RADZIEMICE COMMUNE. NEW SOURCES FOR RESEARCH ON THE PRZEWORSK CULTURE IN THE YOUNGER PRE-ROMAN AND EARLY ROMAN PERIODS IN WESTERN MAŁOPOLSKA

ABSTRACT

Lasota-Kuś A. 2019. Cemetery at Obrażejowice, Radziemice commune. New sources for research on the Przeworsk culture in the Younger Pre-Roman and Early Roman periods in Western Małopolska. *Sprawozdania Archeologiczne* 71, 341-358.

In 2019, test excavations and surface surveys were carried out on an accidentally discovered Przeworsk culture cemetery at Obrażejowice, Radziemice commune. The materials recovered during the research should be dated to the Younger Pre-Roman period (phases A2, A3, and A3/B1) as well as Early, and probably Younger, Roman period (phases B1, B2, B2/C1). It is worth noting that the finds represent “pure” Przeworsk culture, since fragments of Celtic vessels have not as yet been identified.

Keywords: cemetery, Przeworsk culture, Younger Pre-Roman period, Roman period

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INTRODUCTION

In 2018, The Małopolska Province Heritage Protection office in Kraków received information that amateur detectorists had recovered a series of metal artefacts from several places in the village of Obrażejowice, Radziemice commune. Among other objects, the artefacts included a spearhead, allegedly discovered together with cremated bones. It was

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possible to precisely pinpoint the place of this discovery, which turned out to be close to archaeological site 13 (AZP 98-58/127). Site 13 was recorded by J. Górski and M. Zając in 1997, when a fragment of a ceramic vessel of undetermined chronology was found.

In May 2019, a geomagnetic survey was performed on the site (by PRYNCYPAT company, Marcin Przybyła), encompassing an area of 2,5 ha. The research revealed multiple dipole anomalies, possibly indicative of cremation burials (more in: A. Lasota-Kuś, M. M. Przybyła, in preparation). Test excavations, carried out by Piotr Włodarczak from



Fig. 1. Obrażewice, Radziemice commune. Location of the site. Drawn by A. Lasota-Kuś

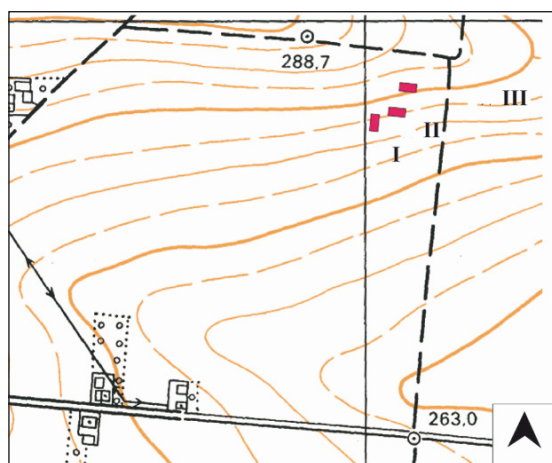


Fig. 2. Obrażewice, Radziemice commune, site. 13. Location of excavations. Drawn by A. Lasota-Kuś

the Institute of Archaeology and Ethnology, Polish Academy of Science, were launched the same month, with trenches opened in places where the anomalies were recorded.

The locality of Obrażejowice, is situated on the Miechów Upland, in the upper course of the Ścieklec River, a small left-bank tributary of the middle Szreniawa River (Fig. 1). Site 13 occupies the south-eastern slope of a prominent promontory. As suggested by the surface surveys, the site probably does not encompass the top of the promontory, since no archaeological material has been found in this area.

As demonstrated by the excavations (which encompassed 650 sq.m. – Fig. 2) and the accompanying metal-detector surveys, the site was occupied in two phases, both linked with the Przeworsk culture. The first phase dates to the Younger Pre-Roman period, while the other one with the Early Roman period.

PRELIMINARY RESULTS OF EXCAVATIONS

The excavations resulted in the discovery and exploration of 31 archaeological features, of which 26 produced archaeological material (Fig. 3, 4). Except for feature 27 linked with the Early Roman period, these were cremation burials of the Przeworsk culture from the Younger Pre-Roman period. They contained relatively small amounts of strongly cremated, milk-white bone, and usually also remains of funeral pyres in the form of charcoal. Therefore, they represent the most typical form of Przeworsk culture burial of that period. The pits were oval or roughly circular in plan, with diameters ranging from approx. 25 to 70 cm, and a maximum size of 150 x 100 cm. The relatively small thickness of the fills (30 cm on average) suggests that the ceiling parts have been disturbed. The burials were furnished with intentionally broken ceramic vessels and occasionally metal artefacts (an iron brooch, knives, an iron ribbon-like fitting, an iron pin, and a melted-down bronze object). Some of the artefacts bear traces of having been secondarily burnt in a funeral pyre.

As mentioned, grave cuts were usually small in size. Grave 10 stands out in this respect, with dimensions of 150 x 100 cm. Its fill produced an iron wire brooch with an upper cord (Fig. 5: 1), representing Kostrzewski type M (Kostrzewski 1919). Brooches of this type were local rather than Celtic products, and were widespread in Central Europe (Dąbrowska 2008, 30). They were incidentally found in Tyniec group sites, which gave rise to their interpretation as a reflection of differences in costume preferences among Przeworsk culture and Celtic populations (Poleska 2006, 150). However, new research at Pełczyska, which revealed a series of such brooches, suggests the picture stemmed only from the state of research (Rudnicki 2009, 308). Brooches of the M type appear in transitional phase A2/A3 and are characteristic of phase A3 in the system of relative chronology applied to the Przeworsk culture (Dąbrowska 1988, 31, plate IV).

All the vessels found in graves were hand-made. Most of them reveal traces of exposure to high temperatures in a pyre, which negatively affects the possibility of determining their

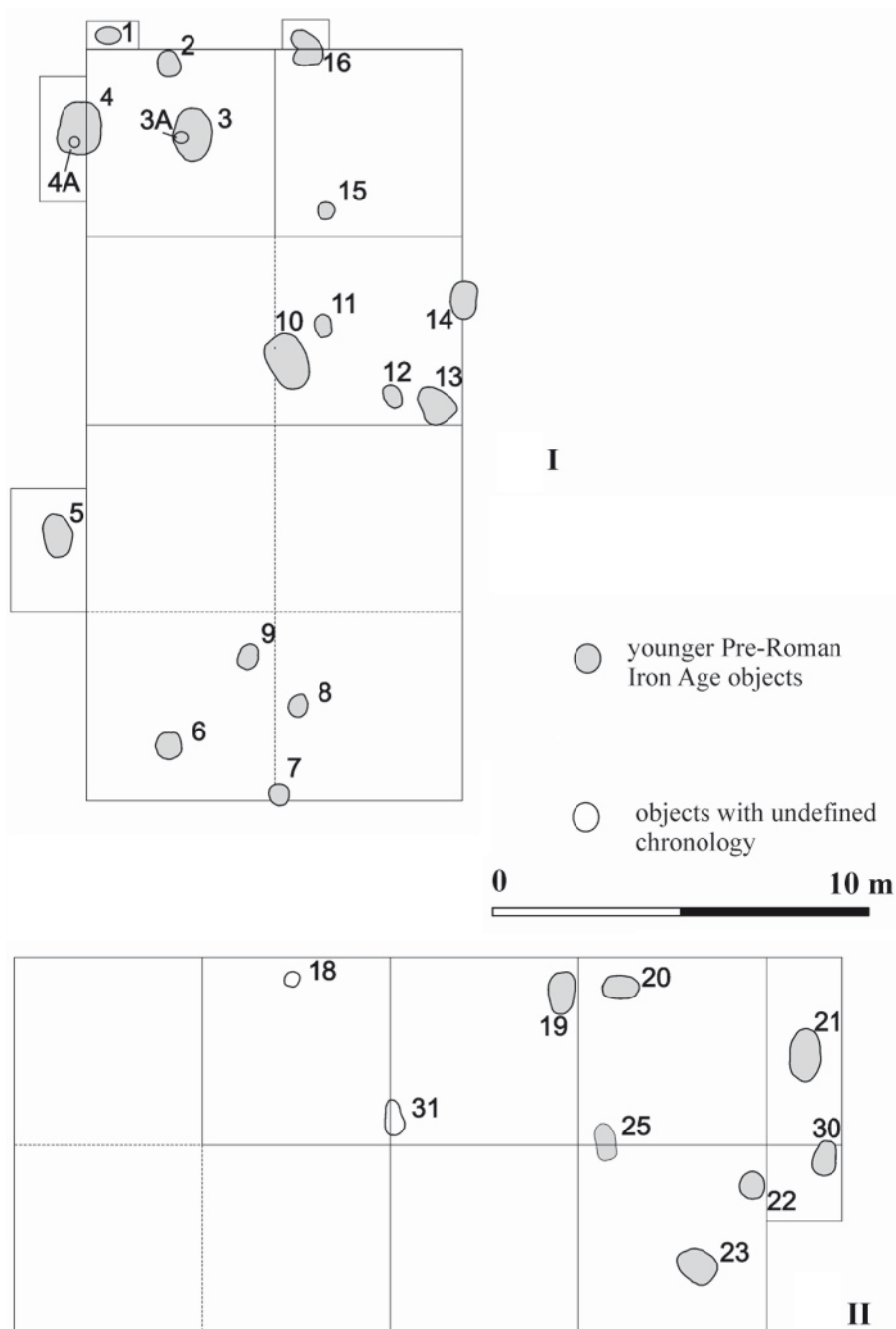


Fig. 3. Obrażejowice, Radziemice commune, site. 13. Plan of the cemetery (trench I-II).
Drawn by A. Lasota-Kuś

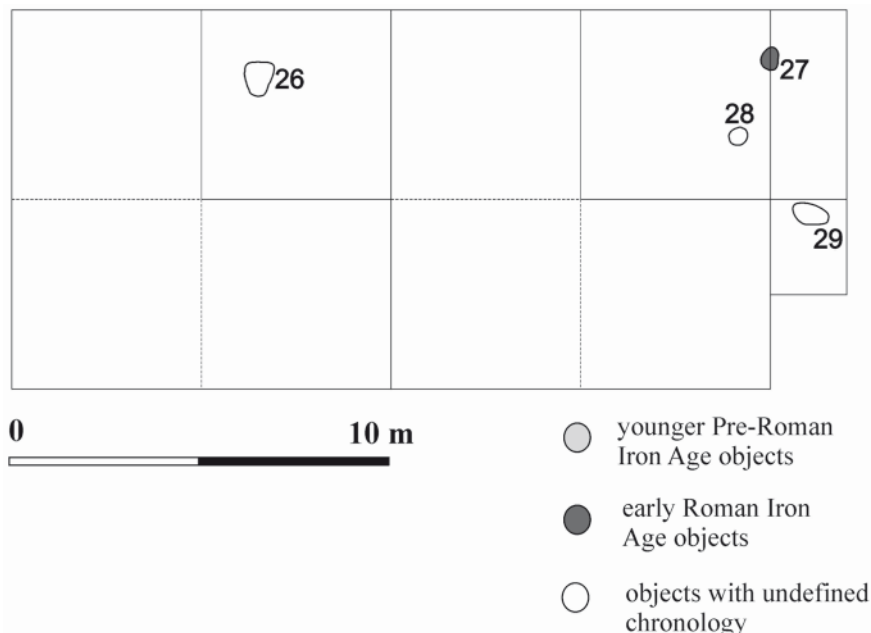


Fig. 4. Obrażejowice, Radziemice commune, site. 13. Plan of the cemetery (trench III).

Drawn by A. Lasota-Kuś

technological attributes. Grave 10 mentioned above yielded sherds originating from no less than five different vessels (Fig. 5: 2-5). Their fragmentary preservation makes precise reconstruction of the vessel shapes very difficult. The rims are slightly faceted, typically in two planes. A partly reconstructed bowl with thickened rim and rounded body (Fig. 5: 2) finds analogies, among other places, in vessels known from the cemetery at Olbin site 5, Maciejowice commune (Czarnecka 2007). Vessels having slightly faceted or thickened rims occurred there in assemblages precisely dated to phase A3 (e.g. graves 20, 26a, 35a – Czarnecka 2007, pl. XVII: 10; XXIII: 9; XXXV: 16). Both the iron brooch and the sparse potsherds found in grave 10 at Obrażejowice indicate its chronology should be placed within phase A3.

Among ceramic materials from other graves in the site in question, it is worth noting vessels representing the so-called older ceramic style of the Przeworsk culture, characteristic of phases A1-A2 of the Younger Pre-Roman period (Dąbrowska 1988, 15, 24, 28-31). With phase A2 one should probably link, among others, feature 6. A cup discovered in this grave has blackened, smooth surfaces, and its rim is evidently bevelled in three different planes (Fig. 6: 1). In the lower part of the body the walls are strongly arching, while the fragmentarily preserved handle has a slightly marked constriction. In the upper part the cup is covered with a narrow band of incised decoration consisting of two horizontal bands filled with short horizontal strokes. The bands are separated by another band of incised decora-

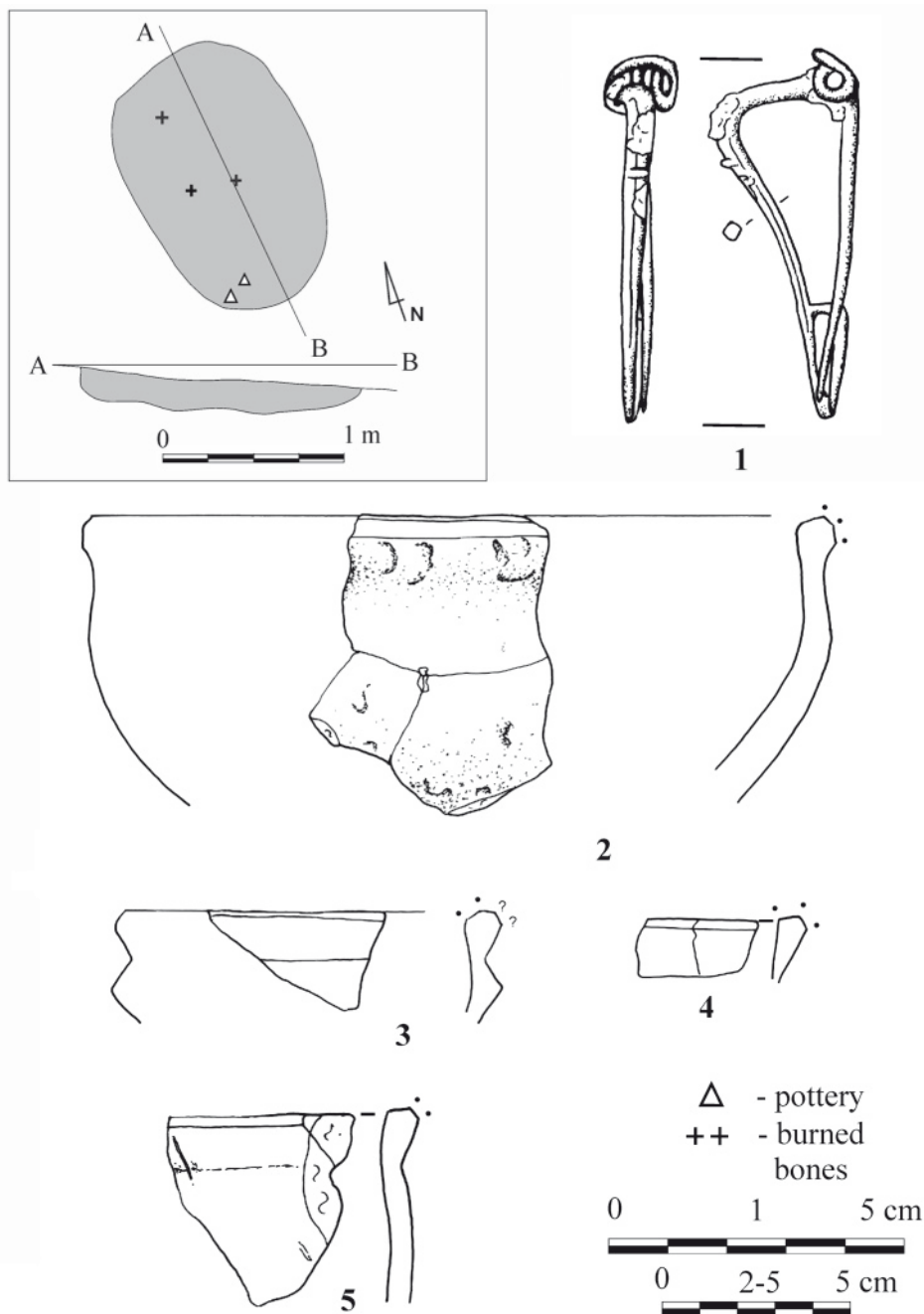


Fig. 5. Inventory of grave 10: 1 – iron fibula; 2-5 – clay vessels. Drawn by A. Lasota-Kuś

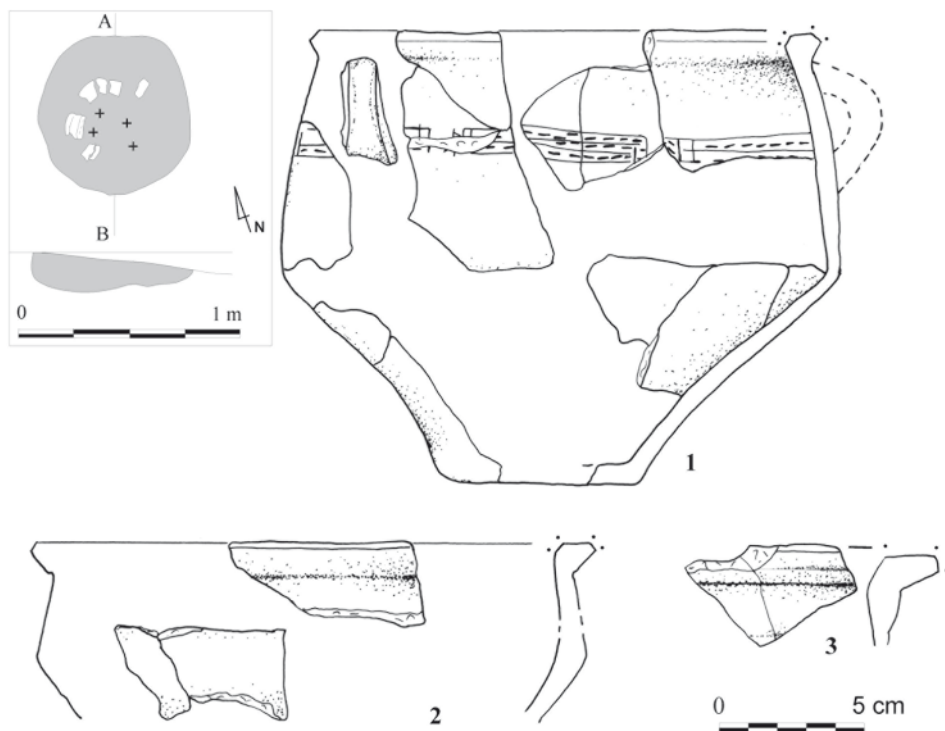


Fig. 6. Inventory of grave 6: 1-3 – clay vessels. Drawn by A. Lasota-Kuś

tion, poorly legible. Simple geometric motifs composed of lines, strokes, and dots belong to the most widespread ornamental patterns in Przeworsk culture pottery in the Younger Pre-Roman period (Dąbrowska 1988, 29, 30). The cup's morphology suggests analogies should be sought among vessels typical of late phase A2 (cf. Dąbrowska 1988, trait 51). To the same period of time (phase A2) also date two graves (119 and 365) from the cemetery at Kamieńczyk site 1, Wyszaków commune, where analogical cups with a clearly undercut lower body were found (Dąbrowska 1997, pl. LXIV: 8; CLXXI: 13). The remaining, fragmentarily preserved vessels from grave 6 at Obrażejowice (Fig. 6: 2-3), including rims bevelled in three planes, confirm the proposed dating of the burial.

MATERIALS FROM SURFACE SURVEYS

Parallel with the excavations, surface surveys using a metal detector were carried out in the immediate vicinity of the trenches, encompassing an area of approx. 100 ares. They brought about the discovery of 42 metal artefacts, all of them retrieved from shallow

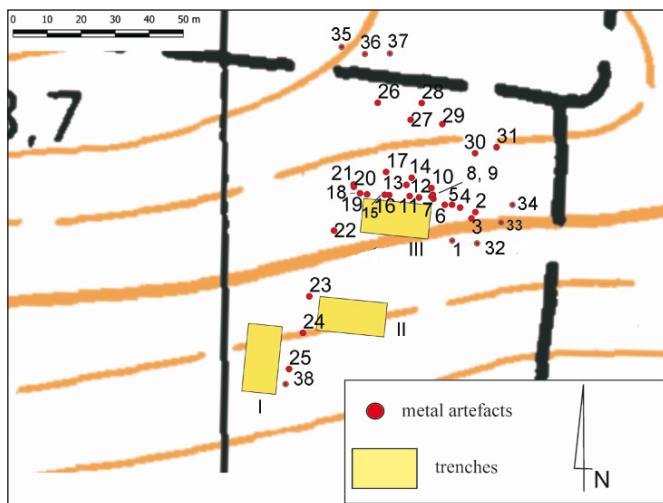


Fig. 7. Obrażejowice, Radziemice commune, site. 13. Planigraphy of the finds from surface surveys.
Drawn by A. Lasota-Kuś

depths, from the contemporary topsoil layer. When two artefacts were found in the same spot, they were given numbers, e.g. 8 and 8a, 10 and 10a, 11 and 11a, 20 and 20a. The finds had their locations recorded with GPS and marked on the map (Fig. 7). Some of the artefacts could not be identified and typologically determined. However, it should be stressed that some objects are badly corroded and only future preservation works can possibly allow for their proper identification. The designations of the artefacts follow the numbers on the attached map (Fig. 7).

1. Fragmentarily preserved triangular piece of sheet bronze, one edge undulating, one side ornamented with incised lines; height 1.4 cm, width 0.9 cm;

2. Iron brooch with a flaring head flat from underside; the spring covered with a cylindrical spring case; with a grooved ring on the bow; the foot bears incisions and traces of inlay with silver wire, in the form of tiny lumps of melted silver; the knob terminating the foot is decorated with a single groove; it is a strongly profiled brooch of group IV with a spring case, akin to type Almgren 93 (1923); length 4.4 cm, height 2.1 cm (Fig. 8: 4);

3. Sheet bronze fragment with traces of melting (possibly fragment of a vessel); length 3.2 cm, width 2.5 cm, thickness 0.6 cm;

4. Fragmentarily preserved bronze brooch (the head and the bow with a ring survived), with a flaring head touching a ring on the triangle-sectioned bow; length 2.4 cm (Fig. 8: 1);

5. Iron knife, fragmentarily preserved (the tip of the blade survived), length 3.1 cm;

6. Iron shaft (possibly from a rivet), with the end bent at a right angle, quadrangular in section, width 0.2 cm, length 4.5 cm;

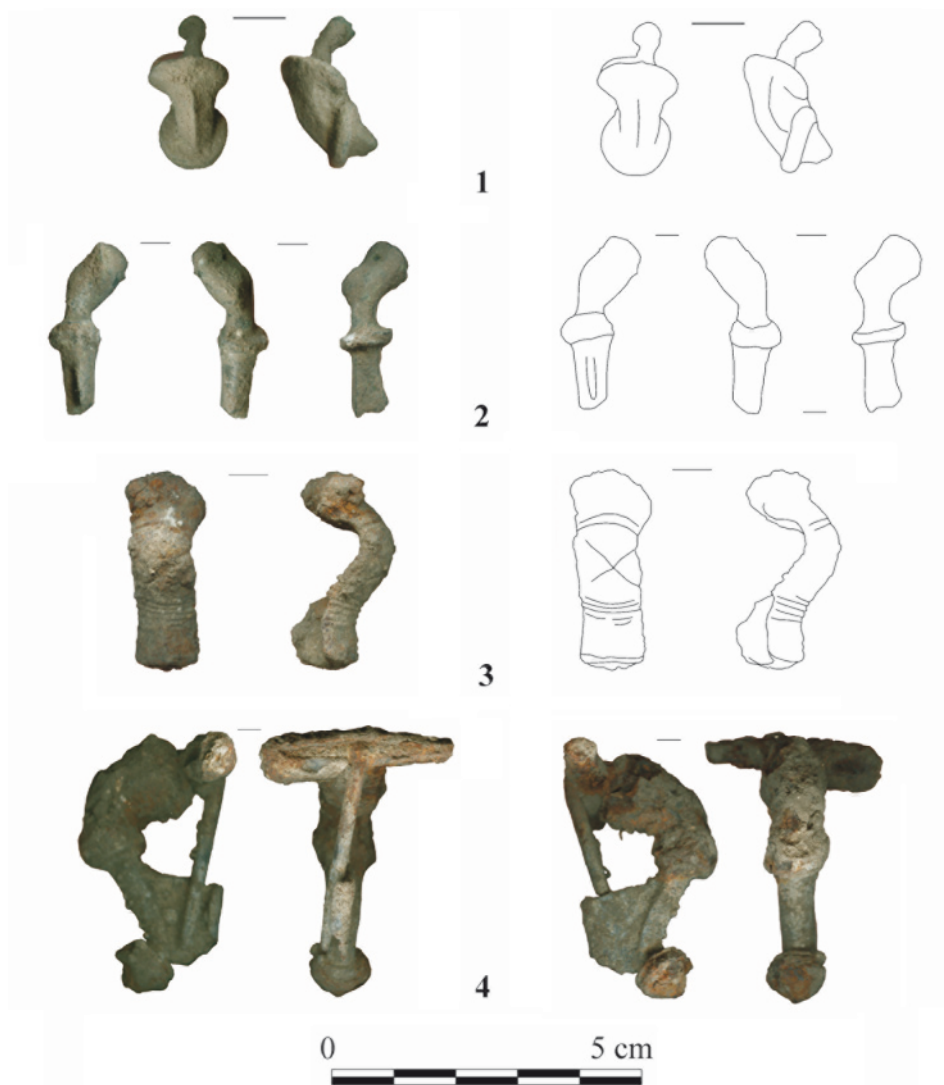


Fig. 8. Fibulae from surface surveys: 1-2 – bronze; 3-4: iron. Drawn by A. Lasota-Kuś, K. Rosińska-Balik

7. Bronze rivet with hemispherical head, the round-sectioned shaft is bent, head diameter 1.2 cm, shaft length 1.5 cm;

8. Iron sheet with two rivets: one completely, the other fragmentarily preserved (the head with a shaft fragment), the head is rounded, the shaft is round in section; fragment length 3.2 cm, width 0.7 cm, rivet length 2 cm;

8a. Bronze object, melted, survived in the form of a ball 0.9 cm in diameter;

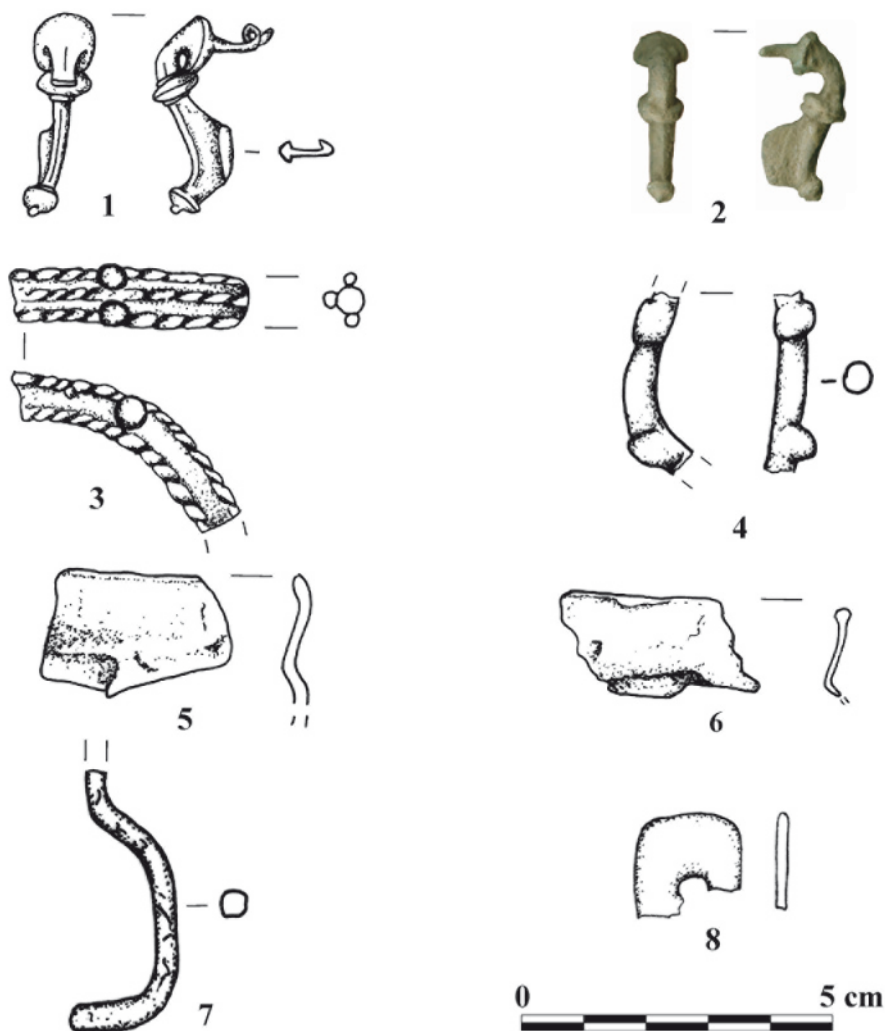


Fig. 9. Finds from surface surveys: 1-2 – bronze fibulae; 3-4: bronze bracelets; 5-6 – bronze sheets; 7 – iron key; 8 – iron fitting of a casket lock. Drawn by A. Lasota-Kuś

9. Bronze brooch, fragmentarily preserved, the head is melted and distorted, the bow is triangle-sectioned and has a ring on it, length 3 cm (Fig. 8: 2);

10. Spring with axle from an iron brooch, spring length 2.5 cm;

10a. Bronze sheet, slightly bent, length 1.3 cm, width 1.1 cm;

11. Golden pear-shaped pendant, the lower part has not survived; richly decorated with twisted filigree wire and plated wires, the loop and its base is decorated with filigree wire; length with the loop 2.4 cm, maximum width 1.4 cm (Fig. 10);



Fig. 10. Find from surface surveys. 1 – golden pear-shaped pendant. Photo by K. Rosińska-Balik

11a. Lump of bronze from a melt-down artefact (possibly a vessel), length 3.1 cm, width 1.4 cm;

12. Iron rivet with flat, spherical head, the shaft is polygonal in section and terminates in a rectangular sheet; head diameter 2 cm, shaft length 5.3 cm;

13. Bronze brooch, with a flaring head flat from underside; the bow is triangular in section; pin and spring are missing; the head and ridge are decorated with a circumferential groove; it represents variant 2 of trumpet brooches; length 2.7 cm, height 1.4 cm (Fig. 9: 2);

14. Fragment of a conical bronze object (possibly a spur shaft), round in section, height 2 cm, diameter at the base 1.4 cm;

15. Fragment of an iron object, width 1.3 cm, height 1.5 cm;

16. Bronze sheet (possibly a fragmentarily preserved coin), with one edge rounded; diameter 1.4-1.7 cm;

17. Bronze sheet with traces of melting (possibly a vessel fragment), length 3.1 cm, height 2.1 cm, thickness 0.3 cm (Fig. 9: 5);

18. Fragment of an unidentified iron object, length 2.4 cm, width 1.6 cm;

19. Iron chisel (?), rectangular in section, length 13.5 cm, width 1.1-1.2 cm;

20. Bronze object, slightly melted, with a bent, conical spike and a ring at the spike's base; the spike is set on an elongated, slightly concave body with four protrusions, body length 2 cm, width 0.9 cm, spike length 1 cm;

20a. Melted lump of bronze, diameter 0.9 cm;

21. Iron fitting in the form of a sheet with a hole for a rivet; length 2.2 cm, width 2.1 cm, thickness 0.4 cm (Fig. 9: 8);

22. Fragmentarily preserved iron knife, with slightly arching edge, triangular in section; length 5.8 cm, width 1.5 cm, thickness 0.4 cm;
23. Sub-triangular iron sheet, length 4.7 cm, width 3 cm, thickness 0.1 cm;
24. Melted bronze object in the form of an irregular lump, length 1.2 cm, width 2.1 cm;
25. Sub-rectangular iron sheet, length 4.5 cm, width 3.7 cm, thickness 0.2 cm;
26. Ribbon-like iron fitting, length 5 cm, width 0.5 cm;
27. Fragment of a bronze object (ring ornament) with two knobs preserved on the circumference; round in section; length of the surviving fragment 3.5 cm, width 0.5 cm (Fig. 9: 4);
28. Fragment of a slightly melted bronze object, D-sectioned, length of the surviving fragment 1.9 cm, width 0.5 cm;
29. Bronze sheet (possibly vessel fragment), length 1.7 cm, width 1.4 cm;
30. Bronze sheet (possibly vessel fragment), length 2.6 cm, width 0.7 cm (Fig. 9: 6);
31. Iron brooch with S-shaped bow, with the bow and foot decorated with parallel incised lines, and with two crossing lines in the middle of the bow; the bow is triangular in section; length 4.7 cm, width 1.4 cm, group V series 8 (type A.123) (Fig. 8: 3);
32. Bronze rivet with doming head and fragmentarily preserved shaft, round in section, head diameter 1.4 cm, preserved length of shaft 0.9 cm;
33. Iron rivet with hemispherical head and the shaft of quadrangular section, head diameter 1.5 cm, preserved shaft length 1.8 cm;
34. Head of a bronze brooch, slightly melted; the head is trumpet shaped, the bow is triangular in section; the brooch adheres to a melted bronze object, probably the head of another trumpet fibula;
35. Fragment of an iron knife, with the shaft differentiated from both sides; preserved blade length 1.3 cm, width 1.4 cm, shaft length 2.8 cm;
36. Iron key, fragmentarily preserved, rectangular in section; preserved length 6.2 cm, type A acc. to A. Kokowski (1997) (Fig. 9: 7);
37. Bronze brooch with flaring head touching a ring on the bowl; the bow is triangle-sectioned and the foot terminates with a knob; length 3.5 cm, bow width 0.5 cm, variant 1 of trumpet brooches acc. to T. Liana (1970) (Fig. 9: 1);
38. Fragment of a bronze ring ornament, made from a round-sectioned bar, with three symmetrically arranged twisted wires, and two ferrules on the sides of the central twisted wire; length of the surviving fragment 4.9 cm, type *Șimleul Silvaniei* (type 3 acc. to A. Rustoiu) (Fig. 9: 3).

Brooches

The surface surveys revealed eight brooches, preserved completely or in fragments. Strongly profiled pieces belonging to Almgren's group IV prevail. Two bronze pieces, one complete and one fragmentarily preserved, should be considered as variant 1 of trumpet

brooches in T. Liana's classification (Fig. 8: 1; 9: 1; nos 4 and 37). Trumpet brooches of variant 1 are typical local products of Przeworsk culture people and are the basic indicators of phase B1 (Liana 1970, 443; Godłowski 1985, 21).

Variant 2 of trumpet brooches is represented by another two bronze artefacts (Fig. 8: 2; 9: 2; nos 9 and 13). One of them (no 9) has the head melted and deformed. The other is decorated with a circumferential groove, originally probably with a silver wire, on the head and on the ridge placed at the transition from the bow to the foot. The brooches in question date to phase B2, with the majority originating from stadium B2a (Liana 1970, 444). Most likely, artefact no 34 is in fact two adhering heads of trumpet brooches, one of them badly melted.

The only iron example of group IV is a brooch provided with a spring cover and decorated with silver inlay on the foot, resembling type A.93 (Fig. 8: 4; no 2). An analogical brooch, also made of iron, was discovered in grave 121 at Nadkole site 2, Łochów commune (Andrzejowski 1998, pl. LXXV: 3). This burial is linked with the youngest, third phase of the cemetery development, correlated with the close of the Early Roman period, i.e. phases B2c – B2/C1 (Andrzejowski 1998, 109).

An iron brooch belonging to group V series 8, with traces of silver inlay (Fig. 8: 3; no 31) represents type A.123, form 2 acc. to H. Machajewski (1998, fig. 2). Such artefacts occur in the Przeworsk culture range primarily in phases B2b – B2/C1 (Machajewski 1998, 192). The typological attribution of another brooch, from which only an iron spring survived (no 10), cannot be established due to the state of its preservation.

Golden pear-shaped pendant

Of note among the surface finds from Obrażejowice is a golden pear-shaped pendant, richly adorned with beaded wire, twisted wire, and wires plaited together (Fig. 10). It represents type III acc. to A. Müller (1956).

Pendants of that type incidentally occur in Przeworsk culture materials. Isolated specimens are known from sites situated to the west of the middle Vistula River, and on the upper Oder River. The only example in the upper San River basin comes from the cemetery at Prusiek site 25, Sanok commune (Madyda-Legutko et al. 2010, with the full list of finds from the Przeworsk culture area). In Przeworsk culture sites the mentioned pendants occur primarily in assemblages dated to phase B2/C1 of the Roman Period. The find from grave 6 at Stary Zamek, Sobótka commune, stands out in this respect, as it is dated to phase B1a of the Early Roman period (Domański 1992, plate 3).

On the other hand, golden pear-shaped pendants are quite common in the north of the Elbe River basin and in Scandinavia, and are also characteristic elements of strings of beads known from the Wielbark culture (Müller 1956; Andersson 1990; Patalan 2017).

Bracelets

A fragment of a ring ornament of the *Șimleul Silvaniei* type, i.e. type 3 (probably 3b) in A. Rustoiu's classification (1996, 95-96, plate 44, 45) (Fig. 9: 3) may be possible evidence of connections linking the Przeworsk culture population from the Obrażejowice cemetery with a foreign cultural milieu. Such artefacts originating from Poland have already been many times comprehensively discussed in literature (e.g. Margos, Stąporek 2001, 258-262; Rudnicki, Milek 2011; Kordowska, Kowalska 2018, 45-46). It is worth recalling here that in light of current research, in sites of Przeworsk, Oksywie, and Wielbark cultures they are dated from phase A3 of the Younger Pre-Roman period until phase B1b of the Early Roman period (Rudnicki 2012).

It has been assumed thus far that they are a local, Dacian version of older ornaments originating from the Celtic world, and finds from beyond the range of the Dacian occupation have been seen as evidence for contact with Dacian populations (Rudnicki 2012, 474-476). However, new discoveries made over recent years urge a more cautious approach to this interpretation (Andrzejowski, Maciałowicz 2017, 205-214; with the full list of finds). This is because, unlike other finds linked with the Dacian milieu, these bracelets do not concentrate in south-eastern Poland.

A fragmentarily preserved, round-sectioned bronze artefact with two protrusions on the perimeter (Fig. 9: 4) may perhaps also be considered as a ring ornament of a kind. However, its shape differs from *Knotenringe* characteristic of the Celtic world (cf. Bochnak 2014, 55-62).

Bronze sheets and lumps of bronze

It is worth noting a significant number of melted lumps of bronze and fragments of sheet bronze, most of which also bear traces of melting (Fig. 9: 5, 6; objects nos 1, 3, 8a, 10a, 11a, 16, 17, 20a, 24, 28, 29, and 30). Some of them probably originate from bronze vessels, and one may even be a fragmentarily preserved coin (object no 16). These artefacts may point to the existence of a bronze-smith workshop in the Obrażejowice site, and would then be raw material for casting other objects. It is worth recalling that such a workshop was discovered in the Mysławczyce settlement, Proszowice commune, situated on the Szreniawa River and dated to the Younger Roman period (Bodzek, Dobrzańska 2014, 305, 310, 311). The same chronology applies to a slightly more remote settlement at Jakuszowice site 2, Kazimierza Wielka commune, where metallurgical production was confirmed (Bursche *et al.* 2000, 102, with older literature).

Other bronze and iron artefacts

Among the objects discovered by the surface surveys were 2 bronze and 2 iron rivets, which may be remains of a wooden box. Bronze rivets with hemispherical heads and an iron rivet with rectangular head, which means artefacts analogical to those from Obrażejowice, have been discovered, among other places, in rich grave 39 at Chmielów Piaskowy, Bodzechów commune (Godłowski, Wichman 1998, plate LX: 37). On the other hand, the sheet iron fragment with a hole, also found at Obrażejowice, should probably be interpreted as a fitting of a casket lock (Fig. 9: 8; no 21). The discovered fragment of a key (Fig. 9: 7) allows it to be assigned to Kokowski type A, the most widespread form in the Przeworsk culture and typical of assemblages dated from phase A3 of the Younger Pre-Roman period until phase C2 of the Roman period (Kokowski 1997, 36, 40). Keys and metal fittings of caskets are considered markers of female graves, typical in particular of graves of higher ranking older women aged *adultus* and *maturus* (Czarnecka 1990, 49, 63; Kokowski 1997, 41).

In addition, the collection from Obrażejowice includes fragments of three knives (nos 5, 22, 35). These artefacts are not precise chronological indicators and occur throughout the whole of the Roman period. As for the remaining iron and bronze artefacts, i.e. ribbon-like fittings (no 26), sheets, and other objects (objects nos 6, 8, 14, 15, 18, 19, 20, 23, and 25), their fragmentary survival and poor preservation precludes any precise identification.

SUMMARY

The preliminary analysis of the furnishings of graves discovered during the excavations at Obrażejowice cemetery allows for a conclusion that the burial ground probably remained in use from phase A2 of the Younger Pre-Roman period until the beginnings of the Early Roman period. Additional information on the site's chronology can be derived from the results of the surface surveys, which suggest that the area was used in successive phases of the Early Roman period until the beginnings of the Younger Roman period (phase B2/C1). However, at this stage of research it is difficult to conclude whether the materials of such chronology are sepulchral or settlement finds. It is worth mentioning that in the only Early Roman period feature explored in the site (feature 27) no cremated bones were found, and the artefacts discovered there included, among other objects, four iron brooches and a considerable number of bronze sheets with traces of melting.

The ceramic materials uncovered in the course of the excavations are of "purely" Przeworsk culture nature, and no sherds attributable to the Celtic culture have been found. This fact deserves particular attention given that Celtic wheel-made painted pottery has been confirmed at Przemęczany site 1, Radziemice commune, a settlement situated in the

immediate vicinity of Obrażejowice. What is more, this pottery was found in a settlement pit together with Przeworsk culture pottery from the close of the Younger Pre-Roman period (Poleska 1986).

It should be emphasised that the Obrażejowice cemetery is thus far the only Przeworsk culture necropolis from the Younger Pre-Roman period excavated in this region. The closest sepulchral site is the large, badly damaged cemetery at Pelczyska site 6, Złota commune, which produced materials spanning from phase A2 of the Younger Pre-Roman period until phases B2-C1a of the Roman period (Rudnicki 2006, 97-98). To the south of Obrażejowice, a Przeworsk culture settlement was discovered during surface surveys carried out in recent years in the Szreniawa River basin. This is site 17 at Czechy, Słomniki commune, where, as it was the case in the necropolis discussed here, Przeworsk culture ceramic materials of a Younger Pre-Roman period date were not accompanied by Celtic pottery (Du-Łęba, Wysocki 2016).

Future excavations at Obrażejowice can be expected to produce further sources for precisely determining the chronology of the cemetery. They should also explain the nature of the finds dated to the Early Roman period.

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A UNIQUE SARMATIAN-TYPE ARROWHEAD FROM FEATURE 109 FROM A PRZEWORSK CULTURE NECROPOLIS IN PODLESIE, OLEŚNICA DISTRICT, ŚWIĘTOKRZYSKIE VOIVODESHIP

ABSTRACT

Kontny B., Grabarek A., Jaskulska E. 2018. A unique Sarmatian-type arrowhead from feature 109 from a Przeworsk culture necropolis in Podlesie, Oleśnica district, Świętokrzyskie voivodeship. *Sprawozdania Archeologiczne* 71, 359-385.

This paper presents the trilobate arrowhead of Sarmatian origin found in 2014 in Podlesie, Oleśnica district, site 6 by the expedition of the Institute of Archaeology at the University of Warsaw, conducted under the guidance of Artur Grabarek. It was found in a Przeworsk culture grave (feature 109) together with weapons, tools, pottery and costume elements (i.a. brooch Almgren 236c). It is dated to the beginning of Phase B1, i.e. much earlier than the chronology of such arrowheads from the territory of Poland assumed earlier. Similar items from the Przeworsk culture and the Bogaczewo culture are mentioned. The find is discussed within the context of Germanic-Sarmatian contacts at the turn of the eras and slightly later.

Keywords: the Przeworsk culture, arrowheads, Sarmatians, Roman Period, weapon

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In 2014, an expedition of the Institute of Archaeology at the University of Warsaw, under the guidance of Artur Grabarek, M.A., conducted excavations at a Linear Pottery culture settlement, i.e., Podlesie, Oleśnica district, site 6 (Fig. 1). The investigated area is located in the south-central part of the Połaniec Basin, which is also one of the mesoregions of the Małopolska Upland (Kondracki 2002, 263-270). Around this time, the team was informed by the head of the village of Podlesie, Mr. Marian Piekut, about a disturbed cemetery located in the western part of the village, and they visited the spot immediately. The burial ground was located on a small, sandy elevation sloping on all sides, ca 400 m to the east of the edge of the village of Podlesie and ca 600 m to the south of the Wschodnia river bed. During the survey, a sand pit with numerous hand-made potsherds and small pieces of human bones were found. Additionally, one complete and two damaged urns were discovered and, as they seemed very fragile, explored on the spot. The site was explored with the permission of the Provincial Monument Conservator in Kielce, Sandomierz branch.

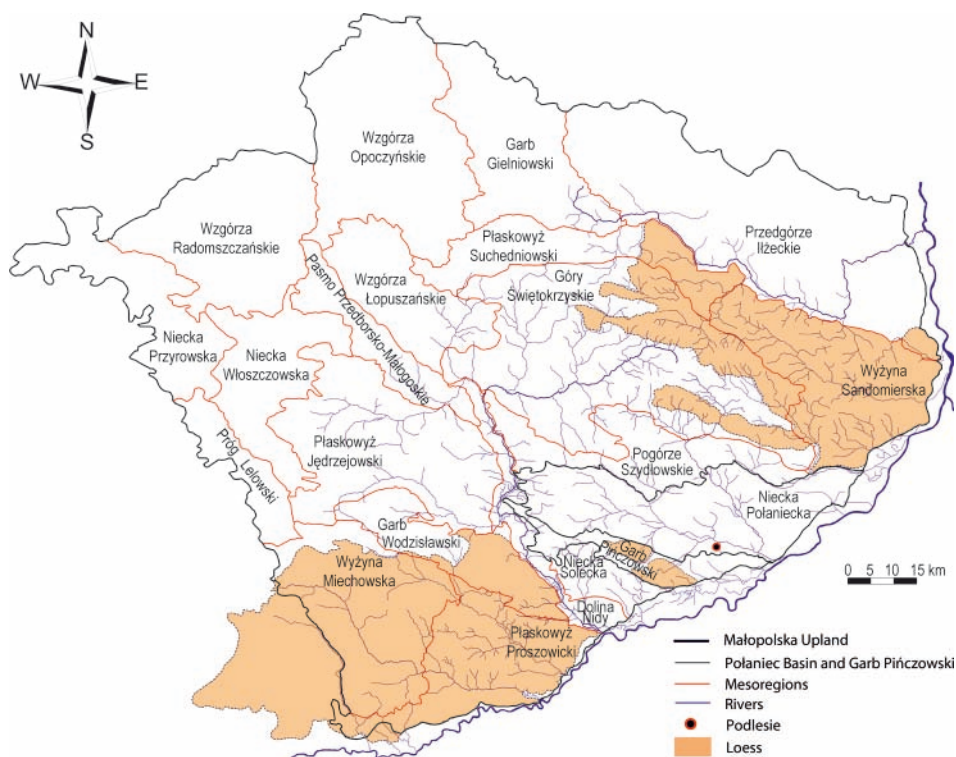


Fig. 1. Location of Podlesie on the map of the Małopolska Upland (drawn by Artur Grabarek)

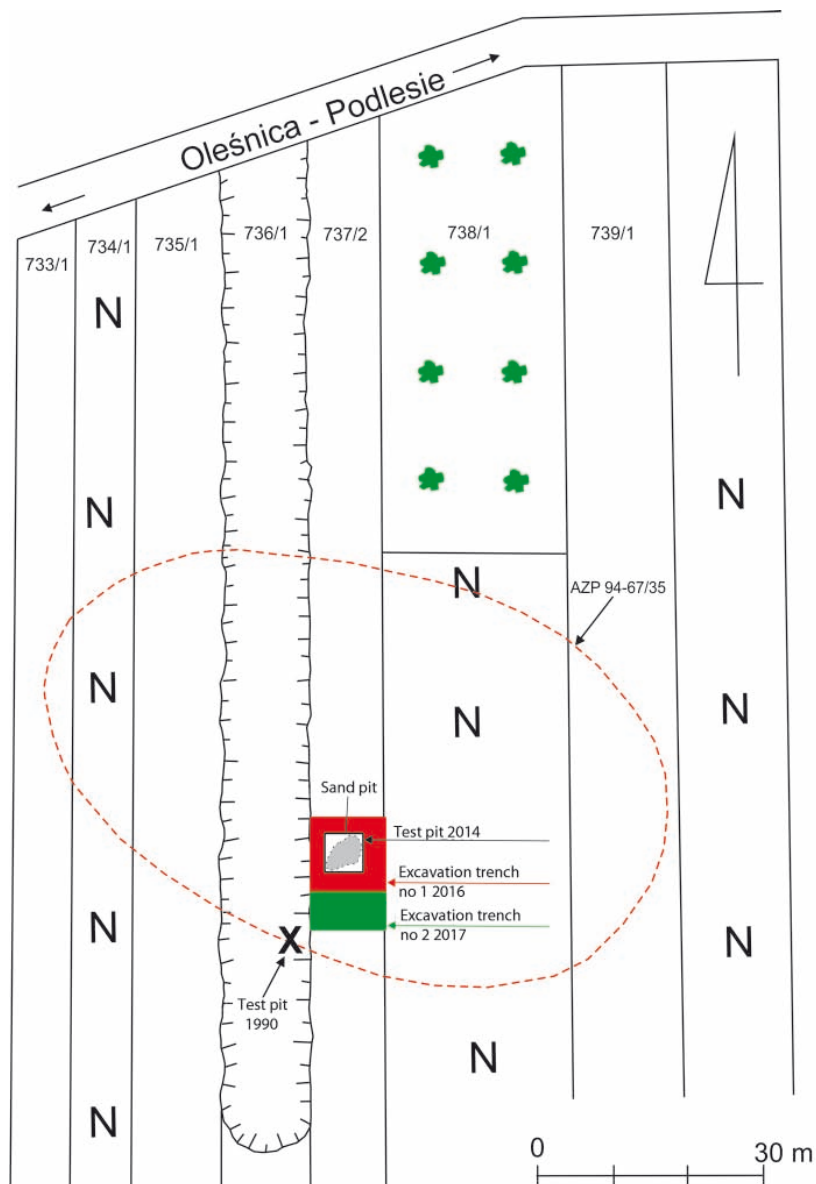


Fig. 2. General plan of site 5 at Podlesie (drawn by Artur Grabarek)

The query of the records from the National Heritage Board of Poland in Warsaw confirmed that this was site 5, discovered in the late 1960s when the road from Oleśnica to Podlesie were constructed. At that time, from several to more than a dozen cremation urn burials were uncovered in the layer of sand excavated during the works, along a length of

tens of metres, at right angles to the road. It is not known what happened to these artefacts later. In 1990, information about this old discovery reached the archaeologists working in the Archaeological Museum in Cracow. On July 8, 1990, Andrzej Matoga and Bartłomiej Konieczny confirmed the existence of the site. Besides the field survey, a 1 × 1 m test pit was made. It contained a disturbed Lusatian culture burial.

The sand pit is now overgrown and has remained undisturbed since the last exploration. Some years ago, a new sand pit was made close by (Fig. 2). For that reason, in order to act before the site was further damaged, rescue excavations were conducted beginning in 2014. During three excavation seasons, an area of 1.5 ares (0,01 ha) was uncovered (Fig. 3). The excavations revealed two pit cremation burials and 129 vessels, the majority of them probably also being urn cremation burials (their function will be ascertained when the contents of the vessels have been explored in the laboratory). Also, more than 3000 potsherds of various sizes, probably coming from the disturbed burials, especially bowls covering the urns, were found in the alluvium layer. Besides the abundant pottery materials, a very rich collection of flint artefacts, including more than 350 products, has considerable scientific value. In their majority, these products were discovered both at the site and in the burials. They were mostly scaled pieces or small scales connected with the use of the scaling technique. The collection also includes several flint blades from the Early Neolithic, which were probably brought from site 6.

Site 5 in Podlesie is a flat cremation burial ground of the Lusatian culture. The analysis of the artefacts has shown that it was used for a very long period of time, at least from Bronze Age IV until the Early Pre-Roman Period, i.e., the time of the decline of the Lusatian culture in the area (Dziechciarz 2015, 40). Especially interesting are two features from younger dates: two cremation urn burials that can be undoubtedly assigned to the Roman Period and the Przeworsk culture. Significantly, these two burials do not disturb the earlier ones (or any other features), which indicates that even many years after the Tarnobrzeg Lusatian culture had disappeared, the local residents were aware of the existence of the cemetery in that place, possibly due to the fact that near the burials there were large stones (between 15 and 40 cm in diameter) that may have marked the graves or determined the borders of burial quarters.

FEATURE 109 (Figs 4-5)

The outline of the feature was not very clear on the background of the virgin soil (yellow, fine-grained sand); it was strongly blurred, probably oval-shaped, with dimensions of 70 × 45 cm. In the top part, there was a large pebble. The filling was uniform in the cross-section and was composed of a grey layer of burning with more than a dozen rather large pieces of charcoal (lumps of ca 2-5 cm), strongly blurred in the bottom part. The filling was 35-40 cm thick. The artefacts, consisting of strongly burnt and fragmented hand-made

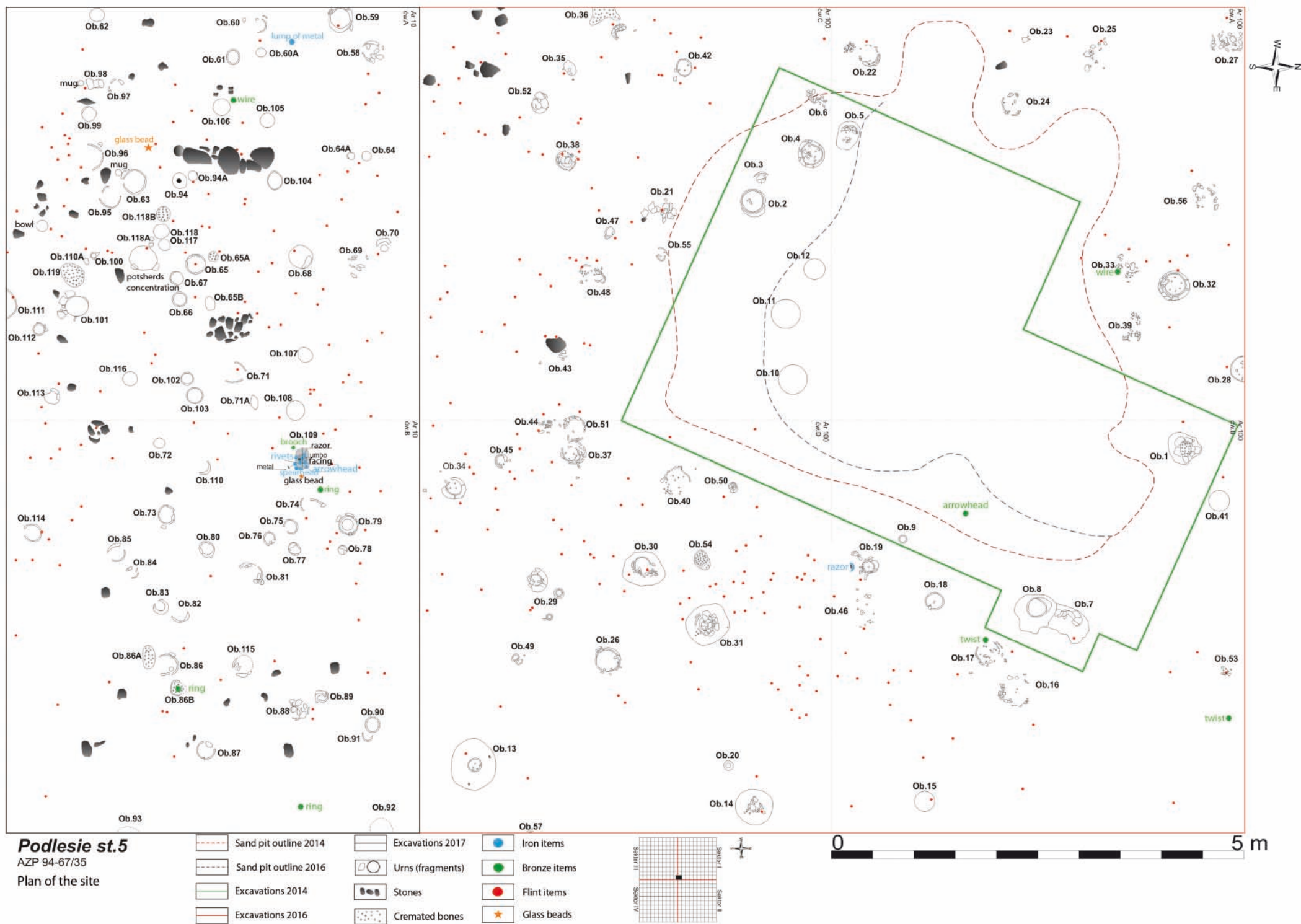


Fig. 3. Detailed plan of Podlesie, site 5. Drawn by Artur Grabarek

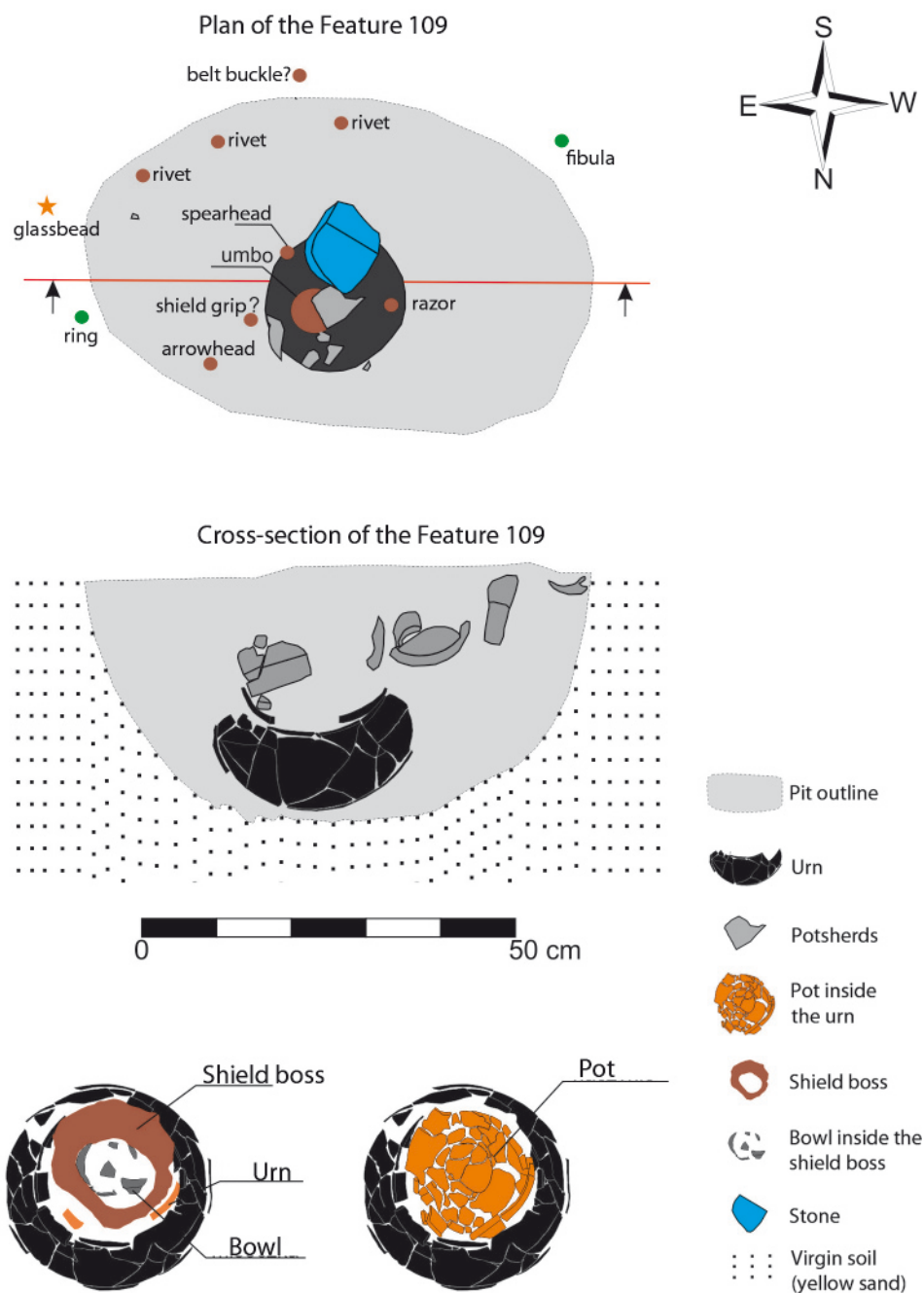


Fig. 4. Podlesie, site 5, feature 109 – plan and profile (drawn by Artur Grabarek)



Fig. 5. Podlesie, site 5, feature 109 during excavation (photograph by Artur Grabarek)

potsherds, were located in the upper part of the feature. In the centre of the pit there was a richly decorated urn (Fig. 7:1). During the exploration, another vessel was found in the pit (Fig. 7:2) with a shield boss inside. In the boss, there was a small bowl (Fig. 7:4). The urn was covered with a grey layer, which can be interpreted as soil mixed with the remains of the pyre. When the top part of the feature was cleared, six metal artefacts were discovered: two rivets, an arrowhead, a brooch, the head of a shafted weapon, and a fragment of a buckle (?). The other metal artefacts, i.e., the shield boss, a razor fragment, a shield handle fragment, and a rivet were found within the filling. Additionally, in the western part of the ceiling of the feature, a bronze ring was discovered, which may be related to the burials of the Tarnobrzeg Lusatian culture.

Grave goods

1. Fragment of a brooch made from a copper alloy, Type 236 after O. Almgren (1923); most probably Variant 236c (Garbsch 1965), partly deformed by the fire (parts of the head, missing parts of the foot). Preserved length – 2.3 cm, weight – 0.006 kg (Fig. 6:1).

2. Iron shield boss, Type 5 after M. Jahn (1916). Ritually damaged: the depressions on the top were made by at least five blows of a heavy blunt object. The edge partially bent

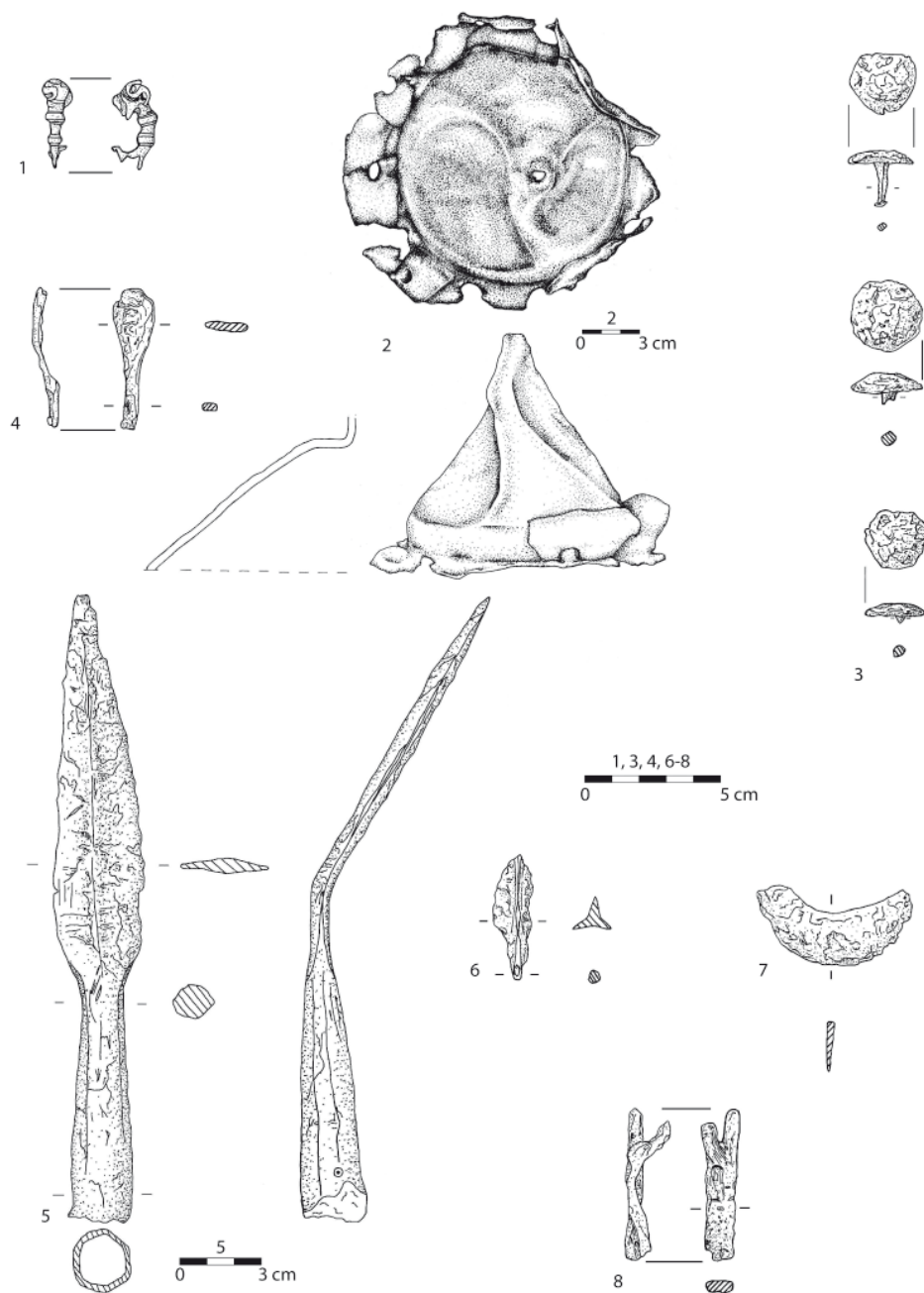


Fig. 6. Podlesie, site 5, feature 109 – metal elements of the grave furnishing (drawn by Agata Borowska – 2, and Katarzyna Szymańska – others). 1 – copper alloy brooch, 2 – iron shield boss, 3 – iron rivets, 4 – iron shield grip (?), 5 – iron spearhead, 6 – iron trilobate arrowhead, 7 – iron razor, 8 – iron bar (buckle?)

upwards. In the upper part is a hole with a diameter of ca 0.5 cm. Dimensions: reconstructed diameter – 16 cm, width of the rim – 3 cm, height – 10.5 cm, height of the edge – 2 cm, weight – 0.373 kg; reconstructed number of rivet holes – 11 (Fig. 6:2, 8:4).

3. Three shield boss rivets made of iron, circular with slightly convex heads, Type B after N. Zielsing (1989); one of them has a completely preserved pin (thickness of the preserved tang is equivalent to the diameters of the holes in the shield boss). Dimensions: head diameters – 2.3-2.6 cm, height of the item with the pin – 2 cm (the pin is flattened at the end), weight – 0.005 kg; reconstructed thickness of the shield in the place where the rivet was fixed – 1.4 cm (Fig. 6:3).

4. Droplet-shaped iron plate with a rivet hole. At one end it has a slightly bent, narrow rod, broken off in the distal part. It is probably a fragment of a shield handle, Type C after N. Zielsing (1989) / 3 after M. Jahn (1916). Dimensions: preserved length – 5.3 cm, weight – 0.004 kg (Fig. 6:4).

5. Iron head of a shafted weapon of Type X, after P. Kaczanowski (1995), with a bent blade and faceted socket (octagonal in cross-section, variety PT7 – the system of the symbols used in the description of the shafted weapon heads was elaborated by P. Kaczanowski 1995), hammered down (deformed), with a transverse rivet in the socket. Dimensions: length of the head G (reconstructed) – 24.2 cm, length of the blade L (reconstructed) – 15.6 cm, length of the socket – 8.6 cm, width of the blade A (reconstructed) – 3.2 cm, length between the tip and the widest part Q – 12.2 cm, diameter of the socket T – 2 cm (on the outside), height of the place where the rivet was fixed starting from the lower end of the socket – 1.5 cm, cross section of the blade PL2B, cross section in place where the blade meets the socket PTL5; T/G shape coefficient = 0.35, A/L = 0.20, Q/L = 0.78; weight 0.140 kg (Fig. 6:5, 8:5).

6. Iron trilobate, tanged arrowhead Type IV after A.M. Hazanov (1971, Plate XIX) with slightly convex lobes and low undercut; the lower parts of the sharpened edges are partly missing and the tangs are broken off. Dimensions: preserved length – 4.7 cm, reconstructed width – 1.5 cm, weight – 0.006 kg (Fig. 6:6).

7. Iron crescent-shaped razor, broken off at the ends. Dimensions: length – 5.4 cm, weight – 0.006 kg (Fig. 6:7).

8. Iron bar forked at one end, broken off at both ends; perhaps a fragment of the loop and tongue of a figure eight-shaped buckle, Group A after R. Madyda-Legutko (1987). Dimensions: preserved length – 5.5 cm, weight – 0.007 kg (Fig. 6:8).

9. Pottery (all the vessels were hand-made):

a) clay vessel (urn) Type I/1 after T. Liana (1970), with a slanting neck, an out-turned rim of even thickness and a bent profile in the bottom part; grey-brown, decorated with a horizontal rib below the neck and engraved envelope-, meander-, and swastika-shaped ornaments (this ornament is commonly considered as a solar symbol cf., e.g., Bugaj 1999, 185-186; Lasota-Kuś 2018, 163-164) filled with horizontal, vertical and oblique lines forming a horizontal decorative band in the upper part of the belly. Dimensions: rim diameter – 20.3 cm, height – 23.9 cm, diameter of the bottom – 13.8 cm (Fig. 7:1, 8:1);

b) vase-like vessel Type II/2 after T. Liana (1970), with a slanting rim; thin-walled, orange in colour (grey in the break), deformed by fire (rim in-turned on one side), and almost complete (preserved in numerous fragments, only a small rim fragment is missing); fine-grained admixture. Dimensions: rim diameter (reconstructed) – ca 18 cm, diameter of the bottom – 8.6 cm, height – 12 cm (in the deformed part), originally ca 11 cm (Fig. 7:2, 8:2);

c) small bowl Type VI/1 after T. Liana (1970), thin-walled with polished surface, bottom rounded in profile (partly reconstructed), marked out vertical neck. Non-uniform in colour, dark brown-orange. Dimensions: rim diameter – 8.4 cm, height – 4.3 cm (Fig. 7:4, 8:3);

d) Fragments of at least two thin-walled clay vase-like vessels Type II/2 after T. Liana (1970), orange in colour (secondary burning), deformed in fire: a fully preserved bottom with a diameter of 9 cm, a fragment of the bottom part of a vessel, two rim fragments (one with a rib below the neck and one with the base of a handle located between the undercut of the belly and the rim), three uncharacteristic belly fragments; fine-grained admixture (Fig. 7:3);

e) Two fragments (belly and upper part: rim and neck with a preserved handle) of an orange-brown vessel, probably Type I/3 after T. Liana (1970), rounded and burnt;

f) Two belly fragments of an orange-brown vessel Type I/3 after T. Liana (1970);

g) More than a dozen small, uncharacteristic fragments;

h) Fragments of the bottom part (?) of a brown-orange vessel, swollen and deformed by fire; fine-grained admixture;

i) A large fragment of a belly bend of a vase-like vessel Type II/2 after T. Liana, thin-walled, discoloured into orange (grey in the break) and slightly swollen by fire;

j) Five rim fragments of thin-walled vessels, brown-orange in colour (including one swollen by fire); fine-grained admixture;

k) Three belly fragments of thin-walled vessels (uncharacteristic), grey-orange in colour (discoloured by fire); fine-grained admixture;

l) Three rim fragments of two vase-like vessels Type II/2 after T. Liana (1970), thin-walled, brown-orange in colour (one swollen by fire); fine-grained admixture;

m) Fragment of a vessel with a thickened, slightly faceted rim, thin-walled, brown-orange in colour; fine-grained admixture;

n) Uncharacteristic fragment of a thick-walled belly, brown in colour; rough on the outside; medium-grained mineral admixture;

o) Eight uncharacteristic fragments of an orange-brown vessel with a rough external surface;

p) 14 uncharacteristic fragments of an orange-brown vessel.

10. Charcoal from the fill: oak (*Quercus* sp.) – 157 pieces, pine (*Pinus sylvestris*) – 61 pieces, birch (*Betula* sp.) – 3 pieces (the analysis was done by Grzegorz Skrzyński, Polish Academy of Sciences – Museum of the Earth in Warsaw).

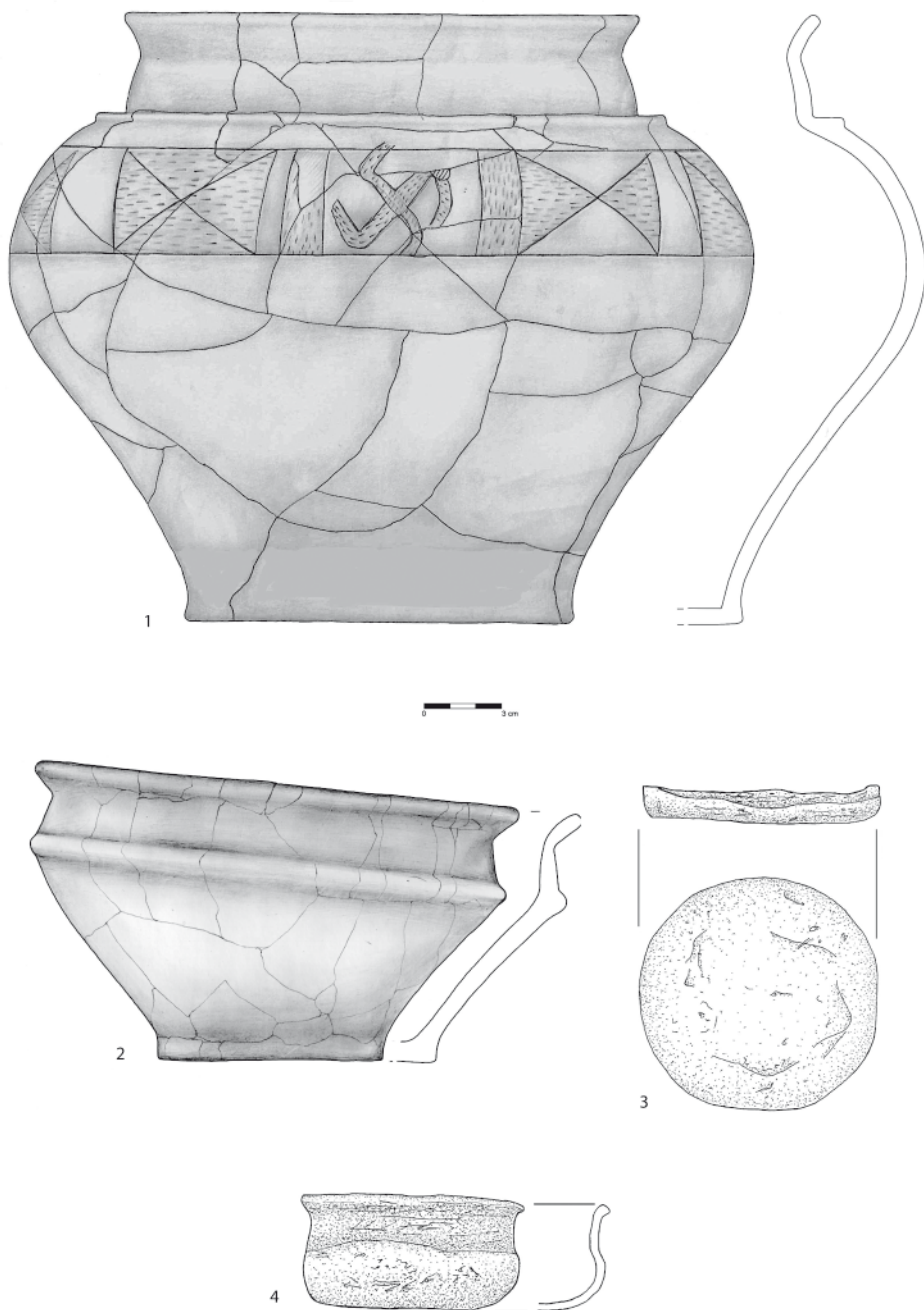


Fig. 7. Podlesie, site 5, feature 109 – pottery (drawn by Agata Borowska: 1-3 and Katarzyna Szymańska: 4).
1 – urn, 2 – vase-like vessel, 3 – bottom of vase-like vessel, 4 – bowl



Fig. 8. Podlesie, site 5, feature 109 – grave furnishing (photograph by Paweł Kobek). 1 – clay urn, 2 – clay vase-like vessel, 3 – clay bowl, 4 – shield boss, 5 – spearhead

11. Sample of the wood from the upper part of the fill.
12. Fragment of a burnt piece of flint (cracked inside and patinated).
13. Remains of a burnt skeleton of a single human adult individual, with an uncertain indication of middle adult age category (around 30-40 years old).

OSTEOLOGICAL ANALYSIS

A grave labelled feature 109 was excavated in trench no 2, are 10, quadrant A/B, sector III within the 3rd layer. The human cremains within were extracted and submitted for laboratory analysis. The total weight of the cremains was determined to be 437 g, which indicates that the burial is smaller than the average of the previously analyzed burials from the site (679 g, see Jaskulska, in print). The remains were not excavated in layers, thereby precluding a spatial analysis of identified fragments within the grave.

Due to the relatively small amount of cremains, the analysis was limited to a description of the level of fragmentation and anatomical identification of the fragments. The level of fragmentation was established using the method proposed by McKinley (1994; 2004), which is fairly easy to perform, while allowing for a relatively detailed description of the size of the bone fragments. The cremated remains were sieved through a set of sieves of 10, 5 and 2 mm mesh, and each fraction passing through the different sieves was weighted. During the analysis, some small fragments of pottery (probably urn fragments) were removed (weight of 6.8 g). The fractioned remains were subjected to anatomical analysis, in which fragments belonging to separate parts of the body were identified: skull, upper limb (without shoulder girdle), lower limb (without pelvic girdle), and torso (the postcranial axial skeleton with both shoulder girdles). This way, it was possible to differentiate the preservation of general parts of the body, as well as to identify any potential patterns of variation in heat-related changes among separate regions of the skeleton. This method also allowed us to look for any signs of the possible selection of body parts prior to cremation ritual, such as the exclusion of specific body parts (see analysis of human cremains from Zbucz, site 3 in Jaskulska 2019, 367).

Table 1. Fragmentation of the human cremated remains from feature 109, Podlesie, site 5, compared to the average from burials excavated during the 2014 season (features 1-12) (Jaskulska 2015, Jaskulska in print). Fragmentation expressed as the amount (in grams) of fragments of different size and/or percentage of total weight

Sieve mesh size	Feature 109	Average from features excavated during 2014 season
10 mm	149.2 (34.1%)	49.1%
5 mm	184.9 (42.3%)	41.0%
2 mm	102.9 (23.5%)	9.9%

Table 2. General morphological identification of the human cremated remains from feature 109, Podlesie, site 5, compared to the average from burials excavated during the 2014 season (features 1-12) (Jaskulska 2015, Jaskulska in print). Fragmentation expressed as the amount (in grams) of fragments of different size and/or percentage of the sum of the weight of identified fragments

Morphological identification	Feature 109	Average from features excavated during 2014 season
skull	26.1 (69.4%)	39.5%
torso	10.5 (27.9%)	23.9%
upper limb	–	17.3%
lower limb	1 (2.7%)	19.4%

Table 3. Detailed morphological identification of the human cremated remains from feature 109, Podlesie, site 5, with information on the state of preservation of individual fragments; n.a. (not applicable)

Sieve mesh size	Identified fragment	Number of fragments	Body side	Preservation
10 mm	acetabulum	3	?	<25%
	femur: distal epiphysis	1	?	<25%
	scapula: glenoid cavity	1	left	25-49%
	unidentified vertebral arch	3	?	<25%
	cranial vault	19	?	<25%
	mandible: unidentified tooth socket	1	?	<25%
5 mm	unidentified tooth root	1	?	<25%
	cranial vault	>20	?	<25%
	unidentified rib shaft	2	?	<25%
	unidentified vertebral arch	3	?	<25%
	cervical vertebra: C1; atlas	4	n.a.	<25%
	cervical vertebra: dens C2; axis	2	n.a.	>75%

The overall morphological characteristics of the bone fragments indicate that the remains belong to an adult individual. The small amount of the analyzed fragments suggests that the burial should be regarded as incomplete, with a total weight of around 50% of the expected minimal weight for modern females (modern data indicates that the cremains of an adult should weigh between 876 and 5000 grams or more, with the range for females between 876 and 4000 g, and for males between 1865 and 5379 g; see Bass and Jantz 2004; Warren and Maples 1997). Analysis of the separated fractions of different sizes shows a slightly larger amount of the middle-sized fragments than the largest fragments (see Table 1). The amount of the smallest fragments is lowest, but still significantly larger than in the case of the burials from the 2014 season, analyzed previously (see Table 1 and Jaskulska 2015, Jaskulska in print). This observation may indicate some

difference in the excavation methods employed during various excavation seasons (e.g. sieving techniques).

The morphological analysis of remains has not indicated the presence of more than one individual; a list of characteristic identified fragments is presented in Table 3. The presence of cranial vault fragments with partially fused cranial sutures suggests that the age of the individual could be in the middle adult category (about 30-40 years old), according to the method of Meindl and Lovejoy (1985, after: White *et al.* 2011, 392-393), but the reliability of the fusion of cranial sutures as an age indicator has been long debated by osteologists (e.g. Cunha *et al.* 2009).

Not all skeletal regions were identified (none of the elements belonging to upper limb has been recognized), which should be explained as a result of the small number of analyzed fragments, as well as problems with the separation of most upper limb bones from smaller bones of the lower limb. Detailed information on the amount of the identified skeletal regions is presented in Table 2. It should be noted that identified elements weigh in total about 37.6 g, and the rate of anatomical identification (RAI, expressed as the ratio of the weight of identified fragments to the total weight of the analysed fragments) is significantly low at around 8.6% (average RAI for features from the 2014 season is about 45%).

Within middle-sized fragments, an unusually dense element of trabecular bone tissue was identified, which can suggest it belonged to an animal, but a lack of characteristic morphological features prevented any further identification.

The analyzed remains were described as whitish in colour, with some (less than 5%) fragments of bluish-grey colour, which indicates that they probably underwent nearly full calcination in temperatures over 600°C (after Holden *et al.* 1995a, 1995b). The small amount of analyzed fragments did not yield any additional taphonomic observations.

The analysis of feature 109 from Podlesie, site 5 indicated that the cremated human remains from the grave probably belonged to a single adult individual, with an uncertain indication of middle adult age category (around 30-40 years old). The amount of the excavated cremains is insufficient for representing a whole set of cremated remains; the total weight of the cremains in question represents about 50% of the smallest female skeletal weight after cremation according to modern data (Bass and Jantz 2004; Warren and Mapples 1997). Analysis of the fragmentation showed a similar amount of the largest (>10 mm) and middle-sized (10-5 mm) fragments, but the rate of anatomical identification is significantly low (8.6%). The remains have undergone nearly complete calcination, inferred from their white colouration, indicating pyre temperatures over 600°C. Compared to previously examined graves from the 2014 excavation season, the preservation of feature 109 is significantly worse, as indicated by the rate of anatomical identification and the total amount of analysed fragments.

DATING

The dating of the assemblage can be established mainly on the basis of the brooch and parts of the shield. Although the brooch is incomplete, it can be classified as Type Almgren 236, most probably A. 236c. It should be noted that the artefact is small in comparison to analogous items, and it is the Noric-Pannonian fibula most commonly imported to the Central-Eastern Barbaricum (they were produced in south-western Pannonia and Noricum, cf. Garbsch 1965, 77). They came as part of the Bohemian wave of imports, i.e., du-

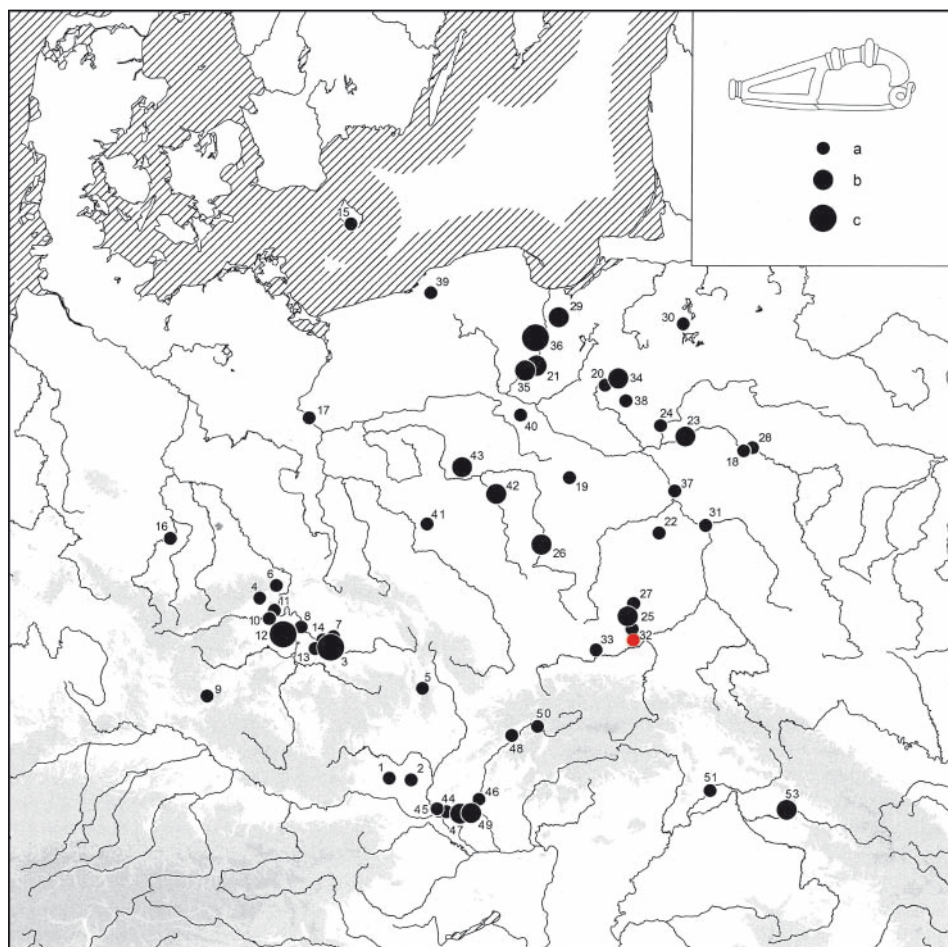


Fig. 9. Distribution map of fibulae of Type A.236c; red dot – Podlesie (numbers and map according to Zagórska-Telega 2017, supplemented by the authors); a – 1 brooch, b – 2 or 3 brooches, c – 4 or more brooches

ring the heyday of the Marcomanni state ruled by Marbod (Wołągiewicz 1970, 218, 245-246), but also of the so-called Slovakian wave, after the fall of Marbod and the takeover of power by the Quadi (Wołągiewicz 1970, 221-222). From the area of modern Poland, two concentrations of brooches of Type A.236c are known (Fig. 9): one on the lower Vistula, and another in the eastern zone of the Przeworsk culture, but they are also known from the Lesser Poland and Kielce regions, as well as from southern Slovakia and Bohemia. Single artefacts have been recorded in Carpatho-Ukraine, the Elbe Land, western Poland (including the Lubusz Group), the Bogaczewo culture, and on Bornholm (Zagórska-Telega 2017, map 2). In the Barbarian areas, they are often found in men's burials, unlike in the Roman provinces where they were used by women (Zagórska-Telega 2017, 588). In the Roman provinces they are found throughout the whole 1st century AD (Garbsch 1965, 27*-30; cf. Demetz 1999, 50-52), but in the Barbaricum they occurred only in Subphases B_{1a} and B_{1b} (Zagórska-Telega 2017, 568-570; cf. Andrzejowski 1998, 75-76).

Another item of attire that was found is represented by elements of the supposed buckle. If it has been correctly classified, it was a representative of Group A after R. Madyda-Legutko, dated in the Przeworsk culture to Phase B₁ (Madyda-Legutko 1987, table 7). Buckles from that group are found in male burials (cf. Madyda-Legutko 1987, 11).

The shield boss should be classified as Type 5 after M. Jahn (1916), and in the Przeworsk culture it represents the chronological Group 1 of graves with weapons, meaning that it occurred in Subphases B_{1a-b} (Godłowski 1992, 72). In some areas of Barbarian Europe, their dating may be considerably different (cf. Kontny 2019, 132). Such shield bosses most probably derived from the conical/dome-shaped forms of Type 8 after D. Bohnsack (1938), characteristic of the final part of the Late Pre-Roman Period (cf. Bochnak 2005, fig. 35; Łuczkievicz 2006, 87-91, table 12). To produce them, it was necessary to use more sophisticated devices than those used for making bosses with a hemispherical or rounded shape, i.e., appropriately shaped insets similar to a shoe-last or an anvil with a horn (Bochnak 2005, 114). The benefits of using a pointed calotte, allowing for greater effectiveness in the offensive use of the shield, are obvious (Kontny 2019, 32). When lacking blacksmithing skills sufficient to make the shield a more effective offensive weapon, craftsmen began to make conical shield bosses by hammering out metal sheets rather than iron billets. The use of this method left a visible trace in the shape of a seam on the cover in the place where the edges of the metal sheet met. Such seams (Germ. *Buckelnaht*) were found, i.a., in the Elbe Cultural Circle, the Przeworsk culture, and in Scandinavia (cf. Jahn 1916, 170-171; Zieling 1989, 294; Kontny 2007, 96).

A clearly archaic feature is the large number of rivets, which was common among artefacts from the Late Pre-Roman Period until its decline (cf. Bochnak 2007; Kontny 2007, 94-95; for the final period of the use of such solutions during the Roman Period in the West Balt Circle cf. Kontny 2017, 30, fig. 11:3-5). This solution was rather ineffective, as the excessive number of the rivets weakened the boards of the shield; it was enough to use three or four rivets, which can be seen in numerous examples from the Roman Period.

However, the discussed technical solution may have also had reasons unknown to us, e.g., the type of wood used to make the shield. It may only be said that the reconstructed thickness of the shield in the place where the boss was affixed, which was 1.4 cm, does not differ from the data known for other such Przeworsk items (see e.g. Zielsing 1989, 288-290). The damage to the boss may have resulted from ritual action, since it is too serious to have been sustained in combat (cf. Czarnecka and Kontny 2009). It is also worth noting the small hole at the top of the boss; it seems to be rather a result of an error made when it was forged and exposed after destruction, since there are no indications that it was intentional (there was no reason to leave such a hole, as it would create a potential threat, albeit small due to its dimensions), or that it was damaged on purpose. Rivets of Type B, after N. Zielsing, occurred in the Late Pre-Roman Period and in Phase B₁ (Zielsing 1989, table 34: B, plate 4). Taking into account these archaic features, it seems justified to shift the dating of the artefact to the early stage of Phase B₁.

The iron fragment that should be considered as part of a double plate for the rivet of a shield handle of Type C after N. Zielsing / 3 after M. Jahn (Jahn 1916, fig. 189) may be dated to the Late Pre-Roman Period (Zielsing 1989, table 2), but in the Przeworsk culture (Bochnak 2005, 121-123; Łuczkiewicz 2006, 170, graph 5, table 14) and in the Oksywie culture, where they were more numerous, they occurred almost exclusively in Phase A₃ (Bochnak 2005, 121-123; Łuczkiewicz 2006, 170, graph 6, table 15 – Group 2a and 2b). Contrary to the general observations made by T. Bochnak (2005, 123), the discussed artefact could not have been fixed with the same rivets as those used for fixing the boss because the rivet hole has a much smaller diameter.

The head of a shafted weapon represents Type X after P. Kaczanowski, which is made up of a set of rather morphologically diverse artefacts. This type is dated to Phases B₂ and, mainly, C_{1a}, yet the earliest specimens may be related to Phase B₁. These forms precede Type IV. In the analysed case, however, we are dealing with an exceptionally early form. This unique element is a polygonal cross-section of the socket, while among the specimens of Type X, sockets that are circular or, exceptionally, lenticular in cross-section are predominant (Kaczanowski 1995, 20-21). The polygonal cross-section became popular in Phase B₂ (Kaczanowski 1995, *passim*).

The arrowhead is not a good chronological determinant; Type IV has a very broad dating to the period between the 3rd and 2nd centuries BC and the 1st-4th century AD (Hazanov 1971, plate 19).

The pottery also does not contribute much to the dating, even though it fits in the chronological framework determined by the artefacts described above. Vase-like vessels of Type Liana II/2 occurred mainly in Phases B₁ and B_{2a} (Liana 1970, 439), Type I/1 occurred earlier, i.e. in Phases A₃ and B₁ (Liana 1970, 439), and Type VI/1 occurred in the Late Pre-Roman Period, Phase B₁ and even slightly later, whereas Type I/3 occurred mainly in Phase B₂ (Liana 1970, 440). As the time frame is not very exact, we may only generally assume that the pottery should be dated to Phase B₁.

The whole assemblage should be dated to this phase, but taking into account the brooch of Type A.236c, the possibly early shield handle and the archaic ways of fastening the shield boss, it may be assumed that it we deal with the earliest stage Subphase B_{1a}.

THE ARROWHEAD

Out of the weapons present, the most interesting is the seemingly least spectacular one, i.e. the arrowhead. It is not a form typical of the Przeworsk culture, in which leaf-shaped blades of arrowheads predominate, barbed items are rare, and needle-shaped ones are exceptional (Kontny 2019, 38). Trilobate arrowheads are typical of nomadic milieus: Sarmatian, Hunnic, and Avarian. It is possible, however, to distinguish between them, as the earliest, Sarmatian ones, had generally triangular lobes forming broad barbs, whereas the Hunnic type (dated to the Migration period) was more rhombic, and the Late Migration Period / Early Middle Ages Avarian three-lobed specimens were most frequently deltoid oblanceolate in shape (cf. Bitner-Wróblewska and Kontny 2005). Naturally, this is only an overall tendency, and particular specimens may differ slightly in shape.

There are only a few examples of such early, viz. Sarmatian, finds from the Polish lands as the case of the item from Podlesie (Figs 10-11). Forms with triangular (or similar in shape) leaves are known from the find of 16 arrowhead fragments from the Przeworsk culture burial ground in Grzybów, Staszów district (Garbacz 1995, 211-214, fig. 2). They were found in a concentration that could not be related to any specific burial, for they were abandoned by unknown looters who had disturbed one or more features.

This lack of context gave the author (Garbacz) an opportunity to make his own interpretation. He considered them as Roman artefacts connected with the territorially close military contacts from the Marcomannic wars (Garbacz 1995, 217-218). They are also dated to the Marcomannic wars by H. Dobrzańska, although she attributes them to the Sarmatians (1999, 86). Indeed, Roman arrowheads looked identical to the Sarmatian ones for, being effective and relatively easy to produce (Zanier 1995), they were included into the Roman weaponry together with the Indo-Iranian arrow men, and these troops (*sagittari*) were recruited from among the Sarmatian and Parthian warriors, and often used in provinces threatened with the invasions of similarly equipped peoples (Zanier 1988, 9-11, fig. 2; Fischer 2012, 201, fig. 294; cf. also Coulston 1985).

However, the finds from Grzybów should not be linked with the Roman milieu in the light of the dating of the arrowhead from Podlesie and the recently published arrowhead from a groove-type feature (No 31) in Michałowice, Kazimierza Wielka district (Zagórska-Telega *et al.* 2011, fig. 12:4). Aside from an analogous arrowhead, in the filling of this feature were found, three brooches of Type M after J. Kostrzewski (1919), a brooch of Type 18 after O. Almgren (1923) and a brooch of Type A. 67 (Zagórska-Telega *et al.* 2011, 212-215, fig. 12:4-9; 16), among other items, which allows the feature to be dated to the earliest

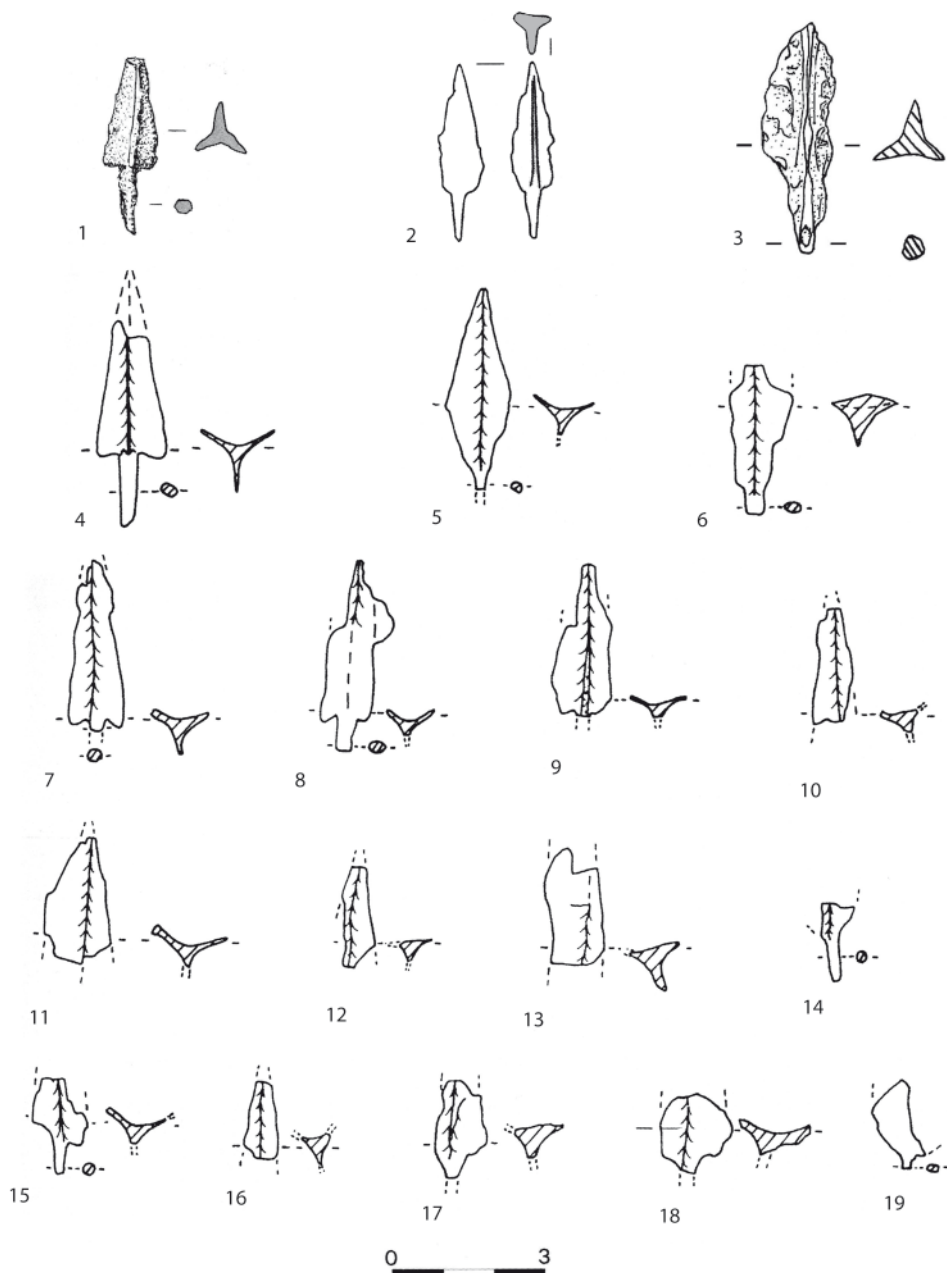


Fig. 10. Examples of Sarmatian-type trilobate arrowheads from the territory of Poland. 1 – Dybów, stray find; 2 – Michałowice, groove feature no 31; 3 – Podlesie, feature 109; 4-19 – Grzybów, stray finds (1 – after Engel *et al.* 2018; 2 – after Zagórska-Telega *et al.* 2011; 3 – drawn by Katarzyna Szymańska; 4-19 – after Garbacz 1995)

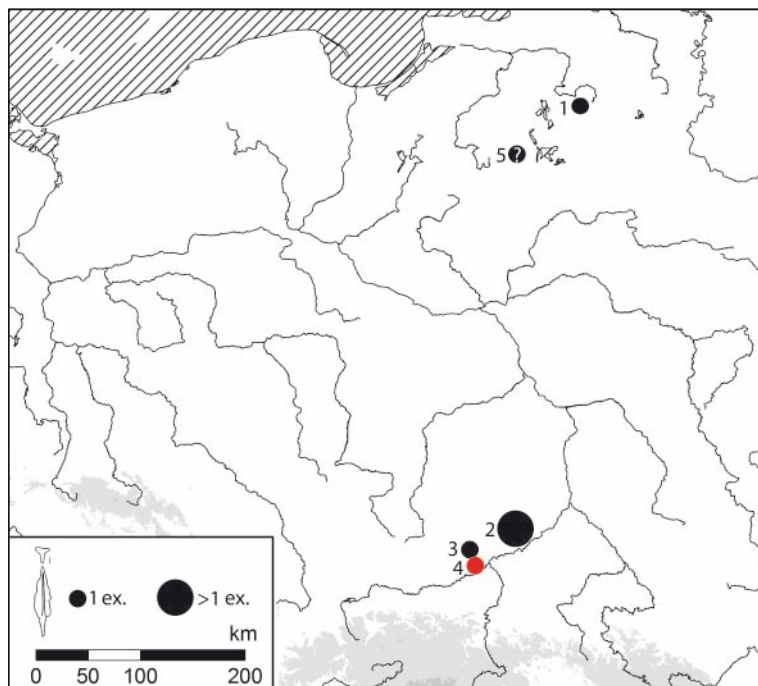


Fig. 11. Distribution map of Sarmatian type trilobate arrowheads from the territory of Poland. 1 – Dybowo; 2 – Grzybów; 3 – Michałowice; 4 – Podlesie; 5 – Mojtyny

stage of Phase B₁ or even stage A₃/B₁ (the context of the Roman provinces indicates the Augustan times, cf. Demetz 1999, 133-135). Therefore, this feature is almost identical in chronology as that of the feature in Podlesie. In such a situation, a late dating of the finds from Grzybów, and their connection to the Roman milieu, is completely improbable. Also, the limited numbers of arrowheads in the graves from Podlesie and Michałowice seem to indicate that at least several if not more than a dozen burials must have been disturbed in Grzybów.

Another three-flanged arrowhead from Polish lands was a stray find from the hillfort in Dybowo, Olecko district, which may be connected with the Bogaczewo culture settlement from the Roman Period; the habitation layers connected with that period were strongly disturbed, but the dating within this stratum can be tentatively limited to Phase B₂/C₁-C_{1a} (Engel *et al.* 2018, 279, fig. 5:5). The find from Grave 59 at the Bogaczewo culture site of Mojtyny, Mrągowo district, may perhaps be interpreted in a similar way (Hollack and Peiser 1904, plate VII:59a), but in this case the unsatisfactory quality of the documentation and the state of preservation do not allow for a definitive determination (Kontny 2019, 138-139). The assemblage is not precisely dated, but taking into account the chronology of

the cemetery (Lewoc 2016, 83-84), it may probably have been made in Phases B_{2b}-C₂. Thus, the Balt finds are most probably not related to the same time horizon as the finds from the Przeworsk culture, and so are not connected to contacts from the Early Roman Period described below.

CULTURAL CONTACTS WITH THE SARMATIANS

The relations with the Sarmatian milieu at the beginning of the Early Roman Period are well documented for the Przeworsk culture, especially in its southern part, and are connected with the relations with the Black Sea littoral. The Sarmatians managed to create there a realm with a capital in Olbia ruled by king Farsoes (from 49 AD), and then (from 70 AD) his successor, king Inismeos (Dobrzańska 1999, 85). Although these contacts were not so intense as in the second half of the 2nd and in the 3rd century AD (cf. Dobrzańska 1999, 85-86), they did exist. They are said to have been manifested by contacts between the elites, cf. a woman's rich burial from Giebułtów, Kraków district, and a man's from Sandomierz-Krakówka, Sandomierz district, in which pottery considered as Sarmatian was found, as well as other artefacts believed to come from that cultural circle (Dobrzańska 1999, 78-79 with further literature).

It should be noted, however, that these graves are later than the feature from Podlesie, and can be linked with Phase B_{2a}, or the last quarter of the 1st century AD. Furthermore, the Sarmatian origins of the pottery are questioned; it could also have had a Dacian provenience (Florkiewicz 2006, 197-198; Lasota 2009, 165). Additionally, the supposedly Sarmatian conical arrowheads with a tang (Dobrzańska 1999, 81) turned out to be decorative points of chair-shaped spurs (Germ. *Stuhlsporn*) (Kontny 2003, footnote 139), most probably attached to organic bases and fixed to additional pairs of shoes put together with the deceased on the pyre – hence the exceptionally large number of spurs in the burial. A similar situation was confirmed for the so-called princely burials (No I and II) of the Early Roman Period from Marwedel, Ldkr. Lüchow-Dannenberg in Lower Saxony (Wegewitz 1983, 129; Bischof 2006, 108-109, fig. 30; cf. Laux 1988).

The importance of the realm of Farsoes, who exerted control over some groups of Dacians or Germans, may be inferred from written sources, and it may be confirmed by the existence of metallurgical centres in the area earlier occupied by the post-Zarubincy culture in the mid-1st century AD – especially in Lyutezh in the central Dnieper region and Uman' on the Boh river, which, as some researchers believe, were controlled by the Sarmatians and produced their wares for them (Voronyatov and Eremenko 2013, 52-58).

German-Sarmatian military contacts are testified by Tacitus, who wrote about the invasion of the Lugii (related to the Przeworsk culture) on the state of the Quadi, ruled by Vannius, which took place in ca 50 AD (Tacitus, *Annales* XII, 29-30; after: Kolendo and Płóciennik 2015, 114). Vannius' troops included the cavalry of Sarmatian Iazyges who lived

in the eastern part of modern Hungary, but who could not withstand the attack – in the open field – of the Lugi and Hermunduri coming from the north (the Iazygi ruler defended himself with his native foot soldiers in fortified places), as a result of which the ruler fell (Kolendo and Płóciennik 2015, 119-120).

The most spectacular manifestation of German-Sarmatian contacts in the military sphere was the adaptation of the Sarmatian tamgas (or motifs based on the tamgas, but not having direct analogies among the Sarmatians) in the second half of the 2nd century and in the early 3rd century AD as decorations for spearheads in the Przeworsk culture or, more broadly, in the Germanic milieu (Voronyatov and Machinskij 2010, 58-65). It is assumed that the adoption of Sarmatian symbols may have been connected with participation in combat (Shchukin 1994, 230) and contacts with the nomadic aristocracy; essentially, these symbols may have been inspired by or copied from designs seen on Sarmatian banners, tattoos, or brands on horses that became property of the Germans as spoils of war (Voronyatov and Machinskij 2010, 62, 69-71, with further literature). This may be related to the period of the Marcomannic wars (167-180 AD) also called (not without reason) the Sarmatian-Marcomannic wars, because both the Germans (not only the Marcomanni but also, i.a., Lugi) and the Sarmatians were plaguing the Romans. S. Voroniatov assumed that an opportunity to adopt the tamgas may also have been provided by the victory of the Goths over the Sarmatian tribe of the *Spali/Spalaei*, who most probably inhabited the area between the Boh and Dniester rivers, and were earlier the subjects of Farzoes and Inismeos as described by Jordanes (*Getica* 28 after E. Zwolski 1984). These events took place soon after the German tribe reached the land of *Oium*, most probably already in the 2nd century AD (Voroniatov 2012, 190). It seems, however, that it is not plausible to associate the adaptation of a new pattern with a single episode.

Mutual contacts in that period were, of course, very broad, and there is no room here to describe them in detail (cf. Istvánovits and Kulcsár 2017, 258-289 with further literature). Contacts in earlier times – from the very beginning of the Roman Period – are also indicated, and not only by the aforementioned arrowheads. One should also note a number of finds from the upper Dniester river, which show that the area of Sarmatian settlement (expanding from the concentration on the middle Prut and Dniester) overlapped with the Dacian one (the Lipica culture in the Pre-Roman Period, Phase A3) and with the Przeworsk culture (with its characteristic elements of men's attire and weapons) at the end of the Late Pre-Roman Period and at the turn of the eras (Kokowski 1999, 30-40; Voronyatov and Machinskij 2010, 59).

There were also finds of German weaponry in purely Sarmatian contexts, such as an eight-shaped buckle (untypical among the nomads) from the younger part of the Late Pre-Roman Period and the beginning of the Early Roman Period at the Sarmatian cemetery of Zolotaya Balka on the lower Dnieper river (Vyazmitina 1972, 134, fig. 66; Madyda-Legutko 1987, 11). It is difficult to establish what events spurred these contacts. The decline of the Zarubincy culture, resulting, as it is believed, from a Sarmatian invasion, seems to be a con-

vincing idea. The Sarmatian arrowheads need not necessarily indicate that Przeworsk culture warriors participated in large numbers in these events; the adoption of certain traits of military gear is possible both when the warriors belong to ethnically mixed military retinues as well as when they fight one against another. Evidently, this did not result in a change of the Przeworsk culture model of military equipment in which the bows and arrows did not play an important part (cf. Kontny 2019, 38-39).

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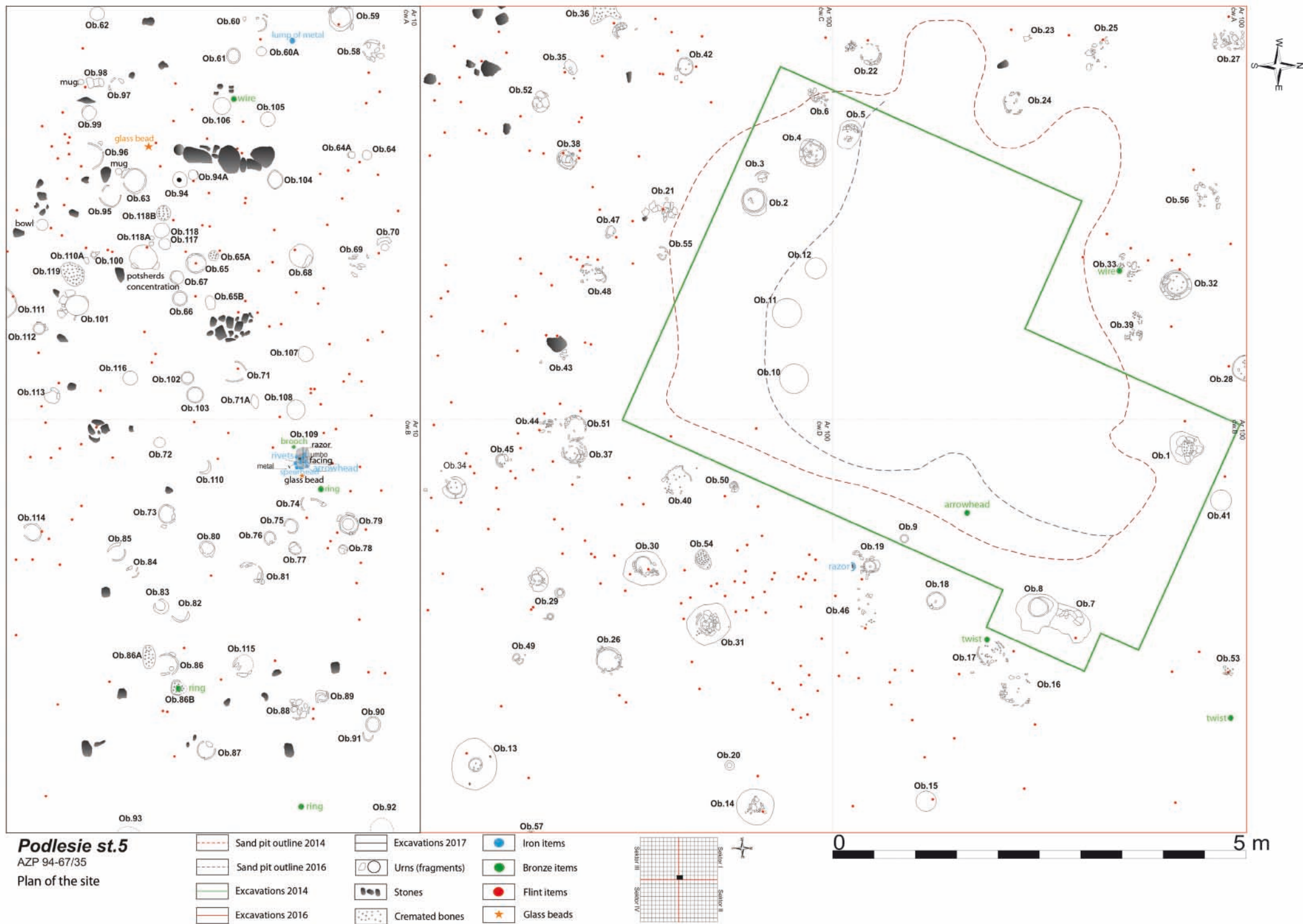


Fig. 3. Detailed plan of Podlesie, site 5. Drawn by Artur Grabarek

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SWORD CHAPE FOUND AT SANTOK: TECHNOLOGICAL, TECHNICAL, FORMAL AND TYPOLOGICAL ASPECTS

ABSTRACT

Janowski A., Gan P., Zamelska-Monczak K. 2019. Sword chape found at Santok: technological, technical, formal and typological aspects. *Sprawozdania Archeologiczne* 71, 387-406.

This paper presents the results of studies and technological analyses of a fragment of the fittings from the lower part of a sword scabbard discovered in 2016 at the stronghold in Santok, Wielkopolska, Poland. The chape represents the type in widespread use across the Baltic lands in the second half of the tenth century and the early eleventh century AD, yet its embellishments are the subject of debate. According to some researchers, the scene shows Odin with his attributes or birds. Others believe that it depicts the sacrifice of Odin, similar to that of the crucified Christ, or the fight between the hero and the monsters. The chape was made of copper alloy, but its chemical composition is unusual, with very high levels of lead. This indicates the conscious and purposeful use of alloys with specific properties. Until now, only about 1% of such artefacts have been subjected to technological analyses, and further research is necessary to confirm standardization regularities in their production process.

Keywords: Santok, Middle Ages, scabbard chapes, ancient metallurgy, metallographic analysis

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In July 2016, the Centre for Prehistoric and Medieval Studies at the Institute of Archaeology and Ethnology, Polish Academy of Sciences (henceforth IAE PAN), Poznań, conducted a surface survey at the stronghold in Santok (site 1). This survey, which included the use of a metal detector, produced a fragment of a so-called chape – the fittings of the lower part of a sword scabbard (inv. no. 127/16 – Fig. 1). The chape, of which only the lower part was preserved, was deposited in humus in the area of the so-called southern suburbium. The 3.66 g fragment is 25.24 mm high and 23.4 mm wide, and the thickness of its walls ranges from 0.9 to 1.3 mm.

Located at a very distinctive place, the Santok site sits at the nexus of three geographical regions – Pomerania, Central Polabia and Wielkopolska (Great Poland) – and at the confluence of the Warta and Noteć rivers. The site is believed to have been first settled in the second half of the eighth century. Initially an open settlement, it was later fortified, and in the second half of the tenth century, expanded to form a multi-part stronghold (Zamelska-Monczak 2017). For about 300 years, Santok was among the central locales in the territorial structures of the Piast state.

TECHNICAL AND TECHNOLOGICAL ASPECTS

Recent years have seen a major increase in the number of archaeological studies making use of the results of physicochemical analyses, as well as papers publishing pure results of such analyses. While this clearly illustrates progress in archaeology, it may also lead to interpretative simplifications resulting from the limitations of the chemical methods themselves or poorly formulated research questions. The analyses of the Santok



Fig. 1. Sword chape from Santok. Photo by A. Janowski

chape conducted at the Bio- and Archaeometry Laboratory at IAE PAN, Warsaw, provide a perfect example to illustrate some of the analytical and methodological problems of archaeometry.

The analyses (no. CL 19558) revealed that the artefact was cast from an alloy of copper (Cu – 74.62%), lead (Pb – 17.87%) and zinc (Zn – 5.85%). The content of other alloying elements did not exceed a total of 2% (Sn – 0.87%, Fe – 0.40%, Al – 0.20%, As – 0.18%, Ni – 0.01%). Analysed as one in a series of a dozen or so artefacts, the chape initially did not arouse much interest, although its chemical composition, i.e. a high amount of lead (about 18%) in the alloy, did not line up with other results. Why should an increased lead content raise doubts and questions about the nature of the artefact? Lead is an alloying additive that improves metal properties. At a level of about 2%, the lead content in the alloy significantly lowers the melting point and increases castability, thus allowing the production of better copies of the mould pattern. It should be nevertheless noted that further increase in the lead content does not improve any metal properties. On the other hand, lead shows an almost complete lack of solubility in copper. Coupled with a low melting point (327°C) relative to the melting point of copper (1083°C), lead is moved to the grain boundaries and into the interdendritic space during the crystallization of the solution. When it solidifies, lead fills the pores, creating zones of increased brittleness, which makes hot copper brittle above the melting point, thus hindering heat treatment. The lead phase shows a tendency for gravity segregation, especially in slow-cooling casts. In the technical sense, the final alloy is a mixture of solid solutions of copper and lead. If additional components, for example tin or zinc, are present in the original metal composition, an alloy is formed after solidification: a multi-component mixture consisting of tin solids in copper and tin solids in lead for the Cu-Sn-Pb alloy. Depending on the tin content and the associated large temperature range of its crystallization, tin can form two phases in copper – a solid α solution and a more brittle eutectoid ($\alpha+\delta$), the secretions of which also accumulate in inter-crystalline spaces. Each of the alloy additives specifically affects the final metal, strengthening or lowering the mechanical properties and affecting the final chemical composition. Some of the most important interactions for early medieval metallurgy include the presence of tin and lead reducing the level of zinc absorption (Craddock 1978, 12), nickel affecting the fragmentation of lead precipitation (Wesołowski 1957, 96) and arsenic increasing the cold and hot brittleness (Hensel 1996, 151).

When the chemical composition of the alloy has been identified, there are a number of questions that can possibly be answered. First, the character of metal – whether it is a single-phase alloy in which the individual elements have been dissolved in the base metal, or an alloy with a two- or more- phase structure. Such mixtures usually have better technological properties: a lower melting point, solidification and overheating (a temperature above the melting point, necessary to pour into the prepared form), as well as a lower production cost.

Secondly, identifying types of alloys helps us to recognise products with similar composition or purpose. Considering the high heterogeneity of alloys produced in the past, the

Table 1. Results of the analysis of the sword chape found at Santok (by P. Gan)

Analysis	Area	Cu	Al	Si	Ti	Cr	Mn	Fe	Ni	Zn	As	Ag	Sn	Sb	Pb	Au	S	Comments
SEM	2	74.62	0.20	0.00	0.00	0.00	0.00	0.40	0.01	5.85	0.18	0.00	0.87	0.00	17.87	0.00	0.00	x200 magnification, measurement from the inside of the artefact, cleaned surface, 20keV
SEM	3 A	69.78	0.04	0.00	0.00	0.00	0.00	0.14	0.06	7.75	0.13	0.00	0.51	0.00	20.85	0.72	0.00	x200 magnification, measurement from the inside of the artefact, cleaned surface, 20keV
SEM	3 B	29.13	0.07	1.12	0.06	0.00	0.00	0.53	0.00	1.34	0.00	0.00	1.91	0.00	56.29	1.60	0.00	x200 magnification, measurement from the inside of the artefact, slightly cleaned surface, 20keV
XRF	3_1	81.96						0.08		8.04	0.25	0.02	0.91	0.17	8.06		0.51	cleaned surface, beam width 200µm, 50keV
XRF	3_2	82.38						0.10		8.19	0.28	0.03	0.83	0.24	7.57		0.37	cleaned surface, beam width 200µm, 50keV
XRF	3_3	78.92						0.16		7.92	0.27	0.03	0.63	0.16	11.30		0.60	cleaned surface, beam width 200µm, 50keV
XRF	3_4	80.98						0.22		8.06	0.29	0.02	0.84	0.22	9.34		0.22	cleaned surface, beam width 200µm, 50keV
XRF	3_5	83.72						0.10		7.38	0.31	0.03	0.75	0.22	6.95		0.67	cleaned surface, beam width 200µm, 50keV

uncritical use of modern technical terminology for this purpose is highly inadvisable, because currently composed alloys are characterised by extreme high mechanical properties, high durability and resistance to atmospheric and chemical corrosion, and steelworkers move within the limits of specific standards, controlling manufactured metal. Commonly used at present are two-phase copper-zinc alloys, or brass, containing amounts of zinc unattainable for historical brass (39%). Brass is a copper alloy with metallic zinc. This technology was invented in Europe as late as the eighteenth century. In the Middle Ages, alloys with brass properties were obtained by combining copper with calamine or zinc ore, and this alloy was known as *aurichalcum* (c.f. Tomaszewska-Szewczyk 2016). Furthermore, the chemical composition of modern copper-tin alloys, or bronze, depends on the purpose: bronzes for plastic forming should contain between 6 and 8% tin, and bronze for casting may have more components (Sn – 2-11%, Pb – 2-26%, Ni – 0.5-1.5%, P – 0.8-1.2%); in addition, special alloys are obtained by adding silicon, nickel, manganese, beryllium, lead or aluminium. However, analyses of archaeological materials do not suggest that similar strict divisions or control of the raw material took place in the past. By observing the physical phenomena occurring during the metallurgical process (e.g., the degree of evaporation, the colour of metal, the degree of its liquidity and viscosity), or by carefully sorting and checking the mechanical properties of the batch of metal prepared for melting, an efficient metallurgist was able to identify materials having better plasticity. Nevertheless, many artefacts were produced and then processed from raw materials that were simply at a manufacturer's disposal at a given time. Several objects treated as multi-component alloys were used both in casting techniques and in plastic processing, requiring more work and inter-operative processes. The main argument against employing historical names of alloys, such as those given for example by Pliny, is their ambiguity: the same metal name denoted a whole range of chemical compositions; the same type of alloy could have had a variety of names depending on the place of production or purpose; in addition, the names of alloys changed over time. Archaeometallurgy has yet to create a single naming system. Based on the content of zinc, tin and lead, the model proposed by British researchers seems to be the most universal (Fig. 2); it allows the maintenance of a uniform nomenclature. Yet, in order to determine detailed boundaries/ranges, at present typically established by each researcher individually based on the analysed material, further research is needed (Dungworth 1997, 906; Ponting 1999, 1312; Bourgarit and Thomas 2012, 3054).

Returning to the Santok chape, after unnaturally high values of lead had been identified, several additional tests were performed. The results of the analyses are summarised in Table 1, including analyses made at various magnifications, and analyses performed on a cleaned and an uncleaned surface to illustrate the wide dispersion of alloy additives. In order for the data to be completely understood, we need to look at the applied research method. Commonly used on archaeological artefacts, the X-ray fluorescence method (XRF – see Miazga 2017, 59-62) allows for the almost non-invasive and quick determination of a number of elements with relatively high accuracy. The characteristic X-ray spectrum is

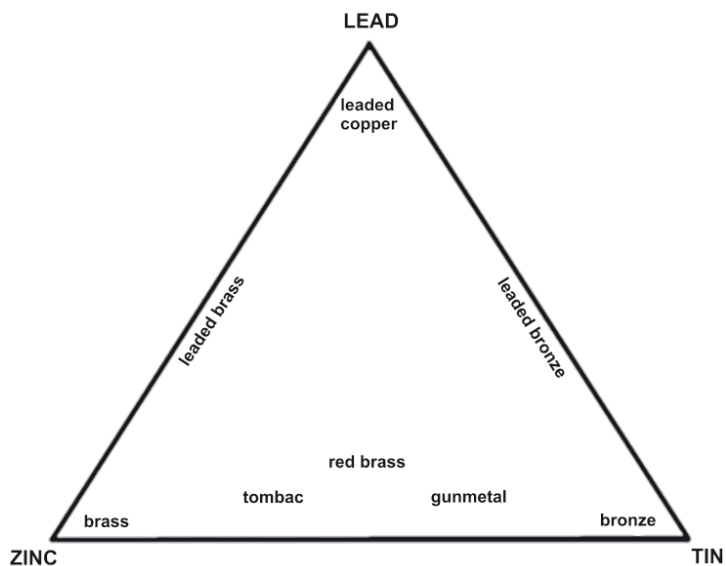


Fig. 2. Alloy nomenclature and relations between alloys.
Elaborated by P. Gan, according to Bayley 1991, fig. 6

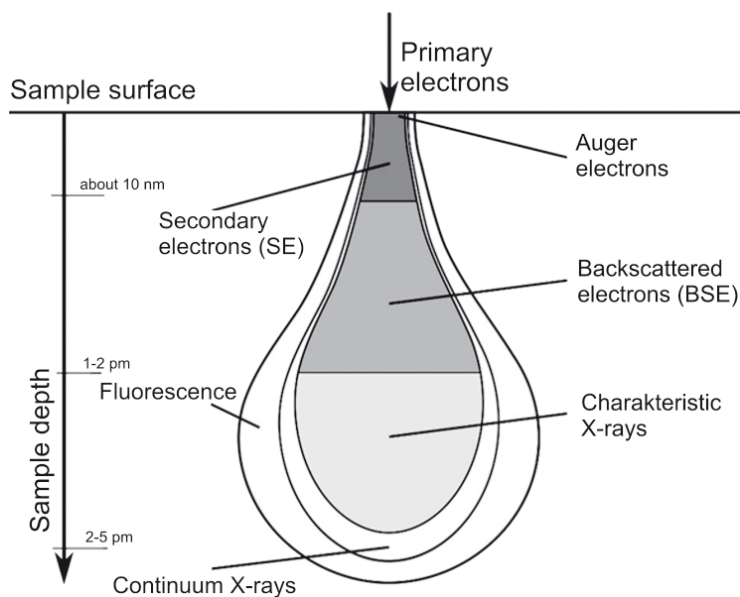


Fig. 3. Scheme showing the range and spatial distribution of emission of various electrons in a sample.
Elaborated by P. Gan

generated by the bombardment of the sample surface with a radiation beam. The supplied energy stimulates electrons, which jump between shells – strictly determined, the energy of such transitions is diagnostic for each element. Changes are registered by the detector in the form of spectra and peaks, and their intensity illustrates the relative content of a given element in a sample. Quantitative reference standards are necessary to quantify the results. The actual chemical composition can be calculated using four methods: k-ratio approximation, a calibration curve based on standards, ZAF matrix correction and fundamental parameters analysis, the so-called non-model analysis. Modern commercial research equipment typically performs an analysis based on theoretical spectrum models from a database, selecting the ones with the highest degree of matching (see Źelechower 2007, 113). The range and spatial resolution of the electron beam and characteristic X-ray are shown in Fig. 3. Characteristic X-ray radiation is collected from a larger area than the falling beam, and also registers the signal located under the surface of the sample. The depth of penetration depends on the applied acceleration voltage, which also affects the degree of excitation of characteristic lines. A voltage of 25 keV is assumed to be a safe energy value of a primary beam. Lower values do not allow the analysis and sufficient separation of all spectral peaks, which is particularly important in identifying, e.g., the Sn, Sb or Pb and As contents.

Figure 4.2 shows the locations and areas of measurements performed on the Santok artefact using the Artax spectrometer (μ XRF) and the SEM-EDS microscope (see Miazga 2017, 76-78). Scanning microscope observations both revealed the metal structure, and enabled the precise selection of measurement locations, thereby avoiding inadequately cleaned sample surfaces and allowing for the elimination of interference (Table 1, analysis 3 B, 3_2, 3_3, Fig. 4: 1, 3-4). Based on the above, it is important to choose relevant analytical techniques and conditions for measurements when performing archaeometallurgical analyses. Both analytical techniques confirmed unusually high lead content accompanying the alloy matrix in the Santok chape, which can be identified as red brass. The high content of alloy additives indicates that the artefact was cast, presumably in heated moulds, which favoured the placement of lead phases closer to the surface of the artefact. It is difficult to tell whether the damage and corrosion on the metal surface is a result of casting and metal composition or perhaps subsequent reparations and additions, or whether these are traces of tin plating or protecting the object against corrosion with a metal layer, which also shows a high decorative value. The early medieval collection of *Mappae Clavicula* recipes mentions the *caldarium* alloy. In Pliny's *Natural History*, the name *caldarium* denoted a fragile alloy used for casting, and was the opposite of a *regulare* alloy suitable for plastic working. Believed to be suitable for casting and white in colour, it consisted of one part of lead (about 20%) and four parts of copper, bronze or brass (Craddock 1979, 75). Since the twelfth century, such alloys were the basis for the production of large kitchen utensils, but their use, also in the production of small items such as buckles, spoons or weights, has also been confirmed for earlier periods (Ponting 1999, 1317). Antimony and

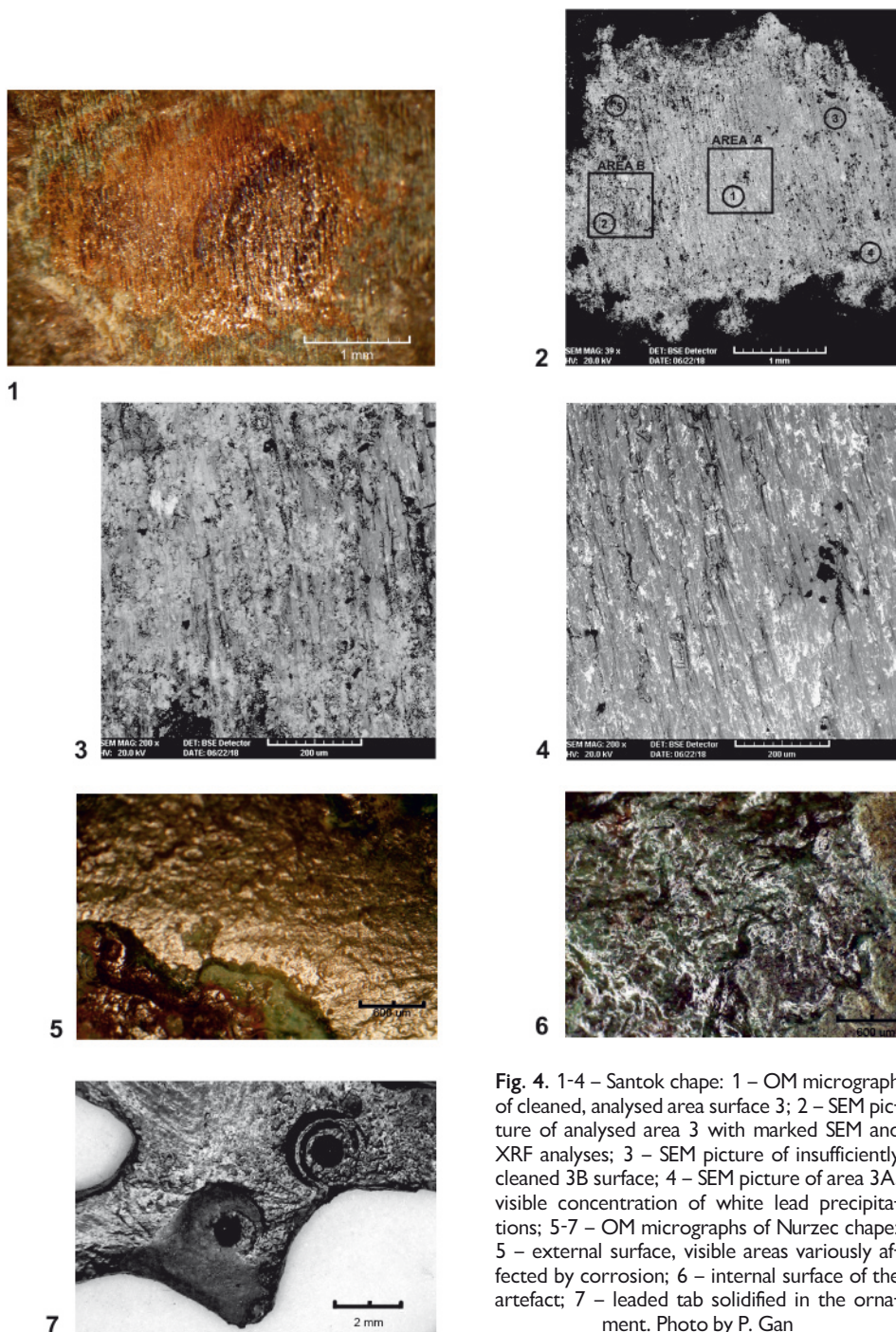


Fig. 4. 1-4 – Santok chape: 1 – OM micrograph of cleaned, analysed area surface 3; 2 – SEM picture of analysed area 3 with marked SEM and XRF analyses; 3 – SEM picture of insufficiently cleaned 3B surface; 4 – SEM picture of area 3A, visible concentration of white lead precipitations; 5-7 – OM micrographs of Nurzec chape: 5 – external surface, visible areas variously affected by corrosion; 6 – internal surface of the artefact; 7 – leaded tab solidified in the ornament. Photo by P. Gan

arsenic were alloy additives. Of notable similarity to the word *caldarium* – for good reason – is the English term *cauldron*. Analyses of fragments of cauldrons (or pipkins, German *Grapen*) from Poland and Germany also show a significant lead content (Gan 2016, 357). However, it should be added that standards prohibiting the use of lead in this type of product were introduced in the second half of the fourteenth century, at the latest (see Janowski 2016, 303).

Lead seems to have been an auxiliary element in historical alloys. Neolithic and Bronze Age artefacts contained very small amounts of lead, usually no more than 2%. Starting from the Hallstatt period, we witness an increased lead content in alloys, sometimes exceeding 5%, especially in alloys produced in the Roman Period. The Middle Ages saw a continued tendency to increase the addition of lead in copper alloys; Scandinavian metallurgy used alloys with a lead content exceeding 10%. In an important early twentieth century publication, Ture Johnsson Arne identified three types of raw material in early medieval Sweden, Rus and the then Prussia (Baltic areas), linking them to the region of origin (Arne 1914, 217-219), the main criterion being the presence of tin. Scandinavian artefacts, purportedly related to Arab metallurgy, showed trace tin content (less than 1%). The term ‘Permian-Siberian alloy’, affiliated with the Chinese zone, was coined to describe alloys with a large (over 20%) tin content. The south-eastern-Rus’ alloy possessed intermediate values. Contemporary research has perfected T. J. Arne’s classification. Noteworthy here is the presence of lead, which is barely present in Permian alloys, but accompanies zinc in Scandinavian alloys. It is difficult to capture definite relations in the Rus’ alloys: levels of tin, zinc and lead are frequently very diverse. It seems that alloy heterogeneity could have been typical of peripheral settlement, which had limited access to good raw material. Its production was thus based on the use of scrap metal, and a negative impact on the casting craftsmanship seems only natural in this context.

Archaeometallurgical analyses and their comparisons must be based on an understanding, among cooperating archaeologists and researchers, of the nature of the provided answers and the limitations of research methods. The character and complexity of historical alloys still require an individualized approach to the planning of analyses according to, despite the wide access to research equipment. Non-invasive analyses of chemical composition can be the first step in archaeometallurgical analyses, thus allowing the detection of compound and problematic artefacts. For a comprehensive description of the applied technology, it may be necessary to remove a small sample of metal from the artefact to perform invasive metallographic analyses.

It is unfortunate that the chemical composition analysis has been performed for only a small number of sword chapes (see Table 2), and some of the results have not yet been published. A brief look at the results presented in Table 2 reveals the diversity of the formulas used by manufacturers, but also the differences in the method of sampling that could have impacted the results. In most cases, one measurement was made on the surface of the object. The measurement showed that the chapes from Mielnik, Siemiatycze district,

Table 2. Results of analyses of sword chapes found across Europe (by A. Janowski)

Site	Place of sampling	Cu	Al	Ti	Cr	Fe	Ni	Zn	As	Ag	Sn	Pb	Sb	Au	P	Ca	Si	Cd	Mn	Mg	S	Type wg V.K.*	Source of information
Kercz (Russia/Ukraine)	no data	rest						20-25				about 1										Ia	Frenkel' 2002, 134
	warp	81.36						4.02				18.58										Ia	Kainov 2015, 626
	surface	31.40						4.01			11.36	52.96											
Kostrzyn (Poland)	surface	17.91				4.42	0.01	2.56		0.03	2.85	70.61			1.16			0.40				Ia	Michalak and Socha 2017, table 1
	surface	23.57				5.23	0.29	2.78		0.04	5.47	61.07			1.52		0.24	0.05					
Nurzec-Szeszły (Poland)	warp	81.67	0.05		0.04	0.28		11.33	0.05		2.20	3.79	0.33	0.11			0.09		0.08			Ia Vb	Janowski in preparation
	surface	69.61	0.08			0.23		9.20	0.26		2.39	18.04				0.18		0.02					
Mielnik (Poland)	surface	73.80	0.11	0.09	0.06	0.28	0.15	6.61	0.10	0.30	9.53	8.78		0.18								Ib4	Kotowicz and Śnieżko 2018, table 1
Łekno (Poland)	surface	67.43				0.10		14.54			1.01	9.72			0.70	3.36	3.14					IIc	Wyrwa and Janowski 2014
Nimschütz (Germany)	surface	about 90	trace		trace			about 0.5		0.001	about 5	about 5				trace	trace		trace			IIc	Coblentz 1985, 300
Gardzień (Poland)	surface	84.97	0.09		0.07	0.28		6.24	0.04	0.03	6.02	1.59	0.26				0.32			0.08		Va	Janowski and Szczepański 2018, 417
Czermno (Poland)	warp	78.45				0.41		3.72			11.99	3.66	0.37									Va	Wołoszyn <i>et al.</i> 2018, table 1
	surface	70.18				0.64		1.88			19.38	6.85	0.34										
	surface	75.63				0.43		1.41			17.21	3.81	0.31										
Talkowszczyzna (Poland)	surface	85.50	0.06	0.05	0.02	0.20		3.19	0.04	0.22	6.94	3.47	0.27				0.03					Vb	Janowski in preparation
Radzim (Poland)	surface	89						5				about 5										-	Sankiewicz 2012, 247, fig. 3

V.K. – Vytautas Kazakevičius

*V.K. – Vytautas Kazakevičius

Talkowszczyzna, Sokółka district, and Nimschütz, Kr. Bautzen were made of bronzes. In the first case, in addition to copper (Cu – 73.80%), the alloy contained tin (Sn – 9.53%), lead (Pb – 8.78%) and zinc (Zn – 6.61%) (see Kotowicz and Śnieżko 2018, 222–223, table 1). In the chape from Mielnik, the copper content was significantly higher (Cu – 85.5%), but the mutual proportions of other components were similar (Sn – 6.94%, Pb – 3.47%, and Zn – 3.19%) (see Janowski in preparation). The chape discovered at the Nimschütz stronghold contained about 89% copper and an equal amount (about 5%) of tin and lead (Coblentz 1985, 300).

Several analyses were performed on the artefact from Czermno, Tomaszów district: one for the groundmass and two for the surface. In our opinion, the results obtained were significantly different: groundmass composition: Cu – 78.45%, Sn – 11.99%, Zn – 3.72%, Pb – 3.66%; surface composition: Cu – 70.18–75.63%, Sn – 17.21–19.38%, Zn – 1.41–1.88%, Pb – 3.81–6.85% (Wołoszyn *et al.* 2018, table 1). It is clear that the amounts of metals with a low freezing point, such as tin and lead, increase in surface layers. A similar pattern was also observed in the case of a chape found in Usvyaty, Pskov Oblast, Russia. The differences in composition were so significant that the groundmass had the properties of brass (Cu – 81.36%, Pb – 18.58%, Zn – 4.02%), while a lead alloy with copper and tin (Pb – 52.96%, Cu – 31.4%, Sn – 11.36%, Zn – 4.01%) was identified on the metal (!) (See Kainov 2015, 626). Particularly puzzling is the unusually high content of lead, which in this case may be the result of deliberately covering surface to give it a silvery colour. In addition to aesthetic value, this coating could also be a protective layer against bad environmental conditions. Similar treatments were also observed on several other chapes discovered in Russia and Belarus, which were covered with a layer of alloy containing from 33 to 59% lead (unpublished research by S.Ů. Kainov – see Michalak and Socha 2017, 165). According to Sergei Ůr'eviĉa Kainova (2015), such a composition is characteristic of early medieval bronzes from the area of Rus. An even higher lead content was found in the chape from Kostrzyn, Gorzów Wielkopolski district. Two analyses made for both external surfaces of the object show 70.61% and 61.07% lead content, respectively, with only about 20% copper (17.91% and 23.57%, respectively) (see Michalak and Socha 2017, 165, table 1).

The chemical compositions of other analysed sword chapes bear a resemblance to brass. The chape from Gadzień, Ĺawa district has a composition similar to tombac (Cu – 84.97%, Zn – 6.24%, Sn – 6.02%, Pb – 1.59%) (see Janowski and Szczepański 2018, 417), much like the specimen found in Radzim (Cu – 89%, Zn – 5%, Pb – 5%) (compare Sankiewicz 2012, 247, fig. 3). The analysis of the surface of the chape from Ĺekno, Wągrowiec district, showed that in addition to copper (at the sampling location, at least), it was composed of an alloy containing 14.54% zinc and 9.72% lead (Wyrwa and Janowski 2014, 329). In the case of the artefact found between the villages of Nurzec and Szeszyły, Bielsk Podlaski province, the analysis of the groundmass showed that it consisted of copper (81.67%), zinc (11.33%), lead (3.79%) and tin (2.20%), while 69.61% copper, 18.04% lead, 9.20% zinc and 2.39% tin were detected at its surface (see Fig. 4.5–7; Janowski in preparation). The

results are significantly different and, as in bronze artefacts, an increased lead content was observed in the surface layers, while the amounts of tin and zinc are just slightly varied. A chape found in Kerch on the Crimean Peninsula was found to have the highest zinc content. It was made of a copper alloy, with approx. 20-25% zinc and a small addition (less than 1%) of lead (Frenkel' 2002, 134).

Some general conclusions can be drawn despite a low number of available analyses. It is clear that the producers demonstrated a working knowledge of the properties of alloys, and attempted to make them with specific parameters in order to manufacture items displaying desired features. On the other hand, they simply used available raw material, even if it did not exactly match the model. Some additional activities may have been performed on finished forms, such as covering them with metal solutions. For example, grey-coloured lead might have been used to give an item a silvery look (?).

FORMAL AND TYPOLOGICAL ASPECTS

Despite the fragmentary state of preservation, the Santok chape can be precisely positioned within the currently applicable typological and chronological systems. The external surface is decorated with a characteristic deep ornament, which in combination with the openwork construction suggests that the chape represents type Ib3, based on the classification proposed by Vytautas Kazakevičius (1998) (see Fig. 5). According to Kazakevičius, this type groups chapes decorated with a strongly stylised silhouette of a bird, which, unlike the images on the Ia and Ib1-2 type fittings, was not clearly divided into three sections, but rather sketched by a system of swirls and symmetrically spaced openings (Kazakevičius 1992, 94, fig. 3: 3-4; 1998, 293, fig. 2, fig. 8:9). This group was first distinguished by V. Kazakevičius himself, since the first chapes of this type were found as late as the 1970s, which means they were unknown to Peter Paulsen, the author of the first serious monograph (1953) on sword chapes. Laima Vaitkunskienė (1983, 10) was unable to find an analogy to the chapes she recovered from graves 62 and 94 in the village of Žąsinas, near Ėilalė, Lithuania (Fig. 8: 3-4). Based on the observed similarity between both items, Vaitkunskienė assumed that they probably came from the hands of the same craftsman. In her opinion, these were *works of local (Baltic – authors' remark) masters in which Scandinavian motifs took on a new form of expression*. This view was appreciated by V. Kazakevičius (1998, 293), who also described this type of chape as a Baltic variation of Scandinavian patterns.

In the same vein, Natalia Valentina Eniosova (1994, 106-107) interpreted images on specimens from Žąsinas and Irzekapinis, in the Kaliningrad region of Russia, (Fig. 8: 2) (type A-I-2b in her typology) as representations of a bird, and the items themselves as a product of Lithuanian craftsmen from the late tenth/early eleventh century.

Likewise, in his doctoral dissertation, Artūrs Tomsons (2012, 193-194, fig. 102: 12-13) held the view that such chapes were a stage in the development of forms decorated with

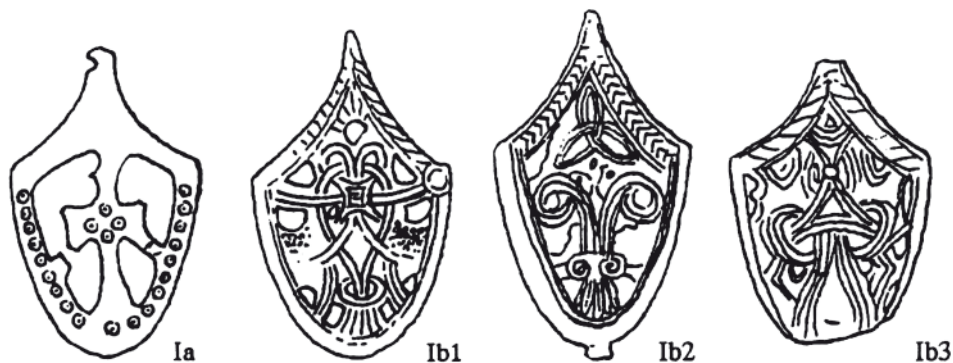


Fig. 5. Type I chapes according to V. Kazakevičius: sub-types. According to Kazakevičius 1998, fig. 2)

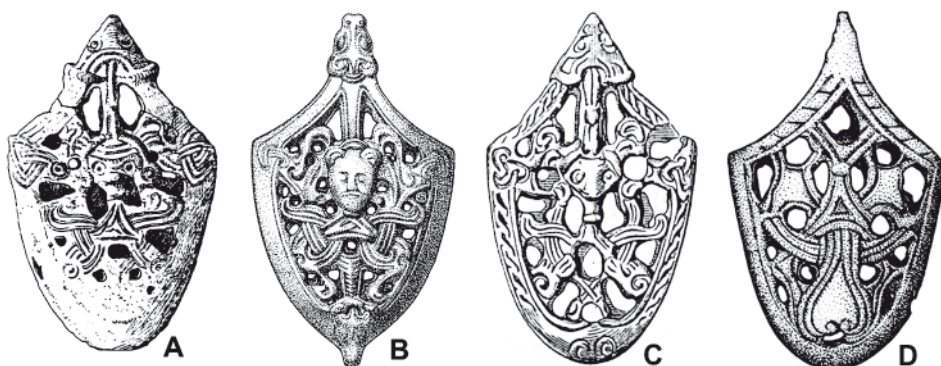


Fig. 6. Classification of chapes with an anthropomorphic figure.
According to Hedenstierna-Jonson 2002, by A. Janowski

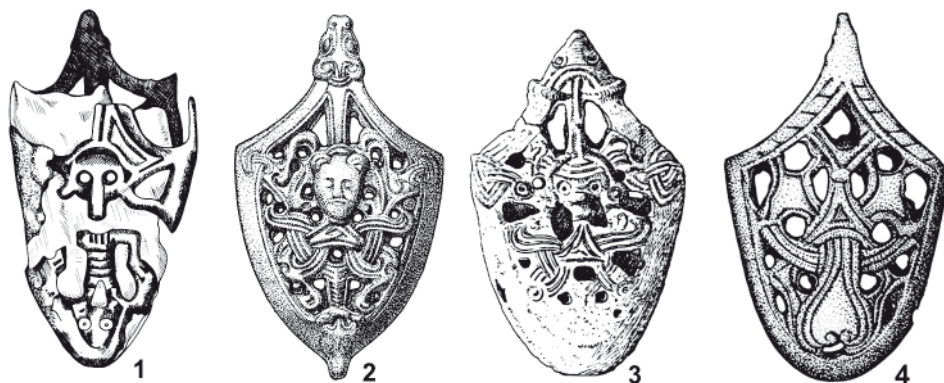


Fig. 7. Classification of chapes with an anthropomorphic figure.
According to Kainov 2009, 97-98, by A. Janowski

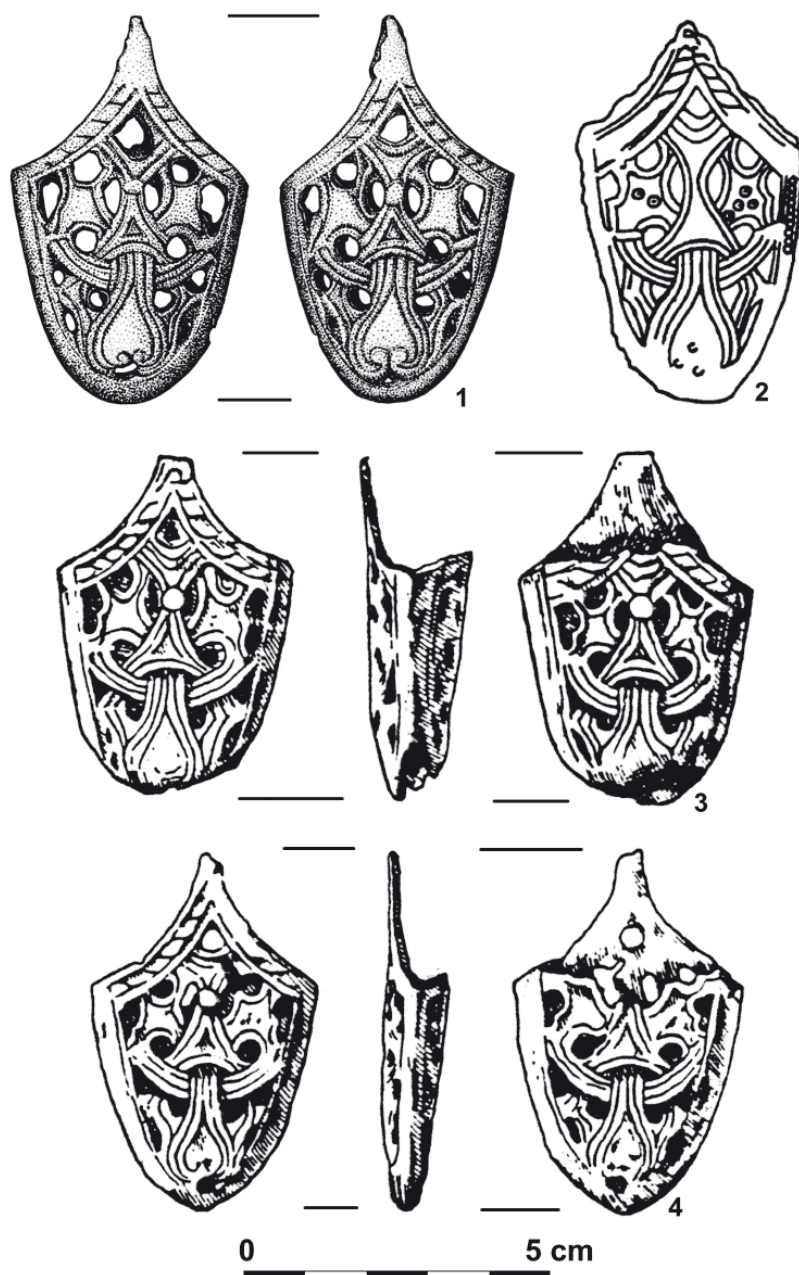


Fig. 8. Type Ib3 chapes: 1 – Novgorod, Russia (according to Kainov and Avdeenko 2012, fig. 1: 2), 2 – Irzekapinis, grave 117 (according to Kulakov 2003, fig. 1: 2), 3 – Žašinas, grave 62 (according to Kazakevičius 1992, fig. 3: 3), 4 – Žašinas, grave 94 (according to Kazakevičius 1992, fig. 3: 4).
Elaborated by A. Janowski

the silhouette of a bird seen from above. Drawing attention to a certain incoherence and internal stratification within the Ib3 sub-group defined by V. Kazakevičius, Tomsons identified an additional variant. In his view, the Ib3 sub-group included chapes such as those found in Žasinas and Irzekapisinis, while all other items decorated with a motif that can be described as 'two volutes forming a sheaf' were moved to sub-group Ib4 (for more on this subject see Kotowicz and Śnieżko 2018).

The iconography and ornamentation of the discussed group of chapes are perceived differently by Vladimir Ivanovič Kulakov. Starting from the early 1990s, in several papers based on the discoveries of L. Vaitkunskienė in graves 62 and 94 at the cemetery in Tršinas and his own find in grave 117 at the cemetery in Irzekapisinis, he argued that the chapes were decorated with a heavily schematised human figure (see, among others, Kulakov 1990, 112; 1995; 2003, 64; Kulakov and Kovalenko 1996, 152, fig. 2: 5-6; Kulakov and Iov 2001).

It is difficult to say whether it is the findings of V.I. Kulakov that inspired Charlotta Hedenstierna-Jonson (2002, 104, fig. 5: 1-3), a Swedish researcher, when she included those artefacts in the classification of chapes with anthropomorphic representations (see Fig. 6). There is no doubt, however, that she knew at least one of his works (Kulakov 1990), although in her article she referred to it only in the list of finds. Chapes similar to those from Santok were placed by Ch. Hedenstierna-Jonson in sub-group D in her classification. In her opinion, the anthropomorphic central motif, clearly visible on artefacts from sub-groups A-C, is drawn so schematically that it is completely unrecognisable (Hedenstierna-Jonson 2002, 104).

The above classification was seriously modified by S.Ū. Kainov (2009, 97-98). In his classification, chapes with anthropomorphic motifs are still divided into four sub-groups; however, Kainov merged sub-groups A and C into one sub-group, and added a sub-group for chapes with a complete human figure (see Fig. 7). After these changes, Kainov's proposition is as follows: sub-group 1 – chapes with a full human figure; sub-group 2 – chapes with a human head in the centre; sub-group 3 – chapes with an animal head in the centre; sub-group 4 – chapes with a barbarised head motif.

The validity of typological sequences proposed by Ch. Hedenstierna-Jonson and S.Ū. Kainov has recently been questioned (see Wyrwa and Janowski 2014). Although the influence of Scandinavian art on the ornaments of the analysed chape group cannot be ruled out (sub-group 4 in the typology of Hedenstierna-Jonson and sub-group 4 according to S. Kainov), the iconography is far enough from that of the alleged prototype so as to be unrecognizable as such. While the chapes in the sequence share some elements, such as elaborate ornamentation with a clear triangle in the field centre and symmetrical entwined ribbon motifs, some major differences, such as the absence of anthropo- or zoomorphic elements, cannot be ignored. The analyzed chapes do not terminate in the heads of animals, which are found mainly on chapes with a bird motif (type I.1 according to P. Paulsen) and a quadruped animal (type II.1 and II.3 according to P. Paulsen), which are characteristic for Scandinavian artefacts. Their borders are decorated with slanting hatches, which

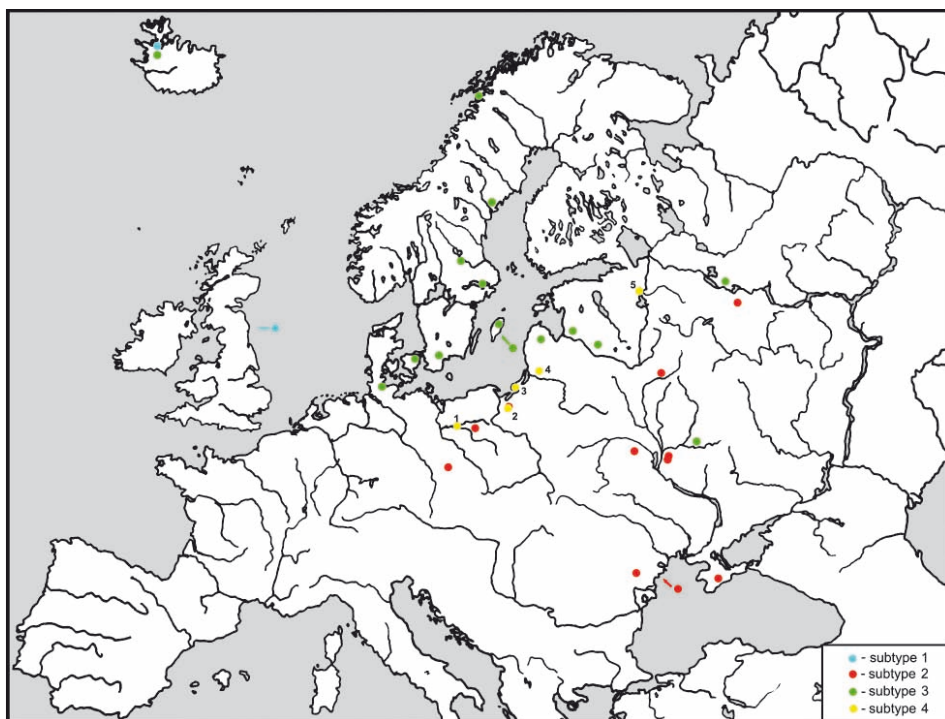


Fig. 9. Map showing the distribution of sword chapes decorated with anthropomorphic motifs:
 1 – Santok; 2 – Jerzwałd; 3 – Irzekapinis; 4 – Žašinas; 5 – Novgorod.
 According to Wyrwa and Janowski 2014, with supplement, by A. Janowski

makes the chapes closer to the fittings with the representation of the bird, and can be an indirect indication that they originated somewhere in the local Baltic area, far from their Scandinavian prototypes. Nevertheless, the issue remains unresolved. At present, in addition to the Santok find and the aforementioned specimens from graves in Žašinas (2 specimens) and Irzekapinis, at least two more artefacts of this type are known. One was discovered in Veliky Novgorod, Novgorod oblast, Russia (Kainov and Avdeenko 2012, 146-147, fig. 1: 2) (Fig. 8: 1), and the second in Jerzwałd, Iława district, Poland (unpublished specimen in the collection of the Museum of Warmia and Mazury in Olsztyn). All the finds are spread in a fairly narrow belt from Veliky Novgorod in the northeast to Santok in the southwest. The strip is located in the contact zone of areas which yielded chapes classified as sub-groups 2 and 3 (see Fig. 9), as well as a number of other types of fittings (at Jerzwałd chapes were found belonging to subgroup 3 and 4). This region was inhabited by various communities of Slavs and Baltic peoples; the development of a new chape form in this border area is entirely plausible.

It is interesting to take a look at the – controversial for some – interpretation of anthropomorphs discernible on chapes. According to V.I. Kulakov, the scene depicts Odin, who wraps his arms around the neck of two crows named Huginn ('thought') and Muninn ('memory') (Kulakov 1995, 73; Kulakov and Kovalenko 1996, 150). Although Volodimir Mikolajovič Zocenko (2004, 88; 2007, 96) approves of the 'divine' interpretation, he believes that the depiction on the fittings is Thor, rather than Odin, and that the scene shows the thunder-god in his fight with Jörmungandr, the World Serpent, at Ragnarök.

According to Ch. Hedenstierna-Jonson (2002, 108-110), the scene on the chapes shows Odin's self-sacrifice, similar to that of the crucified Christ. In her opinion, the iconography exemplifies how the new religion, i.e., Christianity, sought to legitimise its existence with the aid of ancient symbols. The Jellinge runestone in Denmark is purported to be evidence confirming this interpretation. Raised by Harald Bluetooth around 965, the stone shows an entwined crucified figure accompanied by a runic inscription trumpeting that Harald made Danes Christians. Even though indisputable, the resemblance between the ornament on the monument and the chapes might simply have been the result of similar chronology and the style prevalent at the time.

Przemysław Sikora (2001, 109) is alone in his interpretation of the anthropomorphic scene as a fight between a hero and two monsters or a monster with several heads.

The chronology of the artefacts excites less controversy or doubt. The chapes from Santok and Jerzwałd are stray finds, but it is possible to establish a fairly exact chronology for other artefacts. It is believed that the graves with chapes from Žasinas were dug sometime in the tenth or eleventh centuries (Vaitkuskienė 1983, 10). Similarly, V.I. Kulakov dates the chape from grave 117 in Irzekapis to the tenth century. While the chronology provided in subsequent publications shows some variation (in fact, the dating goes systematically back along with the evolution of the author's views: from the second half of the tenth century – Kulakov 1990, 113, through the second quarter of the tenth century – Kulakov and Kovalenko 1996, 160, to the early tenth century – Kulakov 1999, 255), it generally falls within the tenth century. The most precise dating is that of the chape from Veliky Novgorod, found in the area of Troitski Excavation XI: it was deposited in layers dated to the years 970-990 based on the results of dendrochronological analyses (Kainov and Avdeenko 2012, 146). It is not unreasonable, therefore, to assume that the Santok chape also comes from the tenth or, at the latest, from the early eleventh century.

CONCLUSIONS

Its chemical composition, unusual for early medieval metallurgy, and a rare type of decoration make the Santok chape a remarkable find. The artefact eludes the usual interpretation schemes in both aspects. We believe that the conclusions presented in this paper, based on wide-ranging technological and formal-typological analyses, will provide

a basis for even more comprehensive studies in the future. Until now, only about 1% of all protective fittings at the bottom of a sword scabbard have been subjected to technological analyses, and further research is essential if any regularities in the technological processes of their production are to be identified. New finds bring more and more information on the distribution of particular chape types and their iconographic programme, and it is hoped that it will soon be possible to determine the provenance of the chapes and explain the reasons behind the choice of iconography.

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Hanna Olczak*, Dariusz Krasnodębski**

THE CEMETERY IN SZCZYTU-DZIĘCIOŁOWO, BIELSK PODLASKI DISTRICT, AS AN EXAMPLE OF GRAVE FORM DIVERSITY IN THE MIDDLE BUG RIVER BASIN IN THE 11TH-13TH CENTURIES

ABSTRACT

Olczak H., Krasnodębski D. 2019. The cemetery in Szczytu-Dzięciołowo, Bielsk Podlaski district, as an example of grave form diversity in the middle Bug river basin in the 11th-13th centuries. *Sprawozdania Archeologiczne* 71, 407-455.

The Early Medieval burial ground in Szczytu-Dzięciołowo is one of the few cemeteries with graves surrounded by kerbstones located on the Bielsk Plain, in the basin of the Narew River's tributaries – the Orlanka and Łoknica Rivers. In 2015, two graves were excavated at the cemetery: a pit grave with an inhumation burial and a setting of kerbstones and a barrow, where an inhumation burial was discovered as well. This has resulted in yet another confirmation of the differentiation of the funeral rite, which was characteristic for the whole Middle Bug River basin in the 11th-13th centuries. Flat graves with inhumation burials from this period are considered to be a feature of the West Slavic rite, while barrow burials are typical for the majority of East Slavic peoples. This text is an attempt to discuss the issue of grave form diversity in the Mazovian-Rus' borderland region in the younger phase of the Early Middle Ages on the example of the aforementioned cemetery.

Keywords: Early Middle Ages, flat graves with settings of kerbstones, barrows, funeral rite, Middle Bug River basin, Mazovian-Rus' borderland

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INTRODUCTION

The cemetery (site 1, and site 45-89/25 according to the Polish Archaeological Record) is located about 1.5 km northeast of the Szczyty-Dzięciołowo village (Fig. 1). It is situated at the top and on the southwest slope of a small hill covered with a deciduous forest (Fig. 2). At a distance of about 300-500 m to the south and east of the necropolis flows a nameless stream, which is a right tributary of the Orlanka River. This place is referred to as “Grabniak” (Grabnik/Hrabniak) or “Kurhan” (Kurgan). Sometimes the name “Mogilki pogańskie” (pagan graves) is also mentioned (Dzik 2015a, 139), but its relation to the site is not clear. A vast multicultural settlement extends to the south and southwest of the cemetery, the youngest artefacts of which can be dated between the 10th century and the 12th/13th centuries (Olczak 2015). At a distance of about 2.5 km to the east and northeast there is also an Early Medieval complex in Zbucz (see Fig. 1), which includes a gord (site 3) and two

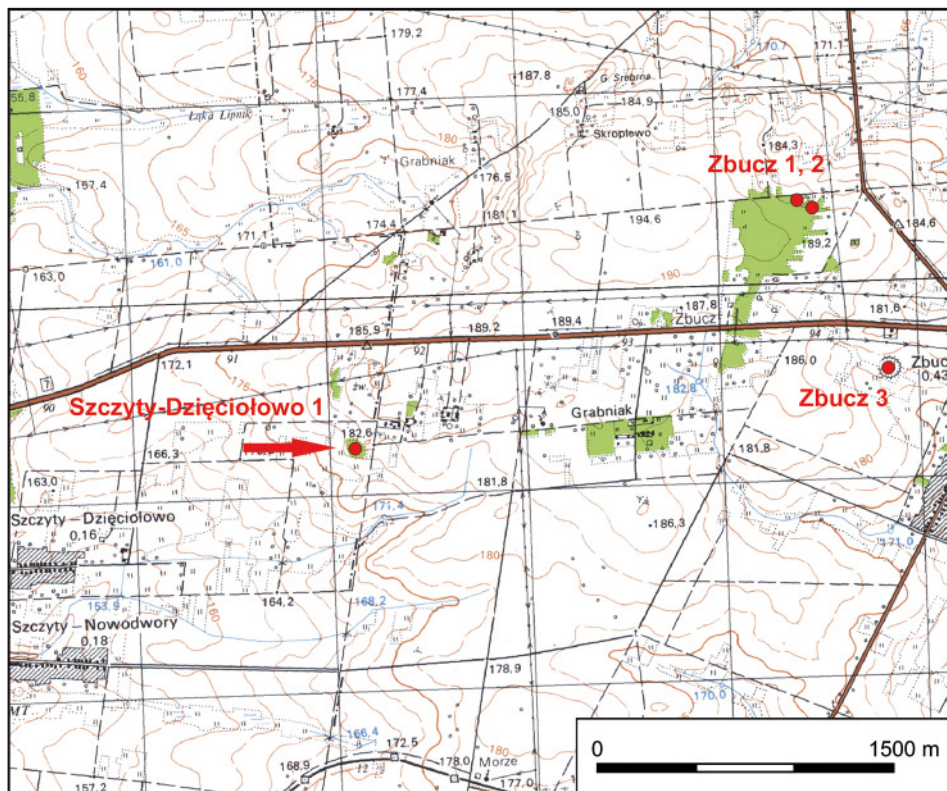


Fig. 1. Location of the cemetery at Szczyty-Dzięciołowo, site 1 and the cemeteries (sites 1, 2) and the strongord (site 3) in Zbucz on a 1:25,000 scale topographic map (Source of the map: Head Office of Geodesy and Cartography). Edited by H. Olczak



Fig. 2. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district. View of the site from the west (15.07.2006). Photo by D. Krasnodębski

burial grounds: one with flat graves surrounded by kerbstones (site 1), the other with burial mounds (site 2; Olczak *et al.* 2019, 61-65).

Geographically, this area belongs to the central part of the Bielsk Plain, which in turn is part of the North Podlasie Lowland (Kondracki 1998, fig. 33). The terrain was formed mainly during the Warthe glaciation, probably during the middle stadial. The site is located at the edge of a wide hill of push moraines, adjacent to an undulated moraine to the west. The surface sediments are made up mostly of glacial till, with numerous aggregations of erratic boulders (Brud and Boratyn 2006).

The described site has been known for over 150 years as a cemetery with graves accompanied by settings of kerbstones (Jaroszewicz 1853, 194-195, note I; Avenarius' 1890, 20-22; Pokrovskii 1895, 65-66; Musianowicz 1960, 188 and no. 245; Rauhut 1971, 642, no. 200; Dzik 2015a, 139-143). Its current surface area, determined by the range of the forest and the preserved stone constructions, is about 0.8 hectares (Fig. 3). Large stones are visible in several locations throughout the necropolis. They form lines or roughly rectangular kerbstone settings, especially in the western part of the cemetery (Fig. 4). In some places (usually near the kerbstones) there are shallow depressions on the modern ground surface, which are probably remains of excavations carried out in the 19th century or of robbery pits of unknown origin. Several earthen mounds with a diameter of about 5-9 m and a height of about 0.4-0.7 m, which can be interpreted as barrows, were also found at the site (see Fig. 3). Their number is difficult to estimate, because some of them (e.g., nos. 3A,

3B, and 7A, 7B) might be spoil heaps from past excavations. With the exception of barrow no. 1, which is located in the central part of the cemetery, the mounds are grouped in its eastern part. At the base of several of them lie individual boulders or smaller stones. The largest mound (no. 2), which is about 9 m in diameter and about 0.7 m in height, has a visible depression of about 1 m in diameter in its middle part, suggesting that it was excavated

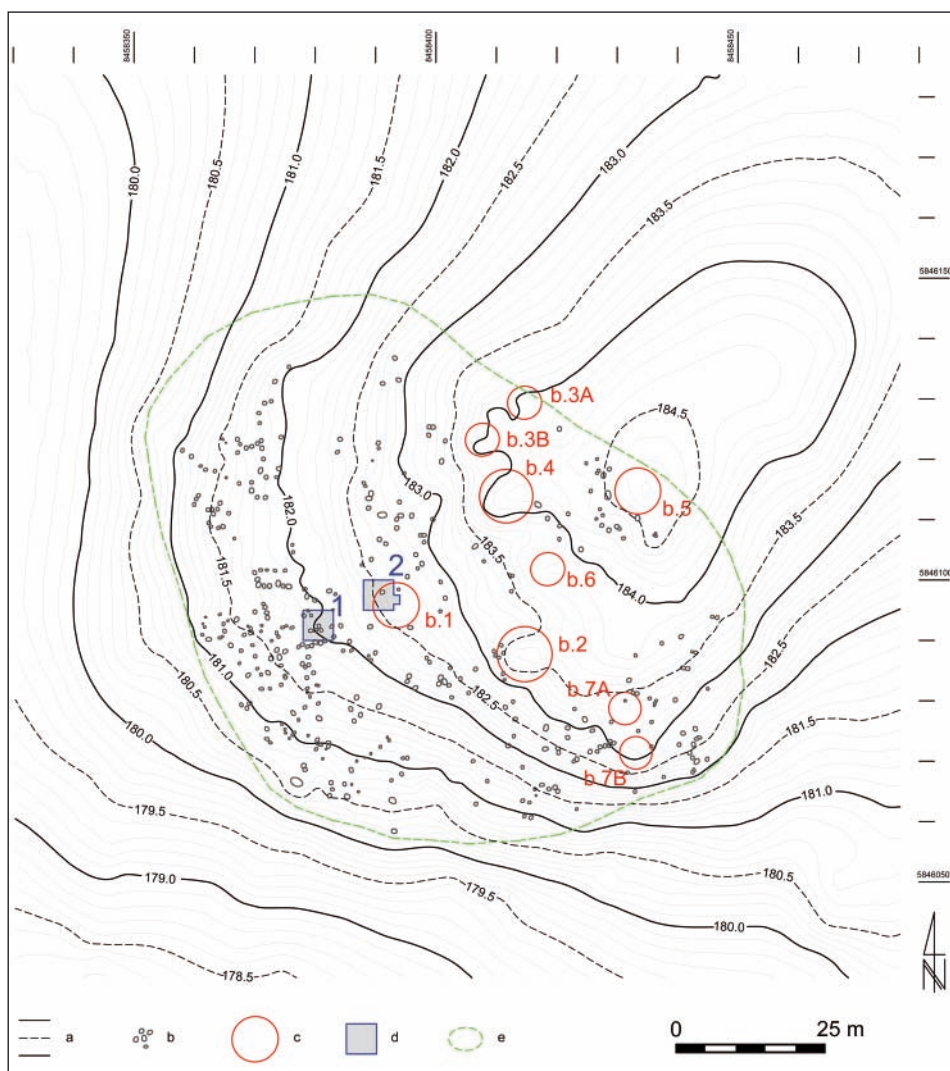


Fig. 3. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district.

Contour plan of the site: a – contour lines, b – stones, c – earthen mounds, d – archaeological trenches, e – area of the forest. Edited by A. Małkowska and W. Małkowski



Fig. 4. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district.
Kerbstones of graves in the western part of the cemetery. Photo by H. Olczak



Fig. 5. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district. Barrow no. 2 (view from the west).
Photo by H. Olczak

in the past (Fig. 5). For many years, inhabitants of neighbouring villages were known to take stones from the cemetery, compromising its archaeological integrity.

The excavations were carried out in autumn of 2015 by the Institute of Archaeology and Ethnology of the Polish Academy of Sciences in Warsaw, led by the article's authors. They were part of the project "The Beginnings of Christianity on the Polish-Ruthenian Frontier," led by Prof. Andrzej Buko and financed by the Ministry of Science and Higher Education (11H 12 0330 81). Two trenches with a total area of 51.5 m² were marked out at the site (see Fig. 3). In addition to the burial site described in this article, relics of a prehistoric settlement, probably from the Roman period, were also discovered (Olczak 2015).

RESEARCH HISTORY

The cemetery in Szczyty-Dzięciołowo is among those Podlachian burial grounds of which little is known, despite being subjected to excavations as early as the 19th century. The first information about the site was published in a monthly titled "Biblioteka Warszawska" (Warsaw Library) in 1853 by historian Józef Jaroszewicz (1853, 194-195, note I). Describing the Early Medieval Podlachian burial grounds, which he attributed to the Yotvingians, he listed the two largest (according to him) cemeteries of this region, located on the grounds of the Szczyty-Dzięciołowo estate, which belonged to the Wiewiórowski family: one in the village of Szczyty and the other in a forest called Grabniak. According to the Jaroszewicz, the graves visible there had been built of large kerbstones and were rectangular or oval in shape. Inside the stone settings there were finer stones, under which, shallowly below the surface ("half a cubit deep or even less," Jaroszewicz 1853, 194-195, note I), human remains were found. Some skeletons were well preserved enough to indicate that the dead had been buried with their heads facing west. The bones in other graves were very poorly preserved. In some of the graves iron nails were found, but no remains of wood from coffins or other structures that would protect the bodies were discovered. This description is based on the results of the excavations conducted around 1850 and led by Adolf Wiewiórowski, possibly with Jaroszewicz's participation (Avenarius' 1890, 20; Pokrovskii 1895, 63). The first of the cemeteries mentioned by the historian can be identified as the site discussed in this article. In the middle of the 19th century, it was located in the fields of Szczyty, on the western edge of the Grabniak forest, near a grange of the same name. The second one is the cemetery in Zbucz, situated at the northeastern edge of the aforementioned forest (see Fig. 1). The vague information published in "Biblioteka Warszawska" does not clearly indicate which one of them (or maybe both?) was excavated by Adolf Wiewiórowski. Based on the diverse variety of finds (e.g., glass beads, bracelets made of copper plate, silver and silver-plated copper earrings – perhaps with openwork beads, a chain of thin brass wire, a silver ring, "an oblong notched circle, like an earring," a probable iron ringed pin, fragments of pottery; Jaroszewicz 1853, 194-195, note I), it can be

assumed that the scale of excavations was large, and it resulted in major destruction of the investigated area.

Subsequent research, which, with all certainty, can be associated with the discussed necropolis, took place several years later. In 1862, a Russian tax official named Sergei Songin excavated several dozen graves with kerbstone settings in the Podlachia region (Avenarius' 1890, 20, 22; Pokrovskii 1895, 10). The scope of his work at the Szczyty-Dzięciołowo cemetery is not known. The only known finds from the site are two iron nails. They were included to the so-called Sznajder's collection in the museum in Vilnius and were catalogued under the name Dzenciolovo (*Katalog' predmetov'* 1885, 77, nos. 644 and 645).

In the years 1886-1888, at the request of the Imperial Archaeological Commission, the excavations of the Early Medieval cemeteries of the former Bielsk district were led by Nikolai P. Avenarius' (1890, 6, 18-24). Similar to Józef Jaroszewicz, the Russian archaeologist mentioned two cemeteries located at the Szczyty-Dzięciołowo estate in the research report "Drogichin' Nadbuzhskii i ego drevnosti." The first one was Dzięciołowo, about which he did not provide any further information, and the other was Grabniak, which he identified as the place excavated by Adolf Wiewiórowski (Avenarius' 1890, 20-21). In 1888, Nikolai P. Avenarius' probably excavated ten graves in Grabniak (Avenarius' 1890, 21; Bobrinskoi 1891, CCCXXI; Dzik 2017, 195). During the excavation he found a coiled bronze temple ring, an iron knife, and fragments of pottery (Avenarius' 1890, 9, 20-22, and table II: 2; Bobrinskoi 1891, CCCXXI; Jakimowicz 1924, 118, no. 80; Dzik 2017, 195).

A few details from the report of Nikolai P. Avenarius' suggests that despite him noting the name Grabniak, which Józef Jaroszewicz had used in relation to the Zbucz necropolis, the excavations in 1888 took place not in Zbucz, but in Szczyty-Dzięciołowo. In the map attached to the book, two sites were identified as burial grounds: Szczyty and the Grabniak grange. The first one was located in the village of Szczyty, and the second one a short distance to the southeast (Avenarius' 1890, table I), which in no way corresponds to the location of the necropolis in Zbucz. On the other hand, Dzięciołowo, which was marked on the bank of the Orlanka River at one of Wiewiórowski's manors, was not – contrary to the information from the text – identified as a cemetery on the map. The inconsistency of the map and the report suggests that Nikolai P. Avenarius' did not know the local topography well and therefore he was not able to properly interpret either the information taken from Józef Jaroszewicz's manuscript or from the artefact catalogue from the research of Sergei Songin, which he saw in the museum in Vilnius (Avenarius' 1890, 20, 22). He probably knew only one necropolis from his personal experience, and everything indicates that it was the discussed site, located only about 1.5 km from the Wiewiórowski manor, where he lived during the research. The fact that the cemetery examined in 1888 was located near the manor is confirmed by his wonderment that neither the manor owners nor the local parish priest could point him to the site that had been excavated by the former landlord (Avenarius' 1890, 20, note 2). This would not be so incomprehensible, if the cemetery had been located a few kilometres further, in the neighbouring parish of Zbucz. This supposition

is also confirmed by another statement of the archaeologist: “The word *kurhan* is not known here. People simply call them (barrows – authors’ note) mounds or Swedish graves. It is strange that the only time I have heard the word *kurhan* from the local people (in the village of Szczyty), it was used not in relation to the mounds, but the stone graves” (Avenarius’ 1890, 18, note 2). Today, the cemetery in Szczyty-Dzięciółowo is also known as “Kurhan” (Kurgan), while the name “Zakurhanki” (behind the barrows) appears in 18th-century historical documents in relation to the neighbouring fields (Sosna and Fionik 2005, 15, 60).

Other evidence that the site examined by Nikolai P. Avenarius was in fact the cemetery in Szczyty-Dzięciółowo can be found in the work of Fiodor V. Pokrovskii (1895, 65-66). As a result of a questionnaire, Pokrovskii acquired information about the Grabniak Range, located 1 verst (about 1 kilometre) east of the village of Szczyty. There was a round earthen mound (barrow), 2-3 arshins in height and 100 or 200 sazhen in circumference. According to a local legend, some warriors had been buried there. The local peasants told Pokrovskii that seven years earlier, the mound had been excavated by officials, who had discovered large human bones, a circle and earring made of bronze, and a broken clay pot with rather thick walls.

Unprofessional excavations carried out in the second half of the 19th century by amateur investigator Zdzisław Bitner were probably also associated with the discussed cemetery. In an article prepared 40 years later, he mentioned a hill called “barrow” by the local people, which was located in a forest belonging to the Karolin grange (Bitner 1900, 761-763). The grange was located south of Grabniak, and belonged to the Wiewiórowski family as well (Sosna and Fionik 2005, 103, 105). As Zdzisław Bitner states in a description of his excavations: “In the forest I have found remains of eight graves surrounded with large stones. (...) I unearthed one of these graves to its depths, removing with difficulty the pile of stones, under which a deep, non-laminar chernozem proved that the soil had once been moved here. At a depth of more than two cubits I found traces of several completely decomposed bodies, with barely a trace of bones left, and a few iron fragments of unknown origin” (Bitner 1900, 762-763). So far, no cemetery has been found in the former Karolin grange, nor was such a cemetery mentioned in the 19th-century sources. Therefore, it is very likely that the grave excavated by Zdzisław Bitner was located at the discussed necropolis. Admittedly, the size of the hill provided by him (43 steps in circumference) is too small, but his account, written years later, is known to have inaccuracies in other places, as well.

The imprecise information given by Józef Jaroszewicz and Nikolai P. Avenarius’ has, in subsequent years, resulted in other authors sometimes drawing unfounded conclusions about the cemeteries in Szczyty-Dzięciółowo and Zbucz. Fiodor V. Pokrovskii (1895, 66) mentioned four cemeteries instead of two, located in Szczyty, Grabniak, Dzięciółowo, and Zbucz (on this subject, i.a. Krasnodębski 2008, 253-255; Dzik 2012, 38-39; 2015a, 139-143). Some 20th-century researchers were also prone to misinterpretations (see, e.g., Musianowicz

1960, 188, 225, nos. 245 and 246). It is also not sufficiently confirmed that all items listed by Józef Jaroszewicz were found at the cemetery in Szczyty-Dzięciołowo, which is sometimes taken for granted (see, e.g., Rauhut 1971, 642, no. 200; Sedov 1982, 119; Dzik 2015a, tables 14, 17, 31).

CHARACTERISTICS OF THE EXCAVATED GRAVES

Flat grave with a setting of kerbstones (trench 1)

Trench 1 was located in the western part of the cemetery where a cluster of large stones was visible on the surface (see Fig. 3). Three of them, with an east-west orientation, formed a line in the southern part of the trench (Figs. 6; 7: 1). The second row of kerbstones, with a similar arrangement, was located at a distance of about 1.2-1.3 m to the south, beyond the investigated area. The stones had probably formed a grave kerb with an external dimension of about 5.0×3.5 m. In addition, several loosely placed stones, some of which seemed secondarily dislocated, were present north and east of this construction. In the southern part of the excavated area, under the plant litter, a black-brown layer of modern



Fig. 6. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district.
Trench 1 – kerbstones of the grave and the upper layer of cobblestone pavement.
Photo by D. Krasnodębski

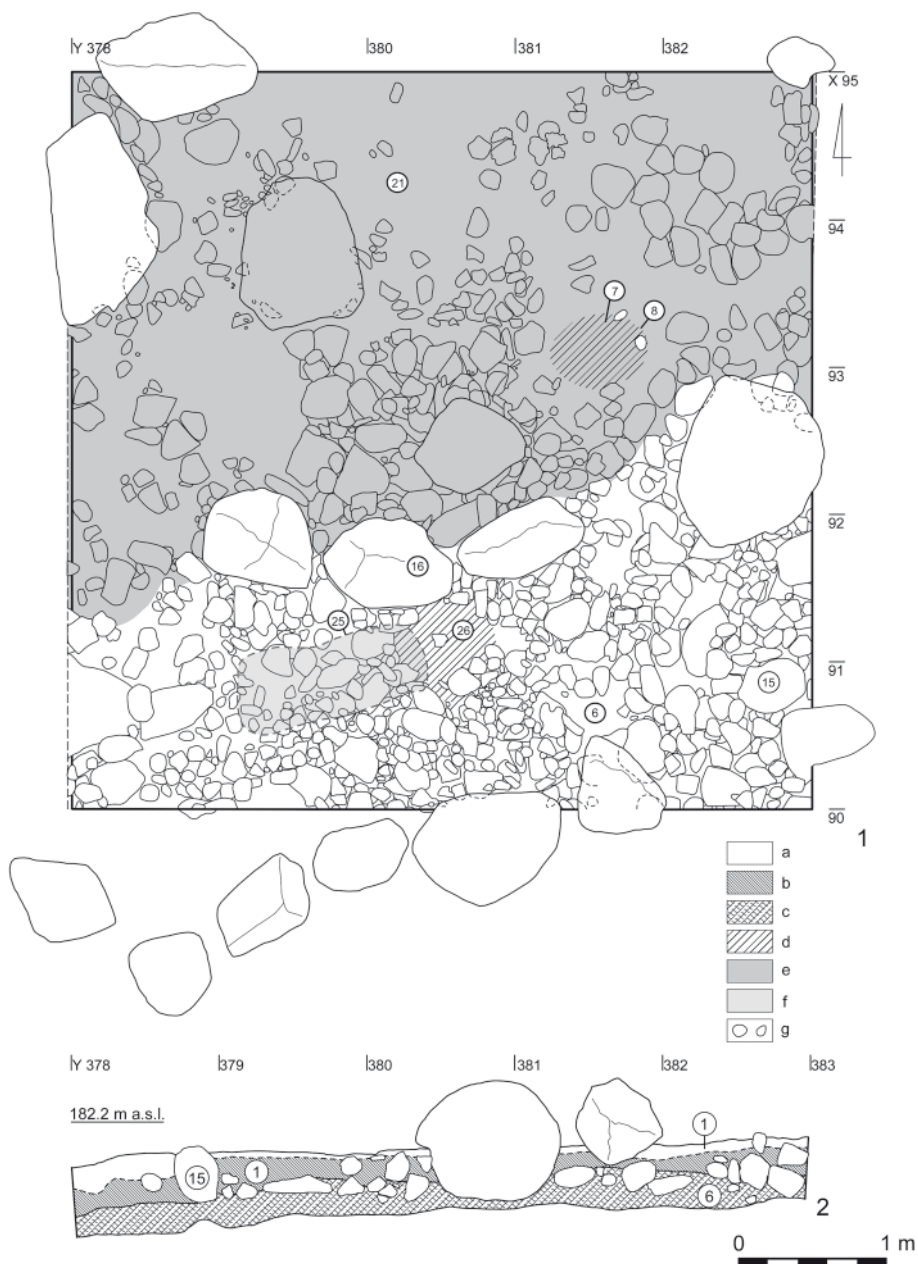


Fig. 7. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district. Plan of trench 1 at the level of the cobblestone pavement (1) and its southern profile (2): a – modern humus; b – brown-black sand; c – slightly clay-like dark grey-brown sand; d – modern destruction; e – boundary of the supposed archaeological excavation from the 19th century; f – outline of the flat grave (feature 25); g – stones. Drawn by B. Jakubowska, H. Olczak

humus (layer 1) with a thickness of about 0.2-0.3 m was unearthed (Fig. 7: 2). In it, four fragments of Early Medieval pottery and an animal bone belonging to an unidentified species were found. Below was a layer of slightly clay-like dark grey-brown sand (layer 6), with a thickness of about 0.1-0.3 m, which can be interpreted as the buried soil. This layer contained small, individual charcoals from common juniper, a tree of the Rosaceae family, and other plants (Skrzyński 2016), as well as animal bones: a few unburnt ones from a dog (including a skull) and perhaps from a horse, and a burnt one from an unidentified species (Piątkowska-Malecka 2016). A fragment of a completely corroded metal item (an ornament?) and seven pottery pieces, from which two bases have been reconstructed (Fig. 8: 1, 2), were also collected. In both layers there were small and medium-sized stones, with a diameter of up to 0.4 m. Most of them were located at different depths, and only in some places did they form a compact and levelled pavement with a thickness of around 0.3-0.4 m (see Figs. 6; 7: 1). The lower layer of the pavement was narrower and formed a row with a width of about 0.5-2.0 m, which extended along the southern limit of the excavated area. Traces of 19th-century or modern destruction were noticed in several parts of the pavement.

Inside the aforementioned setting of kerbstones, under two layers of cobblestones, a burial in a pit (feature 25) dug into the sterile soil was discovered (Figs. 9: 1; 10). It had a roughly rectangular shape with a size of 1.1 × 0.55 m and a preserved depth of about 0.20-0.25 m. The eastern part of the burial pit was adjacent to a modern pit (layer 26), but the grave had not been destroyed by it. In the burial pit there was a skeleton of a child aged 1.5-2 years (*infans* I) (Stanaszek 2019, 226). It was placed in a supine position, with the skull facing southwest and legs slightly bent in the knees. The left arm was stretched out along the body, with the palm perhaps placed on the pelvis. The bones of the right arm were not preserved *in situ*. The burial pit was filled with black sand mixed with gravel. The remains of pinewood found in several places of the pit may indicate the presence of some kind of container or protection for the deceased, for example a coffin. Thirty-eight glass beads and a dozen or so fragments, probably from about five more specimens, were found next to the skeleton. Most of them were below the mandible, while a few were between the ribs. Among them were 12 biconical beads made of blue and blue-green glass in various states of preservation (Figs. 9: 2-11; 11: 1-4), as well as a dozen or so fragments, probably from about five more specimens of this same type, 15 whole and three partly preserved ring-shaped beads made of light green glass (Figs. 9: 12-29; 11: 5, 6), a corroded bi-segmental bead from an unidentified type of glass (Fig. 9: 30), five corroded ring-shaped beads (Fig. 9: 31-33), including one made of dark brown or black glass, and two crushed beads of an unidentified type of glass.

The stratigraphy in the northern part of the trench was destroyed by a large and deep pit that reached the top of the sterile soil. It was probably the result of the 19th-century excavations at the site. Randomly scattered stones, including a dozen or so burnt ones, were found in the fill (layer 21) of the pit (Fig. 7: 1). In addition to several artefacts dated

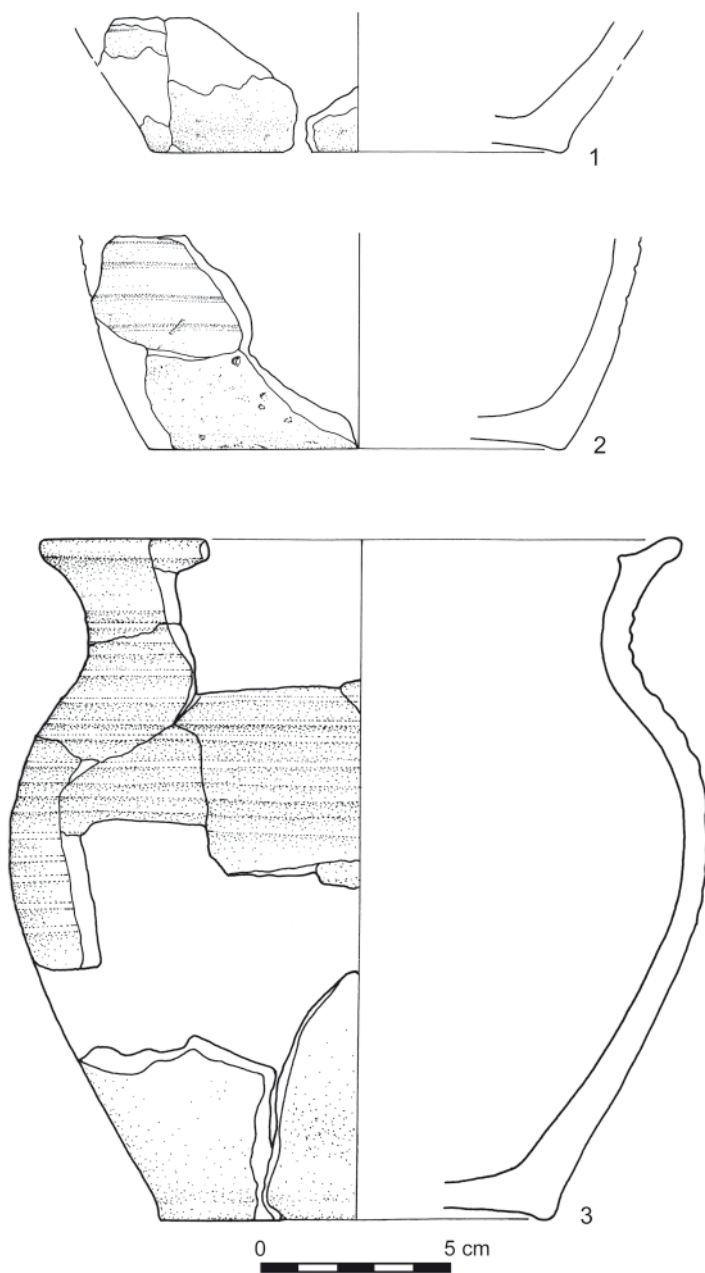


Fig. 8. Szczyty-Dzięciółowo, site 1, Bielsk Podlaski district. A selection of pottery from trench 1: 1, 2 – layer 6; 3 – layer 21. Drawn by G. Nowakowska, H. Olczak

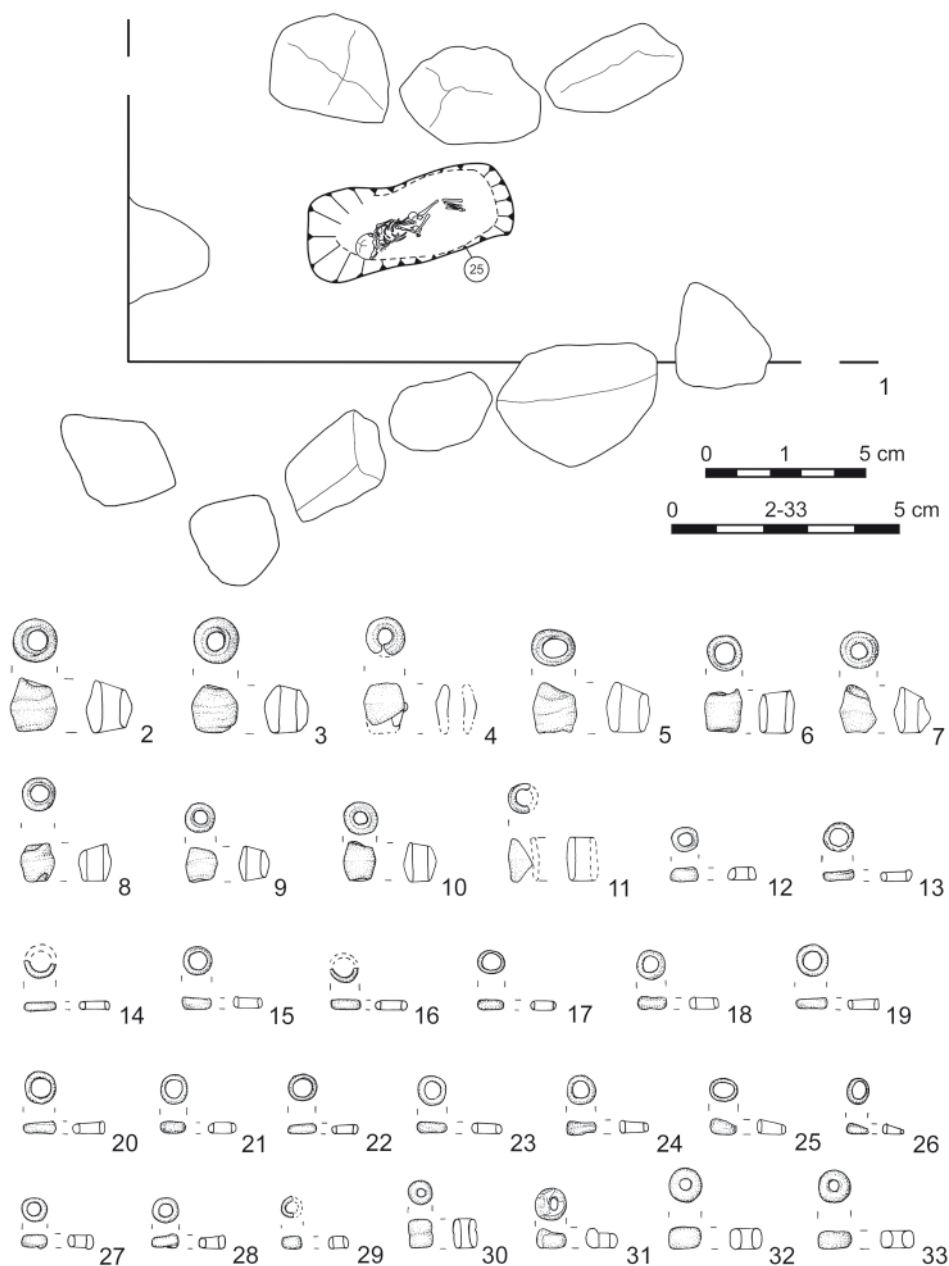


Fig. 9. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district. Trench 1. Flat grave (feature 25) with kerbstone setting, probably preserved *in situ* (1) and glass beads from its grave goods (2-33). Drawn by B. Jakubowska, G. Nowakowska



Fig. 10. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district.
Trench 1. Flat grave (feature 25) during exploration. Photo by H. Olczak



Fig. 11. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district. A selection of grave goods from the flat grave (1-6) and the barrow (7-21): 1-17 – glass; 18, 19 – bronze; 20 – silver; 21 – copper. Photo by M. Osładacz

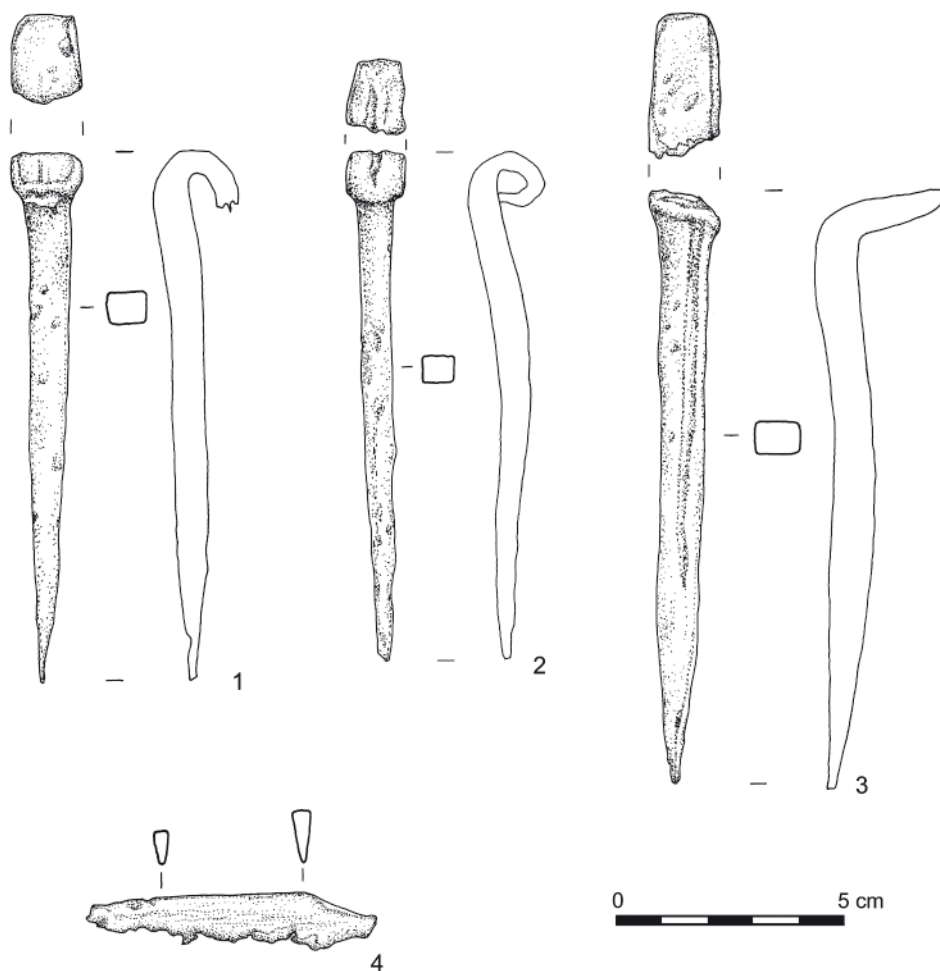


Fig. 12. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski ditrict.
Iron artefacts from trench 1: 1-3 – layer 6; 4 – layer 1. Drawn by A. Poniewierska

between the 19th century and the first half of the 20th century, an iron knife (Fig. 12: 4) and 31 fragments of Early Medieval pottery, found mainly in the northeast corner of the trench and originating from one pot (Fig. 8: 3), were discovered in this area. There were also a dozen or so animal bones belonging to a dog, a bird, and a pig (the ones belonging to the pig are probably modern), and a cluster of several small, burnt bones, one of which came from a medium-sized animal (Piątkowska-Malecka 2016). Apart from that, three iron nails lying next to each other were found in the locally preserved buried soil (Fig. 12: 1-3).

Barrow no. 1 (trench 2)

Another trench was marked out in the northwest part of a small, poorly visible mound with a diameter of about 7 m and a relative height of about 0.5 m (Fig. 3). On its northern slope there was a stone with a length of 1.5 m and a width of about 0.5 m, which was oriented east-west (Figs. 13: 1; 14). In the plant litter and modern humus – with a thickness of about 0.05–0.2 m – several human bones and 11 small fragments of Early Medieval pottery were discovered (Fig. 15: 2, 3). The upper part of the mound was built of dark, grey-brown sand (layer 4), with a thickness of about 0.20–0.25 m (see Figs. 13: 2, 3; 14). In it, there were 12 small pottery fragments (Fig. 15: 1, 4), a blue glass bead (Figs. 11: 13; 16: 29), a copper roundel (Figs. 11: 21; 16: 34), and several human bones. Below was a layer of brown sand (layer 20), slightly clay-like, with a thickness up to about 0.3 m, containing a small number of stones and individual pine and alder charcoals (Skrzyński 2016). A silver S-shaped temple ring (Figs. 11: 20; 16: 33) and 13 pottery fragments (Fig. 15: 8, 9) were collected from this layer. The mound was built on the sterile, sand/clay soil with many medium- and small-sized stones.

In the northern and northwestern base of barrow 1, one to two layers of cobblestone were unearthed (Fig. 14). The cobbles were embedded in a clay-like brown sand (layer 2), with a thickness of 0.15–0.30 m, which can be interpreted as a slope-wash brought down from the upper part of the mound (Fig. 13: 3). In this layer, small charcoals from hazel, alder, poplar or willow, and a tree of the Rosaceae family were found (Skrzyński 2016), as well as eight cattle bones (Piątkowska-Malecka 2016) and 19 pottery fragments (Fig. 15: 5–7). Below, a thin (about 0.1 m in thickness) layer of dark brown sand, slightly clay-like, with lighter patches was recorded (layer 11). Nine fragments of pottery were found in it. At the western base of the mound, under slope-wash deposits brought down from its upper part, a longitudinal pit that was basin-shaped in cross-section (feature 23) was excavated at a length of about 3 m (Figs. 13: 1, 3). It had a width reaching 1.8 m and a maximum depth of about 0.75 m. Three layers of large and medium-sized stones were found in the top and the central part of the pit's fill (Figs. 13: 1; 17; 18). They did not form a regular pavement; instead, they seem to have slipped or been thrown into the pit. Among the stones there was also a probably re-used quern, measuring about 0.65×0.4 m. Aside from this, the fill of the feature was made of brown and dark brown sand that was mixed with clay in its lower part (see Fig. 13: 2) and contained small charcoals from maple and a tree of the Rosaceae family (Skrzyński 2016). Three fragments of Early Medieval pottery, 15 cattle bones, as well as a bone and tooth from a deer were also found in it (Piątkowska-Malecka 2016).

An inhumation burial, heavily damaged by animal dens and tree roots, was found in the middle part of the barrow (Figs. 13: 1; 17; 18). The bones were on a lower mound layer, which had a thickness of about 0.15 m (Fig. 13: 3). Neither a burial pit nor traces of a coffin were observed. The skeleton belonged to an *adultus/maturus* woman (about 35 years old)

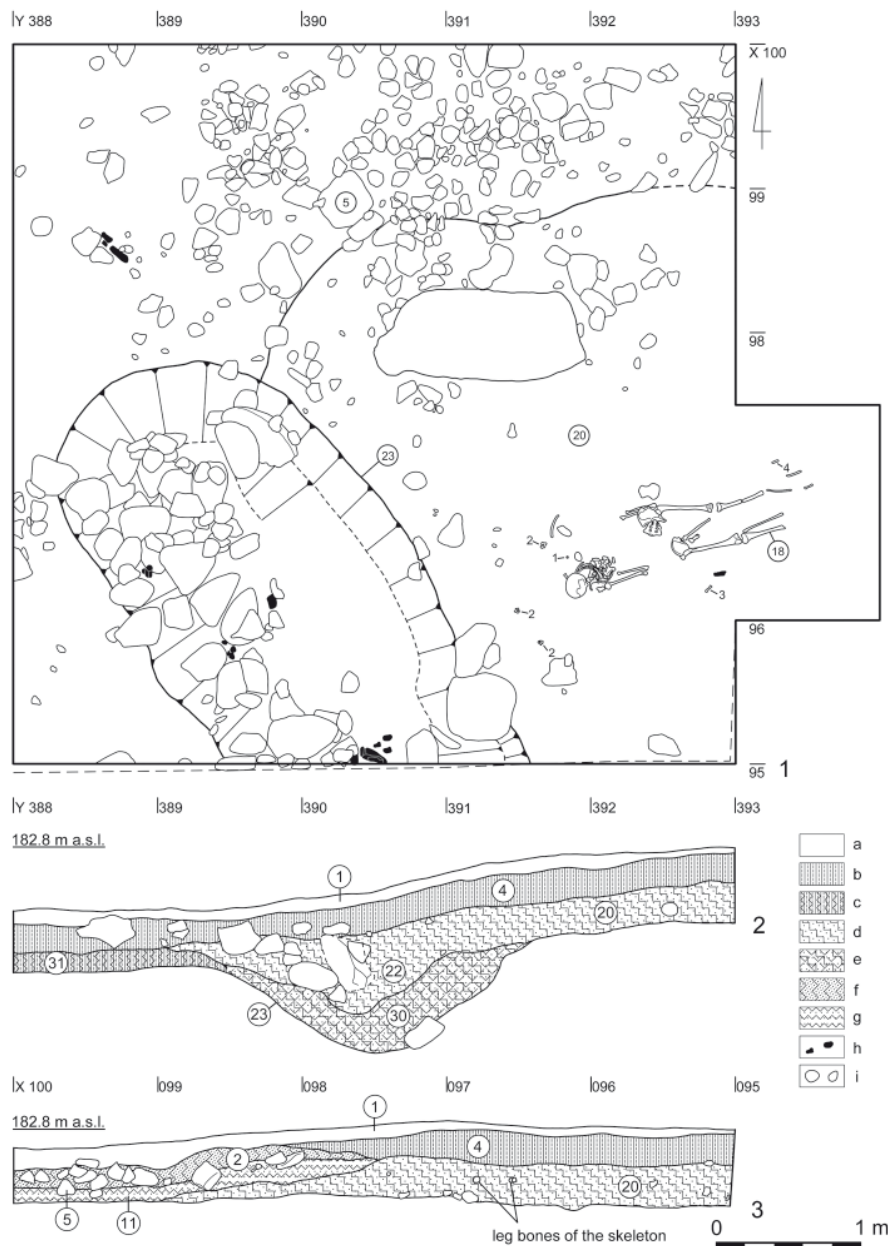


Fig. 13. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district. The plan (1) and the southern (2) and eastern (3) profiles of trench 2 (barrow no. 1): a – modern humus; b – dark grey-brown sand; c – dark grey-brown clay-like sand with patches of brown clay; d – slightly clay-like brown sand; e – dark brown sand with patches of brown clay, yellow-brown gravel and traces of burning; f – clay-like brown sand; g – slightly clay-like dark brown sand with lighter patches; h – animal bones; i – stones. Drawn by B. Jakubowska, H. Olczak



Fig. 14. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district. Barrow no. 1 (trench 2) during exploration – stones at the northern and eastern base of the mound. Photo by D. Krasnodębski

(Stanaszek 2019, 225-226). The deceased was placed on her back, with her head lying on its right side and facing southwest. Due to the disturbed anatomical order of the bones, the arrangement of the arms was not determined. Near the skeleton, at the height of the right femur, fragments of the diaphysis of a cattle tibia and a metapodial section were found (Piątkowska-Malecka 2016). The deceased woman was equipped with ornaments that were dispersed in the vicinity of the skeleton and inside the skull. The grave goods included: two heavily corroded bronze earrings – one with a curly braid (Figs. 11: 18; 16: 30) and the other with three so-called knot-shaped beads (Figs. 11: 19; 16: 31); a tin plate (Fig. 16: 32); glass beads: three bi-segmental beads made of creamy-white and brown glass (Figs. 11: 15-17; 16: 1-3), 21 made of black glass, including 14 with an ornament of yellow eyes (Figs. 11: 8-12; 16: 4-24), one corroded, now of a yellow-brown-green colour (Figs. 11: 14; 16: 25), two made of light green glass (Fig. 16: 26, 27), one made of dark blue glass (Figs. 11: 7; 16: 28), and probably one (in two fragments) made of blue-green glass. Traces of green patina were visible on one of the phalanges, which suggests that the grave goods of the deceased woman could also include a ring.

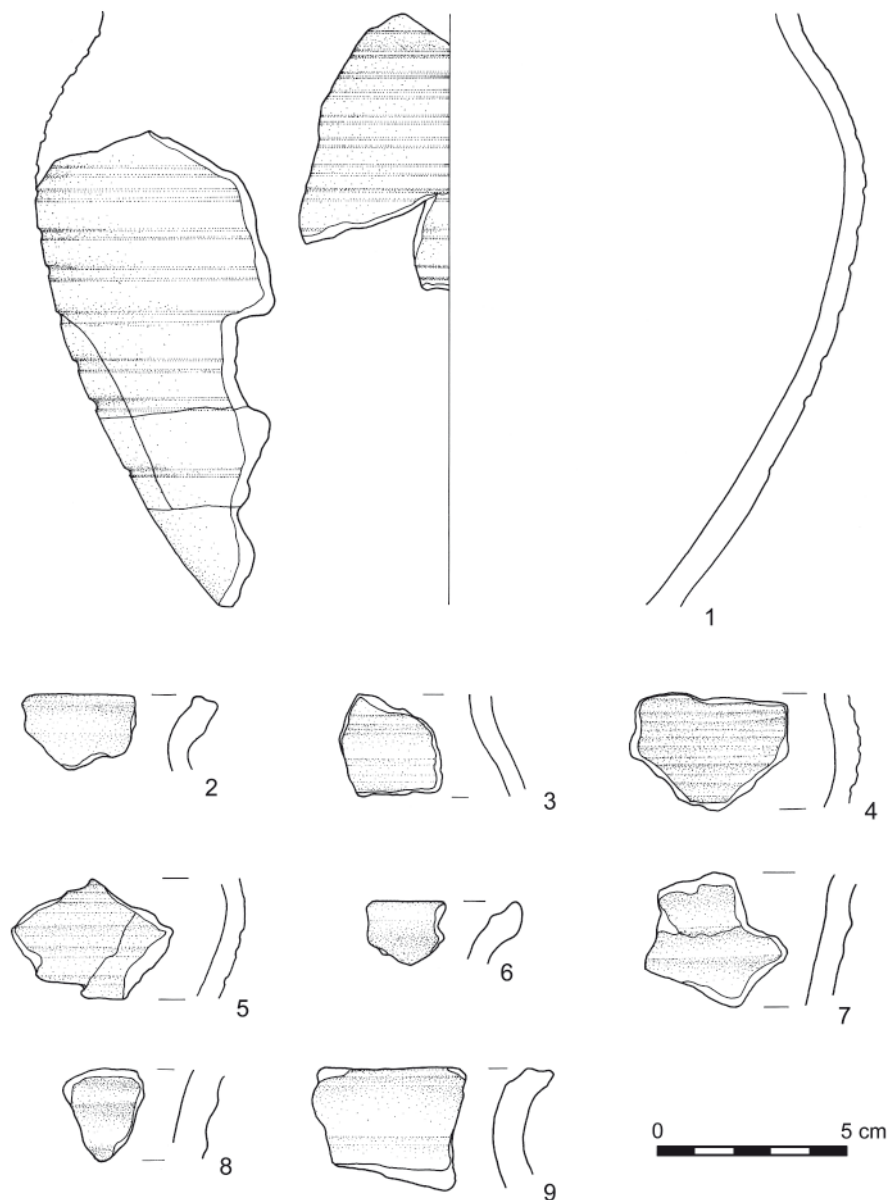


Fig. 15. Szczty-Dzięciołowo, site 1, Bielsk Podlaski district. A selection of pottery from barrow no. 1 (trench 2): 1 – layers 1, 2, 4, 11, 20, and feature 23 (layer 22); 2, 3 – layer 1; 4 – layer 4; 5-7 – layer 2; 8, 9 – layer 20. Drawn by G. Nowakowska, H. Olczak, A. Poniewierska

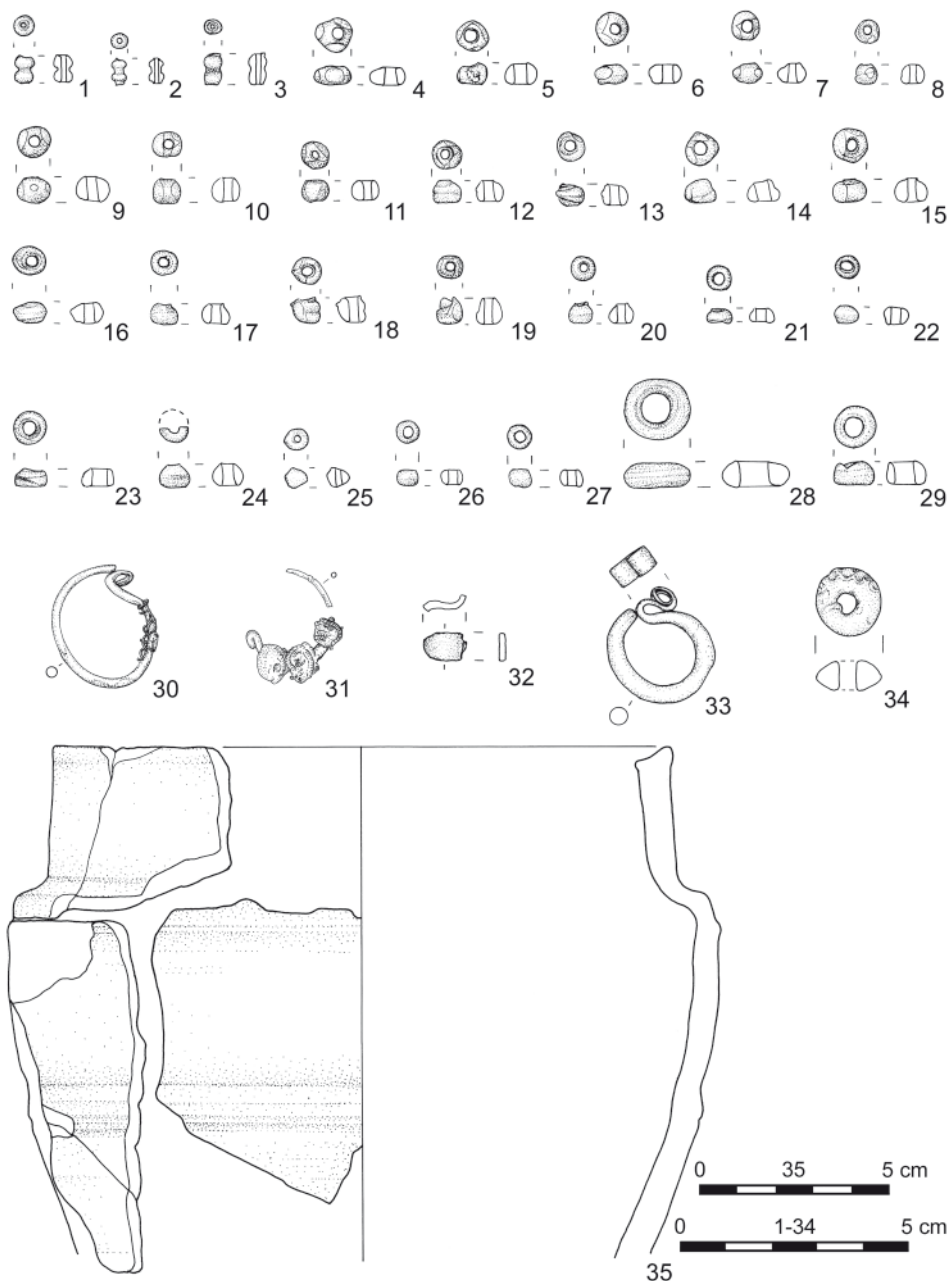


Fig. 16. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district. A selection of artefacts from barrow no. 1 (trench 2): 1-28, 30-32 – grave goods; 29, 33, 34 – artefacts found in the mound (layers 4 and 20), probably coming from the grave goods; 35 – the mound and slope-wash deposits (layers 1, 2, 4, 11, 20): 1-29 – glass; 30, 31 – bronze; 32 – tin; 33 – silver; 34 – copper; 35 – clay. Drawn by G. Nowakowska, H. Olczak



Fig. 17. Szczyty-Dzięciołowo, site 1, Bielsk Podlaski district. View of barrow no. 1 after unearthing the burial and pavement covering the side pit (view from the north). Photo by D. Krasnodębski



Fig. 18. Szczyty-Dzięciołowo, site, Bielsk Podlaski district. Barrow no. 1, southern part of trench 2 – the burial in the foreground, the pavement at the top of the side pit in the background (view from the east). Photo by D. Krasnodębski

GRAVE GOODS AND OTHER FINDS

Glass beads

As a result of the research, several dozen glass beads from both graves have been collected. About 43 specimens in various states of preservation were discovered in the flat grave. Most of them were covered with a layer of white corrosion, which often prevented a determination of the type of glass used. About 31 beads in a slightly better state of preservation were found in the barrow.

The grave goods of the barrow burial included three beads made by the drawing technique of two-layered transparent creamy-white and brown glass. These are bi-segmental specimens, consisting of segments with a spherical shape that had been cut off from a larger tube (Figs. 11: 15-17; 16: 1-3). The diameter of the beads reaches 0.32-0.43 cm and their height, about 0.52-0.63 cm. The inner glass core is decorated with a metal layer, probably a silver one.

The other beads were most probably made by the winding technique. The black opaque glass beads found in the barrow (21 specimens, including one partly preserved) have a ring-like or spherical shape (Figs. 11: 8-12; 16: 4-24). Their cores are often uneven and asymmetrical, with clear traces of non-embedded narrow strips of glass. These beads have a diameter ranging from 0.5 to 0.75 cm and a height ranging from 0.29 to 0.53 cm. Most beads of this type were probably decorated, but an ornament or its remains have only been preserved on 14 of them (see Figs. 11: 8-11). The ornament includes three yellow opaque glass eyes with an oval or circular shape. They are usually slightly convex, and only one bead has high lumps that give it a triangular shape in cross-section (see Figs. 11: 8; 16: 4). Among the decorated beads there is also a corroded yellow-brown-green specimen with a diameter of 0.48 cm and a height of 0.25-0.42 cm (Fig. 11: 14; 16: 25).

Among the beads made using the winding technique, there are also unornamented bi-conical specimens made of transparent blue or blue-green glass. They are often made slapdash and asymmetrical, with a roughly cylindrical shape. Nine completely preserved beads of this type were found in the flat grave as well as one partly preserved bead, two crushed beads, and 11 fragments, probably coming from approximately five more specimens (Figs. 9: 2-11; 11: 1-4). Two fragments that are probably part of a similar bead were also noticed in the barrow. These beads are characterized by a height greater than their diameter, and varying sizes. Their diameters range from 0.65 to 0.99 cm and their heights, from 0.73 to 1.1 cm.

Another group includes transparent, ring-shaped, light-green glass beads. Two of them come from the barrow (Fig. 16: 26, 27), but the majority (15 completely and three partly preserved specimens) were found in the flat grave (Figs. 9: 12-29; 11: 5, 6). Some of the beads were found joined together, so it cannot be excluded that they were originally part of bi-segmental specimens (see Fig. 11: 5). These beads are characterized by very diverse

sizes, with diameters ranging between 0.4-0.7 cm and heights, between 0.18-0.41 cm. A completely corroded bi-segmental bead, 0.5 cm in diameter and 0.6-0.7 cm in height (Fig. 9: 30), may belong to the same type. The other transparent glass beads are represented by two ring-shaped specimens found in the barrow: the first one is dark blue, with a diameter of 1.32×1.45 cm and a height of 0.47-0.52 cm (Figs. 11: 7; 16: 28), while the other one is blue, with a diameter of 0.9 cm and a height of 0.35-0.50 cm (Figs. 11: 13; 16: 29). In addition, five ring-shaped specimens with a diameter of 0.7 cm and a height of 0.31-0.45 cm can be distinguished among the corroded beads from the flat grave, including one that was probably made from dark brown or black glass (Fig. 9: 31-33).

Non-ferrous metal artefacts

During the research led by Nikolai P. Avenarius', a coiled temple ring (also called a "finger-ring type" temple ring, type IV according to Musianowicz 1949, 154-160) was found at the cemetery. It had diameter of 2.2×2.3 cm and was probably made of bronze wire with a diameter of 0.2 cm (Avenarius' 1890, 9 and table II: 2; Dzik 2017, 195 and figs. 2: 93; 7: 1). On the other hand, a silver S-shaped temple ring found in 2015 in the barrow (Figs. 11: 20; 16: 33), due to its size – having an external dimension of 2.3×2.05 cm and an internal one of 1.7×1.4 cm – can be classified as type III, variant A (Kóčka-Krenz 1971, 102; 1993, 47-48).

The bronze earrings found in the barrow, with hoops rolled up into a loop at one end, are heavily damaged. One of them, with a hoop measuring 2.7×2.1 cm, is an earring with a so-called curly braid (Figs. 11: 18; 16: 30). These earrings are rarely found among either East or West Slavs, and their provenance has not yet been convincingly explained (Žak 1971; Kóčka-Krenz 1993, 61 and map 13; Sedova 1997, 65; Jaskanis 2008, 203; Dzik 2014a, 173-174). Another earring is a specimen with three so-called knot-shaped beads (Figs. 11: 19; 16: 31). The beads are about 0.7-0.8 cm in diameter and were made of a thin, coiled wire, around which a filigree wire was spirally wound. This earring belongs to the so-called Kiev type of ornaments (Lysenko 1991, 62-63).

One of the more unusual finds is the copper roundel discovered in the upper layer of the burial mound. It is biconical in cross-section, 1.5 cm in diameter and 0.55 cm in height, and has a hole 0.45 cm in diameter (Figs. 11: 21; 16: 34). Similar items from Novgorod are believed to be spindle whorls (Sedova 1981, 156-158 and figs. 62: 18-32). A rectangular tin plate with bent ends, with a length of 0.9 cm, a width of 0.6 cm and a thickness of 0.15 cm (Fig. 16: 32), which is probably a fragment of some ornament or clasp, was also discovered at the barrow burial.

Iron artefacts

A knife with a length of 6.5 cm and a partial tang was found in trench 1 (Fig. 12: 4). Its blade is triangular in cross-section and is up to 1.8 cm wide, while the tang is rectangular

in cross-section and is 0.5 cm wide and 0.1 cm thick. Another partly preserved knife was discovered during the excavation that took place in 1888 (Dzik 2017, 195 and figs. 7: 15, 16). Knives were typical grave goods at cemeteries with graves that included settings of kerbstones in the basins of the Middle Bug and Upper Narew Rivers (Dzik 2015a, fig. 82).

Three nails discovered in trench 1 are massive specimens, with a length of 11.0 to 13.3 cm and rectangular tangs with a width of 0.7 to 1.1 cm (Fig. 12: 1-3). Their heads were formed by hammering and bending the upper parts of the tangs. Similar nails from the cemetery in Czarna Wielka were classified as group II (Dzik 2014b, 52-56; further literature there). Two nails were also found by Sergei Songin during his excavation at the discussed cemetery (*Katalog' predmetov' 1885*, 77, nos. 644 and 645).

Pottery vessels

110 fragments of Early Medieval pottery were found during the excavation, including 42 from the flat part of the cemetery and 68 from the barrow. Most of them are small fragments with a length of less than 5 cm (88%) and with signs of erosion on the surface (about 81%). After reassembling the material from trench 1, a partly reconstructed pot (Fig. 8: 3), two base fragments (Figs. 8: 1, 2), and individual fragments from at least another three vessels were acquired. All sherds of the reconstructed vessel were found in the destroyed area in the northeastern corner of the trench, while the fragments of the bases were found among the cobblestones in the southwestern and eastern parts of the trench. In trench 2, pottery was mostly found in both of the mound's layers, in the slope-wash deposits at its base, and in the modern humus. Only three small fragments were found in the fill of the side pit. Two pots were partly reconstructed (Figs. 15: 1; 16: 35), and fragments of at least ten more vessels were distinguished among the remaining sherds (Fig. 15: 2-9). Most of the fragments belonging to one of the reconstructed vessels (see Fig. 16: 35) were found in the northeastern part of the trench, mainly in the slope-wash deposits, and less often in the mound. Sherds from another pot (see Fig. 15: 1) were dispersed over a large area of the trench, with the greatest concentration in the northern part of the mound. Traces of usage in the form of soot stains and light burning were noticed on the surfaces of all the reconstructed pots and one of the bases from trench 1.

Vessels from both parts of the cemetery are similar in terms of technique and style. They were formed on a potter's wheel using the coiling technique and then turned on their whole surface. The vessels were made from ferriferous clay of glacial origin, tempered with crushed stone, probably granite, except for one of the pots (see Fig. 16: 35), the clay of which was tempered with both crushed stone and sand. The temper grains were usually not larger than 0.2 cm, with the majority of sherds having grains with a diameter of 0.10-0.15 cm (67%). The vessels were well turned, which resulted in the modest thickness of their walls (most often 0.5-0.6 cm) and the precise development of their rims. All bases were concave, usually slightly, with traces of mineral ballast in the form of medium-grained

(0.1-0.2 cm) crushed stone or sand. The vessels were fired in an oxidizing atmosphere. They generally had brown or orange outer surfaces, as well as multi-coloured cores.

Two morphological types of vessels were distinguished in the collection: S-shaped pots and pots with cylindrical necks. The first of these types is represented by the partly reconstructed vessel from trench 1, characterized by an everted rim and a concave base (Fig. 8: 3). Its total height probably reached about 17.5 cm, while the diameter of the rim was about 17 cm, and the diameter of the base was 10.0-10.5 cm. The partly preserved vessel found in the barrow was S-shaped as well (Fig. 15: 1). This shape was also likely shared by several other vessels, of which only small rim fragments were preserved (Figs. 15: 2, 6, 9). The vessels with cylindrical necks are represented by a pot from the barrow with a diameter of about 16 cm at its rim (Fig. 16: 35). The bases discovered in trench 1 were slightly concave, with a diameter of about 11 cm (Fig. 8: 1, 2). Most of the pots were decorated with incised horizontal grooves (Figs. 8: 2, 3; 15: 1, 3-5, 7-9). Only the pot with the cylindrical neck was covered with a rare ornament, in the form of uncommonly widely spaced grooves (see Fig. 16: 35).

BURIAL RITE

The latest excavations have confirmed that the discussed site is an inhumation cemetery with flat graves accompanied by settings of kerbstones. The discovery of the barrow at its grounds was, however, an unexpected one. The small scope of the excavations from 2015 and the lack of description of the burials excavated in the 19th century make an in-depth characterization of both the cemetery and its funeral rite impossible. In the western part of the site only a few potential stone settings around graves are visible. They each have a length of about 3-6 m and a width of about 2.0-3.5 m. Based on their arrangement, it can be assumed that the graves had an east-west or northeast-southwest orientation. This is confirmed by the orientation of the excavated burial of a child, the head of which was facing southwest. In his report of Adolf Wiewiórowski's research, Józef Jaroszewicz (1853, 194-195, note I) also mentioned a similar orientation of skeletons, which were arranged with their heads facing west. Due to the poor state of preservation of kerbs, it is difficult to say whether the kerbs of adjacent graves had joint walls, which is considered a typical feature of Podlachian cemeteries (Rauhut 1971, 457). The form of the examined grave shows that the deceased were placed in shallow pits covered with multiple layers of cobblestones – type IIb or IIP according to Lechosław Rauhut's classification (1971, 456-457), or type II.1 according to Michał Dzik (2015c, 43-44). So far, in the Upper Narew River basin, inhumation pit graves with kerbstones have been discovered in cemeteries at Kuraszewo, site 4 (Rajewski 1932; Dzik 2015a, 106-107), while in the Middle Bug River basin they were found, for example, at Czarna Wielka, site 1 (Dzik 2014c, 19-22), Rogawka, site 1 (Dzik 2016, 222-225), and Czekanów, site 1 (Zawadzka-Antosik 1982, 27). Despite the existence

of such a tradition at these burial grounds, it was not the most widespread burial rite in these areas. It cannot be ruled out that some of the deceased were placed on the ground's surface, as was the case at other similar Podlachian cemeteries (see, i.a., Dzik 2015c, 41-43). This may be indicated in the account of Józef Jaroszewicz (1853, 194-195, note I) about the shallow burials of the dead. Iron nails discovered in trench 1 and pieces of wood found in the excavated grave prove that some of the dead were buried in coffins or that there was some other type of wooden constructions used for protection of the corpses. The large sizes of the nails indicate that they were used to fasten heavy planks.

The burial ground in Szczyty-Dzięciółowo is unusual among cemeteries with graves accompanied by settings of kerbstones due to the presence of the barrow, located only a dozen or so meters from the examined flat grave. The mound was made of sand and stones, but due to the significant degree of its destruction, details regarding its construction are difficult to recreate. The cobblestones discovered at the base of the mound and in the side pit probably originate from the mantle that originally covered it. An oblong stone lying on the northern slope of the mound can be interpreted as a fragment of the damaged kerb. Stones from other sides of the barrow that are visible on the surface, already outside the research area, could also be parts of this kerb. This hypothesis is supported by finds of individual boulders at the bases of other mounds (see Fig. 5), as well as by the presence of similar constructions at a number of cemeteries in the Middle Bug River basin (see below). However, it is also likely that the aforementioned stone and a small pavement of cobblestones located to the north of it are not related to the barrow, but to a completely destroyed flat grave. The pit located at the western base of the barrow was probably a result of the removal of soil used to build the mound. Only residual artefacts (including pottery from the Roman period) were found in the lower part of the pit, so there is no indication that it fulfilled any ritual function. The inhumation burial was placed within the mound, on a layer with a thickness of about 0.15 m. A similar burial rite was recorded in the cemetery at Leśnictwo Postołowo, site 11 in the Białowieża Forest (Olczak and Krasnodębski 2017), as well as at Baciki Dalsze, Korzeniówka Mała, site 2, and Klukowo, site 1 in the Drohiczyń Upland (Dzik 2015c, 63). It was also noted at several cemeteries located in the Leśna River basin in the Belarussian Pobuże region (Korobushkina 1993, table 5).

The grave goods deposited with the dead at the discussed cemetery include mainly ornaments, but tools like knives and a copper roundel, which was perhaps a spindle whorl, have also been found. Just like in the case of other burial grounds with graves accompanied by kerbstone settings, pottery fragments were also discovered in Szczyty-Dzięciółowo. However, the vessels were not deposited near the deceased in the flat grave nor in the barrow. The presence of base fragments among the cobblestones of the pavement in trench 1 is proof of the placing of pots on the ground near the burials, or of their use during funeral rites (cf. Rauhut 1971, 470; Olczak and Wójcik 2019, 165). Sherds found by Nikolai P. Avenarius' (1895, 20) in various parts of one of the graves indicate, however, that pottery vessels or parts thereof could have also been placed directly near the dead. The dispersion of

pottery fragments in the mound and around its base seems to confirm the thesis that vessels, which might have been ritually broken first, were then thrown into the mound during funeral rites (cf. Korobushkina 1993, 47-50; Olczak and Wójcik 2019, 165-166). It is also possible that one of the pots was originally placed at the top of the barrow. This theory is supported by the concentration of most of its fragments in the slope-wash deposits at the northern slope of the mound. Soot stains and traces of secondary burning visible on the surface of the vessels from both parts of the cemetery indicate either that fire-related rituals were performed (Rauhut 1971, 470; Dzik 2015c, 127-133), or that the pots had served household purposes before the funeral.

Animal bones discovered at Early Medieval burial grounds are also usually considered to prove the performance of cult-related activities, such as funeral feasts (i.a. Musianowicz 1955, 267; Rauhut 1971, 470; Dzik 2015c, 156-158). The vast majority of animal bones found in the barrow came from cattle, mainly from a young individual or individuals (Piątkowska-Malecka 2016). The bones, which had varying degrees of consumption value, were found at the edge of the mound and in the upper and middle parts of the fill of the side pit, but not in the mound itself. The only exceptions were fragments of a tibial diaphysis and a metapodial section situated near the burial, at a distance of about 0.2 m from the skeleton's right femur (Fig. 13: 1). Such a location may indicate an intentional action, for example placing near the deceased an offering of meat that was consumed by the participants of the funeral ceremony. Remains of several animal species were discovered in the flat part of the cemetery, but their connection to the funeral rites is unclear due to the cemetery's high degree of destruction. The only thing worth noting is a long bone found among the cobblestones in the southeastern part of the trench, which probably belonged to a horse (Piątkowska-Malecka 2016). Among other places, horse bones have also been found at a cemetery with graves accompanied by kerbstone settings in Niewiarowo-Sochy (Niemczak 2019).

CHRONOLOGY OF THE CEMETERY

Due to the lack of radiocarbon dating, the chronology of the cemetery is based on the analysis of burial forms and grave goods. Burials placed within mounds, similar to the one found in the discussed barrow, appear as early as at the turn of the 10th and 11th centuries in the area inhabited by the Dregoviches (Lysenko 1991, 40, 46). In the Middle Bug River basin, they are usually dated to the 11th century or the beginning of the 12th century (Korobushkina 1993, 82-92; Zoll-Adamikowa 1975, 56; Dzik 2015a, 48, 83, 89). Only one burial in the cemetery at Leśnictwo Postołowo, site 11 in the Białowieża Forest can be dated to a later period, namely to the 12th century (Olczak and Krasnodębski 2017). Among the oldest of the barrow's grave goods are glass beads made by the stretching technique (Figs. 11: 15-17; 16: 1-3). Similar beads were mostly produced in the 8th to 10th centuries,

but they also sporadically appeared in the younger phase of the Early Medieval period – in the 11th and even 12th centuries (Dekówna 1999, 60-61; Pankiewicz *et al.* 2017, 63-64 and table 2). In the areas of northern Kievan Rus', such beads were most widespread in the second half of the 10th century, but they occurred until the beginning of the 12th century (Fekhnner 1959, annexes III: 1, IV: 1; Kuzina 2016, 219). Similar beads are rarely discovered in the cemeteries of the Middle Bug River basin. At Skiwy Małe, site 1 and Czarna Wielka, site 1, they were found in flat graves with inhumation, along with ornaments dated to the 10th-12th centuries (Bieńkowska 2010, figs. 3: 10-16; Wajda 2014, figs. 24: 3-4, 31, grave 29, and table 7, no. 11). Beads decorated with three eyes (Figs. 11: 8-11; 16: 4-17) in the lands of the northern Kievan Rus' are usually dated from the 11th to the early 12th centuries (Fekhnner 1959, annex VI: 18; Kuzina 2016, 235; Valiulina 2016, 130), while in the Western Slavic areas they are associated with a wider time range, namely the 11th-13th centuries (Markiewicz 2006, 135 and table 13). In the Middle Bug River basin, they were found in Drohiczyn (Pawlata 1991, table II: 5; *Schätze* 2011, 138, no. 372), and in north-eastern Mazovia, they were discovered in one of the graves from the older phase of the cemetery at Daniłowo Małe, site 1, which was dated from the 11th to the first quarter of the 12th centuries (Olczak *et al.* 2019, 77-83, 86-87). Similar beads from Świećk-Strumiany (Jaskanis 2008, 186, 346-347 and fig. 49: XII/N) may be slightly younger, because they were discovered together with bronze temple rings of the Pomeranian type, widespread in Mazovia mainly in the 12th century (Rauhut 1971, 473, chart A; Jaskanis 2008, 199). Beads decorated with three eyes were also part of the hoard from Olbrachtówek, from which the youngest coins are dated to the second half of the 11th century (Bogucki and Kulesza 2013; Czonstke and Koperkiewicz 2013, 234 and table V: 15, 17). The blue glass bead is among the youngest finds from the burial mound (Figs. 11: 13; 16: 29). In the vicinity of the discussed site, ornaments of this type were discovered in flat cemeteries at Zbucz, site 1 (Olczak *et al.* 2019, figs. 5.9: 5, 6) and Kuraszewo, site 1 (Jaskanis 1966, 246, and table XIII: 11), as well as in a barrow at the cemetery in Leśnictwo Postołowo, site 11 in the Białowieża Forest (Olczak and Krasnodębski 2017). These aforementioned burial grounds were used mainly in the 12th century. Metal ornaments from the barrow are also helpful in the dating of the burial. The silver S-shaped temple ring found in the mound (Figs. 11: 20; 16: 33) belongs to type A, which was most widespread in the 11th century (Rauhut 1971, 473, chart A; Kóčka-Krenz 1971, 102-105; 1993, 47-48). On the Bielsk Plain, silver ornaments of similar size were noticed at Kuraszewo, sites 1 or 2 (Musianowicz 1960, table VIII: 14; Pachobut 2006, fig. 5: 2) and in the inhumation barrows at Leśnictwo Przechody, sites 9 and 10 in the Białowieża Forest (Jelonka Range, Olczak *et al.* 2019, fig. 5.13: 3) and Leśnictwo Postołowo, site 3 (Szczekotowo Range, Götze 1929, table 13: 2). Earrings with a curly braid (Figs. 11: 18; 16: 30) occurred in the West Slavic territories in the period from the end of the 10th to the 13th centuries, most often in the 11th-12th centuries (Kóčka-Krenz 1993, 61, 205-206). In Kievan Rus' their chronology is equally wide; specimens from Novgorod were discovered in deposits dated from the late 10th to the second half of the

13th centuries (Sedova 1981, 16 and fig. 3: 3; 1997, 65). In the Mazovian-Rus' borderland, similar bronze earrings were found in a barrow dating back to the 11th century at Hotinovo in the Leśna River basin (Korobushkina 1993, 81, 127, and fig. 39: 17) and in flat graves at Czarna Wielka, site 1 (Bieńkowska *et al.* 2013, table XIV, grave 12: 2; Perlikowska-Puszkarska 2018, fig. 8, grave 255: 1), as well as at Święck-Strumiany, site 3 (Jaskanis 2008, table LXII, grave 23: 1; CXV, grave 289: 1, 2; CXXVIII, grave 383: 2). Earrings with knot-shaped beads (Figs. 11: 19; 16: 31) were discovered in former Rus' territories, often in barrow graves (i.a. Tyszkiewicz 1868, 212-213 and table I: 7; Sedov 1982, tables XXIX: 14, LVIII: 12; Lysenko 1991, 62-63). In cemeteries of the Polans, they were dated to the 10th-11th centuries (Rusanova 1966, table XI), and in the northern regions of Kievan Rus', to the 11th-12th centuries (Levasheva 1967, 21; Sedova 1981, 14; 1997, 65). No earring of this type is known from the Middle Bug River basin, while beads of similar shape were found in Skorbichi, Brest region, Belarus (Andrzejowski *et al.* 2005, 179) and at Twarogi Lackie, site 1 (Dzik 2015a, 190). Both types of earrings were found in a flat inhumation cemetery at Zvenygorod (Dźwinogród in Polish), Lviv region, Ukraine (Hupało 2011, figs. 11: 2-4).

It is much harder to precisely date the graves with kerbstone settings located in the discussed cemetery. The finds from the excavations carried out in the middle of the 19th century have been lost, and it is also not clear whether all the items mentioned by Józef Jaroszewicz (1853, 194-195, note I) were discovered at the said site. The form of the pit grave researched in 2015 indicates its late chronology; in the cemeteries of the Drohiczyn Upland, graves of this type started to spread at the end of the 12th century (Dzik 2016, 225). Biconical blue glass beads (Figs. 9: 2-11; 11: 1-4) discovered at the aforementioned burial were dated to the 11th-12th centuries in the northern part of Kievan Rus' (Fekhnner 1959, annex 6: 1; Kuzina 2016, figs. 1: b, c; 4). In the lands of contemporary Poland, these beads were most popular in the 12th-13th centuries (Wajda 2014, 68-69; Markiewicz 2006, table 13; Pankiewicz *et al.* 2017, 261-263 and table 2). They were found, for example, at nearby cemeteries with graves accompanied by settings of kerbstones at Zbucz, site 1 (Olczak *et al.* 2019, fig. 5.9: 2, 3) and Kuraszewo, site 1 (Jaskanis 1966, tables XIV: 5; XV: 1), as well as in the barrows of the Białowieża Forest at Leśnictwo Postołowo, site 3 and Leśnictwo Przechody, site 10 (Götze 1929, tables 12: 2; 13: 1-3). They were also noted at several flat cemeteries on the Drohiczyn Upland, for example at Baciki Dalsze (Dzik 2015a, table VII: 5-8), Czarna Wielka, site 1 (Wajda 2014, 68-69 and fig. 24: 20), and Krupice, site 1 (Dzik 2015a, table XVIII: 26). In Daniłowo Małe, site 1, they were found in graves of the younger phase, which were probably used in the 12th century (Olczak *et al.* 2019, 86-87). The beads made of light green glass (Figs. 9: 12-29; 11: 5, 6), known for example from Czarna Wielka, site 1 (Wajda 2014, fig. 31, graves 24 and 29), Krupice, site 1 (Dzik 2015a, table XVIII: 30, 31), and Rogawka, site 1 (Dzik 2016, fig. 18: 7) were also dated to the 12th-13th centuries. Among the items discovered in the flat cemetery in the 19th century, the coiled temple ring is worth mentioning. These ornaments have a wide chronology, covering the 11th-13th centuries, with the period of their greatest proliferation in the 11th-

12th centuries (Musianowicz 1949, 206-207; Kóčka-Krenz 1993, 59, 205; Korobushkina 1993, 73; Kalaga 2006, 149). On the Bielsk Plain, similar temple rings were noted at Kuraszewo, site 1 (Jaskanis 1966, table XIII: 8). In the Białowieża Forest, these temple rings were found in the cemeteries at Leśnictwo Przechody, sites 9 and 10 (Olczak *et al.* 2019, fig. 5.13: 2), Leśnictwo Postołowo, site 3 (Götze 1929, table 13: 1), and Leśnictwo Teremiski, site 1 (Zamczysko Range, Krasnodębski *et al.* 2005, figs. 9; 11: d-j).

Pottery vessels found at the cemetery belong to forms that were used for a long period of time. In terms of technique and decoration, they primarily resemble pots discovered at nearby cemeteries with graves accompanied by kerbstone settings at Zbucz, site 1 (Olczak *et al.* 2019, figs. 5.9: 9, 10) and Kuraszewo, site 1 (Jaskanis 1966, tables XIII: 1, 12; XIV: 1, 4; XV: 9; XVI: 8). They are very similar to the vessels from cemeteries in the Białowieża Forest (Götze 1929, table 14: 1-6, 8; Krasnodębski *et al.* 2005, fig. 11: a) as well as the ones from the barrows in the Leśna River basin (Korobushkina 1993, figs. 17: 4, 11, 12, 17, 18; 35: 12; 45). Pots with cylindrical necks are a very common find at the cemeteries on the Drohiczyń Upland (i.a. Rauhut and Długopolska 1975, 360, table VI: f, r, s; Długopolska 1993, tables I: h, i; II: b; Piasecka and Piasecki 2014, tables V: 1; X: 3), while S-shaped vessels are discovered there much less frequently (i.a. Długopolska 1993, table II: i; Piasecka and Piasecki 2014, tables V: 1; X: 1, 3; XI: 4). Vessels from many settlements on the Bielsk Plain are also similar in terms of shape and technique. A good example can be seen in the pots from the gord in Paszkowszczyzna, which is located about 10 km to the southwest of the discussed cemetery (Krasnodębski 2000, figs. 4: 4, 6). In Brest, analogical forms are dated mainly to the 11th-12th centuries (Lysenko 1985, 326), while in the urban centres of north-western Belarus they are known from the 11th-13th centuries (Zverugo 1975, 69; Malevskaia-Malevich 2005, 144-145). In the Upper Narew and Middle Bug River basins, similar vessels probably spread between the middle and the end of the 11th century and remained in use until the end of the Early Medieval period.

Taking the above data into account, it seems that the most probable time of the barrow construction is the period from the end of the 11th century to the middle of the 12th century. The examined flat grave is probably slightly younger and dates to the 12th century or the first half of the 13th century. However, these assumptions do not allow the establishment of the dating for the entire site. They also do not allow the determination of the chronological relationship between the graves with kerbstone settings and the barrows. Neither are there any precise chronological markers for other cemeteries on the Bielsk Plain. For example, the use of the cemetery at Kuraszewo, site 1 was dated to the turn of the 11th and 12th centuries (Jaskanis 1966, 263), while the one at Zbucz, site 1 dates to the period from the end of the 11th century to the end of the 12th century (Olczak *et al.* 2019, 64). At the current stage of research, the dating of the discussed site should therefore stay within the general timeframe adopted for cemeteries of this type. For the Middle Bug River basin, it is believed that cemeteries with graves accompanied by settings of kerbstones began to appear in the period between the middle of the 11th century and the turn of the

11th and 12th centuries, and were used at least until the beginning of the Late Medieval period (Rauhut 1971, 472-474; Miśkiewicz 1981, 101-102; Dzik 2015c, 179-203).

THE CEMETERY AT SZCZYT-Y-DZIEĆIOŁOWO AS AN EXAMPLE OF GRAVE FORM DIVERSITY IN THE MIDDLE BUG RIVER BASIN IN THE 11TH-13TH CENTURIES

The results of the 2015 excavations at the Szczyty-Dzięciołowo cemetery are yet another confirmation of the exceptional diversity of funeral rites that was characteristic of the Middle Bug River basin in the 11th-13th centuries (Zoll-Adamikowa 1979, 214-218, 232-234; Kalaga 2006, 184-191; Dzik 2015c, 170-199). According to the division proposed by Helena Zoll-Adamikowa, this period in the discussed area coincides with phase III of the Early Medieval funeral rite. During this phase, the passage from cremation to inhumation rites took place under the influence of Christianity (Zoll-Adamikowa 1979, 214-218). Simultaneously with the spread of inhumation in most of the areas inhabited by West Slavs, barrows were supplanted in favour of flat graves, while the East Slavs retained the former grave form. In the Mazovian-Rus' border region this process was slower than in other areas, and cremation burials, according to various researchers, continued there until the second half of the 12th century or even to the end of the 13th century (Rauhut 1973; Zoll-Adamikowa 1979, 214-215; Kalaga 2006, 186). The habit of burying the dead in barrows survived even longer in the Middle Bug basin – up to the Early Modern period, although, starting from the Late Medieval period, the deceased were usually buried in older mounds (Dzik 2015c, 64-66; Olczak *et al.* 2019, 90-94). The issue of funeral rite diversity has been thoroughly studied in recent years (see, i.a., Kalaga 2006; Dzik 2015c; Skrzyńska 2019); in this case, therefore, the authors are going to concentrate only on one aspect of this phenomenon, namely the diversity of grave forms.

Many different theories have been formulated about the genesis of “Podlachian” cemeteries with graves accompanied by settings of kerbstones (their juxtaposition in: Dzik 2014d, 87-93). They are most often considered to be a feature of Mazovian ritual and are connected with the population influx from Old Mazovia into the Middle Bug River basin (see, i.a., Jakimowicz 1935; Musianowicz 1960, 191-193; Rauhut 1971, 482-485; Miśkiewicz 1981, 106-116). Others, however, argue that graves with settings of kerbstones were spread throughout the discussed region by the Rus'-Varangian settlers brought in by Yaroslav the Wise (Kiersnowska 1992, 69-72; Kordala 2006, 233-249). Michał Dzik (2015b, 132-135; 2015c, 186-187) has recently presented an interesting theory of the local genesis of this type of grave. According to this theory, graves with kerbstone settings originate from the transformation of older barrows with stone constructions (cf. Sedov 1982, 122; Kvyatkovskaya 1998, 37-39, 170). In contrast to flat graves, inhumation barrows are considered to be an element of the East Slavic burial rite (see, i.a., Lysenko 1991, 33-49; Korobushkina

1993, 93-107). The presence of both grave types in the Middle Bug River basin was noted by, among others, Roman Jakimowicz (1935, 248-249) and Krystyna Musianowicz (1960, 191-199), who recognized it as evidence of an ethnically mixed Mazovian-Rus' or, more precisely, Mazovian-Dregovich settlement. In the opinion of Helena Zoll-Adamikowa (1979, 232-234; 1996, 88-90), the dominance of inhumation barrows in some regions was a reflection of the missionary influences of the Eastern Church, which was probably a result of political affiliation to the Kievan Rus'. This concept was also adopted by Michał Dzik (2015c, 190-192). According to Dzik, the survival of the custom of barrow construction at some cemeteries on the Drohiczyn Upland can be seen as a manifestation of the slowed progress of Christianisation and the tolerance of the ancient grave form. These two events resulted from the subjugation of this area by the Rurikids.

The vast majority of well-known cases where graves with kerbstone settings and barrows existed side-by-side were concentrated in the Drohiczyn Upland. These are, for example, sites at Baciki Dalsze (Musianowicz 1960, nos. 183, 184; Rauhut 1971, 630, nos. 161, 162; Zoll-Adamikowa 1975, 53-56; Dzik 2015a, 48-52), Baciki Średnie, sites 1-3 (Musianowicz 1960, nos. 185, 186; Dzik 2015a, 52-53), Kamianki (Musianowicz 1955, 247 and fig. 1; 1960, nos. 122, 123), Korzeniówka Mała, sites 1 and 2 (Dzik 2011; 2015a, 87-89), Nie-wiarowo-Sochy (Musianowicz 1955, 247 and fig. 1; 1960, nos. 119, 120), Rogawka, sites 1 and 3 (Dzik 2016, 209), and Skiwy Małe, site 1 (Bieńkowska 2010; Dzik 2015a, 135-137). It should be remembered, however, that the barrows located near flat grave cemeteries were not always excavated; hence, it is difficult to determine their dating and the type of burial rite. It is probable that some of the listed mounds are older graves with cremation, which had prevailed in these areas at least until the middle of the 10th century (phase II according to Helena Zoll-Adamikowa 1979, figs. 57, 58). So far, Early Medieval inhumation burials in barrows have been confirmed at just a few cemeteries, for example at Baciki Dalsze (barrow no. 9 – Zoll-Adamikowa 1975, 56; Dzik 2015a, 48-49), Czarna Cerkiewna, site 1 (barrow no. II – Chilmon 1974, 310-313; Zoll-Adamikowa 1975, 69), and Korzeniówka Mała, site 2 (barrow no. 2 – Dzik 2011; 2015a, 87-89). Graves from Klukowo, site 1 (barrow no. 19 – Zoll-Adamikowa 1975, 60-66, Dzik 2015a, 82-84) and Kamianki (Musianowicz 1960, no. 123) could also come from the same period, but a Late Medieval or Early Modern origin cannot be excluded. The cemeteries at Baciki Dalsze and Korzeniówka Mała, where barrows were located just a few meters from flat graves (Dzik 2015c, figs. 35 and 40), are particularly interesting. In the Siedlce Upland, the close proximity of barrows with inhumation and graves with kerbstone settings was observed at Łuzki (Łuniewski 1883, 478; Musianowicz 1950/51, 229-236, 240-248; 1960, nos. 70, 71; Kalaga 2006, 58-59, and the documentation at the State Archaeological Museum in Warsaw) and Czekanów, site 1 (Zawadzka-Antosik 1982, 27). The spatial relationships between the two types of graves is not known at Łuzki, whereas at Czekanów very few barrows were situated in the southern and western parts of the cemetery, where they copied the row arrangement of flat graves (*ibidem*).

Unlike in the Drohiczyń and Siedlce Uplands, inhumations in flat graves and barrow graves on the Bielsk Plain occur in two separate zones, and the cemetery in Szczyty-Dzięciołowo is an exception in this respect. It is part of a cluster of several burial sites with graves accompanied by settings of kerbstones, which is located in the interfluvium of the Orlanka and Łoknica Rivers, left tributaries of the Narew River. About 2.5 km northeast of Szczyty-Dzięciołowo lies the aforementioned cemetery at Zbucz, site 1, and about 10 km further are three cemeteries at Kuraszewo – sites 1, 2, and 4 (Rajewski 1932, 95-97; Musianowicz 1960, nos. 251-253; Jaskanis 1966; Pachobut 2006; Dzik 2015a, 98-107). There is another site that is reportedly located near the village of Krzywa, but has not been found to this day, which is likely a burial ground of the same type (Avenarius' 1890, 21; Pokrovskii 1895, 66; Musianowicz 1960, no. 244; Rauhut 1971, no. 198). This group forms the northernmost enclave of Podlachian cemeteries with graves accompanied by settings of kerbstones, which is clearly distinguishable from the Drohiczyń cluster. Apart from the unlocated necropolis in Kruhle, the character of which is not fully defined (Dzik 2015a, 93-94), the cemetery in Sasiny, about 25 km from Szczyty-Dzięciołowo, is the closest known site of this type (Dzik 2015a, 133-134). Despite insufficient knowledge of these cemeteries, which was a result of their high degree of destruction, as well as the unprofessional research conducted there in the 19th century and the first half of the 20th century, the difference of the funeral rite practised there is noticeable. In this small area there are cemeteries with cremation burials in pit graves (Kuraszewo, sites 1 and possibly 2), inhumation burials in pit graves (Szczyty-Dzięciołowo, site 1 and Kuraszewo, site 4), and probably also with burials placed directly on the ground (Zbucz, site 1), possibly both inhumation and cremation ones. At the current stage of research, there is insufficient data for the chronological stratification of these cemeteries, which would perhaps partly explain the phenomenon of such a large diversity of burial rites. In this part of the Bielsk Plain, however, Early Medieval barrow cemeteries with inhumation burials have not been found so far. In recent years, it has been excluded that the neighbouring mounds from Zbucz, site 2 are inhumation barrows, since cremation burials dated to the 9th-10th centuries were discovered there (Olczak *et al.* 2019, 61-62). Other features excavated in this region are either barrows with the cremation rite (Lachy – Zoll-Adamikowa 1975, 153-156; Dzik 2015a, 109-110), barrows in which Early Modern inhumation burials were unearthed (Koźliki, Kuraszewo – Jaskanis 1963; Dzik 2015a, 107-109; Olczak *et al.* 2019, 90-94), or uninvestigated mounds known from field surveys or 19th-century discoveries (Jaroszewicz 1844, 204-205; 1853, 194-195, note I; Musianowicz 1960, nos. 248, 255, and table IX, as well as the Polish Archaeological Record documentation in the Podlachian Museum in Białystok).

In contrast to the western part of the Bielsk Plain, in the eastern part of this region the barrow was the most common type of grave during this period. Several of the biggest cemeteries with inhumation barrows in northeastern Poland, dated from the second half of the 11th century to the end of the 13th century, are located in the Narewka River basin in the Białowieża Forest. The two westernmost of these cemeteries, Leśnictwo Postołowo,

sites 3 and 11, are located about 20 km from Szczyty-Dzięciółowo, while a bit further north-east there are cemeteries in Leśnictwo Przechody, sites 9 and 10, as well as the barrows in the Ładzka Forest, which have not yet been located (Götze 1929, 528-540; Walicka 1958; Krasnodębski *et al.* 2011, 155-163; Olczak and Krasnodębski 2017; Olczak *et al.* 2019, 58-61, 67-72). It is very likely that other earthen mounds located in the Białowieża Forest are also barrows from the same period. Two examples are unexcavated mounds at Leśnictwo Jelonka, site 1 (Götze 1929, 518) and barrows at Leśnictwo Krynica, site 2, where pottery from the second half of the 11th century or the 12th century was discovered (Wawrzeniuk 2017, 207-213, figs. 13-16). Though present in both the older and the most recent literature (i.a. Górská 1976; Wawrzeniuk 2017), the thesis of an Early Medieval origin and sepulchral function of most of the earthen mounds in the Białowieża and Ładzka Forests (including mounds where no burials were discovered) is nevertheless unfounded at the current stage of research (Samojlik 2007, 88-95; Krasnodębski *et al.* 2011, 148-149, 163; Krasnodębski and Olczak 2018, 28-29). Burial mounds from the eastern part of the Bielsk Plain belong to zone K, which, according to Helena Zoll-Adamikowa (1979, 232-234, fig. 59), covers the majority of Eastern Slavic territories. The cemeteries from the Narewka River basin are probably a continuation of a large cemetery complex located in the Leśna River basin in the Belarussian Pobuże region (Korobushkina 1993). Both groups share not only a similar form of graves, but also more frequent exceptions to the western orientation of the burials, and a more widespread custom of equipping the dead with clay vessels, which sets them apart from other cemeteries of the Middle Bug River basin (Korobushkina 1993, tables 1, 2, 5; Olczak *et al.* 2019, 60, 71; Olczak and Wójcik 2019, 155-156). No cemeteries with flat graves accompanied by kerbstone settings have been found in the Białowieża Forest so far, although it is possible that any such graves were heavily damaged by the repurposing of stones over the years by locals. One such place is the cemetery at Leśnictwo Teremiski, site 1 (Krasnodębski *et al.* 2005). The boulders visible on its surface and the remains of cobblestone pavements, which covered both pit graves as well as burials placed on the original ground surface, are evidence of the use of stone constructions. Due to the high degree of destruction, however, interpreting these constructions as kerbs of flat graves is not obvious. According to one of the witnesses of the excavations at this necropolis in 1825, there had been a "stack of stones formed in a cone," under which a skeleton was discovered (Bajko 2001, 16). This information may indicate the presence of small barrows with stone constructions at the cemetery.

In view of the insufficient state of research, it is difficult to say whether the duality of grave types on the Bielsk Plain reflects an actual diversity of forms, or is rather just an accidental phenomenon, which resulted from the significant destruction of burial grounds in this region. The fact that there were many fewer cemeteries on the Bielsk Plain than in the Drohiczyń Upland is already apparent in the middle and late 19th-century reports (Jaroszewicz 1844, 104-105; 1853, 194-195, note I; Avenarius' 1890, 18-24 and table I; Pokrovskii 1895). Particularly interesting is the lack of known cemeteries in areas with intense settlement

near 11th-13th century gords such as Bielsk or Bobrówka (Krasnodębski *et al.* 2019, 38-39). This leads to the conclusion that in addition to the aforementioned enclaves of cemeteries with graves accompanied by kerbstones, one can also expect the presence of flat cemeteries without stone constructions on the Bielsk Plain, such as the so-called rural cemeteries like Daniłowo Małe, site 1, located in northeastern Mazovia (Krasnodębski 1998; Olczak *et al.* 2019, 77-83), or church graveyards, like the ones at Suraż, site 2 (Bieńkowska 2005) and Drohiczyn (Pawlata 1991; Andrzejewski and Sikora 2009, 162, 164-165).

It should be considered that the diversity of grave types in the Middle Bug River basin may, in some cases, be the result of a long period of use of the cemeteries. Michał Dzik (2015c, 186-187) pointed out that in the Drohiczyn Upland, the settlement zone from the older phase of the Early Middle Ages – indicated by the presence of barrows with cremation burials – is the same as the range of occurrence of flat cemeteries in later times. This could indicate the continuity of settlement in this region. It is very probable that some inhumation burials in barrows may prove that the local population changed their burial rites from cremation to inhumation under the influence of the Christianity, while maintaining the older grave form. This applies to the previously mentioned inhumation barrows at Baciki Dalsze and Korzeniówka Mała, and perhaps at Klukowo as well, all of which were located in the immediate vicinity of barrows with cremations. Two inhumation burials had been deposited in one of the two mounds excavated at the beginning of the 20th century in Baciki Dalsze, including a burial with grave goods dated to the 11th century or the beginning of the 12th century. On the other hand, a Drohiczyn-type vessel fragment was found in a cremation barrow, which indicates that it was built in the 11th century at the earliest (Zoll-Adamikowa 1975, 56; Dzik 2015a, 48-49). A similar situation was observed in Korzeniówka Mała, where one of the three excavated barrows contained an inhumation burial, while the other two had cremation burials. The barrow with the inhumation was dated to the 11th century or the first quarter of the 12th century. The chronology of the two cremation barrows was determined by radiocarbon dating to the second half of the 10th century, but since a Drohiczyn-type vessel was found at the bottom of one of the mounds, their formation in the 11th century seems more likely (Dzik 2015a, 87-89; 2015c, 49-50). The early dating of inhumation burials probably indicates the continuous use of cemeteries in Baciki Dalsze and Korzeniówka Mała during the period of transition from cremation to inhumation. The presence of flat graves with settings of kerbstones in the aforementioned burial grounds is more difficult to explain. The small number of examined burials makes it impossible to precisely determine when the areas of both cemeteries with flat graves began to be used, but it is likely that this occurred at the end of the 11th century (Dzik 2015a, 48-49, 89; 2017, 193). On the one hand, the close proximity of barrows and graves with settings of kerbstones seems to indicate long-time settlement in this region. On the other hand, the change in grave form could be proof of the abandonment of ancient funeral practices, whether because of the influence of religious ideas (the spread of Western Christianity) or for ethnic and cultural reasons (the arrival of new settlers). The inhumation cemetery from

Łuzki, located in the Siedlce Upland, may be interpreted in a slightly different way. According to Krystyna Musianowicz (1950/51, 247), it was used in the 11th-12th centuries, which was the period when flat graves prevailed in these areas. The grave goods found in barrows and flat graves with kerbstone settings in Łuzki were similar, which indicates that both types of graves in this cemetery were probably built at the same time (Dzik 2015c, 190). A similar phenomenon has been confirmed at the necropolis in Podroś in the Neman River basin (Belarus), which was probably being used during the same period. There were barrows in its northern part and flat graves with settings of kerbstones in its southern part (Jaskanis 1962). Both types of graves were similar in terms of grave goods. In the case of the cemetery in Szczyty-Dzięciółowo, it is hard to speculate on the relative chronology of barrows and graves with settings of kerbstones due to the insufficient level of research. Although it was established that the examined barrow was older than the flat grave, these conclusions cannot be applied to the entire necropolis. The discussed barrow should not be considered evidence of the survival of the local traditional grave form during the time of transition from cremation to inhumation funeral rites. This is because settlement continuity in the Bielsk Plain in the 11th century has not been confirmed. This hiatus in settlement manifests itself in the abandonment of old cemeteries and the establishment of new ones, albeit sometimes only at a short distance from the previous ones (Olczak *et al.* 2019, 65-67).

As was already mentioned, the burial mound in Szczyty-Dzięciółowo could have been covered with a stone mantle, with a setting made of large kerbstones probably laid at its base. Various forms of stone constructions found on barrows (generally those with cremations) that date between the 8th-9th centuries and the 12th-13th centuries are characteristic of the Middle Bug River basin (Zoll-Adamikowa 1979, 103-115, 224; Kalaga 2006, 103-108; Dzik 2014d, 94-98; 2015b). One such form includes a quadrangular or circular setting of kerbstones, which often co-exists with other features, such as multiple layers of cobblestone pavements, kernels, or mantles covering the mounds (Dzik 2015b, table 1). While the kerbstone settings of older cremation barrows were usually made of small or medium-sized stones (see, e.g., Dzik 2014d, fig. 6), larger stones were also used for this purpose in the case of mounds with inhumation burials in the 11th-13th centuries. In the Bielsk Plain, burial mounds with settings of kerbstones visible on their surfaces are concentrated in the Białowieża Forest. Several such features were noticed at the burial ground in Leśnictwo Postołowo, site 11 (Olczak and Krasnodębski 2017), and single ones were found in the cemeteries at Leśnictwo Przechody, sites 9 and 10, with at least 20% of the mounds in the last two cemeteries having stone mantles or kernels (Götze 1929, 515-518, 528-531; Olczak *et al.* 2019, 67-69, 71). Earthen mounds with stone constructions were also found at other places in the Białowieża Forest, such as Leśnictwo Krynica, site 2 (Wawrzeniuk 2017, 207-213), Leśnictwo Jelonka, site 1 (Götze 1929, 518), Leśnictwo Przechody, site 1 (Götze 1929, 526-528), or Białowieża National Park, sites 22 and 30 (Górska 1976, 132, fig. 17; Krasnodębski and Olczak 2018, 22-23, fig. 13), but their dating and funeral rites have not been

determined yet. In the Drohiczyn Upland, inhumation barrows with settings of kerbstones and sometimes also layers of cobblestones were found in the cemeteries at Czarna Cerkiewna, site 1 (Chilmon 1974, 310, 313-314), Baciki Dalsze (Zoll-Adamikowa 1975, fig. 15; Dzik 2015c, table 6), and probably Kamianki (Musianowicz 1960, no. 123). No setting of kerbstones was observed on the edge of an inhumation barrow at Korzeniówka Mała, site 2, but such constructions, as well as cobblestone pavements, were discovered at two neighbouring cremation mounds (Dzik 2015a, 87; 2015c, table 6). The barrows at two sites on the Siedlce Upland, Łuzki (documentation at the State Archaeological Museum in Warsaw) and Czekanów (Zawadzka-Antosik 1982, 27), were also surrounded by kerbstones. Additionally, the barrows in Czekanów were also covered with mantles (*ibidem*).

Burial mounds with settings of kerbstones at their bases, sometimes covered with stone mantles or with other stone constructions, were the dominant grave form in the region of the Leśna River basin, which neighbours the discussed area, in the 11th-13th centuries (Salewicz 1937, 166-169; Korobushkina 1993, 11-17). These so-called stone barrows with inhumation burials were being built at the same time in the Upper Neman River basin as well (Jaskanis 1962, figs. 2, 5; Zvyaruga 2000, 104-106; Yurkavets 2006, 128, fig. 2: 1, 2). Valentin Sedov (1982, 120) saw the form of graves from the aforementioned regions as a reference to the older West Baltic barrows and interpreted them as burials of slavified Balts, who inhabited these territories along with the Slavs. This view was challenged by Tatiana Korobushkina (1993, 100-101), according to whom the construction of the discussed mounds was based on practical considerations – namely the use of stone material, which is common in these areas. Korobushkina also drew attention to the wider zone of occurrence of barrows with stone constructions in the lands of Eastern Slavs (*ibidem*).

It is difficult to say to what extent burial mounds with settings of kerbstones were widespread in the Middle Bug River basin in the 11th-13th centuries, because these constructions were heavily impacted by the removal and reuse of their stones by locals. It is undisputed, however, that they were built both in areas dominated by flat graves with settings of kerbstones (the Drohiczyn and Siedlce Uplands, the western part of the Bielsk Plain) as well as in regions where earthen burial mounds were the most common form of burial (the Białowieża Forest). In the first case, barrows with settings of kerbstones were located near or at the same cemeteries as flat graves, but usually – apart from Szczyty-Dzięciołowo – in separate zones. It should also be noted that inhumation barrows without stone constructions are found in those regions only sporadically. On the other hand, in the Białowieża Forest, barrows surrounded by settings of kerbstones appeared at the same burial grounds as barrows without stone constructions (Leśnictwo Przechody, sites 9 and 10) or formed separate cemeteries (Leśnictwo Postołowo, site 11). The last example is significant, because in the cemetery at Leśnictwo Postołowo, site 3, which is located only 400 m from the aforementioned cemetery at Leśnictwo Postołowo, site 11 and was used during the same period, only barrows without stone constructions were found (Götze 1929, 518-521, 535-540; Krasnodębski *et al.* 2011, 155-160; Olczak *et al.* 2019, 58-61). At the current stage of research,

it is difficult to say whether stone constructions in inhumation barrows in the Middle Bug River basin are a result of the evolution of older cremation mounds, or are rather an indication of a form borrowed from the neighbouring Leśna or Upper Neman River basins, which is possibly an effect of migration from those regions. It cannot be excluded that both factors overlapped here; the first one seems to be more likely in the case of the Drohiczyn Upland, while the second one is more probable in the Białowieża Forest, where barrow cremation graves without stone constructions had predominated in the earlier period (Götze 1929, 531-535, 541; Krasnodębski *et al.* 2011, 150-155).

It was repeatedly pointed out that some barrows with stone constructions have a shape resembling that of flat graves with settings of kerbstones (see, e.g., Jaskanis 1962, 358; Yurkavets 2006, 130; Dzik 2015b). This is particularly evident in the case of the aforementioned burial ground at Leśnictwo Postołowo, site 11 (Olczak and Krasnodębski 2017). There are five mounds of varying sizes in this cemetery, all of them with settings of large kerbstones arranged at their bases or on their slopes. The two best-preserved graves are very small mounds with a diameter of about 3 m and a height of about 0.3-0.4 m, accompanied by a quadrangular setting of closely placed kerbstones. Due to the shape of these constructions and the small size of the mounds, these features are confusingly similar to flat graves with settings of kerbstones. Another grave with an unusual form was found at the flat cemetery with graves surrounded by kerbstones at Zbucz, site 1. A quadrangular kerb made of large stones and measuring approximately 5.0 × 4.5 m was excavated there. In the middle part of this kerb there were a few similar-sized stones and three layers of cobblestones, which formed a small mound with a height of about 0.4 m (Olczak *et al.* 2019, fig 5.9.1). No human bones were found inside the setting of kerbstones, only some grave goods and iron nails. It cannot be excluded that the current shape of this grave is the result of a later transformation of the cemetery, but it must also be remembered that in the case of some Mazovian graves with kerbstones, the internal pavements were arranged in small cones, which made them look similar to barrows (see Rauhut 1971, 455). According to Michał Dzik (2014d, 94-101), in the case of both flat graves and barrows, settings of kerbstones could be an expression of the same idea, namely the house of the dead. However, it should be emphasized that – with the exception of the above-mentioned examples – both types of graves differ significantly in their shapes and usually also in size. Regardless of the idea (which could be similar), communities burying their dead in barrows undoubtedly took great care to emphasize their own distinctiveness by constructing an earthen or stone mound.

The diversity of grave forms in the Middle Bug River basin has little reflection in the grave goods of the dead. Ornaments with connections to both West and East Slavs are characteristic of the cemeteries throughout the discussed area in the 11th-13th centuries (Musianowicz 1955, 267-273; Miśkiewicz 1981, 94-100; Dzik 2015c, 192-194, 197). Grave goods with West Slavic connections include mainly S-shaped temple rings and vessels with cylindrical necks. Ornaments of East Slavic origin include coiled temple rings, band

bracelets and openwork beads – the so-called Dregovich ones, which were used as parts of necklaces and earrings. The grave goods in flat graves with settings of kerbstones and in barrows are very similar in this respect; the aforementioned types of ornaments were found at the same cemeteries, and sometimes even in the same graves (see, e.g., Musianowicz 1955, table IV: 1-5, 15-17; Bieńkowska *et al.* 2013, table LXVIII: 1-6; Olczak *et al.* 2019, fig. 5.13: 2, 3). This phenomenon extends further to the east, reaching the basins of the Leśna River (Korobushkina 1993, 67-92) and the Upper Neman River (Jaskanis 1962, table X: 1-6; Kizyukevich 2006, fig. 2), although the dominance of ornaments of East Slavic character is visible there. The culturally heterogeneous, West and East Slavic character of grave goods is most likely a reflection of the region's location near the Bug River trade route, the centre of which was Drohiczyn (Musianowicz 1969, 219-223). In terms of grave goods, the cemeteries there clearly differ from the nearby burial sites of northeastern Mazovia, where most ornaments have West Slavic connotations, with a noticeable share of items pointing to contacts with Baltic territories (Jaskanis 2008, 174-247; Bieńkowska 2005, 139-143; Olczak *et al.* 2019, 77-90). On the other hand, greater regional diversification is observed among the pottery vessels found in the Middle Bug River basin, which, unlike the ornaments, were fully local products. In the 11th-13th centuries, the so-called Drohiczyn-type vessels or their imitations – the main production centre of which was probably in Drohiczyn (Musianowicz 1969, 145) – are widespread in the Drohiczyn and Siedlce Uplands (Olczak and Wójcik 2019, fig. 9.12). In the Bielsk Plain, the presence of these vessels has not been sufficiently confirmed yet. Furthermore, at burial sites of all types (both barrow cemeteries from the Białowieża Forest and flat cemeteries from the basins of the Orlanka and Łoknica Rivers), aside from pots with cylindrical necks, S-shaped vessels were discovered, which were similar to the pottery from Brest and the cemeteries of the Leśna River basin, but also to pottery from the urban centres of northwestern Kievan Rus' (see above).

In this context, the finds from the discussed necropolis are very interesting. While the grave goods of the flat grave with settings of kerbstones are common in the Middle Bug River basin, items with few analogies in this area were found in the barrow (see above). One could venture to hypothesize that the form of the discussed barrow burial did not have to be a result of the westward permeation of funerary rites from the nearest cemeteries in the Narewka and Leśna or even Upper Neman River basins. Instead, it could be a reflection of the traditions of the deceased – a woman perhaps coming from farther areas of Kievan Rus'. One of the potential regions of her origin is the area around the basins of the Middle Dnieper and Berezina Rivers, where numerous examples of earrings with knot-shaped beads and burials placed within the mounds – which were more frequent than in other areas inhabited by the Dregoviches – were found (Lysenko 1991, 33, 62-63).

Unfortunately, this issue has not been resolved by genetic research, although such research has brought many interesting results. The woman buried in the barrow had mtDNA of haplogroup H1c3b, while the child buried in the flat grave belonged to haplogroup U5a

(Molak *et al.* 2019, table 14.4, annex 14.1). Haplogroup HV is one of the most frequent in modern European populations, including among Slavs (Juras 2012, 101-102). In the Bielsk Plain it was extracted from the majority of six studied individuals who were buried in barrows, with the exception of one skeleton from the cemetery at Leśnictwo Przechody, site 10. Large shares of haplogroup HV were also noted among the human remains from flat cemeteries of northeastern Mazovia (Daniłowo Małe, site 1 and Suraż, site 2) and the Siedlce Upland (Czekanów, site 1 and Niewiadoma, site 3), while in the Drohiczyn Upland it was found only in one individual from the necropolis in Twarogi Lackie (Molak *et al.* 2019, fig. 14.1). Interestingly, haplogroup H1c3b – the same as that of the deceased in the barrow at Szczyty-Dzięciołowo – was also discovered in a woman and a man buried in one of the barrows in the cemetery at Leśnictwo Postołowo, site 3. According to the authors of the analysis, this may indicate their relation along the maternal line (Molak *et al.* 2019, 239). On the other hand, haplogroup U5a was recorded in two individuals from a cemetery with graves accompanied by kerbstone settings at Klepacze, site 1, and in one individual from Suraż, site 2 (Molak *et al.* 2019, table 14.4, annex 14.1). The cited genetic studies have revealed another aspect of the issue under consideration: they showed a great diversity of the Early Medieval population of the Middle Bug River basin, with a distinct separateness of the Drohiczyn Upland, where individuals with haplogroup HV were almost completely absent.

The diversity in grave forms from the Middle Bug River basin in the 11th-13th centuries was a consequence of these areas being part of the broadly defined Mazovian-Rus' borderland region. It was characterized by political instability due to an unstable and fluid affiliation to the states of Poland and Kievan Rus' (Bieniak 2010, 165-178), which in turn probably resulted in the late establishment of permanent church structures. The nature of the borderland and its proximity to the Bug River trade route led to the development of a diversified material culture and the differentiation of funeral rites. Grave form diversity probably had a slightly different background depending on the region. It is worth considering whether the division of the Bielsk Plain into an eastern part (with barrows) and a western part (with a predominance of flat graves) could, according to the suggestion of Helena Zoll-Adamikowa (1979, 232-234; 1996, 88-90), reflect the zones of influence of the Eastern and Western Churches. This thesis finds only partial confirmation, since it seems that both parts of the Bielsk Plain were subjugated by one administrative centre located in Brest as early as in the second half of the 11th century. At the same time, it is difficult to imagine that the influence of both burial rites would be so clear at such a great distance from administrative and church centres. The presence of a cemetery enclave with graves accompanied by kerbstone settings in the Orlanka and Łoknica River basins can be explained in two ways. According to the first explanation, this was a reflection of the situation prior to the middle of the 11th century. According to the second one, it was the result of a local migration of people from the Drohiczyn Upland. This group maintained its own funeral customs, while, in the field of material culture – manifested for example in pottery

production – they did not differ from the inhabitants of the eastern part of the Bielsk Plain. The discovery of the burial mound in Szczyty-Dzięciołowo revealed yet another possible aspect, namely the settling of Ruthenians from the more distant parts of Kievan Rus' into the area of the Middle Bug River basin. In the case of the cemetery at Łuzki in the Siedlce Upland, ethnic and cultural differences also seem to be the most likely explanation for a different grave form. However, this phenomenon could have had slightly different causes in the Drohiczyn Upland, where it was noted that some cemeteries were continuously used from the early phase of the Early Middle Ages. One may agree with the view of Michał Dzik, according to whom burying the dead in barrows in the 11th-12th centuries on the Drohiczyn Upland was a consequence of the tolerance for the ancient grave form. This tolerance was a result of this area being subjugated by Kievan Rus' (Dzik 2015c, 190-192). In this case, however, ethnic factors and the intention of the local population to emphasize their cultural identity should not be underestimated as well. On the one hand, any conclusions regarding this problem need to be supported by evidence in the form of radiocarbon datings of graves, which at the moment is almost completely non-existent. On the other hand, they need to be supported by wider settlement studies.

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DISCUSSIONS AND POLEMICS

Lech Czerniak* and Aleksander Koško**

GREAT EXPECTATIONS: REFLECTIONS ON THE 20TH ANNIVERSARY OF POLAND'S MOTORWAY CONSTRUCTION RESCUE ARCHAEOLOGY PROGRAMME

ABSTRACT

Czerniak L. and Koško A. 2019. Great expectations: reflections on the 20th anniversary of Poland's motorway construction rescue archaeology programme. *Sprawozdania Archeologiczne* 71, 457-464.

This paper examines the political, legal and organisational aspects of rescue excavations carried out in advance of motorway construction in Poland during the last 20 years. This analysis tries to determine why this comprehensive and ambitious programme was downgraded ten years after its launch and now bears little resemblance to the original concept. Why, despite the existence of an appropriate legal framework and the supervision, was it possible to breach the basic provisions of the Malta Convention (La Valetta, 1992), which states that rescue excavations should be governed by the principles of scientific research? The authors believe that the successful implementation of complex, long-term and costly projects funded by the public purse does not depend solely on having legal and organisational structures in place. Critical factors, particularly in countries emerging from authoritarian rule, include the political will of the government, a lack of public engagement with archaeology and the absence of widely accepted professional standards in archaeological practice.

Keywords: the Malta Convention, archaeological heritage, rescue archaeology, rescue excavations

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INTRODUCTION

A comprehensive and ambitious programme of motorway rescue excavations was launched in Poland just over 20 years ago. This paper tries to answer why this programme was completely downgraded after ten years in operation. It also looks into why, despite the existence of an appropriate legal framework, it was possible to breach the basic provisions of the European Convention on the Protection of the Archaeological Heritage (La Valetta, 1992), which states that rescue excavations should be governed by the principles of scientific research. Why does the supervision of Poland's National Heritage Protection Service not guarantee that these principles are observed? And finally, why does the government not react to information and even protests from the academic community, about the drastic oversimplification of methods and reduction in scope of rescue excavations?

We believe that the way in which complex, long-term and costly projects funded by the public purse are implemented is not always dictated solely by the binding legal framework. Legal regulations concerning the protection of archaeological heritage in Poland conform to the highest standards of conservation doctrine. However, they are variously interpreted depending on what can best be described as 'political will'. 'Political will' is a phenomenon we see in Poland, but which also appears to be a characteristic legacy of other countries emerging from authoritarian rule. It involves the selective application of laws to suit particular social, political, and, most often, economic goals. This type of propaganda exercise and legal manipulation is made easier by a weak civil society, which, in this case, is manifest in the absence of a professional body to uphold standards in archaeological practice (also: Czerniak 2011). This is exacerbated by the notorious impotence of the National Heritage Protection Service. Inadequately funded and frequently reformed, it is understaffed by underqualified employees, who – in consequence – are ill-equipped to carry out procedural monitoring, and almost entirely lack the capacity to oversee professional standards.

At the *Annual Meeting of the European Association of Archaeologists* held in Kraków in 2006, when one of us summed up ten years of rescue excavation work along Poland's motorway routes, all the talk was of success (Czerniak *et al.* 2006). This was the prevalent opinion about the legal measures that had been adopted, the organisation of the archaeological work and its results. Unfortunately, the enthusiasm surrounding the fall of communism, and the conviction that entering the European Union would make up for the absence of a robust legal culture, blinded us all to the fact that this success was built on shaky foundations.

This is why, barely ten years later, at a conference in University of Łódź ('Preventive archaeology – an attempt to diagnose of the last quarter', December 9, 2016), we presented a joint paper describing the rapid decline of standards in motorway rescue archaeology. Sadly, today we can only repeat the assessment we made two years ago. However, above all, we want to focus on more universal problems, which we believe not only lie be-

hind the negative changes we have witnessed in Poland, but also pose a genuine threat in countries with similar historical and socio-political backgrounds.

This paper based on text presented at '18th UISPP World Congress' (Paris, June 2018).

1. WHAT HAPPENED?

In essence, the developments which took place in Poland can be attributed to the fact that after 2007 the system for selecting archaeological contractors and monitoring their working practices was changed within a matter of several months. In 1994, when devising the national motorway construction strategy, it was decided (the act '*on toll motorways*') that the related archaeological rescue excavations would be sponsored by the government. The funds allocated for this task, and the responsibility of accounting for expenditure on archaeological work, were entrusted to the Motorway Construction Agency – a subsidiary of the Ministry of Infrastructure. However, the responsibility for selecting archaeological contractors, and monitoring the standard of their work, fell to the Rescue Archaeology Centre (in 2002 replaced by the Archeological Heritage Preservation Center, see: Grabowski 2012) set up by the Ministry of Culture. In addition, excavation work was also to be overseen by the local offices of the National Heritage Protection Service, whose remit includes issuing archaeological excavation permits.

Recognising these excavations as scientific research (as per *the Malta Convention*) was crucial to the viability of this system. It allowed the criteria for competitive tendering to be drawn up in such a way as to give precedence to large scientific institutions (mainly academic ones) experienced in excavating archaeological sites in the particular region where a given section of motorway was being built. This system was meant to – and did – ensure that archaeological work would be carried out to the highest professional standards. It was finally adopted in 1996. Notably, the most frequently discussed problem was: What exactly does rescuing the archaeological heritage involve? The debate centred on whether funding for rescue operations should cover not only the cost of excavation, but also the cost of archaeological archiving, artefact conservation and storage, as well as writing up and publishing results. Determining a price for writing up excavation results proved to be a particularly contentious issue. As we know, this is a costly phase of post-excavation work, but it is also difficult to define exactly what this process entails and what its scope should be.

Although the system we've described worked smoothly for over a decade, during which motorway construction work reached a peak, it raised concerns and was heavily criticised from the very beginning. The stumbling block was the role which the Rescue Archaeology Centre was to play in this system. Its presence restricted the autonomy of the Motorway Construction Agency, and at the same time attested to the ineptitude of the National Heritage Protection Service. It is no wonder that both organisations tried to gain exclusive control. And, indeed, they did so gradually between 2007 and 2010.

2. WHAT CHANGED?

Firstly, it was concluded that a system in which the selection of contractors is not based on unrestricted competitive tendering invites corruption, as well as causing an excessive increase in costs and destroying the free market. The criteria that had previously been considered most important – such as having highly skilled staff and experience of excavating in a given region – were now judged by the Scientific Advisory Board of the Archeological Heritage Preservation Center, as criteria weighted to guarantee the selection of specific contractors.

To remedy the situation, the job of selecting archaeological contractors was handed over to the Agency subordinate to the Ministry of Infrastructure, while the Archeological Heritage Preservation Center was incorporated into another department of the Ministry of Culture and took on a purely advisory role in matters concerning motorway construction. Under this new system, rescue archaeology ceased to be a scientific endeavour and instead became an integral phase of construction work. This made it possible to relax the criteria for selecting archaeological contractors and introduce competitive tendering, which in Poland is based almost exclusively on price. Within a short space of time, the price of rescue excavations had dropped several folds. In addition, academic teams withdrew mostly from excavating, as they were unable to cope with the competition from small private companies. These companies were not averse to cutting costs by ‘simplifying’ excavation methods, spending less time in the field and reducing the scope of analysis and reporting. Naturally, the new Agency managing this process declared it a huge success that had brought financial savings and reduced excavation time.

3. WHAT DID THE NATIONAL HERITAGE PROTECTION SERVICE DO?

In levelling such charges there are several questions which have to be answered. Why did Heritage Protection Service inspectors not suspend excavations that were not being carried out to professional standards? Why did they sanction restrictions in the scope of specialist analyses and a reduction in the quality of site reporting? These questions are crucial to understanding the way in which the Polish system of heritage protection operates.

The answers seem simple, though the issues behind them are complex. Firstly, Heritage Protection Service employees are civil servants, which means that they will always be more concerned with overseeing procedural norms rather than professional standards. In other words, ensuring compliance with procedures is paramount. In the case of archaeological projects, we know exactly what conditions must be met to be granted an excavation permit, and what documents must be submitted for the excavation to be deemed completed. However, there is nothing to prevent someone from excavating a megalithic tomb who has

never done so before. What's more, it's not easy to prove that the methods used in excavating our example tomb were inappropriate for this type of feature.

This raises a second issue. Because the Heritage Protection Service has a limited budget, the people it employs as inspectors lack the relevant practical experience and recognised professional standing that would allow them to effectively monitor professional standards. So the safer option is to carry out compliance checks, ensuring that all of the necessary formalities have been observed, usually concerning the location and size of trenches, general site appearance and the manner in which the written, drawn and photographic record is compiled.

There is also a third issue. Imagine that as a result of a monitoring visit an inspector suspends an excavation and demands that the archaeological contractor is replaced. Although it is within the inspector's rights to do this, the consequences of such a decision would be radical. The whole process would have to start afresh: a new tender would have to be announced, new permits obtained, a new workforce recruited, and so on. This would threaten delays to development and huge losses for the construction works contractor. How many low-grade civil servants would be able to find the courage and fortitude, based on their own experience, to set such a chain of events in motion? And so the status quo prevails. In procedural terms everything is fine, and the National Heritage Protection Service does not register any complaints about the non-compliance of rescue excavations along planned motorway routes.

4. IT ALL DEPENDS ON HOW ARCHAEOLOGICAL CONTRACTORS ARE SELECTED

In purely theoretical terms, there are two methods of selecting archaeological contractors, both of which seemingly guarantee a high professional standard of services. The first relies on selecting contractors who have a long-standing reputation for high-quality work. This method narrows the competitive field, which means that services are more expensive, but do not require frequent monitoring and carry a minimal risk of failure. The second method does not impose conditions on the contractor but on the services. Anyone can be a contractor as long as they guarantee an appropriate level of service quality. This method broadens competition, which brings benefits in the form of cheaper services, but requires stringent controls and the readiness to terminate contracts.

The changes we've described in the approach to Polish motorway rescue archaeology consisted of replacing the first of these methods with the second. Unfortunately, weak control systems meant that these changes had disastrous results. This can be put even more bluntly. In a discipline such as protection of the archaeological heritage, where sites cannot be re-excavated and mistakes made during excavation cannot be amended, only the first of these methods will be successful. In this instance, the same principles apply to archaeology as to a good lunch: it's always best to choose a renowned chef.

5. WHAT DOES THE ARCHAEOLOGICAL COMMUNITY HAVE TO SAY?

The fact that the National Heritage Protection Service has no objections to the quality of rescue archaeology does not mean that this issue has been laid to rest. Academic institutions and archaeological associations in particular have long sent petitions and delegations to the government about this matter. To no avail. Government agencies responsible for carrying out rescue excavations do not acknowledge that the work done by the National Heritage Protection Service is not up to scratch. We are told that 'everything is fine' in terms of legal and procedural compliance. It is sometimes alleged that our criticism is biased, because this 'reform' has denied those in academic circles access to a lucrative source of income. Others believe that not all rescue projects can meet the highest scientific standards, because maintaining short deadlines and low costs is sometimes more important. This, in all its glory, is a prime example of what we refer to here as a lack of 'political will'.

6. WHAT IS 'POLITICAL WILL'?

In order to understand this phenomenon it is important to bear in mind that not all societies believe that something is done purely because 'it has already been prescribed by law' or 'it needs to be done'. There are also those which, even though they are subject to the same law, believe that the way and scope in which it is applied can be altered depending on needs, possibilities and even political advantages. When one of us outlined the problem we're presenting here today to a very high-ranking politician, he didn't ask: '*What is it that's not working properly?*', but '*Don't you think that archaeologists have profited enough from motorway construction?*'

In countries like Poland, which, thirty years ago, were emerging from over five decades of authoritarian rule, state financing of major projects, such as conducting rescue excavations along more than three thousand kilometres of motorways within a relatively short space of time, required governments to demonstrate 'political will' above all. Someone important had to give '*the green light*', not only for money to be spent, but also for the voices of archaeologists to be listened to regarding a system of organisation, cost calculation and settlement of accounts for this work. The way in which such a system works is naturally susceptible to the circumstances of the given time, and is under constant threat from ongoing political change. Poland's system was introduced in 1996 and eventually collapsed around 2010. However, before reaching that point it had undergone three major crises (in 2002, 2005 and 2007) precipitated by general elections and the formation of new governments. It was at moments like this that politicians were confronted with the conflicting interests of two communities which remained at loggerheads throughout the project's duration: road constructors and archaeologists.

7. ROAD CONSTRUCTORS

In the case of rescue excavations, it seems obvious that the Agency responsible for managing road construction works should also take responsibility for organising archaeological works. In practice, however, it transpired that when the road authorities had the ultimate say in selecting archaeological contractors, determining the costs of their services and settling payment for them, they ended up treating archaeological units like construction companies. They found it difficult to understand the unpredictability of archaeological discoveries and how hard it is to assess the quality of excavation work once it's been completed. Naturally, this problem could have been resolved during negotiations given a little goodwill towards archaeology.

This, however, was never forthcoming, and it's not easy to say exactly why. To some extent, the fact that archaeological operations complicate the logistics of construction work and can put completion deadlines at risk may be significant. Then again, our own observations suggest that the root of the problem lies in cultural attitudes entrenched in society. These are what lead people to question the validity of spending public money on archaeological heritage protection (as well as artistic and scientific projects), when the state budget lacks the funds to provide adequate healthcare, security and education services.

It is hardly surprising that the road construction community put pressure on successive politicians to save money by doing away with a system of contractor procurement that was not based on the '*lowest bid wins the tender*' principle, which applies in the construction industry. This required the reclassification of archaeological excavations. It was within this community, albeit with the consent of the government of the day, that the precepts of paragraph 3 of the *Malta Convention* were breached, and rescue archaeology was deemed not to be scientific research but an integral part of the road construction process, on a par with earth removal, soil compaction or surface laying. The logical consequence of this decision was that the Archeological Heritage Preservation Center and its Advisory Board, appointed by the Minister of Culture, were gradually marginalised and finally excluded from this process.

8. ARCHAEOLOGISTS

News of an impending large-scale programme of rescue excavations in Poland was welcomed by a sizeable archaeological community with limited access to finances for research projects and conservation. Added to this was an idiosyncratic division of labour, which meant that archaeologists working in universities and museums had very little practical experience of rescue archaeology. For forty years this had been the domain of a specialist institution which, after the fall of communism, had splintered into numerous private companies. These companies expected to retain their former position as the contractor of

choice for heritage services. Meanwhile, the country's largest ever rescue archaeology programme was addressed to the academic community. This was not only because of their greater scientific capacity, but also because the project was to be government-funded. It was inevitable that private firms would demand a level playing field for all operators and the application of free market principles. Attempts were made to avoid conflict by subcontracting tasks to private companies, but this proved to be inadequate. The call for a free-market approach was taken up by developers, who took advantage of existing support for the idea and introduced the changes I described earlier.

At the end of the day, everyone is responsible for the current state of crisis in rescue archaeology in Poland. Politicians, because in 30 years they have not managed to create a country built on the rule of law. Developers, because they still perceive archaeology as an adventure that archaeologists want to have at their expense. And last, though by no means least, archaeologists themselves, because they have failed to rise above group rivalries and establish a code of professional practice for protecting and safeguarding the country's archaeological heritage.

The text translated into English by Barbara Gostyńska

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REVIEWS AND SHORT REVIEW NOTES

Anna Zakościelna*

(Review) Joanna Pyzel, *Kultury pamięci, kultury zapomnienia. Osady pierwszych rolników w percepcji młodszych ugrupowań naddunajskich. Studium wybranych przypadków* (*Cultures of remembrance, cultures of forgetting. Settlements of the first farmers in the perception of later Danubian groups. Selected case studies*). Gdańsk 2018: Wydawnictwo Uniwersytetu Gdańskiego, 284 pp.

Joanna Pyzel is well known among scholars involved in studies on the Early Neolithic of Central Europe, in particular on the Linear Band Pottery culture and later Danubian cultures, as well as among those interested in the Neolithic of Anatolia and Near East – owing to her participation in the Çatalhöyük research and analyses of materials from this benchmark site. By her previous studies she has proven herself to be an expert in studies on LBK settlement (Pyzel 2006; 2010), on archaeological source material, in particular the pottery of Danubian cultures from the Polish Lowlands (Czerniak *et al.* 2016; and a number of unpublished analyses of materials retrieved during research preceding road constructions), and on the pottery manufacture in Late Neolithic Çatalhöyük communities (e.g. Czerniak and Pyzel 2017). Among the issues raising her particular interest is also the broadly understood topic of a house in Danubian communities (e.g. Pyzel 2012; 2013; Czerniak and Pyzel 2016).

In the reviewed book J. Pyzel resolved to address the issue of cultural memory in Neolithic Danubian communities. Taking the perspective of non-portable archaeological features, she examined various ways in which communities described as later Danubian cultures referred to settlement relics left by LBK people. The author is driven by a conviction that collective memory can and should be a subject of archaeological investigation, and that the time has come to go beyond an approach in which prehistoric communities are perceived mainly from the perspective of their own time period, in other words, to give them back their historicity.

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This highly interesting albeit difficult subject of the “past in the past”, i.e. collective memory, social memory, and historicity, has rarely been raised in Polish or in Central European archaeology in general. It is only the second time that it has been so extensively addressed in the Polish archaeological milieu. The first forum to discuss these issues was the international conference *Miejsca pamięci. Pradzieje, średniowiecze i współczesność* (*Places of memory – Prehistory, Middle Ages and Present Day*) (Biskupin, 4-6 July 2012), organised on the initiative of the Archaeological Museum in Biskupin, the Archaeological Commission of the Wrocław branch of the Polish Academy of Sciences, and the Institute of Archaeology and Ethnology of the Polish Academy of Sciences. The conference resulted in a collective, interdisciplinary study published in 2015 (Gediga *et al.* ed. 2015; Mamzer 2016). In the context of cultural change and understanding of archaeological culture, these issues have also been addressed in many works by Sławomir Kadrow (e.g. 2015; 2017).

The reviewed book numbers 264 pages and is comprised of the author's foreword, an introduction, three chapters, a very extensive bibliography, and lists of tables (and a list of the used abbreviations of archaeological cultures and chronological periods, provided before the introduction). The text is illustrated with 53 figures with maps showing locations of the analysed sites and schematic site plans showing the archaeofacts which have been interpreted in terms of intentional references to the past. The book is not free of deficiencies, the most notable of which is the lack of a summary in a foreign language, considerably limiting the circle of the readers. I have also noticed some technical faults, but these are minor and not significant enough to deserve more focus here.

The monograph takes a very coherent and logical arrangement, with the contents distributed proportionally among the chapters. The above assessment is not contradicted by the most copious chapter two, since it contains the source material and analytical parts of the book. The introduction provides all the necessary information concerning the objectives and subject of the research, the justification for undertaking the subject, the applied methods, and the research questions and hypotheses. They are formulated in a very concise manner here, and are developed further in chapter one and in the introductory part of chapter two. The main research hypothesis posits that remnants of LBK longhouses remained long visible on the surface and – as the author has put it – “must have been a kind of a point of reference for subsequent groups inhabiting these places” (p.12). The objective of the research has been defined as a comprehensive analysis of references to the past among Linear and post-Linear communities in three research areas: Northern Rhineland, Central Germany, and Kuyavia, and an attempt to determine whether these references constituted a socio-cultural norm or were exceptions in particular cultures. Furthermore, the author makes a statement on her methodological approach to the research (synchronic and diachronic perspectives, macro- and micro-regional analyses). The introduction also contains a justification of the selection of research areas and a brief discussion of the book's structure and the contents of particular chapters. All these issues are presented

clearly, with an awareness of various limitations concerning both the state of research and the interpretational possibilities.

In the first chapter, entitled *The past in the past*, Pyzel elaborates upon the theoretical assumptions signalled in the Introduction. Sub-chapter 1.1, *Collective memory in social sciences, humanities, and archaeology*, introduces the reader to research on memory. One can find there a critical review of definitions of memory used by different authors and methodological schools, references to classic studies from the fields of cultural anthropology, history, and sociology, and the precursors of research on historicity, memory, and processes of remembrance. Pyzel herself seems inclined to follow the definition of collective memory formulated by Barbara Szacka (2006), along with Szacka's approach to the functions that this memory serves.

In sub-chapter 1.2, *Studies on collective memory of hunter-gatherers and early farming communities*, the ethnographic (evidence for the very long duration of oral traditions among indigenous people of America and Australia) and archaeological (palimpsest sites with evidence of multiple re-visiting and overlapping occupation) data are used by the author to formulate a critical opinion on the perception of Palaeolithic communities as ahistorical people functioning in "timeless contemporaneity", attaching no importance to memory and tradition. Especially with respect to the Upper Palaeolithic, with its caves and spectacular cave art, which were surely revisited many times as sacred places having special social and ritual importance, the author has no doubt that the memory of such places must have lasted for generations. Further in this sub-chapter she discusses evidence for various 'memory practices' among early farming societies of the Near East, with particular emphasis on settlement continuity on tell sites, and a symbolic (or broader, social) role of domestic architecture and funerary rites. She points to a number of analogical behaviours observable among LBK communities, underlining the role of longhouses and graves in memory practices.

Sub-chapter 1.3, *Cognitive potential of studies on collective memory in Early Neolithic*, opens with a more extensive presentation of the main research hypothesis signalled in the Introduction, namely that remnants of LBK settlements, of longhouses in particular but also of other domestic features, remained for a very long period of time discernible on the ground surface. Related to this issue are various natural processes occurring after a settlement was left by inhabitants, with forest regeneration among the most important of them. Acknowledging objective difficulties involved in the reconstruction of these processes, the author believes that remnants of the first farmers' settlements must have been identifiable on the surface for a long (possibly very long) time, and were important elements of landscape for later communities. She presents a body of palynological data indicative of the regeneration of forests, including examples from the examined research areas, as well as archaeological examples where relics of LBK settlements were referred to not only by later Danubian groups, but also by Late Neolithic, or even Iron Age communities. The above examples are used by the author to argue for the validity of her research hypothesis.

Chapter 2, *Regional analysis of references to the past. Selected case studies*, is the longest part of the book, providing source material and analysis, divided into three substantive sub-chapters sharing the same structure and dealing with the three selected research areas: Northern Rhineland, Central Germany, and Kuyavia. The analysis of the sources is preceded by a brief introduction in which Joanna Pyzel declares her post-processual, holistic approach to space in archaeology and to the choice of places to settle. She believes that among Neolithic communities, settlement decisions were dictated by a number of factors and did not result from economically/adaptively rational reasons alone. Once again, she emphasises the special role of the house in prehistoric communities, for whom a house was not merely a place to dwell, but also played a range of social roles. One cannot but agree with this approach.

Next, Pyzel formulates the research questions which she plans to address through macro- and micro-regional analyses of non-portable sources, performed from diachronic and synchronic perspectives.

The main research questions concern the existence of practices of memory associated with settlement among later Danubian cultures, and the problem of their connection with analogical phenomena among Neolithic communities in Europe and the Near East; the continuity of settlement and continuity of ideas; the intentional nature of practices of memory; and the community (group/groups) who practiced various forms of references to the past connected with LBK. This last issue deals with the diversity of cultural behaviours, and the possible existence of different forms of collective memory in the same taxonomic unit.

The author's choice of the research areas deserves acclamation. In all three areas we are dealing with a sequence of Danubian cultures starting from the arrival of the first farmers. The state of archaeological investigation is similar in all three areas, in terms of both surface surveys (used in macro-regional analyses) and excavations, especially large-scale open-area rescue excavations preceding infrastructure projects (used in micro-regional analyses within test areas). Joanna Pyzel emphasises the particular importance of results obtained through rescue archaeology for her research, as the choice of sites to be explored by rescue excavations is not adjusted to solve any particular research problem, limiting a bias in the collection of sources.

As mentioned, each sub-chapter has the same, uniform structure. The author first presents the characteristics of the analysed region (here, the introductory remarks concerning particular areas should be deemed overly expanded and saturated with data having little relevance to the subject of the book, i.e. historical and political, concerning financial aspects of research, etc.), assesses the state of research and publication, and presents developmental sequences of Danubian cultures with a critical review of hypotheses concerning the first occupation by LBK communities and the development of particular cultural formations and cultural change between them (crises and settlement gaps, continuity), which is of great importance for her studies on references to the past. Next, the author presents published examples of such references within a culture and between cultures, followed by an

in-depth, multi-aspectual analysis of the gathered sources from macro- and micro-regional perspectives. Each chapter closes with the recapitulation of both these levels of analysis.

In Northern Rhineland the Danubian sequence opened with LBK settlers. Later, there was a chronological and cultural hiatus, after which Middle Neolithic communities of the Grossgartach culture appeared, followed by those representing the Rössen culture. At the macro-regional level the author observes a strong similarity in settlement preferences among all Danubian groups, although settlement traces of different cultures rarely co-occur on the same site; this picture, identified on the basis of survey data, finds confirmation in the results of excavations as well. The micro-regional analysis performed for a smaller test area also confirms that later settlers avoided places previously inhabited by the first farmers, with only occasional instances of intentional references to the past.

In Central Germany, where the earliest LBK occupation is followed by the Stroked Pottery culture and later the Rössen culture, Joanna Pyzel also observes quite similar settlement preferences, with much more frequent overlapping of different cultures within the same site. She identifies examples of intentional references to features linked with the first farmers both among Stroked Pottery and Rössen communities, as well as such where Rössen communities referred to the remnants left by Stroked Pottery people. As emphasised by the author, these references were diversified and not a common rule.

Pyzel devotes by far the most space to Kuyavia, a region which has been the primary target of her research since the beginning of her professional career. She notices a cultural crisis towards the end of the development of large LBK settlements (which she had already identified in her monograph published in 2010), after which follows dispersed occupation of the Stroked Pottery culture. The next period of stabilisation came with the network of large, long-lasting settlements created by the communities of the Brześć Kujawski culture. The macro-regional analysis has demonstrated frequent – but not common – settling of the same places by LBK and later Danubian communities. However, micro-regional analyses have shown that none of the large, long-lasting settlements founded by the first farmers came to be later intensively exploited by later communities, and the Brześć Kujawski communities even avoided such places entirely. Intentional references to the past are observable starting from the closing stages of the Late Band Pottery culture (LBPC) and become particularly intensive in the times of the Brześć Kujawski culture. This does not necessarily reflect a change in cultural behaviours, but may instead stem from the small size of the LBPC population and the unstable settlement pattern. The author observes various forms memory practices, which focused particularly around the house and domestic area, and identifies different types of relations: between house and house, grave and house, and among ritual deposits and pits into which they were dug (often claypits accompanying houses).

The chapter in question attests to Pyzel's research acumen and analytical discipline, which are confirmed by the arrangement and consequent realisation of this part of the study. She presents and discusses arguments for and against the intentional references to the past, emerging from the analysed situations. There are no grounds to suggest that

Pyzel aims to prove her research hypothesis by disregarding, or by failing to mention, shortages of source bases or negative examples.

In chapter 3, *References to the past in later Danubian cultures*, the author summarises her studies on practices of memory among Danubian communities in the three regions, gathering together the conclusions emerging from the partial analyses carried out in chapter 2. She compares the observed references, sets them against the situation in Central Europe in the times of LBK and the Neolithic of the Near East, and discusses the issue in the context of socio-cultural changes occurring in the Eneolithic period. She highlights the most convincing examples of positive and negative references to the past from the sites analysed in the second chapter. The general conclusion is quite obvious, and it comes down to stating a great diversity of behaviours legible in the archaeological record: from the avoidance of places inhabited by LBK populations, interpreted by Pyzel as an intentional settlement strategy (Northern Rhineland, Kuyavia during the development of the Brześć Kujawski culture with respect to large LBK settlements), to re-settling old settlements, and sometimes their transformation into places of ritual activity (Central Germany, Kuyavia starting from the times of the Stroked Pottery culture). She notices the intensification of practices of memory with time, both among Rössen and Brześć Kujawski communities, which were chronologically quite distant from the first farmers. The latter culture provided particularly abundant positive references to the past, with respect to their own features as well as to those linked with LBPC and the relics of the earliest Linear occupation. In this connection, Pyzel reflects on the nature of these references: to what extent could they represent a continuation of a real memory, and to what extent could it be what is known as “invented memory”. Single cases connected with the Brześć Kujawski culture she tends to interpret as a continuation of memory about LBK transmitted via LBPC communities. In consequence, she arrives at a conclusion that Brześć Kujawski communities may have adopted the past associated with LBK as their own, which would be manifested by the persistence of monumental domestic architecture, archaic by that time. In her opinion, a special role should be ascribed precisely to the idea of a longhouse, which in itself was a reference to the past. She interprets it in terms of a continuation of Neolithic traditions originating from the Near East and later transformed by Linear cultures in Europe. Pyzel presents interesting and convincing reflections on the role that memory (practiced in various manners) of the real or imagined past may have played among Brześć Kujawski communities functioning on the far margins of the Danubian world, on the importance of memory for building their sense of identity and rooting in a tradition, and for legitimisation of power among those hierarchised communities.

The reader receives a very interesting study, demonstrating the author's vast knowledge in terms of both theory and source material, and written with immense discipline which, as I hope, will provoke a wider discussion on the potential and methods of archaeological investigation of the interesting and at the same time complex issues such as cultural memory, social memory, and historicity of prehistoric communities.

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(Review) M. Szmyt (ed.), *Mrowino, stanowisko 3. Późny neolit nad środkową Wartą* (*Mrowino, site 3. Late Neolithic on the middle Warta*). Bibliotheca Fontes Archaeologici Posnanienses 22. Poznań 2018: Muzeum Archeologiczne w Poznaniu. 568 pp. + CD

Research into the Neolithic of Central Europe has been hampered by the insufficient publication of large series of sources, sometimes those of the highest importance. This is also the case regarding studies on the Neolithic of Greater Poland. The reviewed book presents materials from Mrowino site 3, one of the most important Funnel Beaker culture (further as FBC) sites in the region, previously presented only in short papers by the author of the excavations (recapitulatory publications: e.g. Tetzlaff 1981; 1989). The book was created under the editorship of Marzena Szmyt, an experienced researcher of the Lowland Neolithic. This multi-author publication is a result of the cooperation among archaeologists and specialists from a number of other fields. The book is comprised of the foreword, 17 chapters, a summary in English, and an appendix on the attached CD-ROM (containing detailed information concerning the analysed materials). Going far beyond a basic study of archaeological material, the book also presents results of specialist analyses and discusses the Mrowino materials against the Middle Neolithic of Greater Poland (Chapter 17 by Marzena Szmyt).

Chapter 1 (by Wanda Tetzlaff and Marzena Szmyt) presents the history of research at Mrowino. The works carried out at the site for many years were possible thanks to the funds from the Provincial Heritage Protection Office. The analysed materials come primarily from excavations conducted by Wanda Tetzlaff in 1973-1980, which encompassed an area of 12 ares and resulted in the discovery of more than 170 features, mainly associated with FBC occupation. They also produced a rich collection of artefacts (mostly pottery), allowing for performing detailed analyses.

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In Chapter 2, Iwona Hildebrandt-Radke discusses the Neolithic occupation at Mrowino from an environmental perspective. She presents the site against geomorphological characteristics, geology, hydrography, soils, and potential natural vegetation in the area, demonstrating that the site occupied an environmentally favourable location.

In Chapter 3, Mateusz Stróżyk, Marzena Szmyt, and Danuta Żurkiewicz discuss the stratigraphy of the site and characterise the non-portable archaeological features. The recorded profiles prove the site lies in a sandy area with developed podzols, typical of low-land areas. The majority of features discovered at Mrowino were settlement pits (137), apart from which also postholes, a grave (linked – with no certainty – with the Globular Amphora Culture), concentrations of daub and pottery, a ditch, and remnants of houses were identified. The chapter also includes standard tabular lists and drawings of features. The latter are basically good quality filed drawings. The lack of graphic interpretation of field drawings is generally a controversial approach, although in this particular case the draughtsman (or draughtsmen?) maintained quite uniform standards and the boundaries of layers and features are quite legible and raise no doubts. The authors characterise particular feature categories in detail, with most attention given to pits, which were the most numerous group. They also address stratigraphic relationships among the pits, which best illustrate the multi-phase nature of the analysed materials.

The interpretation of architectural relics discovered in the Mrowino settlement is an important issue (Chapter 4: Aleksandr Diachenko, Mateusz Stróżyk, Marzena Szmyt, Danuta Żurkiewicz). A detailed analysis of impressions preserved in daub offered the authors an opportunity to revise the development reconstructions presented in preliminary field reports. The inspiration for this study came from studies on Trypillia culture buildings (the participation of A. Diachenko in the project). It has been found out that there were four buildings connected with the older occupational phase within the explored area; construction details and manners of wall finishing are also discussed. Furthermore, the authors argue that the high degree of burning of some daub lumps is indicative of intentional burning down of the settlement. The obtained results are undoubtedly an original contribution to studies into issues regarding the settlement and economy of the Lowland Neolithic.

Chapter 5 discusses the basic category of portable sources, namely ceramic vessels (Marzena Szmyt, Danuta Żurkiewicz). The size of the ceramic assemblage guarantees its important position in source material and chronometric studies. The pottery is described according to a system developed for Kuyavia (original model: Koško 1981), and the descriptions are supplemented with complete illustrations (92 figures presenting distinctive elements, and photographs and comparative drawings of distinguished vessel types). The authors' experience with Kuyavian materials allowed the analysed finds to be placed within the Late Beaker pottery tradition, with technological parameters, temper types in particular, as a decisive factor. Following algorithms used in other studies, the analysis of pottery style distinguishes four components: two of endogenic nature (Wiórek and Luboń) and two of exogenic nature (Baden and western). It is a pity that the authors have not taken

this opportunity to discuss in more detail the cultural-chronological aspects of this complication. Pointing at the core nature of the Wiórek component one perhaps should mention its immanent presence in the younger Luboń component (the alternative would be the relationships between the parallelly developing centres of Wiórek and Luboń). Another problem concerns the possibility to distinguish in the lowlands the Luboń component free of the Baden component, which would also have implications for chronometric reconstructions. Discussion of these issues goes beyond the problems of the Mrowino site itself. Nevertheless, the analysed materials offer a good (if not ideal) starting point for undertaking this discussion (or to be more precise, for continuing it, since the problem of parallel paths of cultural transformations has often been addressed in studies devoted to lowland materials, in particular those from Kuyavia).

In the next two chapters (6 and 7) Marzena Szmyt discusses ceramic objects other than vessels (including spindle-whorls, weights, miniature axes, and ceramic figurines) and ceramic vessels assigned to other cultural units (which constitute a marginal admixture in the analysed assemblage). The part of the book devoted to pottery closes with Chapter 8 by Anna Rauba-Bukowska, where results of petrographic and mineralogical analyses of pottery are presented on the basis of microscopic examination of 40 samples. The analyses have shown no marked differences in preparation of ceramic masses, and a distinct variability in raw materials.

The copious Chapter 9 (with extensive catalogue) deals with flint artefacts (Jacek Kabański, Małgorzata Winiarska-Kabacińska). The assemblage, totalling 836 artefacts, has high cognitive value due to the homogeneity of the materials (setting aside the phases of FBC occupation at Mrowino), with only very small admixtures indicative of Late Palaeolithic and Mesolithic occupation. The technological, typological, and traseological analyses have allowed the authors to attempt functional division of the FBC settlement into four areas, two of which were connected with the presence of dwellings. The set of Neolithic artefacts has been interpreted as typical for Late Neolithic household assemblages in Greater Poland.

In Chapter 10, Jakub Niebieszczanski characterises the patterns of exploitation of non-silicate lithic raw materials. The analysed assemblage was relatively small (85 pieces). The author confirms exploitation of various rocks, and identifies distinct functional preferences. Of particular note are preferences observed with respect to the manufacture of stone battle-axes – with only a small section of the spectrum of erratic raw materials available in the lowland areas used.

Proceeding from microscopical examination of 12 pottery fragments, in Chapter 11 Andrzej Sikorski addresses issues related to textile impressions. The analysis produced data concerning pottery making and production of plaited and woven objects. Among others, impressions left by plaited baskets and fabrics used at the stage of forming and decorating ceramic vessels have been identified. The results point towards significant potential of studying impressions on pottery and suggest such studies should be implemented on other Neolithic sites.

Two metal artefacts are discussed in Chapter 12 by Aldona Garbacz-Klempka. One of them – a finger ring made from tin bronze – was made using a sophisticated technology, which indicates its much later provenance than the close of the 4th millennium BC.

Since the analysis of animal bone remains from Mrowino carried out in the past (Schramm 1987) does not meet today's standards, it became necessary to repeat it (Chapter 13: Daniel Makowiecki, Marzena Makowiecka, and Marzena Szmyt). Remains of domesticated mammals, including cattle, prevail in the analysed assemblage, although the proportion of wild animals is relatively high (8.5%). The authors suggest that the presence of bones exposed to high temperatures can be linked with a fire in the settlement (cf. Chapter 4).

In Chapter 14, Joanna Rennwanz discusses the exploitation of plants by the inhabitants of the Neolithic settlement at Mrowino. With no soil samples available, she based her analyses on the examination of selected potsherds and lumps of daub. The impressions had been analysed before by Melania Klichowska (1972). Rennwanz's analysis has allowed for identification of a relatively long list (526 items) of remains of cultivated plants, weeds, and trees. The presence of emmer and einkorn wheats and barley has been confirmed (interestingly, barley prevailed). On the other hand, the presence of millet, previously suggested in the context of Mrowino, has been ruled out. Among tree species, Scots pine played the fundamental role as a building material and fuel. Impressions of branches with leaves of willow and hornbeam indicate their use for construction of wattle-and-daub walls of houses. The particular importance of the discovery of hornbeam impressions is emphasised – at that time (second half of the 4th millennium BC) this species was entering low-land landscapes.

Chapter 15 is devoted to the sphere of ritual behaviours. It is based on ascribing certain objects a particular role in ceremonial activities (a drum, selected ceramic vessels, clay balls known as "loaf-of-bread idols", miniature ceramic axes, figurines). These artefacts were spread throughout the entire explored part of the settlement, hence no areas of special, ceremonial function have been identified.

15 AMS dates were obtained for archaeological features from Mrowino (Chapter 16: Tomasz Goslar, Marzena Szmyt, and Danuta Żurkiewicz). This has allowed for constructing chronological models for occupational phases. In the past, one conventional C¹⁴ date was obtained at the Groningen laboratory (Tetzlaff 1989). Rejecting two distinctly older dates obtained from charcoal samples, the potential lifespan of the site has been estimated at 471 years (with 68.2% probability). However, this is the maximum, and at the same time little likely, range. Therefore, the authors carried out four model estimations using different sequences. Nevertheless, even with the ranges considerably narrowed in model 4, the lifespan of the buildings – estimated at 102 years (68.2%) – seems quite long. A model assuming the shortest possible lifespan of the buildings has not been presented (phases MRO-A1). It is worth noting that determining precise lifespans of occupational phases in an objective manner is very difficult in this case, due to insufficient precision of the method.

What is important is setting the age of Luboń materials on the scale of cultural transformations in the lowland zone, with a strong indication at the second half of the 4th millennium BC. However, the authors have not presented a comparative background: dates from other sites and a related discussion on the chronometry of Lowland Neolithic.

The book closes with the recapitulatory Chapter 17, by Marzena Szmyt. The chapter sums up the results of analyses discussed in previous chapters, presents the context of FBC occupation, and proposes a division of the Mrowino materials into occupational phases. From the perspective of understanding the nature and dynamics of settlement processes, the lack of graphic interpretation of traces of FBC occupation at the two major stages distinguished is a significant drawback. Such a graphic reconstruction would legitimise the divisions proposed in the book. The recapitulation focuses on multi-aspectual presentation of settlement and economic issues, leaving out a discussion on chronology and genesis of late Funnel Beaker culture in Greater Poland.

The high quality of the book, its substantial content, and the appeal of the presented materials, confirm the great importance of the National Heritage Board of Poland's programme, which provides funding for publication of sources originating from field research carried out many years ago. Thus, the Editor's declaration that the publication of the Mrowino materials marks the beginning of a series of publications devoted to Neolithic materials from Greater Poland in the collection of the Archaeological Museum in Poznań, bodes well for the coming years.

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CHRONICLE

Hanna Kowalewska-Marszałek*

PROFESSOR BOGDAN BALCER (1936-2018)

The first days of January 2019 brought the sad news of the death of Professor Bogdan Balcer – archaeologist, researcher of the Neolithic, specialist in prehistoric flint industries, mountaineering enthusiast (Fig. 1), and passionate cyclist... The best cyclist among archaeologists and the best archaeologist among cyclists (Fig. 2). A man of many passions, among which archaeology and sport always featured prominently.

We bade him farewell this year on 17 January, a sad and grey winter day. We did so first at a funeral Mass in St. Augustine's church in the Muranów district of Warsaw, when we were all deeply impressed by Professor Machnik with his loud cry of "Bodziu!", and later on at the cemetery in Ursus near Warsaw, where Bogdan Balcer was laid to rest alongside his parents. Those joining his wife Róża, his son Maciej, and his closest family in bidding him farewell included a large number of colleagues, friends, collaborators, and followers. Among those who gave eulogies were Professor Jerzy Maik, the Head of the Institute of Archaeology and Ethnology of the Polish Academy of Sciences, Professor Romuald Schild, the former Head of the Institute of Archaeology and Ethnology of the Polish Academy of Sciences, Professor Ryszard Grygiel, the Head of the Museum of Archaeology and Ethnography in Łódź, and Dr Janusz Budziszewski.

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Bogdan Balcer was connected with Warsaw throughout his life. He was born there (16 December 1936), graduated from the prestigious Stefan Batory Lyceum in 1953, and later received a degree in archaeology from the University of Warsaw. His links with Warsaw

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Fig. 1. Mountains, the Tatras in particular, were one of Bogdan Balcer's early passions. On the Orla Perć trail in the early 1960s. Photo from M. Balcer's private collection

continued throughout his professional career: first (1957-1972) in the State Archaeological Museum, and later (1972-2006) in the Institute of Material Culture History (now the Institute of Archaeology and Ethnology) of the Polish Academy of Sciences. However, Warsaw was also a place of childhood trauma for him: while living with his parents on Ogrodowa street, he endured the first few days of the Warsaw Uprising and survived the Wola massacre (beginning of August 1944), before being forced out of the city after the uprising was crushed. He recalled this time in the memoirs which he published towards the end of his life (Balcer 2015, 24).

After the war, the family took up residence in Ursus near Warsaw, and this was precisely where Bogdan's great adventure with sport began: in 1950, merely 14 years old, he embarked on his first cycling trip to Kraków (Balcer 2015, 337), and two years later started regular training, ultimately becoming a professional cyclist. In their recently published book *Sportowe dzieje Ursusa* (*Sport history of Ursus*), Robert Gawkowski and Jacek Wiśniewski acknowledged Bogdan Balcer as "one of the best cyclists in Ursus in the mid-1950s" (Gawkowski, Wiśniewski 2017, 84-90). Owing to his many successes in cycling, but also because he was tall of stature, Bogdan earned himself the nickname of the "giraffe from Ursus" (Balcer 2015, 351).

The archaeological studies he undertook in 1953, and particularly the participation in excavations which they entailed, began to interfere with his professional sporting career at a certain point. Over time, new interests emerged: mountain trips, underwater archaeological research, travels... Nevertheless, what remained unchanged was the “fighting spirit” and the “finish” which Bogdan referred to many times – the desire and ability to fight until the very end, the persistence in pursuing goals.

An archaeological site that became a particular and important place for Bogdan Balcer was Biskupin, which he first visited as early as 1954, to participate in a student training camp. It was there that he was given the nickname “Bodzio the cyclist”, since he had cycled from Warsaw to Biskupin by bike. He was also attached to Biskupin for personal reasons: as he recalled, at Biskupin “a few couples began their road to marriage, including me and my Róża” (Balcer 2015, 93). The research at Biskupin (site 4) was also the subject of his early publications (Balcer 1963; for a full list Bogdana Balcer’s publications see: *Archeologia Polski*, vol. 64, in print).

Krzemionki Opatowskie came to be another “place on Earth” hugely important for Bogdan Balcer. He not only participated in the excavations (led by doc. dr hab. Jan Kowalczyk



Fig. 2. Bogdan Balcer – the best archaeologist among cyclists – in an “echelon” formation during road races. Sękocin near Warsaw, 1982. Photo from M. Balcer’s private collection

in 1969-1970), but also in kind of an archaeological experiment, namely the realisation of a movie entitled *Prastary skarb/Ancient treasure* in which Bogdan impersonated the flintknapping Master's assistant. He later described these experiences, among many others, in *Z otchłani wieków* (Balcer 1969a) and in *Wiadomości Archeologiczne* (Balcer 1969b).

Bogdan Balcer was connected with research on Neolithic flintknapping for almost his entire professional life. These studies, which he undertook on the initiative of docent Jan Kowalczyk, were continued and developed further under the direction of Professor Stefan Krukowski. Most of his publications were devoted to flintknapping, including his outstanding doctoral dissertation on the role of the Świeciechów-type of flint which he defended in 1973 and which was published two years later (Balcer 1975). As emphasised by Professor Romuald Schild "Bogdan did not invent the Świeciechów flint, nor – as is widely known – did he discover its outcrops, but he was the first to understand its paramount importance in Polish prehistory. He was also the first to launch excavations in the flint mine at Świeciechów itself [...]" (Schild 2002, 7).

Among Bogdan Balcer's most prominent publications one should also mention *Ćmielów – Krzemionki – Świeciechów. Związki osady neolitycznej z kopalniami krzemienia*, Sum.: *Ćmielów – Krzemionki – Świeciechów. Relations between the Neolithic settlement and flint mines* (Balcer 2002). As Professor Stanisław Tabaczyński wrote "This is [...] a unique study, which is based on an immense collection of flint artefacts and which addresses the issues of raw material acquisition and processing, the exploitation of flint tools within the site, and the export of surpluses, analysing them in a full cultural and socio-economic context" (Tabaczyński 2006, 11). The study was met with great interest in archaeological circles, and in 2003 was rewarded with the Erazm Majewski Prize in the field of archaeology.

What Bogdan Balcer himself valued the most were source publications, which constitute a significant part of his work. He also ascribed considerable importance to the excavations he conducted at the sites of Zawichost-Podgórze, Dist. Sandomierz (1962-1964) and Świeciechów-Lasek, Dist. Kraśnik (1967), the results of which were promptly and thoroughly published. This is why the book he published with Jan Machnik and Jan Sitek, *Z pradziejów Roztocza na ziemi zamojskiej*, Sum.: *Prehistory of Roztocze and Zamość Region* (Balcer et al. 2002), was particularly important for him.

Perhaps to counterbalance the previous dominance of flintknapping, Bogdan Balcer focused his attention in the last period of his research activity on issues pertaining to prehistoric building. He addressed them in one of his last books: *Budownictwo mieszkalne i gospodarcze w neolicie ziem Polski*, Sum.: *Dwellings and utility constructions in the Neolithic of Poland*, (Balcer 2012) – an important and much needed publication summing up the current state of research in this respect. He also worked on preparing his memoirs – mentioned here more than once – for publication, which eventually happened in 2015 (Balcer 2015) thanks to the support from the Konrad Jażdżewski Foundation for Archaeological Research. This publication fully revealed his narrative ability and accuracy of style,

which had already manifested themselves before in the many papers he had written for the *Z otchłani wieków* journal, among others. These papers were distinguished by a serious – but free of pathos – approach and professional integrity. They also demonstrated his talent for the popularisation of science, which can be discerned in even his earliest papers, like those on prehistoric fishing published in *Wiadomości Wędkarskie* (Balcer 1960; 1961).

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Bogdan Balcer crossed the finish line on 30 December 2018. But he will continue to live in memory of many of us as a direct and modest man, one who was open and warm-hearted. A good and kind colleague, a man with passion and passions.

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